

Project Manual For:

Sanford High School and Technical Center
Sanford, Maine

Bid Documents

VOLUME 1 (Section 00 01 03 through Division 14)

Project 12-067-00

11 February 2016



LAVALLEE | BRENSINGER ARCHITECTS

Boston | Manchester | Portland

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SECTION 00 01 03
PROJECT DIRECTORY

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COMMISSIONING AGENT (OWNER CONSULTANT):

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**SECTION 1-A
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LONG FORM**

For public school projects the facilities of the Maine Construction Bid Depository shall be used, and all subcontract proposals must be filed in accordance with the General Conditions and regulations as prepared by the Maine Construction Bid Depository, a copy of which is included in these specifications. Additional copies may be obtained from the Designer or the office of the Associated Constructors of Maine, Inc., Whitten Road, P.O. Box 5519, Augusta, Maine 04330

1. At the time of the opening of proposals, each bidder will be presumed to have inspected the site and to have read and be thoroughly familiar with the plans and contract documents, including all addenda. The failure or omission of any bidder to receive or examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect to his proposal. The Owner reserves the right to accept or reject any or all proposals as may best serve the interest of the Owner. Any proposal filed by a Sub-Contractor on any incomplete form may be considered informal and not a valid proposal.

2. (a) Sub-Contractors for trades, as listed in the General Contractor's proposal form (2B-1) and the notice to Contractors form (2-A), are required to deliver (or mail at their own risk) their proposals to the Maine Construction Bid Depository, Whitten Road, P.O. Box N, Augusta, Maine 04330 and, to be considered valid, must be received in the bid depository on or before

3:00 PM (Eastern Time)

(Time)

March 16, 2016

(Date)

in accordance with these instructions to bidders, on the form provided by the Designer.

(b) Subcontract proposals, filed with the bid depository, must be accompanied by a satisfactory bid bond, in conformity with the form of bond contained in section 2-D1, made out to the Owner, for 5% of the SUBPROPOSAL amount and filed separately in the WHITE envelope.

(c) After opening, any filed subcontract proposal not in conformity with these instructions or not in conformity with the requirement of the plans and specifications shall be declared invalid and the filed subcontract proposal of the next acceptable filed Sub-Contractor will be substituted. If there is a cost increase between the two proposals then the contract price will be increased by the difference times 1.05 for purposes of covering items such as overhead and bond costs of the general contractor. Such substitutions will be made prior to the selection of the General Contractor.

(d) At the closing time for filing subcontract proposals if the only filed subcontract proposals for any individual trade or trades, are filed by a General Contractor, it shall be

assumed that such subcontract proposal is restricted to said General Contractor and it will not be furnished to other General Contractors. In such an event, the Bureau of General Services shall establish a lump sum allowance for such trade or trades and include it in the letter to General Contractors announcing the names of the Sub-Contractors filing subcontract Proposals. This lump sum allowance shall be included in the proposal of all General Contractors.

(e) In the event a filed subcontract proposal is requested but none received, the Bureau shall establish a lump sum allowance for that trade and include it in the letter to the General Contractors announcing the names of the Sub-Contractors filing subcontract proposals. This allowance shall be included in the proposal of all General Contractors in lieu of a filed subcontract proposal.

(f) After opening the filed subcontract proposals, if all are found to be invalid for any particular trade or trades, the amounts used by General Contractors for any particular trade or trades in preparing their proposals shall be deducted from the total of the proposal of each General Contractor and the contract shall be awarded to the lowest responsible General Contractor after said deductions are made.

(g) Telegraphic subcontract proposals will not be considered, but modifications by telegram of subcontract proposal already filed will be considered if received prior to the hour set for receipt of subcontract proposals. If the telegram discloses the amount of the subcontract proposal submitted the subcontract proposal would be declared invalid.

3. (a) Any SUBPROPOSAL received from a General Contractor who does not have the qualified personnel or experience for that particular trade shall be considered informal and not a valid SUBPROPOSAL.

(b) At the expiration of the time stated for the filing of sub-proposals, the Maine Construction Bid Depository will mail to the General Contractors, who have taken plans and specifications, the names of Sub-Contractors who have filed their sub-proposals with the bid depository in accordance with the provisions of these instructions to bidders. If any General Contractor has not received a copy of this list of sub-bidders, within a reasonable time following the time set for their delivery, he should contact the Maine Construction Bid Depository for confirmation of the list of sub-bidders who have filed, prior to the completion of his own proposal.

(c) General Contractors will be furnished by the Designer two (2) copies of the proposal form for General Contractor. One (1) copy shall be filled out and signed and sent to the Owner in a *printed envelope furnished by the Designer* to arrive on or before the time specified in the "Notice to Building Contractors" Section 2-A.

(d) Each proposal by a general contractor shall be submitted on a form provided, and the list of specified subcontractors with their respective subproposals shall be complete. Any proposal submitted by a general contractor with an incomplete list of filed subcontractors shall not be considered a valid

proposal. Any proposal by a general contractor with the name or names of filed subcontractor(s), who have filed not in accordance with these instructions to bidders, shall follow Article 2(c) of these conditions.

(e) Any proposal, submitted by a General Contractor, with a sub-proposal amount for a Sub-Contractor's work different from the sub-proposal amount filed by that Sub-Contractor, shall have the sub-proposal amount filed substituted for the sub-proposal amount carried by the General Contractor, after which the proposal of the General Contractor shall be adjusted by the difference, prior to the selection of the low General Contractor.

(f) Telegraphic proposal from the General Contractors will not be considered, but modifications by telegram of proposals already submitted will be considered, if received prior to the hour set for receipt of proposals. If the telegram discloses the amount of the proposal submitted, the proposal will be declared invalid.

4. The Owner reserves the right to reject any Sub-Contractor not qualified or whose proposal is invalid under these instructions to bidders, and will, before the selection of General Contractor, substitute another Sub-Contractor who is qualified and has properly filed.

5. Subject to the Owner's right, reserved herein, to accept or reject any or all proposals, the General Contractor will be selected on the basis of the sum of the lowest acceptable proposal plus such of the alternates as the Owner desires to use, it being understood that the Sub-Contractors listed in the said proposal shall be acceptable to the Owner.

6. After the selection of the General Contractor, the proposal of all Sub-Contractors will be considered by the Owner, Bureau of General Services, the Designer, and the General Contractor. Any agreement to substitute the names of Sub-Contractors other than those named in the General Contractor's proposal shall cause an adjustment of the contract amount in accordance with the Owner's copy of the subcontract proposals filed with the bid depository. If the said Sub-Contractor or Sub-Contractors so substituted fail to execute a subcontract, in accordance with their filed sub-proposal, with the selected General Contractor within five days of receipt of a subcontract from the General Contractor and before a contract between the Owner and the General Contractor shall select from the list of Sub-Contractors, who filed copies of their proposals, with the bid depository, a new Sub-Contractor or Sub-Contractors, and the contract amount shall be revised in accordance with the subcontract proposals so filed.

7. The Owner is exempt from the payment of Federal Excise Tax on articles not for resale and the Federal Transportation Tax on all shipments. The Contractor shall quote less these taxes.

8. Maine State Sales and Use Tax should not be included in your quotation as the Owner is exempt from the payment of such taxes. All Contractors and Sub-Contractors should refer to State of Maine, Bureau of Taxation - "Sales and Use Tax Division" for latest bulletin covering Sales and Use Tax Regulations.

9. No General or Subcontract proposal may be withdrawn during a period of thirty (30) calendar days immediately following the opening of the General contract proposals. Alternate proposals shall remain valid for a period of sixty (60) calendar days immediately following the opening of the General contract proposals.

10. No contract may be assigned, sublet or transferred without the written consent of the Owner.

11. (a) All foreign corporations intending to do business in the State of Maine must comply with the provisions of Title 13-A M.R.S.A., Chapter 12. Any foreign corporation receiving notice of award of contract shall contact the Secretary of State for the purpose of complying with this statute.

(b) All individuals not residents of the State of Maine are subject to the provisions of Title 14, M.R.S.A., Section 704-A.

(c) It may be necessary for the General Contractor to submit to the Owner documentary evidence that the provisions have been complied with.

12. (a) The selected General Contractor will be required to furnish a 100% performance bond and a 100% payment bond to cover the execution of his contract in conformity with the form of bonds shown in sections 2-C2 and 2-C3.

(b) The selected Contractors, required to file their sub-proposals with the bid depository, are also required to furnish the selected General Contractor with a 100% performance bond and a 100% payment bond for their portion of the work, in conformity with the form of bonds shown in sections 2-D2 and 2-D3.

13. General Contractors and Sub-Contractors may be required to furnish a statement of their business experience, record of accomplishments, and financial responsibility at the discretion of the Owner.

14. (a) The date of completion is stated in the proposal form section 2-B-1 and in the contract form section 2-E. If the Contractor finds it impossible to complete the work on or before the said date of completion, he may make a written request to the Owner for an extension of time setting forth therein the reasons for the request. If the Owner finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor he may extend the date of completion in such amount as, in his judgment, the conditions warrant. The said new date of completion shall then be in full force and affect the same as though it were the original date of completion.

(b) Time is an essential element of the contract and it is important that the work be pressed vigorously to completion. The cost to the Owner of administration of the Contract, inspection and supervision will be increased as the time occupied in the work is lengthened.

15. (a) The proposal shall be based on the materials, methods, equipment and products as specified.

(b) Any materials, methods, equipment and products not herein specified but deemed worthy of consideration by any General Contractor or Sub-Contractor, may be introduced by a separate letter attached to his proposal. He shall state the cost comparison with the specified methods, equipment and products and the reason for the suggested substitution.

(c) It shall be understood by the General Contractor or Sub-Contractor that the attached letter describing the proposed change will not be used in determining the low General or Sub-Contract proposal submitted unless the General or Sub-Contractor shall have submitted their list of proposed changes to the Designer 10 days prior to the date set for the receipt of their respective proposals, the Designer shall have issued an addendum related to the change(s) proposed, and the Contractor shall have received written approval by the Designer.

16. Employment Practices

(a) Listing of job vacancies; [Executive Order No. 5, dated December 6, 1971](#), requires that "the Contractor, or any Sub-Contractor holding a contract directly under the Contractor, shall, to the maximum feasible, list all its suitable employment openings with the Maine Employment Security Commission."

(b) "This provision shall not apply to employment openings which the Contractor proposed to fill from its own organization."

(c) Two copies of a "Quarterly Report of New Hires" shall be prepared by the 7th of January, April, July and October for the calendar quarter to which data pertains and sent to the local office of the Maine Employment Security Commission.

(d) A copy of the reporting form is attached to these Instructions to Bidders. These may be obtained from the nearest [office of M.E.S.C.](#) serving the area.

17. Code of Fair Practices; [Executive Order No. 11, dated July 1, 1972](#), requires that every State contract for public works contain the following provisions: "During the performance of this contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religious creed, sex, national origin, ancestry or age. Such action shall include, but not be limited to the following: employment upgrading, demotions, transfers, recruitment or recruitment advertising; layoffs or terminations; rates of pay or other forms of compensation; and selection of training including apprenticeship.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor; state that all qualified applicants will receive consideration for employment without regard to race, color, religious creed, sex, national origin, ancestry or age.

(c) The Contractor will send to each labor union or representative of the workers with which he has a collective or bargaining agreement, or other contract or understanding, whereby he is furnished with labor for the performance of his contract, a notice, to be provided by the contracting department or agency, advising the said labor union or workers' representative of the Contractor's commitment under this section and shall post copies of the notice in conspicuous places available to employees and to applicants for employment."

(d) The Contractor will cause the foregoing provisions to be inserted in all contracts for any work covered by this agreement so that such provisions will be binding upon each Sub-Contractor.

18. OSHA - Safety Regulations. This project is subject to compliance with all requirements of the Occupational Safety and Health Administration, Volume 36, No. 105 of the Federal Register, U.S. Department of Labor published Saturday, May 29, 1971 as amended.

19. Any proposal that contains an escalation clause will be invalid.

20. Any and all Designer interpretations and/or clarifications of bidding documents must be in the form of written addenda issued from the Designer office to all bidders who are on record at the Designer office not later than 72 hours prior to scheduled receipt of bids. (No verbal interpretations and/or clarifications shall be allowed as a substitute for written addenda.)

21. Questions by the bidder concerning alternate work descriptions/content/completeness and bidding process must be clarified with the Designer to assure the proper bidding and execution of all work intended under the alternate. This clarification must be in the form of a written addendum as described in item 20 above.

22. Preparation of filed sub-bid proposal.

(a) Filed sub-bidders are responsible for filing a complete proposal in the form of Maine Construction Bid Depository Form. [\(BGS/72/B2.\)](#)

(b) Quotation must include cost of work specified in all addenda issued from the Designer office 72 hours prior to the scheduled time of receipt of proposal.

(c) Any sub-bid proposal which fails to indicate the cost of the work specified in any alternate (work relating to bidders trade area) may be declared informal if Owner elects to include the alternate in the General contract.

(d) Acknowledge all addenda legally issued. (Failure to acknowledge addenda may be cause to have sub-bid declared informal.)

(e) Sub-Contractor may include license number, as applicable.

(f) Include corporate/partnership information as required.

- (g) Proposal must be signed in ink.
 - (h) Proposal must be supported by a properly signed and executed bid bond.
23. Preparation of General Contract Bid Proposal.
- (a) General contract bidders are responsible for the completeness of their bid proposal on form issued with bidding document.
 - (b) Proposal must show cost of work specified including work specified; in any and all legally issued addenda.
 - (c) Any General contract proposal which fails to include the cost of work specified in an alternate may be declared informal if the Owner elects to include said alternate in the General contract.
 - (d) Proposal is to acknowledge all addenda that may have been legally issued.
(Failure to acknowledge may be cause to have bid declared informal.)
 - (e) Indicate time for completion of the work, if required.
 - (f) Include corporate/partnership information as required.
 - (g) Proposal must be signed in ink.
 - (h) Proposal must be accompanied by required certified or cashier's check or a duly signed and executed bid bond.

END OF SECTION

**LONG FORM
SECTION 1-B
MAINE CONSTRUCTION BID DEPOSITORY
GENERAL CONDITIONS AND REGULATIONS**

NAME AND LOCATION

The Depository shall be known as MAINE CONSTRUCTION BID DEPOSITORY and shall be located at the office of the Associated General Contractors of Maine, Inc., Whitten Road, P.O. Box 5519, Augusta, Maine 04432-0551. Tel. 622-4741.

DEFINITION AND PURPOSE

The Bid Depository is a system designed to maintain a high standard of bidding practices in the construction industry. It provides for the reception of sealed bids from subcontractors whereby the sanctity of bidding is protected and adequate time is provided for the general contractor to compile bids completely and accurately. These procedures are in the best interest of owners, architects, engineers, contractors and subcontractors.

Whenever the word "Designer" is used throughout this text, it shall be understood to mean "engineer of architect." Additionally, whenever the word "subcontractor" is used throughout this text, it shall be understood to mean "materials supplier" where applicable.

ELIGIBILITY

Any general contractor, subcontractor, designer or owner may use the facilities of the bid depository, regardless of membership in any association or geographic location, provided the conditions and regulations established by the depository are followed.

SCOPE

The bid depository shall accept and transmit bids for those trades named in the project manual.

MANAGEMENT

The depository will be operated and managed by the Associated General Contractors of Maine, Inc. in accordance with these general conditions and regulations.

DEPOSITORY FEE

The fee for each use of the depository shall be two hundred fifty dollars (\$250.00), payable by the designer to the Maine Construction Bid Depository.

ADVISORY COMMITTEE

A Bid Depository Advisory Committee shall be maintained to provide project owners and awarding authorities with advice and counsel relative to matters concerning the administration of the bid depository filed bid system.

The Committee shall consist of two (2) architects, two (2) engineers, two (2) subcontractors and two (2) general contractors, all to be selected by the AGC Building Specifications Committee, after consultation with MAIA, CEM, ASAM and ABC. Two (2) at-large members shall be selected by the committee once formed. The chairman shall be chosen by the committee members, but the chairmanship shall alternate bi- annually between a general contractor and a subcontractor.

Meetings of the advisory committee shall be called, as necessary, by the chairman or by a quorum of the committee membership. A quorum shall consist of any three members of the committee.

RECOMMENDED CLOSING TIME FOR BIDS

All subcontractors' bids are to be received by the depository not later than 3:00 P.M. and not less than six (6) calendar days prior to the closing of the general contractor bid as prescribed by the designer in the bid call and in the instructions to bidders. Bids received after prescribed closing time shall be stamped and returned unopened by the depository.

Recommended closing dates for the bid depository are Tuesday, Wednesday and Thursday, except when such date follows a statutory holiday.

PROCEDURE FOR SUBMITTING BIDS

All bids should be placed in official envelopes and on official forms obtained from the bid depository or designer. Three types of official envelopes should be used:

LARGE WHITE envelopes will contain the following small envelopes:

- (a) PINK envelope is for the general contractor and will contain a complete formal bid.
- (b) GREEN envelope is for the depository and will contain a copy of the bid, listing those general contractors intentionally omitted, if any.
- (c) The BID BOND, if required, should be enclosed in a large white envelope, separate from the pink and green envelopes.

Each filed sub-bid shall include only those sections or combined sections which are required by the designer, including all addenda issued from the designer's office 72 hours prior to sub-bid closing time. Sub-bids in any other form will be rejected by the owner.

PROCEDURE TO BE FOLLOWED BY DESIGNER

Designers shall insert in their specifications: "Sealed bids of subcontractors shall be filed in official envelopes and on official forms and deposited with the bid depository at the AGC office, Whitten Road, Box N, Augusta, Maine, no later than 3:00 P.M. (date). No bids will be accepted by the depository after that time. The sections of work that must be filed with the depository are:

Sub-Bid Package A:

04 20 00	Unit Masonry	All Paragraphs
-----------------	---------------------	-----------------------

Sub-Bid Package B:

05 40 00	Cold-Formed Metal Framing	All Paragraphs
09 21 16	Gypsum Board Assemblies	All Paragraphs
09 24 00	Portland Cement Plastering	All Paragraphs

Sub-Bid Package C:

Division 21	Fire Protection	All Sections
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Sub-Bid Package D:

Division 22	Plumbing	All Sections**
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(Sub-Bid Package D to Exclude sections 22 11 13 Facility Water Distribution Piping, 22 13 00 Sewers, Drains and Site Piping, and 22 13 01 Check Valves, which shall be part of Sub-Bid Package F)**

Division 23 Mechanical All Sections

Sub-Bid Package E:

Division 26 Electrical All Sections

Division 27 Communications All Sections

Sub-Bid Package F:

12 93 00 Site Furnishings All Paragraphs

Division 31 Earthwork All Sections -

(Section 31 51 00 Rammed Aggregate Pier Foundation Systems shall be excluded from the Sub-Bid package and included within the General Contractor Bid)

Division 32 Exterior Improvements All Sections

Division 33 Utilities All Sections

02 41 16 Structure Demolition

22 11 13 Facility Water Distribution Piping

22 13 00 Sewers, Drains and Site Piping

22 13 01 Check Valves

Designers shall clear the closing date with the depository.

Addenda affecting sub-trades filed with the depository shall be issued from the designer's office to all firms holding full or partial sets of plans, no later than 72 hours prior to sub-bid closing time.

PROCEDURE TO BE FOLLOWED BY SUBCONTRACTORS

On or before the time specified by the designer in the instructions to bidders, subcontractors shall deliver their sealed bids to the depository as follows:

A WHITE ENVELOPE SHALL CONTAIN:

- (a) Individual sealed PINK envelopes containing a bid proposal to each general contractor concerned, on official forms.
- (b) A GREEN envelope for the depository which will contain a copy of the bid, listing those general contractors intentionally omitted, if any.
- (c) A BID BOND, if required should be enclosed separately from the pink and green envelopes.

When requested, receipt shall be given for each WHITE envelope when deposited. Subcontractors may mail their sealed bids to the depository, but they do so at their own risk.

Subcontractors are responsible for reading the general conditions and the specifications thoroughly and must submit their bid in accordance with the bid document. The responsibility for checking with the designer on the existence of addenda and the content of same, rests solely with the subcontractor. Failure of the subcontractor to acknowledge addenda may result in the disqualification of his bid.

When a subcontractor has missed bidding to a general contractor, and if that subcontractor wishes to bid to that general contractor:

1. The subcontractor shall, not later than 24 hours prior to the closing date for the general contractor, notify the bid depository, in writing, as follows: "We missed bidding to (Black Construction) on ABC High School.) Please consider our bid addressed to (White Construction) as if it were submitted to Black Construction)
2. The subcontractor shall, after notifying the bid depository, advise (Black Construction.)

Any general contractor wishing to use it own forces for filed sub-bid work, shall follow general contractor procedures listed later in these regulations.

PROCEDURES TO BE FOLLOWED BY THE BID DEPOSITORY

Each depository box shall clearly designate the project, and the date and time of closing as stated by the designer in the bid documents. When large WHITE envelopes are presented for deposit prior to closing, they shall be stamped by a time clock showing the day, hour and minutes received and placed in the depository box. A receipt noting the number of the envelope will be handed to the firm representative when requested.

Late bids will be stamped and returned unopened by the depository.

Immediately after the closing time, the depository box shall be opened by an official representative of the depository and the WHITE envelopes removed and opened in the presence of any interested party.

The PINK envelopes will be picked up by the general contractor or a duly authorized representative. The depository may require the general contractor or representative to sign for envelopes when received. The depository may mail envelopes to the general contractor at his request, and his own risk and expense.

The GREEN envelopes shall be forwarded by the depository to the designer unless otherwise directed.

If bid bonds are required, they shall be forwarded by the depository with the GREEN envelopes.

AMENDMENTS TO BIDS

Written amendments to subcontractor bids which have been properly filed may be submitted to the bid depository provided that such amendments are received prior to the sub-bid closing time, and provided further that if the amendment discloses the amount of the subcontract price submitted, the proposal will be declared VOID.

WITHDRAWAL OF BID

Verified requests from subcontractors for withdrawal of bids will be accepted up to the time of sub-bid closing. Following the time of sub-bid closing, no such request will be considered until after the opening of the general contract bids.

PROCEDURES FOR GENERAL CONTRACTORS

A general contractor intending to use his own forces or a subsidiary company for one or more complete trade sections, shall deposit his bid in accordance with the regulations of the bid depository even if he bids only to himself. Such bid shall include a statement of the general contractor's qualifications to perform the work.

The general contractor should notify the bid depository of his intentions to bid a particular job. He should also advise subcontractors that he is bidding in order to assure that he receives a price for each filed trade.

The general contractor, when submitting his bid, will name his subcontractors, with a separate price carried for each trade, which must correspond with the copy received by the depository.

Any proposal submitted by a general contractor with a proposal for subcontractor's work which contains a price different from the proposal filed by that subcontractor, shall have the proposal amount filed substituted for the proposal amount carried and the proposal of the general contractor shall be adjusted by the difference prior to the selection of the general contractor.

INFORMATION FOR THE DESIGNER

For the convenience of the designer, the bid depository will provide, on request, information concerning scheduled bid closing to avoid conflicts at peak closing periods.

COMPLAINTS

Formal complaints relative to the administration of the filed bid system must be submitted, in writing, to the project owner or awarding authority, with a copy of the complaint submitted to the project designer. Upon receipt of the complaint, the owner or awarding authority may, before responding to the complaint, seek advice and counsel from the Bid Depository Advisory Committee, by contacting the committee through the AGC office at 622-4741.

END OF SECTION

SECTION 2-A

NOTICE TO BUILDING CONTRACTORS
(PUBLIC SCHOOL PROJECTS)
LONG FORM
(Advertisement)

Sealed proposals in envelopes plainly marked, Proposal For:

Sanford High School and Technical Center, Sanford, Maine 04073
Project: 12-067-00, Dated: 11 February 2016, Issuance: Bid Documents

Brief Job Description:

Construction of a new 368,000 sf plus two story regional high school and technical center including site and infrastructure developments. New building will be a Construction Type IB/II (222) (Non-Combustible) structure and include full fit out. Site development will include but not be limited to utility infrastructure, road access and associated parking, athletic fields & grounds including bleacher seating in addition to other amenities.

Addressed to: **Sanford School Department**
917 Main Street Suite 200
Sanford, Maine 04073

will be opened and read aloud at **Sanford City Hall Chambers** on **March 23, 2016**. Bids received after **2:00 PM (Eastern Time)** will not be considered and will be returned unopened.

General contract proposals must be accompanied by a certified or cashier's check for 5% of the proposal or a satisfactory bid bond (2-C1) in a similar amount. The owner reserves the right to waive all formalities, and reject any and all proposals or to accept any proposal. Proposals shall be submitted upon the form provided by the architect.

The selected general contractor will be required to furnish a 100% contract performance bond and a 100% contract payment bond to cover the execution of the work which shall be in conformity with the form of bonds contained in section 2-C of the specifications and for the contract amount.

Subcontractors submitting proposals to General Contractors for work listed on general contractor's proposal form (2B-1) and the notice to contractors form (2-A), are required to send or deliver a copy of their proposals to the Maine Construction Bid Depository, 188 Whitten Road, PO Box 5519, Augusta, Maine 04332, and to be considered valid, must be received in the bid depository on or before

3:00 PM (Eastern Time) on March 16, 2016

in accordance with the Instructions to Bidders, Section 1-A, and the General Conditions and Regulations of the Maine Construction Bid Depository, on the form provided by the architect. No bids will be accepted by the Bid Depository after that time.

Subcontract proposals filed with the bid depository must be accompanied by a satisfactory bid bond, in conformity with the form of bond contained in Section 2-D1, made out to the Owner, for 5% of the sub-proposal amount, and filed separately in the WHITE envelope.

The selected subcontractors, required to file their sub-proposals with the bid depository, will also be required to furnish the selected general contractor with a 100% performance bond and a 100% payment bond, for their portion of the work, in conformity with the form of bonds contained in section 2-D2 and 2-D3.

Subcontractors required to file their sub-proposals and bid bonds with the bid depository are as follows: **See Section 1-B Maine Construction Bid Depository General Conditions and Regulations for a complete list of sections of work that must be filed as sub-bid proposals by subcontractors with the depository.**

Official forms and envelopes for sub-proposals may be obtained from either the architect, or the office of the Maine Construction Bid Depository, 188 Whitten Road, PO Box 5519, Augusta, Maine 04332.

PRE-BID CONFERENCE

A pre-bid conference will be conducted for this project. The pre-bid conference is mandatory for General Contractors and optional for Subcontractors and suppliers. Contractors who arrive late or leave the meeting early may be prohibited from participating in this meeting and bidding. Pre-bid conference will be held at the **Sanford City Hall Chambers on February 25, 2016, at 1PM (Eastern Time)**

The Prequalified General Contractors for the Project are:

Cianbro Corporation
Consigli Construction
CTA Construction
Eckman Construction
Harvey Construction
Hutter Construction
JCN Construction
PC Construction

1. Bidding Documents may be purchased from:

Construction Summary of Maine
Cross Insurance Building
2331 Congress Street
Portland, Maine 04101
Ph (207)990-1156
Fax (603)627-4524

McGraw Hill Construction/Dodge Plan Room
Spiller's Reprographics
224 Gorham Road
Scarborough, Maine 04074
Ph (207)883-4856

Signature Press and Blueprinting
45 Londonderry Turnpike
Hooksett, New Hampshire 03106
Ph (603)624-4025

2. Bidding Documents may be examined at:

Sanford School Department

917 Main Street Suite 200
Sanford, Maine 04073

Associated General Contractors of Maine

188 Whitten Road
PO Box 5519
Augusta, Maine 04332
Ph (207)622-4741
Fax (207)622-1625

3. Electronic PDF format files of Bidding Documents may be requested from or downloaded at:

Lavallee Brensinger Architects Inc.

155 Dow Street Suite 400
Manchester, New Hampshire 03101
Ph (603)622-5450

Bureau of General Services (BGS) State of Maine website:

http://www.maine.gov/bgs/constrpublic/contractors/gc_rfp.htm

END OF SECTION

SECTION 2-B-1

PROPOSAL FORM FOR GENERAL CONTRACTORS
(PUBLIC SCHOOL PROJECTS)

BIDDER: _____

TO: **Sanford School Department**
917 Main Street Suite 200
Sanford, Maine 04073

A. Having carefully examined the form of contract, general conditions, special provisions and plans and specifications dated **11 February 2016** Prepared by: **Lavallee Brensinger Architects** For **Sanford High School and Technical Center, Sanford, Maine 04073 Project: 12-067-00, Dated: 11 February 2016, Issuance: Bid Documents** as well as the premises and conditions affecting the work, we the undersigned propose to furnish all labor, equipment, and materials necessary for and reasonably incidental to the construction and completion of this proposal for the amount of:

_____ Dollars
\$ _____

The above amount includes the allowances listed in Specification Section 01 21 00 – Allowances.

B. Alternate bids are included on this project. Refer to Section 01 23 00 – Alternates. Any dollar amount line below that is left blank by the Bidder shall be taken as a bid of \$0.00. Alternate Bid prices are as follows:

<u>Alternate No.</u>	<u>Title of Alternate</u>	<u>Dollar Amount</u>
1	<i>Roof Protection Board</i>	ADD / DEDUCT \$ _____ (Circle One)
2	<i>Concrete Brick at Rear Elevations</i>	ADD / DEDUCT \$ _____ (Circle One)
3	<i>Concrete Brick at Front Elevations</i>	ADD / DEDUCT \$ _____ (Circle One)
4	<i>Resilient Floor Tile and Ceramic Floor Tile</i>	ADD / DEDUCT \$ _____ (Circle One)
5	<i>Porcelain Tile at Main Spine Area</i>	ADD / DEDUCT \$ _____ (Circle One)

Sub-Bid Package D	_____	\$ _____
Sub-Bid Package E	_____	\$ _____
Sub-Bid Package F	_____	\$ _____

The undersigned agrees that each of the above named subcontractors represents a bona fide SUBPROPOSAL based on the plans and specifications and will be used for the work indicated at the amount stated, unless a substitution is made by mutual agreement as provided for in section 1, paragraph 6, "Instructions to Bidders". In the event alternate prices are requested and various trades are involved, the general contractor may use properly filed subproposals even though a change in subcontractors from those carried in his base proposal may occur. If he does use different subcontractors because of alternates, he shall use supplemental sheets attached to the proposal form (2-B1) to indicate such changes.

E. The undersigned agrees, if this proposal is accepted, to sign a contract and deliver it, along with the bonds and affidavits of all insurance specified within twelve (12) calendar days after the date of notification of such acceptance, except if the 12th day falls on a holiday, a Saturday or Sunday, then the conditions will be fulfilled if the required documents are received before 12 o'clock noon on the day following the holiday, or the Monday following the Saturday or Sunday, and as a guarantee thereof, herewith submits a certified or cashier's check or bid bond as required.

The undersigned agrees, if awarded the contract, to complete the work on or before **August 1, 2018.**

This proposal includes the cost of a 100% performance bond and a 100% payment bond.

Signed _____
By _____
Address _____

NOTE: If bidder is a corporation, write State of incorporation, and if a partnership, give full names of all partners.

END OF SECTION

2-B2
 MAINE CONSTRUCTION BID DEPOSITORY
 (PUBLIC SCHOOL PROJECTS)
 PROPOSAL FORM FOR SUBCONTRACTORS
 LONG FORM

To: _____

For green envelope copy, list any general contractor(s) excluded from your bid.

**PROJECT: Sanford High School and Technical Center, Sanford, Maine 04073, Project: 12-067-00,
 Dated: 11 February 2016, Issuance: Bid Documents**

SECTION(S) QUOTED: _____

PRICE QUOTED: SECTION _____ \$ _____ SECTION _____ \$ _____

TOTAL COMBINED PRICE (if applicable) SECTIONS _____ \$ _____

A. The undersigned propose to furnish all labor and materials required for completing in accordance with the hereinafter described plans, specifications general conditions and addenda, all the work specified in the above stated section(s) of the specifications and contract drawings dated **11 February 2016**.

Prepared by **Lavallee Brensinger Architects**.

B. Alternate bids are included on this project. Refer to Section 01 23 00 – Alternates. Any dollar amount line below that is left blank by the Bidder shall be taken as a bid of \$0.00. Alternate Bid prices are as follows: (Use separate sheets as necessary)

<u>Alternate No.</u>	<u>Title of Alternate</u>	<u>Dollar Amount</u>
1	<i>Roof Protection Board</i>	ADD / DEDUCT \$ _____ (Circle One)
2	<i>Concrete Brick at Rear Elevations</i>	ADD / DEDUCT \$ _____ (Circle One)
3	<i>Concrete Brick at Front Elevations</i>	ADD / DEDUCT \$ _____ (Circle One)
4	<i>Resilient Floor Tile and Ceramic Floor Tile</i>	ADD / DEDUCT \$ _____ (Circle One)
5	<i>Porcelain Tile at Main Spine Area</i>	ADD / DEDUCT \$ _____ (Circle One)
6	<i>Field Storage Building</i>	ADD / DEDUCT \$ _____ (Circle One)
7	<i>Additional Fencing at Track</i>	ADD / DEDUCT \$ _____ (Circle One)
8	<i>Organic Infill at Turf</i>	ADD / DEDUCT \$ _____ (Circle One)

SECTION 2-C1
SHORT FORM
FORM OF GENERAL CONTRACT BID BOND
(Public School Projects)

KNOW ALL MEN BY THESE PRESENTS, THAT WE, THE UNDERSIGNED (1) _____
_____, (2) _____
OF _____ AND STATE OF _____
AS PRINCIPAL AND (3) _____
AS SURETY, ARE HEREBY HELD AND FIRMLY BOUND UNTO (4) _____
_____ IN THE PENAL SUM OF _____
FOR THE PAYMENT OF WHICH, WELL AND TRULY TO BE MADE, WE HEREBY JOINTLY
AND SEVERALLY BIND OURSELVES, OUR HEIRS, EXECUTORS, ADMINISTRATORS,
SUCCESSORS AND ASSIGNS, SIGNED THIS (5) _____ DAY OF _____ 20_____.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT WHEREAS THE
PRINCIPAL HAS SUBMITTED TO (6) OWNER _____
_____ A CERTAIN PROPOSAL, ATTACHED HERETO AND HEREBY MADE A PART HEREOF, TO
ENTER INTO A CONTRACT IN WRITING, FOR THE CONSTRUCTION OF (7) **SANFORD HIGH
SCHOOL AND TECHNICAL CENTER, SANFORD, MAINE**

NOW THEREFORE:

(A) IF SAID PROPOSAL SHALL BE REJECTED, OR, IN THE ALTERNATE,
(B) IF SAID PROPOSAL SHALL BE ACCEPTED AND THE PRINCIPAL SHALL
EXECUTE AND DELIVER A CONTRACT IN THE FORM OF CONTRACT ATTACHED
HERETO (PROPERLY COMPLETED IN ACCORDANCE WITH SAID PROPOSAL) AND SHALL
FURNISH A BOND FOR HIS FAITHFUL PERFORMANCE OF SAID CONTRACT, AND FOR
THE PAYMENT OF ALL PERSONS PERFORMING LABOR OR FURNISHING MATERIAL IN
CONNECTION THEREWITH, AND SHALL IN ALL OTHER RESPECTS PERFORM THE
AGREEMENT CREATED BY THE ACCEPTANCE OF SAID PROPOSAL, THEN THIS
OBLIGATION SHALL BE VOID, OTHERWISE THE SAME SHALL REMAIN IN FORCE AND
EFFECT: IT BEING EXPRESSLY UNDERSTOOD AND AGREED THAT THE

LIABILITY OF THE SURETY FOR ANY AND ALL CLAIMS HEREUNDER SHALL, IN NO
EVENT, EXCEED THE PENAL AMOUNT OF THIS OBLIGATION AS HEREIN STATED.

THE SURETY, FOR VALUE RECEIVED HEREBY STIPULATES AND AGREES THAT
THE OBLIGATION OF SAID SURETY AND ITS BOND SHALL BE IN NO WAY IMPAIRED OR
AFFECTED BY ANY EXTENSION OF TIME WITHIN WHICH THE PRINCIPAL MAY ACCEPT
SUCH PROPOSAL: AND SAID SURETY DOES HEREBY WAIVE NOTICE OF ANY SUCH
EXTENSION.

IN WITNESS WHEREOF, THE PRINCIPAL AND THE SURETY HAVE HEREUNTO SET
THEIR HANDS AND SEALS, AND SUCH OF THEM AS ARE CORPORATIONS HAVE
CAUSED THEIR CORPORATE SEALS TO BE HERETO AFFIXED AND THESE PRESENTS TO
BE SIGNED BY THEIR PROPER OFFICES, THE DAY AND YEAR FIRST SET ABOVE.

SIGNED AND SEALED THIS (5) _____ DAY OF _____, 20__.

WITNESS: _____ CONTRACTOR: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

_____ By _____ (L.S.)

WITNESS: _____ SURETY: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

APPROVED AS TO FORM _____, 20__.

BY _____

(Owner's Attorney)

Legend

- (1) Correct name of contractor.
- (2) A corporation, a partnership, or an individual, as the case may be.
- (3) Correct name of surety.
- (4) Treasurer of the municipality or school administrative district, as the case may be.
- (5) Same date as that of proposal.
- (6) Owner shall be the municipality or school administrative district, as the case may be.
- (7) Name of project as designated in the contract documents.

If contractor is a partnership, all partners should execute bond. A power of attorney document, together with a statement that it still is in full force and effect shall be provided by the person executing this bond.

END OF SECTION

**SECTION 2-C2
LONG FORM
FORM OF GENERAL CONTRACT PERFORMANCE BOND
(Public School Projects)**

KNOW ALL MEN BY THESE PRESENTS THAT (1) _____
_____(2) _____
OF _____ AND STATE OF _____
AS PRINCIPAL, AND (3) _____
A CORPORATION DULY ORGANIZED UNDER THE LAWS OF THE STATE OF _____
AND HAVING A USUAL PLACE OF BUSINESS IN _____ AS
SURETY, ARE HELD AND FIRMLY BOUND UNTO THE (4) _____
AS OBLIGEE, IN THE PENAL SUM OF _____ DOLLARS
(\$ _____), TO BE PAID SAID _____
OR HIS SUCCESSORS IN OFFICE, FOR WHICH PAYMENT WELL AND TRULY TO BE MADE,
PRINCIPAL AND SURETY BIND THEMSELVES, THEIR HEIRS, EXECUTORS AND
ADMINISTRATORS, SUCCESSORS AND ASSIGNS, JOINTLY AND SEVERALLY BY THESE
PRESENTS.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT IF THE PRINCIPAL SHALL
PROMPTLY AND FAITHFULLY PERFORM THE CONTRACT ENTERED INTO ON THE
(5) _____ DAY OF _____ A.D. 20 ____ FOR THE
CONSTRUCTION OF (6) **SANFORD HIGH SCHOOL AND TECHNICAL CENTER, SANFORD,
MAINE**

THEN THIS OBLIGATION SHALL BE NULL AND VOID: OTHERWISE IT SHALL REMAIN IN
FULL FORCE AND EFFECT.

THE SURETY HEREBY WAIVES NOTICE OF ANY ALTERATION OR EXTENSION OF
TIME MADE BY THE (7) OWNER.

SIGNED AND SEALED THIS (5) _____ DAY OF _____ 20_____

WITNESSES: _____ CONTRACTOR _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

_____ By _____ (L.S.)

WITNESSES: _____ SURETY: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

APPROVED AS TO FORM _____, 20_____.

BY _____
(Owner's Attorney)

Legend

- (1) Correct name of contractor.
- (2) A corporation, a partnership, or an individual, as the case may be.
- (3) Correct name of surety.
- (4) Treasurer of the State of Maine.
- (5) Same date as that of contract.
- (6) Name of project as designated in contract documents.
- (7) Owner shall be the State of Maine.

If contractor is a partnership, all partners should execute bond. A power of attorney document, together with a statement that it still is in full force and effect shall be provided by the person executing this bond.

END OF SECTION

SECTION 2-C3
SHORT FORM
FORM OF GENERAL CONTRACT PAYMENT BOND
(Public School Projects)

KNOW ALL MEN BY THESE PRESENTS THAT (1) _____

_____ (2) _____
OF _____ AND STATE OF _____
AS PRINCIPAL AND (3) _____
A CORPORATION DULY ORGANIZED UNDER THE LAWS OF THE STATE OF _____
AND HAVING A USUAL PLACE OF BUSINESS IN _____ AS SURETY ARE HELD
AND FIRMLY BOUND UNTO THE (4) _____ IN THE SUM OF
_____ DOLLARS, (\$ _____) FOR THE USE
AND BENEFITS OF CLAIMANTS* AS HEREIN BELOW DEFINED, THE PAYMENT
WHEREOF PRINCIPAL AND SURETY BIND THEMSELVES, THEIR HEIRS, EXECUTORS AN
ADMINISTRATORS, SUCCESSORS AND ASSIGNS, JOINTLY AND SEVERALLY BY THESE
PRESENTS. THE CONDITION OF THIS OBLIGATION IS SUCH THAT IF THE PRINCIPAL
SHALL PROMPTLY SATISFY ALL CLAIMS AND DEMANDS INCURRED FOR ALL LABOR
AND MATERIAL, USED OR REQUIRED BY HIM IN CONNECTION WITH THE WORK
CONTEMPLATED IN THE CONTRACT ENTERED INTO ON THE (5) _____ DAY
OF _____ A.D. 20____ FOR THE CONSTRUCTION OF (6) **SANFORD HIGH SCHOOL
AND TECHNICAL CENTER, SANFORD, MAINE**, AND SHALL FULLY REIMBURSE THE
OBLIGEE FOR ALL OUTLAY AND EXPENSE WHICH SAID OBLIGEE MAY INCUR IN
MAKING GOOD ANY DEFAULT OF SAID PRINCIPAL, THEN THIS OBLIGATION BE NULL
AND VOID: OTHERWISE, IT SHALL REMAIN IN FULL FORCE AND EFFECT.

* A claimant is defined as one having a direct contract with the principal or with a subcontractor of the principal for labor, material, or both, used or reasonably required for use in the performance of the contract.

SIGNED AND SEALED THIS (5) _____ DAY OF _____ 20 _____

WITNESSES: _____ CONTRACTOR: _____

_____ BY _____ (L.S.)

_____ BY _____ (L.S.)

_____ BY _____ (L.S.)

WITNESSES: _____ SURETY _____ (L.S.)

_____ BY _____ (L.S.)

_____ BY _____ (L.S.)

APPROVED AS TO FORM _____, 20 _____.

BY _____
(Owner's Attorney)

Legend

- (1) Correct name of contractor.
- (2) A corporation, a partnership, or an individual, as the case may be.
- (3) Correct name of surety.
- (4) Treasurer of the municipality or school administrative district, as the case may be.
- (5) Same date as that of contract.
- (6) Name of project as designated in the contract documents.

If the contractor is partnership, all partners should execute bond. A power of attorney document, together with a statement that it still is in full force and effect shall be provided by the person executing this bond.

END OF SECTION

**SECTION 2-D1
FORM OF SUBCONTRACTORS BID BOND
(Public School Projects)
LONG FORM**

KNOW ALL MEN BY THESE PRESENTS, THAT WE, THE UNDERSIGNED,
(1) _____
_____ AND STATE OF _____
AS PRINCIPAL, AND (3) _____ AS
SURETY, ARE HEREBY HELD AND FIRMLY BOUND UNTO (4) _____
_____ AS OBLIGEE, IN THE PENAL SUM OF _____
FOR PAYMENT OF WHICH, WELL AND TRULY TO BE MADE, WE HEREBY JOINTLY AND
SEVERALLY BIND OURSELVES, OUR HEIRS, EXECUTORS, ADMINISTRATORS,
SUCCESSORS, AND ASSIGNS, SIGNED THIS (5) _____ DAY OF _____ 20____.
THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT WHEREAS THE
PRINCIPAL HAS SUBMITTED TO THE OBLIGEE A CERTAIN SUBPROPOSAL, ATTACHED
HERETO AND HEREBY MADE A PART HEREOF, TO ENTER INTO A SUBCONTRACT IN
WRITING, FOR THE CONSTRUCTION OF (6) **SANFORD HIGH SCHOOL AND TECHNICAL
CENTER, SANFORD, MAINE**
WITH ANY GENERAL CONTRACTOR LISTED IN SAID PROPOSAL, PROVIDED THE
DESIGNATED GENERAL CONTRACTOR HAS ENTERED INTO A WRITTEN CONTRACT
WITH THE OWNER.
NOW THEREFORE:
(a) IF SAID SUBPROPOSAL SHALL BE REJECTED, OR IN THE ALTERNATE,
(b) IF SAID SUBPROPOSAL SHALL BE ACCEPTED AND THE PRINCIPAL SHALL
EXECUTE AND DELIVER A SUBCONTRACT TO THE GENERAL
CONTRACTOR DESIGNATED BY THE OWNER IN THE FORM OF
SUBCONTRACT ATTACHED HERETO (PROPERLY COMPLETED IN
ACCORDANCE WITH SAID SUBPROPOSAL) AND SHALL FURNISH BONDS

FOR HIS FAITHFUL PERFORMANCE OF SAID SUBCONTRACT, AND FOR THE PAYMENT OF ALL PERSONS PERFORMING LABOR OR FURNISHING MATERIAL IN CONNECTION THEREWITH, AND SHALL IN ALL OTHER RESPECTS PERFORM THE AGREEMENT CREATED BY THE ACCEPTANCE OF SAID SUBPROPOSAL,
THEN THIS OBLIGATION SHALL BE VOID, OTHERWISE THE SAME SHALL REMAIN IN FULL FORCE AND EFFECT: IT BEING EXPRESSLY UNDERSTOOD AND AGREED THAT THE LIABILITY OF THE SURETY FOR ANY AND ALL CLAIMS HEREUNDER SHALL IN NO EVENT, EXCEED THE PENAL AMOUNT OF THIS OBLIGATION AS HEREIN STATED. THE SURETY, FOR VALUE RECEIVED, HEREBY STIPULATES AND AGREES THAT THE OBLIGATION OF SAID SURETY AND ITS BOND SHALL IN NO WAY BE IMPAIRED OR AFFECTED BY ANY EXTENSION OF THE TIME WITHIN WHICH THE PRINCIPAL MAY ACCEPT SUCH PROPOSAL AND SAID SURETY DOES HEREBY WAIVE NOTICE OF ANY SUCH EXTENSION. IN WITNESS WHEREOF, THE PRINCIPAL AND THE SURETY HAVE HEREUNTO SET THEIR HANDS AND SEALS, AND SUCH OF THEM AS ARE CORPORATIONS HAVE CAUSED THEIR CORPORATE SEALS TO BE HEREUNTO AFFIXED AND THESE PRESENTS TO BE SIGNED BY THEIR PROPER OFFICERS, THE DAY AND YEAR FIRST SET ABOVE.

SIGNED AND SEALED THIS (5) _____ DAY OF _____ 20____.

WITNESS: _____ SUBCONTRACTOR: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

_____ By _____ (L.S.)

WITNESS: _____ SURETY: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

APPROVED AS TO FORM _____

By _____
(Owner's Attorney)

Legend

- (1) Correct name of subcontractor.
- (2) A corporation, a partnership, or an individual, as the case may be.
- (3) Correct name of surety.
- (4) Treasurer of the municipality or school administrative district, as the case may be.
- (5) Same date as that of SUBPROPOSAL.
- (6) Name of project as designated in contract documents.

If subcontractor is partnership, all partners should execute bond. A power of attorney document, together with a statement that it still is in full force and effect shall be provided by the person executing this bond.

END OF SECTION

SECTION 2-D2
LONG FORM
FORM OF SUBCONTRACT PERFORMANCE BOND
(Public School Projects)

KNOW ALL MEN BY THESE PRESENTS THAT (1) _____
_____, (2) _____
OF _____ AND STATE OF _____ AS
PRINCIPAL, AND (3) _____
A CORPORATION DULY ORGANIZED UNDER THE LAWS OF THE STATE OF _____
AND HAVING A USUAL PLACE OF BUSINESS IN _____ AS
SURETY, ARE HELD AND FIRMLY BOUND UNTO THE (4) _____ AS
OBLIGEE, TO BE PAID SAID (4) _____
OR HIS ASSIGNS, FOR WHICH PAYMENT WELL AND TRULY TO BE MADE, PRINCIPAL
AND SURETY BIND THEMSELVES, THEIR HEIRS, EXECUTORS AN ADMINISTRATORS,
SUCCESSORS AND ASSIGNS, JOINTLY AND SEVERALLY BY THESE PRESENTS.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT IF THE PRINCIPAL SHALL
PROMPTLY AND FAITHFULLY PERFORM THE SUBCONTRACT ENTERED INTO ON THE
(5) _____ DAY OF _____ A.D. 20 _____
FOR THE CONSTRUCTION OF (6) **SANFORD HIGH SCHOOL AND TECHNICAL CENTER,**
SANFORD, MAINE

THEN THIS OBLIGATION SHALL BE NULL AND VOID: OTHERWISE, IT SHALL REMAIN
IN FULL FORCE AND EFFECT.

THE SURETY HEREBY WAIVES NOTICES OF ANY ALTERATION OR EXTENSION OF
TIME MADE BY THE OWNER AND GENERAL CONTRACTOR.

SIGNED AND SEALED THIS (5) _____ DAY OF _____ 20____.

WITNESS: _____ SUBCONTRACTORS: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

_____ By _____ (L.S.)

WITNESS: _____ SURETY: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

APPROVED AS TO FORM _____, 20____.

BY _____
(Owner's Attorney)

Legend

- (1) Correct name of subcontractor.
- (2) A corporation, a partnership, or an individual, as the case may be.
- (3) Correct name of surety.
- (4) General contractor.
- (5) Same date as that of subcontract.
- (6) Name of project as designated in contract documents.

If subcontractor is a partnership, all partners should execute bond. A power of attorney document, together with a statement that it still is in full force and effect shall be provided by the person executing this bond.

END OF SECTION

**SECTION 2-D3
LONG FORM
FORM OF SUBCONTRACT PAYMENT BOND
(Public School Projects)**

KNOW ALL MEN BY THESE PRESENTS THAT (1) _____

(2) _____
OF _____ AND STATE OF _____
AS PRINCIPAL AND (3) _____
A CORPORATION DULY ORGANIZED UNDER THE LAWS OF THE STATE OF _____
AND HAVING A USUAL PLACE OF BUSINESS IN _____ AS SURETY ARE HELD
AND FIRMLY BOUND UNTO THE (4) _____ AS OBLIGEE, IN THE PENAL
SUM OF _____ DOLLARS, (\$ _____) FOR THE
USE AND BENEFIT OF CLAIMANTS* AS HEREIN BELOW DEFINED, FOR THE PAYMENT
WHEREOF PRINCIPAL AND BIND THEMSELVES, THEIR HEIRS, EXECUTORS AND
ADMINISTRATORS, SUCCESSORS AND ASSIGNS, JOINTLY AND SEVERALLY BY THESE
PRESENTS.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT IF THE PRINCIPAL SHALL
PROMPTLY SATISFY ALL CLAIMS AND DEMANDS INCURRED FOR ALL LABOR AND
MATERIALS, USED OR REQUIRED BY HIM IN CONNECTION WITH THE WORK
CONTEMPLATED IN THE SUBCONTRACT ENTERED INTO ON THE (5) _____ DAY OF
_____ A.D. 20 ____ FOR THE CONSTRUCTION OF (6) **SANFORD HIGH
SCHOOL AND TECHNICAL CENTER, SANFORD, MAINE**, AND SHALL
FULLY REIMBURSE THE OBLIGEE FOR ALL OUTLAY AND EXPENSE WHICH SAID
OBLIGEE MAY INCUR IN MAKING GOOD ANY DEFAULT OF SAID PRINCIPAL, THEN THIS
OBLIGATION SHALL BE NULL AND VOID: OTHERWISE, IT SHALL REMAIN IN FULL
FORCE AND EFFECT.

* A claimant is defined as one having a direct contract with the principal or with a subcontractor of one of the principal for labor, material or both, used or reasonably required for use in the performance of the subcontract.

Signed and sealed this (5) _____ day of _____ 20_____

WITNESS: _____ SUBCONTRACTORS: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

_____ By _____ (L.S.)

WITNESS: _____ SURETY: _____

_____ By _____ (L.S.)

_____ By _____ (L.S.)

APPROVED AS TO FORM _____, 20_____.

BY _____
(Owner's Attorney)

Legend

- (1) Correct name of subcontractor.
- (2) A corporation, a partnership, or an individual, as the case may be.
- (3) Correct name of surety.
- (4) General contractor.
- (5) Same date as that of subcontract.
- (6) Name of project as designated in contract documents.

If subcontractor is partnership, all partners should execute bond. A power of attorney document, together with a statement that it still is in full force and effect shall be provided by the person executing the bond.

END OF SECTION

STATE OF MAINE
CONSTRUCTION CONTRACT

Public School Project

THIS AGREEMENT made the date of month in the year 2016 by and between the State of Maine through the Sanford School Department hereinafter called the *Owner*, and Contractor company name hereinafter called the *Contractor*.

WITNESSETH, That the *Owner* and the *Contractor* for the consideration hereinafter named agree as follows:

ARTICLE 1 SCOPE OF WORK

§ 1.1 The *Contractor* shall furnish all of the materials and perform all the work described in the specifications and shown on the drawings for the project entitled: Sanford High School and Technical Center, Sanford, Maine 04073 Project: 12-067-00, Dated 11 February 2016, Issuance: Bid Documents.

§ 1.2 The specifications and the drawings have been prepared by Lavallee Brensinger Architects, acting as Designer and named in the documents as the Architect or Engineer. This firm has responsibilities for defining the scope of work governed by their agreement with the *Owner*, the specifications and the drawings, and the General Conditions and Special Provisions of the contract.

ARTICLE 2 COMPLETION DATE

§ 2.1 The work to be performed under this contract shall be completed on or before August 1, 2018. For each calendar day the project remains uncompleted \$Per Section 3-A, Standard General Conditions and Contract Work shall be charged as liquidated damages.

ARTICLE 3 CONTRACT SUM

§ 3.1 The *Owner* shall pay the *Contractor* for the performance of the contract, subject to additions and deductions provided by approved Change Orders in current funds as follows: amount in words dollars and 00cents, \$0.00

ARTICLE 4 CONTRACT BONDS

§ 4.1 Contract bonds are not required if the contract amount is less than \$125,000 unless bonds are specifically mandated by the contract documents.

§ 4.2 On this project, the *Contractor* shall furnish the *Owner* the appropriate contract bonds in the amount of 100% of the contract amount.

ARTICLE 5 PROGRESS PAYMENTS

§ 5.1 The *Owner* shall make payments on account of the contract as provided therein as follows: Each month 95% of the value, based on contract prices of labor and materials incorporated in the work and of materials suitably stored at the site thereof up to the first day of that month, as certified by the Architect or Engineer.

§ 5.2 The *Owner* may cause the *Contractor* to be paid such portion of the amount retained hereunder as he deems advisable.

ARTICLE 6 FINAL PAYMENT

§ 6.1 Final payment shall be due 60 days after completion and acceptance of the work, provided the *Contractor* has submitted evidence satisfactory to the *Owner* that all payrolls, material bills and other indebtedness connected with the work has been paid.

ARTICLE 7 CONTRACT DOCUMENTS

§ 7.1 The General Conditions of the contract, Special Provisions, the written specifications and the drawings, and any Addenda, together with this agreement, form the contract; they are as fully a part of the contract as if hereto attached or herein repeated.

§ 7.2 Specifications: *Sanford High School and Technical Center, Sanford, Maine 04073, Project: 12-067-00, Dated: 11 February 2016, Issuance: Bid Documents*

§ 7.3 Drawings: *Sanford High School and Technical Center, Sanford, Maine 04073, Project: 12-067-00, Dated: 11 February 2016, Issuance: Bid Documents*

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R.100 RADON PIPING PLAN & DETAILS

§ 7.4 Addenda: **None**

ARTICLE 8 OTHER PROVISIONS

§ 8.1 **There are no other provisions.**

The *Owner* and the *Contractor* hereby agree to the full performance of the covenants herein.

IN WITNESS WHEREOF the parties hereby execute this agreement the day and year first above written.

OWNER

CONTRACTOR

_____ <i>(Signature)</i>	_____ <i>(Date)</i>	_____ <i>(Signature)</i>	_____ <i>(Date)</i>
_____ <i>(Printed name and title)</i>		_____ <i>(Printed name and title)</i>	
_____ <i>(School Administrative Unit name)</i>		_____ <i>(Contractor company name)</i>	

SAMPLE

BUREAU OF GENERAL SERVICES			
Contract Reviewed by:		Contract Approved by:	
_____ <i>(Signature)</i>	_____ <i>(Date)</i>	_____ <i>(Signature)</i>	_____ <i>(Date)</i>
<i>Project Manager/ Contract Administrator</i>		<i>Planning, Design & Construction Division</i>	

STATE OF MAINE
CONSTRUCTION SUBCONTRACT

Public School Project

THIS AGREEMENT made the date of month in the year 2016 by and between the Contractor company name hereinafter called the *Contractor*, and Subcontractor company name hereinafter called the *Subcontractor*.

WITNESSETH, That the *Contractor* and the *Subcontractor* for the consideration hereinafter named agree as follows:

ARTICLE 1 SCOPE OF WORK

§ 1.1 The *Subcontractor* shall furnish all of the materials and perform all the work described in the specifications and shown on the drawings for the project entitled: Sanford High School and Technical Center, Sanford, Maine 04073 Project: 12-067-00, Dated 11 February 2016, Issuance: Bid Documents for the specification sections here described:

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Geotechnical Report Dated 10-14-2015.

§ 1.2 The specifications and the drawings have been prepared by Lavallee Brensinger Architects, acting as Designer and named in the documents as the Architect or Engineer. This firm has responsibilities for defining the scope of work governed by their agreement with the Owner, the specifications and the drawings, and the General Conditions and Special Provisions of the contract.

ARTICLE 2 COMPLETION DATE

§ 2.1 The work to be performed under this contract shall commence on or before August 1, 2018 and will be completed according to the established construction schedule.

ARTICLE 3 CONTRACT SUM

§ 3.1 The Contractor shall pay the Subcontractor for the performance of the subcontract, subject to additions and deductions provided by approved Change Orders in current funds as follows: amount in words dollars and 00cents, \$0.00

ARTICLE 4 CONTRACT BONDS

§ 4.1 Subcontract bonds are required for projects utilizing Filed Sub-bids.

§ 4.2 The *Subcontractor* shall furnish the *Contractor* the appropriate subcontract bonds in the amount of 100% of the contract amount.

ARTICLE 5 PROGRESS PAYMENTS

§ 5.1 The *Contractor* shall make payments on account of the subcontract as provided therein as follows: Each month 95% of the value, based on contract prices of labor and materials incorporated in the work and of materials suitably stored at the site thereof up to the first day of that month, as certified by the Architect or Engineer.

§ 5.2 The *Contractor* may cause the *Subcontractor* to be paid such portion of the amount retained hereunder as the *Owner* may approve.

ARTICLE 6 FINAL PAYMENT

§ 6.1 Final payment shall be due 60 days after completion and acceptance of the work, provided the *Subcontractor* has submitted evidence satisfactory to the *Contractor* and the *Owner* that all payrolls, material bills and other indebtedness connected with the work has been paid.

ARTICLE 7 CONTRACT DOCUMENTS

§ 7.1 The General Conditions of the contract, Special Provisions, the written specifications and the drawings, and any Addenda, together with this agreement, form the contract; they are as fully a part of the contract as if hereto attached or herein repeated.

§ 7.2 Specifications: *Sanford High School and Technical Center, Sanford, Maine 04073, Project: 12-067-00, Dated: 11 February 2016, Issuance: Bid Documents*

§ 7.3 Drawings: *Sanford High School and Technical Center, Project: 12-067-00, Dated: 11 February 2016, Issuance: Bid Documents*

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§ 7.4 Addenda: None

ARTICLE 8 OTHER PROVISIONS

§ 8.1 There are no other provisions.

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SECTION 3-A

STATE OF MAINE

STANDARD GENERAL CONDITIONS
AND
CONTRACT WORK

For

PUBLIC SCHOOL PROJECTS

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ARTICLE 1. DEFINITIONS

Whenever the following terms are used in these specifications or the contract, the intent and meaning shall be interpreted as follows:

Designer: The project Architect and/or Engineer whose name appears on the plans and/or specifications for the project, acting directly or through an authorized representative.

Bid Security: The security designated in the proposal, furnished by bidders as a guaranty of good faith to enter into a contract with the state, should a contract be awarded to that bidder.

Bidder: Any individual, partnership, or corporation submitting a proposal for the performance of the work described under the terms of the contract, acting directly or through a duly authorized representative.

Bureau: The Bureau of General Services.

Calendar Days: Consecutive days, as occurring on a calendar, taking into account the day of the week, month, year, and any religious, national or local holidays.

Change Order: A written agreement between the Owner and the Contractor, operating as a supplement to the contract, covering correction of: omissions, errors, and discrepancies between the plans and the proposal or estimates; or any alterations in the plans; or additional requirements; work, materials, and incidentals required to complete the construction of the project in an acceptable manner, and setting forth the basis of compensation for that supplemental work, if any. Before any change order modifies or becomes a part of the work, it must be duly signed by the Contractor, and the Owner, and approved by the Bureau of General Services and the Designer.

Clerk of the Works: The authorized representative of the Designer.

Contract: A written agreement between the Owner and the successful bidder, by which the Contractor is bound to perform the work specified, in accordance with plans, specifications, general conditions, and special provisions, that are a part of the contract documents, together with all supplemental agreements by which the Owner is bound to compensate the Contractor at mutually established and accepted rates or prices.

Contract Bond: The approved forms of security furnished by the Contractor and his surety, or sureties, which guarantee the faithful performance of all the terms of the contract and the payment of all bills, for labor, materials and equipment by the Contractor.

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Contract Documents: The contract documents consist of the contract, general conditions, special provisions, the plans and specifications including all addenda, change orders, and all other modifications thereof, that were incorporated in the documents subsequent to their execution.

Contractor: The individual, partnership, or corporation undertaking the execution of the general contract work under the terms of the contract with the Owner, acting directly or through a duly authorized representative.

Director of the Bureau of General Services: The State Director of the Bureau of General Services or his/her duly authorized representative.

Final Completion: The stage of the Work when the Work has been fully completed in accordance with the terms and conditions of the Contract Documents.

Owner: School Administrative Unit, acting through its duly authorized representative.

Plans: All official drawings or reproductions of drawings pertaining to the work provided for in the contract and such working plans as may be furnished or approved by the Owner or Designer from time to time.

Project: The entire improvement proposed by the Owner to be constructed in part or in whole pursuant to these specifications and contract documents. Where the word "Job" appears it shall mean the project.

Proposal or Bid: The written offer of the bidder, on a form prescribed to perform the work specified.

Provide: The word "provide" shall mean, "furnish and install," including connections to services if required, unless specified otherwise.

Sub-Contractor: The individual, the firm or corporation undertaking the execution of any part of the work under the terms of the contract by virtue of a written agreement between itself and the Contractor.

Substantial Completion: The stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use. Minor corrections and repairs that can be performed while the Owner has occupied the building and without undue annoyance to personnel will be acceptable under the definition of Substantial Completion. It shall also include major final cleaning required under the Contract, removal of all surplus equipment and material not required for completion of

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remaining work, and the placement of remaining materials and equipment in convenient locations as approved by the Owner.

Superintendent: The representative of the Contractor, authorized by the Contractor to receive and fulfill instructions from the Designer.

Supplemental Agreement: A supplemental agreement is any agreement entered into between the Contractor and the Owner with the approval of the Bureau and the Designer subsequent to the execution of the contract.

Surety: The individual, partnership, or corporation who is bound jointly and severally with the Contractor and sub-Contractor to insure his faithful performance of the contract and for his payment of the bills for labor, materials and equipment by the Contractor and Sub-Contractors.

Work: See Project.

ARTICLE 2. INTENT, CORRELATION AND EXECUTION OF DOCUMENTS

The intent of the Contract Documents is to prescribe a complete work or improvement. The Plans, including all revisions, General Conditions for Contract Work, Special Provisions, Instructions to Bidders, Proposal, Contract, Contract Bonds, and all other sections of the specifications, including all addenda, all dated and on file in the Bureau of General Services, prior to the time set for receiving proposals as prepared by the Designer, shall each become a part of the Contract Documents, and all proposals must be based on a full compliance therewith. Any Supplemental Agreements entered into subsequent to the Contract will become a part of said Contract.

The contract documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the documents is that, unless otherwise specified, the Contractor shall furnish all labor, materials, equipment, items, articles, tools, transportation, insurance, services, necessary supplies, operations or methods and incidentals that may be reasonably required to construct and complete the project, facility or improvement in a manner necessary for the proper execution of the work. Any deviations from the plans which may be required by the exigencies of the construction, or because of error, will in all cases, be determined by the Designer, and authorized in writing subject to approval by the Owner and Bureau of General Services. Materials or work described in words, which so applied, have a well-known technical or trade meaning shall be held to refer to such recognized standards. Since the plans and specifications cover the dimensions and features of the work and do not set forth the analysis of the design, it is the duty of the Contractor fulfilling them to ascertain the true intent in any case where it is doubtful.

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Work not covered under any heading, section, branch, class or trade of the specifications, shall not be supplied unless it is shown on the drawings or is reasonably inferable there from as being necessary to produce the intended results.

The Contractor shall take no advantage of any apparent error or omission in the plans and specifications, and the Designer shall be permitted to make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the plans and specifications. Where errors or omissions appear in the contract documents, the Contractor shall promptly notify the Designer in writing of such errors or omissions. Inconsistencies in the contract documents are to be reported before proposals are received, whenever found.

Should the Drawings or the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and/or materials unless otherwise directed by written addendum to the Contract Documents.

The Contractor shall, upon his acceptance of a contract and before commencing work, contact the Designer and request a preconstruction conference. The purpose of this conference shall be as follows:

1. To introduce the members of the Designer's firm and the representative of the Owner and define their responsibilities in connection with this project.
2. To emphasize any special provisions applicable to the project.
3. To establish the work progress schedule and set up procedures for prompt review of all required shop drawings. If the Contract Sum exceeds \$ 10,000,000. the Contractor shall supply the Owner with the planned Critical Path Method ("CPM") schedule prior to the submission of the first payment requisition. The Contractor shall supply the Owner monthly with CPM "as built" schedule updates. The update shall include the dates of activities' start and completion; percent of work remaining for activities started but not completed; narrative report indicating a listing of monthly progress; any changes to critical path activities from the prior update; sources of delay and potential problems; and work planned for the next month. If any date is more than fifteen (15) days behind, the Contractor must submit a recovery schedule. When a Change Order is proposed, the Contractor must identify all schedule impacts which result from the Change Order.
4. To provide the Contractor with opportunity to discuss points of doubt and any apparent inconsistencies noted in the plans and specifications before proceeding to purchase material or execute the work.

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During the further progress of work, regular meetings will be held at time intervals appropriate in the judgment of the Designer to review the work progress schedule, general project progress and any other questions, which might affect the execution of this contract.

ARTICLE 3: DETAIL DRAWINGS AND INSTRUCTIONS

The Designer shall furnish, with reasonable promptness, additional instructions by means of drawings or otherwise, that are necessary for the proper execution of the work. All such drawings and instruction shall be consistent with the contract documents, shall be true developments thereof, and shall be reasonably inferable there from.

The work shall be executed in conformity therewith and the Contractor shall do no work without proper drawings and instructions except as allowed by Article 13.

Immediately after being awarded the contract, the Contractor shall prepare an estimated progress schedule and submit same for Designer's approval. It shall indicate the dates for starting and completion of the various stages of construction.

ARTICLE 4: COPIES FURNISHED

Unless otherwise provided in the contract documents the Contractor will be furnished, free of charge, PDF files of all drawings, and specifications.

ARTICLE 5: SHOP DRAWINGS

The Contractor shall check and verify all field measurements and shall submit with such promptness as to cause no delay in the Contractor's own work or in that of any other Contractor, adequate copies, checked and approved by the Contractors of all shop drawings and schedules required for the work of the various trades. The Designer shall check and approve, with reasonable promptness, such scheduled drawings only for conformance with the design concept of the project and compliance with the information given in the contract documents. The Contractor shall make any corrections required by the Designer, and shall file with the Designer two corrected copies, and shall furnish such other copies as may be needed. The Designers approval of such drawings or schedules shall not relieve the Contractor from responsibility for deviations from drawings or specifications, unless the Contractors have, in writing, called the Designer's attention to such deviations at the time of submission and secured the Designer's written approval; nor shall it relieve the Contractors from responsibility for errors in shop drawings or schedules.

ARTICLE 6: DRAWINGS AND SPECIFICATIONS

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The Contractor shall keep, in good order, one copy of all drawings and specifications on the work, which will be made available to the Designer and to his representative.

ARTICLE 7: OWNERSHIP OF DRAWINGS

All drawings, specifications and copies thereof furnished by the Designer are the property of the Designer. They are not to be used on other work without written permission from the Designer, and, with the exception of the signed contract set, are to be returned to the Designer upon request, or at the completion of the work.

ARTICLE 8: SAMPLES

The Contractor shall furnish for review, with reasonable promptness, all samples as directed by the Designer. The Designer shall check and review such samples, with reasonable promptness, only for conformance with the design concept of the project and for compliance with the project and for compliance with the information given in the contract documents. The work shall be in accordance with reviewed samples.

ARTICLE 9: MATERIALS, APPLIANCE, EMPLOYEES

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation and facilities necessary for the execution and completion of the work.

Whenever an article or material is defined by describing a proprietary product, or by using the name of a manufacturer, the term "Or Approved Equal", if not inserted, shall be implied. The specific article or material mentioned shall be understood to establish minimum standards as to the type, function, standard of design, durability, efficiency and quality desired and shall not be construed to exclude other manufacturers' products of comparable quality, design and efficiency.

Materials and models of items, which the Contractor alleges to be equal to the materials and methods of items named in the specifications, shall be subject to the written approval by the Designer. If the alleged equals are to receive consideration in the bid award, written approval shall be received from the Designer at least ten days prior to the established bid opening dates. The use of alternate items will not be permitted without the approval of the Owner and Designer. All approved substitutions shall be in writing and approved by the Designer. The Contractor shall not be relieved of the responsibility to furnish articles or materials equal in quality, design and efficiency to those specified because of the approval of such alternate items by the Designer. The Designer's approval or rejection of a proposed substitution may be based on any of the previous considerations, and his decision may or may not express reasons for rejection and shall

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be final. Requests for substitutions shall originate and be submitted by the Contractor, not a Sub-Contractor. The materials or equipment shall be sufficiently described to enable the Designer to easily identify salient features.

Any material or products not specified in the bidding documents but being worthy of consideration may be introduced by the Contractor, or Sub-Contractor. The Contractor's submission shall include a cost comparison with the specified material and the reason for the suggested substitution. The basic proposal shall be as specified.

It shall be understood by the general Contractor or Sub-Contractor that the attached letter describing the proposed changes will not be used in determining the low general Contractor or Sub-Contractor proposal submitted, unless the general Contractor or Sub-Contractor has submitted its list to the Designer 10 days prior to the date set for the receipt of their respective proposals and has received written approval by the Designer five days prior to the opening of the bid.

The Contractor shall guarantee his work against any defects in workmanship and materials for a period of one year from the date of the written acceptance of the project.

Materials and equipment shall be new, free from defects, perfect and complete, unless otherwise stipulated. Materials or equipment specified or shown on the drawings shall be applied or installed according to the directions with the manufacturer, or the recommendations of an association dealing primarily with the material, unless specifically designated otherwise. The scope of the direction furnished shall include the application of experienced personnel to each trade involved. In no case shall the installation be below the standard recommended by the manufacturer or association.

The Contractor shall be responsible to the Owner for the suitability of materials and equipment furnished and for full compliance with the specification.

The Contractor shall promptly pay all his employees when their pay is due, shall promptly pay when due all bills for materials, supplies and services going into the work, and all bills for insurance, workmen's compensation coverage, federal and state unemployment compensation, and Social Security charges applicable to said project. Before final settlement is made, the Contractor shall furnish to the Owner affidavits that all said payments have been made.

The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him.

ARTICLE 10: ROYALTIES AND PATENTS

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The Contractor shall, for all time, secure to the Owner the free and undisputed right to the use of any and all patented articles or methods used in the work and shall defend at his own expense any and all suits for infringement or alleged infringement of such patents, and in the event of adverse award under patent suits, the Contractor shall pay such awards and hold the Owner harmless in connection with any patent suits that may arise as a result of installations made by the Contractor, or to any awards made thereunder.

ARTICLE 11: SURVEYS, PERMITS, LAWS, TAXES AND REGULATIONS

The Owner shall furnish all surveys unless otherwise specified.

Permits and licenses necessary for the prosecution of the work shall be secured by the Contractor. Fees associated with the City of Sanford permits shall be paid directly by the Owner: the City of Sanford Building Permit, the City of Sanford Sprinkler Permit, the City of Sanford Other Fire Protection Permit, Sanford Public Water Hookup, Sanford Public Sewer Hookup, Sanford Sign Permit (for permanent signs only), City of Sanford Town Engineering Inspection Fee, City of Sanford Occupancy Permit, and the City of Sanford Plumbing Permit. The Contractor is responsible for fees associated with temporary structures and temporary signage. Easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Owner, unless otherwise specified.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the drawings and specifications are at variance therewith, the Contractor shall promptly notify the Designer in writing and any necessary changes shall be adjusted as provided in the contract for changes in the work. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations and without such notice to the Designer, the Contractor shall bear all costs arising there from.

Adherence to the Code of Federal Regulations 29 CFR Part 1926 and 29 CFR Part 1910 as adopted by the State Board of Occupational Safety and Health is required by statute.

The State is exempt from the payment of Federal Excise Taxes on articles not for resale and for the Federal Transportation Tax on all shipments. All quotes from the Contractor and Sub-Contractors shall be free of these taxes. The State is exempt from the payment of Maine State Sales and Use Taxes. All quotes from the Contractor and Sub-Contractors shall be free of these taxes.

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In execution and performance of the Contract, the Contractor and all subcontractors agree to be aware of and to comply with the requirements and regulations of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et. seq.)

ARTICLE 12: LABOR AND WAGES

All Contractors and Sub-Contractors shall conform to the labor laws of the State of Maine, and all other laws, ordinances and legal requirements affecting the Work in Maine.

In the employment of laborers, preference shall first be given to residents of the State of Maine who are qualified to perform the work to which the employment relates, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, who may reside in other states.

ARTICLE 13: CONDITIONS AND CARE OF SITE AND PROTECTION OF THE WORK

The Contractor shall continuously maintain adequate protection of all work from damage and shall protect the property from injury or loss for the duration of this contract, and shall make good any such damage, injury or loss. He shall adequately protect adjacent property as provided by law and the contract documents.

The Contractor shall take all necessary precautions for the safety of employees on the work, and shall comply with all applicable provisions of federal, state and municipal safety laws and building codes, and shall prevent accidents or injury to persons on, about or adjacent to the premises where the work is being performed. The Contractor shall erect and properly maintain all necessary safeguards for the protection of workmen and the public at all times, as required by the condition and progress of the work, and shall post danger signs warning against all hazards created by the construction process, such as (but not limited to) protruding nails, hoists, well holes, elevator hatchways, scaffolding, window openings, stairways and falling materials. The Contractor shall designate a responsible member of his organization on the work, whose duty shall be the prevention of accidents. The Contractor shall report the name and position of any person so designated to the Designer.

The Contractor shall return to conditions existing prior to the start of work on the project, all aspects of the site that have not been altered, removed, or otherwise changed permanently by the work. The Contractor shall protect all existing buildings, structures, or other features from damage by any operation in connection with the project. Utilities encountered shall be protected and maintained in service until removed or abandoned. The Contractor shall exercise care in his work around such utilities as may be shown on the plot plan or otherwise found. Such utilities are not to be moved, replaced or abandoned.

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The Contractor shall protect existing trees, and other aspects of the site, which will remain a permanent part of the site from damage during grading, excavation, filling, trucking, etc. If necessary, tree trunks shall be boxed, and barricades set up at sufficient distance to prevent damage to major tree branches.

Should the work or material of this or any other Contractor employed by the Owner become damaged when reasonably protected, the same shall be replaced by the Contractor causing the damage at no expense to the Owner.

In an emergency potentially affecting health or life or of serious damage to property or of adjoining property, the Contractor, without special instruction or authorization from the Designer or Owner, is hereby permitted to act on his own discretion, to prevent such threatened loss or injury, and the Contractor shall so act, without appeal, if so authorized or instructed. Any compensation claimed by the Contractor on account of emergency work, shall be determined by agreement.

ARTICLE 14: INSPECTION OF WORK

The Designer and his representatives, the Bureau of General Services representatives and the Owner, shall at all times have access to the work whenever it is in preparation or progress. The Contractor shall provide proper facilities for such access and for inspection.

If the specifications, the Designer's instructions, laws, ordinances or any public authority require any work to be specially tested or approved, the Contractor shall give the Designer timely notice of its readiness for observation by the Designer or inspection by another authority, and if the inspection is by another authority than the Designer, on the date fixed for such inspection, required certificates of inspection shall be secured by the Contractor. Observations by the Designer shall be promptly made, and where practicable, prior to work is covered or buried. If any work which will ultimately be covered, is covered prior to approval or consent of the Designer, it must, if requested by the Designer, be uncovered for examination at the Contractor's expense.

Reexamination of questioned work may be ordered by the Designer, and, if so ordered, the work must be uncovered by the Contractor. If such work were found in accordance with the contract documents, the Owner shall pay the cost of the reexamination and replacement. If such work were found not in accordance with the contract documents, the Contractor shall pay such cost, unless it is found that the defect in the work was caused by a Contractor employed as provided in Article 32, and in that event the Owner shall pay such cost.

The Bureau of General Services, through its representatives shall make periodic inspections of the work during the course of construction and make recommendations to

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the Designer, when employed. The Designer shall provide adequate inspection of materials, equipment, methods and changes in plans on all projects under his supervision.

ARTICLE 15: SUPERINTENDENCE: SUPERVISION

The Contractor shall have, during the progress of all work, a competent superintendent and any necessary assistants. The superintendent shall not be changed except with the consent of the Owner unless a superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The superintendent shall represent the Contractor and all directions given to the superintendent in the absence of the Contractor shall be as binding as if given directly to the Contractor. Important directions shall be confirmed in writing to the Contractor. Other directions shall be confirmed on written request in each case. The Designer shall not be responsible for the acts or omissions of the superintendent or his assistants.

The Contractor shall give efficient supervision to the work using his best skill and attention. He shall carefully study and compare all drawings, specifications and other instructions and shall at once report to the Designer any error, inconsistency or omission which he may discover, but he shall not be liable to the Owner for any damage resulting from any errors or deficiencies in the contract documents or other instructions by the Designer.

ARTICLE 16: CHANGES IN THE WORK

The Owner reserves the right to increase or decrease any or all of the items of work indicated in the plans, proposal, and contract, or the elimination of any one or more of such items, without invalidating the contract. As the work progresses, the Owner may make such alterations in the plans, in the character of the work, or in the specified coordination of two or more concurrent contracts, as may be considered necessary or desirable in order to complete the construction. Such changes shall in no way invalidate the contract. All such work shall be executed under the conditions of the original contract except that any claim for extension of the time caused thereby shall be adjusted at the time of the ordering of such change.

In giving instructions, the Designer shall have authority to make minor changes in the work, not involving extra cost, and not inconsistent with the purposes of the building or project, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a duly signed change order.

Should the Contractor encounter during the progress of the work, latent conditions at the site materially differing from those shown on the drawings or in the specifications, or unknown conditions of an unusual nature differing materially from those already encountered in such work, the attention of the Designer shall be immediately called for such conditions before they are disturbed. The Designer shall

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promptly investigate the conditions and if they do so materially differ, the contract shall, with the approval of the Owner and the Bureau be modified by a change order to provide for any increase or decrease in cost resulting from such conditions.

Should such alterations be productive of increased unit cost, or result in decreased unit cost to the Contractor, a fair and equitable sum therefore shall be agreed upon in writing before such work is begun, and shall be added to or deducted from the contract amount, as the case may be, by means of a written change order. The change order shall state the nature of the change, the location, the itemized estimate of unit quantities, the basis for payment, and the reason for the change. Such change order to be on approved forms.

When the change order has been properly signed by all parties and encumbered, it shall become a part of the contract.

The value of any such extra work or change shall be determined in one or more of the following ways:

- A. By estimate and acceptance in a lump sum.
- B. By unit prices named in the contract or subsequently agreed upon.
- C. By cost and percentage or by cost and a fixed fee.

If none of the above methods is agreed upon, the Contractor, provided he receives an order as above, shall proceed with the work.

Under case (C.), he shall keep and present in such form as the Designer may direct, a correct account of the cost, together with vouchers. In any case, the Designer shall certify to the amount, including reasonable allowance for overhead and profit, due to the Contractor. Pending final determination of value, payments on account of changes shall be made on the Designer's certificate.

If the price of a change order cannot be agreed upon, nothing contained herein shall prevent the Designer, with approval from the Owner and BGS, from directing the Contractor to make a change in the work, with the price to be determined on either a cost and percentage basis or under the dispute resolution provision of this contract.

If the price of a change order cannot be agreed upon, an Owner and/or Designer initiated Construction Change Directive can order a change in the work prior to an agreement on the adjusted Contract Sum or Contract Time. The Cost of the work is to be determined by: 1) a cost and percentage basis 2) lump sum 3) unit prices or 4) under the Dispute Resolution provision of this contract.

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When the subparagraphs (A) and (C) above are used to determine the value of the work, the allowance for overhead and profit combined, included in the total expense to the Owner, shall be based upon the following schedule:

For the Contractor, for any work performed by his own forces, 20% of the cost;
For each Sub-Contractor, for work performed by his own forces, 20% of the cost;
For the Contractor, for work performed by his Sub-Contractor, 10% of the amount due the Sub-Contractor.

Cost shall be limited to the following: Cost of materials, cost of delivery, cost of labor, including Social Security, old age and unemployment insurance (labor cost may include a pro ratio share of foremen's time, only in case an extension of contract time is granted on account of the change); workmen's compensation insurance; rental value of power tools and equipment.

Overhead shall include the following; bond premium, supervision, wages of timekeepers, watchmen and clerks, small tools, incidental, general office expense, and all other expenses not included in "cost".

If the net value of a change results in a credit from the Contractor or Sub-Contractor the credit given shall be the net cost without overhead or profit. The cost as used herein shall include all items of labor, materials and equipment.

ARTICLE 17: CLAIMS FOR EXTRA COST

If the Contractor claims that any instructions by drawings or otherwise involve extra cost under this contract, he shall give the Designer written notice thereof within 10 days after the receipt of such instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property, and the procedure shall then be as provided for in Section 16, "changes in work." No such claim shall be valid unless so made.

ARTICLE 18: DEDUCTIONS FOR UNCORRECTED WORK

If the Designer and Owner deem it inexpedient to correct work injured or done not in accordance with the contract, an equitable deduction from the contract amount shall be made therefore.

ARTICLE 19: DELAYS AND EXTENSION OF TIME

If the Contractor is delayed at any time in the progress of the work by any act or neglect of the Owner or the Designer, or of any employee of either, or by any separate Contractor employed by the Owner, or by changes ordered in the work or by strikes,

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lockouts, fire, unusual delay in transportation, unavoidable casualties Or by causes beyond the Contractor's control, or by any cause which the Designer shall decide to justify the delay, then the time of completion shall be extended for such reasonable time as the Designer may decide. Inclement weather or other natural causes shall not be reason to allow additional time under this contract.

No such extension shall be made for delay occurring more than seven days before claim therefore is made in writing to the Designer. In case of a continuing cause of delay, only one claim is necessary.

If no schedule or agreement stating the dates upon which drawings shall be furnished is made, then no claim for delay shall be allowed on account of failure to furnish drawings until two weeks after demand for such drawings and not then unless such claim be reasonable.

This article does not exclude the recovery of damages for delay by either party under other provisions in the contract document. The amount of Contractor's delay damages shall be limited to the Costs, overhead and profit items enumerated in Article 16. Recovery of delay damages is conditioned upon compliance with the notice requirements of Article 17.

ARTICLE 20: CORRECTION OF WORK

The Contractor shall promptly remove from the premises all work condemned by the Designer as failing to conform to the contract, whether incorporated or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the contract and without expense to the Owner and shall bear the expense of making good all work of other Contractors destroyed or damaged by such removal or replacement.

If the Contractor does not remove such condemned work within a reasonable time, fixed by written notice, the Owner may remove it and may store the material at the expense of the Contractor. If the Contractor does not pay the expenses of such removal within ten days time, thereafter, the Owner may, upon ten days written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs and expenses that should have been borne by the Contractor.

The Contractor shall remedy any defects due to faulty materials or workmanship and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from the date of final payment, or from the date of the Owner's substantial usage or occupancy of the project, whichever is earlier, and in accordance with the terms of any special guarantees provided in the contract. The Owner shall give notice of observed defects with reasonable promptness. All questions arising under this article will be decided by the Designer, notwithstanding final payment.

ARTICLE 21: OWNER'S RIGHT TO DO WORK

If the Contractor should neglect to prosecute the work properly or fail to perform any provisions of this contract, the Owner, after three days written notice to the Contractor may, without prejudice to any other remedy may make good such deficiencies and may deduct the cost thereof from the payment; then or thereafter due the Contractor, provided, however, that the Designer shall approve both such action and the amount charged to the Contractor.

ARTICLE 22: OWNER'S RIGHT TO TERMINATE CONTRACT

If the Contractor should be adjudged bankrupt, or if the Contractor should make a general assignment for the benefit of it's creditors, or if a receiver should be appointed on of account the Contractor's insolvency, or if the Contractor should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials or if the Contractor should fail to make prompt payment to Sub-Contractors or for material, or labor, or persistently disregard laws, ordinance or the instructions of the Designer, or otherwise be guilty of a substantial violation of any provision of the contract, then the Owner, upon the certificate of the Designer that sufficient cause exists to justify such action, may without prejudice to any other right or remedy and after giving the Contractor and the Contractor's surety seven days written notice, terminate the employment of the Contractor and take possession of the premises and of all materials, tools and appliances thereon and finish the work by whatever method the Owner may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract amount shall exceed the expense of finishing the work including compensation for additional Designer, managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner. The expense incurred through the Contractor's default, shall be certified by the Designer.

ARTICLE 23: THE CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the work should be stopped under an order of any court, or other public authority, for a period of thirty days, through no act or fault of the Contractor or of anyone employed by him, then the Contractor, may, upon seven days written notice to the Owner and the Designer, terminate this contract and recover from the Owner, payment for all work executed and any proven loss sustained upon any plant or materials and reasonable profit and damage.

Should the Designer fail to issue any certificate for payment, through no fault of the Contractor, within seven days after the Contractor's formal request for payment or if the Owner should fail to pay to the Contractor within 30 days after presentation, any sum

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certified by the Designer, then the Contractor may, upon seven days' written notice to the Owner and the Designer, stop the work or terminate this Contractor as set out in the preceding paragraph.

ARTICLE 24: PAYMENTS

The Contractor shall, before the first application for payment, submit to the Designer in triplicate a "contract cost breakdown" form acceptable to the Designer, if required, this form shall be supported by such evidence as to its correctness as the Designer may direct and, shall be reviewed by the Designer and unless found to be in error, used as a basis for payments.

The Contractor shall submit to the Designer an application for each payment on the latest revision of the BGS "Requisition for payment" form, and, if required, receipts or other vouchers, showing his payments of materials and labor, including payments to sub-Contractors as required by Article 34.

Application for payment as the Work progresses may be made of the Owner but no more often than once a month, unless due to unusual circumstance the Owner may approve more frequent payment. Said requisition for payments shall be based on the proportionate quantities of the various classes of work completed or incorporated in the Work less retainage, in accordance with the Work progress schedule and the value thereof determined from the contract cost breakdown. Payments, upon authorization of the Designer, may be made on account of materials not incorporated in the Work but delivered and suitably stored at the site. Such payments shall be conditioned upon submission by the Contractor of bills of sale, or such other procedure as will adequately protect the Owner's interest including applicable insurance.

In the event any materials are delivered but not yet incorporated in the Work, have been included in any said "Requisition for Payment" and payment thereon made and said materials thereafter deteriorate, become damaged or destroyed or for any reason whatsoever become unsuitable or unavailable for use in the Work, then the full amount allowed therefore in any previous "Requisition for Payment", shall be deducted from the gross value of any subsequent payment or final payment unless the Contractor shall satisfactorily replace said material.

After said "Requisition for Payment" has been prepared by the Contractor in the required number of copies, it shall be submitted to the Designer for review. The Designer shall verify and approve the "Requisition for Payment", and forward all copies to the Owner for processing for payment by the Owner.

No certificate issued nor payment made to the Contractor, nor partial or entire use or occupancy of the Work by the Owner, shall be an acceptance of any Work or materials not in accordance with this contract. Except for those claims previously made by either

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party and still unsettled, the making and acceptance of the final payment shall constitute a waiver of all claims by the Owner, other than those arising from unsettled liens, those not complying with the requirements of the plans and specifications, those covered by warranties, and of all claims by the Contractor.

Title 5 M.R.S.A. Section 1746 as amended provides that in any contract awarded for any public improvement, the State shall withhold 5% of the money due the Contractor until the project under the contract has been accepted by or for the State, except that when the contract has been *substantially completed* the State may, upon request, further reduce the amounts withheld if it deems it desirable and prudent, or except when the Contractor elects to deposit with the Treasurer of the State certain Government Bonds as provided in Chapter 437, Public Laws of 1967.

With each monthly requisition the Contractor shall release and indemnify the owner from and against all liens on the project through the requisition date and shall supply partial lien waivers from all subcontractors through the date of the prior requisition.

All payments to be made in accordance with Title 10 MRSA Chapter 201-A “An Act to Ensure Prompt and Equitable Payment for Construction Services”.

ARTICLE 25. PAYMENTS WITHHELD

The Designer may withhold or, on account of subsequently discovered evidence, nullify the whole or a part of any certificate to such extent as may be necessary in his reasonable opinion to protect the Owner from loss on account of:

- A. Defective work not remedied.
- B. Claims filed or reasonable evidence indicating probable filing of claims.
- C. Failure of the Contractor to make payments properly to Sub-Contractors for materials or labor.
- D. A reasonable doubt that the contract can be completed for the balance then unpaid.
- E. Damage to another Contractor.
- F. Damage to the premises or Work.
- G. Failure to carry out the Work in accordance with the Contract Documents.

When the above grounds are removed, payments shall be made for amounts withheld because of them.

ARTICLE 26. CONTRACTOR'S INSURANCE REQUIREMENTS

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The Contractor shall not commence work under this contract until the Contractor has obtained all insurance required under this article and such insurance has been approved by the Owner, nor shall the Contractor allow any Sub-Contractor to commence work on a subcontract until all similar insurance required of the Sub-Contractor has been so obtained and approved.

The State and the Owner does not warrant or represent that the insurance required under this paragraph constitutes an insurance portfolio which adequately addresses all risks faced by the Contractor or its Sub-Contractors. The Contractor and Sub-Contractors of every tier shall satisfy themselves as to the existence, extent and adequacy of insurance prior to commencement of work.

The Contractor and any Sub-Contractor shall procure and maintain for the duration of the Project insurance of the types and limits set forth under this paragraph and such insurance as will protect themselves from claims which may arise out of or result from the Contractor's or Sub-Contractor's execution of the work, whether such execution be by themselves or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable. The insurance coverage provided by the Contractor and any Sub-Contractor will be primary coverage. All required insurance coverages shall be placed with carriers authorized to conduct business in the State of Maine by the Maine Bureau of Insurance.

A. Workers' Compensation Insurance

Worker's compensation insurance for all employees on site in accordance with the statutory workers' compensation law of the State of Maine.

Minimum acceptable limits for Employer's Liability are:

Bodily Injury By Accident	\$500,000
Bodily Injury by Disease	\$500,000 Each Employee
Bodily Injury by Disease	\$500,000 Policy Limit.

B. Liability Insurance

1. General Liability Insurance

General liability insurance shall be on a form providing coverage not less than that of the 1996 occurrence version of the Insurance Services Office (ISO) Commercial General Liability Policy. This insurance shall cover bodily injury and property damage liability for all hazards of the Project including premise and operations, products and completed operations, contractual, and personal injury liabilities. It shall include collapse and underground coverage - as well as explosion coverage if explosion hazards exist. Aggregate limits shall apply on a per location or project basis.

Minimum acceptable limits are:

General aggregate limit:	\$2,000,000
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Products and completed operations aggregate:	\$1,000,000
Each occurrence limit:	\$1,000,000
Personal injury aggregate:	\$1,000,000

2. Automobile Liability Insurance

Automobile liability insurance against claims for bodily injury, death or property damage resulting from the maintenance, Ownership or use of all owned, nonowned and hired automobiles, trucks and trailers.

Minimum acceptable limit is \$1,000,000 any one accident or loss.

3. Owners Protective Liability

For Contracts exceeding \$50,000 in total Contract amount, Contractor shall secure an Owners Protective Liability policy naming the Owner as the Named Insured.

Minimum acceptable limits are:

General aggregate limit:	\$2,000,000
Each occurrence limit:	\$1,000,000

4. Pollution Liability

In the event that any disruption, handling, abatement, remediation, encapsulation, removal, transport, or disposal of contaminated or hazardous material is required, the Contractor or its Sub-Contractor shall secure a pollution liability policy in addition to any other coverages contained in this section. The insurance shall be provided on an occurrence based policy and shall remain in effect for the duration of the Project.

Minimum acceptable limit is \$1,000,000 per occurrence.

C. Property Insurance

Unless otherwise waived in writing by the Owner, the Contractor shall procure and maintain Builder's Risk insurance naming the Owner, Contractor and any Sub-Contractor as insureds as their interest may appear. Covered causes of loss form shall be all Risks of Direct Physical Loss, endorsed to include flood, earthquake, transit and sprinkler leakage where sprinkler coverage is applicable. Unless specifically authorized in writing by the Owner, the limit of insurance shall not be less than the initial contract amount and coverage shall apply during the entire contract period and until the work is accepted by the Owner.

D. Certificates of Insurance

Four original copies of all certificates of insurance in a form and issued by companies acceptable to the Owner shall be provided to the Designer prior to commencement of work. The certificates shall name the Owner as certificate holder and shall contain a provision that coverage afforded under the insurance policies will not be canceled or

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materially changed unless at least thirty (30) days prior written notice by registered letter has been given to the Owner.

ARTICLE 27: CONTRACT BONDS

The Contractor shall furnish to the Owner and State upon execution of the contract, a contract performance bond and a contract payment bond; each for the full amount of the contract and issued by a surety company or surety companies authorized to do business in the State of Maine as approved by the Owner and State. The bonds shall be in accordance with and executed on the forms furnished in the specifications. The bonds shall allow for any addition or deductions to the contract.

The contract bonds shall continue in effect for the applicable periods limiting actions as provided by, as applicable, 14 MRSA Section 871 or Section 752 to protect the Owner's interest and to assure settlement of claims for the payment of all bills for labor, materials, and equipment by the Contractor.

The Contractor shall submit to the Bureau of General Services through the Designer, copies of the Contract Performance Bond and Contract Payment Bond for each of the Filed Sub-Bid Subcontractors that were required to submit Bid Bonds.

ARTICLE 28: DAMAGES

1. The Contractor shall indemnify and hold harmless the Owner and the Designer and their agents and employees from and against all claims, damages, losses, and expenses including attorneys' fees arising out of or resulting from the performance of the work, provided that any such claim, damage, loss, or expense (a) is attributable to bodily injury sickness, disease or death, or injury to or destruction to tangible property (other than the work itself) including the loss of use resulting therefrom, and (b) is caused in whole or in part by a negligent act or omission of the Contractor, any Sub-Contractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.
2. In any and all claims against the Owner or the Designer or any of their agents or employees, by any employee of the Contractor, any Sub-Contractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 1 shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Sub-Contractor under Workmen's Compensation Acts, disability benefit acts, or other employee benefit acts.

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3. The obligations of the Contractor under paragraph 1 shall not exceed the liability of the Designer, the Designer's agents or employees arising out of:

(a) The preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications; or

(b) The giving of or the failure to give directions or instructions by the Designer, the Contractor, agents or employees provided such giving or failure to give is the primary cause of the injury or damage.

ARTICLE 29: LIENS

Neither the final payment nor any part of the retained percentage shall become due until the Contractor, shall deliver to the Owner a complete release of all liens arising out of this contract, or receipts in full in lieu thereof, and, an affidavit that so far as the Contractor has knowledge or information the releases and receipts include all the labor and material for which a lien could be filed; but the Contractor, may if any Sub-Contractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Owner, to indemnify him against any lien. If any lien remains unsatisfied after all the payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging such lien, including all cost and reasonable attorney's fee.

ARTICLE 30: ASSIGNMENT

Neither party to the contract shall assign the Contractor or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any money due or to become due to him hereunder, without the previous written consent of the Owner.

ARTICLE 31: MUTUAL RESPONSIBILITY OF CONTRACTORS

Should the Contractor cause damage to any separate Contractor on the work, the Contractor agrees, upon due notice, to settle with such Contractor by agreement or arbitration, if he will so settle. If such separate Contractor sues the Owner or Designer on account of any damage alleged to have been so sustained, the Owner or Designer shall notify the Contractor, who shall defend such proceedings at the Contractor's expense and if any judgment against the Owner or Designer arises therefrom, the Contractor shall pay or satisfy it and pay all costs incurred by the Owner or Designer.

ARTICLE 32: SEPARATE CONTRACTS

The Owner reserves the right to let other contracts in connection with this work under similar general conditions. The Contractor shall afford other Contractors

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reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate his work with theirs.

If any part of the Contractor's work depends on proper execution or results upon the work of any other Contractor, the Contractor shall inspect and promptly report to the Designer any defects in such work that render it unsuitable for such proper execution and results. The Contractor's failure so to inspect and report shall constitute an acceptance of the other Contractor's work as fit and proper for the reception of his work, except as to defects which may develop in Contractor's work after the execution of the Contractor's work.

To insure the proper execution of the Contractor's subsequent work the Contractor shall measure work already in place and shall at once report to the Designer any discrepancy between the executed work and the drawings.

ARTICLE 33: SUBCONTRACTS

The Contractor shall not sublet any part of this contract without the written permission of the Owner.

The Contractor shall submit in writing to the Designer for approval a complete list of the names of all particular items of work he proposes to furnish and the names of the Sub-Contractors to whom the Contractor proposes to sublet work. The Sub-Contractors named shall be reputable firms of recognized standings with a record of satisfactory work. The Contractor shall not employ any Sub-Contractor or use any material that requires approval by any Specification Section until they have been approved, or where there is reason to believe the work will not be accomplished in accordance with the contract documents. The complete list of Sub-Contractors and materials must be submitted for approval to the Designer and Owner.

The Designer shall, on request, furnish to any Sub-Contractor, wherever practicable, evidence of the amounts certified on his account.

The Contractor agrees that he is as fully responsible to the Owner for the acts and omissions of his Sub-Contractor and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

Nothing contained in the contract documents shall create any contractual relation between any Sub-Contractor and the Owner.

ARTICLE 34: RELATIONS OF CONTRACTOR AND SUB-CONTRACTOR

The Contractor agrees to bind every Sub-Contractor and every Sub-Contractor agrees to be bound by the terms of the contract documents, as far as they are applicable to

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his work, including the following provisions of this article, unless specifically noted to the contrary in a subcontract approved in writing as adequate by the Owner or Designer.

The Sub-Contractor agrees:

A. To be bound to the Contractor by the terms of the contract documents, and to assume toward the Contractor all the obligations and responsibilities that the Contractor, by those documents, assumes toward the Owner.

B. To submit to the Contractor applications for payment in such reasonable time as to enable the Contractor to apply for payment as specified.

C. To make all claims for extras, for extensions of time and for damages for delays or otherwise, to the Contractor in the manner provided in the general conditions for like claims by the Contractor upon the Owner, except that the time for making claims for extra cost is one week.

The Contractor agrees:

D. To be bound to the Sub-Contractor by all the obligations that the Owner assumes to the Contractor under the contract documents, and by all the provisions thereof affirming remedies and redress to the Contractor from the Owner.

E. To pay the Sub-Contractor, upon the payment of certificates, the amount allowed to the Contractor on account of the Sub-Contractor's work to the extent of the Sub-Contractor's interest therein.

F. To pay the Sub-Contractor, upon the payment of certificates, if issued otherwise as in section E above, so that at all times the Sub-Contractor's total payments shall be as large in proportion to the value of the work done by the Sub-Contractor.

G. To pay the Sub-Contractor to such extent as may be provided by the contract Documents or the subcontract, if either of these provide for earlier or larger payments than the above.

H. To pay the Sub-Contractor on demand for subcontract work or materials as far as executed and fixed in place, less the retained percentage, at the time the certificate should issue, even though the Designer fails to issue it for any cause not the fault of the Sub-Contractor.

I. To make no demand for liquidated damages or penalty for delay in any sum in excess of such amount as may be specifically named in the subcontract.

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J. That no claim for services rendered or materials furnished by the Contractor to the Sub-Contractor shall be valid unless written notice thereof is given by the Contractor to the Sub-Contractor during the first ten days of the calendar month following that in which the claim originated.

K. To give the Sub-Contractor an opportunity to present and to submit evidence in any progress conference or disputes involving subcontract work.

L. To pay the Sub-Contractor a just share of any fire insurance money received by him, the Contractor, under Article 26 of the General Conditions.

ARTICLE 35: DESIGNER'S STATUS

The Designer shall be the Owner's representative during the construction period and he shall observe the work in progress on behalf of the Owner. He shall have authority to act on behalf of the Owner only to the extent expressly provided in the contract documents or otherwise in writing, which shall be shown to the Contractor. He shall have authority to stop the work whenever such stoppage may be necessary in his reasonable opinion to insure the proper execution of the contract.

The Designer shall be, in the first instance, the interpreter of the conditions of the contract and the judge of its performance. The Designer shall side neither with the Owner nor with the Contractor, but shall use the Designer's powers under the contract to enforce its faithful performance by both.

In case of the termination of the employment of the Designer, the Owner shall appoint a capable and reputable Designer whose status under the contract shall be that of the former Designer.

ARTICLE 36: CASH ALLOWANCES

The Contractor shall include the contract sum and all allowances named in the contract documents and shall cause the work so covered to be done by such Contractors and for such sums as the Designer may direct, the contract amount being adjusted in conformity therewith. The Contractor declares that the contract amount includes such sums for expenses and profit on account of cash allowances, as he deems proper. No demand for expenses or profit other than those included in the contract shall be allowed. The Contractor shall not be required to employ for any such work, persons against whom the Contractor has a reasonable objection.

ARTICLE 37: USES OF PREMISES

The Contractor shall confine his apparatus; the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits or directions of

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the Designer, and as required by the Contract Documents, and shall not unreasonably encumber the premises with his materials.

The Contractor shall not load or permit any part of the structure to be loaded with a weight which will endanger its safety. The Contractor shall enforce the Designer's instructions regarding signs, advertisements, fires, and smoking.

If any part of the building is completed and ready for occupancy, the Owner may, by written and mutual consent, without prejudice to any of the Owner's rights or the rights of the Contractor enter in and make use of such completed parts of the building. Such use or occupancy shall in no case be construed as an acceptance of any work or materials.

ARTICLE 38: CUTTING, PATCHING AND DIGGING

The Contractor shall do all cutting, fitting or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other Contractors shown upon, or reasonable implied by, the drawings and specifications for the completed structure, and he shall make good after them as the Designer may direct.

Any cost caused by defective or ill-timed work shall be borne by the party responsible therefore. The Contractor shall not endanger any work by cutting, excavating or otherwise, and shall not cut or alter the work of any other Contractor save with the consent of the Designer. Cutting, drilling, or patching work of Contractors other than the general Contractor shall be done only with the permission and instruction of the general Contractor and Designer. Cutting of structural members must be approved by the Designer. All cutting, patching, and digging of other Contractors in or about the building shall be done under the supervision of the general Contractor who shall be responsible to see that the work is neatly done, and in a manner that will not endanger the structure or harm the component parts, and that patching and back filling shall be done to restore the structure and surfaces to its original condition.

ARTICLE 39: LAYOUT OF WORK

The Contractor shall be responsible for the correct staking out of the new work on the site, and shall employ a competent engineer/surveyor to locate the building on the site. He shall run the axis lines locating the work, establish correct datum points, and check each line and point on the site to insure their correctness. All such lines and points shall be carefully preserved throughout the construction.

The Contractor shall lay out all work from dimensions given on plans. The Contractor shall take measurements and verify dimensions of existing or old work, if any, that affect his work or to which his work is to be fitted. The Contractor alone shall be

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responsible for the correctness of all measurements and shall verify all grades, lines, levels, elevations and dimensions shown on the drawings and report any errors or inconsistencies to the Designer prior to commencing work.

ARTICLE 40: WORKMANSHIP

All workmanship, materials or equipment, either at the site or intended for it shall conform with all respects with the requirements of all the contract documents, and shall be strictly first class, workmanlike installation and the best obtainable from the crafts and trades. Incomplete or careless workmanship will not be allowed. In all cases the materials, equipment and work shall be equal to or better than the grade specified and the best of their kind that is obtainable for the purpose for which they are intended. The Designer's decision on the quality of work shall be final.

All labor shall be performed by mechanics skilled in their respective trades. Prior to submitting a proposal, the Contractor shall become familiar with the local labor conditions, skilled and unskilled.

If, in the opinion of the Contractor, any work is indicated on the drawings or specified in such manner as would make it impossible to produce work of the highest quality, or should discrepancies appear between drawings, or drawings and specifications, the Contractor shall refer the same in writing to the Designer for interpretation before proceeding with the work.

If the Contractor fails to make such reference, no excuse will be entertained thereafter for failure to carry out the work in the satisfactory manner.

The Contractor shall guarantee the Contractor's work against any defects in workmanship and materials for a period of one year from the date of the written final acceptance of the project.

ARTICLE 41: CLEANING UP

The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by his employees or work, and at the completion of the work he shall remove all his rubbish from and about the building and all his tools, scaffolding and surplus materials and shall leave his work "Broom Clean" or its equivalent, unless more exactly specified.

In case of failure to comply by the Contractor, the Owner may perform the cleanup and deduct the cost from any monies due the Contractor.

ARTICLE 42: DISPUTE RESOLUTION

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If, in the performance of this contract, there arises a dispute between the Contractor and the Owner that cannot be resolved by the parties to the contract, the dispute shall be referred to the Director of the Bureau of General Services who, at his/her discretion, will submit the dispute to non-binding Alternate Dispute Resolution (ADR) or binding arbitration. If the parties in dispute are not satisfied with the results of ADR the Owner or the Contractor may resubmit the dispute to the Director of the Bureau of General Services for binding arbitration.

In any non-binding Alternative Dispute Resolution (ADR) or binding arbitration between the Owner and the Contractor, the Owner may elect to consolidate related claims between the Owner and the Designer. Any mediator and/or arbitrator shall be subject to the mutual approval of the Owner, the Contractor and, as applicable, the Designer, such approval not to be unreasonably withheld by any party.

ARTICLE 43: COMPLETION TIME AND LIQUIDATED DAMAGES

a) The Date(s) of Completion is stated in the Proposal Form Section 2-B and in the Contract Form Section 2-E. If the Contractor finds it impossible to complete the Work on or before the said Date(s) of Completion, he make a written request to the Owner for an Extension of Time setting forth therein the reasons for the request. If the Owner finds that the Work was delayed because of conditions beyond the control and without the fault of the Contractor he may extend the Date(s) of Completion which will then be in full force and effect, the same as though it was the original Date(s) of Completion. b) Time is an essential element of the Contract and it is important the Work be pressed vigorously to Completion. The cost to the Owner of Administration of the Contract, inspection and supervision will be increased as the time occupied in the Work, is lengthened. c) For each calendar day that the Work shall remain uncompleted after the Date(s) of Completion specified in the Contract, the amount per day, listed below in the Schedule of Liquidated damages, shall be deducted from any money due the Contractor, not as a penalty but as liquidated damages, provided, however that due account shall be taken of any adjustment of the Date(s) of Completion granted under the provisions of Paragraph (a) above. d) The Contractor shall expressly be prohibited from filing delay claims or attempting to recover damages for its scheduled early completion. The Owner and Designer have not requested accelerated schedules and cannot accommodate the Contractor if he chooses to accelerate the Work. The Owner and Designer have designed the Project to be done in an orderly fashion which allows for bad weather, minor changes in the Work, and an orderly submittal and review process of materials and workmanship. Any Contractor choosing to bid the project with accelerated completions, earlier than those allowed by the phasing plan, has a duty to inform the project owner of the Contractor's intention to achieve early completion and he shall also note early completion as a qualification on his bid form. The Owner reserves the right to reject all bids containing limitations or qualifications.

SCHEDULE OF LIQUIDATED DAMAGES

Amount of

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<u>Damages</u>	<u>Liquidated</u>
<u>Original Contract Amount</u>	<u>Per Day</u>
More than \$ 100,000 and less than \$ 3,000,000	\$ 750.00
More than \$ 3,000,000 and less than \$ 7,000,000	\$ 1000.00
More than \$ 7,000,000 and less than \$ 10,000,000	\$ 1500.00
More than \$ 10,000,000	\$ 1500.00 plus \$ 150 per \$ 1,000,000

SECTION 01 00 00
GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The State of Maine, Standard General Conditions and Contract Work Section 3-A of this Contract shall apply to each and every contract and contractor or other person or persons supplying labor, material, equipment and/or services entering into this Project and/or on the premises directly or indirectly.
- B. Definitions:
 - 1. The word "Contractor" where used throughout this document to describe the General Contractor, shall also mean the "General contractor", both Contractor and General contractor describing the entity holding the prime Contract for Construction.
 - 2. The word "Owner" where used throughout this document shall also mean the "Owner's Project Manager".
 - 3. The word "provide" shall include furnishing and installing a product, materials, systems, and/or equipment, complete in place, fully tested and approved.
 - 4. The word "custom" when referring to a material, color, finish design, pattern, or configuration shall be understood to mean as selected or determined by the Architect, and shall in no way be limited to any of the published offerings of the supplier or manufacturer.
- C. Work Included in This Contract:
 - 1. Providing all labor, materials, equipment, and services, etc., as required to properly complete all Work identified in, implied by or otherwise required by the Construction Documents.
 - 2. Should the Construction Documents disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and/or materials, unless specifically otherwise directed by written Addendum to the Contract.
 - 3. The Contractor and all subcontractors shall refer to all of the Construction Documents, including those not specifically showing the Work of their specialized trades, and shall perform all work reasonably inferable from them as being necessary to produce the intended results.
- D. Work Excluded from This Contract:
 - 1. Providing equipment noted as "Not in Contract" (N.I.C.) or "By Owner," (B.O.). The Contractor shall, however, provide services and coordination related to items not in the Contract as otherwise required or implied by the Construction Documents.

1.02 GENERAL RESPONSIBILITIES OF THE CONTRACTOR

- A. Regulations: The Contractor shall fully comply with all governing Local, State and Federal Laws, Codes, Rules, Regulations and Ordinances, including but not limited to The Americans with Disabilities Act, Equal Employment Opportunity and Affirmative Action provisions, and Occupational Safety and Health Administration provisions.
- B. Permits: The Contractor shall apply for and obtain all permits required. The Contractor shall arrange for all necessary inspections and approvals from the authorities having jurisdiction. The Owner shall pay for all permits fees directly. Should any changes be necessary in the Construction Documents to secure such approvals, the Contractor shall promptly notify the Architect. It should be noted that DEP site permitting, is already completed.
 - 1. For the Owner's records, submit copies of permits, licenses, inspection reports, certifications, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing on the Work.
- C. Coordination: The Contractor shall be fully responsible for coordinating all construction activities to assure efficient and orderly installation of each part of the Work. In general coordination duties shall include, but not be limited to verifying dimensions and existing field conditions,

coordinating construction operations, establishing on-site lines of authority and communication, monitoring schedules and progress, monitoring quality, maintaining records and reports and in general assuring the proper administration of the Work.

1. Since the Construction Documents are complementary, before starting each portion of the Work, the Contractor shall carefully study and compare the various Drawings and other Construction Documents relative to that portion of the Work, as well as the information furnished by the Owner, shall take field measurements of any existing conditions related to that portion of the Work and shall observe and document any conditions at the site affecting it. Before starting the Work, and at frequent intervals during the progress thereof, the Contractor shall carefully study and compare the Construction Documents with each other and with the information furnished by the Owner and shall at once report to the Architect any error, inconsistency or omission the Contractor may discover. If the Contractor proceeds with the Work without such notice to the Architect, having discovered such errors, inconsistencies or omissions, or if by reasonable study of the Construction Documents the Contractor should have discovered such, the Contractor shall bear all costs arising therefrom.
 2. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
 3. Where installation of a component or system involves installation of component parts by multiple subcontractors, the Contractor shall inventory, store, and distribute parts to appropriate installers.
 4. Where structural, electrical, or mechanical components such as columns, ductwork, sprinkler piping, or raceways are installed in finished spaces, the intent is for room finish to enclose such components unless indicated otherwise. Coordinate between the trades and with the Architect.
 5. Where inspections or approval of a substrate or component to be concealed by another is required, coordinate construction activities and notification of Architect or inspecting party. Do not conceal substrate or component until it has been inspected and is satisfactory.
 6. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
 7. Make adequate provision to accommodate items scheduled for later installation.
 8. Coordinate completion and clean-up of Work in preparation of Substantial Completion.
 9. After Owner occupancy, coordinate access to site for correction of defective or incomplete Work to minimize disruptions to Owner's activities.
- D. Supervision – Construction Superintendent: The Contractor shall place and maintain a competent, experienced construction Superintendent/Foreman in charge of the Work on the job site at all times while work is in progress, including overtime operations by the Contractor's forces or by subcontractors. No changes in this position shall be made without the Owner's prior approval. The Owner shall have the right to review the qualifications of the proposed Superintendent/Foreman and ask for a replacement if in his opinion the person does not meet the qualifications that the project will demand. The same superintendent who was in charge during the general progress of the Work shall oversee the completion of all punch list items.
1. The Contractor shall be responsible for the strict enforcement of the following requirements:
 - a. All persons working on the Project site shall be required to conduct themselves in a courteous and professional manner. The use of profane language shall be strictly prohibited.
 - b. Smoking and alcoholic beverages shall be strictly prohibited on the Project site.
 - c. The use of radios, etc. shall be strictly regulated if they interfere with the Owner's ongoing building operation.
 - d. Contact with building occupants and visitors shall be minimized to the extent necessary for the safe and proper execution of the Work.

- E. On-Site Documents: The Contractor shall provide in a visible and accessible location in the on-site office:
1. Complete, currently updated set of Specifications and Drawings, Change Orders, reviewed Shop Drawings, and other documents and samples.
 2. Permits and notifications required by laws and regulations.
 3. Standards, manuals, installation instructions, or reports required by individual Specification sections.
 4. Product MSDS Sheets.
 5. List of Owner, Owner's Representative, Architect, Architect's Consultants, Contractor's project manager, superintendent, assistant superintendent, subcontractors, building inspector, police, ambulance and fire departments; include telephone numbers and fax numbers.
- F. Phasing and Work Scheduling
1. In planning his construction schedule within the agreed upon Contract Time, it shall be assumed that the Contractor has anticipated the amount of adverse weather conditions normal to that of Work for the season(s) of the year involved. Only those weather delays attributable to other than normal weather conditions will be considered by the Owner and Architect.
- G. Safety: The Contractor shall assume full responsibility for all means, methods, procedures, sequences and techniques of construction employed and shall take all measures required to ensure the safety of construction workers, as well as the safety of the general public. The Contractor shall take into full consideration and assure himself that all necessary barricades, fencing, and shoring are provided and that they comply with applicable regulations and standards of good practice. The public shall be guarded from all construction hazards and/or attractive nuisances. The construction site is nearby major public thoroughfares. Therefore, site safety is of the utmost importance. The Contractor shall pay all costs necessary for temporary partitioning, barricading, fencing, shoring, walks, ramps, enclosures, flashing lights, warning signs, security and safety devices required for the maintenance of a clean and safe construction site.
1. MSDS Sheets: The Contractor shall furnish copies of Material Safety Data Sheets to the Owner for all materials classified as hazardous or poisonous. MSDS for all materials shall be maintained with the Contractor in a file on-site.
- H. Environmental Regulations: The Contractor shall comply with all applicable environmental laws and regulations. Particular attention shall be paid to proper dust, fume and vapor control throughout the building and site.
- I. Hazardous Substances: The Architect's Scope of Services and responsibilities exclude the investigation, discovery, detection, identification, presence, leakage, release, use, handling, disposal, encapsulation, abatement, treatment, or removal of, or exposure of a person or persons to hazardous materials, pollutants, contaminants, or disease transmitting organisms, pre-existing or otherwise deposited in any form at the project, indoors or outdoors, at any time before, during or after construction, including but not limited to volatile organic compounds, petroleum products, bacteria, molds, fungus, asbestos or asbestos products, lead, radon, electro-magnetic frequency radiation or other radiation. Should any such substances be encountered, the Owner and Architect shall be promptly notified, in writing.
- J. Layout and Field Engineering: The Contractor shall be responsible for all layout of all Work, even if such layout is done by others. The Contractor shall employ a qualified field engineer or land surveyor to determine all lines and grades and to field verify existing job conditions and measurements indicated on the Drawings. The Contractor's responsibility includes but is not necessarily limited to levels, control points, base lines, on-site bench marks, reference points, siting of building and other improvements, locations of components, fixtures, equipment, finishes, site improvements, etc.
1. The Contractor shall be responsible to submit a certificate signed by land surveyor registered in the State of Maine, hired by the Contractor, certifying that the location of new

- building lines and location and elevation of improvements comply with the Construction Documents.
2. The Owner has generally identified on the existing conditions survey, existing topography, utilities, wetlands, control points, and property line corner stakes.
 3. The Contractor shall provide to the Architect written documentation to verify all layout. Include any deviations from the Construction Documents. Do not start any Work affected by such deviations until reviewed by the Architect.
 4. The Contractor shall be responsible for costs of survey work including but not necessarily limited to establishing and protecting on-site benchmarks, replacement or relocation of bench marks, additional base lines or levels, reference points, location of site improvements, verification of existing building dimensions, layout and floor elevations. All discrepancies shall be reported to the Architect for clarification.
 5. The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction. Verify the location and invert elevation at point of connection of sanitary sewer, storm drainage, and water service piping, etc.
 6. The Contractor shall maintain a surveyor's log of control and other survey work. Record deviations from required lines, and level, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.
 7. The Contractor shall carefully examine all buildings, sites, and Construction Documents prior to submitting his Bid and satisfy himself as to the conditions under which he must operate to perform the Work. No additional compensation will be made to the Contractor for any error or negligence on his part, nor for discrepancies between actual conditions found at the buildings and sites and as indicated in the Construction Documents, unless such discrepancies are brought to the attention of the Architect by a Bidder or Sub-Bidder, in writing, prior to the opening of Bids.
 8. The Drawings are generally made to scale, but all working dimensions shall be taken from the figured dimensions or by actual measurements at the job; in no case by scaling. Study and compare all the Drawings and verify all figures before laying out or constructing work. The Contractor shall be responsible for errors in his work that might have been avoided thereby. Whether or not an error is believed to exist, deviation from the Drawings and the dimensions given thereon shall be made only after approval in writing from the Architect.
- K. Protection of Adjoining Property: The Contractor shall provide all shoring, fencing, and other work necessary to support, protect and keep unharmed all walls, footings, floors, roofs, walks, roadways and all other parts of any existing buildings, facilities, site improvements, land forms, trees and plant materials, etc. The Contractor shall hold the Owner and Architect harmless from any such damage due to any operations under this Contract. Any existing work or property damaged or disrupted as a result of this Contract shall be replaced or repaired to match original existing conditions at no additional cost to the Owner.
- L. Utilities: The Contractor shall send proper notices, make all necessary arrangements and perform all other services required for the removal or the care, protection and maintenance of all utilities, including, but not limited to, mail boxes, fire plugs (hydrants), electric, gas, water, sewer, alarm, television, telephone, computer, and telegraph poles and wires, and all other items of this character above or below the ground, on and around the building site, assuming all responsibility and paying all costs related thereto. Related services to any existing facilities shall not be disrupted without the prior approval of the Owner, and then only to the minimum extent required. The Contractor shall comply with the "Underground Utility Damage Prevention System" by notification to DIG SAFE SYSTEM of intent to excavate near or around any underground utility installations. The Contractor shall call DIG SAFE SYSTEM at least 72 working day hours in advance of starting any such excavation.
- M. Traffic Regulations and Parking: The Contractor shall properly regulate traffic at times when the Work interferes with the normal flow of traffic both on and off the site. Parking for workers on

the project shall be limited to areas designated by the Owner or governing officials. Roadways and driveways outside the limits of the Contract shall be kept free of debris resulting from construction related traffic.

- N. Roads and Access to the Site: Access to the site for workers and the delivery or removal of construction materials and/or equipment shall be made only from locations approved by governing authorities and acceptable to the Owner. Existing roads, lanes and other required fire access shall remain accessible to fire vehicles at all times. Hauling permits and route approvals shall be obtained from governing authorities as applicable.
- O. Security: The Contractor shall be responsible for the securing of new and existing structures against the entry of unauthorized persons at all times, including nights, holidays and days when the buildings may be unoccupied.
 - 1. When construction related personnel are the last to leave either the new or existing facilities, they shall verify that the entire building perimeter is properly secured.
 - 2. When non-construction related personnel are the last to leave either the new or existing facilities, the Contractor shall verify that all unoccupied areas are properly secured, and shall record the names and affiliations of those persons remaining in the facilities.
- P. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of permanent fire protection facilities, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- Q. Dewatering: The Contractor shall protect the Work, including but not limited to all excavations, trenches, buildings and materials from storm water, ground water, back-up or leakage of sewers, drains or other piping, and from water of any other origin and shall control, collect and dispose of any accumulation of such water.
 - 1. Dewatering operations shall include, but not be limited to:
 - a. Furnishing, operating, and maintaining all pumps, piping, drains, and other equipment, including spare units available for immediate use in the event of equipment breakdowns.
 - b. Designing, engineering, constructing, maintaining and removing cofferdams, temporary underdrains, wellpoints and all other systems necessary for dewatering.
 - c. Disposing of all water in a safe and proper manner, acceptable to governing authorities.
 - 2. The Contractor shall pay all costs related to dewatering. All damage resulting from dewatering operations, or the failure of the Contractor to maintain the Work in a suitable dry condition, shall be promptly repaired by the Contractor at no additional cost to the Owner.
- R. Snow Removal: The Contractor shall remove all snow or ice which might result in damage or delay to the Work.
- S. Vandalism: The Contractor shall take all reasonable precautions necessary to prevent loss or damage caused by vandalism, theft, burglary, pilferage, or unexplained disappearance of property of the Owner, whether or not forming part of the Work, located within those areas of the Project to which the Contractor has access.
- T. Shipping and Storage of Materials: See Section 01 60 00 - Product Requirements.
- U. Owner Furnished Equipment: See Section 01 60 00 - Product Requirements.
- V. Watertight Structure: The Construction Documents are not intended to depict each and every condition or detail of construction. As the knowledgeable party in the field, the Contractor is in the best position to verify that all construction is completed in a manner that will provide a watertight structure during construction (i.e. as needed to keep all interior construction dry both during and following its installation) and upon completion of construction. The Contractor shall be solely responsible for ensuring the watertight integrity of the structure.
- W. Guarantee: The Contractor shall guarantee the entire Work to be free from defective or improper work or materials, and shall make good any damage due to such work or materials for

a term of one year from the date of the satisfactory completion and acceptance of the Work.
See Section 01 78 10 - Warranties.

1.03 MEASUREMENT AND PAYMENT

- A. Schedule of Values: Submit a preliminary sample of the Schedule of Values for review and comment regarding format and content to the Architect at the earliest feasible date, but in no case later than fourteen (14) days prior to submittal of the first Application for Payment. The Schedule of Values shall clearly identify the cost of the Work by trade, plus all General Conditions, Allowances, and accepted Alternates.
1. The format and general content of such schedule shall be acceptable to the Owner and Architect.
 - a. Round amount off to the nearest whole dollar; the total shall equal the Contract Sum.
 - b. No later than seven (7) days prior to submittal of the first Application for Payment, the Contractor shall submit to the Architect and Owner, the fully completed Schedule of Values.
- B. Payment Requisition: The Contractor shall submit to the Architect three original copies of "Application for Payment", AIA Forms G702 and G703, an itemized statement showing the original Contract Amount, the value of the Work to date, the amount previously approved, the amount presently requested and the balance remaining. Each copy shall be fully executed and properly signed and sealed.
1. Application for Payment entries shall match the Schedule of Values. Include amounts of Change Orders issued prior to the last day of the construction period covered by the application.
 2. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
 3. Progress payment dates shall be as established elsewhere in the Agreement. The Contractor shall submit a draft of the Application for Payment to the Architect sufficiently in advance of the due date to the Architect to allow for preliminary review and adjustments.
 4. The Contractor shall clearly differentiate between items stored on-site and items stored off-site. For off-site stored materials, provide invoices, list of materials, insurance certificate, right of entry, transfer of title, and other documents as may be required by the Architect and Owner.
 5. Provide invoices, vouchers, time sheets, and other documents as may be required by the Architect to verify labor and materials costs.
 6. Each Application for Payment shall be accompanied by a transmittal listing all attachments.
 7. Initial Application for Payment: The following administrative actions and submittals shall precede or coincide with the submittal of the first Application for Payment:
 - a. List of subcontractors, principal suppliers, and fabricators.
 - b. Schedule of Values.
 - c. Contractor's Construction Schedule (preliminary, if not final).
 - d. Contractor's Submittal Schedule (preliminary, if not final).
 - e. List of Contractor's staff assignments.
 - f. Copies of building permits, authorizations, and licenses from governing authorities.
 - g. Certificates of insurance.
 - h. Data needed to acquire Owner's insurance.
 - i. Initial Progress Report.
 - j. Performance and Payment Bonds, if applicable.
 8. Application for Payment at Substantial Completion: Submit an Application for Payment following issuance of the Certificate of Substantial Completion. The application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. See State of Maine, Standard General Conditions and Contract Work Section 3-A. The following administrative actions and submittals shall precede or coincide with the submittal of this Application for Payment:
 - a. Occupancy permits, as applicable.

- b. Warranties and maintenance agreements.
 - c. Testing / adjusting / balancing reports.
 - d. Maintenance instructions.
 - e. Meter readings, as applicable.
 - f. Start-up performance reports.
 - g. Change-over information related to Owner's occupancy, use operation and maintenance.
 - h. Final cleaning.
 - i. Application for reduction of retainage, and consent of surety.
 - j. Advice on shifting insurance coverage.
 - k. List of incomplete Work, recognized as exception to the Architect's Certificate of Substantial Completion, if any.
9. Final Application for Payment: This application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. See Article regarding Final Payment of the Agreement and State of Maine, Standard General Conditions and Contract Work Section 3-A. The following administrative actions and submittals shall precede or coincide with the submittal of the final Application for Payment:
- a. All items required by State of Maine, Standard General Conditions and Contract Work Section 3-A.
 - b. Completion of Project close-out requirements.
 - c. Completion of items specified for completion after Substantial Completion.
 - d. Assurance that unsettled claims will be settled.
 - e. Transmittal of required Project construction records, including Record Drawings to the Owner.
 - f. Proof that taxes, fees and similar obligations have been paid.
 - g. Removal of temporary facilities and services.
 - h. Removal of surplus materials, rubbish, and similar elements.
 - i. Return to the Owner all tools and equipment purchased as part of the Cost of the Work.
- C. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien for every entity who is lawfully entitled to file a lien arising out the Contract and related to the Work covered by the Payment. See State of Maine, Standard General Conditions and Contract Work Section 3-A.
1. The Contractor shall promptly execute a partial waiver of mechanics lien for the period of construction covered by each application. Executed waivers shall be submitted to the Architect with the submittal of the next Application for Payment by the Contractor. With each Application for Payment, submit partial waiver of mechanics liens from subcontractors, or sub-subcontractors and suppliers for the construction period covered by the previous application.
 2. When an application shows completion of an item, submit final or full waivers when retainage is released.
 3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit the final Application for Payment with or preceded by final waivers from every entity involved with the performance of the Work covered by the application who could lawfully be entitled to a lien. The total amount of each entity's final waiver of lien shall equal the Contact Sum for that entity including all additions and reductions thereto.
 5. Submit waiver of liens on the following forms, and executed in a manner, acceptable to the Owner:
 - a. Partial waiver of liens: Form provided by the Contractor and acceptable to the Architect and Owner.
 - b. Final waiver of liens: AIA G706A Contractor's Affidavit of Payment of Release of Liens or another form acceptable to the Architect and Owner.

- D. Schedule Update: Along with each payment requisition, the Contractor shall submit a report on the status of the next month's construction schedule. Each such monthly report shall update the progress of the Work and shall identify:
 - 1. Areas of the building and site expected to be worked on during the next month.
 - 2. Special conditions or circumstances that may affect the safe use of the building or site.

1.04 MODIFICATION PROCEDURES

- A. Minor Changes to the Work: Supplemental Instructions, authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, may be issued by the Architect.
- B. Architect / Owner Initiated Change Order Proposal Requests: The Architect shall issue Proposal Requests that describe proposed changes in the Work that may require adjustment to the Contract Sum and/or Contract Time. The Architect will provide supplemental sketches or revised Drawings and Specifications as necessary.
 - 1. Proposal requests are for information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.
 - 2. Unless otherwise indicated in the proposal request, within ten working days of receipt of the proposal request, the Contractor shall submit to the Architect and Owner for review, an estimate of cost necessary to execute the proposed change. Include an itemization of quantities, unit costs, etc. Include all related charges and a statement indicating the effect the proposed change will have on the Contract Time.
- C. Contractor Initiated Change Order Proposal Requests: The Contractor may propose changes when latent or other unforeseen conditions require modifications to the Contract, by submitting a request for a change to the Architect.
 - 1. Provide a complete description of the proposed change. Indicate the reason for the change and the effect of the change on the Work, the Contract Sum and the Contract Time. Include an itemization of quantities, unit costs, etc. and include all related charges. Comply with requirements for "Substitutions".
- D. Allowances: See Section 01 21 00 - Allowances. For allowance cost adjustment, base Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the measurement for work-in-place. Submit substantiation of all changes in Work claimed in the Change Orders. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.
 - 1. No change to the Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated. A change in the Contractor's indirect expense will only be allowed when it is clearly demonstrated that either the nature or scope of the Work was changed from that which could be foreseen from the description of the allowance and other information in the Construction Documents.
- E. Construction Change Directive: Construction Change Directives, containing descriptions of changes in the Work and designating methods to be followed to determine changes in the Contract Sum and/or Contract Time may be issued by the Architect.
 - 1. Maintain detailed records of time and materials related to the Work required by the Construction Change Directive. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
- F. Change Order Procedures: Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor, (5) copies to be provided (Architect, Contractor, Owner, DOE and BGS).

1.05 SUBSTITUTIONS

- A. Substitutions are changes, modifications or deviations in those products, materials, equipment, and methods of construction required by the Construction Documents proposed by the Contractor after the receipt of Bids. Substitutions for the convenience of the Contract or

subcontractors, or materials suppliers will only be considered if submitted prior to the receipt of Bids, in strict conformance with the Instructions to Sub-bidders. The following shall not be considered substitutions:

1. Changes, modifications, or deviations requested by Bidders during the bidding period and accepted prior to the receipt of Bids shall be considered as included in the Contact Documents and are not subject to the requirements of this Section.
 2. Revisions to Construction Documents requested by the Owner or Architect.
 3. Specified options of products or materials included in the Construction Documents.
 4. The Contractor's compliance with governing regulations and orders issued by governing authorities, subject to the Architect's prior written notice and approval.
- B. Substitution Requests: See Section 01 60 00 - Product Requirements, for substitution request procedures.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for requirements regarding submission of:
1. Outline Construction Schedule.
 2. Comprehensive Construction Schedule.
 3. Schedule of Materials.
 4. Schedule of Submittals.
 5. Shop Drawings, Product Data and Samples.
 6. Mock-ups and Sample Field Installations.
 7. Requests for Substitution

1.07 ELECTRONIC MEDIA

- A. Electronic Media: See Section 01 00 30 - Electronic Media, for information regarding obtaining the Construction Documents electronically and their limited use for purposes of project coordination, Contractor's use in the preparation of submittals, and Contractor's use in the preparation of Record Drawings.

1.08 QUALITY CONTROL

- A. General: The Owner shall employ an independent testing agency for the purpose of testing and inspecting portions of the Work in progress. The Contractor and his various subcontractors shall be responsible for specific testing and inspections as identified in individual specification sections. See Section 01 40 00 - Quality Requirements

1.09 TEMPORARY FACILITIES

- A. See Section 01 50 00 - Temporary Facilities and Controls, for information regarding:
1. Field offices and storage sheds.
 2. Project signs.
 3. Temporary utilities.
 4. Temporary stairs, hoists, and lifts.
 5. Temporary enclosures and heat.
 6. Sanitary facilities.
 7. Temporary protective covering of finished work.
 8. Temporary protection of existing facilities.
 9. Temporary fencing.
 10. Temporary fire protection.
 11. Temporary drainage and storm water control.
 12. Temporary parking and roads.
 13. Clean-up and waste removal.

1.10 PROJECT MEETINGS

- A. The Contractor shall schedule the following project meetings including but not limited to:
1. Pre-Construction Meeting.
 2. Pre-Installation Meetings.
 3. Coordination Meetings.

4. Job Meetings.
 5. Project Close-out Meeting.
 6. Other meetings as necessary.
- B. Pre-Construction Meeting: The Contractor shall conduct an initial organization meeting at the Project site or other convenient location after the Notice to Proceed and prior to commencement of construction activities. The Owner, Architect, Owner's Representative, Contractor, his Superintendent, major subcontractors, and other concerned parties shall each be represented at the meeting by persons familiar with and authorized to conclude matters related to the Work. The Contractor shall record the minutes of this meeting. The minutes shall be distributed promptly to all participants.
1. Agenda items shall include, but not be limited to:
 - a. Notice to Proceed
 - b. Designation of personnel representing the parties and their responsibilities.
 - c. Construction Documents: on-site documents, discrepancies or omissions, interpretations and clarifications.
 - d. Subcontractors
 - e. Schedule of Values
 - f. Insurance requirements.
 - g. Application for Payment: progress payments, Substantial Completion, off-site stored materials.
 - h. Project meetings.
 - i. Layout.
 - j. Scheduling: Construction schedule, working hours, overtime, holidays.
 - k. Permits and regulations
 - l. Testing and inspections.
 - m. Submittals: schedule, process, shop drawings, samples, record documents.
 - n. Substitutions.
 - o. Changes.
 - p. Job responsibilities: Superintendent, Owner's Representative.
 - q. Temporary facilities: parking, staging areas, site security, water, power, clean-up
 - r. Job safety.
- C. Pre-Installation Meetings: The Contractor shall conduct pre-installation meetings before each major construction activity that requires coordination is begun. Attendees may include the Contractor, Superintendent, Owner's Representative, Architect, Installers, Manufacturer's representatives, and fabricators. Refer to individual Specification Sections for required pre-installation meetings. Review progress of other construction activities and preparation for the particular activity under consideration.
- D. Coordination Meetings: The Contractor shall conduct coordination meetings at regularly scheduled times convenient to all parties. All major subcontractors shall be represented and other trades or subcontractors as required for coordination, planning and scheduling construction activities. The Contractor shall bring any significant issues to the next Job Meeting.
- E. Job Meetings: The Contractor shall conduct regular job meetings once every two weeks, or more frequently if required, during the construction period, at such time as is mutually acceptable to the Owner, Architect and Contractor. All major subcontractors shall be represented at each meeting as needed. Other trades or subcontractors may be called to particular job meetings as the progress of the Work requires. The Contractor shall record the minutes of each meeting. The minutes shall be distributed promptly to all participants.
1. Agenda items shall include, but not be limited to:
 - a. Review construction progress since the last meeting.
 - b. Review work progress in relation to the Construction Schedule.
 - c. Review "Old Business" and new items significant to the Work.
 - d. Review issues regarding construction activities and Owner's on-going occupancy.

- e. Review work sequence, deliveries, hazards, quality standards, housekeeping, security, etc.
- f. Review Change Orders, Proposal Requests, Requests for Information, Supplemental Instructions.
- g. The Contractor will distribute updated Construction Schedule once per month.

F. Project Close-out Meeting: See Section 01 78 00 - Project Close-out.

1.11 WARRANTIES

A. See Section 01 78 10 - Warranties, for requirements regarding submission of a bound set of warranties and certificates as required by the Construction Documents.

1.12 PROJECT CLOSE-OUT

- A. See Section 01 78 00 - Project Close-out, for requirements regarding:
- 1. Substantial Completion procedures, including Project Close-out Meeting and Occupancy Permit.
 - 2. Architect's evaluation of the Work.
 - 3. Final Acceptance procedures.
 - 4. Project record documents submittal, including O&M manuals, warranties binder, record photographs, and record drawings.
 - 5. Spare parts and extra materials procedures.
 - 6. Indoor Air Quality Management, building commissioning and systems testing.
 - 7. Operating and maintenance instructional sessions.
 - 8. Final cleaning.
 - 9. Contractor's Certificate of No Hazardous Materials.
 - a. Testing agency final report.
- B. Occupation by the Owner: The Owner shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding the fact that the time for completing the entire Work or such portions thereof may not have expired; but such possession and use shall not be an acceptance of the Work.

1.13 TIME FOR COMPLETION

- A. Time is of the essence of the Contract, and the Work to be performed under the Contract shall be commenced on or about **April 7, 2016 pending Agreement of Terms and Contract Execution (Final Date To Be Determined)**, and shall be Substantially Complete and in receipt of an Occupancy Permit on or before **August 1, 2018**.
- 1. The Contractor at his/her discretion, without any additional costs or any other means/methods of compensation by the Owner, may choose to substantially complete the scope of work prior to the specified date of August 1, 2018. However, under no circumstances shall the project be considered Substantially Complete prior to June 1, 2018.
- B. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for completion of the Work described herein is reasonable for the completion of same, taking into consideration the climatic and industrial conditions prevailing in this locality.

END OF SECTION

**SECTION 01 00 30
ELECTRONIC MEDIA**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The provisions of this Section apply to each and every contract and contractor or other person or persons supplying labor, material, equipment and/or services entering into this Project and/or on the premises directly or indirectly.
- B. Following the receipt of a written request by the Contractor, signed Electronic Data Transfer and Non-Disclosure Agreement, and if applicable, payment in full from the Contractor, the Architect will make available an electronic data version of the Project, for the limited purposes described in this Agreement. It shall be the Contractor's responsibility to make electronic files available to subcontractors in accordance with the Electronic Data Transfer and Non-Disclosure Agreement.

ELECTRONIC DATA TRANSFER AND NON-DISCLOSURE AGREEMENT

The Agreement is entered into and agreed by, between and among Lavallee Brensinger Professional Association (LBA), and TO BE DETERMINED (Recipient) and is made in reference to the Sanford High School and Technical Center, Sanford, Maine Project. It is understood and agreed that it may become desirable for LBA to make certain Instruments of Service in electronic machine readable format, hereinafter referred to as "Electronic Data" available to other parties related to the Project. It is also understood that such information is proprietary to LBA and that LBA intends to limit its distribution and use. It is the intent of the Agreement to govern all circumstances under which Electronic Data is made available by LBA.

In consideration of the request of TO BE DETERMINED (Recipient) to LBA to deliver to Recipient or otherwise enable the Recipient to access certain Electronic Data for use on the Project, the parties mutually agree as follows:

1. Electronic Data includes but is not limited to, computer-aided design files including native file formats (DWG), Building Information Models (BIM), files produced by word processing, spread sheet, scheduling, data base and other software programs. Computer-Aided-Design files shall be provided as Autocad.dwg files. Building Information Models shall be provided as Revit.rvt files.

2. The means by which the Electronic Data is transferred may include, but are not limited to, electronic mail, File Transfer Protocol sites and CD-Rom, transmitted between the parties in this Agreement. Recipient acknowledges that Electronic Data transferred in any manner or translated from the system and format used by LBA to an alternate system or format is subject to errors that may affect the accuracy and reliability of the data and that the data may be altered, whether inadvertently or otherwise. Accordingly, LBA makes no warranty, express or implied, as to the correctness, accuracy, and/or completeness of the information transferred. Although LBA may issue information throughout the development of the Project, LBA does not represent that the information provided includes all revisions to-date, nor shall LBA assume any responsibility for providing updated information as the Project proceeds.

3. LBA reserves the right to retain hard copy originals in addition to electronic copies of the Electronic Data transferred, which originals shall be referred to and shall govern in the event of any inconsistency with the transferred data. Should the recipient discover errors or conflicts in any transferred files, he shall promptly notify LBA.

4. As consideration to LBA for the transfer of the Electronic Data, Recipient agrees that the use of Electronic Data shall be entirely at his/her own risk, and that LBA shall not be liable for, and Recipient hereby waives all claims and agrees to indemnify and hold LBA harmless from all liabilities, claims, losses, damages or expenses (including attorneys' fees) arising out of, or connected with: (1) the transfer of Electronic Data by any means; or (2) the use, modification or misuse of the Electronic Data by parties other than LBA; or (3) the limited life expectancy and decline of accuracy or readability of the Electronic Data due to storage; or (4) translation and data errors; or (5) any use of the Electronic Data by any third parties receiving the data from other parties to this Agreement; or (6) the incompatibility of software or hardware used by LBA and the other parties to this Agreement.

5. The Electronic Data provided by LBA under the terms of this Agreement is the proprietary information of LBA, containing designs, details, model elements and other information developed by LBA. LBA is willing to supply such information only if the Recipient enters into this Non-Disclosure Agreement and agrees to strictly enforce its terms and conditions. All Electronic Data is to be treated as confidential and is not to be disclosed to or shared with any third parties, not expressly allowed herein, without LBA's express, written consent.

6. Recipient agrees to maintain and protect any and all proprietary information of LBA and to exercise great care in the preservation of its confidentiality. The Recipient will disclose the proprietary information only to its own employees, and then only to the extent required for the design and construction of this Project. The Recipient shall be responsible for any unauthorized use or disclosure of LBA's proprietary information by anyone to whom it may disclose such information.

7. The Recipient agrees that any and all Electronic Data shall remain the property of LBA. Neither the execution of this Agreement, nor the transfer of Electronic Data shall constitute a conveyance or transfer to the Recipient of any right, interest, or license in the proprietary materials. The Recipient shall not reproduce any proprietary information without the express written authorization of LBA.

8. Electronic Data are provided as a convenience to the Recipient for informational purposes only in connection with the Recipient's performance of its responsibilities and obligations relating to the Project. The Electronic Data do not replace or supplement the paper copies of the Drawings and Specifications which are and remain, the Construction Documents for the Project.

9. Electronic Data shall only be used for purposes allowable by this Agreement. It is understood and agreed that, without the separate express written permission of LBA to do so, the Electronic Data are not to be used for any purpose whatsoever, by anyone (any contractor or any of its subcontractors of any tier or any materials supplier or vendor) other than the Recipient. It shall be the responsibility of the Recipient to notify LBA of any and all third parties with whom the Recipient wishes to share LBA's Electronic Data, to identify the intended uses of the information, and to obtain LBA's prior written authorization to share LBA's information.

10. All transmittal of Electronic Data whether by CD-Rom, e-mail, Internet or any other methods shall require that the file name, size, date and time be recorded along with the date and time of transmission (if by electronic means) and the identity of the sender and recipient.

11. The Recipient further agrees to indemnify and save harmless LBA and its sub-consultant and each of their partners, officers, shareholders, directors and employees from any and all claims, judgments, suits, liabilities, damages, costs or expenses (including reasonable defense and attorneys' fees) arising as the result of either: 1) Recipient's failure to comply with any of the requirements of the Electronic Data Transfer Agreement; or 2) a defect, error or omission in the Electronic Data or the information contained therein, which defect error or omission was not contained in the Contact Documents as defined in paragraph 3 or where the use of such Contact Documents would have prevented the claim, judgment, suit, liability, damage, cost or expense.

12. This agreement shall be interpreted under the laws of the State of New Hampshire. The Recipient hereby agrees that the breach of this Agreement by the Recipient will cause LBA considerable harm, and LBA shall be entitled to recover damages, as well as all expenses and costs incurred by LBA arising out of or related to such breach, including, without limitation, reasonable attorney's fees and costs.

13. In general, the protocols for the distribution of Electronic Data shall be as follows:

- a. LBA may make certain Electronic Data available to TO BE DETERMINED (Recipient - MUST be Owner or General Contractor) free of charge, providing that:
 - 1) Such files can be issued in the format currently used by LBA, without modification.
 - 2) The Recipient delivers to LBA a fully executed copy of this Agreement and, among other requirements, agrees not to share LBA's Electronic Data with any third parties without LBA's prior written authorization.
- b. In the event the Recipient wishes to share LBA's Electronic Data with a third party:
 - 1) The Recipient shall first forward a complete list of all such third parties to LBA for LBA's prior written authorization. The list shall include all third party names, addresses, telephone numbers, and email addresses.
 - 2) Each individual third party shall then deliver, through the Recipient, a fully executed copy of this Agreement.
- c. In the event that it is necessary for LBA to convert files from its currently used format of Revit to an alternative format, LBA shall be compensated for such conversion at the rate of \$75.00 per file, payable in advance.

The parties have executed this Agreement as of the dates stated below:

RECIPIENT

Company: _____

By: _____

Title: _____

Date: _____

LBA

Title: _____

Date: _____

END OF SECTION

**SECTION 01 21 00
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cash Lump Sum and Unit Cost allowances.
- B. Inspecting and testing allowances.

1.02 RELATED REQUIREMENTS

- A. Section 01 00 00 - General Requirements: Additional payment and modification procedures.

1.03 QUANTITY ALLOWANCES

- A. Types of allowances required include Lump Sum allowances and Unit Cost allowances.
- B. All Allowances under this Section shall be included in the Base Bid and shall be carried by the Contractor, unless specifically indicated to be carried by a subcontractor.
- C. The Contract shall cause the work covered by these Allowances to be performed for such amounts and by such persons as the Owner may direct, but he will not be required to employ persons against whom he makes a reasonable objection.
- D. Costs Included in Cash Allowances: Cost of product or work by the Contractor or subcontractor, less applicable trade discounts, and other costs, if any, specifically included in the description of the Allowance.
- E. Costs Not Included in Allowances: Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing, unless specifically included in the description of the Allowance.
- F. Refer to related Drawings and Specifications for additional information regarding Work to be included as a part of Allowances.
- G. Architect Responsibilities:
 - 1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
 - 2. Select products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Change Order.
- H. Contractor Responsibilities:
 - 1. At the earliest practical date after award of the Contract, advise the Architect of the date when selection and purchase of each product or system described by an Allowance must be completed to avoid delaying the Work.
 - 2. Assist Architect in selection of products. Where services, products and/or systems are selected by the Owner, purchase such items from the designated supplier.
 - 3. Obtain proposals from suppliers and installers for use in making final selections and offer recommendations.
 - 4. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
 - 5. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
 - 6. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
 - 7. Submit invoices or delivery slips to show quantities of materials delivered to the site for use in fulfilling each allowance.
 - 8. Cost monitoring:
 - a. Monitor progress of Allowance costs and expenditures and regularly report to the Architect and Owner.

- b. Provide written advance notice to Architect and Owner if Allowance is likely to be exceeded.
 - c. Obtain Owner's written authorization prior to incurring costs in excess of the stated Allowance.
 - d. The Contractor shall assume responsibility for all costs in excess of the stated Allowance with failure to perform the above cost monitoring procedures.
- I. If the cost, when determined, is more than or less than the Allowance, the Contract Sum shall be adjusted accordingly by Change Order, which will include additional or reduced handling costs on the site, labor, installation costs, overhead, profit and other expenses resulting to the Contractor for any increase over or decrease from the original Allowance.

PART 2 - ALLOWANCES

2.01 LEDGE EXPORT ALLOWANCE

- A. The Base Bid shall require all ledge to be excavated, processed onsite and re-used as fill and gravel materials onsite (meeting material requirements of the civil drawings and specifications) per Civil Specifications. An additional ledge export allowance shall be carried within the Base Bid for the exportation of ledge from the site. The allowance shall include removal and proper off-site disposal of ledge (bedrock) for up to 5000 cu yds of ledge.
- B. Costs below the Base Bid quantity:
1. The Contractor shall survey, measure and document quantities of ledge removed throughout the Project on a weekly basis. Measurements and quantities will be reviewed by Architect.
 2. Variance from the Base Bid quantity shall be added or deducted with the unit prices for ledge removal in Section 01 22 00 – Unit Prices.
 3. Provide all necessary equipment, workers, and survey personnel as required.
 4. Measurement by Volume: Measured by cubic dimension using mean length, width and depth or thickness.
 5. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.
 6. Contractor's Engineer's Responsibilities: Sign surveyor's field notes or keep duplicate field notes, calculate and certify quantities for payment purposes.
 7. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this work measured, at the Owner's expense, by an independent surveyor acceptable to the Contractor
- C. Payment Procedures:
1. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.
 2. Payment will not be made for any of the following:
 - a. Products wasted or disposed of in a manner that is not acceptable.
 - b. Products not completely unloaded from the transporting vehicle.
 - c. Products placed beyond the lines and levels of the required Work.
 - d. Products remaining on hand after completion of the Work.
 - e. Loading, hauling, and disposing of rejected materials.
- D. Differences in cost will be adjusted by Change Order.

2.02 UNSUITABLE SOILS ALLOWANCE

- A. The Base Bid shall include an allowance for removal and proper off-site disposal of 16,000 cubic yards of unsuitable soil materials over excavation and backfilling with compacted fill materials. If unsuitable soils can be processed to meet requirements for common fill materials they may be permitted to be re-used on-site. See Civil Drawings and Specifications.

- B. Amounts above or below the Base Bid quantity:
1. The Contractor shall survey, measure, and document quantities of unsuitable soil removed throughout the Project on a weekly basis (beyond bearing elevations). Measurements and quantities will be reviewed by Architect.
 2. Variance from the Base Bid quantity shall be adjusted with the unit prices for unsuitable soils removal in Section 01 22 00 – Unit Prices.
 3. Provide all necessary equipment, workers, and survey personnel as required.
 4. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
 5. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.
 6. Contractor's Engineer's Responsibilities: Sign surveyor's field notes or keep duplicate field notes, calculate and certify quantities for payment purposes.
 7. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this work measured, at the Owner's expense, by an independent surveyor acceptable to the Contractor.
- C. Payment Procedures:
1. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.
 2. Payment will not be made for any of the following:
 - a. Products wasted or disposed of in a manner that is not acceptable.
 - b. Products not completely unloaded from the transporting vehicle.
 - c. Products placed beyond the lines and levels of the required Work.
 - d. Products remaining on hand after completion of the Work.
 - e. Loading, hauling, and disposing of rejected materials.
- D. Differences in cost will be adjusted by Change Order.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 22 00
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. List of unit prices, for use in preparing Bids.
- B. Measurement and payment criteria applicable to Work performed under a unit price payment method.
- C. Defect assessment and non-payment for rejected work.

1.02 COSTS INCLUDED

- A. Proposals/Bids shall not be based on the Unit Prices requested per this Section. As such, Unit Prices will not be requested on the Bid Form. Contractors will be required to provide the schedule of Unit Prices as a project submittal.
- B. Unit Prices shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit and insurance & bond.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantities indicated are for bidding and contract purposes only. Allowance Quantities and measurements of actual Work will determine the payment amount.

1.04 MEASUREMENT OF QUANTITIES

- A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
- B. Take all measurements and compute quantities. Measurements and quantities will be reviewed by Architect.
- C. Assist by providing necessary equipment, workers, and survey personnel as required.
- D. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
- E. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
- F. Measurement by Area: Measured by square dimension using mean length and width or radius.
- G. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.
- H. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.
- I. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.
- J. Contractor's Engineer Responsibilities: Sign surveyor's field notes or keep duplicate field notes, calculate and certify quantities for payment purposes.
- K. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this work measured, at the Owner's expense, by an independent surveyor acceptable to the Contractor.

1.05 PAYMENT

- A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

- B. Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from the transporting vehicle.
 - 4. Products placed beyond the lines and levels of the required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected Products.
- C. The decision as to whether or not to use the unit prices provided by the Contractor or employ some alternative method of compensation for changes in scope shall be at the sole discretion of the Owner, and the Owner's decision shall be considered final.

1.06 DEFECT ASSESSMENT

- A. Replace Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:
 - 1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Architect.
 - 2. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.
- C. The authority of Architect to assess the defect and identify payment adjustment is final.

1.07 SCHEDULE OF UNIT PRICES

- A. Item 1: Provide unit pricing for structural fill. Provide unit pricing for unsuitable soils which shall apply to quantities in excess of or below the Base Bid quantity identified in Section 01 21 00 – Allowances, as follow follows. In no instances shall the deduct price be no less than 80 percent of the add price.
 - 1. Unsuitable soils excavation and off-site disposal; \$ /cu yd.
 - 2. Unsuitable soils excavation and on-site processing for on-site reuse; \$ /cu yd.
 - 3. Unsuitable soils excavation and on-site disposal at a location approved by the Owner; \$ /cu.yd.
 - 4. Structural fill delivered, placed and compacted to 95% requirement: \$ /cu yd.
 - 5. Granular Borrow delivered, placed and compacted to requirement: \$ /cy yd.

**NOTE: Cubic Yard measurement shall be based on in-place volume

- B. Item 2: Provide unit pricing for ledge exportation which shall apply to only to ledge encountered in excess of what can be processed for re-use on site. Note: the quantity of ledge that may be exported from the site shall not exceed 5,000 cu yds. All other ledge is required to be processed on site for re-use (as part of the Base Bid). The Unit price listed below shall be used to bill against the Allowance set for ledge exportation which shall be carried in the Base Bid. See section 01 21 00 – Allowances.
 - 1. Mass rock excavation and off-site disposal; \$ /cu yd.
- C. Item 3: Electrical Devices: Provide unit pricing to furnish and install the following additional devices above and beyond such devices included within the Base Bid. Provide unit pricing for the following as indicated:
 - 1. Power outlet wired to nearest power source; \$/ completed device.
 - 2. Power outlet wired to nearest panel including 20 A breaker; \$ per completed device.
 - 3. IT / AV / Communication outlet wired to associated patch panel location; \$per completed device.
 - 4. Security Camera wired to associated system; \$per completed device.
 - 5. Card Access module wired to associated system; \$per completed device.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of alternates.
- B. The Contractor shall provide all labor, materials, equipment, and services, etc., necessary for the proper and complete execution of accepted Alternates including all mark ups. Amount of Alternate prices to be added to or deducted from the Base Bid shall be stated on the Proposal Form and shall include cost of any and all modifications made necessary by Owner's acceptance of Alternates.
- C. Related Work Described Elsewhere:
 - 1. Materials and methods to be used in the Base Bid and in the Alternatives are generally described in the Construction Documents.
 - 2. Method for stating the proposed Contract Sum is described in the Proposal Form.

1.02 RELATED REQUIREMENTS

- A. Section 3-A Standard General Conditions and Contract Work.
- B. Section 01 30 00 - Administrative Requirements
- C. Section 03 30 00 - Cast-in-Place Concrete
- D. Section 03 35 13 - Concrete Floor Finishing
- E. Section 04 20 00 - Masonry
- F. Section 07 53 00 – Elastomeric Membrane Roofing.
- G. Section 09 05 61 – Common Work Results for Flooring Preparation
- H. Section 09 30 00 - Tiling.
- I. Section 09 65 00 – Resilient Tile
- J. Section 22 13 00 - Sewers Drains and Site Piping
- K. Section 23 97 50 – Building Automation System.
- L. Section 26 11 90 – Underground Electric Work
- M. Section 26 51 00 – Lighting
- N. Section 32 12 16 – Asphalt Paving.
- O. Section 32 12 93 - Artificial Grass Turf
- P. Section 32 31 13 - Chain Link Fencing and Gates.

1.03 ACCEPTANCE OF ALTERNATES

- A. If the Owner elects to proceed on the basis of one or more of the described Alternates, make all modifications to the Work required in order to furnish and install the selected Alternate or Alternates to the approval of the Architect and at no additional cost to the Owner, other than as proposed on the Proposal Form.
- B. At the time of the award of the Contract, Alternates will be selected. At that time, the Contractor shall thoroughly and clearly advise all necessary personnel and suppliers as to the nature and extent of Alternates selected by the Owner. Use all means necessary to alert those personnel and suppliers involved as to all changes in the Work caused by the Owner's selection or rejection of Alternates.

- C. It shall be the responsibility of the Contractor to properly coordinate work related to Alternates with all other Work of this Contract in order to ensure that a complete and proper job is provided.
 - 1. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
- D. Submit a Schedule of Values including adjustments to all Sections affected by accepted Alternates.
- E. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted alternates will be identified in the Owner-Contractor Agreement. The Owner reserves the right to select as many or as few alternates as they deem fit, in any order or combination that they choose.
- F. Coordinate related work and modify surrounding work to integrate the Work of each alternate.

1.04 SCHEDULE OF ALTERNATES

- A. Alternate No.1 (Roof Protection Board)
 - 1. State the amount to be ADDED to the Base Bid to provide one layer of Roofing Protection Board over roof insulation for the specified roof system. See Section 07 53 00 – Elastomeric Membrane Roofing.
- B. Alternate No.2 (Concrete Brick at Rear Elevations)
 - 1. State the amount to be DEDUCTED from the Base Bid to provide Concrete Brick in lieu of Facing Brick Type 1 and Facing Brick Type 2 at rear elevations. Facing Brick Type 1 shall be changed to be Easy Brick by Genest, modular size, Port City Blend (or equivalent concrete brick product submitted per 01 60 00 - Product Requirements). Facing Brick Type 2 shall be changed to Easy Brick by Genest, modular size, Custom Color (or equivalent concrete brick product submitted per 01 60 00 - Product Requirements). See Section 04 20 00 - Masonry. See Architectural Drawings A2.07, A2.08, and A2.09 for locations this alternate.
- C. Alternate No.3 (Concrete Brick at Front Elevations)
 - 1. State the amount to be DEDUCTED from the Base Bid to provide Concrete Brick in lieu of Facing Brick Type 1 and Facing Brick Type 2 at front elevations. Facing Brick Type 1 shall be changed to Easy Brick by Genest, modular size, Port City Blend (or equivalent concrete brick product submitted per 01 60 00 - Product Requirements). Facing Brick Type 2 shall be changed to Easy Brick by Genest, modular size, Custom Color (or equivalent concrete brick product submitted per 01 60 00 - Product Requirements). See Section 04 20 00 – Unit Masonry. See Architectural Drawings A2.04, A2.05, A2.06, A2.09, and A2.10 for locations of this alternate.
- D. Alternate No.4 (Resilient Floor Tile and Ceramic Floor Tile)
 - 1. State the amount to be ADDED to the Base Bid to provide Resilient Floor Tile in lieu of Base Bid Sealed Colored Concrete Type 1 (SC-1A, SC1-B, SC-1C, SC-1D) at locations indicated on the Finish Schedule. Resilient Floor Tile shall be RF-2, RF-3, RF-4, RF-5, and RF-6. As part of this Alternate, provide porcelain floor tile Type PT-1 and matching base in lieu of Base Bid flooring at rooms: B126, B124, B224, B226, C128, C130, C219, C221, D126, D124, D203, D224, E133, E135, E233, E231. Alternate shall include all specified and necessary accessories, transitions, and sub-floor preparations. See Drawings AI0.02, AI0.03, AI0.04, AI0.05. See Section 03 35 13 - Concrete Floor Finishing, Section 09 05 61 – Common Work Results for Flooring Preparation, Section 09 65 00 – Resilient Tile, and Section 09 30 00 - Tiling.
- E. Alternate No.5 (Porcelain Tile at Main Spine Areas)
 - 1. State the amount to be ADDED to the Base Bid to provide Porcelain Tile and matching base in lieu of Base Bid Sealed Colored Concrete Type 1 (SC-1A, SC1-B, SC-1C, SC-1D)

at locations indicated on the Finish Schedule. Porcelain Tile shall be PT-6, PT-7, and PT-8, per the Finish Schedule. Alternate shall include all specified and necessary accessories, transitions, and sub-floor preparations. See Drawings AI0.02, AI0.03, AI0.04, AI0.05. See Section 03 35 13 - Concrete Floor Finishing, Section 09 05 61 – Common Work Results for Flooring Preparation, and Section 09 30 00 – Tiling.

- F. Alternate No.6 (Field Storage Building)
 - 1. State the amount to be DEDUCTED from the Base Bid to eliminate the Field Storage Building. Alternate shall include elimination of entire building structure and foundation. Plumbing and Electrical connections shown shall be provided to allow for future construction of the field storage building. See Drawing A8.01, Section 04 20 00 - Masonry.
- G. Alternate No.7 (Additional Fencing at Track)
 - 1. State the amount to be ADDED to the Base Bid to provide a second fence at the track, as shown on the Civil Drawings. See Drawing C12. See Section 32 31 13 - Chain Link Fencing and Gates.
- H. Alternate No.8 (Organic Infill at Turf)
 - 1. State the amount to be ADDED to the Base Bid to provide an Organic Infill System in lieu of Base Bid Crumb Rubber System at the synthetic Turf Field. Cost to include all accessories to achieve turf manufacturers recommended system using the organic infill materials specified. See Section 32 12 93 - Artificial Grass Turf
- I. Alternate No.9 (Turf Custom Logo)
 - 1. State the amount to be ADDED to the Base Bid to provide a Custom Logo as shown on the Drawings at the synthetic Turf Field. See Civil Drawings. See Section 32 12 93 - Artificial Grass Turf.
- J. Alternate No.10 (Emergency Access Road Paving)
 - 1. State the amount to be ADDED to the Base Bid to pave the emergency access road at the rear of the building, See Drawing C6, C7, and C10. See Section 32 12 16 – Asphalt Paving.
- K. Alternate No.11 (Vinyl Fencing)
 - 1. State the amount to be ADDED to the Base Bid to provide black vinyl coating for all chain link fencing and gates in addition to the specified metallic coating. Vinyl Coating system shall be Poly Vinyl Chloride (PVC) and Other Organic Polymer-Coated to meet the requirements of ASTM 688. Fused and adhered PVC coated fabric to be galvanized wire PVC-coated, Class 2b meeting requirements of ASTM F668. All framework and fittings to match. The cost increase shall assume that Alternate #7 has been accepted. See Section 32 31 13 - Chain Link Fencing and Gates, for other requirements.
- L. Alternate No.12 (Building Automation System / Controls Manufacturer)
 - 1. State the amount to be ADDED to the Base Bid (if any) to provide controls for the Building Automation System manufactured by Trane. Note that the specifications allow for multiple manufacturers, including Trane. The added costs stated for this alternate shall be to allow only Trane. See Section 23 97 50 – Building Automation System.
- M. Alternate No.13 (Stadium and Press Box Emergency Inverter)
 - 1. State the amount to be ADDED to the Base Bid to provide emergency lighting at the grandstands and walkways leading to the parking lot drive for occupants of the stadium. Provide a 2.4KW stand-by emergency lighting inverter (typical of DSPM #CPLUS-2.4-277/277-OCB/277/6/20A/1). The inverter shall be fed from panelboard P4NFF1. The lighting inverter shall be located in the electric room under the main grandstand. (2) circuits powering the walkway site poles, type P2H, closest to both grandstands shall be wired to the inverter. These site pole fixtures and wiring are covered under base bid, with wiring to the inverter under this alternates' scope. Provide (6) new LED floodlights (typical of Lithonia #DSXF3 LED-8-A530/40K-HMF-MVOLT-IS-VG-DBLXD) total, for coverage of the grandstands. At the main grandstand provide (2) floodlights mounted to the press box

and (1) at each end mounted to new 35' poles (typical of Lithonia #SSA-35-6J-T20-DBL) located directly behind the grandstand structure. Also provide (1) floodlight at each end of the visitors grandstand mounted to new 25' poles (typical of Lithonia #SSA-25-6J-T20-DBL) located directly behind the grandstand structure. Wiring for the pole mounted LED floodlights is to be in PVC conduit underground back to the grandstand electric room.

- N. Alternate No.14 (Concrete Brick at Front Elevations)
1. State the amount to be ADDED or DEDUCTED from the Base Bid to Metal Panel Type 1 in lieu of Facing Brick Type 1 at areas around the gymnasium, as indicated on the drawings. See Section 04 20 00 – Unit Masonry. See Section 07 42 13 – Metal Wall Panels. See Architectural Drawings A2.05, and A2.06 for locations of this alternate. Note that detail D1/A3.36 would change to detail J8/A3.33 above the locker rooms.
- O. Alternate No.15 (Site Signs)
1. State the amount to be DEDUCTED from the Base Bid to eliminate the three site signs shown on sheet A8.50. Alternate shall include elimination of entire building structure and foundation. Electrical connections shown shall be provided to allow for future construction of the signs.
- P. Alternate No.16 (Site Underdrain Reduction)
1. State the amount to be DEDUCTED from the Base Bid to eliminate all j-drains as indicated for baseball and softball fields as shown on the civil drawings C46, C47 and C48.

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electronic document submittal service.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Job meetings.
- E. Requests for Information.
- F. Construction reports.
- G. Construction Progress Schedule.
- H. Materials Schedule.
- I. Submittal Schedule.
- J. Coordination Drawings.
- K. Shop Drawings.
- L. Approval Drawings.
- M. Product Data, Certifications, Delegated-Design Submittals
- N. Submittals for review, information, and project closeout.
- O. Submittal procedures.
- P. Architect's Review

1.02 RELATED REQUIREMENTS

- A. Section 01 00 00 - General Requirements.
- B. Section 01 78 10 - Warranties.
- C. Section 01 78 00 - Project Close-out: Project record documents.

1.03 PROJECT COORDINATION

- A. Project Coordinator: Contractor.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for delivery access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect through the Project Coordinator:
 - 1. Requests for interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.

8. Progress schedules.
9. Coordination drawings.
10. Correction Punch List and Final Correction Punch List for Substantial Completion.
11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
 1. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 2. It is Contractor's responsibility to submit documents in PDF format.
 3. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
 4. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 5. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.
 6. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the contract sum.
- C. Training: Training for all users of the system shall be provided by the Contractor.
- D. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. Agenda:
 1. Introductions of attendees and their Project duties.
 2. Execution of Owner- Contractor Agreement.
 3. Submission of executed bonds and insurance certificates.
 4. Distribution of Construction Documents.
 5. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 6. Designation of personnel representing the parties to Contract and Architect.
 7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 8. Scheduling.
 9. Scheduling activities of a Geotechnical Engineer.
- B. Contractor shall record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

- A. The Contractor shall schedule a meeting at the Project site prior to his occupancy.
- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. Contractor's Superintendent.
 - 5. Major Subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements and occupancy prior to completion.
 - 3. Construction facilities and controls provided by Owner.
 - 4. Temporary utilities provided by Owner.
 - 5. Survey and building layout.
 - 6. Security and housekeeping procedures.
 - 7. Schedules.
 - 8. Application for payment procedures.
 - 9. Scope and procedures for testing and inspections. Review of Statement of Special Inspections and Testing Agency duties.
 - 10. Procedures for maintaining record documents.
 - 11. Requirements for start-up of equipment.
 - 12. Inspection and acceptance of equipment put into service during construction period.
- D. Contractor shall record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.04 JOB MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems that impede, or will impede, planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Maintenance of progress schedule.
 - 7. Corrective measures to regain projected schedules.
 - 8. Planned progress during succeeding work period.
 - 9. Maintenance of quality and work standards.
 - 10. Review of testing and inspection reports.
 - 11. Effect of proposed changes on progress schedule and coordination.
 - 12. Other business relating to Work.
- E. Contractor shall record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.05 CONSTRUCTION REPORTS

- A. The Contractor's superintendent shall maintain an on-site daily construction log, recording the following information concerning events at the site and allow access to the Owner and Architect for review.
1. List of subcontractors at the site.
 2. Approximate count of personnel at the site.
 3. Visitors at the site.
 4. High and low temperatures, general weather conditions.
 5. Accidents and unusual events.
 6. Meetings held at the site.
 7. Communications received or conveyed by the superintendent.
 8. Stoppages, delays, shortage, losses.
 9. Meter readings and similar recordings.
 10. Emergency procedures.
 11. Orders and requests of governing authorities.
 12. Testing agency observations and tests.
 13. Change orders received and implemented.
 14. Services connected, disconnected.
 15. Significant deliveries.
 16. Equipment or system tests and start-ups.
 17. Partial completions, occupancies.
 18. Substantial Completions authorized.
 19. Masonry reports.

3.06 REQUESTS FOR INFORMATION

- A. Immediately on discovery of the need for additional information or interpretation of the Construction Documents, Contractor shall prepare and submit an RFI in the form specified. All RFIs shall be submitted to the Architect through the Contractor.
- B. Content of the RFI shall include the Project name and number, date, name of Contractor, RFI number, assigned sequentially, RFI subject, Specification Section number and paragraph number, as applicable, Drawing and detail number as applicable, field dimensions and conditions as applicable, Contractor's suggested resolution and any impact on time or cost, Contractor's signature. Attach any sketches, descriptions, photos or other information relevant to fully describe items needing interpretation.
- C. RFI form shall be soft-ware generated including the above information and acceptable to the Architect.
- D. Architect's Action: Architect will review each RFI, determine action required and respond. Allow 10 working days for Architect's response to each RFI. Architect's action may include a request for additional information. If the Contractor believes the RFI response warrants a change in Contract Time or the Contract Sum, notify the Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain and submit an RFI log organized by RFI number. Submit log weekly. Include date RFI was submitted and date of Architect's response.
- F. On receipt of Architect's action, update RFI log and distribute response to affected parties. Notify Architect within 7 days if Contractor disagrees with response.

3.07 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review. All significant construction activities shall be represented. Time duration shall be in weekly increments. If work is planned in phases, provide scheduling for each phase. Schedules shall be coordinated with Owner's on-going occupancy, as applicable.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Time Frame: Schedule shall extend from date established for the Notice to Proceed to the date of Final Completion. Contract completion date shall not be changed unless specifically authorized by Change Order.
- E. Include important stages of construction and milestones including, but not limited to, Notice to Proceed, Completion of each phase, if applicable, Substantial Completion and Final Completion.
- F. Submit updated schedule with each Application for Payment.

3.08 CONTRACTOR'S SCHEDULE OF MATERIALS

- A. Within twenty-one (21) days after date established for the Commencement of the Work, prepare and submit to the Architect a projected schedule for materials delivery, clearly identifying all products with long lead times or which are likely to cause delay due to unavailability, extended delivery dates or any other reason. Once approved, long lead times shall be pre-ordered in a timely manner as not to delay the progress of the Work. The Contractor shall assume full responsibility for delays attributed to unavailability, insufficient time for delivery and/or installation of materials or performance of the Work, unless he has conformed with these instructions.

3.09 CONTRACTOR'S SUBMITTAL SCHEDULE

- A. Within ten (10) days after development and acceptance of the Contractor's Construction Schedule, prepare and submit to the Architect a complete schedule of submittals. Coordinate schedule with subcontractors and provide adequate time for review, processing and the possibility of non-acceptance and resubmission. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of ordering materials or performance of the Work to permit processing. Update schedule as necessary.

3.10 SHOP DRAWINGS

- A. Shop Drawings: Shop drawings include fabrication and installation drawings, coordination drawings, setting diagrams, schedules, patterns, templates, and similar drawings specially prepared for the Work by the Contractor, subcontractors, manufacturers, fabricators, suppliers or distributors to illustrate some portion of the Work.
 1. Shop drawings shall show the design, dimensions, connections, and other details necessary to ensure the accurate interpretation of the Construction Documents and shall show adjoining Work in such detail as required to provide for proper connection to same. Where adjoining Work requires shop drawings, they shall be submitted concurrently for a coordinated review.
 2. Submit information specifically prepared for this Project, drawn to accurate scale. Do not reproduce Construction Documents or copy standard information as the basis for shop drawings. Standard information prepared without specific reference to the Project is not considered a shop drawing. Clearly and specifically indicate deviations from the Construction Documents.
 3. In addition to the above, include the following information:
 - a. Dimensions and notation of dimensions established by field measurements.
 - b. Identification of products and materials included.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements and specific procedures.
 - e. Utility connections for equipment.
 - f. Identification of any change, variance or non-conformance with requirements of Construction Documents. Indicate with a "cloud" and provide detailed notation including reason for each change. Include completed "Contractor's Substitution Request" (See Section 01 60 00).

themselves available to meet with the Architect as required to resolve the issue(s) in question.

4. Coordination Drawings shall be required for all building structure, ductwork, and piping systems.

3.12 APPROVAL DRAWINGS

- A. Whenever the Contractor or subcontractor is required to submit Shop Drawings and/or Product Data to the Authority Having Jurisdiction over the Project for review and approval of a particular component or system, prior to starting on-site work, the Contractor shall submit to the Architect five (5) copies of the approved documents including the authority stamp and approving signature. Submit as "For Information Only".

3.13 RECORD DRAWINGS

- A. Record Drawings: See Section 01 78 00 - Project Close-out.

3.14 PRODUCT DATA

- A. Compile Product Data into a single submittal for each element of construction or complete system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, materials test reports, color charts, roughing-in diagrams, templates, and wiring diagrams. Mark each copy to show applicable choices and options.
 1. Identify any change, variance, or non-conformance with requirements of Construction Documents with a "cloud" and provide detailed notation including reason for each change. Provide a completed "Contractor's Substitution Request" (see Section 01 60 00).

3.15 CERTIFICATIONS

- A. Certifications from manufacturers and/or installers required in individual Specification Sections shall be submitted with Product Data.
 1. In accordance with State of Maine, Standard General Conditions and Contract Work Section 3-A, prior to Substantial Completion, the Contractor shall submit a written certificate that no asbestos and/or other hazardous substances have been incorporated into the Work of this Project.
 2. Contractor's Asbestos/Hazardous Material Certification with the following language:
 - a. I, _____ the undersigned representing _____ (company), do hereby certify that the products furnished and/or fabricated and/or installed by my firm under contract with _____ (G.C.) at the Sanford High School and Technical Center located in Sanford, Maine does not contain asbestos and /or other hazardous materials.
 - b. Provide signature, title and date.
 - c. The form of certificate shall be submitted to the Architect for review prior to use.

3.16 DELEGATED-DESIGN SUBMITTALS

- A. Where professional engineering services or certifications by a professional engineer are specifically required to be provided by the Contractor, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are not sufficient to perform services or certifications required, submit a written request for additional information to the Architect.
 2. In addition to Shop Drawings, Product Data, and other required submittals, submit a certification, signed and sealed by the responsible professional engineer, licensed in the State of Maine, for each product and system specifically assigned to the Contractor to be engineered or certified by a professional engineer, indicating that the products and systems are in compliance with performance and design criteria indicated. Include a list of codes, loads, and other factors used in performing these services.

3.17 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit for review:
 1. Product data.
 2. Shop drawings.

3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Construction Documents.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

3.18 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit for information:
1. Design data.
 2. Certificates.
 3. Test reports.
 4. Inspection reports.
 5. Manufacturer's instructions.
 6. Manufacturer's field reports.
 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator. No action will be taken.

3.19 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual Sections, submit them at project closeout:
1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.20 NUMBER OF COPIES OF SUBMITTALS

- A. Documents for Review: Submittals to the Architect shall be electronic files in PDF format, unlocked, markable and reproducible. In addition to electronic files, the following types of submittals shall also be submitted in hard copy, quantity indicated:
1. Steel rebar (2).
 2. Structural steel and deck (2).
 3. Doors and Frames (1).
 4. Door hardware (1).
 5. Millwork and casework (1).
 6. Sprinkler shop drawings (2).
 7. Fire alarm shop drawings (2).
 8. Small Size Sheets, Not Larger Than 11 x 17 inches.
 9. Large Size Sheets, Not Larger Than 30 x 42 inches.
- B. Documents for Information: Submit three copies.
- C. Samples: Confirm with the Architect the number of samples required for each submittal; one of which will be retained by Architect.
1. After review, produce duplicates.
 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.21 SUBMITTAL PROCEDURES

- A. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Construction Documents and coordinating related Work.

2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.
- B. Transmit each submittal with a copy of approved submittal form.
- C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- D. Submittal form shall include identification information: Project name, Contractor, Subcontractor or supplier; product name, pertinent drawing and detail number, and specification section number, submittal category, date, and total number of pages in the submittal.
- E. Contractor's Action and Certification: The Contractor shall review each submittal, check for compliance with the Construction Documents, note corrections, note field dimension, and complete a review stamp with the following information:
 1. Contractor stamp, signed or initialed certifying that the submittal conforms to requirements of the Construction Documents in accordance with State of Maine, Standard General Conditions and Contract Work Section 3-A.; or, Submittal deviates from requirements of the Construction Documents, with deviations clearly noted and marked with Contractor's initials; or, Contractor's substitution requested.
- F. Deliver submittals to Architect at business address. Submittals may only be sent directly to the Architect's consultants by special arrangement with the Architect. Subcontractors shall not directly send submittals to the Architect.
 1. Concurrently, deliver an electronic copy of all submittals to the Owner's representative.
- G. Submittals of poor legibility may be returned without action.
- H. Submittals not including a completed Contractor's Certification will be returned without action.
- I. Submittals certified as in conformance by the Contractor and found to deviate from requirements of the Construction Documents will be returned without action.
- J. The Contractor may require sub-contractors to submit similar certification, however this shall not in any way relieve the Contractor of responsibility for review and certification of all submittals.
- K. All notations made on submittals by the Contractor, sub-contractors, suppliers, or fabricators shall be made in bold line type and initialed by person making the notations. Clearly indicate specified items with a "cloud" or arrows. Cross out all extraneous information not intended as part of the submission. Do NOT use highlighter or colored markings, only arrows, circles, text and the like that can be copied in black and white shall be allowed.
- L. Provide a detailed notation of all deviations from the Contract Document requirements including minor variations and limitations, and the reason for each deviation. Include a Contractor's Substitution Request.
- M. Contractor's Substitution Request: All requests for substitutions shall be submitted on the form included at the end of Section 01 60 00.
- N. Schedule submittals to expedite the Project, and coordinate submission of related items.
- O. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- P. Identify variations from Construction Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- Q. Provide space for Contractor and Architect review stamps.
- R. When revised for resubmission, identify all changes made since previous submission.
- S. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- T. Submittals not requested will not be recognized or processed.
- U. Do not order materials or proceed with the Work requiring submission and review of Product Data, Shop Drawings, Samples or similar submittals prior to receiving acceptance of the submittal from the Architect.

- V. The Contractor shall not use or take submittals on-site without the Architect's or the Architect's consultant's Submittal Stamp indicating acceptance. Submittals without this stamp or with a stamp indicating non-acceptance shall not be used in connection with construction.

3.22 ARCHITECT'S REVIEW

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal and mark to indicate action taken.
1. In general, the Architect will strive to complete his review of submittals and return them to the Contractor in approximately two (2) weeks. Additional time may be required if large volumes of submittals are simultaneously delivered to the Architect for review. Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow three (3) weeks for initial review of each submittal.
 2. The Architect will not review submittals of colors and finishes until submittals for all such related materials are complete and delivered for collective review. This same requirement may be extended to other components and systems as deemed appropriate by the Architect.
 3. The Architect's review shall, among other limitations, not include the calculation, coordination, or verification of dimensions or quantities, which shall be the sole responsibility of the Contractor.
 4. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows to indicate the action taken:
 - a. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken", that part of the Work covered by the submittal may proceed provided it complies with requirements of the Construction Documents.
 - b. Final-but-Restricted Release: Where submittals are marked "Note Markings" or "Comments Attached" or "Revise and Resubmit Record Copy", that part of the Work covered by the submittal may proceed provided it complies with markings / comments and requirements of the Construction Documents.
 - c. Returned for Resubmittal: Where submittals are marked "Revise and Resubmit for Further Review", do not proceed with that part of the Work covered by the submittal including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat as necessary to obtain a different action mark.
 - d. Rejected: When the submittal is marked "Rejected", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Do not resubmit that product.
- B. Other Action: Where a submittal is primarily for record purposes, the submittal will be returned marked "Received and Distributed for Record Only". Where a submittal cannot be reviewed due to lack of Contractor review or illegibility, for example, the submittal will be returned marked "Returned No Action".

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. References and standards.
- B. Quality assurance submittals.
- C. Samples, Mock-ups and Sample Field Installations.
- D. Control of installation.
- E. Tolerances.
- F. Testing and inspection services.
- G. Manufacturers' field services.

1.02 RELATED REQUIREMENTS

- A. Section 01 00 00 - General Requirements.
- B. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- C. Section 01 45 33 – Code-Required Special Inspections.

1.03 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2014.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2013.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 – Administrative Requirements, for submittal procedures.
- B. Contractor's Testing Agency Qualifications: Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
- B. Contractor's Test Reports: After each test/inspection, promptly submit one copy of reports to Architect, Engineer, Building Official and to Owner. Information required on Test Reports shall be as identified herein for the Owner's Testing Agency.
- C. Certificates: When specified in individual Specification Sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the

Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

- E. Manufacturer's Field Reports: Submit reports within 10 days of observation to Architect and Owner for their information.
- F. Erection Drawings: Submit drawings to the Architect and Owner for their information.
 - 1. Submit for information for the sole and limited purpose of generally assessing conformance with the design intent expressed in the Construction Documents.
 - 2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.05 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Construction Documents, except where a specific date is established by applicable code.
- C. Should specified reference standards conflict with Construction Documents, request clarification from Architect before proceeding.

1.06 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Quality control services include inspections, tests, and related actions including reports performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Architect.
- B. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
- C. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
- D. Inspections, tests and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
- E. Requirements for the Contractor to provide quality control services as directed by the Architect, Owner, or authorities having jurisdiction are not limited by the provisions of this Section.
- F. The Owner will employ and pay for services of an independent testing and inspection agency(s) to perform Special Inspections and certain other specified testing.
- G. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Construction Documents.
- H. Testing and Inspection Agencies Quality Assurance:
 - 1. Testing agency: Comply with requirements of ASTM E 329, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, and ASTM D 3740.
 - 2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
 - 3. Laboratory: Authorized to operate in the State in which the Project is located.
 - 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
 - 5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

1.07 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by Special Inspectors as indicated in the Statement of Special Inspections, appended to Section 01 45 33 – Code-Required Special Inspections. Special Inspectors shall:

1. Verify that manufacturer maintains detailed fabrication and quality-control procedures and review the completeness and adequacy of those procedures to perform the Work.
2. Notify AHJ, Architect, Structural Engineer of Record, Contractor and Owner promptly of irregularities and deficiencies observed in the Work during performance of its service.
3. Submit a certified written report of each test, inspection, and similar quality-control service to AHJ, Architect, Structural Engineer of Record, Owner and Contractor.
4. Submit a final report of special tests and inspections, identifying any unresolved deficiencies to AHJ, Architect, Structural Engineer of Record, Owner and Contractor.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Construction Documents.
6. Retesting and re-inspecting corrected work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Construction Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 SAMPLES, MOCK-UPS AND SAMPLE FIELD INSTALLATIONS

- A. Tests shall be performed under provisions identified in this Section and identified in the respective product Specification Sections.
- B. Assemble and erect specified items at full scale, with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. The purpose of mock-ups and sample field installations shall be to clearly establish standards of quality for the Work prior to proceeding with the Work itself. They shall be constructed in sizes, locations and quantities as directed by the Architect.
- D. To the extent possible, all samples, mock-ups and sample field installations accepted by Architect shall be preserved until the Work itself has been completed and accepted by the Architect. The alteration, destruction or removal of mock-ups and sample installations shall not commence without the Architect's prior authorization.
- E. The Contractor and/or his subcontractors shall construct or prepare all samples, mock-ups and sample field installations as required in individual Specification Sections or as directed by the Architect.
- F. Sample field installations are full sized, fully fabricated, cured, and finished built in-place assemblies that maybe permanent if acceptable to the Architect.
- G. Samples shall be clearly marked with the manufacturer's name, generic description of the sample and compliance with required standards. Where samples are for selection of color,

pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

- H. All costs related to providing, maintaining and removing required samples, mock-ups and sample field installations shall be paid by the Contractor.

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Construction Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

- A. See Section 01 45 33 - Code Required Special Inspections, and individual Specification Sections for testing and inspection required.
- B. Testing Agency Duties and Responsibilities:
1. Test samples of mixes submitted by Contractor.
 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 3. Perform specified sampling and testing of products in accordance with specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Construction Documents.
 5. Promptly notify (within 24 hours) Owner, Architect and Contractor of observed irregularities or non-conformance of Work or products during performance of its services.
 6. Perform additional tests and inspections required by Architect.
 7. Submit written reports of all tests, inspections or other services to the Architect, Owner, Contractor and local Building Authority. Reports indicating compliant inspections shall be submitted within three (3) days. Reports shall include:
 - a. Date of issue.
 - b. Project name and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making tests or inspections.
 - f. Designation of the Work and test method.
 - g. Identification of product and Specification Section.
 - h. Complete inspection or test data.
 - i. Test results and interpretations of test results.
 - j. Ambient conditions at time of sample taking, testing, or inspection.
 - k. Comments or professional opinion regarding whether inspected or tested Work complies with the Construction Documents.
 - l. Recommendations for re-testing.
 - m. Name and signature of laboratory inspector.
 8. The Masonry Inspector shall submit daily Masonry Inspection Reports as prescribed in Section 04 20 00: Unit Masonry.
 9. The Testing Agency shall maintain a complete deficiency list of all items not corrected and shall re-test and/or re-inspect as required after each deficiency has been corrected. All such re-testing and re-inspection shall be at the Contractor's expense. The Testing Agency shall submit a final signed report, stating whether or not all corrections have been made and the Work tested and inspected conforms to the Construction Documents.
 10. Limits on Testing/Inspection Agency Authority:
 - a. Agency may not release, revoke, alter, or enlarge on requirements of Construction Documents.
 - b. Agency may not approve or accept any portion of the Work.

- c. Agency may not assume any duties of Contractor.
 - d. Agency has no authority to stop the Work.
- C. Owner Responsibilities:
- 1. The Owner will provide Special Inspections, observations, inspections, tests and similar quality control services specified to be performed by independent agencies, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity. The costs for Owner provided testing and inspection services shall be paid for by the Owner.
 - 2. The Owner will employ directly an independent agency, testing laboratory, or other qualified firm to perform services that are the Owner's responsibility. Such inspections and tests may include, but shall not be limited to:
 - a. Soils Analysis and Bearing Capacity.
 - b. Subgrade Preparation.
 - c. Soils Compaction.
 - d. Bituminous Pavement Mix Design and Compaction.
 - e. Concrete Reinforcement.
 - f. Cast-In-Place Concrete.
 - g. Mortar and Grout.
 - h. Unit Masonry (testing during construction).
 - i. Masonry Observation/Inspection.
 - j. Structural Steel, Steel Joist and Steel Deck.
 - k. Fireproofing.
 - l. Firestopping.
 - m. Substrate moisture testing for finishes.
 - n. Other testing specified to be by Owner required under individual Specification Sections.
- D. Contractor Duties and Responsibilities:
- 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections and provide storage and curing of test samples.
 - 4. Scheduling: Notify Testing Agency, Special Inspector, Owner's Representative and, Architect [sufficiently in advance of operations] to allow for the proper assignment of personnel and scheduling of testing and inspections.
- E. Re-testing:
- 1. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by the Special Inspector and/or Architect.
 - 2. Re-testing required because of non-conformance to specified requirements shall be paid for by the Contractor.
 - 3. The Contractor is responsible for re-testing where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with the Contract Document requirements, regardless of whether or not the original test was the Contractor's responsibility. Cost of re-testing construction revised or replaced by the Contractor is the Contractor's responsibility.
- F. Contractor's Testing and Inspections: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity. Costs for these services shall be included in the Contract Sum.

2. The Contractor shall employ and pay an independent testing agency to perform quality control services, including but not limited to inspections, sampling and tests required for determining the suitability of materials prior to delivery to the site and other services as specified in the Specification Sections. Such inspections and tests shall include, but may not be limited to the following:
 - a. Analysis of loam.
 - b. Off-site borrow.
 - c. Concrete mix designs and pre-construction tests.
 - d. Pre-construction unit masonry testing.
 - e. Sealant testing.
 - f. Elevator and Lifts.
 - g. Electrical systems.
 - h. HVAC systems.
 - i. Piping systems.
 - j. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.

3.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Report in writing, observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 45 33
CODE-REQUIRED SPECIAL INSPECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 40 00 - Quality Requirements: General requirements for testing and inspections.
- C. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 DEFINITIONS

- A. Code or Building Code: 2009 Edition of the International Building Code, as amended by Maine, Chapter 17 - Structural Tests and Inspections, of same.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Construction Documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.04 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- B. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.
- C. AISC 360 - Specification for Structural Steel Buildings; 2010.
- D. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.
- E. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2012.
- F. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete; 2010.
- G. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- H. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.
- I. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.
- J. ASTM E605 - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2011.

- K. ASTM E736 - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2011.
- L. AWCI 125 - Technical Manual 12-B: Standard Practice for the Testing and Inspection of Field-Applied Thin Film Intumescent Fire-Resistance Materials; 1998.
- M. AWS D1.1 - Structural Welding Code - Steel; 2011 w/Errata.
- N. AWS D1.3 - Structural Welding Code - Sheet Steel; 2008.
- O. AWS D1.4 - Structural Welding Code - Reinforcing Steel; 2011.
- P. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.
- Q. IAS AC291 - Accreditation Criteria for Special Inspection Agencies; 2012.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Special Inspectors: Prior to the start of work, proposed Special Inspectors shall submit their qualifications to the AHJ for review and acceptance.
- C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency shall submit the following to the AHJ, Architect, Structural Engineer of Record, Owner and Contractor:
 - 1. Agency name, address, and telephone number, and names of full time licensed Engineer and responsible officer.
 - 2. Copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 - 3. Documentation that Testing Agency is accredited by IAS according to IAS AC89.
- D. Smoke Control Testing Agency Qualifications: Prior to the start of work, the Testing Agency shall submit the following to the AHJ, Architect, Owner and Contractor:
 - 1. Agency name, address, and telephone number, and names of full time licensed Engineer and responsible officer.
 - 2. Documentary evidence that agency has appropriate credentials and documented experience in fire protection engineering, mechanical engineering and HVAC air balancing.
 - 3. Submit documentation that Testing Agency is accredited by IAS according to IAS AC89.
- E. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector shall promptly submit copies of report to Architect, Structural Engineer of Record, Contractor, Owner's Representative and AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of fabricated item and specification section.
 - f. Location in the Project.
 - g. Results of special inspection.
 - h. Verification of fabrication and quality control procedures.
 - i. Conformance with Construction Documents.
 - j. Conformance to referenced standard(s).
- F. Test Reports: After each test or inspection, promptly submit copies of report to Architect, Structural Engineer of Record, Contractor, Owner's Representative and AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.

- e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test or inspection.
 - h. Date of test or inspection.
 - i. Results of test or inspection.
 - j. Conformance with Construction Documents.
- G. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect, Structural Engineer of Record, Contractor, Owner's Representative and AHJ, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- H. Special Inspection Reports: After each special inspection, all Special Inspectors and Testing Agencies shall promptly submit copies of report to Architect, Structural Engineer of Record, Contractor, Owner's Representative, and AHJ at intervals identified on the Statement of Special Inspections.
1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. ICC, AWS and ACI certification #'s.
 - f. Identification of product and Specifications Section.
 - g. Location in the Project.
 - h. Type of special inspection.
 - i. Date of special inspection.
 - j. Results of special inspection.
 - k. Conformance with Construction Documents.
 2. Final Special Inspection Report: Each Special Inspector shall submit a Final Report upon the conclusion of each special inspection regime. Document special inspections and correction of failed testing and inspections, corrective action and successful re-tests in a final report to be submitted to the AHJ, Architect, Structural Engineer of Record, Owner and Contractor.
 3. The Architect as Registered Design Professional in Responsible Charge shall assemble all Final Reports submitted by the Special Inspectors, determine that all required test and inspection reports have been submitted, and submit a Project Final Report Summary to the AHJ, Owner and Contractor.

1.06 TESTING AND INSPECTION AGENCIES

- A. The Owner shall employ services of independent inspection and testing agency and/or agencies to perform Special Inspections required by the building code.
 1. The Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.
- B. Employment of agency(s) in no way relieves the Contractor of obligation to perform the Work in accordance with requirements of the Construction Documents.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

1.01 SCHEDULE OF SPECIAL INSPECTIONS

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous, periodic, or aperiodic.
1. Continuous Special Inspection: Approved individual of the Special Inspection agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.
 2. Periodic Special Inspection: Approved individual of the Special Inspection agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.
 3. Aperiodic Special Inspection: Approved individual of the Special Inspection agency shall be present in the area where work is being performed and observe the work irregularly scheduled as required or as needed.

1.02 TESTING AGENCY AND INSPECTORS DUTIES AND RESPONSIBILITIES

- A. See Section 01 40 00 – Quality Requirements, for the duties and responsibilities of the testing agency and inspectors.

1.03 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. See Section 01 40 00 – Quality Requirements, for the duties and responsibilities of the Contractor.

1.04 STATEMENT OF SPECIAL INSPECTIONS

- A. See the appended Statement of Special Inspections following this Section, for the scope of required testing and inspections for this Project.

END OF SECTION

Statement of Special Inspections
 Sanford High School and Technical Center

Bid Documents
 11 February 2016

Project Name: Sanford High School and Technical Center
 Location: Sanford, Maine

Owner: Sanford School Department
 917 Main Street Suite 200, Sanford, Maine 04073

Maine Department of Education
 23 State House Station, Augusta, Maine 04333-0023

Architect of Record (AoR): Chris Drobat, President 603-622-5450
 & Registered Design Professional Lavallee Brensinger Architects
 in Responsible Charge (RDPiRC): 155 Dow St. Manchester, NH

Structural Engineer of Record (SER): Ethan Rhile, P.E. 207-879-1838x101
 Becker Structural Engineers Inc

Testing Agency(s) (TA): To Be Determined

Geotechnical Engineer (GE): Timothy J. Boyce, P.E. 207-657-2866
 S.W. Cole Engineering Inc

Commissioning Agency (CA): Deborah Kay Nicolini, P.E. 978-296-6200
 RDK Engineers

Specialty Engineer(s) (SE): Jeremy Mason, P.E. 781-787-3500
 Howe Engineers, Inc.

This Statement of Special Inspections is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the International Building Code, 2009 edition.

The firms, agencies, or individuals noted above (hereafter referred to collectively as agents) will perform the structural tests and inspections as specified herein.

The complete set of Construction Documents (Drawings and Specifications) that accompany the application for building permit is to be considered attached to this program as reference material.

This program does not relieve the Contractor of their responsibility to conduct the work in accordance with the requirements of the Construction Documents, the approved Shop Drawings and the Maine State Building Code.

Construction Categories: The following construction categories are included in the Statement of Special Inspections for this Project. Specific tests and inspections required for each designated category are listed on the page noted opposite the category.

<u>Construction Category</u>	<u>Page</u>	<u>Construction Category</u>	<u>Page</u>
Structural Steel Framing	<u>3-4</u>	In-situ Bearing Strata	<u>9</u>
Shear Connectors	<u>3-4</u>	Controlled Fill	<u>9</u>
Steel Joist Framing	<u>3-4</u>	Site Infrastructure	<u>10-11</u>
Steel Decking	<u>3-4</u>	Fireproofing	<u>12</u>
Cast-In-Place Concrete	<u>5-6</u>	Curtain wall	<u>14</u>
Masonry	<u>7</u>	Storefront	<u>15</u>
Pile Foundations	<u>8</u>	Arch, Mech & Electrical Components	<u>17</u>
Earthwork	<u>9</u>	Steel Stairs & Handrails/Guardrails	<u>19</u>

Performance Specifications: The following construction components are designated in the Construction Documents on the basis of a performance specification to be designed by the Contractor's or Subcontractor's registered professional engineer, i.e. Specialty Engineer - SE.

<u>Construction Component</u>	<u>Page</u>
Skylight Systems	<u>13</u>
Curtainwall	<u>14</u>
Storefront	<u>15</u>
Aluminum Window	<u>16</u>
Steel Stairs & Handrails/Guardrails	<u>19</u>
Cold Formed Metal Framing	<u>20</u>

Reports: Test and inspection reports prepared by the AOR, SER, TA, GE, and SE will be collected and maintained by the RDPiDC and distributed, according to the procedures established by the Building Official. Prior to the issuance of a certificate of occupancy the RDPiDC will submit a final report to the Owner and Building Official in accordance with the Building Code.

Prepared by the SER:

Name: Ethan Rhile, P.E.
Maine Professional Engineer Registration # 10266 (Structural)

Signature: _____

Firm: Becker Structural Engineers Inc

Date: _____

Registered Design Professional in Responsible Charge:

Name: Chris Drobat, R.A., AIA
Maine Registered Architect # 3254

Signature: _____

Firm: Lavallee Brensinger Architects

Date: _____

Steel Construction (IBC 2009 Section 1704.3) (Specification Sections 051200, 052100 & 053100)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2,3}	Frequency
1. Steel Construction QC Review	<ul style="list-style-type: none"> Review Contractor's field quality control procedures. Review frequency and scope of field testing and inspections. 	Spec. Section 051200	SER	-	Each submittal
2. Fabricator and Erector Certifications	<ul style="list-style-type: none"> Review AISC Certified Fabricator Submittals. 	AISC (Fabricator) Certification Standard for Steel Building Structures (STD) and AISC Certified Steel Erector (CSE)	SER	-	Each submittal
	<ul style="list-style-type: none"> For record and use in field verification 		TA	Periodic	In conjunction with related field visits
3. Materials	<ul style="list-style-type: none"> Review material certifications for conformance to Specifications. 	AISC 360 A3.1 AISC 360 A3.3 & 3.4 Spec. Section 051200	SER	-	Each submittal
	<ul style="list-style-type: none"> For record and use in field verification 		TA	Periodic	In conjunction with related field visits
4. Anchor Rods	<ul style="list-style-type: none"> Review Contractor's as-built survey. Verify that all anchor rods have been properly torqued and have adequate fit-up. 	ASTM F1554 AISC 360 M4 Spec. Section 051200	TA	Periodic	Verify bolt length, projection and condition. Verify "Snug tight" torque for 100% of anchor bolts in braced bays, 20% in all other cases.
5. Bolting	<ul style="list-style-type: none"> Verify bolt size and grade. Test and inspect bolted connections. 	AISC 360 A3.3 & M2.5 Spec. Section 051200 AISC Specification for Structural Joints Using A325 or A490 Bolts	TA	Continuous (Slip-critical) Periodic (Bearing)	As appropriate for connection type and fastener type. Per Construction Documents and AISC specifications.
			SER	-	SER to review conditions identified as critical
6. Welding	<ul style="list-style-type: none"> Check welder qualifications. Check weld identification markings. Test and inspect welds. 	AWS D1.1 Section 6 Spec. Section 051200	TA	<u>Continuous:</u> •Complete and partial penetration groove welds, •Multiple pass fillet welds, •Plug and slot welds •Single pass fillet welds >5/16" <u>Periodic:</u> •Fillet welds ≤ 5/16"	<u>At complete and partial penetration groove welds:</u> Visually inspect and test all welds by ultrasonic or radiographic methods. If for an individual welder, the rejection rate is demonstrated to be five (5) percent or less, the non-destructive testing rate may be reduced to twenty-five (25) percent for the individual welder. The evaluation of the welding shall be based on a sampling of at least forty (40) completed welds and completed by an AWS Certified Weld Inspector. <u>At all other welds:</u> Visually inspect all welds and test as required by magnetic particle, ultrasonic or radiographic methods and shall be completed by an AWS Certified Weld Inspector.
			SER	-	During aperiodic site visits

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 Sanford High School and Technical Center

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 11 February 2016

7. Shear Connectors	<ul style="list-style-type: none"> • Check against Construction Documents and latest approved shop drawings. • Inspect shear connectors for size, quantity, and location. • Test shear connectors for proper weld attachment. 	AWS D1.1 Section 7 Construction Documents Spec. Section 051226	TA	Periodic	Test a minimum of 10% of shear connectors; if one or more fail, then test all shear connectors.
			SER	-	SER to review conditions identified as critical
8. Structural Framing, Details, and Assemblies	<ul style="list-style-type: none"> • Check against Construction Documents and latest approved shop drawings. • Inspect for size, grade of steel, camber, installation, and connection details. • Verify steel frame joint details including: <ul style="list-style-type: none"> • Details such as bracing and stiffeners • Moment connections • Joint configurations and locations • Preparation of faying surfaces 	Construction Documents Spec. Section 051200	TA	Periodic	All framing, details, and assemblies.
			SER	-	SER to review conditions identified as critical
9. Open Web Steel Joists	<ul style="list-style-type: none"> • Inspect condition of joists for any damage to members and/or welds. • Inspect for size, placement, bridging, bearing, and connection to structure. 	SJI Standard Specs. Construction Documents Spec. Section 052100	TA	Periodic	Visually inspect all noted items, including 5% of joist support welds at randomly selected locations
			SER	-	SER to review conditions identified as critical
10. Expansion & Adhesive Anchors	<ul style="list-style-type: none"> • Review installation procedures for both mechanical anchors and adhesive anchors. • Verify that materials are suitable for job conditions. 	ACI 318 Appendix D Anchor manufacturer's instructions	TA	Periodic	All anchors
			SER	-	Each submittal
11. Steel Decking	<ul style="list-style-type: none"> • Verify gage, depth, and type. • Inspect placement, laps, welds, side lap attachments, and mechanical fasteners • Check welder qualifications. 	SDI Steel Deck Design Manual AWS D1.3 Section 7 Construction Documents Spec. Section 053100	TA	Periodic	All decking and connections, inspection shall be completed by a AWS Certified Weld Inspector.
			SER	-	SER to review conditions identified as critical
12. Field Correction of Fabricated Items	<ul style="list-style-type: none"> • Review documentation of approved repairs and verify completion of repairs. 	Construction Documents Spec. Section 051200	TA	As required, per above	Each repair
			SER	-	SER to review conditions identified as critical

¹Continuous Inspection: Full-time observation of the indicated work by approved individual of the noted Agency, as the work is being performed.

²Periodic Inspection: Part-time or periodic observation of the indicated work by an approved individual of the noted Agency and an inspection of the completed work.

³Aperiodic Inspection: Irregularly scheduled as required or as needed observation of the indicated work by an approved individual of the noted Agency; Principal Inspection responsibility is that of the Testing Agent TA.

Concrete Construction (IBC 2009 Section 1704.4) (Specification Section 033000)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2,3}	Frequency
1. Cast in Place Concrete Construction QC Review	<ul style="list-style-type: none"> Review Contractor's field quality control procedures. Review frequency and scope of field testing and inspections. 	Construction Documents Spec. Section 033000	SER	-	Each submittal
2. Mix Design	<ul style="list-style-type: none"> Review mix designs prior to placement. 	Construction Documents Spec. Section 033000	SER	-	Each submittal
	<ul style="list-style-type: none"> Verify use of approved mix design. 	ACI 318, 1.3.2.A ACI 318, Chapter 4 ACI 318, 5.2-5.4	TA	-	Each concrete placement
3. Materials	<ul style="list-style-type: none"> Review material certifications for conformance to Specifications. 	Construction Documents Spec. Section 033000	SER & TA	-	Each submittal
4. Batching Plant	<ul style="list-style-type: none"> Review plant quality control procedures and batching/mixing methods. 	ACI 304	TA	-	One (1) visit at the start of production & one (1) during the production period. Additional visits may be requested by the SER, if necessary.
5. Reinforcement Installation	<ul style="list-style-type: none"> Use latest set of approved reinforcing bar shop drawings. Inspect reinforcing for grade, size, quantity, spacing, lap lengths, bends, hooks, condition, and placement. Verify adequate cover per specifications. Confirm dowel installation for masonry and concrete, including embedment lengths. 	ACI 318, 1.3.2.C ACI 318, 7.5	TA	Periodic	Each concrete placement
			SER	-	SER to review conditions identified as critical
6. Anchor Rods	<ul style="list-style-type: none"> Inspect anchor rods prior to and during placement of concrete. 	ACI 318 1.3.2.C	TA	Continuous	All anchor rods
			SER	-	SER to review conditions identified as critical
7. Formwork	<ul style="list-style-type: none"> Inspect forms for cleanliness and for proper sizes/locations of concrete members. 	ACI 318 6.1.1	TA	Periodic	Each concrete placement
			SER	-	SER to review conditions identified as critical

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8. Concrete Placement and Sampling of Fresh Concrete	<ul style="list-style-type: none"> Review hot-weather and cold-weather placement procedures submitted by the Contractor. 	ACI 305 ACI 306	SER	-	Each submittal
	<ul style="list-style-type: none"> Verify conformance to Specifications including hot-weather and cold-weather placement procedures. 	ACI 305 ACI 306	TA	-	Each concrete placement
	<ul style="list-style-type: none"> Observe concrete placement operations. Check that total water does not exceed amount in design mix. 	ACI 318, 1.3.2.D ACI 318, 5.9-5.10	TA	Continuous	Each concrete delivery
			SER	-	SER to review conditions identified as critical
	Concrete Strength	ASTM C31, C39 & C172	TA	-	For each strength of concrete, each day, take six (6) standard 6"x12" cylinders for the first placement up to 50 CY. Then take six (6) additional cylinders for every 50 CY thereafter. Take sample from point of discharge and at time fresh concrete is placed. Concrete for each set of cylinders shall be from (1) representative sample of the entire batch.
	Concrete Slump	ASTM C143			
	Concrete Air Content	ASTM C231			
	Concrete Temperature	ASTM C1064			
10. Evaluation of Concrete Strength	<ul style="list-style-type: none"> Test and evaluate in accordance with the Specifications. 	Construction Documents Spec. Section 033000 ACI 214 ASTM C42	TA	-	(1) 7-day & (2) 28-day results. Hold (2) for 56-day results, as needed.
			SER	-	Each submittal
11. Curing and Protection	<ul style="list-style-type: none"> Observe procedures for conformance to the Specifications. 	Construction Documents Spec. Section 033000	TA	Periodic	Each concrete placement
			SER	-	SER to review conditions identified as critical
12. Welding Reinforcing Steel	<ul style="list-style-type: none"> Verify that rebar is ASTM A706 and observe preheating as necessary. 	ACI 318, 3.5.2 ASTM A706 AWS D1.4, Section 7	TA	Continuous	Visual inspection of all welds
13. Mechanical Reinforcing Splices	<ul style="list-style-type: none"> Confirm that the correct, approved couplers are being used. Verify proper embedment, joint fit-up, and tightness of mechanical parts. 	ACI 318, Chapter 12 & Manufacturer's installation instructions	TA	Periodic	Visual inspection of all splices

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³Aperiodic Inspection: Irregularly scheduled as required or as needed observation of the indicated work by an approved individual of the noted Agency; Principal Inspection responsibility is that of the Testing Agent TA.

⁴TA shall coordinate initial visit with SER to review reinforcing inspection requirements.

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Masonry Construction (IBC 2009 Section 1704.5) (Specification Section 042000)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2}	Frequency
1. Tests Submitted by Contractor for Masonry Units/ Assemblages	<ul style="list-style-type: none"> Review mortar, grout, and prism tests submitted by Contractor. 	Construction Documents Spec. Section 042000 ACI 530.1 Art. 1.5	SER	-	Each class of masonry unit and type of masonry assemblage.
2. Materials Certification	<ul style="list-style-type: none"> Review masonry units, masonry veneers, precast masonry units, and mortar and grout materials. 	Construction Documents Spec. Section 042000 ACI 530.1 Art. 1.4B	SER	-	Each submittal
	<ul style="list-style-type: none"> For record and field verification 		TA		In conjunction with related field visits
3. Testing & Evaluation of Mortar & Grout Strength	<ul style="list-style-type: none"> Sample and test mortar and grout used in field for masonry construction. 	Construction Documents Spec. Section 042000 ACI 530.1 Art. 1.4B	TA	-	For each type of mortar and grout, per every 5,000 square feet of wall surface area: test mortar per ASTM C780 test grout per ASTM C1019
	<ul style="list-style-type: none"> Review test results for mortar and grout. 		SER	-	Each report
4. Proportioning, Mixing, and Consistency of Mortar & Grout	<ul style="list-style-type: none"> Observe field procedures for proportioning and mixing of the mortar and grout to be used in the masonry construction. 	Construction Documents Spec. Section 042000 ACI 530.1 Art. 2.6	TA	Continuous	Once, for each type of grout, at the beginning of masonry construction
			SER	-	SER to review conditions identified as critical
5. Masonry Installation	<ul style="list-style-type: none"> Inspect and report on installation of masonry units for general configuration and placement. 	Construction Documents Spec. Section 042000 ACI 530.1 Art. 3.3	TA	Periodic	All locations
			SER	-	SER to review conditions identified as critical
6. Anchorage	<ul style="list-style-type: none"> Inspect type, spacing, and placement of masonry anchors and ties. 	ACI 530 Sections 1.2.2.e & 1.16.1	TA	Periodic	All locations
			SER	-	SER to review conditions identified as critical
7. Reinforcement Installation	<ul style="list-style-type: none"> Inspect reinforcement for grade, size, quantity, spacing, condition, cover, bar positioners, and placement. 	Construction Documents Spec. Section 042000 ACI 530 Section 1.15 ACI 530.1 Art. 2.4 & 3.4	TA	Periodic	All locations
			SER	-	SER to review conditions identified as critical
8. Grouting Operations	<ul style="list-style-type: none"> Inspect cells of masonry units for cleanliness prior to grouting. Observe partial/full grouting procedures. 	Construction Documents Spec. Section 042000 ACI 530.1 Art. 2.6B	TA	Continuous	All locations
			SER	-	SER to review conditions identified as critical
9. Weather Protection	Review submittal on protection of masonry against cold and hot weather.	IBC Sections ACI 530.1 Articles 1.8C & 1.8D	SER	-	Each submittal
	<ul style="list-style-type: none"> Observe protection of masonry against cold and hot weather. 		TA	Periodic	Each masonry placement
10. Anchorage of Exterior Wall Masonry Veneer	<ul style="list-style-type: none"> Inspect type, size, spacing, and placement of approved anchorage to adjacent back-up framing. 	Construction Documents Spec. Section 042000 ACI 530 Section 1.2.2.e	TA	Periodic	All locations
			SER	-	Each submittal

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²Periodic Inspection: Part-time or intermittent observation of the indicated work by an approved individual of the noted Agency and an inspection of the completed work.

³Aperiodic Inspection: Irregularly scheduled as required or as needed observation of the indicated work by an approved individual of the noted Agency; Principal Inspection responsibility is that of the Testing Agent TA.

Pile Foundations (IBC 2009 Section 1704.8) (Specification Section 31 66 13.13)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2,3}	Frequency
1. Materials Certification	<ul style="list-style-type: none"> Verify elements materials, sizes and lengths comply with the requirements 	Construction Documents Spec. Section 31 66 13.13	GE & SER	Continuous	At each location
2. Testing and Evaluation	<ul style="list-style-type: none"> Observe contractor-provided load test and verify design capacity is achieved. 	Construction Documents Spec. Section 31 66 13.13	GE	Continuous	At each location
3. Observations & Procedures	<ul style="list-style-type: none"> Observe driving operations and maintain complete and accurate records for each element 	Construction Documents Spec. Section 31 66 13.13	GE	Continuous	At each location
4. Pile Foundation Placement	<ul style="list-style-type: none"> Verify placement locations and plumbness, confirm type and size of piles. Verify required penetrations and torque per the submittal to achieve design capacity, record tip and butt elevations and document any damage to foundation element. 	Construction Documents Spec. Section 31 66 13.13	GE	Continuous	At each location

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Soils (IBC 2009 Section 1704.7) (Specification Section 31 23 15)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2,3}	Frequency
1. Excavation	<ul style="list-style-type: none"> Review existing sub-soils and groundwater conditions during building excavation. 	Construction Documents Spec. Section 320000	GE	Periodic	At each location
2. Bearing Strata	<ul style="list-style-type: none"> Review the in-situ bearing strata and compacted structural fill bearing strata for footings and slabs cast on grade. 	Construction Documents Spec. Section 320000	GE	Periodic	At each location
3. Structural Fill	<ul style="list-style-type: none"> Observe and test compacted structural fill. 	Construction Documents Spec. Section 320000	GE	Continuous	At each location
4. Field Conditions	<ul style="list-style-type: none"> Review existing conditions, procedures and in-situ bearing strata for underpinning. 	Construction Documents Spec. Section 314000	GE	Continuous	At each location
5. Concrete Placement	<ul style="list-style-type: none"> Observe concrete placement operations. 	Construction Documents Spec. Sections 033000 & 314000	GE	Periodic	See Concrete Construction Requirements
6. Earthwork	<ul style="list-style-type: none"> Observe and test excavation and soil placement 	Construction Documents Spec. Section 312000	TA & GE & Contractor	Periodic	Each Submittal & As noted in Construction Documents

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Site Infrastructure					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2,3}	Frequency
7. Stormwater BMPs	<ul style="list-style-type: none"> 3rd party inspection during and after construction of stormwater best management practices (BMPs). BMPs include, but are not limited to, underdrained soil filters, infiltration basins, level spreader, subsurface sand filter, permeable pavers, porous pavement and tree filters. Contractor shall provide photos and as-builts of stormwater BMPs. 	<p>Construction Documents</p> <p><u>Volume III. BMP Technical Design Manual</u>, by Bureau of Land and Water Quality, Maine Department of Environmental Protection, latest revision</p> <p>Conditions of Approval of Department Order, Bureau of Land and Water Quality, Maine Department of Environmental Protection</p>	TA	Continuous	At each location
8. Artificial Turf G-MAX testing	<ul style="list-style-type: none"> Testing of installed artificial turf field. 	<p>Construction Documents</p> <p>ASTM F1936</p> <p>Turf Spec. Sections</p>	TA	Aperiodic	Each Submittal
9. Water Distribution	<ul style="list-style-type: none"> Pressure testing and Disinfection Per Sanford Water District Requirements 	<p>Construction Documents</p> <p>Spec. Section 221113 & Sanford Water District Specifications</p>	Contractor	Aperiodic	At each location
10. Sewer	<ul style="list-style-type: none"> Pressure testing Leakage testing Deflection Test Per Sanford Sewer District Requirements 	<p>Construction Documents</p> <p>Spec. Section 221300 & Sanford Sewer District Requirements</p>	Contractor &	Aperiodic	After backfilling of piping
11. Underground ducts	<ul style="list-style-type: none"> Testing of installed underground duct 	<p>Construction Documents</p> <p>Spec. Section 260543</p>	Contractor	Aperiodic	After installation of underground duct
12. Asphalt Paving	<ul style="list-style-type: none"> Thickness Test On-Site Density Testing 	<p>Construction Documents</p> <p>Spec. Section 321216</p>	TA	Aperiodic	Random locations during paving operations
13. Asphalt Treated Permeable Base	<ul style="list-style-type: none"> Testing of mix design, production, placement and compaction 	<p>Construction Documents</p> <p>Spec. Section 321217</p>		Aperiodic	As note in Construction Documents
14. Concrete Paving	<ul style="list-style-type: none"> Testing of concrete 	<p>Construction Documents</p> <p>Spec. Section 321313</p>	TA	Aperiodic	As noted in Construction Documents
15. Erosion & Sedimentation Control	<ul style="list-style-type: none"> Inspection of erosion control measures 	<p>Construction Documents</p> <p>Spec. Section 312500</p>	GE or TA (Certified by MaineDEP)	Continuous/Aperiodic	As noted in Construction Documents

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Fire-resistant Materials Specification Section 07 81 00 and 07 81 23. (IBC 2009 Sections 1704.12 & 1704.13)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2}	Frequency
1. Materials Certification	Review materials certifications for conformance to Specifications	IBC 1704.12, 1704.13 Spec. Section 078100 and 078123 ASTM E605 ASTM E736	AOR	-	Each submittal
	For record and use in field verification		TA	Periodic	In conjunction with related field visits
2. Sprayed Fire-resistant Materials	<ul style="list-style-type: none"> Inspect and test sprayed fire-resistant materials applied to floor/roof assemblies and structural members in accordance with ASTM E605 and ASTM E736, based on the fire-resistance design as designated in the Construction Documents. Inspections shall include: <ul style="list-style-type: none"> Condition of substrates Thickness of application Density Bond strength adhesion/cohesion Condition of finished application 	IBC 1704.12 Spec. Section 078100 ASTM E605 ASTM E736	TA	Periodic	<u>Floor & Roof Assemblies:</u> <ul style="list-style-type: none"> Thickness: 4 measurements per 1,000 square feet of sprayed area of each assembly at each story Density: 1 measurement per 2,500 square feet of sprayed area of each assembly at each story Bond Strength: 1 measurement per 2,500 square feet of sprayed area of each assembly at each story <u>Structural Members:</u> <ul style="list-style-type: none"> Thickness: 25 percent of the structural members at each story Density: 1 measurement per 2,500 square feet of sprayed area of each type of member at each story Bond Strength: 1 measurement per 2,500 square feet of sprayed area of each type of member at each story
3. Mastic and Intumescent Fire-resistant Coatings	<ul style="list-style-type: none"> Inspect coatings applied to structural elements in accordance with AWCI 12-B, based on the fire-resistance design as designated in the Construction Documents. 	IBC 1704.13 Spec. Section 078123 AWCI 12-B	TA	Periodic	At all locations

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Skylights (IBC 2009 Section 1704.15) (Specification Section 086000)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2}	Frequency
1. Skylights	<ul style="list-style-type: none"> Review supplier's structural design of system. 	Construction Documents Spec. Section 086000	SER	-	Each submittal
2. Material Certification	<ul style="list-style-type: none"> Review materials used. 	Construction Documents Spec. Section 086000	SER	-	Each submittal
	<ul style="list-style-type: none"> For record and use in field verification 		TA		In conjunction with related field visits
3. Installation of Skylights	<ul style="list-style-type: none"> Inspect type, size, gauge, spacing, and placement of members for conformance to the approved skylight Shop Drawings and Construction Documents. Inspect member-to-member connections and connections/anchorage to adjacent steel/concrete/wood support elements. 	Construction Documents Spec. Section 086000 Manufacturer's installation instructions	TA	Periodic	All locations
			SE	-	Once during performance of the work and once after completion of the work
4. Field Testing	<ul style="list-style-type: none"> Operable Components: AAMA 502. Fixed Components: AAMA 501.2. 	Construction Documents Spec. Section 086000	CA	-	All locations

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Glazed Aluminum Curtain Walls (IBC 2009 Section 1704.15) (Specification Section 084410)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2}	Frequency
1. Glazed Aluminum Curtainwalls	<ul style="list-style-type: none"> Review supplier's structural design of system. 	Construction Documents Spec. Section 084410	SER	-	Each submittal
2. Material Certification	<ul style="list-style-type: none"> Review materials used. 	Construction Documents Spec. Section 084410	SER	-	Each submittal
	<ul style="list-style-type: none"> For record and use in field verification. 		TA		In conjunction with related field visits
3. Installation of Glazed Aluminum Curtainwalls	<ul style="list-style-type: none"> Inspect type, size, gauge, spacing, and placement of members for conformance to the approved Curtain Wall Shop Drawings and Construction Documents. Inspect member-to-member connections and connections/anchorage to adjacent steel/concrete/wood support elements. 	Construction Documents Spec. Section 084410 Manufacturer's installation instructions	TA	Periodic	All locations
			SE	-	Once during performance of the work and once after completion of the work
4. Field Testing: Water Intrusion	<ul style="list-style-type: none"> Operable Components: AAMA 502. Fixed Components: AAMA 501.2. 	Construction Documents Spec. Section 084410	CA	-	All locations

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Aluminum Storefront (IBC 2009 Section 1704.15) (Specification Section 084313)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2}	Frequency
1. Aluminum Storefront	<ul style="list-style-type: none"> Review supplier's structural design of system. 	Construction Documents Spec. Section 084313	SER	-	Each submittal
2. Material Certification	<ul style="list-style-type: none"> Review materials used. 	Construction Documents Spec. Section 084313	SER	-	Each submittal
	<ul style="list-style-type: none"> For record and use in field verification. 		TA		In conjunction with related field visits
3. Installation of Glazed Aluminum Storefront	<ul style="list-style-type: none"> Inspect type, size, gauge, spacing, and placement of members for conformance to the approved Storefront Shop Drawings and Construction Documents. Inspect member-to-member connections and connections/anchorage to adjacent steel/concrete/wood support elements. 	Construction Documents Spec. Section 084313 Manufacturer's installation instructions	TA	Periodic	All locations
			SE	-	Once during performance of the work and once after completion of the work
4. Field Testing: Water Intrusion	<ul style="list-style-type: none"> Operable Components: AAMA 502. Fixed Components: AAMA 501.2. 	Construction Documents Spec. Section 084313	CA	-	All locations

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Aluminum Windows (Specification Section 08 5113)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2}	Frequency
1. Field Testing: Water Intrusion	<ul style="list-style-type: none"> • Operable Components: AAMA 502. • Fixed Components: AAMA 501.2. 	Construction Documents Spec. Section 085113	CA	-	All locations

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Architectural, Mechanical and Electrical Components (IBC 2009 Section 1707) Building Seismic Design Category: C					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2}	Frequency
1. Cladding & Walls	<ul style="list-style-type: none"> Inspection of air and vapor barrier/flashings installation 	-	CA	-	Once during installation of wall systems mock-up.
				-	Once during performance of the work.
				Periodic	Upon the completion of air and vapor barrier/flashings prior to concealment by exterior cladding systems. DO NOT conceal areas without written approval that barrier/flashings have been inspected and approved by CA.
2. Mechanical and Electrical Components	<ul style="list-style-type: none"> In Seismic Design Categories C, D, E, & F, Special Inspection is required for mechanical and electrical equipment as follows: <ol style="list-style-type: none"> Refer to Mechanical/Electrical Drawings and Specifications 	IBC 1707.7	MEP	Periodic	In conjunction with related field visits. Review of reports and other documents by TA.
			TA	Periodic	In conjunction with related field visits.
3. Smoke Evacuation Systems	Refer to Mechanical and Electrical Drawings and Specifications.	IBC 909.3, 1704.16	MEP	-	During component installation and as work is completed. . Review of reports and other documents by TA and Other "SE"
			TA	-	During component installation and as work is completed.
			Other "SE"	Periodic	Specialty Smoke Evacuation Consultant to provide commissioning and testing associated with this system.
					Issuance of special inspections reports and other documents in satisfaction to code and AHJ
					Review of mechanical, fire protection and fire alarm submittals in relation to smoke evacuation systems.
Witnessing of functional integrated systems testing per MSBC Section 909, NFPA 92N92B and as indicated per specifications.					
4. Laboratory Exhaust	Refer to Mechanical and Electrical Drawings and Specifications.	-	MEP	-	During component installation and as work is completed. Review of reports by TA.
			TA	-	During component installation and as work is completed.

Statement of Special Inspections
Sanford High School and Technical Center

Bid Documents
11 February 2016

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Stairs and Railings (IBC 2009 Section 1704.15) (Specification Section 055100)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2,3}	Frequency
1. Steel Stairs & Handrail/Guardrail Assemblies	<ul style="list-style-type: none"> Review supplier's structural design of stair pans, stringers, landings, and railings. 	Construction Documents Spec. Section 055100	SER	-	Each submittal
2. Materials Certification	<ul style="list-style-type: none"> Review certification of materials. 	Construction Documents Spec. Section 055100	SER	-	Each submittal
	<ul style="list-style-type: none"> For record and field verification. 	Construction Documents Spec. Section 055100	TA	Periodic	All locations
3. Installation of Steel Stairs & Handrail/Guardrail Assemblies	<ul style="list-style-type: none"> Inspect installation of steel stairs. Check component type, size, spacing, and placement for conformance with the approved stair system design. Check member-to-member connections and connections to adjacent steel/concrete support elements. 	AWS D1.1 AISC 360 NAAMM Metal Stair Manual Construction Documents Spec. Section 055100	TA	Periodic	All locations
			SE	-	Once during performance of the work and once after completion of the work

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Cold Formed Metal Framing Construction (IBC 2009 Section 1704.3) (Specification Section 054000)					
Item	Tests / Inspections	Code, Standard, or Document Reference	Agency	Type of Inspection ^{1,2}	Frequency
1. Cold Formed Metal Exterior Wall Stud Backup Framing Design and Cold Formed Metal Roof Truss Design	<ul style="list-style-type: none"> Review supplier's structural design of cold formed metal exterior wall stud backup framing and cold formed metal roof trusses. 	Construction Documents Spec. Section 054000	SER	-	Each submittal
2. Materials Certification	<ul style="list-style-type: none"> Review certification of materials. 	AISI Cold Formed Steel Design Manual Construction Documents Spec. Section 054000	SER	-	Each submittal
	<ul style="list-style-type: none"> For record & field verification 		TA		In conjunction with related field visits
3. Installation of Cold Formed Metal Exterior Wall Stud Backup Framing and Cold Formed Metal Roof Trusses	<ul style="list-style-type: none"> Inspect type, size, gauge, spacing and placement of cold formed metal exterior wall studs, connections, anchorage, bridging, accessories, etc. for conformance with the approved Shop Drawings and Construction Documents. Inspect installation of cold formed metal roof trusses, connections, anchorage, bridging, bracing, accessories, etc. 	AISI Cold Formed Steel Design Manual Construction Documents Spec. Section 054000	TA	Periodic	All locations
			SE	-	Once during performance of the work and once after completion of the work

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SECTION 01 50 00
TEMPORARY FACILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Project identification sign.
- I. Field offices.

1.02 RELATED REQUIREMENTS

- A. Section 01 00 00 - General Requirements.
- B. Section 01 40 00 - Quality Requirements.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 241 Building Construction and Demolition Operations, ANSI A10 Safety Requirements for Construction and Demolition, AGC and ASC industry recommendations, and other applicable standards.
 - 1. Temporary electrical service shall comply with NECA Temporary Electrical Facilities, NEMA, UL and NFPA 70 National Electric Code.
- B. At the earliest time, when acceptable to the Owner, change over room use of temporary service to use of the permanent service.
- C. Operate temporary service and facilities in a safe and efficient manner, taking necessary fire prevention measures.

1.05 TEMPORARY UTILITIES

- A. Provide and pay for all drainage and stormwater, electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- B. New permanent facilities may not be used.

1.06 TELEPHONE SERVICES

- A. Provide, maintain, and pay for telephone and Internet services to field office and Owner's field office at time of Project mobilization through completion of project.
- B. Telecommunications services shall include:
 - 1. Personal computer dedicated to project telecommunications, with necessary software and laser printer.
 - 2. Telephone Land Lines: One line, minimum; one handset per line.
 - 3. Internet Connections: Minimum of one; DSL modem or faster.
 - 4. Email: Account/address reserved for project use.

1.07 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

- B. New permanent facilities may not be used during construction operations.
- C. Maintain daily in clean and sanitary condition.

1.08 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect adjacent properties from damage from construction operations.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.09 FENCING

- A. Scope: The base bid scope of work DOES NOT REQUIRE that the Contractor provide fencing along any/all portions of the construction site. The decision to provide any/all such fencing shall be per the discretion of the Contractor and his/her means and methods to provide site security, protection of the general public within a construction area and any/all other requirements and responsibilities of the Contractor included within these specifications or per contractual agreements with the Owner.
- B. Construction (Where provided): Commercial grade chain link fence, 6 foot high. Gates and latches as necessary.
- C. Coordinate and obtain approval of all gate(s) locations, proposed fence perimeter and lock access with Sanford Fire Department.

1.10 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.11 SECURITY

- A. Provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

1.12 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Designated existing on-site roads may be used for construction traffic.
- F. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- G. Designate one parking space each for Owner and Architect use.

1.13 WASTE REMOVAL

- A. See Section 01 74 19 - Construction Waste Management, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.

- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.14 PROJECT IDENTIFICATION

- A. Provide project identification sign.
- B. Erect on site at location approved by Owner and governing authorities.
- C. No other signs are allowed without Owner permission except those required by law.
- D. Size: 8' x 4' (unless otherwise required by local authorities) The Contractor shall be required to furnish and erect the Project sign complete in all respects, and to dismantle when so instructed by the Owner.
- E. Content: Display names and addresses of the Project, Owner, Architect, and Contractor. Design of graphics, text, lettering, colors, and layout shall be provided by the Architect and approved by the Owner, at a later date.
- F. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors. Do not permit installation of unauthorized signs. No other signs or advertisements shall be displayed on the premises without the approval of the Owner.

1.15 FIELD OFFICES

- A. The Contractor shall provide and maintain an insulated, weather tight, field office at the site. The office shall be of sufficient size to accommodate required office personnel and meeting place for eight people. Provide electrical service, heat, lighting, telephone, fax machine, and personal computer, Internet connected with e-mail capability and printer. At a minimum, furnish with a desk and chair for each Superintendent, conference table and chairs, 4-drawer file cabinet, plan table, plan rack, and bulletin board. Equip with a water cooler and first aid cabinet unit. New construction shall not be available for this purpose.
- B. In addition to his own field office, the Contractor shall provide and maintain a temporary private office of not less than 140 sq. ft. for the use of the Owner's Representative and Architect at the site. The Owner's Representative's office shall be similarly equipped and furnished, for use of Architect and Owner.
- C. Temporary offices shall be maintained until the issuance of a Certificate of Substantial Completion and shall be removed when no longer required. The Contractor shall pay all costs in connection with the construction, servicing, maintenance, and removal of temporary offices.
- D. Locate offices a minimum distance of 30 feet from existing and new structures.

1.16 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS

2.01 PRODUCTS

- A. Tarpaulins: Waterproof, fire-resistant, UL labeled, with flame spread rating of 15 or less.
- B. Water: Potable water.

PART 3 EXECUTION

3.01 GENERAL

- A. Review locations of temporary facilities, equipment, and storage with the Architect and Owner, for the Owner's approval.

- B. Use qualified personnel for the installation of temporary facilities. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. Temporary Water Service: The Contractor shall:
 - 1. Provide and maintain a temporary water service, or install the permanent water service as required for the proper execution of the Work. Such service shall be installed in a manner approved by governing authorities.
 - 2. Pay for the installation, metering, use and removal of any temporary service, and for all water used throughout the construction period.
 - 3. Extend a supply adequate for all construction purposes and convenient to all trades.
 - 4. Protect lines against freezing and be fully responsible for the temporary installation in every way.
 - 5. Provide backflow preventer(s), vacuum breakers, etc., as required to protect water systems from contamination.
 - 6. Provide any and all hose needed. All service hoses shall be bubble-tight at all times. Trigger operated nozzles shall be used to reduce water waste. No leakage shall be acceptable. Remove all temporary equipment and materials completely upon completion of construction.
 - 7. Repair all damage caused by use of temporary or permanent water services.
- B. Temporary Electrical Services: The Contractor shall:
 - 1. Provide and maintain temporary light and power as required for the proper execution of the Work. Such service shall be installed and maintained in conformance with NEMA, NECA, UL standards for temporary electric service, National Electric Code and in a manner approved by governing authorities and local utility regulations.
 - 2. Pay for the installation and removal of any temporary service, and for all electricity used throughout the construction period.
 - 3. Extend a supply of temporary lighting and power adequate for all construction purposes and convenient to all trades.
 - 4. Accept full responsibility for the temporary installation in every way. Remove all temporary equipment and materials completely upon completion of construction.
 - 5. Whenever overhead floor or roof deck has been installed, provide temporary lighting with local switching. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions. Provide a minimum of one (1) lamp per story at interior stairways and ladder runs, located to illuminate each landing and flight.
 - 6. Determine that construction use of power will not affect the operation or performance of any equipment or appliances within the existing building.
- C. Temporary Drainage and Storm Water Control: The Contractor shall provide drainage ditches, dry wells, stabilization ponds, and similar facilities. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge. Maintain temporary drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains. Protect site from puddling or running water. Provide water barriers as required to protect site and abutting properties from soil erosion.
- D. Sanitary Facilities: The Contractor shall provide and maintain in a sanitary condition temporary toilets, wash facilities and drinking water fixtures complying with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities.
 - 1. Toilets shall be enclosed, weather-tight chemical type for the use of all construction personnel at locations acceptable to the Owner and governing authorities. Permanent toilets installed under this Contract shall not be used during construction.

2. Drinking water facilities shall be containerized tap-dispenser bottled water units, with paper cups.
 3. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste container for used materials. Maintain daily in clean and sanitary condition.
- E. Temporary Heat: The Contractor shall provide temporary heat to permit construction work to be carried on during the winter months and as required by construction activities for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. These Specifications are not to be construed as requiring heat for operations that are not adversely affected by the weather.
1. The Contractor shall maintain a minimum temperature of 40 degrees F at the working surface, unless higher temperatures are required for specific work activities. This provision does not supersede any specific requirements for methods of construction, curing of materials, or the applicable General Conditions set forth in the Construction Documents with added regard to performance obligations of the Contractor.
 2. During the progress of the Work and at all times prior to the date of Substantial Completion, the Contractor shall provide and pay all costs related to temporary heat as required to prevent damage to completed work, work in progress or stored materials.
 - a. For new buildings, the Contractor shall provide independent temporary heating systems and shall pay all costs, including fuel, related thereto.
 3. During the progress of the Work and at all times prior to the date of Substantial Completion, the Contractor shall provide and pay all costs related to temporary heat as required to prevent damage to completed work, work in progress or stored materials.
 - a. The Contractor shall furnish and install one accurate recording Fahrenheit thermometer at a place designated by the Architect, and one additional accurate thermometer for every 5000 square feet of floor space, located as directed by the Architect in order to determine if the specified temperatures are maintained. He shall furnish daily to the Owner's Representative or Architect a certified statement of temperatures recorded at beginning, end and middle of the work day. Upon receipt of written request from the Contractor, the Architect may modify or waive this requirement. However, such waiver shall in no way diminish the Contractor's responsibility for providing adequate heat.
 4. The Contractor may, where applicable and with the approval of the Architect, elect to use the permanent new heating system as specified for the project once it has been tested and is ready to operate. Should the permanent new system be used for temporary heat during construction, the Contractor shall pay for all maintenance and fuel related to such use. Upon Substantial Completion, filters shall be replaced and the system shall be cleaned and adjusted. Such cleaning shall include the insides of all ductwork used during construction and intended to remain in operation.
 - a. The entire system shall be returned to suitable conditions in accordance with the HVAC protection measures described in Section 01 57 21 Indoor Air Quality Controls. The Contractor shall verify that his use of new systems during construction will not diminish applicable warranties.
- F. Operating labor shall be provided by the Contractor for all heating equipment. Operating labor shall include frequent inspection, emergency repairs, and maintaining temperature records. The Contractor shall provide continuous direct attendance as appropriate or otherwise required by governing authorities.
1. The installation and operation of heating devices used hereunder shall comply with all safety regulations, including provisions for adequate ventilation and fire protection. Select safe equipment that will not have a harmful effect on completed installation or elements being installed. Coordinate ventilation requirement to produce the ambient condition required and minimize consumption of energy. Use of gasoline burning space heaters, open flame, or salamander type heating units is prohibited. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes vapors, or gases.

- G. Temporary Ventilation: Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

3.03 TEMPORARY SUPPORT FACILITIES INSTALLATION

- A. Storage Sheds and Trailers: Existing facilities and/or new construction shall not be available for this purpose.
1. All field offices, storage sheds, and trailers located within the construction area, or within 30 feet of building lines shall be of non-combustible construction, complying with requirements of NFPA 241.
 2. Construction shanties, sheds, and temporary facilities provided as required above or for the Contractor's convenience shall be located as approved by the Owner and governing authorities and maintained in good condition and neat appearance.
- B. Temporary Roads and Parking: Construct and maintain temporary roads to adequately support loading and withstand exposure to traffic during the construction period. If possible, locate temporary roads, storage areas, and parking where the same permanent facilities will be located. Coordinate temporary road development with sub-grade grading, compaction, installation and stabilization of sub-base, and installation of base and finish coats of permanent paving. Extend temporary roads in and around the construction area as necessary to accommodate delivery and storage of material, equipment usage, administration, and supervision. Plan installation of the final course of permanent paving after all heavy truck traffic and immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.
- C. Temporary Traffic Control: Provide temporary traffic control at the junction of temporary roads with public roads, including, but not limited to, warning signs for public traffic and "STOP" signs for entrance onto public roads. Comply with requirements of local or state traffic authorities. Provide all necessary equipment, flag people, or special police, as required by traffic authorities having jurisdiction.
- D. Temporary Stairs, Lifts, and Hoists: The Contractor shall furnish and maintain all equipment such as temporary stairs, ladders, ramps, scaffolds, runways, chutes, etc., as required for the proper execution of the Work, unless specifically included under the Work of other trades.
1. All such apparatus, equipment, and construction shall meet all requirements of applicable laws, regulations, and standards of safety and good practice.
 2. Until permanent stairs are available, provide temporary stairs where ladders are not adequate. As soon as permanent stairs are erected, the Contractor shall provide temporary protective treads, and handrails.
 3. All hoisting equipment and machinery required for the proper and expeditious prosecution and progress of the Work shall be furnished, installed, operated, and maintained in safe condition by the Contractor for the use of all subcontractors' material and/or equipment delivered to the designated hoisting area. All costs for such equipment operating services shall be paid by the Contractor.
 4. In the event that a particular subcontractor has certain specific requirements which are peculiar to his needs, and which cannot be satisfied with the hoist provided by the Contractor, the subcontractor shall provide, maintain, operate, and pay for hoisting equipment necessary for the proper execution and completion of his work.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, the Contractor shall provide and maintain in good operating condition temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses, and as recommended by representatives of the fire insurance company carrying insurance on the Work or by governing fire or building authorities. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations".
1. Flammable products shall be properly stored in containers acceptable to fire officials.

2. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.
 3. Fire extinguishers shall be located where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stair well.
 4. Maintain unobstructed access to fire extinguishers, temporary fire protection facilities, stairways, and other access routes for fighting fires.
 5. Smoking shall be strictly prohibited on the construction site.
 6. Provide supervision of welding operations, soldering operations, combustion type temporary heating units, and similar sources of fire ignition.
- B. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
- C. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result. Minimize the use of tools and equipment that product excessive noise and restrict their use to hours that will minimize complaints from persons near the site.
- D. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
1. All cavities of masonry construction and masonry construction containing uncured mortar shall be covered during rainy conditions and at the end of a day's work.
 2. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilation and material drying or curing requirements to avoid dangerous conditions and effects. This protection shall provide adequate working areas during winter months, consistent with the approved construction schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations.
 3. Install tarpaulins securely, with non-combustible wood framing and other materials. Close openings 25 sq. feet or less with plywood or similar materials.
 4. Close openings through floor or roof decks and horizontal surfaces with load-bearing temporary construction. Where temporary wood or plywood is used and exceeds 100 sq feet in area, use fire-retardant treated framing and plywood.
- E. Protective Covering of the Work: The Contractor shall protect all finished surfaces, including the jambs and soffits of all openings used as passageways or through which materials are handled, against any possible damage resulting from the conduct of work by all trades.
1. All finished surfaces, including factory-finished and job-finished items, shall be clean and not marred upon delivery of the building to the Owner. The Contractor shall, without extra compensation, refinish all spaces where such surfaces prove to have been inadequately protected and are damaged.
 2. Tight wood sheathing shall be laid under any materials that are stored on or moved over finished surfaces. Reinforced non-staining kraft building paper and plywood or planking shall be laid over all types of finished floor surfaces in traffic areas before moving any material over these finished areas. Wheelbarrows, if used over such areas, shall have rubber-tired wheels.
 3. Roof surfaces shall not be subjected to unnecessary traffic nor shall they be used for storage of material. Wherever such activity must take place in order to carry out the Work of the Contract, adequate protection shall be provided.
 4. Prohibit traffic on grass and landscaped areas.
- F. Temporary Tree and Plant Protection: The Contractor shall provide temporary fencing adequate to properly protect existing trees to remain specifically identified on the Drawings during

construction. Fencing shall be located at each tree's drip line in order to protect the tree's root structure as well as its trunk and branches. Damaged trees shall be replaced in-kind at the Contractor's expense.

3.05 TERMINATION AND REMOVAL

- A. Remove temporary facilities when the need has ended, or when replaced by authorized use of permanent facilities.
- B. Materials and facilities that constitute temporary facilities are the property of the Contractor.
 - 1. The Owner reserves the right to take possession of the Project sign.
- C. Remove temporary roads that are not intended or acceptable for integration into permanent roads. Remove soil and fill that does not comply with requirements for fill in these areas. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials. Repair or replace street paving and curb at the temporary entrances, as required by the governing authority.
- D. At Substantial Completion, clean and restore permanent facilities that have been used during construction, including but not limited to, replacing air filters, cleaning ductwork, and replacing lamps effected by substantial use.

END OF SECTION

SECTION 01 57 21
INDOOR AIR QUALITY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction procedures to promote adequate indoor air quality after construction.
- B. Building flush-out after construction and before occupancy.

1.02 PROJECT GOALS

- A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
 - 1. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
- B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
 - 1. Furnish products meeting the specifications.
 - 2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012.
- B. ASHRAE Std 62.1 - Ventilation For Acceptable Indoor Air Quality; 2013.
- C. ASHRAE Std 129 - Measuring Air-Change Effectiveness; 1997 (Reaffirmed 2002).
- D. ASTM E779 - Standard Test Method for Determining Air Leakage Rate by Fan Pressurization; 2010.
- E. SMACNA (OCC) - IAQ Guideline for Occupied Buildings Under Construction; 2007.

1.04 DEFINITIONS

- A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.
- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA (OCC) as a guide.
 - 1. Submit not less than 60 days before enclosure of building.
 - 2. Identify potential sources of odor and dust.
 - 3. Identify construction activities likely to produce odor or dust.
 - 4. Identify areas of project potentially affected, especially occupied areas.
 - 5. Evaluate potential problems by severity and describe methods of control.
 - 6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
 - 7. Describe cleaning and dust control procedures.

- C. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.
- B. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE 52.2.

PART 3 EXECUTION

3.01 CONSTRUCTION PROCEDURES

- A. Prevent the absorption of moisture and humidity by adsorptive materials by:
 - 1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 - 2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
 - 3. Provide sufficient ventilation for drying within reasonable time frame.
- B. Begin construction ventilation when building is substantially enclosed.
- C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.
- D. HVAC equipment and ductwork may NOT be used for ventilation during construction:
 - 1. Provide temporary ventilation equivalent to 1.5 air changes per hour, minimum.
 - 2. Exhaust directly to outside.
 - 3. HVAC ductwork shall be kept clean, free of dust during storage, handling and installation. Seal HVAC air inlets and outlets immediately after duct installation with tape and plastic sheeting. All seams in ductwork shall be sealed.
- E. All inspection and filter replacement shall occur with the HVAC equipment turned off.
- F. Do not store construction materials or waste in mechanical or electrical rooms.
- G. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
 - 1. Inspect duct intakes, return air grilles, and terminal units for dust.
 - 2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
 - 3. Clean tops of doors and frames.
 - 4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 - 5. Clean return plenums of air handling units.
 - 6. Remove intake filters last, after cleaning is complete.
- H. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.
- I. Use other relevant recommendations of SMACNA (OCC) for avoiding unnecessary contamination due to construction procedures.

3.02 BUILDING FLUSH-OUT

- A. Perform building flush-out before occupancy.
- B. Do not start flush-out until:
 - 1. All construction is complete.
 - 2. HVAC systems have been tested, adjusted, and balanced for proper operation.
 - 3. Cleaning of inside of HVAC ductwork, specified elsewhere, has been completed.

4. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
 5. New HVAC filtration media have been installed.
- C. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot of floor area has been supplied.
1. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
 2. Maintain interior temperature of at least 60 degrees F and interior relative humidity no higher than 60 percent.
 3. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
 4. If interior spaces must be occupied prior to completion of the flush-out, supply a minimum of 25 percent of the total air volume prior to occupancy, and:
 - a. Begin ventilation at least three hours prior to daily occupancy.
 - b. Continue ventilation during all occupied periods.
 - c. Provide minimum outside air volume of 0.30 cfm per square foot or design minimum outside air rate, whichever is greater.
- D. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

END OF SECTION

CONTRACTOR'S SUBSTITUTION REQUEST

To Architect: _____ Date: _____

From Contractor: _____ Number: _____

Specification Section: _____ Page: _____

Article / Paragraph: _____

1. Product data for proposed substitution to include: Description of product, reference standards, performance, and test data.

Sample attached: Yes ___ No ___ To be sent if requested by Architect Yes ___ No ___

2. Itemized comparison of proposed substitution with product specified is attached.

ORIGINAL PRODUCT PROPOSED SUBSTITUTION

Trade Name, Model: _____

Manufacturer: _____

Installer: _____

History of proposed substitution: New product ___ 2-5 years old ___ 5-10 years old ___ > 10 years old ___

Significant variations of proposed substitution from original product: _____

Proposed substitution affects other parts of the Work: No ___ Yes, explain _____

Similar installations within 150 miles: Provide project name, address, architect, install date: _____

Reason for not providing specified item: _____

3. Unit costs, if applicable: State if cost is materials only ___ or materials installed ___.

Original product \$ _____ per _____ Substitution \$ _____ per _____

Savings to Owner for accepting substitution: _____ \$ _____

Proposed substitution changes Contract Time: No ___ Yes ___ Add/Deduct _____ days.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior to the specified product.
- Same warranty will be furnished for proposed substitution as for the specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated herein is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions, functional clearances or design appearance.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Attachments: _____

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations and procedures.
- E. Procedures for Owner-supplied products.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 3-A State of Maine, Standard General Conditions and Contract Work.
- B. Section 01 00 00 - General Requirements.
- C. Section 01 40 00 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project. See Section 01 30 00 - Administrative Requirements, for more information regarding product data submittals.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances. See Section 01 30 00 - Administrative Requirements, for more information regarding Shop Drawings.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Construction Documents.
- B. Do not use products made using or containing CFC's or HCFC's.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with product model: Use a product of one of the manufacturers named; no substitutions if so indicated; substitutions by following substitution procedures.
- C. Products Specified by Naming One manufacturer with other acceptable manufacturers listed without product model: Submit a request for substitution following substitutions procedures.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual Specification Sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

- A. Substitutions are changes, modifications or deviations in those products, materials, equipment, and methods of construction required by the Construction Documents proposed by the Contractor after the receipt of Bids. Substitutions for the convenience of the Contract or subcontractors, or materials suppliers will only be considered if submitted prior to the receipt of Bids, in strict conformance with the Instructions to Sub-bidders. The following shall not be considered substitutions:
1. Changes, modifications, or deviations requested by Bidders during the bidding period and accepted prior to the receipt of Bids shall be considered as included in the Contract Documents and are not subject to the requirements of this Section.
 2. Revisions to Construction Documents requested by the Owner or Architect.
 3. Specified options of products or materials included in the Construction Documents where both a manufacturer and Model/Product # is specified.
 - a. Where specified options include Manufacturer name only but do not specify a specific Model/Product # by said manufacturer the Contractor shall submit a Substitution Request per the procedures included within this Section.
 4. The Contractor's compliance with governing regulations and orders issued by governing authorities, subject to the Architect's prior written notice and approval.
- B. Substitution Requests: Request for substitution will be considered only if, in the opinion of the Architect, such substitution will be of benefit to the Owner. Substitution requests after receipt of bids will not be considered solely related to an "or approved equal" clause in the Construction Documents.
1. The Contractor's substitution request will be considered by the Architect when all of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action.
 - a. Extensive revision to the Construction Documents are not required.
 - b. Proposed changes are in keeping with the general intent of the Construction Documents.
 - c. The request is timely, fully documented and properly submitted.
 - d. In addition to the above conditions, one or more of the following conditions must be satisfied, as determined by the Architect. The Contractor shall provide written documentation for each condition noted.
 - 1) The specified product cannot be provided within the Contract Time. However, the request will not be considered if the specified product cannot be provided as a result of the Contractor's failure to submit to the Architect or order from the manufacturer in a timely fashion.
 - 2) The specified product cannot receive necessary approval of governing authority and the requested substitution can be approved.
 - 3) A substantial advantage is offered to the Owner, in terms of cost savings, time savings, energy conservation, or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
 - 4) The specified product cannot be provided in a manner that is compatible with or coordinated with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
 - 5) The specified product cannot provide the warranty required by the Construction Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

- C. Substitution Request Procedure: Complete the Contractor's Substitution Request form provided at the end of this Section. Submit electronically each request for substitution using the provided form with all required information. Incomplete forms will not be reviewed. Additionally, the Contractor shall provide a side-by-side comparison of the proposed product compared to the specified product, listing all properties within the specification for that product.
- D. Architect's Action: Within five (5) working days of receipt, the Architect will request additional information to evaluate the substitution if any is required. Within ten (10) working days of receipt of all necessary information, the Architect will notify the Contractor of acceptance or rejection of the proposed substitute. If a decision on the use of a proposed substitute is not or cannot be made or obtained within the time allocated, the Contractor shall use the specified product. Acceptance will be in the form of a Change Order.
- E. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this Section.
- F. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same or better warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Construction Documents.

3.02 OWNER-SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver shop drawings, product data, certificates, manufacturer's instructions and samples, to Owner.
 - 2. Arrange and pay for product delivery to site in accordance with the progress schedule.
 - 3. On delivery, inspect products jointly with Contractor.
 - 4. Submit claims for transportation damage and arrange for replacement of damaged, defective, or deficient items.
 - 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
 - 1. Review Owner reviewed shop drawings, product data, and samples. Submit to the Architect with notification of any observed discrepancies or problems anticipated due to non-conformance with the Construction Documents.
 - 2. Designating delivery dates for each product in accordance with the progress schedule.
 - 3. Receive and unload products at site; inspect for completeness or damage jointly with Owner. Record shortages, and damaged or defective items.
 - 4. Install blocking and supports as required for proper installation.
 - 5. Handle, uncrate, store, assemble, install, connect, adjust and finish products.
 - 6. Protecting products from damage and from exposure to the elements.
 - 7. After receipt, repair or replace items damaged the Contractor or persons under his control.
- C. Owner furnished equipment for installation by the Contractor may be indicated on the Drawings, or otherwise identified for the Contractor's information. Concealed wood blocking shall be provided for mounting equipment. See Section 06 10 54. Such equipment shall include, but not be limited to:
 - 1. Soap dispensers - surface mounted.
 - 2. Interactive marker boards and projectors.
 - 3. Video and TV screens.
 - 4. Interior signage - Surface mounted.

3.03 TRANSPORTATION AND HANDLING

- A. The Contractor shall be responsible for the proper protection from damage of all materials and equipment prior to and following their incorporation into the Work. Materials and equipment shall be inspected by the Contractor
- B. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- C. Transport and handle products in accordance with manufacturer's instructions.
- D. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- E. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, products are undamaged and if found to be damaged or otherwise unsuitable, shall be promptly rejected.
- F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- G. Arrange for the return of packing materials, such as wood pallets, where economically feasible.
- H. All materials stored on or off the site shall be kept in secured, weathertight enclosures, and the Contractor shall correct, at no additional cost to the Owner, any damages resulting from his failure to provide proper protection. Such corrective work shall include total replacement if so required by the Architect.
- I. The Contractor shall exercise caution in temporarily loading materials on floors, decks, roofs, etc. It shall be the Contractor's responsibility to determine the size of loads to be imposed and the adequacy of the affected structure to support such loads. The Contractor shall correct, at no additional cost to the Owner, any resultant damages.

3.04 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- L. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 71 00
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included in This Section:
 - 1. Provide all labor, materials, equipment and services, etc., required for all cutting (including excavation), removal, fitting, patching, and/or repairs as required to:
 - a. Make the several parts fit properly.
 - b. Uncover work to provide for installing, inspecting, or both, of ill-timed work.
 - c. Remove and replace work not conforming to requirements of the Construction Documents.
 - d. Remove and replace defective work.
- B. Related Work:
 - 1. In addition to other requirements noted or specified, upon the Architect's request uncover work to provide for observation by the Architect of covered work, and remove samples of installed materials for testing.
 - 2. Do not cut or alter work performed under separate contracts without the Architect's written permission.

1.02 SUBMITTALS

- A. Where cutting and/or patching is required, the Architect's review of proposed cutting and patching procedures is required. The following information shall be included in the submission prior to proceeding with cutting:
 - 1. Clearly describe the extent of cutting and patching required and how it is to be performed. Layout the work on-site as appropriate. Indicate why it cannot be avoided.
 - 2. Describe the anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components and changes in the building's appearance and other visual elements.
 - 3. List products to be used and firms that will perform the Work. Indicate dates for cutting and patching. Submit samples of actual materials to be used for patching.
 - 4. List any utilities that will be disturbed, relocated, made temporarily out-of-service, and indicate the length of service disruption.
 - 5. Where cutting and patching involves the addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
- B. Acceptance of the cutting and patching proposal by the Architect does not waive the Architect's right to later require complete removal and replacement of Work found to be unsatisfactory, nor does it alter the Contractor's sole responsibility for the safe and proper execution of all cutting and patching.
- C. Submit written notice to the Architect designating the time the Work will be uncovered, to provide for the Architect's observation.

1.03 QUALITY ASSURANCE

- A. Structural Work: Do not cut and patch structural elements in a manner that would reduce their structural characteristics such as load-carrying capacity or load deflection ratio.
 - 1. Obtain approval of the cutting and patching proposal before cutting and patching structural elements, including but not necessarily limited to:
 - a. Foundation construction.
 - b. Bearing and retaining walls.
 - c. Structural concrete.
 - d. Structural steel.
 - e. Lintels.

- f. Structural decking.
 - g. Stair systems.
 - h. Miscellaneous structural metals.
 - i. Equipment supports.
 - j. Piping, ductwork, vessels, and equipment.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life or safety.
- 1. Obtain approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems, including but not necessarily limited to:
 - a. Shoring, bracing, and sheeting.
 - b. Primary operational systems and equipment.
 - c. Firewalls and fire separation assemblies.
 - d. Fire-rated and non-fire-rated smoke barriers.
 - e. Water, moisture, or vapor retarders.
 - f. Membranes and flashings.
 - g. Fire protection systems.
 - h. Sprayed-on Fireproofing.
 - i. Control systems.
 - j. Voice, video, and data systems.
 - k. Conveying systems.
 - l. Electrical wiring systems.
- C. Miscellaneous: Do not cut and patch elements in a manner that would reduce their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
- 1. Obtain approval of the cutting and patching proposal before cutting and patching building elements, including but not necessarily limited to:
 - a. Water, moisture or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtainwall construction.
 - 2. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.
- D. Remove, replace, patch and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. For replacement of items removed, use materials identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible. Use materials whose performance will equal or surpass that of existing materials.

2.02 PAYMENT FOR COSTS

- A. Perform cutting and patching needed to comply with the Construction Documents at no additional cost to the Owner.
- B. All costs resulting from ill-timed or defective work, or work otherwise not conforming to the Contract Documents shall be borne by the Contractor.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection: Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.
- B. After uncovering the work, inspect conditions affecting installation of new work.
- C. Prior to proceeding, meet with all parties involved in cutting and patching including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Discrepancies: If uncovered conditions are not as anticipated, immediately notify the Architect and secure needed directions. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION PRIOR TO CUTTING

- A. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.
- B. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Work that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas. Take all precautions to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.
- D. Provide proper dirt, dust, fume, vapor, and noise control.
- E. Verify the conditions and requirements of all existing warranties that may be affected by cutting and patching (such as roofing warranties). It is the intent that all cutting and patching be performed in a manner that preserves all such warranties in full, without compromise.

3.03 PERFORMANCE

- A. General: Cutting and patching shall be kept to an absolute minimum by careful planning and through proper holes, sleeves, anchors, inserts, or other built-ins as the Work progresses.
- B. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
- C. The Contractor shall properly restore work that has been cut or removed and install new products to provide completed work in accordance with the requirements of the Construction Documents. Existing surfaces shall be restored to their original condition.
- D. Cutting: Perform cutting and demolition by methods least likely to damage elements to be retained or adjoining construction and that will provide proper surfaces to receive installation of repair and new work. Where possible, review procedures with the original installer. Comply with the original installer's recommendations.
- E. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- F. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
- G. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
- H. Perform necessary excavating and backfilling as required under pertinent other Sections of these Specifications.
- I. By-pass utility services such as pipe or conduit, before cutting, where services are shown, or removal required, relocated, or abandoned. Cut off pipe or conduit in walls or partitions, to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

- J. Patching: Perform fitting and adjusting of products as required to provide finished installations complying with the specified tolerances and finishes or otherwise satisfactory to the Architect.
- K. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
- L. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
- M. Where the removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
- N. Where patching occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch, after the patched area has received primer and first coat.
- O. Patch, repair, or re-hang existing ceilings, as necessary to provide an even plane surface of uniform appearance.
- P. At penetrations in fire-resistive rated walls, partitions, ceilings, floors, or roof construction, completely seal voids with firestopping materials in compliance with Section 07 84 00 - Firestopping.

3.04 CLEAN-UP

- A. All debris and rubbish shall be properly removed from the premises as it occurs. All materials shall be properly disposed of off-site, in strict accordance with all applicable Laws, Rules, Regulations, and Ordinances.
- B. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean surfaces before painting or finishing.

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as possible without additional cost(s) to the project.
- D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling (if applicable), salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports. The purpose of the required disposal reports is intended to ensure the Owner that all waste is being properly and legally disposed of in accordance with all applicable local, state or federal regulations.
- E. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- F. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
 - 5. Incineration, either on-site or off-site.
- G. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.
- H. Related Requirements: See Division 31 – Earthwork for existing site trash and waste requiring removal.

1.02 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.

- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of landfill disposal of all non-recycled project trash/waste.
 - 3. Landfill Alternatives (if applicable): List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 - 5. Designation of the party who will be responsible for implementing the plan.
- C. Monthly Reports: The certified facility shall submit monthly reports of all project demolition debris and construction waste removed, recycled (if applicable) and landfilled. The report shall include:
 - 1. Date, disposal ticket #, materials type, total weight of the load, weight of material recycled from the load, % of materials recycled, materials destinations, tipping fees and disposal cost.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate a person who will be responsible for implementing the plan, instructing workers, coordinating waste materials handling, any on-site separation requirements for all trades and overseeing and documenting results of the Waste Management Plan.
- B. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Pre-bid meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.
 - 4. Job safety meetings.
 - 5. Project Close-out meeting.
- C. Facilities: Provide specific facilities for on-site containment and transportation of demolition debris and construction waste materials to off-site disposal facility for use by all contractors and installers
 - 1. Provide containers as required.
 - 2. Provide adequate space for pick-up and delivery of containers.

- 3. Keep trash/waste bin areas neat and clean.
- D. Keep trash/waste collection areas neat and clean.
- E. Do not handle, separate, store, salvage, or recycle hazardous materials. Contact Owner if hazardous materials are encountered.

END OF SECTION

SECTION 01 78 00
PROJECT CLOSE-OUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Substantial Completion procedures.
 - 1. Project Close-out meeting.
 - 2. Occupancy Permit.
- B. Project Record Documents.
 - 1. Record Drawings.
 - 2. List of Subcontractors and material suppliers.
 - 3. Operation and Maintenance Data.
 - 4. Warranties and bonds.
 - 5. Contractor's Certificate of No Hazardous Materials.
 - 6. Testing Agency Final Report.
- C. Architect's evaluation of the Work.
- D. Final Acceptance procedures.
- E. Operating and Maintenance Instructional Sessions.
- F. Adjustments.
- G. Final Cleaning.

1.02 RELATED REQUIREMENTS

- A. Section 3-A State of Maine, Standard General Conditions and Work Contract.
- B. Section 01 00 00 - General Requirements.
- C. Section 01 00 30 - Electronic Media: Record Drawing backgrounds.
- D. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- E. Section 01 40 00 - Quality Services: Final Test Reports.
- F. Section 01 78 10 - Warranties: General warranty requirements.
- G. Individual Product Sections: Specific requirements for operation and maintenance data.
- H. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBSTANTIAL COMPLETION PRELIMINARY PROCEDURES

- A. Prior to requesting evaluation of the Work for certification of Substantial Completion, the Contractor shall complete the following items.
- B. Close-out Meeting: Not less than thirty (30) days prior to the anticipated date of Substantial Completion, the Contractor shall conduct a Project close-out meeting. Participants in the meeting shall include the Contractor, subcontractors, Owner and Architect. The Contractor shall prepare the agenda and schedule of close-out tasks, for prior distribution, which, among other items as may be determined by the Contractor, shall include the following:
 - 1. HVAC Start-up Activities.
 - a. Building "flush-out"
 - b. Air and water balancing
 - c. Controls sequence check
 - d. HVAC filter replacement
 - e. Cleaning of ductwork used during construction
 - 2. Programming of Energy Management System
 - 3. HVAC System Commissioning
 - 4. Indoor Air Quality Testing (as applicable)

5. Testing and Inspections with Authorities Having Jurisdiction:
 - a. Fire alarm system test
 - b. Generator and transfer switch test
 - c. Sprinkler system testing
 - d. Kitchen hood suppression system testing
 - e. Fire and smoke vents, fire shutters
 - f. Elevator and lift testing and inspection
 - g. Health Department food service inspections
 - h. Certificate of Occupancy inspection
6. Other Testing.
 - a. Security system
 - b. Clock system
 - c. Data and Telephone distribution systems
7. Owner's Equipment Testing.
 - a. Telephone equipment
 - b. Computer network equipment
 - c. Laboratory equipment
 - d. Audio-visual equipment
 - e. Theater equipment.
8. Delivery of tools, spare parts, extra stock, etc.
9. Punch Lists:
 - a. Contractor
 - b. Architect / Owner
10. Final Cleaning Operations.
11. Transition Security Issues.
 - a. Removal of construction trailers, fencing, gates, etc.
 - b. Door key change-over
 - c. Set-up key cabinet
 - d. Locker key & combination listing and turn-over
 - e. Miscellaneous key turn-over (casework, millwork, toilet accessories, gas valves, F.D. security key box, septic pump station, display cases, flag pole lock keys, etc.)
 - f. Activation of the security system
12. Transition Issues.
 - a. Electric service change-over.
 - b. Insurance change-over.
 - c. Owner's schedule for move-in of furnishings and equipment
13. Instructional Sessions:
 - a. Mechanical, sprinkler and electrical systems.
 - b. Door hardware, windows, and window operators
 - c. Carpet cleaning & maintenance
 - d. Theatre equipment
 - e. Food service equipment
 - f. Athletic equipment
 - g. Gymnasium bleachers
 - h. Laboratory equipment
 - i. Greenhouse equipment
 - j. Elevators and lifts
14. Record Information:
 - a. Warranty binder
 - b. Record Drawings
 - c. Record survey
 - d. O&M manuals
 - e. Food service & laboratory equipment binders
15. Close-out Paperwork:

- a. Release of Liens
 - b. Consent of Surety
 - c. Certification of No Hazardous Materials
 - d. Testing Agency Final Report
- C. Contractor's Punch List: Prior to preparation of a punch list by the Owner and Architect, the Contractor shall prepare his own comprehensive punch list, and along with his subcontractors, properly complete all Work items thereon. The receipt of the Contractor's written punch list, clearly identifying all completed and pending items, shall be considered a prerequisite for the commencement of the Owner and Architect's evaluation of the Work for Substantial Completion.
- D. Advise Owner of pending insurance and utility change-over requirements.
- E. Submit warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
- F. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities, including Occupancy Permits, operating certificates and similar releases. If the Project is completed in phases, obtain Occupancy Permits as required by governing authorities.
- G. Deliver tools, spare parts, extra stock, and similar items.
- H. Make final change-over for locks, keys, and other security provisions.
- I. Complete start-up testing of equipment and systems, conduct Owner's training sessions.
- J. Discontinue, change over and remove temporary facilities from the site. Remove temporary protection measures provided during construction.
- K. Final Cleaning.
- L. Certificate of Occupancy: The Contractor shall schedule various inspections with the Authority Having Jurisdiction as required to obtain a Certificate of Occupancy.

1.04 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
1. Record Drawings: Shall be required for all Site Utilities, Site Drainage, Architecture, Building Structure, Mechanical Systems, Fire Protection Systems and Electrical Systems.
 - a. The Contractor shall maintain one set of Construction Documents for use in the preparation of Record Drawings. This set shall be maintained at the site, and upon them, the Contractor shall clearly and accurately record all Supplementary Instructions, Change Orders, Architect's responses to Contractor's Requests for Information, and all significant changes made during construction to the Work hereinafter listed.
 - b. Upon completion of the Contract, and as a prerequisite to final Payment, the Contractor shall prepare (draft as necessary), check, and certify the Record Drawings for completeness and accuracy and submit them to the Architect. The Contractor's submittal shall include one set of CD Rom electronic media files and one set blackline hard copy Record Drawings. The Contractor shall imprint the following text on each Record Drawing and Record Drawing Electronic Media File:
 - 1) NOTE: This drawing has been produced by (name and address of contractor). It is not the originally designed Construction Document. It is a Record Drawing."
 - 2) See Section 01 00 30 - Electronic Media for information regarding obtaining electronic Construction Documents for use in preparing for Record Drawings.
 - c. The Architect will casually review such drawings, but will in no way ascertain or certify their completeness or correctness, which shall remain the sole responsibility of the Contractor. The Architect shall be entitled to rely upon the thoroughness and accuracy of the Contractor's documents, without further verification. Following his review, the Architect will forward all Record Drawings to the Owner for his use.

2. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Complete miscellaneous records, place in good order, properly identified and bound ready for reference and submit to the Architect for the Owner's records.
 3. List of Subcontractors: The Contractor shall submit to the Architect two (2) typed updated lists of all subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.
- B. Operation and Maintenance Data:
1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
1. The Contractor shall submit to the Architect two (2) typed sets, neatly bound and indexed in a loose leaf binder, of all warranties, certificates and bonds as required by the Construction Documents.
 2. For equipment or component parts of equipment put into service during construction with Owner's permission, submit a copy of documents within 10 days after acceptance.
 3. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 4. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period. Pages shall be pre-punched for insertion into the bound set.

1.05 ARCHITECT'S EVALUATION

- A. On receipt of a written request from the Contractor, the Architect will either proceed with evaluation of the Work for Substantial Completion or advise the Contractor of requirements yet to be completed prior to evaluation.
- B. Based on his/her observations, the Architect will provide a written list, or "Punch List", of items to be corrected or to be completed. The Architect's list may not include all Work necessary for completion in accordance with the Construction Documents and shall not in any way relieve the Contractor of responsibility for compliance with the Construction Documents.
- C. The Architect shall prepare the AIA G704 Certificate of Substantial Completion form and attach his/her written evaluation list thereto.
- D. Additional Work found to be incomplete or not in conformance with the Construction Documents after the Architect's evaluation shall be completed or corrected before Final Acceptance and Final Payment.
- E. When Work has been completed or corrected, the Contractor shall submit to the Architect a written request for re-evaluation. Include a copy of the Architect's previous evaluation report with notation of action taken for each item.

1.06 FINAL ACCEPTANCE

- A. Within five (5) working days after the date of Substantial Completion, the Contractor shall provide a list of final Contract requirements with anticipated completion dates including:
 1. List of incomplete Work.
 2. Final Change Orders.
 3. Consent of Surety to final payment

4. Assurances that unsettled claims will be settled.
 5. Record Drawings, O&M Manuals, Damage or Settlement Survey or other final record information.
 6. Final Application for Payment with releases and supporting documentation, including final waivers of lien.
 7. Written confirmation that corrective work related to any failed quality control testing has been provided, and that satisfactory retesting has been performed and approved by the testing agency.
- B. Re-evaluation Procedure: The Architect will re-evaluate the Work upon receipt of written notice from the Contractor that the Work, including correction of items previously noted, has been completed.
1. Upon completion of re-evaluation, the Architect will prepare a Certificate of Final Acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for Final Acceptance.
 2. If necessary, re-evaluation for Final Acceptance will be repeated. Cost of re-evaluation will be the responsibility of the Contractor.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 INDOOR AIR QUALITY MANAGEMENT

- A. The Contractor and his various subcontractors as he may direct shall implement the procedures throughout construction in an effort to improve indoor air quality during the Owner's occupancy. See 01 57 21 - Indoor Air Quality Controls.

3.02 BUILDING COMMISSIONING

- A. The Owner shall employ an independent Commissioning Agent for the purpose of performing Building Commissioning. See Section 01 91 00 Commissioning and 01 91 15 Building Exterior Commissioning.

3.03 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Field changes of dimension and detail.
 2. Details not on original Construction Documents.

3.04 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.05 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.
- D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.06 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- L. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- M. Include test and balancing reports.

- N. Additional Requirements: As specified in individual product specification sections.

3.07 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages, house in plastic sleeves.
- L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.

3.08 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products in quantities as specified in individual Specification Sections. Deliver to the site and place in locations as directed by the Owner. Obtain receipts signed by Owner's Representative and submit copies to the Architect if so directed.

3.09 WARRANTIES AND BONDS

- A. See Section 01 78 10: Warranties, for additional information.
- B. Retain warranties and bonds until time specified for submittal.
- C. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- D. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- E. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- F. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

3.10 CERTIFICATE OF NO ASBESTOS

- A. See Section 01 30 00 - Administrative Requirements, for requirements for submission of Certificate(s) of No Asbestos.

3.11 FINAL TESTING REPORTS

- A. See Section 01 40 00 - Quality Services, for requirements for the Testing Agency's Final Report.

3.12 OPERATING AND MAINTENANCE INSTRUCTIONS / OWNER TRAINING

- A. Instructions: The Contractor and his subcontractors and suppliers shall jointly, thoroughly instruct the Owner's representative and maintenance personnel in the proper maintenance and operation of all materials and systems that require training for proper operation and/or regular maintenance as follows:
 - 1. Demonstrated and written detailed instructions shall be provided and reviewed for materials and systems listed in Substantial Completion Preliminary Procedures paragraph of this Section, shall include, but not be limited to:
 - a. Start-up and Shut-down procedures.
 - b. Emergency operations.
 - c. Noise and vibration adjustments.
 - d. Control sequences.
 - e. Trouble-shooting.
 - f. Safety procedures.
 - g. Maintenance manuals.
 - h. Maintenance agreements.
 - i. Warranties.
 - j. Record Drawings.
 - k. Tools, spare parts, lubricants.
 - l. Cleaning, economy and efficiency adjustments.
 - m. Fuels, and fuel conversion, if applicable.
 - n. Identification systems.
 - o. Hazards. Any operations that, if improperly performed, might endanger the building's occupants or damage the building's equipment or contents.
 - p. Theatre Equipment: Proper use, operation, and safety procedures for theater rigging, lighting, and audio/visual systems.
 - 2. Video all demonstrations of operation and maintenance sessions, which shall be held at the completed facility to instruct the Owner in the proper operation of equipment and systems. Prior to final payment, deliver two (2) copies to the Architect for forwarding to the Owner.

3. The Contractor shall obtain sign-off from the Owner for meeting with each installer or manufacturer's representative.
4. For equipment or systems requiring seasonal operation perform demonstrations for the other season within six (6) months.

3.13 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation. For testing, adjusting and balancing of HVAC systems see Division 25 - Mechanical.

3.14 FINAL CLEANING

- A. Final Cleaning: Upon the completion of the Work, the Contractor shall remove all tools, scaffolding, surplus materials, debris, and shall leave the Work "broom clean" or its equivalent. In addition to general broom cleaning, the Contractor shall employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Use products that are non-hazardous. Cleaning shall be in compliance with requirements of Section 01 73 40 - Indoor Air Quality and with all manufacturer's written instructions. The following cleaning shall be done just before inspection for certification of Substantial Completion and final acceptance of the Work:
 1. Transparent Materials: Clean mirrors and glazing in doors and windows; remove paint and glazing compounds that are noticeably vision obscuring; wash and polish, taking care not to scratch materials. Replace chipped, scratched, or broken materials.
 2. Ceiling and Wall Surfaces: Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, marks, fingerprints, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Carefully clean (vacuum) fabric type surfaces as recommended by manufacturer. Generally clean as required to leave in first class condition.
 3. Flooring: Remove all temporary protection; remove all spots, soil and paint; and clean, shampoo, wax, and buff, etc. all ceramic tile, resilient flooring, base, and other floors in accordance with manufacturer's recommendations. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 4. Hardware: Clean and polish all hardware for all trades; this shall include removal of all paint stains, dust, dirt, etc.
 5. All fixtures, equipment, doors, and door and window frames: Clean all surfaces per manufacturer's instructions, removing all stains, paint, dirt and dust.
 6. Labels: Remove all labels that are not permanent.
 7. Mechanical and Electrical Equipment: Wipe surfaces of equipment to be free of paint, dirt, and dust. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps. Replace burned-out lamps.
 8. Roofs: Clean debris from roofs, scuppers, and drainage systems.
 9. Site: Clean the building site and surrounding ground. All trash and rubbish shall be removed and properly disposed of off-site and in accordance with Section 01 74 19 Construction Waste Management. Sweep paved areas broom clean and remove stains and spills. Rake disturbed grounds that are neither paved nor planted, to a smooth even-textured surface.

END OF SECTION

SECTION 01 78 10
WARRANTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for warranties.

1.02 RELATED SECTIONS

- A. Section 01 00 00 - General Requirements.
- B. Section 01 78 00 - Project Close-out.
- C. Divisions 2 through 28 for specific Section requirements.

1.03 GENERAL

- A. Manufacturers' disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- B. "Standard Product Warranties" are preprinted written warranties published by individual manufacturers of particular products and are specifically endorsed by the manufacturer to the Owner.
- C. "Special Warranties" are written warranties required by or incorporated in the Construction Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.04 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and has been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Construction Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Construction Documents.
- E. Owner's Right of Refusal: The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- F. Commencement Date of Warranties: The Date of Substantial Completion designates the commencement date for warranties unless specifically indicated otherwise.
 - 1. Commencement of warranties for items not accepted shall not begin until after items have been accepted.

2. In the event that equipment or systems are installed and made operational, but are not in service for the benefit of the Owner due to occupancy phasing and school operation schedules, the one (1) year warranty period shall start on the date of Substantial Completion.

1.05 SUBMITTALS

- A. Submit written warranties and bonds to the Architect in conformance with Section 01 78 00 - Project Close-out.
- B. When a special warranty is required from the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Architect for review by the Owner prior to final execution.
- C. Form of Submittal: At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer.
 1. Verify the documents are in proper form, contain full information, and are notarized. Co-execute warranties when required.

1.06 SCHEDULE OF GUARANTEES, WARRANTIES, AND BONDS

- A. Guarantee: The Contractor shall guarantee the entire Work to be free from defective or improper work or materials, and shall make good any damage due to such work or materials for a term of one year from the date of the satisfactory completion and acceptance of the Work. In general the commencement date for warranties and guarantees shall be the date of Substantial Completion. Under no circumstances shall any warranties or guarantees for any individual or collective materials or items of equipment commence prior to the date of Substantial Completion. Extended guarantees or warranties shall be provided as specified elsewhere.
- B. Provide guarantees, warranties, and bonds on products and installations as specified in individual Sections.

END OF SECTION

SECTION 01 91 00
COMMISSIONING

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SECTION 01 91 00
COMMISSIONING

PART 1 - GENERAL

1.00 GENERAL PROVISIONS AND GOALS

- A. Attention is directed to the Contract, General Conditions, and all sections within Division 1 – General Requirements that are hereby made part of this Section of the Commissioning Plan/Specifications.
- B. Examine all Sections of the Specifications for requirements that affect work under this Section and in particular, Divisions 1, 21, 22, 23, and 26. In addition, refer to Section 01 91 15 Building Exterior Commissioning for requirements that are included within the commissioning requirements for this project.
- C. This Section of the Contract is set aside to incorporate current Commissioning contract requirements and to be the document by which this Section of the Contract will be built into the Final Commissioning Report.
- D. Commissioning Goal: Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the Owner's operational needs. This is achieved by beginning in the Design Phase and documenting design intent and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process encompasses and coordinates the traditionally separate functions of system documentation, equipment start-up, automatic control system calibration, testing, adjusting, and balancing (TAB), electrical systems, plumbing systems, fire protection systems, HVAC systems, process, electrical, and performance testing and training.
- E. Commissioning Goal: To have the General Contractor complete a comprehensive system readiness process followed by system demonstration to the Commissioning Team with the CA providing the documentation/verification of the building systems that they perform in accordance with the requirements of the construction Documents.
- F. Commissioning Goal: To have the General Contractor complete a comprehensive Systems Manual documentation process that will assist the CA and Owner with enhancing of the building automation system and general operations of the facilities operation upon project closeout and occupancy.
- G. Abbreviations found in this specification:
 - 1. Commissioning Agent - CA
 - 2. Pre-functional Performance Test - PFPT
 - 3. Functional Performance Test – FPT
 - 4. Testing, Adjusting and Balancing - TAB

1.01 COMMISSIONING PLAN

- A. The following Commissioning Plan is included herein outlines the contract requirements once authorization-to-proceed with construction has been given and the plan extends into the Warranty Phase (also noted herein).
- B. The Owner shall champion the commissioning process with the CA to commission the building systems to the quality standards and procedures specified herein and as documented on the contract drawings.
- C. As information to the Commissioning Team joining in the commissioning process at the Construction Phase the CA completed the following in the Design Phase:

1. Created the Commissioning Plan and imbedded it into this Section of the specification.
 2. Review the Design Engineer's Basis of Design (BOD).
 3. Included within the Commissioning Specification sample of the suggested PFPT checklist and associated Observation of Installation Checklist, the Table of Content for the Systems Manual, Commissioning Test Plan & Schedule template, and draft FPT narrative for Contractor understanding of commissioning process and contract requirements.
- D. The following activities will be completed by the Commissioning Team per the construction Documents starting in the Design Phase:
1. CA shall complete a Summary Commissioning Report at the end of the project.
 2. Commissioning Team shall utilize the Commissioning Plan. The following are integral parts of the Commission Plan and are imbedded into this Section of the specification:
 - a. Commissioning Program Overview
 - 1) Goals and objectives
 - 2) General Project Information
 - 3) Systems to be commissioned
 - b. Commissioning Team
 - 1) Team members, roles and responsibilities.
 - 2) Communication protocol, coordination, meetings, field visits, and overall commissioning project management.
 - c. Description of Commissioning Process Activities
 - 1) Preparing the Basis of Design.
 - 2) Developing systems Functional Performance Test (FPT) procedures.
 - 3) Prepare systems for FPT demonstration to the Commissioning Team.
 - 4) Verifying systems performance.
 - 5) Reporting deficiencies and the resolution process.
 - 6) Accepting the building systems.
 - d. Project is to include the following commissioning process activities:
 - 1) Documenting the Commissioning Review Process.
 - 2) Reviewing Contractor submittals.
 - 3) Developing the Systems Manual.
 - 4) Verification of training of operations personnel.
 - 5) Reviewing building operation after final acceptance.
 3. CA shall review Contractor submittals applicable to systems being commissioned.
 4. CA shall verify the installation and performance of commissioned systems
 - a. Installation Observation.

- b. Systems Performance Testing.
 - c. Evaluation of Results compared to Basis of Design/Design Intent.
5. CA shall provide to the Project Team, the Table of Contents for a Systems Manual for the commissioned systems. The Systems Manual provides future operating staff the information needed to understand and optimally operate the commissioned systems. A Systems Manual is in addition to the O&M Manuals submitted by the Contractors. The Systems Manual requires the following for each commissioned system:
- a. Final version of the Basis of Design (provided by the Design Team).
 - b. System single-line diagrams (provided by the Design Team and may include the TAB system flow diagrams and the CAs system flow diagrams).
 - c. As-built sequences of operations, control drawings and original set points (provided by the ATC Contractor and each Equipment Manufacturer's ATC submittal for pre-packaged ATC).
 - d. Operating instructions for integrated building systems (provided by the Contractor).
 - e. Recommended schedule of maintenance requirements and frequency requirements and frequency, if not already included in the project O&M Manuals (provided by the Contractor).
 - f. Recommended schedule for retesting of commissioned systems with blank test forms from the original Commissioning Plan (provided by the CA).
 - g. Recommended schedule for calibrating sensors and actuators (provided by the ATC Contractor and each Equipment Manufacturer's ATC submittal for pre-packaged ATC).
 - h. PFPT documents and Start-Up Documents to be included within the System Manual specified herein (provided by the Contractor).
6. CA shall verify that the requirements for training are completed by the General Contractor and their team per Construction Documents.
7. CA shall review building operation within 10-months after substantial completion.
8. CA shall complete a Summary Commissioning Report.
- E. In the Construction Phase, the Contractor shall work closely with the CA in establishing and maintaining the schedule of commissioning events for the commissioning of systems and activities noted here based on the draft Commissioning Test Plan & Schedule.
- F. Commissioning of the selected systems shall consist of documentation of system readiness prior to demonstration using the PFPT checklists followed by demonstration of the system using the FPTs.
- G. The PFPTs shall be developed and provided to the General Contractor by the CA and shall be used in concert with the addition of Equipment Manufacturer start-up checklists, Contractor's own "static inspection" checklists, Pre-TAB checklists, ATC System Graphics, and Control Contractor (both the ATC firm and each Equipment Manufacturer providing packaged ATC) point-to-point checkout check lists as part of Contract equipment and system start-up system readiness process. In addition, the ATC contractor(s) shall provide a minimum of 48 hours system trending prior to the FPT system demonstrations continuing on with a minimum of 120 additional hours of system trending.

- H. These PFPT documents shall be included in an on-site 3-ring binder(s) and kept current by the Contractor during the Construction Phase. This binder shall become an integral part of the Systems Manual at the end of the project.
- I. The CA shall complete random installation observation per construction Documents and shall include in each commissioning Field Report, the associated equipment and distribution Observation Checklists.
- J. Commissioning of the selected systems shall consist of demonstration of the interactive system operation through the use of finalized FPT narratives. The FPT narratives shall be completed with input during the Construction Phase from the Contractor and Design Team and used to verify operation per design intent through all modes and conditions. Facility staff shall participate and receive on-the-job training during the system demonstration.
- K. Prior to Project Closeout, the General Contractor, using the Table of Contents provided by CA, shall compile the Systems Manual.
- L. In the Post-Construction Phase, the CA shall facilitate a 10-month Warranty/Project Closeout meeting, as well as facilitate a seasonal/deferred system demonstration (i.e., FPT for heating system in heating season).

1.02 SYSTEMS TO BE COMMISSIONED

- A. Systems to be commissioned shall be listed below. Systems include all interconnected components and are not limited to the equipment listed within this specification. Refer to Cx Test Plan & Schedule that is located at the end of this commissioning specification.
 - 1. HVAC
 - a. Building Automation System as it pertains to the systems being commissioned
 - b. Hot Water System
 - 1) Boilers and associated controls/pumps
 - 2) HW Primary Pumps
 - 3) 25% randomly selected cabinet unit heaters, propeller unit heaters, heating coils, radiant heat panels, finned tube radiation.
 - c. Air Handling Units
 - 1) Air Handling Units
 - 2) Dehumidification Air Handling Units
 - 3) VRF Indoor Units - 25% randomly selected
 - 4) VRF Outdoor Units - 100%
 - 5) A/C Split Systems
 - 6) VAV Units - 25% randomly selected
 - d. Exhaust Systems
 - 1) Toilet Exhaust Fans - 100%
 - 2) Kitchen Hood Exhaust - 100%
 - 3) Fume Hood Exhaust - 100%
 - 4) Dishwasher Exhaust - 100%
 - 5) Vehicle Exhaust Systems

- 6) General Exhaust - 50%
- e. Other
 - 1) Testing Adjusting and Balancing – Review TAB Plan and Reports.
 - 2) Review of the air and water systems balancing by spot testing a 10% random selection of the air and water systems utilizing a third party certified TAB firm.
- 2. Plumbing
 - a. Domestic Hot Water System
 - 1) Domestic Hot Water Heaters
 - 2) Hot Water Recirculation Pumps
 - 3) Sump Pumps
 - 4) Thermostatic Mixing Valves
- 3. Electrical
 - a. Lighting Control
 - 1) Occupancy Sensors - 25%
 - 2) Daylight Harvesting - 25%
 - 3) Lighting Control Panel/Low Voltage Switching - 50%
 - b. Distribution System
 - 1) Distribution Switchboards - 100%
 - 2) Panel Boards - 25%
 - a) Verification of EPO's, Skills Labs - 100%
 - 3) Low Voltage Transformers - 25%
 - 4) Coordination Study (Setting Verification) - 100%
 - 5) Grounding, Bonding inclusive of IT/Server Room - 25%
 - c. Emergency Distribution - 100%
 - 1) 500KW Standby Generator
 - 2) Transfer Switch (s)
 - 3) Witness Load Bank Testing of Standby Generator
 - 4) Pull The Plug (Simulated Power Failure), Verification of Egress Lighting, and mechanical equipment on Standby Power.
 - d. Low Voltage Systems
 - 1) Public Address - 100%
 - 2) Security - 100%
 - a) Access Control
 - b) Intrusion Detection
 - c) Monitoring Video/CCTV
 - e. Interfaces of systems to the Building Automation Control Systems - 100%

B. Commissioning Activities

1. Construction Phase

- a. Facilitate a Commissioning Team Kick-off Meeting with handouts referencing Commissioning Test Plan & Schedule and the Systems Manual Table of Content to provide a Commissioning Education Platform to the Commissioning Team.
- b. Participate in regularly scheduled commissioning field coordination meetings facilitated by the CA at intervals based on meetings with the General Contractor, TAB Firm, installing Trade Sub-Contractors, Control Contractor (both the ATC firm and each Equipment Manufacturer providing packaged ATC) and Owner facility manager representative. The purpose of the meetings will be to review the status of commissioning activities, schedule future activities, and resolve commissioning process issues.
- c. Respond to comments on submittals that have been reviewed for commission-ability.
 - 1) Review for conformance with the Basis of Design.
 - 2) Fulfilling Operation and Maintenance Requirements.
 - 3) Facilitating performance testing.
- d. Coordinate and schedule the prefunctional and functional performance activities, as well as the TAB and other trade activities.
- e. Review the following in the shop drawing phase:
 - 1) Equipment submittals for equipment/systems to be commissioned.
 - 2) TAB submittal including the TAB Plan and associated system flow diagrams indicating design data at pertinent test points in the air and water systems.
 - 3) Equipment and System Training Plan submittal.
 - 4) ATC submittal (both the ATC firm and each Equipment Manufacturer providing packaged ATC).
 - 5) Systems Manual Table of Content.
 - 6) O&M Manuals at end of Submittal Phase along with data retrieval sheets.
- f. Review and respond to pertinent RFIs and change orders associated with the commissioning process.
- g. Respond to comments on mechanical and electrical field coordination drawings that have been reviewed for commission-ability.
- h. Observe and document PFPTs for systems being commissioned.
- i. Observation of Installation per construction Documents all major systems and randomly selected support equipment to be commissioned using Observation Checklists.
- j. Observe and document randomly observed equipment manufacturer's startup for systems being commissioned.
- k. Review of the Systems Manual as it is developed during the Construction Phase.

- I. Facilitate and document FPTs for systems being commissioned.
 - m. Maintaining and resolving Corrective Action Log issues.
 - n. Participate in System Education/Training.
 - o. Facilitate spot testing of a 10% random selection of the air and water systems utilizing a third party certified TAB firm.
2. Post-Construction Phase:
 - a. Perform seasonal/deferred FPT demonstration.
 - b. Facilitate a Warranty/Project Closeout meeting at the 10 month benchmark after the established date of substantial completion (start date of the contractor's warranty period).
 - c. Complete Final Commissioning Report document.
 - d. Final Report to include Systems Manual.

PART 2 - PRODUCT

2.00 COMMISSIONING TEAM

- A. The Commissioning Team shall consist of representatives from the following parties involved in the design and construction of this facility:
 1. Owner's Representative
 2. Owner's Facility Operator and/or Manager
 3. Commissioning Firm
 4. Design Team Professionals (associated with system to be commissioned)
 5. General Contractor
 6. Testing Adjusting & Balancing (TAB) Contractor
 7. Automatic Control Contractor
 8. Trade Contractors (associated with system to be commissioned).
 9. Equipment Manufacturers (associated with system to be commissioned).
 10. Equipment Manufacturer's Automatic Control Engineer (associated with equipment furnished with pre-packaged automatic controls as part of systems to be commissioned).
 11. Independent Testing Agencies (associated with system to be commissioned).

2.01 SYSTEMS MANUAL

- A. The Systems Manual Table of Content shall be the initial cover sheet document that will begin the process of compiling all pertinent documentation associated with each system readiness. Other check lists to be included shall be the following on a system-by-system basis:
 1. Final version of the Basis of Design (provided by the Design Team).
 2. System single-line diagrams (provided by the Design Team and may include the ATC As-Builts, TAB system flow diagrams and the CAs system flow diagrams).
 3. As-built sequences of operations, control drawings and original set points (provided by the ATC Contractor and each Equipment Manufacturer's ATC submittal for pre-packaged ATC).

4. Operating instructions for integrated building systems (provided by the Contractor).
 5. Recommended schedule of maintenance requirements and frequency requirements and frequency, if not already included in the project O&M Manuals (provided by the Contractor).
 6. Recommended schedule for retesting of commissioned systems with blank test forms from the original Commissioning Plan (provided by the CA).
 7. Recommended schedule for calibrating sensors and actuators (provided by the ATC Contractor and each Equipment Manufacturer's ATC submittal for pre-packaged ATC).
 8. PFPT documents and Start-Up Documents to be included within the System Manual specified herein (provided by the Contractor).
- B. Using the PFPT checklists, the Trade Contractor (i.e., for HVAC, the associated ATC and TAB firms, etc.) shall complete the Pre-Functional Test documents and submit the completed signed forms and other appropriate start-up sheets. Trade Contractor shall submit the completed forms, initialed by the technician in-charge and attach other appropriate start-up sheets including but not limited to documents noted above prior to the start of the demonstration of the FPT Demonstration(s) to the Owner.
- C. Each step in the PFPT process shall be initially scheduled within the Commissioning Test Plan & Schedule and updated as work is completed.

2.02 TRAINING

- A. The General Contractor shall submit the Training Plan in a 3-ring binder in the Submittal Phase based on the specification herein. Each Trade Contractor shall include within this binder, their training plan and class handouts. Once Training Plan is reviewed by the Construction Manager/GC, and approved by CA, they shall coordinate the following classes leading up to the final Training.
1. Introduction to the Training Plan at end of Submittal Phase (approximately 2 hour session).
 2. Progress training with walk-thru of site once major equipment has been installed (approximately 4 hour session).
 3. System Training when commissioning of systems (FPT) occurs.
 4. Final Training as outlined within the project specifications.

2.03 OBSERVATION OF INSTALLATION

- A. The CA will visit the project site and randomly perform a system-readiness on systems being commissioned. The CA will use these sheets in concert with the construction documents specified herein. In addition, the approved submittals and RFIs that are on record will be referenced to ensure all field installation/design changes are noted on the completed observation sheet prior to distribution to the Commissioning Team.
- B. All Observation Deficiencies will be noted in a Corrective Action Log and distributed to the Contractor and Design Engineer for corrective measures.
- C. All deficiencies noted on the Observation Corrective Action Log shall be corrected by the appropriate responsible Trade, given to the Contractor who will provide the completed Corrective Action Log updates to the CA prior to system FPT demonstration to Owner.

2.04 FUNCTIONAL PERFORMANCE TEST NARRATIVES

- A. The Contractor along with the rest of the Commissioning Team members (particularly the design engineer) shall review and comment on the FPT narratives specified herein and

edit them based on the approved sequence of operation submittals and return documents to the CA prior to system commissioning for final FPT narratives.

- B. The CA shall revise the FPT narratives during the Construction Phase to incorporate any changes required to comply with the approved submittals and any contract document changes. The revised FPT narratives shall be issued as Final and Approved for executed documents.
- C. The Contractor shall use the FPT narratives to test the systems prior to demonstrating the FPT to the Owner, Facility Manager, and Commissioning Firm. The Contractor shall submit a completed and signed Final FPT form to the CA as evidence that the Contractor and associated Trade Contractors have dry-run tested the systems. All deficiencies noted by the Contractor during the dry-run, will be corrected and noted on the signed off/completed FPT document prior to the CA scheduling the demonstration of the systems to the Owner. This document shall be filed in the Systems Manual.
- D. The Contractor shall make available, during the testing phase, the manufacturer's representative/technician to execute sequences of operation that cannot be demonstrated by the Contractor to the Owner and CA due to their being part of a packaged unit not under their control.
- E. The Contractor shall use the Final FPT narrative format to commission the building systems demonstrating the Functional Performance to the Owner and the CA. During the Owner demonstration all deficiencies that can be corrected within 10 minutes, may be completed. Any corrective measures that will require more than a 10-minute corrective measure will be documented by the CA in a Corrective Action Log for re-testing by the trades at a later, scheduled date. The retesting is performed by the trades and reported to the Commissioning Agent via the Corrective Action Log updates. The results of the retesting and correction of deficiencies by the trades will be reported to the Commissioning Agent via the Correction Action Log updates.
- F. The Contractor shall respond to the Commissioning Firm's Corrective Action Log depicting non-compliant system demonstration items to be corrected within (3) business days after receipt of Corrective Action Log. Upon Commissioning Firm's receipt of executed Corrective Action Log from Contractor, re-testing of systems by the trades will be scheduled upon notifying Owner of such intent. The results of the retesting and correction of deficiencies by the trades will be reported to the Commissioning Agent via the Correction Action Log updates.

2.05 SCHEDULING OF TESTING PHASE

- A. Before scheduling of demonstrations of systems to the Owner by the Contractor, the following items are required to be addressed to the satisfaction of the CA and Owner's Representative.
 - 1. Pre-Functional Checklists have been completed and signed off
 - 2. Corrective Action Log open items have been addressed
 - 3. Testing, Adjusting and Balancing has been complete for those systems being tested with preliminary TAB Report reviewed and approved by Design Team.
 - 4. Point to Point Checklist has been completed and reviewed by CA.
 - 5. Building Automation System and Graphics is complete by ATC Contractor for systems being commissioned for all reporting points required.
 - 6. FPT Dry-Runs are executed by the Trades and signed off.
 - 7. O&M Manuals are complete and Owner has received such for training reference.
 - 8. Training Records have been completed and training scheduled or executed.

PART 3 - EXECUTION

3.00 COMMISSIONING TEAM MEMBER RESPONSIBILITIES

- A. The responsibilities of the various parties in the commissioning process are provided in this section. The responsibilities of the mechanical contractor (included TAB), BMS Contractor and the electrical contractor are included herein. The Design Engineer, Owner's Project Manager or Owner's Representative are also part of the Commissioning Team.
- B. All Parties
 - 1. Attend commissioning scoping meeting and additional meetings as necessary.
- C. Owner Project Manager shall:
 - 1. Champion the commissioning process.
 - 2. Participate in the development of the Owner's Project Requirement (OPR) document.
 - 3. Review and comment on any revisions to the Basis of Design (BOD) document.
 - 4. Attend commissioning specific coordination meetings.
 - 5. Participate in Pre-Functional Checklist observation.
 - 6. Participate in Functional Performance Testing.
 - 7. Participate in system education/training.
- D. Owner Facility Operator and/or Manager shall:
 - 1. Periodically visit the construction site to become familiar with the project equipment/system installation.
 - 2. Attend all commissioning coordination meetings.
 - 3. Review equipment, system and control submittals for Basis of Design (BOD).
 - 4. Work with other Commissioning Team members with system education/training.
 - 5. Witness and, to the greatest extent possible, participate in the following commissioning activities:
 - a. Initial equipment startup
 - b. Testing, adjusting and balancing
 - c. ATC point-to-point checkout
 - d. PFPTs
 - e. FPT
 - 6. Work with the Commissioning Team with interface of automatic control systems with existing building automation system.
 - 7. Work with Commissioning Team to develop the Systems Manual.
 - 8. Review commissioning progress and deficiency reports.
 - 9. Arrange for facility operating personnel and maintenance personnel to attend various field commissioning activities and field training sessions.
 - 10. Assist the CA as necessary in the seasonal or deferred testing and deficiency corrections required by the specifications.
 - 11. Participate in any seasonal or deferred testing and any deficiency issues resolution.

E. Commissioning Agent shall:

1. The CA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CA may assist with the problem solving of non-conformance or deficiencies, but ultimately that responsibility resides with the individual trade contractors and the design team. The primary role of the CA is to develop and coordinate the execution of the testing plan, observe and document performance that systems are functioning in accordance with the documented design intent and in accordance with the Construction Documents. The Contractors will provide all tools or use of tools to start, check-out and functionally test the equipment. The CA does not touch the equipment, run the equipment or manipulate the building automation system.
2. Facilitate commissioning meetings with the Commissioning Team.
3. Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and scheduled and technical expertise.
4. Coordinate the commissioning work and, with the General Contractor, onto the Commissioning Test Plan & Schedule.
5. Request and review additional information required to perform commissioning tasks, including O&M Materials, contractor start-up and check-out procedures.
6. Before start-up, gather and review the current control sequences and interlocks and with the contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
7. Review and approve normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with A/E and Construction Manager/GC reviews.
8. Receive and review construction documentation (Requests for Information, Bulletins, Change Orders etc.) for impact on commissioning process.
9. Maintain Pending Issues Log
10. Review commissioned equipment, system and control submittals for Basis of Design compliance.
11. Monitor the collection of the O&M Manuals by the Contractor immediately following the individual approval of equipment submittals.
12. Work with other Commissioning Team members with system education/training and monitor that training was conducted for all commissioning features and systems. Training program needs to address all training/education aspects.
13. Complete random installation observation according to construction Documents for system readiness assessment and complete each site visit with a Field Visit Report and record of any deficiencies.
14. Monitor the Contractor's development of the Systems Manual on-site. Pre-Functional Checklists will be completed by the installing contractors and signed-off and collected by the CA prior to testing of systems.
15. Randomly observe startup and checkout of equipment completed by the Contractor and documented per the manufacturer's instructions and construction Documents. The CA shall apply a sampling method of start-up observation for systems to be commissioned.

16. With assistance of the design engineer and installing contractors, write the FPT procedures for equipment and systems.
 17. Provide final "draft" FPT procedures to installing contractors for their use in "dry-run" of systems prior to CA observing testing. A sign-off FPT is required by the installing contractors to be provided to the CA before commissioning of the systems is to be scheduled.
 18. Work with ATC Contractor(s) to create and maintain system trending data. Analyze any functional performance trend logs and monitoring data to verify performance.
 19. Facilitate and observe FPT demonstrations by observing each Sequence of Operation for each system being commissioned. Observe to the greatest extent possible, the following commissioning activities:
 - a. Initial equipment startup
 - b. Testing, adjusting, and balancing
 - c. ATC point-to-point component test
 - d. PFPTs
 20. Maintain a Master deficiency and resolution log i.e., Corrective Action Logs and provide the General Contractor with written progress reports and test results.
 21. Maintain Commissioning Pending Issues Log of any issues or concerns identified in the Construction Phase that is Design Team or Owner related.
 22. Facilitate spot testing of a 10% random selection of the air and water systems utilizing a third party certified TAB firm.
 23. Verify the development of a System Manual for the below topics and assignments that is finalized during the Post-Commissioning Phase.
 24. Provide a final commissioning report.
 25. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
- F. Architect Professionals shall:
1. Fulfill construction administration per their contract with the Architect.
 2. Attend the commissioning scoping meeting and selected commissioning team meetings.
 3. Perform normal submittal review, construction observation, as-built drawing validation, O&M Manual validation etc., as contracted.
 4. Provide any design narrative documentation requested by the CA.
 5. Coordinate resolution of system deficiencies identified during commissioning, according to the construction Documents.
 6. Prepare and submit final as-built design intent documentation for inclusion in the O&M Manuals. Review and approve the O&M Manuals.
 7. Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.
- G. Mechanical and Electrical Designers/Engineers (Construction/Acceptance Phase):
1. Perform normal submittal review, construction observation, as-built drawing turnover to client along with O&M Manuals, etc., as contracted. On-site observation should be completed just prior to system start-up.

2. Provide any design narrative and sequences documentation requested by the CA. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
 3. Attend commissioning scoping meetings and other selected commissioning team meetings.
 4. Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
 5. From the Contractor's drawings, edit and update one-line diagrams developed as part of the design narrative documentation and those provided by the vendor as shop drawings for the chilled and hot water, condenser water, domestic water, steam and condensate systems; supply, return and exhaust air systems and emergency power system.
 6. Witness testing of all pieces of equipment and systems.
 7. Review the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures are being followed. Notify Owner's Project Manager of any deficiencies in results or procedures.
 8. Review the testing and cleaning procedures sufficient to be confident that proper procedures are being followed. Notify Owner's Project Manager of any deficiencies in results or procedures.
 9. Witness performance testing of smoke control systems by others and all other owner contracted tests or tests by manufacturer's personnel over which the CA may not have direct control. Document these tests and include this documentation in Commissioning Record in O&M Manuals.
 10. Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning during warranty-period commissioning.
- H. Construction Manager/GC shall:
1. Champion and support the commissioning process.
 2. Attend commissioning coordination meetings.
 3. Manage the master scheduling process with regard to timing and duration of the commissioning activities, as well as manage the Commissioning Test Plan & Schedule document.
 4. Manage the master shop drawing log, data retrieval log, O&M Manuals, Systems Manual, and training schedule log.
 5. Immediately following the acceptance of each submittal and no later than 60-days from submittal acceptance, the Trade Contractor's equipment supplier shall provide the O&M Manuals for systems per trade responsibility. In addition, the Contractor shall submit the equipment website where the O&M data is located.
 6. Coordinate the completion and delivery of shop drawings, O&M Manuals prior to system FPT demonstration to allow facility staff to reference during system education/training provided by the Contractor and monitored by the Commissioning Firm.
 7. Ensure that Contractor correct deficiencies and make necessary adjustments to O&M Manuals and as-built drawings for applicable issues in any testing.

8. Coordinate and schedule all equipment and system education/training. Completion of the Operation and Maintenance Training Record at the end of this section is required by the General Contractor for all systems requiring training. The Agenda portion depicting the training and personnel to be included, shall be completed 2 months prior to training and approved by the Owner's Representative.
 9. A Training Schedule, 2 months prior to training being implemented, shall be developed by the General Contractor and a meeting with the CA, Owner and Owner's facility personnel shall be implemented to discuss and finalize. A Training Record Document has been provided within the templates at the end of the commissioning specification for their use.
 10. Coordinate and schedule all testing compliance and maintain Test Log for pipe testing and flushing and duct testing of system distribution.
 11. Coordinate and schedule PFPTs and notify CA at least one (1) week prior to scheduled date.
 12. Coordinate and schedule the Trade Contractor's initial dry-run FPT demonstration and collect the sign-off FPT document.
 13. Coordinate and schedule deferred/seasonal tests in the appropriate season. The heating system sequence shall be tested in the winter and air-conditioning sequences in the summer.
 14. Coordinate and schedule the TAB spot testing of a 10% random selection of the air and water systems performed by the CA's third party certified TAB firm.
 15. Coordinate and schedule retest activities.
 16. Assemble and deliver Systems Manual to the CA for sign-off before forwarding to the Owner.
- I. Mechanical (including TAB), Electrical, and ATC Contractors:
1. The commissioning responsibilities applicable to each of the mechanical, controls and TAB contractors are as follows (all references apply to commissioned equipment only):
 2. Trade Contractors are as follows:
 - a. HVAC
 - b. Testing, Adjusting and Balancing Contractor
 - c. Sheet Metal
 - d. Automatic Controls
 - e. Electrical
 - f. Plumbing
 - g. Fire Protection
 - h. Low Voltage Systems
 - i. Building Automation (ATC)
 3. Include and itemize the cost of commissioning in the contract price.
 4. Require equipment manufacturer's provides self-contained building automation equipment representative to participate in the commissioning process.
 5. Attend a commissioning scoping meeting and other commissioning coordinating meetings.

6. Contractors shall provide the CA with normal cut sheets and shop drawing submittals of commissioned equipment.
7. Provide additional requested documentation, prior to normal O&M manual submittals to the CA for the development of start-up and functional testing procedures.
 - a. Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA.
 - b. The CA may request further documentation necessary for the commissioning process.
8. Provide a copy of the O&M Manuals and submittals of commissioned equipment, through the submittal process, to the CA for review and approval.
9. Prepare a preliminary schedule of MEP pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start-up and completion for use by the CA.
10. Contractors shall assist (along with design engineers) in clarifying the operation and control of the commissioned equipment in the areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
11. Provide assistance to the CA in preparing the specific FPT procedures. Trade contractors shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
12. Develop a full start-up plan and initial checkout plan using manufacturer's start-up procedures and the prefunctional checklists from the CA for all commissioned equipment. Submit to CA for review and approval prior to start-up.
13. During the start-up and initial checkout process, execute the mechanical-related portions of the prefunctional checklists for all commissioned equipment.
14. Perform and clearly document all completed start-up and system operational checkout procedures, providing a copy to the CA.
15. Address current A/E punch list items before functional testing. TAB shall be completed with discrepancies and problems remedied before the functional testing of the respective air and water related systems. TAB report reviewed and approved by the design team.
16. Provide skilled technicians to execute starting of equipment and to execute the FPTs. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
17. Provide skilled technicians to perform FPTs under the direction of the CA for commissioned systems. Assist the CA in interpreting the monitoring data as necessary.
18. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, CM and A/E to retest the equipment.

19. Provide skilled technicians to participate in the spot testing of a 10% random selection of the air and water systems performed by the CA's third party certified TAB firm.
 20. Prepare O&M manuals according to the Construction Documents, including clarifying and updating the original sequence of operation to as-built conditions.
 21. Develop and deliver O&M manuals immediately after associated equipment submittal is approved.
 22. Refine and implement PFPT Test procedures and, where applicable, have equipment manufacturer participation where controls are packaged.
 23. Develop and implement equipment education/training compliant with Construction Documents .
 24. Prior to the system demonstrations with the Commissioning Team, perform systems dry-run FPT demonstration and submit documented results to the Commissioning Firm.
 25. Demonstrate systems working with the Commissioning Team implementing FPTs.
 26. Demonstrate systems working with the Commissioning Team implementing deferred/seasonal test FPTs.
 27. Correct all Contractor-related deficiencies identified during FPTs and retest the corrected functions with the Commissioning Team.
 28. Provide Systems Manual portions that pertain to your discipline to the CA.
- J. Equipment Manufacturers shall:
1. Participate in the commissioning process. Participation shall include demonstration of furnished equipment operation and packaged control system functions.
 2. Prior to the systems demonstrations with the Commissioning Team, perform system dry-run FPTs in conjunction with the Trade Contractor.
 3. Demonstrate systems working with the Commissioning Team including joint automation demonstration with the ATC Contractor implementing FPTs in conjunction with the Trade Contractor.
 4. Demonstrate systems working with the Commissioning Team implementing deferred/seasons test FPT in conjunction with the installation subcontractor.
 5. Correct all equipment deficiencies identified during FPT and retest the corrected functions with the Commissioning Team.
- K. Testing, Adjusting and Balancing (TAB) Firm shall:
1. Attend all commissioning coordination meetings.
 2. Submit TAB Plan including TAB shop drawing submittal requirements (i.e., system flow diagrams with design data at pertinent test points) during the submittal phase period of the job.
 3. Review and comment on field coordination drawings during the mechanical-electrical field drawing coordination meetings relative to testing, adjusting and balancing.
 4. Participate in PFPTs completing Pre-TAB field visits.
 5. Complete testing, adjusting and balancing of systems.

6. Participate in FPT system demonstrations.
7. Provide system performance verification data for commissioned systems.
8. Correct all TAB deficiencies identified during the spot testing of a 10% random selection of the air and water systems performed by the CA's third party certified TAB firm.

3.01 CONSTRUCTION DOCUMENTS PHASE

- A. The documentation associated with the activities in the Construction Phase of the project is as follows:
 1. Commissioning Meeting Minutes for documenting regularly scheduled meeting discussions, responsibilities and action agenda due dates.
 2. Pending Issues Log for documenting issues identified and/or commissioning activities that are directed to design issues/concerns, field visit reporting, and other issues not directly related to the seasonal and/or deferred FPTs.
 3. Shop Drawing Log for documenting equipment submittals and associated documents to be commissioned and associated O&M requirements.
 4. Commissioning Test Plan & Schedule is used to document and track the Commissioning Process by listing all systems to be commissioned, documentation to be provided/collected during process and anticipated dates of demonstration of systems to Owner.
 5. Manufacturer/Contractor Test Log for documenting Contract Specification test requirements by Contractor that are directly related to the systems to be commissioned.
 6. Prefunctional Performance Tests (PFPT) for documenting Contractor required start-up compliance for systems to be commissioned.
 7. Commissioning Field Report documenting CAs visits and observations.
 8. Equipment & System Training Log for documenting Contractor required training of Owner personnel.
 9. Commissioning Trending Checklist for documenting and assisting during the start-up of systems and for continuous monitoring and measuring of building systems through the Warranty Period.
 10. Commissioning O&M Checklist for documenting the O&M Manual Process during the Construction Phase. This checklist can be used during the FPT demonstration to ensure proper documentation control is available to the Facility Department and compliance has been met with the Construction Documents.
 11. Functional Performance Test Narratives (FPTs) for documenting Trade Contractor required demonstration of system (s) to be commissioned.
 12. TAB Report reflecting the data recorded during the spot testing of a 10% random selection of the air and water systems performed by the CA's third party certified TAB firm.
 13. Corrective Action Log for documenting system installation observation deficiencies, start-up deficiencies, deficiencies noted during demonstration of systems to the Owner (FPT) and TAB spot testing deficiencies. Each corrective action shall require a Trade Contractor or Design Team signoff that the corrective measure has been completed. Each FPT corrective action shall require a re-test of that deficiency to demonstrate Contract Document compliance.

- B. Refer to attachments at end of this Part 3 Specification for samples of some of these documents mentioned above and will be used by the Commissioning Team during the Construction Phase, as well as Warranty Phase of this project. Commissioning Test Plan & Schedule
- C. The Commissioning Test Plan & Schedule, included within this part of the specification is a list of activities that must occur leading up to and including the FPT demonstration to the Commissioning Team. The document lists the systems and associated equipment that will be commissioned.
- D. The Contractor shall work closely with the CA to input and keep current the activities within the Commissioning Test Plan & Schedule.

3.02 SYSTEMS MANUAL

- A. The Contractor shall be responsible for coordination and development of the System Manual beginning immediately following the acceptance of equipment and component in the submittal phase of the project.
- B. CA shall review the Systems Manual for the commissioned systems. The Systems Manual provides documentation of all pertinent, system readiness checklists leading up to the FPT system demonstration.

3.03 PRE-FUNCTIONAL PERFORMANCE TESTS (PFPTS)

- A. A sample PFPT has been inserted behind this Section 3.
- B. Each PFPT included is the initial system ready checklist to be signed off by each applicable Trade Contractor as they complete their work on the specific piece of equipment. The PFPT is in addition to the start-up report.

3.04 SYSTEM READINESS (OBSERVATION OF INSTALLATION)

- A. CA will perform site visits and submit Field Reports including with the Report completed corrective action log, pending issues log and photo logs.
- B. All deficiencies from the observation of installation will be noted on a Corrective Action Log and distributed to the Commissioning Team for corrective measures. All deficiencies noted from the field visit and logged on the Corrective Action Log shall be corrected by the appropriate Trade Contractor who will then provide the completed Action Log to the Contractor and CA prior to system demonstration (FPT).
- C. The Contractor may use but must enhance the CA furnished PFPT as their "static inspection" checklist to confirm the completeness of the equipment installation prior to the Design Team's own equipment punch list.
- D. In addition to the Static Inspection checklists, the Contractor's equipment manufacturer and/or service department startup technician shall also provide their own inspection/system readiness checklists for each piece of equipment.

3.05 SYSTEM TRENDING DATA

- A. The Contractor shall provide system trending of specific points (i.e., discharge air temperature) for a minimum of 16 hours prior to system FPT demonstration and shall continue the trending after the system has been commissioned. During the Commissioning meetings, trending points shall be mutually agreed upon for the ATC Contractor(s) to program into the commissioning process.
- B. Contractor shall work with the CA and the Owner's Facility Manager in development of trending points during the ATC shop drawing phase.

3.06 FUNCTIONAL PERFORMANCE TESTS (FPT) NARRATIVES

- A. FPTs shall be provided by the CA for each system to be commissioned. The FPTs are the process by which a system shall be demonstrated to the Owner by the Contractor with the CA facilitating the process and the Owner's O&M Group participating.
- B. A FPT narrative have been inserted behind this Section 3 and is a "draft" sample for the Contractor to see as the level of effort and time needed to demonstrate the systems to be commissioned. This document, along with other system FPTs will be finalized during the Construction Phase upon final approved sequence of operations.
- C. Once the FPTs are completed, the Owner, Design Team, and the Contractor shall review and comment. Upon receipt comments, the CA shall finalize the FPTs.
- D. Final FPTs shall be used by the Contractor to implement in a "dry run" prior to the systems FPT demonstration to the CA and the Owner. During the dry run, trending shall occur as part of this system demonstration. With each completed dry run, the Contractor shall sign the FPT document and submit it to the CA as part of the Systems Manual.
- E. After the dry run, the CA shall facilitate the FPT system demonstrations, sequence-by-sequence with the Commissioning Team. Budgeted hours for system demonstrations are approximately as follows:
 - 1. Central Plant (Chillers, boilers, etc.): 8 hours
 - 2. Central Air Handling Unit: 4 hours per unit
 - 3. Pull-the-Plug Emergency Generator System: 8 hours
 - 4. Fire Alarm System in sync with NFPA Test 110: 8 hours
 - 5. Panelboards: 8 hours
 - 6. Terminal Devices (i.e., Fan Coil Units, etc.) 1 hour per device.

3.07 WARRANTY PERIOD

- A. Seasonal deferred FPT system demonstrations shall be completed in the Warranty Phase by the Commissioning Team. Leading up to the FPT demonstration(s), the Owner shall be trending the associated systems to assure the equipment is functioning per the Basis of Design. If the system(s) is not maintaining trend set points, the FPT demonstration shall be delayed until the Contractor has corrected the problem.
- B. Issues such as freeze-stat signal due to cold air stratification, cooling coil moisture carry-over, etc. during the air conditioning season shall also be resolved prior to the seasonal deferred FPT demonstration.
- C. Only that part of the system requiring deferred testing shall be demonstrated (i.e., heating valve sequence during heating season).
- D. A review of the building operation approximately 10 months after substantial completion with O&M staff and occupants. A plan for resolution of outstanding commissioning-related issues is provided. All outstanding construction deficiencies or deficiencies identified in this post-occupancy review should be documented and corrected under manufacturer or Contractor warranties.
- E. Team Member Responsibilities
 - 1. Owner Project Manager
 - a. Maintain records of problems or concerns associated with the systems during normal operation.
 - b. Distribute Post Construction Evaluation information to other Commissioning Team members for review and comment.

- c. Coordinate and facilitate the meeting with the Commissioning Team at the 10 month mark to discuss operational problems and concerns.
 - d. Oversee the revision of the BOD based on the results of the 10-month warranty meeting.
 2. Owner Facility Manager
 - a. Maintain problems/complaints from occupants and Owner personnel regarding commissioned systems.
 - b. Participate in seasonal/deferred FPTs.
 - c. Maintain "as-commissioned" proper operation of the building systems.
 - d. Participate in the 10 month Warranty meeting. Present the problems, issues, and concerns.
 - e. Identify warranty versus operational issues and concerns.
 3. Commissioning Agent
 - a. Maintain Commissioning Corrective Action Log until all issues are resolved. All updates shall be provided by the Contractor to the CA.
 - b. Facilitate seasonal/deferred FPTs.
 - c. Complete Final Commissioning Report document.
 - d. Facilitate the update of the System Manual by Contractor on any significant issues that were identified by the CA that will not be corrected and should be recorded in this System Manual.
 - e. Review of system trends.
 4. Design Professionals
 - a. Be available to consult on the results of the seasonal/deferred FPT results.
 - b. Meet with the Commissioning Team at the 10 month mark to discuss operational problems and concerns.
 5. Construction Manager / General Contractor
 - a. Coordinate scheduling of seasonal/deferred FPTs.
 - b. Participate in the 10 month Warranty meeting. Present the problems, issues, and concerns.
 - c. Provide completed training documentation.
 - d. Update of the Systems Manual on any significant issues that were identified by the CA that will not be corrected and should be recorded in the Systems Manual.
 - e. Address outstanding warranty issues and tasks identified as being under the original construction contract.
 6. Trade Contractors
 - a. Be present for and conduct seasonal/deferred FPTs.
 - b. Address outstanding warranty issues and tasks identified as being under the original construction contract.
 - c. Be available to meet with the Commissioning Team at the 10 month mark to discuss operational problems, issues, and concerns.

7. Equipment Manufacturers
 - a. Be present for and conduct seasonal/deferred FPTs.
 - b. Participation shall include demonstration of furnished equipment operation and packaged control system functions.
 - c. Address outstanding warranty issues and tasks identified as being under the original construction contract.
 - d. Be available to meet with the Commissioning Team at the 10 month mark to discuss operational problems, issues and concerns.
8. Independent Test Agency
 - a. Conduct seasonal/deferred TAB associated with FPTs.

3.08 FINAL COMMISSIONING REPORT

- A. The Final Commissioning Report shall contain the following and be delivered to the Owner within a reasonable time after occupancy:
 1. Executive Summary
 2. Basis of Design
 3. Correspondence
 4. Commissioning Specification
 5. Commissioning Test Plan & Schedule
 6. Design Review documentation
 7. Submittal Review documentation
 8. O&M Manual Review documentation
 9. Training Records
 10. Corrective Actions Log
 11. Pending Issues Log
 12. Systems Manual (a separate binder from the Contractor)
 13. Field Reports & Observation Checklists
 14. FPTs and Results
 15. Testing, Adjusting and Balancing documentation
 16. Operator Handbooks (a separate binder)
 17. Scrubbed FPTs for Re-Commissioning
- B. The Contractor with the participating Trade Contractors shall contribute to the successful project closeout and Final Commissioning Report by providing the following documentation.
 1. Submission of the completed Systems Manual to the Owner.
 2. Submission of the completed Corrective Actions Log to the CA.
 3. Project Closeout documents per the project contract.

3.09 ATTACHMENTS

- A. The following attachments/samples shall be used by the Commissioning Team during the Construction Phase and Warranty Phase and described herein.

1. Cx Test Plan & Schedule
2. Sample PFPT Checklist
3. Sample FPT Narrative
4. Sample Corrective Actions Log

END OF SECTION

COMMISSIONING TEST PLAN & SCHEDULE

PRE-FUNCTIONAL/SYSTEM READINESS & DOCUMENTATION																						
System	Included Equipment	Serves	Location	Total # of Units	% of Units to be CX'd	# Units To Be CX'd	FPT Draft Date (RDk)	Received Contractor Comments (Trades)	FPT Final Date (RDk)	O&M Systems Manual (Team)	TAB System Flow Diagrams (Trade)	Static Inspection (Pre-FPT) (Trades)	Installation Observation Complete (RDk)	Equipment Start-up (Trades)	ATC Installed	ATC Program & Graphics	TAB Completed	FPT "Dry-Run" by (Contractor)	FPT Demonstration to Owner Completion Date (Project Team)	Training Verification (RDk)	Deferred Testing	Refer To Latest Corrective Action Log
BAS SYSTEM																						
Building Automation System	BAS Computer, Monitor and Printer			1	100%	1																Item No.
AIR HANDLING UNITS																						
Air Handling Unit	AHU-1	A-Area: Auditorium	Roof	1	100%	1																
Air Handling Unit	AHU-2	A-Area: Stage	Roof	1	100%	1																
Air Handling Unit	AHU-3	F-Wing: Gym	Roof	1	100%	1																
Air Handling Unit	AHU-4	F-Wing: Practice Gym	Roof	1	100%	1																
Air Handling Unit	AHU-5	B-Wing: Graphic, Video, Spec, Faculty	Roof	1	100%	1																
Air Handling Unit	AHU-6	A-Area: Kitchen, Dining	Roof	1	100%	1																
Air Handling Unit	AHU-7	A-Area: Level 1 & 2 Offices and Facility	Roof	1	100%	1																
Air Handling Unit	AHU-8	D-Wing: Culinary Arts	Roof	1	100%	1																
Air Handling Unit	AHU-9	A-Area: Level 1 & 2 Library & Special Ed	Roof	1	100%	1																
DEHUMIDIFICATION AIR HANDLING UNITS																						
Dehumidification Air Handling Unit	DHU-1A	B-Wing: Level 2 Arts & Communication	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-1B	B-Wing: Level 1 Arts & Communication	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-2	C-Wing: Level 2 Science & Tech	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-3	C-Wing: Level 1 Science & Tech	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-4	C-Wing: Shops Welding & Manufacturing	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-5	C-Wing: Shops Automotive & Building Trades	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-6A	D-Wing: Level 1 Marketing & Cosmetology	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-6B	D-Wing: Level 1 Marketing & Cosmetology	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-7	D-Wing: Level 2 Science & Business	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-8	E-Wing: Level 1 & 2 Science, EMS, Fire & Pathway	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-9	E-Wing: Level 1 Health Occ. & Classrooms	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-10	F-Wing: Locker Room	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-11	F-Wing: Fitness	Roof	1	100%	1																
Dehumidification Air Handling Unit	DHU-12	A-Area: Level 1 & 2 Lobby/Core	Roof	1	100%	1																
Hot Water System																						
Boiler	B-1	Building	Mech Room B057	1	100%	1																
Boiler	B-2	Building	Mech Room B057	1	100%	1																
Boiler	B-3	Building	Mech Room B057	1	100%	1																
Boiler	B-4	Building	Mech Room B057	1	100%	1																
Boiler	B-5	Building	Mech Room B057	1	100%	1																
Hot Water Pump	HWP-1	Building	Mech Room B057	1	100%	1																
Hot Water Pump	HWP-2	Building	Mech Room B057	1	100%	1																
Hot Water Pump	HWP-3	Domestic Hot Water Heaters	Mech Room B057	1	100%	1																
Hot Water Pump	HWP-4	Domestic Hot Water Heaters	Mech Room B057	1	100%	1																
VRV INDOOR UNITS																						
VRV Indoor Units	AC1-1 through AC1-7	Cosmetology Area	Various	7	25%	2																
VRV Indoor Units	AC2-1 through AC2-5	Business Area	Various	5	25%	1																
VRV Indoor Units	AC3-1 through AC3-5	CAD Lab Area	Various	5	25%	1																

COMMISSIONING TEST PLAN & SCHEDULE

PRE-FUNCTIONAL/SYSTEM READINESS & DOCUMENTATION																						
System	Included Equipment	Serves	Location	Total # of Units	% of Units to be CX'd	# Units To Be CX'd	FPT Draft Date (RDk)	Received Contractor Comments (Trades)	FPT Final Date (RDk)	O&M Systems Manual (Team)	TAB System Flow Diagrams (Trade)	Static Inspection (Pre-FPT) (Trades)	Installation Observation Complete (RDk)	Equipment Start-up (Trades)	ATC Installed	ATC Program & Graphics	TAB Completed	FPT "Dry-Run" by (Contractor)	FPT Demonstration to Owner Completion Date (Project Team)	Training Verification (RDk)	Deferred Testing	Refer To Latest Corrective Action Log
VRF OUTDOOR UNITS																						
VRF Outdoor Unit	ACC1-1	AC1-1 through AC1-7	High Roof	1	100%	1																
VRF Outdoor Unit	ACC2-1	AC2-1 through AC2-5	High Roof	1	100%	1																
VRF Outdoor Unit	ACC3-1	AC3-1 through AC3-5	High Roof	1	100%	1																
UNIT HEATERS																						
Cabinet Unit Heaters	CUH-1 through CUH-21	Various	Various	21	25%	5																
Propeller Unit Heaters	PUH-1 through 34	Various	Various	34	25%	9																
SPLIT AIR CONDITIONING UNITS																						
Split Air Conditioning Units	AC/ACC-1 through AC/ACC-15	Various	Various	15	100%	15																
DUCT MOUNTED HEATING COILS																						
Heating Coils	HC	Various	Various	188	25%	47																
RADIANT HEAT PANELS																						
Radiant Heat Panels	RH	Various	Various	TBD	25%	TBD																
FIN TUBE RADIATION																						
Fin Tube Radiation	FT	Various	Various	TBD	25%	TBD																
VARIABLE AIR VOLUME UNITS																						
Variable Air Volume Units	VAV	Various	Various	TBD	25%	TBD																
MECHANICAL FANS																						
Chem Exhaust Fan	CEF-C110	Fume Hood	Roof	1	100%	1																
Chem Exhaust Fan	CEF-C114	Fume Hood	Roof	1	100%	1																
Dishwasher Exhaust Fan	DEF-1	Main Kitchen Dishwasher Exhaust	Roof	1	100%	1																
Dishwasher Exhaust Fan	DEF-2	Culinary Kitchen Dishwasher Exhaust	Roof	1	100%	1																
Exhaust Fan	EF-1	Room 132D	Roof	1	100%	1																
Exhaust Fan	EF-2	Room C104B, C104C, C104D	Roof	1	100%	1																
Kitchen Exhaust Fan	KEF-1	Main Kitchen Dishwasher Exhaust Hood	Roof	1	100%	1																
Kitchen Exhaust Fan	KEF-2	Culinary Kitchen Dishwasher Exhaust Hood	Roof	1	100%	1																
Kitchen Exhaust Fan	KEF-3	Culinary Kitchen Dishwasher Exhaust Hood	Roof	1	100%	1																
Kitchen Exhaust Fan	KEF-4	FACS Culinary Lab D112	Roof	1	100%	1																
Kitchen Exhaust Fan	KEF-5	FACS Culinary Lab D112	Roof	1	100%	1																
Kitchen Exhaust Fan	KEF-6	FACS Culinary Lab D112	Roof	1	100%	1																
DOMESTIC HOT WATER																						
Domestic Water Heater	DWH-1, DWH-2	Building	Mech Room 1486	2	100%	2																
Hot Water Recirculation Pumps	PP-1, PP-2	DWH-1, DWH-2	Mech Room B057	2	100%	2																
SUMP PUMP																						
Sump Pumps	SP-1, SP-2	Elevator Pits	Elevators	2	100%	2																
THERMOSTATIC MIXING VALVES																						
Thermostatic Mixing Valves	TMV-1 through TMV-5	Domestic Hot Water System	Various	5	100%	5																

COMMISSIONING TEST PLAN & SCHEDULE

PRE-FUNCTIONAL/SYSTEM READINESS & DOCUMENTATION																						
System	Included Equipment	Serves	Location	Total # of Units	% of Units to be CX'd	# Units To Be CX'd	FPT Draft Date (RDK)	Received Contractor Comments (Trades)	FPT Final Date (RDK)	O&M Systems Manual (Team)	TAB System Flow Diagrams (Trade)	Static Inspection (Pre-FPT) (Trades)	Installation Observation Complete (RDK)	Equipment Start-up (Trades)	ATC Installed	ATC Program & Graphics	TAB Completed	FPT "Dry-Run" by (Contractor)	FPT Demonstration to Owner Completion Date (Project Team)	Training Verification (RDK)	Deferred Testing	Refer To Latest Corrective Action Log
LIGHTING CONTROL																						
Lighting Control System	Lighting Control Panels	Building	Building	8	50%	4																
Occupancy Sensors	Occupancy Sensors	Building	Building	400	25%	100																
Daylight Harvesting	Daylight Harvesting	Building	Building	75	25%	19																
EMERGENCY POWER SYSTEMS																						
Generator	Generator	Life Safety and Standby Systems	Exterior	1	100%	1																
Automatic Transfer Switches	Transfer Switches (Programming and Testing)	Life Safety and Standby Systems	Main electric	2	100%	2																
Emergency Power Systems	Pull the Plug	Life Safety and Standby Systems		1	100%	1																
NORMAL POWER SYSTEMS																						
Main Switchboard	Main Switchboard	Building	Main electric	1	100%	1																
Panelboards	Panelboards	Building	Electric Rooms	50	25%	13																
Low Voltage Transformers	Low Voltage Transformers	Building	Electric Rooms	10	25%	3																
Grounding and Bonding	Grounding and Bonding	Building	Elect & Telecom	60	25%	15																
LOW VOLTAGE SYSTEMS																						
Public Address	Public Address	Building	Building		100%	0																
Security System	Access Control, CCTV	Building	Building		100%	0																
BUILDING ENVELOPE																						
Exterior Walls																						
Exterior Windows																						
Exterior Doors																						
Louvers and Vents																						
Grilles and Sunscreens																						
Roof Systems																						
Roof Openings																						

Rooftop HVAC Unit

Project Name: _____ Unit No.: RTU

Project Number: _____ Location No.: _____

Date: _____ Bar Code: _____

		PASS	FAIL	N/A
Inspection- Verification Electrical	Electrical Connections Completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Disconnect installed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Overload heater sizes confirmed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Motor amps: Rated @ _____ Actual @ _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Rated @ _____ Actual @ _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Rated @ _____ Actual @ _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Motor voltage: Rated @ _____ Actual @ _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Motor "bumped" to confirm equipment rotation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Distribution and terminations labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Panel circuit label and/or bar coded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Electrical contractor sign off by: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Inspection- Verification Automatic Controls	Points list completed	<input type="checkbox"/>	<input type="checkbox"/>
Interlock to automation system confirmed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interlock to fire alarm system confirmed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interlock to security system confirmed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interlock to _____ system confirmed		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
End devices stroked for full open & close		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distribution and terminations labeled		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Panel circuit label and/or bar coded		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Valves bar coded and/or tagged		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Control contractor sign off by: _____		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspection- Verification Equipment Installation	Installation on housekeeping pad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation on concrete inertia pad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Vibration isolator and/or mount blocks removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Equipment per construction Documents/details/shop drawing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Drain piping installation completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Vent piping installation completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Noise level and/or vibration acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Equipment insulated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Equipment labeled and/or bar coded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Equipment has been cleaned inside and out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Piping contractor sign-off by: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Insulation contractor sign off by: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Inspection- Verification Equipment Manufacturer	Points list completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Interlock to automation system confirmed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Interlock to fire alarm system confirmed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Interlock to _____ system confirmed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	End devices stroked for full open & close	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Manufacturer's start-up sheet completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Warranty sheet completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Manufacturer sign off by: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspection- Verification Pipe (HVAC) Distribution	Installation @ equipment completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Connections per construction Documents/details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	System has been flushed clean	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	System is filled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation pressure tested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation insulated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation labeled and with flow arrows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Valves bar coded and/or tagged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Piping contractor sign off by: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Insulation contractor sign off by: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Rooftop HVAC Unit

Project Name: _____ **Unit No.:** RTU

Project Number: _____ **Location No.:** _____

Date: _____ **Bar Code:** _____

		PASS	FAIL	N/A
Inspection- Verification Pipe (Plumbing) Distribution	Installation @ equipment completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Connections per construction Documents/details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	System has been flushed clean	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	System is filled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation pressure tested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation insulated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation labeled and with flow arrows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Valves bar coded and/or tagged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Piping contractor sign off by: _____			
Insulation contractor sign off by: _____				
Inspection- Verification Sheet Metal Distribution	Installation @ equipment completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Connections per construction Documents/details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation pressure tested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation insulated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Installation labeled and with flow arrows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Dampers bar coded and/or tagged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Sheet metal contractor sign off by: _____			
Insulation contractor sign off by: _____				
Inspection- Verification Testing & Balancing	Final balancing @ equipment completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shutoffs per construction Documents/details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Gauges per construction Documents/details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Thermometers per construction Documents/details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Strainers cleaned and tagged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Filters cleaned and tagged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Flow meter data sheet completed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Air (CFM) is per design criteria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Static pressure drops are per design criteria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	System static pressure is per design criteria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Water side (GPM) is per design criteria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Pressure drops are per design criteria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Steam/condensate (#/Hr) are per design criteria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Steam pressure is per design criteria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TAB contractor sign off by: _____				

Notes:

Functional Performance Test

Air Handling Units - AHU-1-2

Procedures:

Status: **1-Deenergized**

Mode: **Unoccupied**

- 1 Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
- 2 1) The outdoor air (OA) control damper (OAD) shall remain full closed and AHU & RF remain off. Perimeter fin tube radiation shall be used to maintain heating setback set point of 55°F (adj). If FTR cannot keep up with the heating demand, VAV terminal boxes shall operate with its heating coil ACV modulated as required to provide additional heating. On further call for additional heating, AHU and RF shall operate at maximum of 50% capacity with all VAV boxes fully opened and its HWC ACVs modulated to meet the set point.
- 3 Test Action: Override set points, command function and verify component actions and positions.

Status: **2-Deenergized**

Mode: **Unoccupied during Business hours**

- 1 Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
- 2 1. The rooms shall each be provided with an occupancy sensor by Division 260000. The occupancy sensor shall have an additional set of contacts for integration into the BMS. The occupancy sensor for each control zone shall be wired in parallel such that if any room within a zone is occupied as sensed by the occupancy sensor; the zone shall operate in the occupied mode.
2. Occupancy sensor will be integrated into the BMS. Coordination with Electrical contractor is required to ensure that the occupancy sensors provided can achieve this sequence.
3. Unoccupied mode during normal business hours (8am-6pm Monday-Friday) shall reset room temperature to setbacks of 65°F winter and 80°F summer.
- 3 Test Action: Override set points, command function and verify component actions and positions.

Status: **3-Energized**

Mode: **Warm-up or Cool-down**

- 1 Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
- 2 1. This stage shall be initiated one hour prior to the scheduled occupied periods, based on time of the day, day of the week, and OAT; and shall be owner adjustable.
2) The outdoor air (OA) control damper (ACD) shall remain closed.
3) Supply fan (SF) and return fan (RF) shall be energized and operated in its normal occupied sequence and chilled water ACV modulated to maintain the 52°F discharge set point (adj). VAV terminals will operate as in occupied mode until occupied set point has been achieved.
4) Economizer may be utilized for the cool-down mode whenever outdoor air is favorable.
5) Cx Note: Warm-up mode will modulate heating valve to maintain discharge air setpoint.
- 3 Test Action: Override set points, command function and verify component actions and positions.

Status: **4-Energized**

Mode: **Occupied**

- 1 Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
- 2 1) This stage shall be initiated following the cool-down or warm-up phase; and shall be owner adjustable.
2) AHU outdoor air control damper (AOD-O) shall open to its initial minimum position of 15%.
3) AHU supply fan (SF) and return fan (RF) shall be energized. Supply fan shall modulate between 25% to 100% of VFD speed, to maintain SA duct SP set point, as seen by two duct sensors (DA1-P & DA2-P). The SP set point shall be field determined in conjunction with the balancing contractor to assure that low as possible value is used to deliver the required flow to the furthest point. AHU-2 will operate with its OA damper fully closed.
4) Return fan (RF) shall track the AHU SF with the fixed differential CFM during this phase, which would be 15% of the design flow.
- 3 Test Action: Override set points, command function and verify component actions and positions.

Status: **5-Energized**

Mode: **Heating**

- 1 Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
- 2 1) The two way heating control valve (PH-O) will modulate to maintain preheat coil discharge air set point of 50°F (adj) as sensed by averaging coil leaving sensor (HC-T).
2) Dead-band between enabling the heating or cooling control valves will be provided to prevent simultaneous heating and cooling operation. The cooling coil valves shall remain closed if the preheat coil heating valve is open. An exception shall be upon freeze protection shutdown, the chilled water control valve shall open upon alarm and unit shutdown.
- 3 Test Action: Override set points, command function and verify component actions and positions.

Status: **6-Energized**

Mode: **Cooling**

- 1 Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
- 2 1) The two way chilled water control valve (CLG-O) will modulate to maintain cooling coil discharge air set point of 52°F (adj, refer to schedule for actual design coil leaving conditions) as sensed by averaging coil leaving sensor (CC-T). The set point shall be reset up by 4°F (adj) degrees as OAT falls from 80°F down to 65°F.
2) Dead-band between enabling the heating or cooling control valves will be provided to prevent simultaneous heating and cooling operation. The cooling coil valves shall remain closed if the preheat coil heating valve is open. An exception shall be upon freeze protection shutdown, the chilled water control valve shall open upon alarm and unit shutdown.
- 3 Test Action: Override set points, command function and verify component actions and positions.

Status: **7-Energized**

Mode: **Economizer**

- 1 Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
- 2 1) The AHUs shall utilize economizer control to provide free cooling whenever outside air enthalpy is lower than the return air enthalpy. OA/ RA/ EA ACDs and SF & RF will modulate to maintain neutral space static pressure (SP) as calculated by the CFM values, which will be overridden if space SP sensor pressure exceeds 0.10" WG positive or negative, relative to the outdoor reference.
- 3 Test Action: Override set points, command function and verify component actions and positions.

Functional Performance Test

Air Handling Units - AHU-1-2

Procedures:

Status:	8-Energized
Mode:	CO2 Control

1	Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
2	1) Carbon Dioxide readings expressed in ppm will be provided for AHUs in its return duct mains, and at high occupancy spaces as indicated on the plans. Outside CO2 value will also be continuously monitored (OA-CO2) to maintain LEED OA value + allotted 300 ppm set point (adj). A demand control ventilation sequence shall be used to adjust the outdoor air based upon the CO2 value reading. Upon an increase in CO2 within a space the VAV box serving the space shall open to allow more airflow, if VAV box damper is 100% open and the CO2 level continues to climb over the above specified value then the OA damper at the respective AHU serving the space shall modulate open to increase outdoor air until the room CO2 sensor is satisfied. Upon a rise in the common return air CO2 sensor shall modulate the outdoor air damper open until the CO2 sensor is satisfied. Upon an increase in room CO2 above 10% over the high value (outdoor air ppm+300ppm) an alarm shall be sent to the BAS system and logged for record.
3	Test Action: Override set points, command function and verify component actions and positions.

Status:	9-Energized
Mode:	VFD Failure

1	Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
2	1) In case of fan VFD fault condition, it shall be bypassed to make the VAV system temporarily into constant volume system. VAV boxes range shall be limited to 100-75% modulation range with DAT set point reset to prevent duct over-pressurization.
3	Test Action: Override set points, command function and verify component actions and positions.

Status:	10-Safeties Alarm
Mode:	Safeties

1	Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
2	1) When OAT falls below 40F, preheat coil control valve (NO) shall always be energized to maintain 50°F set point (adj) regardless of fan status. 2) If supply duct SP continues to rise 0.5"WG above SP set point at SF VFD's minimum position of 25% speed, all VAV box primary air dampers shall be incremented toward open position to prevent duct over pressurization. 3) If supply air temperature leaving preheat coil is less than 34°F as seen by the operating sensor and freeze protection secondary sensor, OAD shall close and system shall shut down, with high level alarm being registered. 4) On detection of smoke in the ducts, alarm will be generated. On detection of smoke in the duct, unit will be shut down by hardwired interlock. Filter differential pressure and smoke detector are monitored, and respective alarms will be generated on detection of excessive filter differential pressure or smoke detection. 5) High limit SP sensor (DAPHI-A) will prevent duct over-pressurization in case fire/smoke damper (by others) has been closed (or other obstruction). Value differential between the two operating SP sensors and the high limit sensors shall be continually monitored, and differential exceeding the normal range shall register alarm condition, and the remaining SP sensor operating in normal parameter shall be used for controls until the condition has been corrected. SP set point shall be reset as the flow reduces for optimum motor operating cost savings. When duct SP continues to rise, all VAV boxes shall open to prevent duct damage, and alarm condition registered. 6) Low limit SP sensor (RAPLO-A) will prevent duct under-pressurization in case return fire/smoke damper (by others) has been closed (or other obstruction), and shall register alarm condition. When duct SP continues to drop, return fan shall be shut off to prevent duct damage, and alarm condition registered through the DDC system.
3	Test Action: Override set points, command function and verify component actions and positions.

Air Handling Unit Safeties / Alarms		
1	Low OAT	Pass/Fail
2	Supply Duct SP exceeds setpoint at 25% fan speed	Pass/Fail
3	Low DAT	Pass/Fail
4	Smoke Detection (Refer to NFPA 72 Report)	Pass/Fail
5	High Limit SP	Pass/Fail
6	Low Limit SP	Pass/Fail

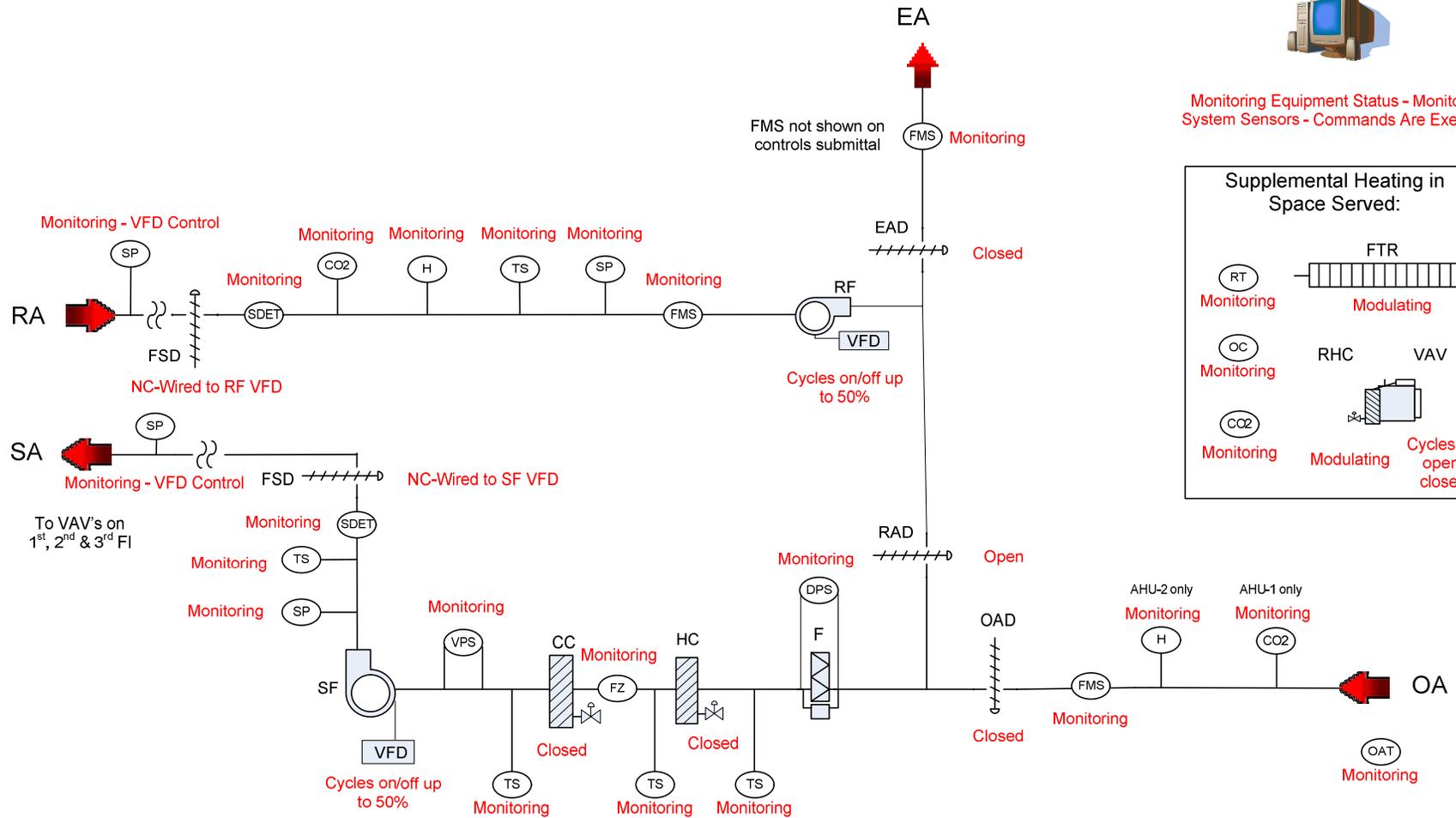
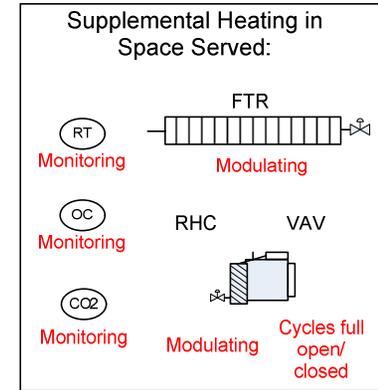
Status:	11-Alarms
Mode:	Alarms

1	Installation, wiring, controls are programmed and configured. Startup and pre-testing is complete.
2	1) If a unit fails to start, as sensed by a current sensors and air flow monitors, an alarm will be generated. 2) If set point deviates by more than 5°F (adj) for more than 10 minutes (adj) alarm condition shall be registered.
3	Test Action: Override set points, command function and verify component actions and positions.

Air Handling Unit Alarms		
1	Supply Fan Failure Alarm	Pass/Fail
2	Return Fan Failure Alarm	Pass/Fail
3	High Space Temperature Alarm	Pass/Fail



Monitoring Equipment Status - Monitoring
System Sensors - Commands Are Executed



	Andover, MA Boston, MA Amherst, MA Durham, NC Charlotte, NC	RDK Engineers 200 Brickstone Square Andover, MA 01810-1488	P 978-475-0928 F 978-475-5768 W www.rdkengineers.com
	TITLE:	STATUS: 1. Deenergized Unoccupied	



200 Brickstone Square | Andover, MA 01810-1488
 P: 978-296-6200 | F: 978-296-6201

Commissioning Corrective Actions Log

PROJECT:	REVISION DATE:
PROJECT NO:	DISCIPLINE:

THE COMMISSIONING CORRECTIVE ACTIONS LOG DOES NOT DISPLACE THE DESIGN ENGINEER'S OR GENERAL CONTRACTOR'S PUNCH LIST RESPONSIBILITIES. CORRECTIVE ACTION ITEMS ARE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR AND TRADES TO REVIEW AND CORRECT THE DEFICIENCY. ALL PARTIES ARE RESPONSIBLE TO REVIEW ALL ITEMS. ITEMS SHADED OUT ARE ITEMS THAT HAVE BEEN REVIEWED AND CORRECTIVE ACTION WAS COMPLETED AND RDK WAS NOTIFIED THAT THE DEFICIENT ITEMS HAVE BEEN CORRECTED AND THE ITEM CLOSED.

No.	Trade	System	Room	Sequence	Description of Issue	Date Observed	Corrective Action (Date Taken)	Status / Comments
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SECTION 01 91 15
BUILDING EXTERIOR COMMISSIONING

PART 1 GENERAL

1. 01 GENERAL REQUIREMENTS

1. The General Conditions of the Contract for Construction and the General Requirements are hereby made part of this specification. This section shall be read in conjunction with Specification Section 019113, *General Commissioning Requirements*.
2. Related Sections:
 1. Section 017800 – Project Close-out
 2. Section 019113 - General Commissioning Requirements
 3. Section 019114 - Commissioning Authority Responsibilities
 4. Section 07 – Thermal and Moisture Protection
 5. Section 08 – Openings
3. Reference Standards:
 1. ASTM E2813-12, *Standard Practice for Building Enclosure Commissioning*

1. 02 SUMMARY

- A. Commissioning is the systematic process of assuring by third-party design review, testing, documentation, and training from the design through construction, acceptance, and warranty phases that new Building Enclosure Assemblies perform independently and interactively in accordance with the design intent and design documentation.
 - A. The independent third-party Commissioning Agent (CxA) for this project is Building Enclosure Associates, LLC. This section relates to the work associated with the building enclosure elements being commissioned with the involvement of the Owner, Design and Construction Team and an independent third-party Commissioning Agent.
 - B. The requirements of this section are intended to supplement the other specification sections. Where any discrepancies exist between what is specified herein and elsewhere, the more stringent requirements apply.
 - C. Commissioning shall be used to assess the following for building enclosure elements:
 1. CxA to review design and execution of building enclosure assemblies for thermal and water integrity, moisture vapor control and assembly life.
 2. Completeness and functional performance according to design intent and Owner's operational needs prior to occupancy,
 3. Documented performance provided by the installed building enclosure elements, deficiencies found, and corrective actions taken,

4. Pertinent, useful, and organized maintenance and warranty data.
- D. The designers and installing contractors retain their full contract document responsibilities in providing a finished and fully functional facility. Commissioning does not take away from or reduce these responsibilities.
- E. Commissioning requires active project team involvement and participation to deliver effective and successful results for all concerned. Project Team to provide labor and project management required to support the commissioning process.
- F. This section is intended to supplement other sections of the construction contract and shall be read in conjunction with Division 1 - General Requirements, Division 7 – Thermal and Moisture Protection and Division 8 - Openings.
- G. All guarantees and warranties shall not begin until final acceptance of the newly installed assemblies by the Owner. Acceptance requires, at a minimum, completion of successful field testing work.
- H. The Commissioning Authority directs and coordinates all commissioning activities, this section describes some but not all of the Commissioning Authorities responsibilities.
- I. The Commissioning Authority is employed by the Owner.
- J. Commissioning Tasks
 1. Review of Design Phase Documents
 2. Review Construction Phase Documents
 3. Periodic observation of work in progress
 4. Field Testing of mock-up assemblies
 5. Field Testing of representative production assemblies
 6. Project commissioning documentation and Project Close Out
 7. Post-Commissioning Review
 8. Issue of Commissioning Report

1.03 SYSTEM DESCRIPTION

- A. Systems to be commissioned with the involvement of the independent third-party Commissioning Agent:
 1. Exterior Assemblies and related components, including but not limited to:
 - a. Insulation
 - b. Weather Barriers

- c. Metal Panels, Fiber Cement Siding, Etc.
- d. Roofing Assemblies and Accessories
- e. Sheet Metal Flashing and Trim
- f. Fenestrations – Windows, Storefronts, Curtain Wall, Skylights, Etc.
- g. Joint Sealants
- h. Any other equipment and systems explicitly identified elsewhere in Construction Documents as requiring commissioning.

1.04 COMMISSIONING TEAM

- A. Commissioning Team:
 1. Owner's Project Manager/Representative
 2. Operations & Maintenance Personnel
 3. Designer / Design Consultants
 4. Contractor / Installer
 5. Commissioning Agent (CxA)
- B. Commissioning Coordination Supervisor: Each Contractor / Installer shall assign a Commissioning Coordination Supervisor with five (5) years of experience with the coordination of disciplines of construction. The coordinator's responsibilities include:
 1. Attendance at commissioning coordination meetings
 2. Planning and coordination of commissioning activities
 3. Incorporate commissioning activities into project scheduling
 4. Compile and submit documentation
 5. Communicate with Commissioning Agent
 6. Direct resolution and documentation of corrective actions
 7. Provide assistance for performance of functional performance tests directed by the Commissioning Agent and included in the project documents.
 8. Address corrective actions and retain Third Party Testing Agent to perform retesting
 9. Compile Project Warranty and Maintenance Documentation
 10. Submit Commissioning Documentation

1.05 SUBMITTALS

- A. Contractor / Installer shall submit the name of person(s) assigned as Commissioning Coordination Supervisor within (2) weeks of contract award. Contractor / Installer shall submit the following information for each assigned Commissioning Representative:

Company Name

Name

Title

Years of Experience

Contact Information

- B. Submit a list of required submittals to the Commissioning Agent. Commissioning Agent will identify submittals relevant to systems being commissioned for which Contractor / Installer shall provide copies for commissioning agent to review concurrent with submission to the Design Engineers for review.
- C. Submittal review by Commissioning Agent will provide insight to the appropriateness of the proposed system to the project conditions and detailing issues that should be resolved. Review of Building Enclosure related Shop Drawings to be reviewed by CxA after Designer has completed review, but prior to return of Shop Drawing to Contractor. Submittal Reviews will be returned to Design Team within 7-10 business days from receipt of submittal. Review will be performed for design intent only and will not include a review of the following issues: verification of dimensions, coordination between trades and/or documents, materials, and other aspects of existing conditions, warranties, building code compliance, energy code compliance, sequencing, value engineering and/or constructability.
- D. Master Construction Schedule: Incorporate all commissioning milestones into the Master Construction Schedule. Provide monthly schedule updates.
- E. Submit a copy of Construction Meeting Minutes, Requests for Information (RFI), Architectural Supplemental Instructions (ASI), Requests for Proposals (RP), Change Orders (CO), etc. to Commissioning Agent.

1.06 INSTALLATION GUIDELINES, TEST DATA, MAINTENANCE MANUALS AND WARRANTIES

- A. Refer to individual sections for maintenance manual and warranty requirements.
- B. In addition to the submittal requirements of individual sections, submit one digital copy of the manufacturers' installation guidelines, laboratory test data, maintenance manuals and warranties for the systems listed in 1.03.A above.
- C. Product Safety/Data Manual: In addition to the requirements of individual sections, provide digital copies of a manual containing product data sheets for all products installed in the project. Manuals shall be arranged in the Division/Section CSI format as indicated in the Table of Contents of this project manual.
- D. Designer acceptance of warranties shall be a prerequisite to approval of final payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 COORDINATION

- A. Assign Commissioning Representative (see 1.04 for requirements).
- B. Include Commissioning Agent on material submittals (see 1.05 for details).
- C. Review the commissioning requirements.
- D. Include commissioning activities in the master schedule.
- E. Request clarification as needed.

3.02 CONSTRUCTION PHASE

- A. Scheduling:
 - 1. Contractor to provide Commissioning Agent time line schedule for construction of various building enclosure elements including preparation of mockups and schedule for coordination meetings.
 - 2. Commissioning Agent to provide input into the master scheduling process with regards to timing and duration of the functional performance tests. The master scheduling process will include the functional performance tests.
 - 3. Contractor / Installer through its Commissioning Coordination Supervisor shall forward to the Commissioning Agent and Project Team, a list and schedule of functional performance tests to be performed. Unless specified otherwise, provide a minimum two week notice to the Commissioning Agent for specified functional tests to be witnessed. See Section 3.02 through 3.06 of this section for additional information.
- B. Commissioning Kick-Off Meeting:

Commissioning Agent will plan and conduct a meeting early in construction phase to review commissioning activities and responsibilities with all parties involved. Meeting will include discussing incorporating CX Schedule with the Construction Schedule, reviewing the submittal review requirements, the inspection and testing process, and developing the formal lines of communication between all parties. Attendance will be required of all members of the Commissioning Team.
- C. Site Visits:
 - 1. Contractor responsible for providing safe and full access to Commissioning Agent, or his representative to make observations of the work in progress during the course of the project.
 - 2. Periodic site visits will be made during Construction by Commissioning Agent to become generally familiar with the progress and quality of the work and to

determine in general if the work, when completed, will be in accordance with the Construction Documents. Visits will be coordinated with Owner's Project Manager.

3. A field report will be issued to the Commissioning Team following each site visit. Field report will contain general observations and a deficiency log. Deficiencies will be identified in field based upon general industry standards and Construction Documents.
4. Site visits will be made, whenever possible, to review completed air and vapor barrier/flashings prior to installation of cladding. Commissioning Agent will inform the Owner's designated inspector for the Air Barrier of items to be inspected and reports to be provided.
5. Construction observations made by Commissioning Agent will be made independently of and in addition to those observations to be performed by the Contractor, Architect and others involved in this project.
6. Exhaustive or continuous on-site observations are not included. Means and Methods of Construction as well as worker safety programs and precautions are the sole responsibility of the Contractor and not part of our responsibility or control.

D. Deficiency Log:

1. Throughout the Construction Process, the CxA will maintain a Commissioning Issues Log which will enumerate deficiencies observed during field visits.
2. Responses to and resolution of items included in deficiency log are required by the responsible party within 2 weeks of receipt of report. Deficiency will remain in log until resolved.
3. Resolution of all deficiency items required for completion of project. See Part 3.07 of this specification for additional information.

3.03 CONTRACTOR'S FUNCTIONAL PERFORMANCE TESTS

- A. Functional field performance testing will be performed on representative typical building exterior assemblies to verify their conformance with Project Performance Requirements. Demonstration of successful field performance testing is required for Project Close Out.
- B. This testing is to be performed by a Third Party Independent Testing Agent retained by the Installer, unless specified otherwise.
- C. Contractor and Installer to provide personnel and equipment as required to assist the third party testing agent to perform the functional performance tests, including retesting required due to corrective actions required.
- D. Installer to reference Project Specifications for specified field testing work and request clarification from Designer or Commissioning Agent if necessary. Contractor / Installer to review and comment on the final detailed functional performance test procedures identified. Provide feedback as to the efficiency of the procedures and possible alternate approaches to achieving the same results.

- E. Contractor / Installer through it's Commissioning Coordination Supervisor shall forward to the Commissioning Agent and Project Team, a list and schedule of functional performance tests to be performed.
- F. Unless specified otherwise, provide a minimum two week notice to the Commissioning Agent for specified functional tests to be witnessed.
- G. Test Reports by Others:

Provide Commissioning Agent full access to inspection and test reports on building enclosure elements by various agencies retained by the Contractor / Installer or Owner. Submit Contractor / Installer's Testing Agent's test reports to the Commissioning Agent, Owner and Designer/Engineer within one week of the successful completion of each test.

3.04 PRETESTING INSPECTION AND ACCEPTANCE BY INSTALLER

- A. Prior to the scheduled start of functional performance tests, Installer to submit Pre-Functional Test Statement to CxA and Project Team, indicating written acceptance of completed work and confirming readiness for functional field testing.
- B. Pre-Functional Test Statement to indicate that systems installed as part of the project and scheduled to be tested are 100% complete and ready to be tested to confirm their compliance with the Project's Performance Requirements.
- C. Functional performance testing on a system shall not commence until Pre-Functional Test Statement is provided by the Installer.
- D. Prior to the Commissioning Agent attending any field testing, the following requirements must be met in advance:
 - 1. Installer(s) responsible for installing components to provide Pre-Functional Test Statement for assemblies scheduled for field testing, verifying their completion and suitability for testing. This documentation is to be distributed to the Team, including the CxA at least one week in advance of scheduled test.
 - 2. The responsible Installer is to be present for any field testing performed.
 - 3. It is recommended that Installer inform Manufacturer of assemblies being tested that testing will take place, and it is encouraged that a Manufacturer's representative be present to witness this field testing.
 - 4. Time lost and costs incurred (including cost of Commissioning Agent) due to a false start of functional performance testing because of inaccurate, incomplete, and/or untruthful field data shall be paid for by the Contractor / Installer(s) providing the erroneous data.

3.05 FUNCTIONAL PERFORMANCE TESTING

- A. Building enclosure elements shall be tested in accordance with the requirements of the Technical Sections for these items of work. As a minimum, tests shall be performed on mock-up assemblies and on at least two more occasions during production work.

- B. All performance criteria to be used for the basis of field testing should be provided by the Designer. All testing should be performed in accordance with the most current AAMA and ASTM Test Methods for the assembly being tested.
- C. Additional testing may be performed at the discretion of the OPM and Designer.
- D. Testing performed by Commissioning Agent:

Contractor responsible for providing personnel and equipment as required to assist the following functional performance tests performed by the Commissioning Agent:

1. Mock-Up Assemblies:

Water Penetration and Air Infiltration Testing on representative air/vapor barrier, window flashings and fenestration assemblies installed as a mock-up as soon as possible after initial installation of the assemblies, at no later than 25% completion. Intent of mock-up testing is to verify that installed assemblies meet Project Performance Requirements and to determine if they are suitable as a standard for the remaining project, subject to approval by the Architect of Record.

If failure occurs, additional testing to be performed to determine source of failure and no additional installation should occur until mock-up assemblies meet the Project Performance Requirements as demonstrated through successful field testing.

2. Infrared Thermal Scanning:

Owner reserves the right to perform the following testing on the completed roofing and façade assemblies:

a. Infrared Moisture Scan of Completed Roofing Assembly:

Test to be performed in accordance with ASTM C1060 on entire new flat roofing assembly following completion. Any locations indicative of the presence of moisture will be identified during this survey, and should be investigated and remediated as necessary by the Roofing Installer at no additional cost

b. Infrared Thermal Survey of Façade Assemblies:

Test to be performed in accordance with ASTM C1060 on all new façade areas when proper conditions are met. Any locations indicative of air leakage, missing insulation or other deficient conditions should be investigated and remediated as necessary by the responsible Installer at no additional cost.

E. Testing performed by Installer's Third Party Independent Testing Agency:

Building enclosure assemblies shall be tested by a Third Party Independent Testing Agency retained by the Contractor / Installer in accordance with the requirements of the Technical Sections for these items of work.

The following is a series of functional testing to be performed by the Contractor / Installer's Third Party Testing Agency and witnessed by the Commissioning Agent:

1. Building Exterior Assemblies:

Water Penetration and Air Infiltration Tests on representative fenestration assemblies should be performed in accordance with the Project Specifications at a minimum during the following stages of construction:

- a. Production Assemblies:
 Field testing should be performed on representative production fenestration assemblies following both 50% and 75% completion. Test specimens shall consist of different fenestration configurations/types during each test, unless indicated as acceptable by CxA in advance.

Required minimum functional field tests indicated in the following table:

Minimum Functional Testing performed by Contractor's Third Party Testing Agency:			
Component	Test Method	Quantity	Frequency
Metal Wall Panels	Water Penetration:	2 assemblies	50% of Completion
	AAMA 501.2:	2 assemblies	75% of Completion
Joint Sealants	Field Adhesion Pull Test: ASTM C1521.	As identified in Test Method. Minimum 10 test locations per first 1,000 linear feet of joint length, 1 test per 1,000 linear feet or 1 test floor per elevation after that.	25% Completion, Throughout course of project.
Metal Windows	Air Infiltration & Water Penetration: ASTM E783, ASTM E1105, AAMA 502	3 assemblies	50% of Completion
		3 assemblies	75% of Completion
Curtain Wall	Air Infiltration & Water Penetration: ASTM E783, ASTM E1105, AAMA 503	1 assembly	50% of Completion
		1 assembly	75% of Completion
	Water Penetration: AAMA 501.2:	2 assemblies	50% of Completion
		2 assemblies	75% of Completion
Storefront Assemblies	Water Penetration: AAMA 501.2:	1 assembly	50% of Completion
		1 assembly	75% of Completion
Metal Framed Skylight	Water Penetration: AAMA 501.2:	1 assembly	75% Completion
Note: 1 assembly = min. 100 sf or entire fenestration within wall opening			

F. Deviations from Standard Test Methods:

If the Testing Agent anticipates deviating from the standard test methods for any assemblies, including those methods indicated in this specification, the deviations are to be indicated in writing and submitted for review to the CxA and Commissioning Team at least 3 days in advance of scheduled testing.

Any deviations from the standardized test methods indicated in this specification are to be agreed to by all parties involved, including the OPM, Designer/Engineer, Contractor/Installer and CxA prior to the testing being performed.

G. Partial Fenestration Test Specimens:

Due to the length and width of some of these types of assemblies included in this project, there may be issues in constructing a test chamber to comply with requirements specified by AAMA and ASTM - a test chamber that is able to encapsulate, and introduce a test pressure differential on the entire assembly.

To accommodate these conditions, some of the field testing performed on this project may be performed as a deviation to the test methods, on a partial assembly/specimen, with prior approval by CxA in advance.

1. This partial test specimen may consist of a portion of the window or curtain wall with a minimum size of 100 sf.
2. Each modified test specimen shall consist of a width of at least 3 vertical mullions and extend at least 3 horizontal mullions in height, including either or both the sill and head of the assembly.
3. No more than 4 total window tests and 3 curtain wall tests shall be performed with a partial test specimen configuration.
4. With this partial test specimen configuration, air infiltration readings taken during this test may not be representative of the entire installed assembly and should be taken for reference only and not for measurement of conformance with project performance requirements.

3.06 FUNCTIONAL PERFORMANCE TESTS FAILURE

A. If failure occurs during field testing, the following steps are to be taken:

- i. Investigatory work shall be performed as necessary by the responsible Installer or Manufacturer to identify source of failure.
- ii. The Installer or Manufacturer is to identify a course of remedial work, which is to be approved by the Owner and Designer prior to being performed. Course of remedial work is to be performed on the assembly that has experienced failure. Upon completion of the remedial work, re-testing is to be performed at the responsible Installer's expense until successful results are achieved.
- iii. Following completion of successful field testing, all similar assemblies are to be reviewed by the Installer and those with similar issues are to be identified. The approved course of remedial work is to be performed on at least one other assembly and this assembly is to be field tested.
- iv. For every failed assembly, at least one additional assembly is to be tested. Additional testing beyond this requirement may be performed at the request of the Owner and Designer.
- v. Upon completion of successful field testing of additional assemblies, the approved course of remedial work is to be performed on all similar assemblies. The course of inspection and remedial work performed by the Contractor is to be documented for Record in writing and photographs as a minimum.

3.07 CORRECTIVE ACTIONS

- A. Contractor to respond in writing to and perform corrective actions for resolution of deficiencies found during all periods of construction and testing. Responses shall be provided within 2 weeks following documentation of deficiency.
- B. Corrective work and retesting shall continue until all deficiencies identified have been corrected to the satisfaction of the Owner.
- C. Additional costs associated with the need to retest a system, including cost of Commissioning Agent, become eligible for being paid for by the party or parties responsible for the need for further retesting. There will be no charges to the Owner for retest of systems that do not pass the functional performance requirements during commissioning testing.

3.08 WARRANTY AND CLOSE OUT DOCUMENTS

- A. Warranty period begins at final acceptance of completed work by the Owner, including completion of successful functional testing. Warranty to meet requirements identified in Construction Documents by Designer of Record.
- B. CxA to receive copies of Close Out Documents, including Operation and Maintenance Documents, Warranties and other Record Documentation concurrent with submission to the Designer of Record for Review. CxA to perform review of items for compliance with requirements identified in Construction Documents.

3.09 POST COMMISSIONING

- A. Commissioning Agent to perform post commissioning warranty review of newly completed exterior work ten months after substantial completion. This visit will include a visual review of the building envelope to identify issues of concern with the performance of the building envelope elements and repair work required.
- B. This review will be documented in a Field Report distributed to Project Team. Any deficiencies identified during post commissioning review are to be remediated by responsible Contractor.
- C. Commissioning Agent to assist with planning the satisfactory resolution of warranty problems and committing the necessary resources to follow through with achieving the activities planned. Complete any unfinished performance verification.

3.10 PROJECT COMPLETION

- A. Following completion of review of Close Out Documents and Post Commissioning visit, and resolution of any deficiencies identified during all phases, the Commissioning Agent may proceed with their Close Out of the Project.
- B. Upon completion of the Commissioning activities, a Commissioning Report will be generated documenting the Commissioning Process from Design through the Post Commissioning Phases. Copies of all documents generated by the CxA and building exterior related items generated by Others during these phases will be included in the Report.

- c. The Commissioning Report will include the following:
- i. Comments made by Architect's Consultant on Design Documents and Action taken by Design Team at 70% and 100% Document Sets;
 - ii. Review comments made by Commissioning Team on Shop Drawings and action taken by Design/Construction Team;
 - iii. BEA Field and Functional Test Reports;
 - iv. Functional Test Reports by Others;
 - v. Building Enclosure Product Warranties;
 - vi. Cumulative Punchlist and resolution of same;
 - vii. Letter of compliance, assuming all non-compliance items are addressed.

END OF SECTION

SECTION 02 32 10
SUBSURFACE EXPLORATIONS

PART 1 - GENERAL

1.01 GEOTECHNICAL REPORT AND SAMPLES

- A. On January 6th, 7th & 8th 2014, May 6th, 7th & 8th 2014, March 23rd & April 3rd 2015, March 19th & 20th 2015 and April 9th 2015, soils investigations (test pits, test borings, and hand pushed tile probes) were conducted and a report prepared for the Owner by S.W. Cole Engineering Inc. of Gray, Maine. This report, titled "Proposed Sanford High School & Regional Technical Center, Main Street and Old Mill Road, Sanford, Maine", dated October 14, 2015, was provided for the use of the Architect in the design of the Project. Part of the information contained in this report is interpretive (not factual) and therefore Bidders shall make their own deductions of subsurface conditions which may affect methods or cost of construction. This report is available for viewing at the office of Sanford School Department, David Theoharides, Superintendent of Schools, 917 Main Street - Suite 200, Sanford, Maine.

1.02 SUBSURFACE CONDITIONS

- A. The Owner has explored subsurface conditions and authorized soil investigations on site.
- B. Factual boring logs, test pit logs and laboratory test results, are part of the geotechnical report. The logs describe subsurface conditions encountered at the exploration locations at the time explorations were made. Actual subsurface conditions may vary between exploration locations. No warranties, expressed or implied, are made as to accuracy of subsurface information provided herein.
- C. No warranty is made of the continuity of strata or material between the exploration locations. The stratification lines on the logs represent approximate boundaries between soil types. The actual transitions between soil types may be gradual.
- D. Water level readings have been observed in the explorations at times and under conditions stated on the logs. It must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors not evident at the time of drilling when the measurements were made
- E. Boring and test pit locations shown on the drawings are approximate only and the Owner and Architect, including their consultants, make no representations regarding correctness of such information.
- F. Bidders shall make their own deductions of subsurface conditions which may affect methods or cost of construction. Bidders may, at their own expense, and upon application to the Owner, conduct additional subsurface testing.

1.03 USE OF DATA

- A. The subsurface investigations were obtained by the Owner only for the Architect's use in design, and are not a part of the Construction Documents. It is understood that neither the Owner, Architect, nor their consultants shall be responsible for any interpretations or conclusions drawn there from by Bidders or the Contractor with regard to the interpretive data or geotechnical report. The Owner and Architect, including their consultants, claim no responsibility for or endorsement of any construction methods, means, or techniques which may be contained in or implied by the above referenced logs and report.
- B. Bidders shall visit the site and familiarize themselves with all existing conditions. Prior to bidding, Bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but all such investigations shall be performed under time schedule and arrangements approved in advance by the Owner.
- C. The Owner and Architect, including their consultants, cannot guarantee the continuity of subsurface conditions between test locations. The Owner and Architect, including their consultants, cannot guarantee the accuracy or completeness of related documents and reports.

- D. The Contractor must interpret the subsurface data relying upon his own judgement and acknowledges that the Owner and Architect, including their consultants, shall not be responsible for any deduction, interpretation, or conclusion made by any Bidder or Contractor.
- F. No claim for extra cost or extension of time resulting from the Bidder or Contractor's deductions, interpretations, or conclusions shall be allowed.

END OF SECTION

SECTION 024116
STRUCTURE DEMOLITION
(Trade Bid Required)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of concrete building slabs and concrete structures.
 - 2. Removing below-grade construction debris.
 - 3. Disconnecting, and relocating site utilities.

1.2 DEFINITIONS

- A. Demolish: Completely remove and legally dispose of off-site.
- B. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.

1.3 RELATED REQUIREMENTS

- A. Section 1-B – School Bid Depository Conditions and Regulations

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance," article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- B. Proposed Protection Measures: Submit informational report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control]. Indicate proposed locations and construction of barriers.
 - 1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.

- C. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - 2. Temporary interruption of utility services.
- D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- E. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by site demolition operations. Retain record submittal in first paragraph below if applicable. Landfill records may be required by Owner when demolished materials contain hazardous wastes or, in rare circumstances, where recycling is not allowed.
- F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.
- C. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

- A. Buildings immediately adjacent to demolition area will be occupied. Conduct demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- B. Owner assumes no responsibility for building slabs and structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner.
- D. On-site storage or sale of removed items or materials is not permitted.

1.8 COORDINATION

- A. Arrange demolition schedule so as not to interfere with operations of adjacent occupied buildings.

1.9 ADMINISTRATIVE REQUIREMENTS

- A. Trade Bids for work under this Section shall be for the complete work of this Section and shall be filed under the provisions and requirements specified under Division 01 – General Requirements.
 - 1. Special attention is directed to Section 1-B – School Bid Depository Conditions and Regulations and all Sections within Division 01 – General requirements which are hereby made a part of this Section of the Specifications.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Division 312000 Section Earthwork.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been relocated or abandoned as required within contract documents, before starting demolition operations.
- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

- A. Existing Utilities: Locate, identify, utilities serving buildings adjacent to structures to be demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
- B. Existing Utilities: Refer to Division 22 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, and driveways during demolition operations.
- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
 - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction, and as indicated. Comply with requirements in Division 01 Section "Temporary Facilities and Controls."
 - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated existing building slabs and structures completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
- B. Site Access and Temporary Controls: Conduct demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.
- D. Below-Grade Construction: Demolish concrete slab and other below-grade construction.
 - 1. Remove below-grade construction, including basements, foundation walls, and footings, completely
- E. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

3.5 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.6 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION

SECTION 03 30 00

CAST -IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

- A. Work included: Provide labor, materials, and equipment necessary to complete the work of this Section and, without limiting the generality thereof, furnish and include the following:
 - 1. The extent of cast-in-place concrete work is shown on drawings and includes (but not by way of limitation) formwork, reinforcing, cast-in-place concrete, accessories, finishing, and casting in of items specified under other Sections of the Specifications or furnished by Owner that are required to be built-in with the concrete.
 - 2. Equipment support pads indicated on mechanical drawings to be installed by the Building Contractor.
 - 3. Cast-in-place retaining walls, exterior slabs on grade and other concrete shown on site drawings.

1.03 RELATED WORK:

- A. Concrete Floor Finishing: Section 03 35 13
- B. Metal Fabrications: Section 05 50 00
 - 1. Expansion Anchors - Section 05 12 00
 - 2. Embedded Items - Section 05 50 00
- C. Anchor Bolts: Section 05 12 00
- D. Joint Sealants: Section 07 90 00
- E. Underslab Vapor Retarders/Wall Waterproofing: Division 7

1.04 QUALITY ASSURANCE:

LBA 12-067-00

- A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:
1. ACI "Manual of Concrete Practice".
 2. ACI 117 "Standard Specifications for Tolerances for Concrete Construction and Materials".
 3. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete."
 4. ACI 212.3R "Chemical Admixtures for Concrete."
 5. ACI 301 "Specifications for Structural Concrete for Buildings."
 6. ACI 302.1R "Guide for Concrete Floor and Slab Construction."
 7. ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete."
 8. ACI 304.2R "Placing Concrete by Pumping Methods."
 9. ACI 306 R "Cold Weather Concreting."
 10. ACI 308 "Standard Practice for Curing Concrete."
 11. ACI 309R "Guide for Consolidation of Concrete."
 12. ACI 315 "ACI Detailing Manual."
 13. ACI 318 "Building Code Requirements for Reinforced Concrete."
 14. ACI 347R "Guide to Formwork for Concrete."
 15. Concrete Reinforcing Steel Institute, "Placing Reinforcing Bars."
 16. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 17. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS:

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with Division 1.

- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. Incomplete submittals will not be reviewed.
- D. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with.
- E. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- F. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.
- G. Electronic Submittals:
 - 1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
 - 2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
 - 3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
 - 4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.
 - 5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

- H. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
1. Reinforcement certified mill reports covering chemical and physical properties and yield strength.
 2. Patching products.
 3. Non-shrink grout.
 4. Curing compounds, where applicable.
 5. Admixtures.
 6. Expansion/Adhesive Anchors.
- I. Shop Drawings:
1. Shop Drawing Preparation: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings is prohibited. Shop drawings created from reproduced Construction Documents will be returned without review. Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315, showing bar schedules, stirrup and tie spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete elements. Include supplemental reinforcing and bar supports necessary to support reinforcing steel at proper location within forms or slabs.
 - a. Review of the shop drawings will be made for the size and arrangement of reinforcement. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.
 - b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided all items listed prior. **Incomplete submittals will not be reviewed.**
- J. Mix designs: Submit all laboratory test reports and materials for each mix design listed within. Prepare mixes by the field experience method and/or trial mixtures per the requirements of chapter 5 of ACI 318. Include the calculation of average strength and standard deviation. Proportioning by water cement ratio method will not be permitted.
- K. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.
- L. Curing Methods: Submit documentation of curing methods to be used for review. Account for anticipated project temperature ranges and conditions in curing methods.

- M. Contraction/Construction Joints: Submit plan indicating proposed location of contraction and construction joints in walls and slabs.
- N. Test Reports: Test reports shall be submitted to the Owner, Architect and Engineer within 48 hour after completion of each test.

PART 2 PRODUCTS

2.01 FORM MATERIALS:

- A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
 - 1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS:

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. Provide welded wire fabric in flat sheets.
- C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use plastic, wire bar type supports or concrete block supports complying with CRSI recommendations, unless otherwise specified. Wood, clay brick and other unspecified devices are not acceptable.
 - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class I) or stainless steel protected (CRSI, Class 2).

2.03 CONCRETE MATERIALS:

- A. Single-Source Supplier: Ready-mix concrete shall be from one supplier unless specific written approval is received from the Structural Engineer.
- B. Portland Cement: ASTM C 150, Type I or Type II, unless otherwise approved Use one brand of cement throughout project, unless otherwise acceptable to Architect.
- C. Normal Weight Aggregates: ASTM C 33. Provide from a single source for exposed concrete. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, or ochre which can cause stains on exposed concrete surfaces.
- D. Light Weight Aggregates: ASTM C 330.
- E. Water: Potable.
- F. Air-Entraining Admixture: ASTM C 260.
- G. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G containing not more than 1% chloride ions.
- H. Fiber reinforcement shall be Type III Synthetic Virgin Homopolymer Polypropylene Fibers conforming to ASTM C1116. Fiber reinforcing shall be added and distributed prior to incorporation of Super Plasticizer.
- I. Normal range water reducing admixture: ASTM C 494 Type A containing no calcium chloride.
- J. Accelerating Admixture: ASTM C 494, Type C or E.
- K. Blast Furnace Slag: ASTM C989
- L. Fly Ash: ASTM C618, Class C or F
- M. Calcium Chloride is not permitted.

2.04 RELATED MATERIALS:

- A. Underslab Vapor Retarder: Provide vapor retarder over prepared sub base. Refer to architectural drawings, geotechnical report and/or division 7 specifications for additional requirements and vapor retarder location.
- B. Non-Shrink Cement-based Grout: Provide grout consisting of pre-measured, prepackaged materials supplied by the manufacturer requiring only the addition of water. Manufacturer's instructions must be printed on the outside of each bag.
 - 1. Non-shrink: No shrinkage (0.0%) and a maximum 4.0% expansion when tested in accordance with ASTM C-827. No shrinkage (0.0%) and a maximum of 0.3% expansion in the hardened state when tested in accordance with CRD-C-621.
 - 2. Compressive strength: A minimum 28 day compressive strength of 5000 psi when tested in accordance with ASTM C-109.

3. Setting time: A minimum initial set time of 60 minutes when tested in accordance with ASTM C-191.
 4. Composition: Shall not contain metallic particles or expansive cement.
- C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M182, Class 2.
- D. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171.
1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.
- E. Liquid Membrane-Forming Curing Compound: Liquid type membrane forming curing compound complying with ASTM C 309, Type I, Class A unless other type acceptable to Architect. Curing compound shall not impair bonding of any material, including floor finishes, to be applied directly to the concrete. Demonstrate the non-impairment prior to use.
- F. Preformed Expansion Joint Formers:
1. Bituminous Fiber Type, ASTM D 1751.
 2. Felt Void, Poly-Styrene Cap with removable top as manufactured by SUPERIOR.
- G. Slab Joint Filler: Multi-component polyurethane sealant (self-leveling type).
- H. Waterstops shall be Bentonite/Butyl Rubberbased product. Use in conjunction with manufacturer's approved mastic. Acceptable products include:
1. "Waterstop Rx," by American Colloid Co.
 2. "Adeka Ultra Seal MC-2010," by Asahi Denka Koeyo, Kik MN.

2.05 PROPORTIONING AND DESIGN OF MIXES:

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 318. Use material, including all admixtures, proposed for use on the project. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.
- B. Submit written reports to Architect of each proposed mix for each class of concrete. Do not begin concrete production until mixes have been reviewed by Architect.
- C. Proportion design mixes to provide concrete with the following properties:

1. Footings and foundation walls
 - a. Strength: 3,500 psi at 28 days.
 - b. Aggregate: 3/4" Normal Weight
 - c. Design Air Dry Density: 145 pcf Normal Weight
 - d. W/C Ratio: 0.55 maximum
 - e. Entrained Air: 6% +/- 1.5%
 - f. Slump: 4" maximum
2. Interior Slabs on grade, U.N.O.:
 - a. Strength: 3,000 psi at 28 days
 - b. Aggregate: 3/4" minimum, 1 1/2" maximum Normal Weight.
 - c. Design Air Dry Density: 145 pcf Normal Weight
 - d. W/C Ratio: 0.55 maximum
 - e. Entrapped Air only (no entrainment), 2.5% +/- 1%
 - f. Slump: 4" maximum
3. Elevated slabs:
 - a. Strength: 4,000 psi at 28 days
 - b. Aggregate: 3/4" minimum Light Weight
 - c. Design Air Dry Density: 115 pcf Light Weight
 - d. W/C Ratio: 0.52 maximum
 - e. Entrapped Air only (no entrainment), 2.5% +/- 1%
 - f. Slump: 4" maximum
4. Exterior Slabs and all other exposed Site Concrete not specified elsewhere:
 - a. Strength: 5,000 psi at 28 days
 - b. Aggregate: 3/4" Normal Weight
 - c. Design Air Dry Density: 145 pcf Normal Weight
 - d. W/C Ratio: 0.40 maximum

- e. Entrained Air: 6% +/- 1.5%
 - f. Slump: 4" maximum
- 5. Add air entraining admixture at manufacturers prescribed rate to result in concrete at point of placement having the above noted air contents.
 - 6. Additional slump may be achieved by the addition of a mid-range or high-range water reducing admixture. Maximum slump after the addition of admixture shall be 6 or 8 inches for mid-range or high range water reducing admixtures, respectively.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor, when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Structural Engineer before using in work.
- 1. Water may be added at the project only if the maximum specified slump and design mix maximum water/cement ratio is not exceeded.
 - 2. Additional dosages of superplasticizer should be used when delays occur and required slump has not been maintained. A maximum of two additional dosages will be permitted per ACI 212.3R recommendations.

2.06 CONCRETE MIXING:

- A. Job-Site Mixing will not be permitted.
- B. Ready-Mix Concrete: Must comply with the requirements of ASTM C 94, and as herein specified. Provide batch ticket for each batch discharged and used in work, indicating project name, mix type, mix time and quantity.
 - 1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required by Structural Engineer.
 - 2. When the air temperature is between 85 degrees F. and 90 degrees F., reduce the mixing and delivery time from 1 1/2 hours to 75 minutes, and when the air temperature is above 90 degrees F., reduce the mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 FORMS:

- A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

- B. Design, construct, erect, maintain, and remove forms for cast-in-place concrete work in compliance with ACI 347.
- C. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.
- D. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- E. Vertical dovetail slots may be required for masonry tie installation. Coordinate dovetail slot spacing and location with division 4 specifications and Architectural drawings.
- F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, dovetail slots, reglets, recesses, and the like to prevent swelling and for easy removal.
- G. Provide temporary openings where interior area of formwork is inaccessible for clean out, for inspection before concrete placement and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.
- H. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- I. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
 - 1. Unless otherwise indicated, provide ties for concrete surfaces to be exposed to view in the final condition so portion remaining within concrete after removal is 1" (minimum) inside concrete.
 - 2. Form ties shall not leave holes larger than 1" diameter in concrete surface. Repair holes left by form ties after removal of formwork.
- J. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- K. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.02 PLACING REINFORCEMENT:

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
1. Subgrade tolerance shall conform to a tolerance of $+0/-1\ 1/2"$. Base tolerance (fine grading) for slabs shall conform to a tolerance of $+0"/-3/4"$ in. Confirm compliance of above tolerances with surveyed measurements taken at 20 ft. intervals in each direction.
 2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
 3. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
 4. Place reinforcement to obtain specified coverage for concrete protection within tolerances of ACI-318. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
 5. Install welded wire fabric in flat sheets in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.03 JOINTS:

- A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Architect. Submit plan indicating proposed location of construction joints for review prior to beginning work.
1. Provide keyways at least 1-1/2" deep in construction joints in walls, and slabs; bulkheads reviewed by the Engineer, designed for this purpose may be used for slabs.
 2. Roughened surfaces shall be used between walls and footings unless shown otherwise on the drawings. The footing surface shall be roughened to at least an amplitude of 1/4" for the width of the wall before placing the wall concrete.
 3. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.
 4. Joints in slabs on grade shall be located and detailed as indicated on the drawings. If saw-cut joints are required, the early-entry dry-cut process shall be used. Refer to ACI 302, section 8.3.12.

3.04 INSTALLATION OF EMBEDDED ITEMS:

- A. General: Set, securely anchor and build into work prior to concrete placement all anchorage devices and all other embedded items, including but not by limitation reinforcement, reinforcing dowels, embedded plates, anchor rods, anchor inserts, sleeves, load transfer plates, diamond dowels and shelf bulk heads required for other work that is attached to, bear upon, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto. Notify other trades to permit installation of their work. Templates to be utilized for setting of anchorage devices shall be constructed in a manner to allow mechanical consolidation of concrete without disturbance. Embedments shall be placed in a timely fashion to permit the inspection of embedments prior to concrete placement. **“Wet Setting” of embedded items into plastic concrete is strictly prohibited.**
- B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface.
- C. Provide PVC sleeves where pipes and/or conduit pass through exterior concrete or slabs. Sleeves or penetrations shall not be placed through footings, piers, pedestals, drop caps, columns or pilasters unless specifically noted.
- D. Tolerances: Tolerances for Anchor Bolts/Rods, other embedded items and bearing surfaces shall meet the requirement set forth in the latest edition of the American Institute of Steel Construction “Code of Standard Practice for Steel Buildings and Bridges,” and ACI 117. The more stringent criteria from these documents shall apply.

3.05 INSTALLATION OF GROUT

- A. Place grout for base plates in accordance with manufacturer's recommendations.
- B. Grout below setting plates as soon as practicable to facilitate erection of steel and prior to removal of temporary bracing and guys. If leveling bolts or shims are used for erection grout shall be installed prior to addition of any column load.
- C. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials and allow to cure. For proprietary grout materials, comply with manufacturer's instructions.

3.06 PREPARATION OF FORM SURFACES:

- A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- B. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating material manufacturer's directions. Do not allow excess form coating to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.07 CONCRETE PLACEMENT:

- A. Preplacement Review: Footing bottoms are subject to review by the Geotechnical Engineer. Reinforcement and all concrete preparation work shall be subject to review by the Structural Engineer. Verify that reinforcing, ducts, anchors, seats, plates and other items cast into concrete are placed and securely held. Notify Engineer/Project Special Inspector 48 hours prior to scheduled placement and obtain approval or waiver of review prior to placement. Be sure that all debris and foreign matter is removed from forms.
- B. Concrete shall be placed in the presence of an approved testing agency.
- C. General: Comply with ACI 304, and as herein specified.
1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.
 2. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.
 3. Conveying equipment shall be approved and shall be of a size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or work day. Conveying equipment and operations shall conform to the following additional requirements:
 - a. Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. An arrangement shall be used at the discharge end to prevent apparent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.
 - b. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long, and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.
 - c. Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete.
 - d. Concrete shall not be conveyed through pipe made of aluminum alloy. Standby equipment shall be provided on the site.
 - e. Tined rakes are prohibited as a means of conveying fiber reinforced concrete.
 4. Do not use reinforcement as bases for runways for concrete conveying equipment or other construction loads.

- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
1. Consolidate placed concrete by mechanical vibrating equipment. Hand-spading, rodding or tamping as the sole means for the consolidation of concrete will only be permitted with special permission from the Engineer. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
 2. Use vibrators designed to operate with vibratory equipment submerged in concrete, maintaining a speed of not less than 8000 impulses per minute and of sufficient amplitude to consolidate the concrete effectively. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine, generally at points 18 inches maximum apart. Place vibrators to rapidly penetrate placed layer and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion maintain the duration of vibration for the time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operation.
- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
1. Consolidate concrete using internal vibrators during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations. Do not sprinkle water on plastic surface.
 3. Maintain reinforcing in proper position during concrete placement operations.
 4. Slab thicknesses indicated on the drawings are minimums. Provide sufficient concrete to account for structure deflection, subgrade fluctuations, and to obtain the specified slab elevation at the flatness and levelness indicated here within.
 5. Finish: See "Monolithic Slab Finishes" in this specification for slab finish requirements.
- F. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F (27degrees C) at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators.
 4. All temporary heat, form insulation, insulated blankets, coverings, hay or other equipment and materials necessary to protect the concrete work from physical damage caused by frost , freezing action, or low temperature shall be provided prior to start of placing operations.
 5. When the air temperature has fallen to or is expected to fall below 40 degrees F, provide adequate means to maintain the temperature in the area where concrete is being placed between 50 and 70 degrees F.
- G. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 3. Wet forms thoroughly before placing concrete.
 4. Do not use retarding admixtures without the written acceptance by the Architect.

3.08 FINISH OF FORMED SURFACES:

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This concrete surface shall have texture imparted by form facing material, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 in. in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, damp-proofing, painting or other similar system. This as-cast concrete surface shall be obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

- C. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth form finish treatment. Combine one part Portland cement to 1-1/2 parts fine sand by volume and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will closely match adjacent surfaces.
 - 1. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- D. Related Unformed Surfaces: At tops of walls and grade beams, horizontal offset surfaces occurring adjacent to formed surfaces, strike-off, smooth and finish with a texture matching adjacent unformed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 FLOOR FLATNESS AND LEVELNESS

- A. Floor flatness/levelness tolerances: Tolerances for various floor uses shall conform to the requirements set forth in ACI 117 and ACI 302 for "flat" floor profile.
 - 1. Minimum Test Area Flatness/Levelness: F_F35/F_L25
 - 2. Minimum Local F Number: F_F25/F_L15
- B. Levelness criteria shall be applied to slabs-on-grade only.
- C. Contractor shall measure floor finish within 72 hours after slab finishing and provide corrective measures for finishes not within tolerance. Corrective procedures shall be reviewed by the Architect prior to implementation.

3.10 MONOLITHIC SLAB FINISHES:

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds, and as otherwise indicated.
 - 1. After placing slabs, plane surface to a tolerance not exceeding 1/2 in. in 10 ft. when tested with a 10-ft. straightedge. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, and as otherwise indicated.
- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces indicated, including slab surfaces to be covered with carpet, resilient flooring, paint or other thin-film finish coating system.
- D. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.

- E. Slab finishes for floor coverings not indicated or exposed to view in the final condition shall be coordinated with the Architect prior to slab placement.
- F. Slab Joints: Where indicated, sawn slab contraction joints shall be "soft cut", immediately after concrete surface is firm enough not to be torn or damaged by the blade.

3.11 CONCRETE CURING AND PROTECTION:

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 308 as herein specified.
- B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified unless noted otherwise. Curing shall commence as soon as concrete surfaces are sufficiently hard as to withstand surface damage.
- C. Curing of Slabs-on Grade:
 - 1. Slabs-on-grade shall be cured by wet curing methods unless otherwise noted.
 - 2. Slabs-on-grade to receive floor coverings with moisture sensitive adhesives shall be cured by means of a moisture retaining covering. Coordinate curing with flooring adhesive manufacturer and flooring installer. Submit curing methods to Architect for review and approval.
- D. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- E. Protection From Mechanical Injury: During the curing period and duration of construction, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials, or methods, by application of curing procedures, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

3.12 REMOVAL OF FORMS:

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

- B. Formwork supporting weight of concrete, such as joints, slabs and other structural elements, may not be removed in fewer than 14 days or until concrete has attained design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and support.

3.13 REUSE OF FORMS:

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and latency, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

3.14 MISCELLANEOUS CONCRETE ITEMS:

- A. Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.15 CONCRETE SURFACE REPAIRS:

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Architect.
 - 1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with approved bonding agent. Place patching mortar after bonding compound has dried.
 - 2. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, form tie holes, cracks, spalls, air bubbles, honeycomb, rock pockets, fins, and other projections on surface and stains and other discolorations that cannot be removed by cleaning.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION:

- A. Testing Agency/Project Special Inspector shall verify reinforcement, including foundation reinforcement and slab reinforcement (WWF or reinforcing bar). Agent shall verify WWF or reinforcement has been chair/placed with proper clearances.
- B. The Owner shall employ a Testing Laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports. Concrete testing shall be performed by technicians certified by the Maine Concrete Technician Certification Board and/or ACI Concrete Field Testing Technician Grade I.
- C. Concrete shall be sampled and tested for quality control during placement. Quality control testing shall include the following, unless otherwise directed by the Architect.
- D. See Submittals section for report requirements.
- E. Sampling Fresh Concrete: ASTM C 172.
 - 1. Slump: ASTM C143; One test for each set of compressive strength test specimens. Sample shall be taken from middle third of the load per ASTM C172. A slump test must be run prior to the incorporation of the CFP fibers per recommendations of ACI 544. A slump test must be run prior to and following the addition of a water reducer (superplasticizer) per recommendations of ACI 301.
 - 2. Air Content: ASTM C231 "Pressure method for normal weight concrete." One test for each set of compressive strength specimens measured at point of discharge.
 - 3. Concrete Temperature: Per ASTM C-1064; One test each time a set of compression test specimens are made.
 - 4. Compression Test Specimen: ASTM C31; one set of 5 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 - a. An insulated Cure Box for specimen curing shall be supplied by Testing Agency for initial curing as defined in ACI C31.
 - b. Means of heating or cooling the Cure Box shall be provided by the Inspection Agency if required in order to maintain a temperature between 60 and 80 degrees F. Contractor shall provide an electrical source to the Testing Agency when required for temperature control.
 - c. A maximum-minimum thermometer shall be provided in the Cure Box by the Testing Agency to record the temperature range of the Cure Box during specimen curing. The Testing Agency shall record the maximum/minimum temperature of the Cure Box when transferring the specimens to the laboratory.
 - d. Test Specimens shall be moist cured.

- e. Refer to ACI C31 for additional requirements for Test Specimens.
 - 5. Compressive Strength Tests: ASTM C39; one set for each 50 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 4,000 sq. ft. of surface area placed; 1 specimen tested at 7 days, 2 specimens tested at 28 days, 2 specimen retained in reserve for later testing if required.
 - 6. Pumped concrete shall be tested at point of discharge per ACI 301.
- F. Flatness/Levelness Testing: Perform flatness/levelness testing in accordance with ASTM E1155.
- 1. Testing shall be performed for each concrete slab placement, or per 5,000sf floor area, whichever is more stringent.
 - 2. Testing shall include overall flatness/levelness, and minimum local F number.
 - 3. Levelness testing is not required for slabs on metal deck.
 - 4. Flatness/Levelness testing shall be performed within 24 hours after placement.
- G. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods, as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION

SECTION 03 35 13
CONCRETE FLOOR FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatment with cure-seal-hardener.

1.02 RELATED REQUIREMENTS

- A. Section 01 23 00 – Alternates.
- B. Section 03 30 00 - Cast-in-Place Concrete: Prepared concrete floors ready to receive finish. Control and formed expansion and contraction joints and joint devices.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
- B. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2007.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement, finishing and concrete floor curing.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on installation instructions, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance renewal of applied coatings.

1.06 QUALITY ASSURANCE

- A. Floor Finisher: Floor finishing contractor shall have at least five years of experience with the products specified in this Section and shall be trained and licensed by the manufacturer.

1.07 MOCK-UP

- A. Construct a sample installation, 8 feet x 8 feet, minimum in size, for each product and color used, to demonstrate workmanship and product finish. Unacceptable mock-ups shall be corrected and/or removed, with a new mock-up prepared. Accepted mock-ups may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.09 FIELD CONDITIONS

- A. Temporary Lighting: Maintain light level equivalent to a minimum of 50 footcandles on the floor surface.
- B. Do not finish floors until interior heating system is operational and ambient temperature of 50 degrees F minimum can be maintained.
- C. Provide ventilation sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide a twenty year manufacturer's warranty that surface will remain dustproof, hardened and water repellent.

PART 2 PRODUCTS

2.01 COMPOUNDS - HARDENERS AND SEALERS

- A. Type SC-1A, SC-1B, SC-1C, SC-D - Concrete Floor Finishing System: A 3-component concrete dye and polishing system comprised of concrete dye, densifier and stain protector.
 - 1. Concrete Dye: Penetrating UV stabilized liquid dispersion dye, reactive with concrete to form a bond, minimizing color migration or diffusion. VOC < 40 g/L.
 - a. Colors: At least 4 colors shall be selected from the manufacturer's full line.
 - 2. Patterns: As indicated on the Drawings.
 - 3. Concrete Densifier: Lithium-silicate based deep penetrating densifier and hardener, as recommended the system manufacturer.
 - 4. Stain Protector: Water-based polysilicate acrylic mixture, as recommended by the system manufacturer.
 - 5. Basis of Design: Ameripolish Surelock Densi Color System.
 - 6. Acceptable Manufacturers:
 - a. Bomanite Patene Teres System.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Type SC-2 - Concrete Floor Cure-Seal-Hardener: Water based, no VOC, chemically reactive penetrating sealer and hardener that densifies concrete to make water impermeable, but air and vapor permeable.
 - 1. Coefficient of Friction, ASTM C1028: ADAAG & OSHA compliant; 0.86 dry; 0.69 wet.
 - 2. Hardening, ASTM C39: After 28 days, 38% increase over untreated samples.
 - 3. Light Exposure Degradation, ASTM G23: No evidence.
 - 4. Warranty: 20 years manufacturer limited.
 - 5. Color: Clear.
 - 6. Floor Finish: Level 2 Hard Shell, Medium Sheen Finish.
 - 7. Basis of Design: Ashford Formula by Curecrete Distribution Inc.
 - 7. Alternate Manufacturers:
 - a. BASF Construction Chemicals-Building Systems.
 - b. Dayton Superior Corporation.
 - c. Bomanite Vitra Floor.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this Section. Maintain interior temperatures within manufacturer's acceptable range.
- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1R and in accordance with manufacturer's recommendations.
- B. Mask adjoining areas off where multiple colors are being used in accordance with manufacturer's recommendations.
- C. Slabs shall be clean and dry. Slab moisture content shall be attained per manufacturer's recommendations. See Section 09 05 61 – Common Work Results for Flooring Preparation, for slab testing and preparation. Test slabs with a light water spray for uniform absorption. Do not proceed with installation until slab surfaces are acceptable to the manufacturer.

3.02 SC-1 FLOOR FINISHING

- A. Polish / grind floor and apply the entire dye, densifier and protector system to a minimum 8 ft. x 8 ft. test floor area in an inconspicuous location to determine appropriate application procedure and adjustments, if any, to application rates. Proceed with installation only after test area is acceptable to Owner and Architect.

- B. Grind floor slab up to 200 grit resin bond diamonds, as recommended by the system manufacturer. Remove all dust and debris. If wet cleaning is performed, allow surfaces to dry. Vacuum thoroughly.
- C. Mix dye with densifier uniformly and spray apply as recommended by the manufacturer for application to concrete slab. Upon completion, allow surface to dry.
- D. Polish surface up to 400 grit resin bond diamonds.
- E. Apply a second coat of dye, diluted as recommended by the manufacturer to intensify color. Allow to dry.
- F. Immediately remove any overspray before dye can dry. Remove dye residue on floor with an auto-scrubber fitted with pad and water. Ensure that residue is removed. Wipe down floor.
- G. Polish dry floor surface with 800 grit resin, and higher as required to achieve final sheen level. Clean floor.
- H. Spray apply stain protector in accordance with manufacturer's recommendations. Allow to dry to tack-free and then apply a second coat. Allow to dry and cure at least 24 hours, then burnish with a 3000 grit or finer diamond impregnated pad.
 - 1. Burnish floor surface 3 times to achieve a sheen level of 60.
- I. Protect floor surface. Chemical resistance increases over time. Densifier requires 2 to 6 months to reach full densification.

3.03 SC-2 FLOOR FINISHING

- A. Protect all surfaces not intended to receive hardener.
- A. Apply hardener immediately following finishing operations as soon as the surface is firm enough to walk on an before hairline checking and temperature cracking beings. Spray apply product with equipment and at pressures as recommended by the manufacturer. Work hardener into the slab with brooms. Mist floor as recommended by the manufacturer as floor material cures.
- B. Thoroughly flush the entire surface with water and squeegee completely dry to remove all surface alkali and hardener residue.
- B. Burnish floor surface twice to achieve sheen level of 25.

3.04 PROTECTION

- A. Prohibit traffic on floor finish as recommended by manufacturers. Barricade area to protect flooring until cured.
- B. Continue to protect flooring from damage and staining due to construction operations and placement of equipment and fixtures during the remainder of the construction period. Use protection methods recommended in writing by the manufacturer.

END OF SECTION

SECTION 03 45 00
PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural precast concrete blocks.
- B. Anchors and attachments.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Foundations and footings.
- B. Section 04 20 00 - Unit Masonry: Mortar and grouts.
- C. Section 10 14 00 - Signage: Exterior signage.
- D. Division 26 - Electrical: Coordination of electrical utilities associated with signage.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).
- B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- G. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- H. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
- I. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete; 2010.
- J. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; Precast/Prestressed Concrete Institute; 2007.
- K. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; Seventh Edition, 2010.
- L. PCI MNL-122 - Architectural Precast Concrete; Precast/Prestressed Concrete Institute; 2007, Third Edition.
- M. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; 1988, Second Edition.
- N. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; Precast/Prestressed Concrete Institute; 2000.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.

- C. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials. Provide erection drawings.
- D. Samples: Submit two samples, 8 x 8 inch in size, illustrating surface finish, color and texture.
- E. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.
- F. Submit a written statement, bearing the licensing seal of the fabricator's professional structural engineer, licensed in Maine, certifying that all precast concrete, anchorage and support systems will safely withstand design loads as prescribed by applicable codes, rules, regulations and standards, and upon completion of installation will be in full compliance with the requirements of the Construction Documents. If requested, submit stamped engineering calculations.

1.05 QUALITY ASSURANCE

- A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in the State in which the Project is located.
- B. Fabricator Qualifications:
 - 1. Firm having at least 5 years of documented experience in production of precast concrete of the type required.
 - 2. Fabricator Qualifications: Precast concrete fabricator accredited by IAS according to IAS AC157.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handling: Lift and support precast units only from support points.
- B. Protect units to prevent staining, chipping, or spalling of concrete.

PART 2 PRODUCTS

2.01 PRECAST UNITS

- A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
 - 1. Concrete Face Mix: Minimum 5000 psi, 28 day strength, air entrained to 5 to 7 percent; comply with ACI 301.
 - 2. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
 - 3. Calculate structural properties of units in accordance with ACI 318.
 - 4. Accommodate construction tolerances, and clearances of intended openings.
- B. Finish: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.
- C. Dimensions: 24 inches (W) x 18 inches (H) x 72 inches (L), 24 inches (W) x 54 inches (H) x 72 inches (L), and as indicated per the Drawings.
- D. Edge Profile: All exposed edges to receive a 1 inch chamfer, see Drawings.
- E. Top of Block: Pitched to promote drainage. At end units provide a hip type pitch return

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
 - 1. Deformed billet-steel bars.
 - 2. Galvanized in accordance with ASTM A767/A767M, Class I.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

- B. Fine and Coarse Structural Aggregates: ASTM C 33.
- C. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
 - 1. Color(s): As selected by Architect from manufacturer's full range.
 - a. Basis of Design to include a minimum of two (2) color selections by Architect. Designation of panel/block colors shall be confirmed by the Architect during the submittal process.
 - 2. Manufacturers:
 - a. Basis of Design: Davis Colors Product: Premium Group
 - b. Butterfield Color.
 - c. Lambert Corporation.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Water: Clean and not detrimental to concrete.

2.04 FABRICATION

- A. Fabricate in conformance with PCI MNL-117 and PCI MNL-135.
- B. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.
- C. Maintain consistent quality during manufacture.
- D. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.
- E. Embed conduit, boxes and other devices as required for signage. See Division 26 Electrical.
- F. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- G. Minor patching in plant is acceptable, providing structural adequacy and appearance of units is not impaired.

2.05 FABRICATION TOLERANCES

- A. Conform to PCI MNL-117 and PCI MNL-135, except as specifically amended below.
 - 1. Maximum Variation From Nominal Face Dimensions: Plus or minus 3/32 in.
 - 2. Maximum Variation From Square or Designated Skew: Plus or minus 1/8 inch in 10 feet.
 - 3. Maximum Variation from Thickness: Plus or minus 1/8 in.
 - 4. Maximum Bowing of Members: Plus or minus length/ 360.

2.06 SOURCE QUALITY CONTROL

- A. Provide testing of concrete mix.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.
- B. Verify that utilities are in place and ready to receive precast units with embedded conduit in coordination with electrical requirements.

3.01 ERECTION

- A. Erect units without damage to shape or finish. Replace or repair damaged panels.
- B. Erect units level and plumb within allowable tolerances.
- C. Mortar/Grout units in place per shop drawing specifications.
- D. Exposed Joint Dimension: 1/2 inch. Adjust units so that joint dimensions are within tolerances.

END OF SECTION

SECTION 04 20 00
UNIT MASONRY
(Trade Bid Required)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Block, including standard shapes, solid units and grout filled cores as required.
- B. Polished ground faced concrete block units, including standard shapes, solid units and grout filled cores as required.
- C. Decorative Insulated Concrete Block Wall System, including standard shapes, premolded insulation inserts and grout filled cores as required.
- D. Facing Brick.
- E. Mortar and Grout.
- F. Reinforcement, Ties, and Anchorage.
- G. Flashings and accessories.
- H. Building-in of lintels, bearing plates, anchors, items supplied by other trades, and premanufactured insulation inserts.
- I. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 1-B – School Bid Depository Conditions and Regulations
- B. Section 03 30 00 – Cast-in-Place Concrete: Reinforcing dowels with foundation.
- C. Section 04 23 00 – Reinforced Unit Masonry.
- D. Section 05 50 00 - Metal Fabrications: Loose steel lintels, embedded items.
- E. Section 06 10 54 - Wood Blocking and Curbing: Blocking and nailers at masonry.
- F. Section 07 21 00 - Thermal Insulation: Insulation for cavity spaces.
- G. Section 07 25 00 - Weather Barriers - Weather barrier and membrane flashings in cavity.
- H. Section 07 84 00 - Firestopping: Firestopping at penetrations of masonry work.
- I. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.
- J. Section 07 90 05 - Joint Sealers: Backing rod and sealant at control and expansion joints; compressible fillers at relieving angles.
- K. Section 01 23 00 - Alternates.

1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; American Concrete Institute International; 2011.
- B. ACI "Detailing Manual for Reinforced Concrete" (SP-66); 2004.
- C. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
- D. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2012.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- F. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2013.
- G. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.

- H. ASTM C91 - Standard Specification for Masonry Cement; 2012.
- I. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2011.
- J. ASTM C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2014.
- K. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- L. ASTM C150 - Standard Specification for Portland Cement; 2012.
- M. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2011.
- N. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
- O. ASTM C270 – Standard Specification for Mortar for Unit Masonry, 2014.
- P. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- Q. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
- R. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.
- S. ASTM C1142 - Ready-mixed Mortar for Unit Masonry.
- T. ASTM E447 - Masonry Prism Test
- U. ASTM E514 - Water Penetration and Leakage Through Masonry.
- V. NCMA - Specification for the Design and Construction of Load Bearing Concrete Masonry.
- W. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
- X. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar; 2008.
- Y. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2012.
- Z. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength; 2009.
- AA. CRSI “Manual of Standard Practice”, 28th Edition; 2009.
- AB. CRSI “Placing Reinforcing Bars”, 8th Edition; 2011.
- AC. UL - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene a pre-installation meeting at least 1 month before starting work of this Section; require attendance by all relevant installers.
- B. Trade Bids for work under this Section shall be for the complete work of this Section and shall be filed under the provisions and requirements specified under Division 01 – General Requirements.
 - 1. Special attention is directed to Section 1-B – School Bid Depository Conditions and Regulations and all Sections within Division 01 – General requirements which are hereby made a part of this Section of the Specifications.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, masonry accessories, and all other manufactured products. Coordinate with requirements for submittals with Section 04 23 00.
- C. Shop Drawings:
 - 1. Submit shop drawings of all masonry reinforcement detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 - Details and Detailing of Concrete Reinforcing, showing bar schedules, stirrup spacing, lap lengths, diagrams of bent bars, and arrangement of masonry reinforcement, including elevations of all

- reinforced walls. Wall elevations shall include reinforcing at all architectural and mechanical openings. Coordinate with requirements for submittals with Section 04 23 00.
2. Submit shop drawings of all special masonry shapes. Shop drawings shall indicate types of materials, finishes, dimensions, and anchorage. Shapes shall be represented in plan, elevation, and related details.
 3. Submit shop drawing plan indicating proposed locations of all construction joints in masonry walls. See Section 04 23 00.
- D. Samples:
1. Submit five samples of decorative block, facing brick, and ground face block units to illustrate color, texture, and extremes of color range. Submit samples of concrete masonry units to illustrate surface quality and texture.
 2. Submit samples of each type of reinforcement, ties, anchors, flashing, expansion joints, joint fillers, weeps, etc.
 3. Sample panels: See below.
- E. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.
- F. Mix Designs and Test Reports: Submit in dependent testing lab certificates:
1. CMU with integral water repellent admixture.
 2. Mortar mix designs and test results including proportions and mortar ingredients, prepared in accordance with ASTM C270.
 3. Grout mix designs and test results including description of type and proportions of grout ingredients, prepared in accordance with ASTM C476.
 4. Masonry unit's compression, absorption and measurement test result

1.06 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the Construction Documents.
- B. For all concrete masonry units requiring a fire resistance rating, provide one of the following:
1. Certification from Underwriter's Laboratories (UL) for products used in the tested assemblies as indicated on the Drawings. See tested assemblies appended to the end of this Section.
 2. Certification from a Maine state accredited testing agency certifying fire-resistance rating compliance in accordance with UL618 and ACI 216.1/TMS216.1 "Standard Method of Determining Fire Endurance of Concrete and Masonry Construction Assemblies" for an equivalent product to that used in the tested assemblies as indicated on the Drawings.
 3. For assemblies 1-hour fire-rated or less, provide documentation of calculated fire resistance per IBC Section 720 in accordance with ACI 216.1/TMS 216.1.
- C. Pre-construction Testing: If manufacturers published test reports are not available, the Contractor shall employ and pay an approved testing laboratory to perform pre-construction testing for:
1. Concrete unit masonry tests for each different unit for strength, absorption, and moisture content per ASTM C140 and fire-resistive tests per UL 618 and ACI 216.1/TMS 216.1.
 2. Clay Unit Masonry Tests for each different unit per ASTM C67.
 3. Prism tests for each type of wall construction per ASTM E447.
 4. Mortar testing per ASTM C780.
 5. Grout compressive strength testing per ASTM C1019.

1.07 MOCK-UPS AND SAMPLE PANELS

- A. Mock-Up Panel(s): Construct masonry wall mock-up panel(s) sized 8 feet long by 6 feet high with an outside corner at least 2 feet long; including all components typical to the exterior wall construction, including but not limited to masonry units, mortar and accessories and flashings metal studs, sheathing, weather barrier, sealant, sample window, and insulation.

1. Mock-up panel shall be constructed in a timely manner to allow for review and modifications if necessary prior to start of any related construction
2. Contractor shall provide a concrete pad and all necessary support framing to hold mock-up panel in vertical position. Locate mock-up panel where directed by Architect
3. Mock-up panel(s) shall be of proper thickness, showing proposed masonry color range, texture, bond, mortar joint and workmanship proper installation of various wall components, relationship of mortar and sealant colors to stone colors; tooling of joints; and aesthetic qualities of workmanship. No work shall progress until the Architect has reviewed the mock-up panel(s). Panel(s) shall be revised as necessary to secure the Architect's acceptance.
4. Mock-up panel(s) shall then become the standard of comparison for all masonry work built of the same material. The panel(s) shall not be destroyed or moved until the Work is complete and accepted by the Architect.
5. Contractor shall remove mock-up panel(s) after exterior punch-list is completed.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
 1. The maximum moisture content of concrete block when laid shall not exceed 30% for exterior exposures and 25% for interior exposures (as a percent of total absorption and is in addition to moisture level required under ASTM C90).
- B. All mortar materials shall be stored under cover in a dry place.
- C. Reinforcement steel, ties, and anchors shall be protected from the elements and, before being placed, shall be free from loose rust and other coating, including ice that will destroy or reduce the bond.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Masonry Units (CMU): ASTM C90, normal weight. Manufactured with integral water-repellant admixture where required per 2.01-E-3 in this Section. Comply with referenced standards and as follows:
 1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the Drawings for specific locations.
 2. Special Shapes: Provide non-standard blocks configured for corners, lintels, headers, control joint edges, soap, and other detailed conditions.
 - a. Radius (1") bullnose edges at exposed corners, ends, window openings, door openings with inset frames, typical all areas unless noted otherwise.
 3. Bonds and Patterns: Running bond unless otherwise indicated per the Drawings.
 4. Solid Units: Provide identical solid block units as follows:
 - a. Wherever the cores of hollow block will be exposed to view following the completion of construction.
 - b. At corbeled units and courses below corbeled units.
 - c. Where indicated on the Drawings.
 5. Exposed Faces: Manufacturer's standard color and texture where indicated.
 6. Inner Wythe of Exterior Masonry Walls: Smooth face, uncolored block, unless otherwise indicated.
 7. Interior Units: Smooth uncolored faces, unless otherwise indicated.
 8. Minimum average net area compressive strength: 1,900 psi.
- B. Polished Ground-Faced Concrete Units (GFCU) Types 1, 2, 3, 4 & 5: ASTM C90, normal weight, hollow block, with smooth resinous facing complying with ASTM C744, manufactured with integral water-repellant admixture. Minimum average net area compressive strength 1,900 psi.
 1. Sizes and Shapes: See Drawings.
 2. Special Shapes: Soaps, sill blocks and other shapes as indicated on the Drawings.

- a. Interior Applications: Radius (1") bullnose edges at exposed corners, ends, window openings, typical all areas unless noted otherwise.
3. Face Finish:
 - a. Exterior Applications: Provide polished ground-faced finish one face (exposed face) and at exposed corners and ends.
 - b. Interior Applications: Provide polished ground-faced both faces (exposed both sides) and at exposed corners and ends.
4. Colors (Basis of Design):
 - a. GFCU Type 1: Ocean Mist GF-001 by Genest.
 - b. GFCU Type 2: Smoke GF-102 by Genest.
 - c. GFCU Type 3: Ashland Grey GF-131 by Genest.
 - d. GFCU Type 4: Saddle Brown GF-230 by Genest.
 - e. GFCU Type 5 – Multiple Colored Mirra Tex Plus in equal portions of Type 1, Type 2, Type 3 in pattern as shown on the Drawings.
5. Bonds and Patterns: Running bond unless otherwise indicated on the Drawings.
6. Applications:
 - a. Exterior: All CMU units unless otherwise indicated per the Drawings.
 - b. Interior: All CMU units within Main Gymnasium 1219, Practice Gymnasium 1220, Main Commons, Corridors, Stairs and other locations indicated per the Drawings.
7. Basis of Design: Mirra-Tex Plus by Genest Concrete Works, Inc.
8. Alternate Manufacturers:
 - a. Trenwyth Industries.
 - b. A. Jandris & Sons
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Large Format Concrete Block (LFCB) Type 6: ASTM C90, normal weight, hollow block, with smooth resinous facing complying with ASTM C744, manufactured with integral water-repellant admixture. Minimum average net area compressive strength 1,900 psi.
 1. Sizes and Shapes: See Drawings.
 2. Special Shapes: Soaps, sill blocks and other shapes as indicated on the Drawings.
 3. Colors: As selected by the Architect from manufacturer's Tier 2 standard.
 4. Bonds and Patterns: Running bond unless otherwise indicated per the Drawings.
 5. Basis of Design: Manchester Block by Genest Concrete Works, Inc.
 6. Alternate Manufacturers:
 - a. Trenwyth Industries.
 - b. A. Jandris & Sons
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Decorative Insulated Concrete Block Wall System Types 7 & 8: ASTM C90, normal weight, insulated block, with smooth resinous facing complying with ASTM C744, manufactured with integral water-repellant admixture. Minimum average net area compressive strength 1,900 psi.
 1. Sizes and Shapes: 11-5/8" thick, 15-5/8" long, 7-5/8" tall.
 2. Special Shapes: Stretcher, left & right corners, half blocks and closed end blocks.
 - a. Soaps, sill blocks, bond beams and other shapes (standard or custom) as indicated on the Drawings; See Polished Ground-Faced Concrete Units per this Section.
 - 1) Color and finish to match.
 3. Insulated masonry wall units shall comply with IECC Table 402.2 for prescriptive compliance for above grade mass wall construction for continuous insulation for Zones 5 and 6.
 4. Insulation Inserts: EPS foam inserts at all cores, except structurally grouted cores.
 - a. Thermal Resistance (R Value): 4 (hr*ft²(F)/BTU) per inch and 6.3 (hr*ft²(F)/BTU) total minimum.
 - b. Density: 135 pcf min.
 - c. UL Listed "non-toxic" product.
 - d. Non CFC.

5. Cross Webs: No direct cross webs (thermal path shall be extended to approximately 16 inches). Offset cross webs shall create 2 rows of cells (interior and exterior) that are individually filled with molded EPS insulation inserts.
6. Bonds and Patterns: Running bond unless otherwise indicated per the Drawings.
7. Basis of Design Colors: (matching Mirra-Tex Plus by Genest).
 - a. Type 7: Plus Smoke GF-102 by Genest.
 - b. Type 8: Equal portions of the following colors and finish by Genest, in patterns as shown on Drawings.
 - Ocean Mist GF-001
 - Smoke GF-102
 - Ashland Grey GF-131
8. Basis of Design: Omni-Block by Genest Concrete Works, Inc..
9. Alternate Manufacturers:
 - a. NRG Insulated Block from Gagne Concrete Products. Note: Reinforcing details shall be modified and dimensional coordination may be required for this block to be used. During the bid process contractors submitting alternate manufacturers are encouraged to submit manufacturer engineered reinforcement studies for structural review. Acceptance of any bid including an alternate manufacturer will assume all related reinforcement required to meet the intent of the structural design is included within the submitted bid. Change requests after acceptance of bid will be prohibited.
 - b. InsulTech Insulated Concrete Masonry System by Trenwyth Industries. Note: Reinforcing details shall be modified and dimensional coordination may be required for this block to be used. During the bid process contractors submitting alternate manufacturers are encouraged to submit manufacturer engineered reinforcement studies for structural review. Acceptance of any bid including an alternate manufacturer will assume all related reinforcement required to meet the intent of the structural design is included within the submitted bid. Change requests after acceptance of bid will be prohibited.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Units with Integral Water Repellent: Concrete block units as specified in this Section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
 1. Performance of Units with Integral Water Repellent:
 - a. Water Permeance: When tested per ASTM E514 and for a minimum of 72 hours.
 - 1) No water visible on back of wall above flashing at the end of 24 hours.
 - 2) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
 - 3) No more than 25% of wall area above flashing visibly damp at end of test.
 - b. Flexural Bond Strength, ASTM C1357: Minimum 10% increase.
 - c. Compressive Strength: ASTM C1314; Maximum 5% decrease.
 - d. Drying Shrinkage, ASTM C1148: Maximum 5% increase in shrinkage.
 2. Use only in combination with mortar and grout that also has integral water repellent admixture, all by a single manufacturer.
 3. Applications: All CMU wet areas including: Exterior units, restrooms, locker rooms, shower areas and otherwise indicated per the Drawings.
 4. Products:
 - a. Rheopel by BASF.
 - b. Dri-Block by W.R. Grace..
 - c. RainBloc by ACM Chemistries.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 BRICK UNITS

- A. Facing Brick Type 1: ASTM C 216, Type FBX, Grade SW.
 1. Basis of Design: Commodore Full Range Smooth (Norman) by Belden Brick Company.
 2. Acceptable Products:
 - a. Sunset Flashed FS15 by Glen Gery Brick

- b. Substitutions: See Section 01 60 00 - Product Requirements. Brick products shall be submitted for review and approval only during the bid period.
 3. Size: manufactured to the following actual dimensions: Norman 3 5/8 inches wide x 2 1/4 inches high x 11 5/8 inches long
 4. Special shapes: Molded units as required by conditions indicated. All brick to be used to form outside corners shall be factory formed to provide return legs, as required to maintain a full running bond without clipped brick or mitered corners.
 5. Unit Compressive strength, ASTM C67: 15,859 PSI.
 6. Efflorescence, ASTM C67: Not Effloresced.
 7. Absorption, 24 hr cold water submersion, ASTM C67: 1.58%.
 8. Pattern: Running bond.
- B. Facing Brick Type 2: ASTM C 216, Type FBX, Grade SW.
1. Basis of Design: Claret Smooth (Norman) by Belden Brick Company.
 2. Acceptable Manufacturer(s):
 - a. Bordeaux Blend by Endicott Clay Products Co.
 - b. Substitutions: See section 01 60 00 - Product Requirements. Equivalent brick to be submitted for review and approval only during the bid period.
 3. Size: manufactured to the following actual dimensions: Norman 3 5/8 inches wide x 2 1/4 inches high x 11 5/8 inches long.
 4. Special shapes: Molded units as required by conditions indicated. All brick to be used to form outside corners shall be factory formed to provide return legs, as required to maintain a full stack bond without clipped brick or mitered corners.
 5. Unit Compressive strength, ASTM C67: 15,859 PSI.
 6. Efflorescence, ASTM C67: Not Effloresced.
 7. Absorption, 24 hr cold water submersion, ASTM C67: 1.58%.
 8. Pattern: Stack Bond.

2.03 BRICK MORTAR MATERIALS

- A. Pre-mixed Masonry Cement: ASTM C 270; ASTM C 91, Type N, commercially prepared type of Portland Cement Type 1 and hydrated lime Type N.
1. Products:
 - a. Quik-crete, Type N Portland/Lime Blend.
 - b. Blue Circle.
 - c. Eagle Bond.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979.
1. Colored mortar to be used at all facing brick, decorative insulated concrete block, polished ground faced concrete units and large format concrete block unless otherwise indicated.
 - a. Intent:
 - 1) Facing Brick: As selected by Architect from manufacturer's full range.
 - 2) Polished Ground Faced Concrete Units: Up to (5) five colors, including white, as selected by Architect from manufacturer's full range to match specified concrete units.
 - 3) Large Format Concrete Block: As selected by Architect from manufacturer's full range.
 - 4) Decorative Insulated Concrete Block: Up to (4) four colors, including white, as selected by Architect from manufacturer's full range to match specified concrete units.
 2. Manufacturers:
 - a. Basis of Design: Davis Colors; Product True Tone Premium
 - b. Lambert Corporation
 - c. Solomon Colors
 - d. LeeHigh/Centurion, or Color Match.

3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Water: Clean and potable.
- D. Admixtures: Admixtures shall not be used without the Architect's written permission, unless specified herein.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A 615 Grade 60 (420) deformed billet bars; uncoated, and shall be in conformance with Section 04 23 00 – Reinforced Unit Masonry. Provide reinforcing bar supports/positioners for accurate positioning.
- B. Single Wythe Joint Reinforcement: Ladder type; ASTM A82 steel wire, hot dip galvanized after fabrication to ASTM A153, Class B2 and for interior walls to ASTM A641, Class 1. Standard 0.1875 inch (3/16") side rods with 0.1483 inch (9 gauge) cross rods. Width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
 1. Products:
 - a. Lox-All Ladder-Mesh 220 by Hohmann & Barnard / Dur-O-Wall.
 - b. BL-10 by Blok-Lok.
 - c. Ladder 2 Wire by Wire-Bond.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Multiple Wythe Joint Reinforcement: Adjustable, ties spaced at 16 in on center ASTM A82 steel wire, hot dip galvanized after fabrication to ASTM A153, Class B2. Standard 0.1875 inch (3/16") side rods with 0.1483 inch (9 gauge) cross rods. Rectangular wire pintel ties of 3/16 inch wire. Width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
 1. Pintel Seismic Feature: Provide lip, hook, or clip on extended leg of wall ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.
 2. Products:
 - a. 280-BL with Byna-Lok Wire Tie by Hohmann & Barnard.
 - b. BL-42 Ladder Reinforcement with System 2000 Tie by Blok-Lok.
 - c. Ladder Adjustable Tab by Wire-Bond.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Reinforcing Bar Positioners: Provide reinforcing bar supports/positioners for accurate positioning of horizontal and vertical reinforcement in walls, bond beams, and lintels. Fabricate from cold-drawn plain 9 gage steel wire complying with ASTM A-82.
 1. Manufacturers:
 - a. Dur-O-Wal.
 - b. AA Wire Products Co.
 - c. Substitutions: See Section 01 60 00 – Product Requirements.
- E. Two-Piece Wall Ties: (For Double Wythe Masonry Cavity Walls, supplementing ties integral to Cavity Wall Reinforcement) L shaped 12 gauge back plate with pintel slots; hooked steel pintel, 3/16 inch thick, adjustable, hot dip galvanized to ASTM A 153/A 153M, Class B. Length shall be as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.
 1. Pintel Seismic Feature: Provide lip, hook, or clip on extended leg of wall ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.
 2. All veneer anchors for cavities greater than 5 inches must be engineered by a licensed professional engineer in the State of Maine.
 3. Product:
 - a. HB-213 Adjustable Veneer Anchor by Hohmann & Barnard.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Masonry Veneer Anchors: (For Masonry - Metal Stud Cavity Walls) 2-piece adjustable veneer anchor and pintel tie, hot dip galvanized to ASTM A 153/A 153M, Class B2.

1. Anchor Screws: Single screw veneer tie with dual diameter barrel and factory EPDM washers at both weather barrier and insulation faces. Barrel with 5/16" hex head, length to accommodate insulation.
2. Adjustable Pintle Wire Ties: Triangle shape, 3/16 inch thickness. Tie length shall be as required for a minimum 2" tie embedment in mortar.
3. Pintle Seismic Feature: Provide lip, hook, or clip on extended leg of wall ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.
4. Products:
 - a. Type 1: (Basis of Design) Pos-i-Tie with adjustable Double Pintle Wire Tie by Heckman Building Products.
 - 1). Application: Typical for all masonry veneer applications with an air cavity of 1-3/4 inch to 2 inches in width. Where no other masonry veneer anchor is specified.
 - b. Type 2: (Basis of Design) X-Seal S.I.S. Anchor with adjustable Double Pintle Wire Tie by Hohmann & Barnard Inc.
 - 1). Application: Where indicated per the drawings, masonry veneer details with an air cavity of 3/4 inch to 1 inch.
 - c. Acceptable Manufacturers:
 - 1) Hohmann & Barnard.
 - 2) Bloc-Lok.
 - 3) Heckman Building Products.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Single Strand Reinforcement (For brick sills, soldier course and stack bond): Continuous single strand, galvanized, No. 9 gauge deformed wire.
- H. Fasteners: Anchors shall be mechanically fastened to metal studs using self-drilling, self-tapping screws of sizes and types as recommended by the tie manufacturer. Screw finish shall be Type 304 stainless steel or a high performance polymer coating, complying with ASTM B117, salt spray test result of no rust or other base metal corrosion after a minimum of 800 hours.
- I. Corrugated Wall Ties: Corrugated formed sheet metal, 7/8 inch wide by 22 gauge 0.03 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B2, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
 - a. Application(s): Interior applications detailing the use of "Soaps" as a veneer installation, as indicated per the Drawings.

2.05 FLASHINGS

- A. Cavity Thru-Wall and Drip Edge Flashing (for termination of membrane flashings at exterior face of masonry and to support membrane flashing across cavities): 0.032 inch (22 gauge) Type 304 stainless steel continuous drip flashing, shape as indicated on the Drawings. Drip edge flashing shall extend into cavity to support membrane thru-flashing.
 1. Vent Flashing provided by this Section shall be adhered to the top surface of drip flashing.
- B. Reglet - Two-piece Cap Flashing: (For counter flashing at roof-wall intersections) Receiver formed of stainless steel with a special vertical locking slot to hold vertical component in place. Combination receiver and thru-wall flashing shall have 3/16" high undercut sawtooth ribs at 3" intervals to provide a mechanical bond in the mortar bed in all 3 directions. Insert member formed of stainless steel, designed to snap lock into the receiver and provide a spring like hug against the base flashing. Receiver shall be set with a thin bed of mortar below and above. Install counter joint lapped 3 inches.
 1. Manufacturer: Keystone Manufacturing Co.
 2. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch thick; finish 2B to 2D.

2.06 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
- B. Vent Flashing: Stainless steel core flexible flashing with drainage fabric. Engineered system, with high resistant to damage, composite with a stainless steel with non-asphalt adhesive polymer fabric laminated to one stainless steel and non-woven drainage fabric laminated to opposing face with non-asphalt adhesive.
 - 1. Stainless steel: ASTM A240
 - 2. Fabrics:
 - a. Polymer fabric; laminated back face to stainless steel core
 - b. Non-woven drainage fabric: Fabric laminated to front face stainless steel core.
 - 3. Mastic/sealant, outside & inside corners, end dams, splice materials, termination bars, weep vent protection, fasteners and other accessories as required for a complete system per manufacturer specifications.
 - 4. Products:
 - a. Basis of Design: Flash-Vent SS by York Manufacturing Inc
 - b. STS Coatings Inc.
 - c. Building Materials West Company Inc
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Wall Drainage Baffle: Polyester mesh panels designed for installation at flashing locations to prevent mortar droppings from clogging weeps. Size with of baffle to match depth of cavity.
 - 1. Products:
 - a. Advanced Building Products Inc; Mortar Break DT.
 - b. Mortar Net USA, Ltd; Product MortarNet.
 - c. Weep Armor by York.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Masonry Mat: Continuous polyester mesh panels designed as an air space maintenance system.
 - 1. Application(s): Masonry veneer wall assemblies detailed to receive a 3/4 inch air space.
 - 2. Installation: Continuous throughout 3/4 inch air cavity. Extend minimum 6 inches horizontally beyond and 3 inches vertically below 3/4 air space boundary. At top, stop masonry mat flush with 3/4 inch air space boundary and butt to bottom of Wall Drainage Baffle. Secure in place per manufacturer recommendations.
 - 3. Thickness: 1/2 inch.
 - 4. Products:
 - a. Basis of Design: CavClear by MASONPRO Inc.
 - b. Wire-Bond.
 - c. Hohmann & Barnard, Inc
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Termination Bars: Stainless steel; compatible with membrane and adhesives.
- F. Weep Holes and Cavity Vents: Polypropylene honeycomb, full joint height, color as selected by the Architect.
 - 1. Products:
 - a. Dur-O-Wal; Product DA 1006 Cell Vent.
 - b. Hohmann & Barnard, Inc; Product Quadrovent.
 - c. Mortar Net USA, Ltd; Product Weep Vents.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Single-Wythe (CMU) Concrete Masonry Unit Drainage System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density Polypropylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar. Attached web covers will span from pan to pan providing protection over the web and the joints of the CMU.

1. Application(s): At base course of Singe-Wythe Decorative Insulated Concrete Block Wall System Types 7 & 8, and as indicated per the drawings.
2. Accessories: Drainage mats, insect screens, bridges and other accessories for a complete drainage system.
3. Products:
 - a. Basis of Design: Blockflash by Mortar Net Solutions.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
- I. Compressible Fillers: (Below relieving angles) See Section 07 90 05 - Joint Sealers.

2.07 CMU MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: Pre-mixed masonry cement; ASTM C270; ASTM C91, commercially prepared type of Portland Cement Type 1 and hydrated lime Type S.
 1. Exterior and interior masonry: Type S.
 2. Masonry below grade and in contact with earth: Type S., 1800 psi min.
 3. Products:
 - a. Quik-crete, Type S Portland/Lime Blend.
 - b. Blue Circle.
 - c. Eagle Bond.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Mortar for UL Design CMU: Comply with UL design requirements, not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume).
- C. Pigments for Colored Mortar: See 2.03 Brick Mortar and Grout for this Section.
- D. Water Repellant Admixture shall be added to mortar mix for use with all concrete masonry units specified with water repellent admixture.
 1. Use only water repellent admixture for mortar and grout from the same manufacturer as water repellent admixture in masonry units.
 2. Applications: All CMU wet areas including: Exterior units, restrooms, locker rooms, shower areas and otherwise indicated per the Drawings.
- E. Grout: ASTM C476, 3,000 psi minimum 28-day compressive strength. Consistency required to fill completely volumes indicated for grouting.
 1. Fine grout shall be used for spaces less than 2" in either horizontal dimension.
 2. Mortar shall be used for spaces less than 3/4" in width or spaces less than 1-1/2" x 2" in horizontal dimensions.
 3. Coarse Grout shall be used for filling cavities 2" or larger in width or cells 2" x 3" or larger in horizontal dimensions.
 4. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- F. Mixing: Use mechanical batch mixer and comply with referenced standards.
- G. Use of accelerating admixtures in cold weather and set-retarding admixtures during hot weather only when reviewed and approved by the Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other Sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors and reinforcement supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- C. Steel sleeves shall be installed for all piping and cabling through masonry construction. Coordinate with Fire Protection, Plumbing, Mechanical and Electrical Divisions.

3.03 PROTECTON OF WORK

- A. During erection, all walls shall be kept dry by covering at the end of each day or shutdown period with a strong, waterproof membrane. Partially completed walls not being worked on shall be similarly protected at all times. Covering shall completely cover all projecting rebar and overhang walls at least 2' on each side, and shall be securely held in place.

3.04 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.
- B. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- C. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.05 COURSING, JOINTING AND BOND PATTERN

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. All masonry work shall be properly coordinated as required to maintain aligned coursing throughout the building, unless specifically noted otherwise.
- D. Standard Concrete Masonry Units:
 - 1. Bond: Running Bond unless otherwise indicated per the Drawings.
 - 2. Mortar Joints: Concave.
 - 3. Joints scheduled to receive resilient floor base and other joints not exposed to view shall be flush-cut.
 - 4. Joints within exterior masonry cavity walls to receive vapor retarder membrane shall be flush tooled with the CMU surface and all CMU surface voids filled smooth.
- E. Brick Units:
 - 1. Bond: Running and Stack Bond as indicated per the Drawings.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches. (Running Bond)
 - 3. Mortar Joints: Concave.
- F. Sealant Recesses: Outside joints around the perimeter of exterior door and window frames or other wall openings shall be not less than 1/4" nor more than 3/8" wide, and shall be cleaned out to a uniform depth of at least 3/4" ready for placement of sealant by other trades.

3.06 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with full bed of mortar on head joints, bed joints, and webs.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners, except for units laid in stack bond.

- G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.07 DECORATIVE INSULATED CONCRETE BLOCK WALL SYSTEM

- A. Lay units in uniform and true courses, level and plumb to height indicated on Drawings.
- B. Insulation Inserts:
 - 1. Insulation inserts shall be placed in all exterior cells and shall be installed in interior cells that are not filled with grout and rebar as the wall is laid up (each course).
 - 2. Interior inserts shall overlap from block-to-block at each course of block.
- C. Vertical Reinforcing and Bond Beam Reinforcing:
 - 1. Place in accordance with manufacturer requirements and as indicated per the Structural Drawings.
 - 2. Vertical Reinforcement: Provide continuous reinforcing full height of wall at wall ends, corners, intersections, jambs of openings and each side of control joints. Vertical reinforcing shall match and lap dowels which are at top of foundation walls and precast concrete beams.
 - 3. Bond Beams: Provide horizontal reinforcing of 2 bars in minimum 8 inch deep grouted continuous bond beam at roof and elevated floor lines, unless otherwise noted.
 - 4. Bond Beam and Parapet Reinforcing at Corners and Wall Intersections: Provide bent bars to match reinforcing at corners and wall intersections.
 - 5. Use spacers to position reinforcing steel in center of grout at center of wall as required by code.
- D. See also "A Field Guide to building with Omni Block" available at www.omniblock.com or from Genest Concrete (800)-649-4773.

3.08 VENT FLASHING

- A. Extend flashing 6" minimum, beyond opening, each side without stretching flashing material. Fold flashing ends at end of openings or horizontal flashing terminations to form end dam or use preformed end dams from manufacturer.
- B. Flashing width: Width required starting 1.5" to the exterior of the outside face of exterior wythe, extending through cavity, rising height required to extend above lintel steel at least 2". After inspection by the agreed upon parties the flashing should be cut flush with the leading edge of the brick.
- C. Splice end joints by butting ends together over 4" wide piece of self-adhering stainless steel flashing. The self-adhering stainless steel flashing should be sealed metal face down on to the substrate with the mastic. Remove the release linear and butt the two piece of flashing together and embed them into the splice sealant. Then seal the butt seam with sealant.
- D. Stud back up with sheathing:
 - 1. Surface mount flashing after certified compatible membrane barrier installation specified in Section 07 25 00 in accord with manufacturer's installation instructions
 - 2. Apply flashing with drainage surface to the outside.
 - 3. Fasten to stud back-up surface at top by embedding in layer of sealant and use a termination bar to fasten to the backer wall and seal the top of the termination bar with sealant.
- E. Confirm compatibility with manufacturer's mutual letters for all lapping components.
- F. Inside corners: Make in manufacturers accepted manner using corner and splice material or utilize preformed corners from manufacturer.
- G. Outside corners: Make in manufacturers accepted manner using corner and splice material or utilize preformed corners from manufacturer.

- H. Weep vent protection use the geotextile drainage and install it on the third row height of standard bricks to have the fabric reach the base of the flashing and covering the weep vents.

3.09 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 16 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at top & bottom of walls where indicated per the Drawings.

3.10 SINGLE-WYTHE CONCRETE MASONRY UNIT DRAINAGE SYSTEM

- A. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Attached web covers will span from pan to pan providing protection over the web and the joints of the CMU.

3.11 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity, at top of mortar mat applications and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.
- D. Install cavity mortar mat within 3/4 to 1 inch air cavities per manufacturer specifications. Secure in place to prevent movement.

3.12 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Wall reinforcement shall be installed continuously in all masonry cavity walls, in all interior block walls and partitions and at all other locations identified on the Drawings or specified herein.
- B. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- C. Place concrete masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 24 inches each side of opening.
- D. Unless shown on the Drawings to be more closely spaced or where specifically indicated to be added, horizontal joint reinforcement for concrete masonry shall be installed in the first and second bed joints, 8" apart immediately above lintels and below sills at openings, and in bed joints at 16" vertical intervals elsewhere. Reinforcement in the second bed joint above or below openings shall extend two (2) feet beyond the jambs. All other reinforcement shall be continuous.
- E. Side rods shall be lapped a minimum of 6 inches at splices.
- F. Reinforcement shall be so placed as to assure a 1/2" minimum mortar cover on the faces of walls.
- G. Prefabricated or job fabricated corners and tee sections shall be used to form continuous reinforcement around corners and for anchoring abutting walls and partitions. Materials in corner and tee sections shall correspond to type and design of reinforcement used.
- H. Place horizontal and vertical reinforcing steel in walls and around openings as indicated on the Drawings. See Structural Drawings and Section 03 30 00 - Concrete, for additional information.
- I. Reinforcement for stack bonded soldier course masonry shall be installed continuously at all horizontal joints. Rods shall be lapped at least six (6) inches at splices. Reinforcement shall be placed as to assure 1/2" minimum mortar cover on the faces of walls.
- J. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
- K. Fasten anchors to structural framing abutting masonry and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 16 inches horizontally and 16 inches vertically.

- L. Structural steel clips shall laterally secure the tops of non-loading bearing masonry walls to building structure as indicated on the Structural Drawings.

3.13 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 8 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.14 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
 - 1. Veneer anchors on the cavity side of the stud wall shall be set in a sealant bed. All penetrations through sheathing shall be sealed.
- F. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

3.15 MASONRY FLASHINGS

- A. Coordinate the installation of all flashings in masonry with Vent Flashings in this Section, to ensure that all required flashings divert water to the exterior of the building are installed.
- B. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions. Drip flashings shall extend from 1/8 inch beyond exterior face of masonry, across the cavity and turn up face of cavity wall surface at least 4 inches. Vent Flashing shall seal to weather barrier and lap over drip flashing and extend down to be cut flush with the leading edge of the brick.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- C. Drip flashing shall be laid in a slurry of fresh mortar and mortar shall be placed on top of the flashing as well to maintain wall flexural strength.
- D. Lap end joints of flashings at least 4 inches and seal watertight.

3.16 LINTELS

- A. In general and except where indicated otherwise, masonry lintels shall be provided at all openings in CMU walls 6 inches (nominal) or more in thickness. See Structural Drawings for a schedule of masonry lintels (interior and exterior).
- B. Loose steel angle lintels shall be provided for all openings in brick veneer or 4" CMU masonry as indicated in the lintel schedule or on the Structural Drawings. For miscellaneous loose steel lintels not specified on the structural drawings, refer to Section 05 50 00 - Metal Fabrications.
- C. Vertical cores below lintel ends shall be grouted solid full height to provide suitable bearing. Provide additional reinforcement and filled cores as indicated on the Drawings.

- D. See Architectural and Structural Drawings for additional information related to reinforced concrete masonry lintels.
- E. Temporarily brace lintels as required until mortar has adequately cured.
- F. Maintain minimum 8 inch bearing on each side of opening, unless otherwise indicated.
- G. A minimum of two courses below lintel ends shall be filled solid with mortar to provide suitable bearing.

3.17 GROUTED COMPONENTS

- A. Lap splices minimum 48 bar diameters, unless otherwise noted.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.
- E. Clean concrete grout spaces of excess mortar and debris. Allow mortar to set. After observation of concrete grout spaces, plug clean-out holes with masonry units.
- F. Place grout in accordance with ACI 530 and NCMA guidelines.
- G. Grout mix and grout materials shall conform to ASTM C 476.
 - 1. Use "Fine Grout" for filling spaces less than 2" in either horizontal dimension. Where shown solid, use mortar for cavities less than 3/4" in width or spaces less than 1-1/2" x 2" in horizontal dimensions.
 - 2. Use "Coarse Grout" for filling cavities 2" or larger in width or cells 2"x3" or larger in horizontal dimensions.
 - 3. Use "Concrete", 3000 psi normal weight, for filling spaces ten (10) inches or larger in both horizontal dimensions.
- H. Grouting Method: Grouting shall conform to low-lift or high-lift grouting, at Contractor's option, subject to following requirements.
 - 1. Low-Lift Grouting:
 - a. Low-Lift Grouting SHALL NOT exceed a pour of more than five (5) feet in height not the "Maximum Grout Pour Height" identified below.
 - b. Provide minimum clear dimension of two (2) inches and minimum clear area of eight (8) sq. inches in vertical cavities, cells, or cores to be grouted.
 - c. Place vertical reinforcement prior to laying of masonry units. Extend above elevation of maximum pour height as required to allow for splicing. Support and secure reinforcing as masonry is built.
 - d. Lay masonry to maximum pour height. Do not exceed five feet (5 ft.) or if bond beam occurs below five feet (5 ft.) height, stop pour or course below bond beam.
 - 2. High-Lift Grouting:
 - a. High-Lift Grouting SHALL NOT exceed a pour of one story, but in no case more than twenty-four (24) feet in height nor the "Maximum Grout Pour Height" identified below.
 - b. High-Lift Grouting is NOT PERMITTED unless minimum cavity dimension exceeds three (3) inches and minimum cavity area exceeds ten (10) sq. inches.
 - c. Cleanout holes ARE REQUIRED where high-lift grouting will be employed. Provide cleanouts at the bottom course of masonry at each cell to be grouted for each pour. For solid grouted masonry space cleanouts at 32 in. o.c.
 - d. Cleanout holes shall have minimum width of 3 inches and a minimum height of 6 inches. After cleaning, close cleanouts and brace closures to resist hydrostatic grout pressure.
 - e. Prior to grouting, construct masonry elements and place and secure reinforcing to full height of maximum grout pour. Place horizontal bond beam reinforcing as

- masonry units are laid.
- f. Where lateral tie reinforcing is shown, embed in mortar joints at vertical spacing indicated as units are laid. Where lateral ties wrap vertical reinforcing, embed additional lateral tie reinforcing in mortar joints to resist hydrostatic rupture of masonry face shells. Provide not less than No. 2 bars or 8 gage wire ties spaced at 16 in. o.c. for members with side dimensions of 20 in. or less and at 8 in. o.c. where side dimensions exceed 20 in.
- I. Maximum Grout Pour Height: In no case shall total grout pour height exceed the following heights regardless of grouting method used.

Grout Type	Max. Height	Min. Cavity	Min. Cell
Fine	1'-0"	3/4"	1-1/2" x 2"
Fine	5'-0"	2"	2" x 3"
Fine	12'-0"	2-1/2"	2-1/2" x 3"
Fine	24'-0"	3"	3" x 3"
Coarse	1'-0"	2"	2" x 3"
Coarse	5'-0"	2"	2-1/2" x 3"
Coarse	12'-0"	2-1/2"	3" x 3"
Coarse	24'-0"	3"	3" x 4"

Min. Cavity applies to grouting between wythes of cavity walls. Min. Cell applies to grouting of masonry cells where dimension shown equals grout space width minus horizontal reinforcing bar diameter.

- J. Grout Placement: Limit grout pours to sections which can be completed in one working day with not more than one (1) hour of interruption of pouring operation. Allow not less than thirty (30) minutes, nor more than one (1) hour between lifts of given pour. Rod or vibrate each lift during pouring operation.
 1. Place grout in lifts not to exceed a maximum height of five (5) feet each, regardless of the maximum height of the pour.
 2. Place grout in lintels and beams over openings in one continuous pour.
 3. Pour grout using chute or container with spout. Terminate pour 1-1/2" below top course to form key for next pour.
 4. Where bond beams occur, terminate grouting of vertical cells 1-1/2" below bond beam course. After placing horizontal reinforcing and prior to filling vertical cells above bond beam, pour grout into bond beam and strike off flush with top of bond beam course.
- K. Work grout into cores, eliminating all voids. Mechanically vibrate grout during and after placement to ensure complete filling. Avoid segregation of grout materials. Do not displace reinforcing steel while placing concrete grout.

3.18 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joint in accordance with Drawing details, but not less than 3/8" for installation of sealant and backer rod specified in Section 07 90 05. Keep joint free and clear of mortar.
- D. Build in horizontal, pressure relieving joints where indicated on the Drawings. Construct joints by inserting a compressible filler of width required and installing sealant and backer rod specified in Section 07 90 05 - Joint Fillers. Locate horizontal, pressure relieving joints beneath

relieving (shelf) angles supporting masonry veneer and attached to structure behind masonry veneer.

- E. CMU Control Joints: For interior and exterior concrete masonry partitions in general as follows:
 - 1. At locations not to exceed 25' o.c., or 150% of the height of the CMU wall, or as otherwise indicated on the Drawings, whichever is less.
 - 2. Adjacent to corners and intersections of walls within a distance equal to half the general control joint spacing noted above.
 - 3. At changes in wall height or thickness.
 - 4. Above movement joints in foundations and floors.
 - 5. Below movement joints in foundations and floors.
 - 6. At one side of openings less than 6' wide and at both sides of openings more than 6' wide, located beyond opening reinforcing where applicable.
- F. Brick Veneer Control Joints: For exterior brick veneer masonry in general as follows:
 - 1. At locations not to exceed 23 feet o.c., or as otherwise indicated on the Drawings, whichever is less.
 - 2. Adjacent to corners of walls, with the sum of the distance to the corner at each wall totaling the typical joint spacing and no greater than 10' from the corner.
 - 3. At changes in wall height.
 - 4. At wall offsets.
 - 5. Below relieving angles.
 - 6. Adjacent to openings as indicated on the Drawings.
- G. Control joints in concrete masonry units shall be specially shaped units keyed to receive premolded synthetic rubber joints.

3.19 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames, anchors and plates and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.20 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch.
- B. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft, 3/8 inch in any story and 1/2 inch in 40 feet or more.
- D. Maximum Variation from Plumb at openings (windows, doors, etc): 1/8 inch in total height of opening.
- E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in 40 feet or more.
- F. Maximum Variation from Level Coursing: 1/4 inch in any bay or 20 feet; 1/2 inch in 40 feet or more.
- G. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.21 NON-FIRE RATED AND ACOUSTICAL CONSTRUCTION

- A. General: The following requirements shall apply to all non-fire rated masonry partitions and to all non-fire rated masonry partitions indicated on the Drawings to be "Acoustical Construction".
- B. Where the tops of non-load bearing partitions meet the underside of the structure above, and where gaps in partitions are provided to allow for the penetration of structural members, safing

insulation shall be installed. Insulation shall be compression fit and shall not be visible from below.

- C. Acoustic Sealing and Smoke Sealing: Seal all cracks, joints, and voids in "Acoustical Construction" and in non-fire rated smoke partitions, air tight with sealing products specified in Section 07 9005. Assemblies identified as "Acoustic Construction" are not fire-rated construction. Firestop products are required at fire-rated construction. Acoustic sealing and smoke sealing operations shall include, but shall not necessarily be limited to:
- D. Sealing top of masonry partitions for Acoustical Construction on two sides at interface of top of wall to deck flutes.
- E. Sealing all penetrations for pipes, conduits, structure, etc.

3.22 FIRE RATED CONSTRUCTION

- A. General: The following requirements shall apply to all fire rated masonry partitions indicated on the Drawings.
- B. Where the tops of non-load bearing partitions meet the underside of the structure above, and where gaps in partitions are provided to allow for the penetration of structural members, safing insulation shall be installed. Insulation shall be compression fit and shall not be visible from below.
- C. Firestopping: Seal all cracks, joints, and voids in fire rated masonry partitions with firestop products specified in Section 07 84 00. Coordinate with the Work of Section 07 90 05.
- D. Masonry products and installations shall conform to the requirements of the specified U.L. listed assemblies.

3.23 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, sleeves, and ductwork. Coordinate with other Sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.24 FIELD QUALITY CONTROL

- A. The Owner shall employ and pay a qualified independent testing agency to perform construction testing on all locations of masonry during the first 1,000 square feet and at each additional 5,000 square feet of wall area, or as required by related codes and the Contract Documents or as directed by the Architect.
 - 1. Load-bearing masonry units: For each type of wall construction, prism tests shall be performed on randomly selected units assembled into prisms using representative mortar and grout materials. Prisms shall be fabricated following delivery to the site and prior to placement, in order to confirm the ultimate net compressive strength (f'm) of masonry. A minimum of one (1) test shall be required for each 5,000 square feet of load-bearing wall areas. Tests shall be conducted in accordance with ASTM E447. Minimum ultimate compressive strength of masonry (f'm) shall be 1500 psi for 8" masonry walls. Prepare prisms for testing at 7 and 28 days.
 - 2. Mortar: Mortar composition and properties shall be tested on randomly selected mortar samples. Tests shall be conducted in accordance with ASTM C780.
 - 3. Grout: Grout compressive strength shall be sampled and tested in accordance with ASTM C1019.
 - 4. Additional Testing: Work which testing or inspections indicate is not in conformance with the project requirements may require re-testing. When directed by the Architect, the Contractor shall engage and pay an approved testing laboratory to perform additional testing as necessary to reconfirm nonconformance of original work and compliance of corrected work.
- B. Masonry observation and Inspection: All reinforced masonry shall be viewed in accordance with the Statement of Special Inspections by a Masonry Inspector who shall be an independent

inspector employed by the Owner for conformance with the requirements of ACI 530.1/ASCE 6 /TMS 602 "Specifications for Masonry Structures" and NCMA TR 156.

1. The Contractor shall obtain a copy of ACI 530 and NCMA TR156 which shall be kept on site and available for use.
 2. The Masonry Inspector's daily reports shall include all items listed herein, including deficiencies and remedial actions taken. Reports shall be submitted to the Architect, Owner and the Contractor daily and to other parties weekly, unless determined otherwise. Conditions not in conformance are to be immediately reported to the Contractor and Architect.
 3. The Masonry Inspector shall have access to and be familiar with the following:
 - a. Construction documents, shop drawings, product literature, mix designs, test certificates, and other documents related to the work.
 - b. Reviewed and accepted samples of materials colors, finishes, etc.
 - c. Contractors hot or cold weather construction procedures and grouting procedures.
 - d. Construction of all sample panels.
 - e. Attend applicable pre-construction meetings.
 4. The Masonry Inspector shall, upon delivery to the site, check the following:
 - a. Concrete Masonry units: Size, shape, color, compliance with applicable standards, quality, cleanliness, and proper storage.
 - b. Mortar Materials: Compliance with applicable standards and proper storage.
 - c. Reinforcing steel and Joint Reinforcement: Size, shape, grade, finish, compliance with applicable standards, cleanliness, and proper storage.
 - d. Anchors, Connectors and Accessories: Size, type, grade, finish, compliance with applicable standards, proper storage.
 5. The Masonry Inspector shall periodically during the day examine and record work in progress for quality of workmanship and the following as applicable:
 - a. Verify proper cold or hot weather protection provisions are in place.
 - b. Observe mortar proportioning, consistency, and mixing procedures for each mortar type.
 - c. Check footings for proper size, location, dowel placement, size, length, and location.
 - d. Observe masonry wall construction to verify proper bonding, mortar joint size, and tooling compliance with applicable tolerances.
 - e. Observe the preparation of samples for testing.
 - f. Check concrete masonry wall construction for vertical alignment and continuity of cells, proper bedding, clean cells for grouting, reinforcing bar placement and laps, and proper tie / anchor installation.
 - g. Check concrete masonry wall coordination of rebar placement with piping, duct penetrations, chases, etc.
 - h. Check and observe high and low lift grout materials, placement operations, and proper consolidation.
 - i. Check that shoring and bracing is in place and stored materials and in-place work is properly covered / protected.
 - j. Verify masonry has been installed within applicable tolerances.
 - k. Inspect connections between masonry and adjacent construction.
 - l. Verify presence of control and other movement joints and proper sealing of joints.
 - m. Verify cleaning and waterproofing of masonry.
 6. At the completion of the masonry portion of the Project, the Masonry Inspector shall submit a final report stating that all masonry work was, to the best of the Inspector's knowledge, in conformance with the Construction Documents and all applicable standards.
- C. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- D. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67 requirements, sampling 5 randomly chosen units for each 50,000 installed.

- E. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.
- F. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.25 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. All exposed brick masonry shall be thoroughly cleaned. Before applying any cleaning agent to the entire wall, it shall be applied to a sample wall area of approximately 20 sq. ft. in a location approved by the Architect. No further cleaning work may proceed until the sample area has been approved by the Architect, after which time the same cleaning materials and method shall be used on the remaining wall area. Adequate water shall be available to thoroughly pre-soak and rinse all surfaces to be cleaned.
- E. All traces of excess mortar/grout, all efflorescence and all other construction stains shall be completely removed from exposed masonry.

3.26 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.
- B. Protect finishes until completion of project.

END OF SECTION



Design No. U904
BXUV.U904
Fire Resistance Ratings - ANSI/UL 263

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BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. U904

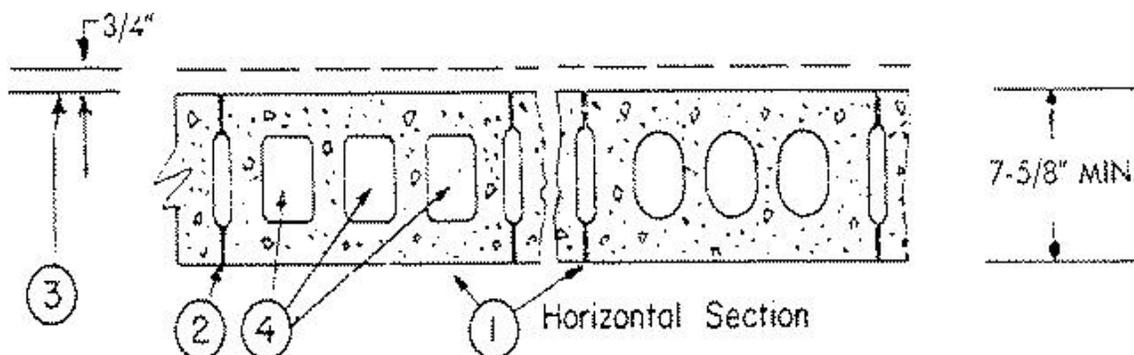
September 11, 2015

Bearing Wall Rating — 3 HR.

Nonbearing Wall Rating — 3 HR.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide **BXUV or **BXUV7****

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



1. **Concrete Blocks*** — Various designs. Classification C-3 (3 hr).

See **Concrete Blocks** category for list of eligible manufacturers.

2. **Mortar** — Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.

3. **Portland Cement Stucco or Gypsum Plaster** — Add 1/2 hr to Classification if used. Attached to concrete blocks (Item 1).

4. **Loose Masonry Fill** — If all core spaces are filled with loose dry expanded slag, expanded clay or shale (Rotary Kiln Process), water repellant vermiculite masonry fill insulation, or silicone treated perlite loose fill insulation add 1 hr to Classification.

5. **Foamed Plastic*** — (Optional-Not Shown) — 1-1/2 in. thick max, 4 ft wide sheathing attached to concrete blocks (Item 1).

ATLAS ROOFING CORP — "EnergyShield Pro Wall Insulation" and "EnergyShield Pro 2 Wall Insulation."

CARLISLE COATINGS & WATERPROOFING INC — Type R2+ Sheath

HUNTER PANELS — Type Xci-Class A, Xci 286

RMAX OPERATING L L C — "TSX-8500", "TSX-8510", "Thermasheath-XP", "ECOMAXci", "Thermasheath-3", "Durasheath-3"

THE DOW CHEMICAL CO — Type Thermax Sheathing, Thermax Light Duty Insulation, Thermax Heavy Duty Insulation, Thermax Metal Building Board, Thermax White Finish Insulation, Thermax ci Exterior Insulation, Thermax XARMOR ci Exterior Insulation, Thermax IH Insulation, Thermax Plus Liner Panel, Thermax Heavy Duty Plus (HDP) and TUFF-R™ ci Insulation

5A. **Building Units** — As an alternate to Item 5, min. 1-in thick polyisocyanurate composite foamed plastic insulation boards, nom. 48 by 48 or 96 in.

RMAX OPERATING L L C — "Thermasheath-SI", "ECOBASEci", "ThermaBase-CI"

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- Only products which bear UL's Mark are considered Certified.

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BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. U905

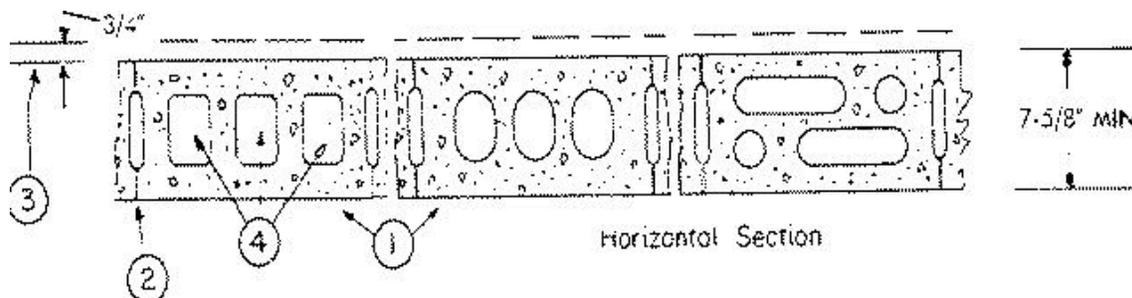
September 11, 2015

Bearing Wall Rating — 2 HR.

Nonbearing Wall Rating — 2 HR

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

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1. **Concrete Blocks*** — Various designs. Classification D-2 (2 hr).

See **Concrete Blocks** category for list of eligible manufacturers.

2. **Mortar** — Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.

3. **Portland Cement Stucco or Gypsum Plaster** — Add 1/2 hr to classification if used. Where combustible members are framed in wall, plaster or stucco must be applied on the face opposite framing to achieve a max. Classification of 1-1/2 hr. Attached to concrete blocks (Item 1).

4. **Loose Masonry Fill** — If all core spaces are filled with loose dry expanded slag, expanded clay or shale (Rotary Kiln Process), water repellent vermiculite masonry fill insulation, or silicone treated perlite loose fill insulation add 2 hr to classification.

5. **Foamed Plastic*** — (Optional-Not Shown) — 1-1/2 in. thick max, 4 ft wide sheathing attached to concrete blocks (Item 1).

ATLAS ROOFING CORP — "EnergyShield Pro Wall Insulation" and "EnergyShield Pro 2 Wall Insulation"

CARLISLE COATINGS & WATERPROOFING INC — Type R2+ Sheath

HUNTER PANELS — Types Xci-Class A, Xci 286

RMAX OPERATING L L C — "TSX-8500", "TSX-8510", "Thermasheath-XP", "ECOMAXci", "Thermasheath-3", "Durasheath-3"

THE DOW CHEMICAL CO — Types Thermax Sheathing, Thermax Light Duty Insulation, Thermax Heavy Duty Insulation, Thermax Metal Building Board, Thermax White Finish Insulation, Thermax ci Exterior Insulation, Thermax XARMOR ci Exterior Insulation, Thermax IH Insulation, Thermax Plus Liner Panel, Thermax Heavy Duty Plus (HDP) and TUFF-R™ ci Insulation

5A. **Building Units** — As an alternate to Items 5, min. 1-in thick polyisocyanurate composite foamed plastic insulation boards, nom. 48 by 48 or 96 in.

RMAX OPERATING L L C — "Thermasheath-SI", "ECOBASEci", "ThermaBase-CI"

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BXUV.U906
Fire-resistance Ratings - ANSI/UL 263

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Design No. U906

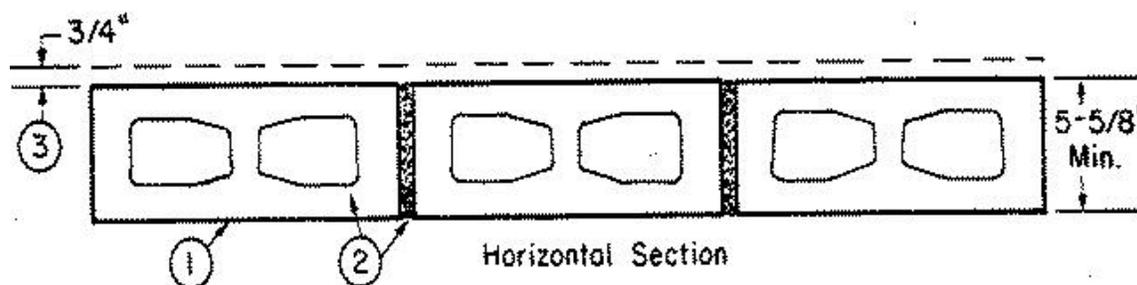
September 11, 2015

Bearing Wall Rating — 2 HR.

Nonbearing Wall Rating — 2 HR.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide [BXUV](#) or [BXUV7](#)

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1. **Concrete Blocks*** — Nominal 6 by 8 by 16 in, hollow or solid. Various designs. Classification (2 hr).

See **Concrete Blocks** category for list of eligible manufacturers.

ANCHOR CONCRETE PRODUCTS INC

GAGNE & SON CONCRETE BLOCK INC

GLENWOOD MASONRY PRODUCTS

Allowable compressive stress of 57% of max allowable compressive stress in accordance with the empirical design method.

OLDCASTLE APG SOUTH INC, DBA ADAMS PRODUCTS

WESTBROOK CONCRETE BLOCK CO INC

Allowable compressive stress of 75.6% of max allowable compressive stress in accordance with the empirical design method.

2. **Mortar** — Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.

3. **Portland Cement Stucco or Gypsum Plaster** — Add 1/2 hr to Classification if used. Attached to concrete blocks (Item 1).

4. **Foamed Plastic*** — (Optional-Not Shown) — 1-1/2 in. thick max, 4 ft wide sheathing attached to concrete blocks (Item 1).

ATLAS ROOFING CORP — "EnergyShield Pro Wall Insulation" and "EnergyShield Pro 2 Wall Insulation"

CARLISLE COATINGS & WATERPROOFING INC — Type R2+ Sheath

HUNTER PANELS — Types Xci-Class A, Xci 286

RMAX OPERATING L L C — "TSX-8500", "TSX-8510", "Thermasheath-XP", "ECOMAXci", "Thermasheath-3", "Durasheath-3"

THE DOW CHEMICAL CO — Types Thermax Sheathing, Thermax Light Duty Insulation, Thermax Heavy Duty Insulation, Thermax Metal Building Board, Thermax White Finish Insulation, Thermax ci Exterior Insulation, Thermax XARMOR ci Exterior Insulation, Thermax IH Insulation, Thermax Plus Liner Panel, Thermax Heavy Duty Plus (HDP) and TUFF-R™ ci Insulation

4A. **Building Units** — As an alternate to Item 5, min. 1-in thick polyisocyanurate composite foamed plastic insulation boards, nom. 48 by 48 or 96 in.

RMAX OPERATING L L C — "Thermasheath-SI", "ECOBASEci", "ThermaBase-CI"

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[See General Information for Fire-resistance Ratings - ANSI/UL 263](#)

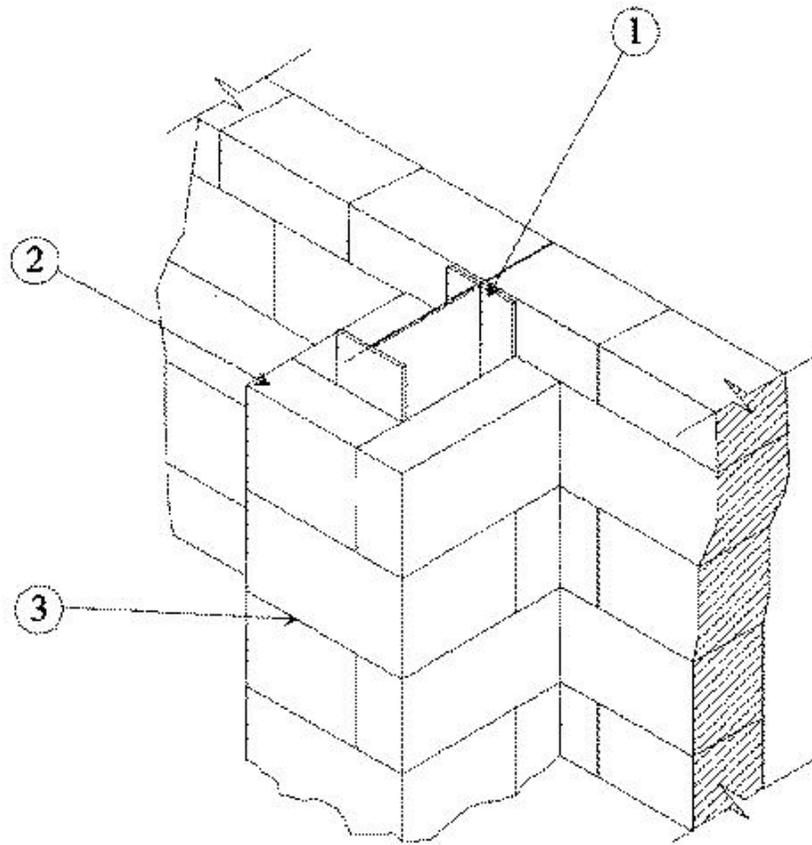
[See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada](#)

Design No. X901

August 03, 2011

Rating — 4 Hr

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1. **Steel Column** — Any size W shaped steel column, steel tube or steel pipe.

2. **Precast Autoclaved Aerated Concrete Blocks or Panels** — Min 4 in. thick by min 7-7/8 in. high by min 23-5/8 in. long blocks or min 8 in. thick by 2 ft wide panels installed either horizontally or vertically. Panels mechanically attached to the concrete floor and ceiling.

AERCON FLORIDA L L C — AC-2, AC-3.3, AC-4, AC-4.4, AC-6, AC-6.6

XELLA MEXICANA S A DE C V — AAC-2, AAC-3.3, AAC-4, AAC-6

3. **Thin Bed Mortar** — Blocks laid in a ANSI A118.4 Latex/Portland cement thin bed mortar installed with vertical joints staggered.

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SECTION 05 12 00
STRUCTURAL STEEL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

- A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.
- B. Structural steel is that work defined in AISC "Code of Standard Practice" and as otherwise shown on drawings.

1.03 RELATED WORK

- 1. Section 05 20 00 – Open Web Steel Joists
- 2. Section 05 30 00 – Metal Deck
- 3. Section 05 50 00 - Metal Fabrications

1.04 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with latest provisions of the following, except as otherwise indicated:
 - 1. AISC "Code of Standard Practice for Steel Buildings and Bridges", Latest Edition.
 - a. The provisions of Section 10, "Architecturally Exposed Structural Steel", apply to exposed steel elements for this project. In addition, exposed welds shall be ground to provide smooth surface.
 - b. Exclude the word "structural" in reference to the "Design Drawings" in section 3.1 of the Code.
 - 2. AISC "Specification for Structural Steel Buildings", including "Commentary" and Supplements issued thereto.

3. AISC "*Specifications for Structural Joints using ASTM A 325 or A 490 Bolts*" approved by the Research Council on Structural Connections of the Engineering Foundation.
 4. AISC 341, "Seismic Provisions for Steel Buildings".
 5. AWS D1.1 - "Structural Welding Code" - Steel.
 6. AWS D1.3 - "Structural Welding Code" - Sheet Steel.
 7. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
 8. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure."
1. Provide certification that welders to be employed in work have satisfactorily passed AWS D1.1 qualification tests and maintained a current certification. Current certification and/or continuity log shall be submitted and be available in the field.
 2. If re-certification of welders is required, retesting will be the Contractor's responsibility.
- C. Fabricator Qualifications: Fabricator must be a member of the American Institute of Steel Construction (AISC), be certified for SBD – Conventional Steel Building Structures, STD – Standard for Steel Building Structures. Provide AISC Certification Certificate with Bid. Fabricator shall be certified at time of bidding and for duration of project. Under no circumstances will this requirement be waived.

1.05 SUBMITTALS

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. INCOMPLETE SUBMITTALS WILL NOT BE REVIEWED.
- D. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.
- E. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

- F. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.
- G. Electronic Submittals:
1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
 2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
 3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
 4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.
 5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.
- H. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
1. Structural steel certified mill reports for each grade of steel covering chemical and physical properties and yield strengths.
 2. High-strength bolts (each type), including nuts and washers.
 3. Structural steel primer paint with compatibility statement per section 2.3 of this specification..
 4. Structural steel top coat paint with compatibility statement per section 2.3 of this specification. (Refer to Section 09 90 00.)
 5. AWS D1.1 Welder certifications.

6. Expansion/Adhesive Anchors (coordinate with section 03 30 00).
 - I. Fabricator's Quality Control Procedures: Fabricator shall submit their written procedural and quality control manuals, and evidence of periodic auditing of fabrication practices by an approved inspection Agency.
 - J. Fabricator's Certificate of Compliance: At completion of fabrication, fabricator shall submit a certificate of compliance stating that the work was performed in accordance with the construction documents.
 - K. Shop Drawings:
 1. Shop Drawing Review: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review.
 - a. Review of the shop drawings will be made for the size and arrangement of the members and strength of the connections. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.
 - b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings indicating all members, braced frames, moment frames and connections. Incomplete submittals will not be reviewed.
 2. Connection Design: Submit design calculations prepared and stamped by a Professional Engineer registered in the State of Maine for all beam and column connections not tabulated in the AISC "Manual of Steel Construction" (ASD or LRFD). Submit design for all building braced frames and moment frames where applicable, as indicated on design drawings. Connection designs shall be submitted prior to or with the Shop Drawing Submittal.
 - a. Fabricator and Erector are responsible to provide connections that meet the requirements of AISC standards. All shop and field welds, bolts, plates and miscellaneous components required to provide complete connection assemblies shall be provided.
 - b. Unless indicated otherwise, simple shear connections shall be provided for the full uniform load capacity of the beam for non-composite construction, and 1.5 times the full uniform load capacity of the beam for composite construction. All connections shall have a minimum of 2 bolts rows in the line of force, and no connection capacity shall be less than 10 kips (unfactored). A tabulation of the simple shear connections shall be provided with the connection submittal.
 - c. Braced frame & moment connections: A design force has been provided on the drawings.

- d. Braced frame connections shall be designed utilizing the Uniform Force Method, with a connection geometry that does not induce a moment on the connected beam or column.
 - e. To the greatest extent possible and where required herewithin, field welds shall be designed and detailed to be installed downhand.
3. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of test conducted and test results.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place, in ample time to not delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Steel materials shall be stored in a manner to avoid ponding of precipitation on members. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 MATERIALS:

- A. Structural Steel Shapes, Plates and Bars (U.N.O): ASTM A 36 minimum, higher strength steel is acceptable.
- B. Structural Steel Hot Rolled Wide Flange Shapes: ASTM A 992 Grade 50 (ASTM A572 Grade 50 with special requirements per AISC Technical Bulletin #3, dated March 1997)
- C. Steel Tube: ASTM A 500, Grade B, $F_y = 46$ ksi.
- D. Steel Pipe: ASTM A 53, Grade B.
- E. Anchor Bolts: ASTM F1554, Grade 36 weldable steel, unless noted otherwise on drawings. Anchor rods that are to be exposed to weather, located in unheated enclosures, or in contact with pressure treated lumber shall be hot dipped galvanized. All anchor bolts shall be headed or double nutted. "J" or "L" type anchor bolts are not permitted. Unless otherwise noted, specified embedment it to top face of head or nut.
- F. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts. Provide hexagonal heads and nuts for all connections.
- G. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A325 or ASTM A490. Refer to drawings for diameter.
 2. Direct tension indicator washers or bolts may be used at Contractor's option.
 3. Provide hot-dipped galvanized fasteners at relieving angles.
- H. Steel Shear Studs: Headed type manufactured from steel conforming to ASTM A108 Grade C1015 by KSM or Nelson. Refer to Drawings for diameter and length.
- I. Deformed Bar Anchors, manufactured by Nelson and attached to structural steel. Refer to drawings for diameter and length.
- J. Electrodes for Welding:
1. Minimum 70 ksi electrodes. Filler material shall meet the grouping requirements per AWS D1.1 Table 3.1 for matching strength of connected materials.
 2. All filler metal used welding shall meet the following Charpy V-Notch (CVN) requirements.
 - a. 20 ft-lb at 0 degrees Fahrenheit unless noted otherwise.
 - b. 20 ft-lb at -20 degrees Fahrenheit and 40 ft-lb at 70 degrees Fahrenheit at all complete joint penetration (CJP) groove welds.
- K. Structural Steel Coatings shall be as specified in the Structural Steel Coatings section of this specification, and as specified in Division 9.
- L. Steel Coatings for Exterior Exposed Steel: Except where indicated to be primed and painted, Hot Dipped Galvanized per ASTM A123/A123M (latest edition). Galvanizing shall be applied in a manner to provide Class C faying surfaces for slip critical connections. See Structural Steel Coatings section for additional requirements for galvanizing and painting.
- M. Non Shrink Cement-Based Grout: See Section 03 30 00
- N. Drilled Anchors: Expansion and adhesive by HILTI, SIMPSON or POWERS/RAWL as indicated on the drawings.

2.02 FABRICATION:

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings.
1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs and other defects.

- B. Connections: Weld or bolt shop connections, as indicated.
 - 1. Provide field bolted connections, except where welded connections or other connections are indicated.
 - 2. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
- C. High-Strength Bolted Connection: Install high-strength threaded fasteners in accordance with AISC "Specification for Structural Joints using ASTM A 325 or A 490 Bolts". Unless otherwise indicated, all bolted connections are to be tightened to the snug tight condition as defined by AISC.
- D. Welded Construction: Comply with AWS Codes for procedures, appearance and quality of welds, and methods used in correcting welding work.
- E. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.
- F. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
- G. Fabricator, Erector and General Contractor shall coordinate safety requirements for the project, in accordance with OSHA Part 1926. Provide all necessary pieces and fabrications as required to safely erect and access the structure for the duration of project construction.
- H. Camber, if any, is indicated on the drawings. Camber indicated is the required camber at time of erection. Contractor shall survey camber prior to placing metal deck.

2.03 STRUCTURAL STEEL COATINGS

- A. Coordinate coating requirements with the Architect, and with Division 9 of the specifications.
- B. General: Shop priming of structural steel is not required for heated, interior steel not exposed to view unless noted otherwise.
- C. Coatings: All exterior steel and/or steel permanently exposed to view, and as indicated in 09 90 00 and/or indicated in the Architectural Drawings shall receive a coating. Unless noted otherwise, refer to Division 9 specifications for products and surface preparation requirements.
- D. Steel which is to receive spray-on fireproofing shall not to be primed or painted, unless specified by the Architect.
- E. Unheated structural steel to be enclosed with architectural finishes, including but not by limitation, canopy members shall be primed with fabricator's rust inhibitive primer compatible with paint specified in section 09 90 00 and fireproofing indicated section 07 81 23 , unless noted otherwise. Follow manufacturer's instructions for surface preparation and application.
- F. To the greatest extent possible, structural steel coatings shall be shop applied.

- G. Ensure primers and surface preparations are compatible with finish systems as specified under section 09 90 00 – Painting and Coating, and fire protection as specified under sections 07 81 00 - Applied Fireproofing and 07 81 23 – Intumescent Mastic Fireproofing. Submit product data and statement of compatibility from manufacturer of each system
- H. Coordinate steel markings with coating system to eliminate “bleed through” on steel permanently exposed to view.
- I. Fabrication, galvanizing, priming and/or painting for structural steel permanently exposed to view shall meet the requirements of Section 10 of the Code of Standard Practice, “Architecturally Exposed Structural Steel”.
- J. Provide venting/drainage holes in closed tubular members to be hot-dipped galvanized. Holes shall be provided in a location hidden from view in the final condition and in a manner that will not reduce the strength of the member. Hole locations shall be clearly indicated on the Shop Drawings and are subject to review by the Architect.
- K. Follow manufacturer’s installation and safety instructions when applying coatings. Adhere to recoat time recommendations set forth by manufacturer.
- L. Brick masonry loose lintels and relieving angle assemblies, including fasteners, shall be hot dipped galvanized, unless noted otherwise on the Architectural Drawings. Complete all shop fabrication prior to galvanizing assemblies.
- M. Steel Embedded in Concrete/Below Grade: Steel which is embedded in concrete, below grade/slab level, or as otherwise indicated on the drawings, shall be field painted with cold-applied asphalt emulsion complying with ASTM D 1187. Paint embedded areas only. Do not paint surfaces which are to be welded until welding is complete.
- N. Field Touch-up: Touch-up all paint and galvanizing damage, including but not by limitation, damage caused during shipping, erection, construction damage, and field welded steel. See Division 9 specifications for additional requirements.

PART 3 EXECUTION

3.01 ERECTION:

- A. General: Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- B. Erection Procedures: Comply with “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- C. Surveys: Employ a Registered Land Surveyor to verify elevations of concrete bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect and Structural Engineer. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been approved by Structural Engineer of Record. Additional surveys required to verify out-of-alignment work and/or corrective work shall be performed at the contractor’s expense.

- D. Temporary Shoring and Bracing: This is the sole responsibility of the Contractor. Provide temporary shoring and bracing members with connections of sufficient strength to support imposed loads. Remove temporary members and connections when all permanent members are in place, and all final connections are made, including the floor and roof diaphragms. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds. Comply with OSHA Standard referenced previous. Retain the services of a Specialty Structural Engineer (Not the Engineer of Record) to design specialty shoring and bracing.
- E. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
1. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 2. Welding to anchor bolts for corrective measures is strictly prohibited without prior written approval from the Engineer.
- F. Setting Plates and Base Plates:
1. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations. Refer to division 3 of the project Specifications for anchor bolt installation requirements in concrete.
 2. Clean concrete bearing surfaces of bond-reducing materials. Clean bottom surface of setting and bearing plates.
 3. Set loose and attached base plates for structural members on wedges or other adjusting devices.
 4. Pack non-shrink grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure. For proprietary grout materials, comply with manufacturer's instructions.
- G. Concrete slabs that are part of elevated floors framing systems shall achieve 28-day design strength prior to the application of any superimposed loads such as curtain walls, masonry veneer, mechanical equipment and stairs. Additional testing beyond that specified in division 3 required to verify the concrete strength prior to application of superimposed loads shall be done at the Contractor's expense.
- H. When installing expansion bolts or adhesive anchors, the contractor shall take measures to avoid drilling or cutting any existing reinforcement or damaging adjacent concrete. Holes shall be blown clean with compressed air and/or cleaned per manufacturer's recommendations prior to the installation of anchors.
- I. Field Assembly:
1. Set structural frames accurately to lines and elevations indicated.
 2. Align, adjust, level and plumb members of complete frame in to the tolerances indicated in the AISC Code of Standard Practice and in accordance with OSHA regulations.

3. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly.
 4. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 5. Splice members only where indicated and accepted on shop drawings.
 6. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
 7. Composite shear studs / deformed bar anchors shall be installed using stud welding process with an appropriately sized insulating ferrule. Fillet welding of shear studs is not permitted. Ferrules shall be broken free from the shear studs and removed from the deck surface along with all other debris.
- J. Tolerances: Erection tolerances shall meet the "Code of Standard Practice" except as noted. Cumulative tolerances of framing elements shall not exceed the available tolerances of façade support systems to ensure and provide a plumb façade face.
- K. Coat columns, base plates, and brace elements encased in concrete and/or below grade with cold-applied asphalt emulsion. Coordinate coating with concrete work.
- L. Erection bolts: Remove erection bolts. On exposed welded construction and at all braced frame members fill holes with plug welds and grind smooth at exposed surface.
- M. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as accepted by the Engineer of Record. Finish gas-cut sections equal to a sheared appearance when permitted.
- N. Coating Damage: Touch up shop applied paint or galvanizing whenever damaged or bare. See "Coatings" sections for additional requirements.
- O. Field Cut Beam Web Penetrations:

1. Field cut beam web penetrations are not permitted without written approval from the Structural Engineer.
 2. Gas cutting torches are not permissible for cutting beam web penetrations without written approval from the Structural Engineer.
 3. Beams with field cut beam web penetrations may require reinforcement, subject to the evaluation by the Structural Engineer.
 4. The evaluation of field cut web penetrations by the Structural Engineers for Design-Build Subcontractors, including but not by limitation, Mechanical, Electrical, Plumbing and Sprinkler Subcontractors shall be compensated by the General Contractor or Design-Build Subcontractor.
 5. The cost of executing field cut web penetrations and the associated beam reinforcement for Design-Build Subcontractors, including but not by limitation, Mechanical, Electrical, Plumbing and Sprinkler Subcontractors shall be paid for by the General Contractor or Design-Build Subcontractor.
 6. Field cut beam web penetrations may not be permitted in certain locations, subject to the evaluation by the Structural Engineer.
- P. Welders shall have current evidence of passing and maintaining the AWS D1.1 Qualifications test available in the field.
- Q. Welding electrodes, welding process, minimum preheat and interpass temperatures shall be in accordance with AISC and AWS specifications. Any structural steel damaged in welding shall be replaced.
- R. Field Welded Moment Connections:
1. Backing materials for top and bottom flanges for field welded moment connections shall be removed, backgouge the weld root, and apply a reinforcing fillet weld.
 2. Where top flange steel backing materials are utilized, the backing may be left in place. In this case, the backing material shall be welded with a reinforcing fillet weld.

3.02 QUALITY CONTROL:

- A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the Contract Documents.
1. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor's quality control efforts in the field.
- B. Testing: Owner shall engage an Independent Testing Agency to inspect all high-strength bolted and welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.

1. Testing agency shall conduct tests and state in each report which specific connections were examined or tested, whether the connections comply with requirements, and specifically state any deviations therefrom.
2. Contractor shall provide access for testing agency to places where structural steel work is being fabricated, produced or erected so that required inspection and testing can be accomplished. Testing agency may inspect structural steel at plant before shipment. The Engineer, however, reserves the right, at any time before final acceptance, to reject material not complying with specified requirements.

C. Inspection Requirements (to be performed by the Independent Testing Agency):

1. Bolted Connections: Inspect all bolted connections in accordance with procedures outlined in the AISC "Specification for Structural Joints using ASTM A325 or A490 Bolts.
2. Snug Tight Bolted Connections:
 - a. The inspector shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is used to tighten all bolts.
 - b. If the inspector does not monitor the installation of bolts, he shall visually inspect the connection to determine that all plies of connected material have been drawn together and conduct tests on a sampling connection bolts to determine if they have been tightened to the snug tight condition. The test sample shall consist of 10% of the bolts in the connection, but not less than two bolts, selected at random. If more than 10% of the tested bolts fail the initial inspection, the engineer reserves the right to increase the number of bolts tested.
3. Slip Critical Bolted Connections:
 - a. The inspector shall monitor the calibration of torquing equipment and the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is used to tighten all bolts.
 - b. If the inspector does not monitor the calibration or installation procedures, he shall test all bolts in the affected connection using a manual torque wrench to assure that the required pretension has been reached.
4. Field Welded Connections: inspect and test during fabrication of structural steel assemblies, and during erection of structural steel all welded connections in accordance with procedures outline in AWS D1.1. Record types and location of defects found in work. Record work required and performed to correct deficiencies.
 - a. Certify welders and conduct inspections and tests as required. Submit welder certifications to Engineer of Record. Perform visual inspection of all welds. Primary and secondary welds, including fillet welds, full penetration welds, and deck puddle welds, applied in the field and/or shop, shall be visually inspected.

- b. Welds deemed questionable by visual inspection shall receive non-destructive testing. In addition, all partial and full penetration welds, and any other welds indicated on the drawings are to receive non-destructive testing. Non-destructive testing methods include the following:
 - 1. Radiographic Inspection (RT): ASTM E 94 and ASTM E 142; minimum quality level "2-2T".
 - 2. Ultrasonic Inspection (UT): ASTM E 164.
 - 3. Magnetic Particle (MT) inspection procedures may be utilized at the inspectors discretion in addition to RT or UT inspection. MT procedures shall not replace RT or UT procedures without permission from the Structural Engineer.
 - c. All welds deemed unacceptable shall be repaired and retested at the Contractor's expense.
- D. Composite Shear Studs/Deformed Bar Anchors:
- 1. Verify shear stud quantity and arrangement.
 - 2. Visually inspect stud weld. A weld less than 360 degrees is cause for further testing by bending to 15 degrees per item 2 below. Strike all studs with a 3 pound sledge hammer with moderates force. Studs shall make a ringing sound when struck with the hammer. If a stud or studs breaks free, or fails to make a ringing sound, further testing shall be performed per item 4.
 - 3. One stud in 100 shall be tested by bending to 15 degrees from vertical, and one stud in 200 shall be tested by bending to 30 degrees from vertical. Single bent studs may be left bent. Failure of stud weld during bend testing is cause for further testing per item 4.
 - 4. When failure occurs during bend testing, additional bend testing shall be performed on 10 studs to either side of failed stud. Bend studs to 30 degrees from vertical. If failure occurs during additional testing, continue testing in series of 10 studs beyond failed stud until no failure occurs.
 - 5. Straighten all studs that were bent in multiple stud testing. Replace all studs that fail.
- E. Inspector shall verify that all ferrules are removed when applicable and that metal deck is free of debris prior to concrete placement.
- F. Testing and inspection reports shall be submitted to the Owner, Architect and Engineer within 48 hours of completion of each test or inspection.
- G. Nonconforming Work: Contractor shall be responsible for correcting deficiencies in structural steel work which inspections laboratory test reports have indicated to be not in compliance with requirements. Additional tests and/or surveys shall be performed, at the Contractor's expense, as may be necessary to show compliance of corrected work. Any costs associated with the Engineer's review and disposition of faulty works shall be borne by the Contractor.

END OF SECTION

SECTION 05 20 00

OPEN WEB STEEL JOISTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this section whether or not such work is specifically mentioned in this section.
- C. Coordinate work with that of all trades affecting or affected by work of this section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

- A. Extent of steel joists is shown on drawings, including basic layout and type of joists required. Include composite shear studs for composite joists.
- B. Related work specified elsewhere:
 - 1. Section 05 12 00 - Structural Steel
 - 2. Section 05 30 00 - Metal Decking
 - 3. Section 05 50 00 - Metal Fabrications

1.03 QUALITY ASSURANCE:

- A. Codes and Standards:
 - 1. Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables- latest revisions-for:
 - a. K-Series Open Web Steel Joists as designated on the Contract Drawings.
 - b. LH/DLH Series Open Web Long Span Steel Joists as designated on the Contract Drawings.
 - c. Composite Steel Joist as designated on the Contract Drawings.
 - 2. Steel Joist Institute (SJI) Recommended Code of Standard Practice for Steel Joists and Joist Girders, latest revision.
 - 3. AWS D1.1 "Structural Welding Code" – Steel
 - 4. AWS D1.3 "Structural Welding Code" - Sheet Steel

5. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Qualification for Welding Work: Qualify welding processes and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure".
 1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
 2. If recertification of welders is required, retesting will be the Contractor's responsibility.

1.04 SUBMITTALS:

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. Incomplete submittals will not be reviewed.
- D. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.
- E. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- F. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.
- G. Electronic Submittals:
 1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
 2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.

3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
 4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.
 5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.
- H. Product Data: Submit manufacturer's specifications and installation instructions for each type of joist and accessories. Include manufacturer's certification that joists comply with SJI Standard Specifications. Product data shall include:
1. Joist steel component certified mill reports for each grade of steel covering chemical and physical properties and yield strengths.
 2. Steel joist primer paint with compatibility statement per section 2.1.D.2 of this specification.
 3. Welder certifications
- I. Shop Drawings:
1. Shop Drawing Review: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review.
 - a. Review of the shop drawings will be made for the size and arrangement of the members and strength of the connections. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.
 - b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings indicating all joist members, bridging, connections and accessories. Incomplete submittals will not be reviewed.
 2. Performance Design: Submit calculations composite joists and joists not uniformly loaded for review and approval. Performance Design shall be signed and sealed by an Engineer licensed in the State of Maine.

- a. Unless noted otherwise, steel joists shall be designed to support the uniformly distributed loads per the "Standard Load Tables" by the Steel Joist Institute. An allowance for MEP equipment and architectural component loads has been included in the uniformly distributed design loads. The joist design shall allow a 150 pound concentrated hanger load be applied at any location along either the top or bottom chord of the joists that is part of the MEP equipment and architectural component allowance, without additional reinforcement.
 - b. Calculations for SP joists: Submit design calculations for special steel joists indicated on Contract Drawings by SP designation, Joist Girders or as otherwise noted. Submit calculations stamped by a licensed Professional Engineer licensed to practice in the State of Maine. Design joists for the loads indicated on the Contract Drawings with a vertical deflection due to live load not exceeding: 1/360 of the span for floor joists, 1/360 of the span for roof joists where plaster ceiling is attached or suspended, and 1/240 of the span for all other roof joists. Concentrated loads applied to SP joists are to be applied as Live Loads unless otherwise indicated.
 - c. Calculations for Composite Joists: Submit design calculations for Composite Steel Joists indicated on Contract Drawings. Submit calculations stamped by a licensed Professional Engineer licensed to practice in the State of Maine. Design Composite Joists for the loads indicated on the Contract Drawings with a vertical deflection due to live load not exceeding: 1/480 of the span for floor joists unless otherwise noted.
3. Evidence of in-plant inspections: Per SJI requirements, each manufacturer shall verify his ability to manufacturer steel joists through periodic in-plant inspections. Inspections shall be performed by an independent testing agency. Submit evidence of participation in SJI in-plant inspections program.
 4. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of test conducted and test results.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- C. Deliver, store and handle steel joists as recommended in SJI Standard Specifications and SJI Technical Digest #9 "Handling and Erection of Steel Joists and Joist Girders". Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses. Protect joist members and packaged materials from corrosion and deterioration.

PART 2 PRODUCTS

2.01 MATERIALS:

- A. Steel: Comply with SJI Standard Specifications.
- B. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel
- C. High-Strength Bolts and Nuts: ASTM A325, Type I, heavy hex structural bolts, heavy hex nuts and hardened steel washers.
- D. Steel Primer Paint:
 - 1. Primer conforming to Steel Structures Painting Council Specification: SSPC-Paint 15 "Steel Joist Shop Primer", or a shop paint which meets the minimum performance requirements of SSPC-Paint 15. Primer shall also meet compatibility as indicated in item 2.
 - 2. Ensure primers and surface preparations are compatible with finish systems as specified under section 09 90 00 – Painting and Coating, and fire protection as specified under sections 07 81 00 - Applied Fireproofing and 07 81 23 – Intumescent Mastic Fireproofing. Submit product data and statement of compatibility from manufacturer of each system.

2.02 FABRICATION:

- A. General: Fabricate steel joists in accordance with SJI Standard Specifications.
- B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; deduct area of holes from the area of chord when calculating strength of member.
- C. Openings in Web: Coordinate openings in joist and joist girder webs to allow through passage of HVAC, sprinklers, etc. in locations shown on the drawings.
- D. Extended Ends: Provide extended ends on joists where shown and where deck extends beyond supports, complying with manufacturer's standards and requirements of applicable SJI Standard Specifications and Load Tables. Unless noted otherwise, "R" type extended ends shall be utilized.
- E. Uplift: Roof joists shall be designed for a net uplift of 15 psf.
- F. Camber: Camber in accordance with SJI Standard Specifications. Joists shall not be manufactured with negative camber.
- G. Bridging:
 - 1. Provide horizontal or diagonal type bridging for "open web" joists, complying with SJI Standard Specifications and any additional requirements shown on Contract Drawings. Bridging layout shall be clearly indicated on the shop drawings.

2. Provide bridging anchors for ends of bridging lines terminating at walls or beams.
 3. Provide bottom chord bridging for uplift, in accordance with SJI Standard Specifications, and SJI Technical Digest #6 "Structural Design of Steel Roof Joists to Resist Uplift Loads" when the above noted uplift load is greater than zero.
- H. End Anchorage: Provide end anchorages to secure joists to adjacent construction, complying with SJI Standard Specifications, unless otherwise indicated. Roof joists shall be anchored to resist the above noted uplift force.
1. Minimum final connection each side of joist seat, unless noted otherwise, shall be as follows:
 - a. "K" Joists: 2 inches, 1/8" fillet weld or (2) 1/2" diameter A307 Bolts
 - b. "LH" Joists: 2 inches, 1/4" fillet weld, or (2) 3/4" diameter A325 Bolts (slip critical)
 - c. Composite Joists: 2 inches, 1/4" fillet weld, or (2) 3/4" diameter A325 Bolts (slip critical)
- I. Shop Painting:
1. Remove loose scale, heavy rust and other foreign materials from fabricated joists and accessories before application of shop paint in accordance with SSPC-SP 1 and SSPC-SP 2.
 2. Apply one shop coat of primer paint, SSPC-Paint 15, or better, to steel joists 2.0 to 3.0 mils DFT (dry film thickness) measurement in accordance with SSPC-PA 2.

PART 3 EXECUTION

3.01 ERECTION:

- A. General: Place and secure steel joists in accordance with SJI Standard Specifications, final shop drawings, and as herein specified. Comply with "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Placing Joists:
1. Do not start placement of steel joists until supporting work is in place and secured.
 2. Place joists on supporting work, adjust and align in accurate location and spacing before permanently fastening.
 3. Provide temporary bridging, connections and anchors to ensure lateral stability during construction.

- C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.
- D. Fastening:
 - 1. Joist at column lines and joist 40 feet and longer shall be bolted with a minimum (2) A325 bolts in a slip critical type connection per SJI and OSHA requirements. Stabilizer plates welded to the columns shall be provided at the bottom chord angles at all column lines. Do not weld bottom chord angles to stabilizer plate unless noted otherwise.
 - 2. Field weld joists to supporting steel framework in accordance with SJI Standard Specifications for type of joists used. Coordinate welding sequence and procedure with placing of joists.
 - 3. Bolt joists to supporting steel framework in accordance with SJI Standard Specifications for type of joists used.
- E. Reinforcement for Concentrated Loads: Reinforcing angles shall be applied for concentrated loads in excess of 150 pounds applied to joists. The reinforcing angles shall transfer the concentrated loads to a joist panel point. Unless noted otherwise, hung elements shall be attached to the joist top chords. Hangers and hanger accessories shall be designed by a Specialty Structural Engineer licensed in the State of Maine (Not the Engineer of Record).
- F. Touch-up painting: Clean field welds, bolted connections, and abraded areas, and apply same type of primer paint as used in shop.

3.02 QUALITY CONTROL:

- A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the Contract Documents.
- B. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor's quality control efforts in the field.
- C. Testing: Owner shall engage an Independent Testing Agency to inspect all puddle welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.
- D. Joist Inspection Requirements (to be performed by the Independent Testing Agency):
- E. Testing:
 - 1. Joist connections, bringing connections and field splices shall be tested as indicated in specification section 05120. Work found to be defective will be removed and replaced at the Contractor's expense.

2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests. If re-certification of welders is required, re-testing will be the Contractor's responsibility.

END OF SECTION

SECTION 05 30 00

METAL DECKING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

- A. Extent of metal floor and roof deck is shown on the drawings and includes type VL composite floor deck, roof deck, acoustic roof deck, cell closures, end plates, pour stops with vertical leg return lip, metal lath column closures, composite finish strips, welding washers and sump plates or pans.

1.03 RELATED WORK

- 1. Section 05 12 00 - Structural Steel
- 2. Section 05 20 00 – Open Web Steel Joists
- 3. Section 05 50 00 - Metal Fabrications

1.04 QUALITY STANDARDS

- A. Codes and Standards: Comply with provisions of the following codes and standards, except where more stringent requirements are indicated or specified:
 - 1. AISI "Specification for the Design of Cold Formed Steel Structural Members".
 - 2. AWS D1.1 "Structural Welding Code" - Steel
 - 3. AWS D1.3 "Structural Welding Code" - Sheet Steel
 - 4. Steel Deck Institute (SDI) " Design Manual for Floor Decks and Roof Decks".
 - 5. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Qualification of field welding: Qualify welding process and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure."

1.05 SUBMITTALS

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. Incomplete submittals will not be reviewed.
- D. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.
- E. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- F. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.
- G. Electronic Submittals:
 - 1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
 - 2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
 - 3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
 - 4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.

5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

H. Product Data:

1. Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.
2. Paint & galvanizing compatibility statement: Submit compatibility statement per section 2.1.C & D of this specification.

I. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings **will not** be provided to the contractor for preparation of shop drawings.
 - a. Submit detailed drawings showing layout and types of deck panels, galvanizing, shop paint, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing, and all other accessories. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.
 - b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings. Incomplete submittals will not be reviewed.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Store materials to permit easy access for inspection and identification. Keep deck sheets off ground, using pallets, platforms, or other supports. Protect deck sheets and packaged materials from corrosion and deterioration.
- C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Materials shall be stored in a manner to avoid ponding of precipitation on members. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 GENERAL:

- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
1. United Steel Deck
 2. Wheeling Corrugating Co.
 3. Epic Metals Corporation
 4. Vulcraft
- B. Materials:
1. Steel for Metal Deck Units:
 - a. Floor Deck Units: ASTM A1008, Grade C, D or ASTM A653, Structural Quality, grade 40 or higher
 - b. Roof Deck Units: ASTM A1008, Grade C, D, or E, or ASTM A653, Structural Quality, grade 33 or higher.
 2. Miscellaneous Steel Shapes: ASTM A36 minimum.
 3. Sheet metal Accessories: ASTM A526, commercial quality, galvanized.
- C. Galvanizing: Conform to ASTM 924-94 with minimum coating class of G60 (Z180) as defined in ASTM A653-94. Ensure galvanizing surface preparations is compatible with finish systems as specified under section 09 90 00 – Painting and Coating, and fire protection as specified under sections 07 81 00 - Applied Fireproofing and 07 81 23 – Intumescent Mastic Fireproofing.
- D. Paint: Manufacturer's baked on, rust inhibitive paint, for application to metal surfaces which have been chemically cleaned and phosphate chemical treated. Ensure primers and surface preparations are compatible with finish systems as specified under section 09 90 00 – Painting and Coating, and fire protection as specified under sections 07 81 00 - Applied Fireproofing and 07 81 23 – Intumescent Mastic Fireproofing.
- E. Flexible closure Strips: Manufacturer standard vulcanized, closed-cell, synthetic rubber.
- F. Acoustic Inserts: Inert, non-organic glass fiber batts to be placed in rib openings.

2.02 FABRICATION:

- A. General: Form deck units in lengths to span 3 or more supports, unless otherwise noted on the drawings, with flush, telescoped or nested 2" laps at ends and interlocking or nested side laps, unless otherwise indicated. For roof deck units, provide deck configurations complying with SDI "Roof Deck Specifications," of metal thickness, depth and width as shown.

- B. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6" wide.
- C. Metal Closure Strips: Fabricate metal closure strips, cell closures, "Z" closures, column closures, pour stops, girder fillers and openings between decking and other construction, of not less than 0.045" min. (18 gage) sheet steel or as indicated on the drawings. Form to provide tight fitting closures at open ends of cells or flutes and sides of decking.
- D. Pour Stops: Minimum material thickness shall be 18 gage or as indicate on drawings.. Fabricate vertical leg to accommodate specified slab thickness. Fabricate horizontal leg to minimize field cuts. Provide welded attachment sufficient to resist forces during concrete placement.
- E. Roof Sump Pans: Fabricate from a single piece of 0.071" min. (14 gage) galvanized sheet steel with level bottoms and sloping sides to direct water flow to the drains, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3" wide. Recess pans not less than 1 1/2" below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.
- F. Acoustic perforations: Where indicated, provide acoustic perforations in vertical webs for sound reduction; perforations shall not have an effect on load carrying properties of decking.
- G. Provide all pour stops and accessories necessary to contain concrete for poured concrete surfaces.

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before permanently fastened. Deck shall be in full contact with members parallel to ribs and attached as indicated. Do not stretch or contact side lap interlocks.
- C. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.
- D. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
- E. Coordinate and cooperate with the structural steel erector in locating decking bundles to prevent overloading of structural members.
- F. Do not use decking units for storage or working platforms until permanently installed.

3.02 FASTENING:

- A. Floor Deck: Fasten metal deck to supporting steel members as indicated on the Design Drawings: Each deck is to be fastened with a minimum of 5/8" diameter puddle welds spaced not more than 12" o.c. with a minimum of 2 welds per unit at each support. Secure deck units at 6" oc along brace lines, edge of building or at the edge of openings or deck discontinuity. Secure deck to each supporting member in ribs where sidelaps occur. Use welding washers where recommended by the deck manufacturer. Deck units shall bear over the ends of supports by a minimum of 1.5. Sidelaps: #10 Tek screws, 5/8" arc puddle welds or 1" long fillet welds, intervals not exceeding 36 inches. Crimped or button punched sidelaps are not permitted.
- B. Roof Deck: Each deck is to be fastened with a minimum of 5/8" diameter puddle welds spaced in a 24/4 pattern (3N deck) or 36/7 pattern (1.5B deck) with a minimum of 2 welds per unit at each support if incomplete sheet is utilized. Where support is parallel to support, at edge of building, at brace lines, at edge of opening or deck discontinuity provide puddle welds at 6" o.c. Secure deck to each supporting member in ribs where sidelaps occur. Deck units shall bear over the ends of supports by a minimum of 1.5". Sidelaps: #10 Tek screws, 6 per span for B deck, 10 per span for N deck.
- C. Welding: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Uplift loading: Floor deck units are not required to resist uplift loads. Decking units used at the roof level shall be designed for a net uplift of 15 psf.
- E. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.
- F. Reinforcement at openings: Provide additional metal reinforcement and closures pieces as required for strength, continuity of decking and support of other work shown.
1. Deck penetrations affecting no more than (1) deck rib need not be reinforced.
 2. For deck penetration affecting more than (1) deck rib, but less than 10", reinforce the opening with a 0.057" thick plate spanning between unaffected ribs, unless otherwise shown on the Design Drawings or supporting a piece of mechanical equipment (see item 3).
 3. Reinforce deck penetrations larger than 10" with the structural frame described in the Design Drawings.
- G. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units.
- H. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12" on center with at least 1 weld in each corner. Cut opening in roof sump bottom to accommodate drain size indicated.
- I. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking, and in voids between decking and other construction. Weld into position to provide a complete decking installation.
- J. Touch-Up Painting:

1. Painted Deck: After decking installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.
 - a. Touch up painted surfaces with same type paint used on adjacent surfaces.
 - b. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.03 QUALITY CONTROL:

- A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the Contract Documents.
- B. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor's quality control efforts in the field.
- C. Testing: Owner shall engage an Independent Testing Agency to inspect all puddle welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.
- D. Deck Testing Requirements (to be performed by the Independent Testing Agency):
 1. Deck and accessory welding and/or attachments subject to inspection and testing. Work found to be defective will be removed and replaced at the Contractor's expense.
 2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests. If re-certification of welders is required, re-testing will be the Contractor's responsibility.

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING
(Trade Bid Required)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud exterior wall framing.
- B. Exterior wall sheathing.

1.02 RELATED REQUIREMENTS

- A. Section 1-B – School Bid Depository Conditions and Regulations
- B. Section 05 12 00 - Structural Steel Framing.
- C. Section 04 20 00 - Unit Masonry: Veneer masonry supported by CFMF stud wall.
- D. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking.
- E. Section 07 25 00 - Weather Barriers: Weather barrier over sheathing.
- F. Section 07 42 13 - Metal Wall Panels: Minimum CFMF requirements for load support of metal/phenolic wall panel and associated subgirt systems provided under Section 07 42 13.
- G. Section 09 21 16 - Gypsum Board Assemblies: Interior metal stud partition, soffit and ceiling framing.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ANSI S200 - North American Standard for Cold-Formed Steel Framing - General Provisions.
- C. ANSI S211 - North American Standard for Cold-Formed Steel Framing-Wall Stud Design.
- D. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- E. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- F. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic-Coated and Non-metallic-Coated for Cold-Formed Framing Members; 2005.
- G. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 inch to 0.112 inch in Thickness; 2004.
- H. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a.
- I. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2004.
- J. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2008.
- K. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other Sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors and subgirt systems, utilities, insulation, weatherbarriers and firestopping.

- B. Trade Bids for work under this Section shall be for the complete work of this Section and shall be filed under the provisions and requirements specified under Division 01 – General Requirements.
 - 1. Special attention is directed to Section 1-B – School Bid Depository Conditions and Regulations and all Sections within Division 01 – General requirements which are hereby made a part of this Section of the Specifications.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on standard framing members and fasteners; describe materials and finish, product criteria, limitations.
 - 1. Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- C. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, and type and location of fasteners, and accessories or items required of related work. All shop drawings shall bear the seal of the licensed structural engineer employed by the CFMF subcontractor, licensed in Maine.
 - 1. Indicate stud layout.
 - 2. Describe method for securing studs to tracks and for bolted framing connections.
 - 3. Provide design engineer's stamp on shop drawings.
 - 4. Provide calculations for loadings and stresses of all framing that bear the seal of the licensed structural engineer employed by the CFMF subcontractor and licensed in Maine.
 - a. Submit record copy of loads and reactions provided under Section 07 42 13 for metal/phenolic wall panel and associated subgirt systems with this submission. Purpose of submission is to show CFMF coordination for support of such loads has been provided.
- D. Samples: Upon request, submit samples of materials specified herein.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Maine.
- B. Manufacturer Qualifications:
 - 1. Company specializing in manufacturing the types of products specified in this Section, and with minimum fifteen years of documented experience.
 - 2. Member in good standing of the Steel Framing Industry Association. Products shall be certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98 IAS Accreditation Criteria for Inspection Agencies.
- C. Installer Qualifications: Company specializing in performing the work of this Section with minimum five years of experience.

1.07 MOCK-UPS

- A. Provide metal stud framing for exterior wall mock-up(s) specified in Section 04 20 00 - Unit Masonry and Section 07 42 13 - Metal Wall Panels.
 - 1. Mock-up panel(s) shall demonstrate actual wall construction, detailing and workmanship.
 - 2. No work shall progress until the Architect has reviewed the mock-up panel(s). Panel(s) shall be revised as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all related exterior wall work.
 - 3. Mock-up panel(s) shall not be destroyed or moved until the Work is complete and accepted by the Architect. Upon completion of construction, mock-up panel(s) shall be removed.

1.08 PRE-INSTALLATION MEETING

- A. At least two weeks prior to start of installation of metal framing systems, meet at project site with installers of other work including door and window frames and mechanical and electrical

work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Protect and store metal framing units from rusting and damage in accordance with AISI Code of Standard Practice. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type, and grade. Store off ground in a dry ventilated space or protect with suitable waterproof covering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing:
 - 1. Dietrich Metal Framing.
 - 2. Marino\Ware.
 - 3. EB Metals.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Design Criteria: Provide completed framing system having the following characteristics:
 - 1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S-100 North American Specification for the Design of Cold-Formed Steel Structural Members.
 - 2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
 - 3. Design Loads: In accordance with applicable codes and/or as specified on the Structural Drawings.
 - a. Where requirements conflict the contractor shall adhere to the more stringent requirement.
 - 4. Live load deflection meeting the following, unless otherwise indicated:
 - a. Horizontal Deflection: Design to permit maximum deflection of 1/720 of span of framing supporting masonry veneer exterior walls.
 - b. Horizontal Deflection: Design to permit maximum deflection of 1/360 of span for exterior siding finish.
 - c. Vertical Deflection: Design framing to accommodate deflection of the structural steel framing members.
 - 5. Provide industry standard safety factors as suited to specific job conditions.
 - 6. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 7. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM A1003 sheet steel, structural grade, Type H; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Thickness: As required to meet specified performance levels, but in no case less than 43 mils thickness.
 - 2. To the extent that component types and thicknesses are indicated in the Construction Documents, they shall be considered minimum requirements to be verified and increased (but not decreased) as determined to be necessary by the fabricator's engineer. Framing

- member depths indicated on the Drawings shall not be altered without the Architect's prior written authorization.
3. Stud spacing shall not exceed 16 inches on center.
 4. Galvanized in accordance with ASTM A653 G60/Z180 coating.
 - a. Provide galvanizing in accordance with ASTM A653 G690/Z275 coating at the following locations: Locker Room F131, Locker Room F135, Locker Room F141 and Locker Room F145.
- B. Framing Connectors: Factory-made formed steel sheet, ASTM A653 SS Grade 50, with factory punched holes.
1. Material: ASTM A653 SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for thicknesses less than 10 gage (0.118 inch), and factory punched holes and slots.
 2. Coating: G90/Z275 hot dipped galvanized coating.
 3. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 4. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
 - a. Where continuous studs bypass elevated floor slab, connect stud to slab in manner allowing vertical movement of slab without affecting studs; allow for minimum movement of 1 inch as indicated on the Drawings.
 - b. Where top of stud wall terminates below structural floor or roof, connect studs to primary structure in manner allowing vertical movement of slab without affecting studs; allow for minimum movement of 1 inch. Studs connecting to secondary structure (bar joist) allow for minimum movement of 1-5/8 inch.
 - c. Manufacturers:
 - 1) Dietrich
 - 2) Superstud
 - 3) Simpson Strong Tie
 5. Channel Bridging and Bracing: U-channel; minimum 0.0538" thickness; minimum 0.5" wide flanges; depth as indicated or required.
 6. Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, gusset plates, and stiffeners.

2.04 WALL SHEATHING

- A. Wall Sheathing: Glass mat faced gypsum; ASTM C1177, square long edges, 5/8 inch Type X fire-resistant.
1. Products:
 - a. DensGlass Gold by Georgia-Pacific.
 - b. Fiberock Sheathing with Aqua-Tough by USG.
 - c. GlasRoc Sheathing Type X by Certainteed - BPB America Inc.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Plates, Gussets, Clips: Formed Sheet Steel, thickness determined for conditions encountered; finish to match framing components.
- C. Clips (For securing head tracks to structural components intended to receive sprayed-on fireproofing): Galvanized steel, depth as required for thicknesses of fireproofing, size and thickness as determined by CFMF system engineering.

- D. Sill Gaskets: Continuous 1/4" thickness closed cell foam from continuous rolls, for use under CFMF tracks on concrete at building perimeters.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of Authorities Having Jurisdiction.

2.06 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Size, type, penetration and spacing shall be in strict accordance with the CFMF contractor's engineered design requirements.
 - 1. Coating: Corrosion resistant, high performance polymer complying with ASTM B117; salt spray test result of no rust or other base metal corrosion after a minimum of 800 hours.
- B. Anchorage Devices: Powder actuated. Welding is NOT allowed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Install sill gaskets continuously on perimeter concrete surfaces, prior to track installation.
- C. Install continuous tracks sized to match studs. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Provide fasteners at corners and ends of tracks. Coordinate installation of sealant with floor and ceiling tracks.
- D. Place studs plumb, at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- E. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- F. Abutting Structure: Where stud system abuts structural column or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
- G. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- H. Install load bearing studs, brace, and reinforce to develop full strength and achieve design requirements.
- I. Wall Openings: Frame wall opening larger than 2 feet square with additional studs (2 minimum) at each jamb of frame as required by the engineered design. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes and space jack studs same as full-height studs of wall.
- J. Install intermediate studs above and below openings to align with wall stud spacing.
- K. Secure studs to top and bottom runner tracks by screw fastening at both flanges. Provide deflection head track directly below horizontal building framing at non-load bearing framing.
- L. Supplementary Framing: Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the walls or partitions. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations, engineering and industry standards in each case, considering weight or loading requirements resulting from item supported.
- M. Attach cross studs to studs for attachment of fixtures anchored to walls.

- N. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- O. Touch-up damaged galvanized surfaces with primer.

3.03 WALL SHEATHING

- A. General: Inspect materials to which gypsum sheathing is to be applied. Remedy all defects prior to installation of sheathing. Provide additional studs and bracing if required to secure sheathing at outside corners.
- B. Wall Sheathing: Cut sheathing by scoring or sawing. Gypsum sheathing shall be fitted tightly to abutting sheathing. All joints shall be closed tight. Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.
 - 1. Coordinate sheathing installation with requirements of the air barrier system. If gaps in sheathing exceed requirements of Section 07 25 00 - Weather Barriers, they shall be taped.
- C. Sheathing shall be held in firm contact with substrate while fasteners are being driven. Sheathing shall be fastened as determined and detailed by the engineered design. Unless otherwise indicated, space fasteners a maximum of 8 inches o.c. around perimeter and in field at framing locations. Care shall be taken not to break sheathing face while driving fasteners.
- D. Fastening Sheathing: Gypsum board at exterior walls may be an integral part of the structural lateral stud bracing of the masonry veneer. Coordinate with the requirements of the engineered design.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for general requirements for testing and inspections.
- B. Testing and inspection shall be performed by the Owner's Testing Agency as identified in the Statement of Special Inspections.
- C. If work is found not to conform to the Construction Documents, the Contractor shall be responsible for the cost of all further testing.

3.05 TOLERANCES

- A. Maximum Variation from True Position: 1/8 inch per 10'.
- B. Maximum Variation of any Member from Plane: 1/8 inch per 10'.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated miscellaneous steel and aluminum items, including but not limited to:
 - 1. Frames, brackets and supports for:
 - a. Overhead coiling grilles and doors, not provided by others.
 - b. Overhead sectional doors.
 - c. Part-height partition braces.
 - d. Metal Grilles.
 - e. Welding bench leg frames.
 - f. Supports for hardware, mechanical equipment, electrical equipment, athletic equipment, theatrical equipment, and other items as indicated or required.
 - 2. Loose lintels not furnished under Section 05 12 00 - Structural Steel.
 - 3. Bollards.
 - 4. Pit covers and frames, elevator sill supports and pit ladders.
 - 5. Decorative metal perforated panels with sub-frame support.
- B. Prefabricated ladders.
- C. Factory fabricated abrasive nosings for exterior concrete stairs.
- D. It shall be a requirement of the Work of the Section to thoroughly review all of the Construction Documents and provide any and all miscellaneous metal fabrications required for a complete and proper job.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 05 12 00 - Structural Steel.
- D. Section 05 51 00 - Metal Stairs.
- E. Section 07 81 00 – Applied Fireproofing: Compatibility of fireproofing systems with primers included in this Section, where applicable.
- F. Section 07 81 23 – Intumescent Mastic Fireproofing: Compatibility of fireproofing systems with primers included in this Section, where applicable.
- G. Section 08 36 00 - Overhead Doors
- H. Section 09 90 00 - Painting and Coating: Compatibility of paint finish systems with primers included in this Section, where applicable.
- I. Section 11 61 00 - Theatre and Stage Equipment
- J. Section 14 20 10 - Passenger Elevators.

1.03 REFERENCE STANDARDS

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.
- B. ASTM A36 - Standard Specification for Carbon Structural Steel; 2008.
- C. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- D. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.

- E. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- F. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2012.
- G. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- H. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2010a.
- I. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- J. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2012.
- K. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2012e1.
- L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- M. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2010.
- N. AWS D1.2 - Structural Welding Code - Aluminum; American Welding Society; 2008.
- O. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- P. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).
- Q. SSPC-SP; Society for Protective Coatings; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit for manufactured products specified herein.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Submit lintel fabrication schedule including location, type, size, length and finish (primed or galvanized coating class).
- D. Certifications:
 - 1. Submit seismic analysis certification sealed and signed by a registered professional structural engineer in the State in which the Project is located, that all equipment stands, frames, and supports comply with applicable codes.
 - 2. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
 - 3. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.
 - 4. Submit documentation of steel fabricator's in-plant special inspections program including registration of special inspections program, written procedural and quality control manuals and evidence of periodic auditing of fabrication practices by an approved inspection agency.
- E. Samples: Submit samples representative of materials and finished products as may be requested by the Architect.

1.05 QUALITY ASSURANCE

- A. Fabricator's Qualifications: Only fabricators that maintain an agreement with an approved independent inspection or quality control agency to conduct periodic in-plant inspections at the fabricator's plant, at a frequency that will assure the fabricator's conformance to the requirements of the inspection agency's approved quality control program will be approved for this project.

- B. Design equipment supports under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- C. Welding Standards: Comply with applicable provisions of ASW D1.1 "Structural Welding Code - Steel" and ASW D1.3 "Structural Welding Code - Sheet Steel".

1.06 PRODUCT HANDLING

- A. Delivery of Materials: Deliver, store and handle components in such a manner as to prevent damage to finished surfaces.
- B. Storage of Materials: Store components in a dry, clean location, away from uncured masonry and concrete. Cover with tarpaulin or polyethylene sheeting.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36.
- B. Steel Tubing: ASTM A500, Grade B cold-formed structural tubing.
- C. Plates: ASTM A283.
- D. Pipe: ASTM A 53, Grade B Schedule 40, black finish.
- E. Slotted Channel Framing: ASTM A653 Grade 33, electro-galvanized steel metal channel framing and ASTM A1011 channel fittings system
 - 1. Engineered, fabricated and installed by the manufacturer's authorized installer with a minimum of five (5) years of experience.
 - 2. Field inspection to verify job conditions, dimensions and suitability of primary structure to receive channel framing.
 - 3. Engineering of all channel framing, attachments between framing members, attachments between framing systems and building structure, and anchor points to receive attachments by the manufacturer of the building material or equivalent to be supported by the channel framing systems.
 - 4. Coordination of framing load capacity and anchor point types and locations with the requirements of the related material or equipment manufacturer.
 - 5. Submission of structural calculations including, but not limited to design criteria, stress and deflection analysis and selected framing, fittings and anchors prepared by a professional structural engineer licensed in the State of Maine.
 - 6. Manufacturer: Unistrut Corp.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Perforated Plate:
 - 1. Type 1 - Steel, 0.063 gauge, ¼ inch square on ¾ inch; straight centers, square perforation; open area 11%. drilled for screw holes on all 4 edges of each plate.
 - a. Plate Edges: Fabricated with non-perforated solid edges, min. 1/2"wide, all 4 sides with screw holes 12" oc. All edges smooth with no burrs or sharp edges.
 - b. Finish: Degreased and shop primed for field finish.
 - c. Application: Wall opening grilles with concealed angle frames, where indicated on the Drawings.
 - d. Product: Perforated Metal – Square Plate by McNichols.
 - 2. Type 2 – Aluminum Type 5052-H32, 0.032 gauge, ¼ inch square on ¾ inch; straight centers, square perforation; open area 11%.
 - a. Plate Edges: Fabricated with non-perforated solid edges, min. 1 1/4"wide, all 4 sides. All edges smooth with no burrs or sharp edges.
 - b. Perimeter Angle and Subgirt System: Provide a 1 inch x 1 1/2 inch continuous perimeter angle (all 4 sides) predrilled for screw holes at 12 inch on center. Subgirt system shall be mounted to the interior side (concealed from exterior view). 2 inch x 1 inch legs @ 12 inches on center horizontal & vertical grid

- providing structural support for panel spans and prohibit oil canning of the sheet face. Perimeter angles, subgirt system and sheet panels to be fully welded.
- c. Finish: Class I natural Anodized to match curtain wall systems specified in Section 08 44 13.
 - d. Application: Curtain Wall infill panels (Interior Side), locations indicated on the Drawings.
 - e. Coordination:
 - 1) Coordinate attachment details with curtain wall manufacturer.
 - 2) Accommodate curtain wall movement per manufacturer requirements.
 - 3) Field verify dimensions prior to fabrication.
 - 4) Provide written confirmation of coordination to Architect for record. Include curtain wall manufacturer approval of attachment details and movement requirements. Curtain wall manufacturer to provide written documentation that all warranties are maintained valid per specification.
 - f. Product: Perforated Metal – Square Plate by McNichols.
- G. Fasteners: ASTM B33, Class FE/An 25 for electro-plated zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
- 1. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.
 - 2. Machine Screws: ANSI B18.6.3.
 - 3. Lag Bolts: ANSI B18.2.1.
 - 4. Expansion Anchors: Carbon steel components zinc-plated to comply with ASTM B633.
- H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- J. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B221, 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209, 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210, 6063 alloy, T6 temper.
- D. Aluminum-Alloy Bars: ASTM B211, 6061 alloy, T6 temper.
- E. Bolts, Nuts, and Washers: Stainless steel.
- F. Welding Materials: AWS D1.2; type required for materials being welded.

2.03 FABRICATION

- A. NOTE: It is the Owner's intent to use energy conserving, environmentally friendly materials to the greatest extent practical. The Contractor is therefore encouraged to use recycled steel products.
- B. Metal fabrications shall be standard approved products, fabricated in accordance with best shop practices and, wherever possible, shop assembled, ready for erection.
- C. Metals shall be free from defects impairing strength, durability, or appearance and shall be best commercial quality for purposes specified. Metals shall be made with structural properties, to safely sustain and withstand strains, stresses, to which they will be normally subjected.
- D. Fit and shop assemble items in largest practical sections, for delivery to site.
- E. Fabricate items with joints tightly fitted and secured.
- F. Continuously seal joined members by continuous welds.
- G. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

- H. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- I. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

- A. Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated that are not a part of structural steel scope as required to complete the Work. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent construction. Fabricate from steel shapes, plates, and steel bars of welded construction using mitered joints for field connections. Cut, drill, and tap units to receive hardware, hangers, and similar items. Equip units with integrally welded anchors for casting into concrete or building into masonry.
 - 1. Part-height Stud Partition Posts: Support frame and post assembly shall be completely concealed within the wall partition. Posts shall be fabricated for attachment of adjacent metal studs, with welded baseplates and holes for expansion bolting to concrete floor slabs. Partition heights shall be as indicated on the Drawings. Framing shall support all partition loads as indicated in Section 09 21 16 - Gypsum Board Assemblies.
 - 2. Door Frames for Overhead Door Openings: Channel sections; galvanized finish
 - 3. Part-height Dowel Anchors: Support plate and dowel assembly shall be completely concealed and sandwiched within the millwork. Plates shall be fabricated for attachment of adjacent millwork panels, with welded dowel leg for chemical embedment into concrete slabs. Plate and millwork details shall be as indicated on the Drawings.
 - a. Plate Thickness: 3/4 inches, minimum.
 - b. Plate Height: 6 inches, minimum.
 - c. Dowel Length: 3 inches, minimum.
- B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
 - 1. Unless otherwise indicated on the Drawings, bollards shall be six (6) inches diameter galvanized Schedule 40 steel pipe and shall be not less than 3'-6" exposed above finish grade.
 - 2. At bollards to be set in-ground, fill bollards with concrete and set a minimum of 3'-0" into the ground; round concrete at cap.
- C. Pit Covers and Frames:
 - 1. Unless otherwise indicated on the Drawings, steel pit covers shall be 1/4" thick galvanized steel checkerplate. Frames shall be appropriately sized galvanized steel angles with suitable stops and anchoring devices.
- D. Abrasive Nosings: For exterior concrete stairs; abrasive-surfaced, cross-hatched, cast iron nosings, 3" wide with integral cast anchors.
 - 1. Product: Style 801 by American Safety Tread.
- E. Metal Grilles: Fabricate 4 sided steel angle frames for securement in wall openings behind face perforated grille. Grille fasteners shall be of type and location visually suitable for exposed condition. Materials shall be field finish painted.
- F. Welding Bench Leg Frames: Fabricate angle counter support frames, 36 inches on center, for attachment to countertops and wall, welded to 2" x 2" steel tubular legs with base flanges to anchor to floor.
- G. Loose Steel Lintels
 - 1. Loose lintels shall be fabricated from A-36 steel from angles, shapes and masonry anchors of size and type scheduled for openings in masonry walls, unless otherwise indicated on the Drawings.
 - 2. Provide not less than eight (8") inches bearing at each side of openings, unless otherwise indicated. Under no circumstances shall bearing (each end) be less than one (1") inch per foot of span.

3. Loose lintels, unless specifically otherwise noted, shall be installed with long legs vertical.
4. All exterior wall lintels shall be hot-dipped galvanized after fabrication. Back-to-back lintels shall have exposed seams continuously welded and ground smooth prior to galvanizing.
5. Lintels shall be required over all openings in masonry walls, including openings required for all other trades (i.e. mechanical and electrical equipment and ductwork, etc.), except where CMU lintels are otherwise scheduled or detailed.
6. Loose Steel Lintel Schedule:

Max. Masonry Openings	Wall Thickness 4 Inch Walls	Wall Thickness 6 Inch Walls
2' - 0" (& under)	1L 3-1/2 x 3-1/2 x 1/4	2Ls 3-1/2 x 2-1/2 x 1/4
3' - 0"	"	"
4' - 0"	1L 4 x 3-1/2 x 1/4"	
5' - 0"	"	2Ls 3-1/2 x 2-1/2 x 5/16
6' - 0"	1L 5 x 3-1/2 x 1/4"	
	Wall Thickness 8 Inch Walls	Wall Thickness 12 Inch Walls
2' - 0" (& under)	2Ls 3-1/2 x 3-1/2 x 5/16	3Ls 3-1/2 x 3-1/2 x 5/16
3' - 0"	"	"
4' - 0"	2Ls 4 x 3-1/2 x 5/16	3Ls 4 x 3-1/2 x 5/16
5' - 0"	"	"
6' - 0"	2Ls 5 x 3-1/2 x 5/16	3Ls 5 x 3-1/2 x 5/16
	Wall Thickness 4 & 6 Inch Walls	Wall Thickness 8 Inch Walls
6' to 10'	1L 5 x 3-1/2 x 3/8	W8 x 10-1/4" plate
10' to 11'	1L 7 x 4 x 3/8	W8 x 10-1/4" plate
11' to 14'	1L 8 x 4 x 3/8	W8 x 13-1/4" plate
	Wall Thickness 12 Inch Walls	Wall Thickness 14 & 16 Inch Walls
6' to 10'	W8 x 10-1/4" plate	W8 x 10-1/4" plate
10' to 11'	W8 x 13-1/4" plate	W8 x 15-1/4" plate
11' to 14'	W8 x 18-1/4" plate	W8 x 24-1/4" plate

- G. Steel Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
 1. Side Rails: 3/8 x 2 inches members spaced at 20 inches.
 2. Rungs: one inch diameter solid round bar spaced 12 inches on center.
 3. Space rungs 7 inches from wall surface.
 4. Applications: Elevator pit ladders. Coordinate ladder configuration and placement with elevator manufacturer.

2.05 PREFABRICATED LADDERS

- A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
 1. Components: Manufacturer's standard rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the Materials article of this Section.
 2. Materials: Aluminum; ASTM B221, 6063 alloy, T52 temper.
 3. Finish: Manufacturer's standard clear anodized coating, comply with AAMA 611, Class 1.
 4. Ladders: Engineer, manufacture and install ladders to support in excess of 300 pounds force concentrated live load.
 5. Ladder Safety Post: Retractable hand hold and tie off.
 6. Basis of Design:

- a. Interior Applications at Hatch Access: Model 501 by O'Keeffe's, Inc.
- b. Exterior Applications at Low Parapet: Model 502 by O'Keeffe's, Inc.
7. Acceptable Manufacturers, pending specific product review:
 - a. FSI Industries.
 - b. Alaco Ladder Company.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 FINISHES - STEEL

- A. Shop Priming:
 1. Applications: All steel items except as otherwise indicated. Do not prime surfaces in direct contact with concrete, galvanized items, where field welding is required, and items to be covered with sprayed fireproofing.
 2. Preparation:
 - a. Prepare exterior steel surfaces to be primed in accordance with SS PC-SP6 Commercial Blast Cleaning Standard.
 - b. Prepare interior steel to be primed and steel to be fireproofed in accordance with SS PC-SP3 Power Tool Cleaning Standard.
 - c. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 3. Product: One coat shop standard primer, 2 - 3 mils DFT.
- B. Galvanizing:
 1. Applications: All exterior steel unless indicated for additional finish.
 2. Galvanize steel members after fabrication to ASTM A123 requirements by a member of the American Galvanizers Association, Inc with a high grade, non-lead zinc bath.
 3. Smoothness: galvanizing shall a rugosity of 4 or less (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments.
 4. Warranty: Galvanizer's standard warranty that materials shall be free from 10% or more visible rust for 20 years.
 5. Where hot-dip galvanizing prior to completion of fabrication (cutting or welding operations) cannot be avoided, joints and cuts shall be finished with four (4) full coats of touch-up galvanizing repair paint as recommended by the fabricator.

2.07 FINISHES - ALUMINUM

- A. Exterior Aluminum Surfaces: Class I natural anodized.
- B. Interior Aluminum Surfaces: Class II natural anodized.

2.08 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work. Coordinate all work with the work of other trades.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

- C. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Welds and flush rivets shall be finished flush and smooth on surfaces that will be exposed after installation. Welds shall be continuous unless otherwise noted. Welds shall not have voids or pockets and shall be ground to provide smooth transitions between metal surfaces. Do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening.
- D. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.
- E. Connections and accessories shall be adequate to safely sustain, withstand stresses, strains, to which they will be normally subjected.
 - 1. Connections to steel unless otherwise specified shall be steel.
 - 2. Connections to genuine wrought iron work shall be wrought iron or steel.
 - 3. Connections to cast iron, unless otherwise specified shall be steel.
 - 4. Bolts, nuts, screws for exterior work shall be electrogalvanized, unless otherwise noted.
- F. Furnish all standard screws, bolts, washers, and other such fastening devices as are necessary for attaching this work to other materials. Anchors and other connecting devices required in concrete or masonry shall be built-in as the work progresses. NOTE: Special attention shall be given to the firm and secure anchoring of overhead mounted materials and equipment.
- G. Do cutting, punching, drilling, tapping required for attachment of other work coming in contact with miscellaneous metal where so indicated or where directions for same are given prior to or with review of shop drawings.
- H. Unless otherwise indicated, bolt, and screw heads shall be flat countersunk in exposed faces of ornamental or finished character; elsewhere as required. Cut off bolts, screws, etc., where exposed, flush with nuts, or other adjacent metal. Except as otherwise required, weld shop-assembled connections; welds, bolts, or machine screws may be used for field connections. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous. Exposed fastenings shall be the same materials, color, and finish as metal to which they apply, unless otherwise required.
- I. Make up threaded connections tightly so that threads will be entirely concealed by fittings.
- J. Allow for thermal movement resulting from a maximum temperature range change of 120 degrees F ambient and 180 degrees F surface by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and night time sky heat loss.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects. All work shall be designed for adjustment to field variation, fitted with proper joints and intersections, adequately anchored in place.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. Work to be built in with masonry shall be of form required for anchorage, or be provided with suitable anchors, expansion shields, toggle bolts, etc. as required for proper anchorage. Fastening to wood plugs in masonry shall not be permitted.
- F. Install all supporting members, fastening, framing, hangers, bracing, brackets, straps, bolts, angles, and the like required to set, connect work rigidly and properly to structural steel, masonry, other construction.

- G. Setting bearing plates: Clean concrete and masonry bearing surfaces of bond reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates. Set bearing and leveling plates on wedges, shims or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
- H. Bollard Installation: Anchor bollards in concrete footings. Support and brace bollards in position in concrete footings until concrete has been placed and cured. Fill permanently installed bollards solidly with concrete, mounding top surface, unless detailed with continuously welded cap.
- I. Stair Nosing Installation: Install with anchorage system indicated to comply with manufacturer's written instructions. Center nosings on tread widths and align nosings flush with riser faces and level with tread surfaces.
- J. Pit Frames: Fabricate frames and supports from structural steel shapes, plates and bars to sizes, shapes and profiles indicated and as necessary to receive gratings. Unless otherwise indicated, space anchors 24" o.c.
- K. Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint, and paint exposed areas with the same materials as used for shop painting, complying with SSPC-PA1. Apply by brush or spray to provide a minimum 2 mil dry film thickness. Clean field welds, bolted connections and abraded areas of galvanized surfaces to comply with ASTM A780.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 51 00
METAL STAIRS AND RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with concrete filled treads.
- B. Guardrails and handrails.
- C. Tube steel perimeter edge assemblies at floor openings as indicated per the Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete fill in stair pans; mesh reinforcement for landings.
- B. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal anchors in concrete.
- C. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
- D. Section 05 12 00 - Structural Steel.
- E. Section 05 50 00 - Metal Fabrications.
- F. Section 05 71 13 - Fabricated Metal Spiral Stairs.
- G. Section 09 90 00 - Painting and Coating: Field applied paint finish.
- H. Section 14 20 10 - Passenger Elevators: Pit ladder.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI A14.3 - Ladders Fixed and Safety Requirements.
- C. ASTM A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2012.
- D. ASTM A36 - Standard Specification for Carbon Structural Steel; 2008.
- E. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- F. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.
- G. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- H. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2012.
- I. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.
- J. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2010a.
- K. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- L. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- M. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2012a.
- N. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

- O. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
- P. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- Q. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2012.
- R. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2010.
- S. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.
- T. NAAMM AMP 510 - Metal Stairs Manual; The National Association of Architectural Metal Manufacturers; 1992, Fifth Edition.
- U. NAAMM MBG 531 - Metal Bar Grating Manual; The National Association of Architectural Metal Manufacturers; 2009.
- V. NAAMM MBG 532 - Heavy Duty Metal Bar Grating Manual; 2009 (ANSI/NAAMM MBG 532).
- W. OSHA 1910.27 - Fixed Ladders.
- X. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- Y. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product data for all manufactured items.
- C. Shop Drawings: Submit stair, tube edging and railing shop drawings drawn at not less than 1/4" scale with components shown in related positions. Provide larger scale custom details. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Show all required field dimensions.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.
 - 3. Indicate points of support and loads imposed on supporting structure.
 - 4. Shop drawings shall indicate all components, both custom fabricated and manufactured products.
- D. Submit structural analysis and certification sealed and signed by a qualified professional structural engineer, licensed in the State in which the Project is being built, that the stairs, platforms, and railings comply with the required structural design loads.
- E. Submit fabricator's certification that the stairs, platforms and railings provided are in full compliance with the requirements of the Construction Documents and are totally suitable for the proposed installations when installed in accordance with the Shop Drawings.
- F. Submit evidence of the steel fabricator's in-plant special inspections program including: registration of special inspections program, written procedural and quality control manual and evidence of periodic auditing of fabrication practices by an approved inspection agency.
- G. Welders' Certificates.
- H. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

- B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- C. Fabricator Qualifications: Accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172) or a member of SSFNE, who participates in a recognized quality assurance program and who is regularly inspected by an independent testing/inspection agency.
 - 1. In the absence of the above requirements, the fabricator shall be required to hire and pay for an independent testing/inspection agency, approved by the Owner, to monitor fabrication and perform random testing of all stair and railing fabrication procedures, and to report to the Owner
- D. Manufacturers: Companies specializing in manufacturing products specified in this Section, with not less than ten years of documented experience.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle components in such a manner as to prevent damage to finished surfaces. Store components in a dry, clean location, away from uncured masonry and concrete.

1.07 STRUCTURAL REQUIREMENTS

- A. Structural Design: Provide complete stair and railing assemblies complying with applicable codes.
- B. Stairs and Platforms: Engineer, fabricate and install steel stairs and platforms in accordance with NAAMM Metal Stair Manual and to withstand the effects of gravity loads and the following structural loads without exceeding the allowable design working stress of the materials involved. Apply each load to produce the maximum stress in each component of steel stairs.
 - 1. Uniform Load: 100 lbf/sq.ft.
 - 2. Concentrated Load: 300 lb applied on an area of 4 sq. in.
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit total load deflection of treads, platforms and framing members to 1/360 of span or 1/4 inch, whichever is less.
 - 6. Limit live load deflection of treads, platforms and framing members to L/480.
 - 7. Stiffness: Design stairs that span more than 15 feet with no vibration. Limit Frequency to a minimum of 5 to 6 Hz.
- C. Handrail and Guardrail Assemblies: Comply with ASTM E 985, ASTM E894, and withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component.
 - 1. Handrails shall be rigid, free of vibration and able to withstand a concentrated force of 200 pounds applied at any point in any direction and, but not simultaneously, a uniform load of 50 pounds per foot applied in any direction.
 - 2. Top Guardrail member shall be rigid and able to withstand a concentrated force of 200 pounds applied at any point and in any direction and, but not simultaneously, a uniform load of 100 pounds per foot applied vertically downward to the top of the guard.
 - a. Infill areas of guardrails shall be rigid and able to withstand a horizontal concentrated force of 200 pounds applied on one square foot at any point in the system including panels, intermediate rails, balusters, or other elements. This loading condition shall not be applied simultaneously with the other loading conditions for guardrails.
 - b. Guardrail System shall withstand stresses resulting from railing system loads specified above.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Handrails: Comply with applicable accessibility requirements of ADA Standards.
 - 2. Dimensions: As indicated on Drawings.
 - 3. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 - 4. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 - 5. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
 - 1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - a. Welded Joints: Continuously welded and ground smooth and flush.
 - b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
 - c. Exposed Edges and Corners: Eased to small uniform radius.
 - d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
 - e. Applications: Stair 0000 (Adjacent Dining 1306A), Main Commons Stair, (Agora)1208A Stair and Main Auditorium A181.
 - 2. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
 - a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
 - b. Welds Exposed to View: Ground smooth and flush.
 - c. Mechanical Joints: Butted tight, flush, and hairline.
 - d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
 - e. Exposed Edges and Corners: Eased to small uniform radius.
 - f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.
 - g. Applications: All locations not indicated for architectural finish level.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS

- A. Jointing and Finish Quality Level: Architectural and Commercial, as defined above.
- B. Type: straight
- C. Risers: Closed.
- D. Treads: Metal pan with field-installed concrete fill.
 - 1. Concrete Depth: 1-1/2 inches, minimum.
 - 2. Tread Pan Material: Steel sheet.
 - 3. Tread Pan Thickness: As required by design; 10 gage inch minimum.
 - 4. Pan Anchorage to Stringers: Continuously welded, from top or bottom.
 - 5. Concrete Reinforcement: Welded wire mesh.
 - 6. Concrete Finish: For resilient or ceramic floor covering. See Finish Schedule..
- E. Risers: Same material and thickness as tread pans.
 - 1. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.
 - 2. Nosing Depth: Not more than 1-1/2 inch overhang.
 - 3. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.

- F. Stringers: As detailed on the Drawings.
 - 1. Stringer Depth: As indicated on drawings.
 - 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- G. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
- H. Finish: Shop prime painted.
- I. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.03 HANDRAILS AND GUARDRAILS

- A. Steel Wall-Mounted Rails: Round pipe rails unless otherwise indicated.
 - 1. Outside Diameter: 1.66 inch. (actual)
 - 2. Finish: Interior primed and exterior galvanized.
- B. Wood Wall-Mounted Rails:
 - 1. Hardwood Lumber (for transparent finish): Hard Maple species, Plain sawn, moisture content of 5 to 11 %.
 - 2. Handrail: 1-3/4 inches round with flat bottom;
 - a. Provide custom fabricated rises, elbows, turns, and other shapes as required to provide a smooth continuous handrail as indicated on the Drawings.
 - b. Products: Brosco; Model # 6040.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 - 3. Continuous steel support bar and wall brackets for wood handrail.
 - 4. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
 - a. Transparent: Conversion varnish (formerly TR-4).
 - 1) Exposed Surfaces: Stain coat, sealer, and 2 topcoats.
 - 2) Sheen: Medium Rubbed.
 - 5. Fasteners and Anchors: For securing wood items, unless indicated otherwise shall be provided in accordance with AITC specifications, applicable Federal standards and materials manufacturer's recommendations.
- C. Guardrails:
 - 1. Steel Top Rails: Round pipe or tube rails unless otherwise indicated.
 - a. Outside Diameter: 1.9 inch. (actual)
 - 2. Wood Top Rails:
 - a. Hardwood Lumber (for transparent finish): Hard Maple species, Plain sawn, moisture content of 5 to 11 %.
 - b. Profile: 2 inch x 3 1/2 inch, rectangular with eased edges and plow. See Drawings.
 - 1) Provide custom fabricated rises, elbows, turns, and other shapes as required to provide a smooth continuous guardrail as indicated on the Drawings.
 - c. Continuous steel support bar and wall brackets for wood handrail.
 - d. Finish: To match wood handrails.
 - 3. Infill at Picket Railings: Vertical pickets.
 - a. Horizontal Spacing: Maximum 4 inches on center.
 - b. Material: Solid steel bar.
 - c. Shape: Round.
 - d. Size: 1/2 inch square.
 - e. Top Mounting: Welded to underside of top rail.
 - f. Bottom Mounting: Welded to top surface of stringer.
 - g. Steel End and Intermediate Posts: Same material and size as top rails.
 - 1) Horizontal Spacing: As indicated on Drawings and as required for structural requirements.
 - 2) Mounting: Welded to top surface of stringer.
 - 4. Steel Infill at Mesh Railings: Woven wire mesh panels.

- a. Material and Finish: Same as stair.
- b. Wire Size: 2 inch square. Not less than 0.25 gage.
- c. Mounting: Mesh welded to steel bar frame, frame welded to posts as indicated per the Drawings.
- d. Top Rail: 1/2 inch x 2 inch bar stock. Predrill for wood guard attachment. Countersunk wood screw heads.
- e. Horizontal Intermediate Rails: 1 inch x 2 inch, solid bar stock.
- f. Top Mounting: Welded to underside of top rail.
- g. Bottom Mounting: As indicated per the Drawings. Typically there are two methods of mounting.
 - 1) Welded to top of stringer/perimeter opening steel tube.
 - 2) Welded to cast in place concrete steel anchors (Angora 1208A Stair and surround)
- h. Steel End and Intermediate Posts: Same material and size as top rails.
 - 1) Horizontal Spacing: As indicated on Drawings and as required for structural requirements.
 - 2) Mounting: Welded to top surface of stringer.

2.04 MATERIALS

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A500 or ASTM A501 structural tubing, round and shapes as indicated.
- C. Steel Plates: ASTM A6 or ASTM A283.
- D. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
 1. Hot-Rolled Steel Sheet: ASTM A1011, Designation CS (commercial steel).
 2. Cold-Rolled Steel Sheet: ASTM A1008, Designation CS (commercial steel).
- E. Galvanized Steel Sheet: ASTM A653 Structural Steel (SS) Grade 33/230 with G40/Z120 coating.
- F. Wire Mesh: Plain steel, cold-rolled; 1.08 #/sf; lock-crimp weave construction; square weave.
 1. Pattern: Square opening, 2" x 2"; 83% open.
 2. Wire Diameter: 0.1920"
 3. Finish: Shop primed.
 4. Manufacturer: McNichols, or equal.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Concrete Fill: Type specified in Section 03 30 00.
- H. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.05 ACCESSORIES

- A. Steel Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
- B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- C. Railing Fittings (Steel): All fittings for exterior applications shall be galvanized. Typical fittings shall include # 938 weld on caps, # 665 and # 1665 wall returns, # 386 and # 1386 brackets, by Julius Blum and Co. or equivalent.
- D. Railing Fittings (Wood): Custom as indicated above.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.06 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Tnemec 10-1009 Grey at 2-3 mils DFT.
 - 1. Preparation of Steel: Interior steel in accordance with SSPC-SP 3 Power Tool Cleaning Standard Exterior steel in accordance with SSPC-SP6 Commercial Blast Cleaning Standard.
 - 2. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - 3. Product: One coat shop standard primer, 2 - 3 mils DFT.
- D. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123.
 - 1. Smoothness: Galvanizing shall a rugosity of 4 or less (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments.
 - 2. All hot-dipped galvanized material shall be stamped to indicate ASTM designation and ounces per square foot of zinc coating required by the specifications.
 - 3. Warranty: Galvanizer's standard warranty that materials shall be free from 10% or more visible rust for 20 years.
 - 4. Where hot-dip galvanizing prior to completion of fabrication (cutting or welding operations) cannot be avoided, joints and cuts shall be finished with four (4) full coats of touch-up galvanizing repair paint as recommended by the fabricator.
 - 5. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.
 - 6. Applications: As indicated on the Drawings and all exterior railings shall be galvanized.

2.07 RAILING FABRICATION - GENERAL

- A. In general, heights of handrails shall be 34 inches above nosings. Heights of guardrails shall be a minimum of 42 inches above finish floor, unless otherwise noted on the Drawings. Handrails shall be mounted to provide a minimum of 2-1/4 inch clear space to walls and other surfaces.
- B. Space intermediate balusters as indicated on the Drawings or as otherwise required to provide a maximum clear space between all members of less than four (4) inches. Space railing posts as indicated on the Drawings, and in accordance with railing engineering requirements.
- C. In general, handrails at stairs shall extend at least 12 inches beyond the top riser and at least 12 inches plus the width of one tread beyond the bottom riser. At the top, the handrail extension shall be parallel to the walking surface. At the bottom, the handrail shall continue to slope for a distance of the width of one tread from the bottom riser, with the remainder parallel to the walking surface.

2.08 FABRICATION - GENERAL

- A. Fit and shop assemble components in largest practical sections, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Stairs shall be fabricated such that the triangle formed between the tread, riser and bottom rail shall not allow a 4 inch sphere to pass.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each configuration required. Maintain cylindrical cross section of pipe throughout the entire bend without buckling, twisting, cracking or otherwise deforming.
- F. All exterior railings, fittings and brackets shall be hot-dipped galvanized after fabrication.
- G. Provide expansion joints in railings at intervals not to exceed forty (40) feet. Provide slip joints with internal sleeves extending two (2) inches beyond the joint on either side. Fasten the internal sleeve securely on one side only. Locate expansion joints within six (6) inches. of posts.

- H. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- I. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- J. Fabricate components accurately for anchorage to each other and to building structure.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify that rough opening and structural support are properly prepared prior to beginning installation.

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- D. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- F. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels. All field joints at galvanized stairs and railings shall be bolted.
- G. Obtain approval prior to site cutting or creating adjustments not scheduled.
- H. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- I. Where railings are to be set in concrete, railing posts shall be set in six (6) inch matching sleeves. Clean dust and foreign matter from sleeves and moisten interior of hole and surfaces with clean water. Pour fast setting cement into the annular space until it overflows the hole. Taper cement away from rails to promote proper drainage.
- J. Steel Stair Installation
 - 1. Set stair units accurately in location, alignment, and elevation, with edges and surfaces level, plumb and free of rack. Measure from established lines and levels.
 - 2. Install steel stairs by welding stair framing to steel structure or to weld plates cast into concrete and/or masonry except where otherwise indicated. Provide temporary bracing as required.
 - 3. Fit exposed connections accurately together to form hairline joints. Weld field connections of interior stairs. All field connections of exterior hot-dip galvanized coated stairs shall be bolted, do not weld, cut or abrade.
 - 4. Set steel stair base plates at masonry walls on wedges or other adjustable devices. After stairs have been positioned, tighten anchor bolts. Use nonmetallic, non-shrink grout and pack grout solidly between bearing surfaces and plates to ensure no voids remain.
 - 5. Completed stair installation shall be rigid and free from vibration.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements for general requirements for testing and inspections.
- B. General: Stair, landing and railing materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified testing agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing his own inspections, quality control and materials and fabrication procedures in compliance with specified requirements. Any non-compliant materials or fabricated components shall be removed and replaced.
- C. The fabricator shall submit evidence of in-plant inspections in conformance with the International Building Code Structural Tests and Inspections - Inspection of Fabricators (1700).
- D. The fabricator's structural engineer shall inspect the stair installation, component type, size, spacing and placement for conformance with the approved stair system design and check member-to member connections and connections to adjacent steel and concrete support elements, once during performance of the work and once after completion of the work.
- E. Testing and inspection shall be performed by the Owner's testing agency as identified in the Statement of Special Inspections.
- F. If Work is found not to conform to the Construction Documents, the Contractor shall be responsible for the cost of all further testing.
- G. The Contractor shall cooperate with and facilitate testing and field inspections. The Contractor shall, at his own expense, furnish the testing agency stair, ladder and railing shop drawings. Field bolted and welded connections shall be inspected.

END OF SECTION

SECTION 05 58 13
ARCHITECTURAL METAL COLUMN COVERS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Architectural metal column covers including material, accessories and related items for the complete installation.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, finishes and installation instructions.
- B. Submittal Drawings: Submit complete shop drawings indicating quantities, finishes, dimensions, and attachment relationships.
- C. Samples: Submit color and finish samples 3" x 3" in size, to determine range of texture and consistency of color and finish to be expected in the finished work.

1.03 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of ten years' experience in manufacturing and shall have successfully completed at least twenty projects within the past five years in architectural metals.
- B. Installer shall have a minimum of five years' experience and shall be approved by the manufacturer.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver components in clearly marked containers and packages suitable for shipment of specified products as to prevent finish damage in transit. Provide protective wrapping or film to provide protection.
- B. Storage components in locations that will avoid damage from job-site traffic, moisture, stacking or other job-site contamination.
- C. Handle components to avoid racking, twisting, denting or scratching of finished surfaces.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's warranty against defects in material and workmanship for a period on one year beginning on Date of Substantial Completion.
- C. Fluoropolymer coating shall be warranted for 10 years from date of Substantial Completion to remain free, under normal atmospheric conditions, from peeling, checking, cracking, chalking in excess of numerical rating of 8 when measured in accord with ASTM D4214, of fading in excess of 5 N.B.S.

PART 2 – PRODUCTS

2.01 PRODUCTS

- A. Basis of Design: Products by Fry Reglet Corp.
 - 1. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Series:
 - 1. Series E – Economical Butt Joint
- C. Galvannealed Steel: ASTM A525; hot-dipped galvanized sheet of an iron-zinc alloy coating, Coating Designation A-40 or A-60 with surfaces chemically treated for paint adhesion in accordance with ASTM D2092, Method.

2.02 MANUFACTURED UNITS

- A. Applications: Interior use only.

- B. Material: Galvannealed steel: 16 gage.
- C. Configurations: Full round.
- D. Diameter and Joint Types:
 - 1. Diameter: 16 inches.
 - 2. Vertical Joint Type: Butt joint.
 - 3. Horizontal Joint Type:
 - a. Ceiling Joint: Flush to ceiling with reveal trim.
 - b. Floor Joint: On raised bases as indicated on the Drawings.

2.03 FABRICATION

- A. Form column covers to specified dimensions and diameters as indicated on the Drawings.
 - 1. Provide fixed column covers, one-piece for up to 12 feet high. Provide additional sections to achieve finished heights above 12'0".
 - 2. Columns shall have no exposed fasteners unless specified.
 - 3. Fabricate ceiling ring to match column covers.
 - 4. Apply manufacture's recommended sound-deadening insulation to backs of column covers.

2.04 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Factory-applied Fluoropolymer Coating Finish: Two coat, baked-on fluoropolymer coating system based on Valspar Corporation and or PPG Industries. Formulated by a licensed manufacturer and applied by manufacturer's approved applicator.
 - 1. Coating system shall provide minimum 1.0 mil dry film thickness consisting of minimum 0.20 mil primer and minimum of 0.80 mil color coat.
 - 2. Color: Selected by architect from manufacturers full line.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine job-site for conditions that may adversely affect installation of column covers.
- B. Verify dimensions of column covers prior to installation to ensure compatibility with job-site conditions.
- C. Verify post structure is plumb, level, and parallel prior to installation of column covers.
- D. Visually examine finished surfaces to ensure that blemished or dented surfaces are not present prior to installation.

3.02 PREPARATION

- A. Verify / Coordinate with other trades prior to installation where they may affect the column cover installation.

3.03 INSTALLATION

- A. Install components in accord with manufacturer's installation instructions and approved submittal drawings.
- B. Anchor components to related structures such as floors, walls and beams as indicated on approved submittals drawings. Use anchors with holding strength to provide a solid installation. Use only plated, galvanized or stainless steel anchors.
- C. Installer to provide additional bracing components as necessary to stiffen substructure and ensure solid mid-span bracings and connections.

3.04 CLEANING

- A. Remove protective coverings and clean column covers to remove adhesives and tape residue. Test all solvents on non-exposed surfaces prior to use.
 - 1. Protect column covers from damage during remainder of construction period

END OF SECTION

SECTION 05 71 13
FABRICATED METAL SPIRAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Center support column, radial shaped treads and closed risers.
- B. Spiral handrail and guardrail.
- C. Landing guardrails.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing.
- B. Section 09 90 00 - Painting and Coating: Field applied paint finish to stair unit and railings.

1.03 REFERENCE STANDARDS

- A. NAAMM AMP 510 - Metal Stairs Manual; The National Association of Architectural Metal Manufacturers; 1992, Fifth Edition.

1.04 SYSTEM DESCRIPTION

- A. Conform to the IBC, edition 2009 building code for live loads applicable to work of this Section.
- B. Stairs and Platforms: Engineer, fabricate and install steel stairs and platforms in accordance with NAAMM Metal Stair Manual and to withstand the following structural loads without exceeding the allowable design working stress of the materials involved. Apply each load to produce the maximum stress in each component of steel stairs.
- C. Stair Treads, Platforms and Framing: Support uniform live load in excess of 100 lb/sq ft and a concentrated load of 300 lb on an area of 4 square inches located in the center of the tread, whichever produces the greater stress, with deflection of stringer or landing framing not to exceed 1/240 of span. Stair framing shall be rigid, free of vibration and able to withstand stresses resulting from loads specified above as well as stresses resulting from railing system loads.
- D. Handrails and Guard railing Assemblies: Comply with ASTM E 985, ASTM E894, and withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component.
 - 1. Handrails shall be rigid, free of vibration and able to withstand a concentrated force of 200 pounds applied at any point in any direction and, but not simultaneously, a uniform load of 50 pounds per foot applied in any direction.
 - 2. Top Guardrail member shall be rigid and able to withstand a concentrated force of 200 pounds applied at any point and in any direction and, but not simultaneously, a uniform load of 100 pounds per foot applied vertically downward to the top of the guard.
 - a. Infill areas of guardrails shall be rigid and able to withstand a horizontal concentrated force of 200 pounds applied on one square foot at any point in the system including panels, intermediate rails, balusters, or other elements. This loading condition shall not be applied simultaneously with the other loading conditions for guardrails.
 - b. Guardrail System shall withstand stresses resulting from railing system loads specified above.
- E. Stair geometry shall comply with NFPA 101, Life Safety Code requirements.
- F. Number of Treads per 360 Degrees of Stair Rotation: 18, clockwise rotation going up.
- G. Minimum Tread depth: 7-1/2 inches, measured at narrow end.
- H. Riser Height: 7 inches maximum.
- I. Minimum clear head height: 6'-8".

- J. Nominal Stair Diameter: 96 inches.
- K. Maximum vertical rise without a landing: 12 feet.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate detailed stair configuration at not less than 1/4" scale, support loads, supporting accessories and connections, floor opening details, required floor opening and stair height tolerances, and other measurements affecting the stair. Provide larger scale custom details.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.
- C. Submit structural analysis and certification sealed and signed by a qualified professional structural engineer, licensed in the State of Maine, that the stairs, platforms and railings comply with the required structural design loads.
- D. Submit fabricator's certification that the stairs, platforms and railings provided are in full compliance with the requirements of the Contract Documents and are totally suitable for the proposed installations when installed in accordance with the Shop Drawings.
- E. Submit evidence of the steel fabricator's in-plant special inspections program including: registration of special inspections program, written procedural and quality control manual and evidence of periodic auditing of fabrication practices by an approved inspection agency.
- F. Manufacturer's Instructions: Include complete assembly and anchorage requirements.
- G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum ten years of documented experience.
- B. Design custom stair under direct supervision of a Professional Structural Engineer experienced in design of products of this type and licensed in the State in which the Project is located.
- C. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- D. Fabricator's Qualifications: Fabricator shall be a certified member of ASIC or a member of SSFNE, who participates in a recognized quality assurance program and who is regularly inspected by an independent testing/inspection agency.
 - 1. In the absence of the above requirements, the fabricator shall be required to hire and pay for an independent testing/inspection agency, approved by the Owner, to monitor fabrication and perform random testing of all stair and railing fabrication procedures, and to report to the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Product:
 - 1. Duvinage Corp.
 - 2. Stairways, Inc.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

- A. Tread and Riser Material: Steel, radial tread with nosing and riser..
- B. Landings: Steel checker floor plate and configured to coordinate with floor opening structural framing.

- C. Column: Steel, with steel plate for base and top anchorage, drilled for attachment.
- D. Guardrail: Continuous at stair outer perimeter and around all floor landing openings. A minimum of 2 1/4" clear shall be provided between guardrail and handrail.
 - 1. Height: Minimum 42" above tread nosing or landing.
- E. Handrail: Tubular Steel, bracketed to baluster posts.
- F. Baluster Posts: 1/1/4" diameter at handrail bracket locations, where indicated, or as otherwise required.
- G. Balusters: 3/4" steel rod spaced 4" o.c., capped with 1-1/4" nom. diameter pipe..
- H. Pipe Weight: As required to support design loads.
- I. Fascia Finish at Floor Opening: By others..

2.03 ACCESSORIES

- A. Attachments and Fasteners: Steel.
- B. Vertical Column Cap: Cast steel.
- C. Tubular Handrail Ends: Cast steel.

2.04 FABRICATION

- A. Assembly Fasteners: Concealed.
- B. Fabricate stairs to comply with NAAMM AMP 510, Class Service.

2.05 FINISHES

- A. All components: Factory primed for field painting.
 - 1. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - 2. Do not prime surfaces in direct contact with concrete or where field welding is required.
 - 3. Prime Paint: Shall be Tnemec 10-1009 Grey at 2-3 mils DFT.
 - 4. Preparation of Steel: In accordance with SSPC-SP 3 Power Tool Cleaning Standard.
 - 5. Number of Coats: One.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are acceptable to suit stair assembly tolerances.
- B. Verify that supports are correctly positioned.

3.02 INSTALLATION

- A. Install stair assembly in accordance with manufacturer's instructions.
- B. Advise if field conditions exceed adjustment limits of attachments. Do not field cut or modify stair components.
- C. Stair shall be securely fastened and free from vibration when in use.

3.03 TOLERANCES

- A. Conform to NAAMM AMP 510 requirements.

3.04 PROTECTION

- A. Do not permit traffic on stair after installation.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. SPECIAL NOTE OF ATTENTION: Scope of work included under this Section and where indicated on the Drawings is **NOT** a component or in any way attached to or part of the Primary Building Structure. Scope of Work here-in pertains to a teaching laboratory mock-up for associated trade programs. The intent of this scope is to create a teaching lab for hands-on training of students within a demonstration Type 5-B residential wood framed structure. Discussions have been held with the Sanford Fire Marshal and local AHJ regarding this program and wood framed training facility. A pre-construction meeting shall be held to coordinate and verify final layout and requirements. Attendees shall include the Contractor, framing subcontractor, Owner, Architect, Sanford Fire Department and local AHJ. Minutes of the meeting shall be recorded by the Contractor and distributed to all parties in attendance for record.
- B. All rough carpentry required for the Work indicated on the Drawings shall be included in the Base Bid. All framing shall be Design-Build by the Contractor in accordance with the 2009 International Residential Building Code for a typical residential home structure as indicated on the Drawings. Components include: structural dimension lumber framing, rough opening framing for doors, windows, and roof openings, subflooring, miscellaneous framing and sheathing.

1.02 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. PS 1 - Structural Plywood; 2009.
- D. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; National Institute of Standards and Technology, 2010.
- E. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, 2010.
- F. SPIB - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2014.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on plywood, manufactured lumber, hangers, connectors, application instructions.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements and 2009 International Residential Building Code.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
3. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.02 DIMENSION LUMBER

- A. Grading Agencies: Southern Pine Inspection Bureau, Inc. (SPIB)
- B. Moisture Content: Kiln-dry or MC15.
- C. Stud Framing: Nominal sized as indicated, S4S, species Spruce-Pine-Fir (SPF).
- D. Joist, Rafter, and Small Beam Framing: No. 2, Species: SPF.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 1. Lumber: S4S, No. 2 or Standard Grade.

2.03 CONSTRUCTION PANELS

- A. Subfloor/Underlayment Combination: Any PS 2 type, rated Single Floor.
 1. Bond Classification: Exposure 1.
 2. Span Rating: 48.
 3. Performance Category: 1-1/8 PERF CAT.
 4. Thickness: 3/4 inches, nominal.
 5. Edges: Square.
- B. Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I.
- C. Miscellaneous plywood: (not specified elsewhere) shall conform to the general applications and corresponding grades of softwood plywood as published in the U.S. Product Standard PS-1 and shall be selected by means of its intended use, subject to the Architect's approval. All plywood shall be exterior grade unless specifically indicated otherwise.

2.04 ACCESSORIES

- A. Fasteners and Anchors: For securing wood items, unless indicated otherwise shall be provided in accordance with AITC specifications, applicable Federal standards and materials manufacturer's recommendations.
 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153 or AISI Type 304 stainless steel, as appropriate to suit job conditions, for high humidity; AISI Type 304 stainless steel at preservative-treated wood locations, unfinished steel elsewhere. Hot-dipped galvanized nails shall meet ASTM A653, Class G185
 2. Bolts: Conform to Federal Specifications FF-B-571 and FF-B-575, ASTM A3-7, Grade A and ASTM A563 for hex nuts and flat washers.
 3. Expansion Shields: Conform to Federal Specifications FF-S-325, not less than 2-1/2" long into concrete or masonry.
 4. Lag Screws and Lag Bolts: Conform to Federal Specifications FF-B-561 and ANSI B18.2.1.
 5. Power Driven Fasteners: Shall conform to National Evaluation Report NER-272.
- B. Provide hangers and connector products with model code evaluation/research reports acceptable to the Authority Having Jurisdiction. Provide products with published manufacturer's allowable design loads determined from empirical data or engineering analysis, and tested by a qualified independent laboratory.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.02 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual and American Institute of Timber Construction (AITC) specifications.
- E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.
- H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

3.05 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.06 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management.
 - 1. Comply with applicable regulations.

2. Do not burn scrap on project site.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 10 54
WOOD BLOCKING AND CURBING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof nailers, perimeter blocking and curbs.
- B. Blocking for wall and roof openings. F.R.T. blocking at wall opening heads as/if required per NFPA 285 wall assemblies.
- C. Blocking for support of wall mounted items furnished by under the contract or by Owner, including, but not limited to: toilet and bath accessories, grab bars, railings, wall cabinets, wood trim, counters, cyclorama seamless wall system, and all other wall mounted fixtures and equipment.
- D. Preservative treatment of wood and isolation strips to separate preservative treated wood from metal surfaces.
- E. Telephone and electrical panel boards, not specified as part of Division 26 - Electrical.

1.02 REFERENCES

- A. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. AWPA U1 - Use Category System: User Specification for Treated Wood; 2013.
- C. PS 1 - Structural Plywood, 2009.
- D. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology; 2010.
- E. SPIB - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2002 and supplements.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.
- C. Certifications: Submit wood preservative treated manufacturer's certifications that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing and finishing treated materials.
 - 1. Submit verification of compliant moisture content for waterborne treated products.
 - 2. Submit warranties from chemical treatment manufacturers for each type of treatment.
- D. Submit dimension lumber certificates indicating compliance with minimum allowable unit stresses. Indicate species and grade selected for each used and design values approved by the American Lumber Standards Committee Board of Review.

1.04 MOCK-UPS

- A. Mock-Ups: Provide mock-ups of exterior framed wall, including components specified elsewhere, such as stud framing, gypsum wall sheathing, weather barrier, insulation, masonry veneer, window framing, and door framing.
 - 1. Mock-up panels shall demonstrate actual wall construction, detailing and workmanship. Finish materials shall be of the proper thickness, showing proposed color range, texture, bond, joints, and workmanship.
 - 2. No work shall progress until the Architect has reviewed the sample panels. Panels shall be revised as necessary to secure the Architect's acceptance. The panels shall then become the standard of comparison for all related exterior wall work.

1.05 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
 - 1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee. Inspection agencies shall include: NLGA, SPIB, WCLIB, WWPA. Lumber shall be piece factory-marked with agency grade stamp.
 - 2. Lumber of other species or grades, or graded by other agencies, is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- B. Plywood: Comply with PS 1.
- C. Coordination with other Trades: Coordinate the locating of blocking, nailers, and similar supports for finish materials, millwork, casework, finish carpentry, equipment, hardware and accessories, regardless of whether such items are Owner or Contractor furnished, so that the installation of finish work may be properly executed in compliance with the intended design requirements. Before starting installation of supports, carefully check all related shop drawings and submittals.

PART 2 PRODUCTS

2.01 DIMENSION LUMBER

- A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).
- B. Miscellaneous Blocking, Furring, Nailers, and Curbs: Nominal sizes as indicated on the Drawings, S4S, kiln dried, S4S, No. 2 or Standard Grade.

2.02 PLYWOOD PANELS

- A. Miscellaneous Panels:
 - 1. Concealed Plywood: APA rated sheathing, PS-1, C-C Plugged or better, exterior grade, thickness as indicated.
 - 2. Electrical Component Mounting: APA rated sheathing, PS-1, C-C Plugged, not less than 15/32 inch thickness; painted with fire-retardant paint.

2.03 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fastener Coatings:
 - a. Hot-dipped galvanized steel per ASTM A153 or AISI Type 304 stainless steel for exposed to weather or high humidity locations.
 - b. AISI Type 304 stainless steel at preservative treated wood locations, as appropriate to suit job conditions.
 - c. Hot-dipped galvanized nails per ASTM A653, Class G185.
 - 2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Expansion anchors shall conform to Federal Specification FF-S325.
 - a. Anchors shall be capable of sustaining without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by ASTM E488.
 - b. Materials: Carbon-steel, zinc plated, ASTM B633, Class FE/Zn5, or Stainless-steel with bolts and nuts, ASTM F593 and ASTM F594, Alloy Group 1 or 2.
 - 3. Lag Screws and Lag Bolts: Shall conform to Federal Specification FF-B-561 and ASME B18.2.1.
 - 4. Power Driven Fasteners; Shall conform to National Evaluation Report NER-272.
 - 5. Nails and Staples: Shall conform to Federal Specification FS-N-105 and ASTM F1667.
 - 6. Bolts: Conform to Federal Specifications FF-B-571 and FF-B-575, ASTM A307, Grade A and ASTM A563 for hex nuts and flat washers.
 - 7. Ground Anchorage: Wood plugs or nailing blocks are not acceptable for fastening grounds, furring, etc. to concrete or masonry. Hardened steel nails, expansion screws,

toggle bolts, metal plugs, or metal inserts, as most appropriate for each type of masonry or concrete construction shall be used.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 - 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Fire Retardant Treatment, Interior Type A: AWWA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated, capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84 and with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - 1. Kiln dry wood after treatment to a maximum moisture content of [15] percent for lumber and 15 percent for plywood.
 - 2. Provide fire-retardant treated wood products in the following locations:
 - a. Wood lumber and plywood indicated to be Fire-Retardant Treated (F.R.T.) or Fire Retardant (F.R.) on the Drawings.
 - 3. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A. Each piece shall have an affixed quality mark to include identification of inspection agency, treatment standard, treating facility, preservative, retention and suitable end use.
 - 1. Kiln dry after treatment to maximum moisture content of 19 percent.
 - 2. Provide preservative pressure treated wood products in locations consistent with manufacturer's use recommendations. Locations as follows, not exposed to weather:
 - a. Wood in contact with roofing or flashing.
 - b. Wood in contact with masonry or concrete.
 - c. Wood more than 18 inches above grade indicated to be pressure treated (PT) on the Drawings.
 - d. Wood built into interior walls in potentially damp areas.
 - 3. Wood Preservatives:
 - a. CA-C - Copper Azole, Type C. (Min. 0.06 absorption).
 - b. ACQ - Alkaline Copper Quaternary. (Min. 0.25 absorption).
 - c. MCA - Micronized copper azole. (Min. 0.05 absorption).
 - d. PTI - Propiconazole-Tebuconazole-Imidacloprid. (Min. 0.018 absorption).
- D. Pressure Treatment of Lumber in Contact with Soil: AWWA U1, Treatment UC4A. Each piece shall have an affixed quality mark to include identification of inspection agency, treatment standard, treating facility, preservative, retention and suitable end use.
 - 1. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 - 2. Heartwood treated pieces shall be culled out and not used in wet or dirty locations.
 - 3. Kiln dry after treatment to maximum moisture content of 19 percent.
 - 4. Provide preservative pressure treated wood products in locations consistent with manufacturer's use recommendations. Locations as follows:
 - a. Wood exposed to weather.
 - b. Wood less than 18 inches above grade.
 - 5. Wood Preservatives:

- a. CA-C - Copper Azole, Type C. (0.15 absorption)
 - b. ACQ - Alkaline Copper Quaternary. (0.40 absorption)
 - c. MCA - Micronized copper azole. (0.14 absorption)
- E. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) or creosote.
- F. Isolation Strips: Self-adhering, polymer modified asphalt sheet, 40 mil thickness, with strippable release paper.
1. Products:
 - a. Vycor V40 Tape.
 - b. Vycor Ice & Watershield.
 - c. Perm-A-Barrier Wall Membrane by W.R. Grace.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Examine and correct any conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected. Set members level and plumb, in correct position.
- B. Place horizontal members with crown side up.
- C. Construct curb members of single pieces.
- D. Space framing and furring members 16 inches o.c.
- E. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- F. Coordinate curb installation with installation of decking and support of deck openings.
- G. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- H. Cut out and discard all defects that will render a piece unable to serve its intended function. The Architect may reject lumber whether or not it has been installed, for excessive checking, warp, twist, bow, crook, mildew, fungus or mold as well as for improper cutting and fitting.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening complying with CABO NER-272 for power-driven fasteners, and fastening schedules in the International Building Code, unless otherwise indicated.
- J. All preservative treated wood shall be separated from all aluminum and steel surfaces by use of flexible membrane isolation strips.

3.02 INSTALLATION OF PLYWOOD

- A. Secure with long dimension perpendicular to framing members, with ends over firm bearing and staggered, using nails, screws, or staples.
- B. Materials shall be applied according to recommendations of the American Plywood Association.
- C. Install telephone and electrical panel back boards made of plywood or other acceptable structural panels at locations indicated. Size back boards to be minimum 48 inches beyond size of telephone and electrical panels.
- D. All preservative treated plywood shall be separated from all metal (coated and uncoated) by use of isolation strips.

3.03 INSTALLATION OF WOOD BLOCKING

- A. Install all wood blocking as required to provide anchorage for other materials, fixtures, accessories, etc. Blocking shall be minimum 1-1/2" thick materials.

- B. Wedge, anchor and align blocking to provide a rigid and secure installation of both blocking and other work related thereto.
- C. All wall-mounted door stops and interior signage attached to gypsum wallboard surfaces shall have blocking within the supporting wall.
- D. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work wherever possible. Secure anchor bolts to formwork before concrete placement wherever possible.
- E. All preservative treated wood blocking shall be separated from all metal (coated and uncoated) by use of isolation strips.

3.04 INSTALLATION OF ROOF BLOCKING

- A. Roof blocking shall be installed in accordance with FM Loss Prevention Data 1-49. The following shall be considered the minimum requirements for anchoring roof blocking. Provide a minimum of two (2) anchors per length of each piece of blocking, and within six (6) inches of each end. The Contractor shall provide additional fasteners as needed to suit specific job conditions. Perimeter roof blocking shall be secured to decking, structural steel, spaced steel angles, or plates as described below unless indicated otherwise on the Drawings:
 - 1. Roof blocking parallel to metal decking ribs: Secure blocking to joists or beams with 3/8" diameter bolts at no more than 4'-0" oc. Where joist or beam spacing is greater than 4'-0", bolt blocking to a continuous steel angle secured to the structure at maximum spacing of 4'-0" o.c. welded to the structure. As an alternative method, blocking may be secured to the deck with two rows of #10 stainless steel screws at twenty-four (24) inches o.c. with 5/8 inch diameter stainless steel washers.
 - 2. Roof blocking perpendicular to metal decking ribs: Secure blocking to the deck with two rows of #10 stainless steel screws at twenty-four (24) inches o.c. with 5/8 inch diameter stainless steel washers.
 - 3. Roof blocking anchored to masonry: Secure blocking with 1/2 inch diameter bolts, spaced a maximum of four (4) feet o.c., staggered if the blocking is wider than six (6) inches. Within eight (8) feet of building corners, provide bolts at two (2) feet o.c. Bolts shall be embedded in grouted masonry cells a minimum depth of eight (8) inches.
 - 4. For nailing layers of blocking to each other, provide nails in two (2) rows, staggered with spacing not to exceed 12 inches o.c. within the row. Nails to secure blocking to other blocking shall be galvanized and shall be long enough to penetrate 1-1/4 inch minimum.
- B. Form blocking in conjunction with perimeter roof fascias, gravel stops and membrane roofs to shapes as detailed. Shim as required to continuously align flush with top of abutting roof insulation, including added thickness of tapered insulation, where applicable. Shim as required to maintain a constant top of fascia/gravel stop elevation, where applicable.
- C. All curbs and blocking related to skylights, roof hatches, smoke vents, mechanical equipment and other roof mounted accessories shall be installed level and plumb and shall not necessarily follow the pitch of the roof, unless specifically indicated on the Drawings.
- D. All preservative treated wood blocking shall be separated from all metals (coated and uncoated) surfaces by use of isolation strips.

3.05 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

END OF SECTION

SECTION 06 19 00

METAL PLATE CONNECTED PRE-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

- A. Definition: Prefabricated wood trusses include planar structural units consisting of metal plate connected members which are fabricated from dimension lumber and which have been cut and assembled prior to delivery to the job site. Work to include anchorage, blocking, curbing, miscellaneous framing and bracing.
- B. Types of fabricated wood trusses are indicated on the drawings.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 06 10 00 - Rough Carpentry

1.04 QUALITY ASSURANCE:

- A. TPI Standards: Comply with applicable requirements and recommendations of the following Truss Plate Institute (TPI) publications, Latest Edition:
 - 1. ANSI/TPI 1 "National Design Standard for Construction. Metal Plate Connected Wood Truss."
 - 2. ANSI/AF&PA (American Forest & Paper Association) – NDS National Design Specification for Wood Construction – Latest Edition
 - 3. "Commentary and Appendices to ANSI/TPI 1 for Bracing Wood Trusses."
 - 4. "Building Component Safety Information, BCSI 1"

5. DSB-89 "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 6. "Quality Assurance Procedures Manual for In-Plant Inspections, QAP-90."
 7. "Quality Control Manual."
 8. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Wood Structural Design Standard: Comply with applicable requirements of "National Design Specification for Wood Construction", published by American Forest and Paper Association.
- C. Lumber Standard: Comply with PS 20 and with applicable rules of the respective grading inspecting agencies for species and grade of lumber indicated.
- D. Connector Plate Manufacturer's Qualifications: Provide truss connector plates manufactured by a firm which is a member of TPI and which complies with TPI quality control procedures for manufacture of connector plates published in TPI "Quality Control Manual."
- E. Fabricator's Qualifications:
1. Provide trusses by a firm which has a record of successfully fabricating trusses similar to type and length indicated.
 2. TPI Inspection Program: Fabricator shall participate in the TPI Quality Assurance Inspection Program, and maintain a copy of the Quality Assurance Procedures Manual, QAP-90. All trusses fabricated for this project shall bear the TPI Registered Mark to indicate compliance with this program.
- F. Uniformity of Manufacturer for Connector Plates: Provide metal connector plates from a single manufacturer.

1.05 SUBMITTALS:

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. Incomplete submittals will not be reviewed.

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- D. Submittals not review by the General Contractor prior to submission the Engineer will not be reviewed. Include on the submittal a statement or stamp of approval by the Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in sections Division 1 have been complied with.
- E. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- F. **Truss design calculations without the appropriate signature and seal indicated below will be rejected and returned without review.**
- G. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.
- H. Electronic Submittals:
1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
 2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
 3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Adobe Acrobat Professional version 7.0 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
 4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.
 5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

- I. Product Data: Submit fabricator's technical data covering lumber, metal plates, hardware, fabrication process, treatment (if any), handling and erection.
 1. Submit certificate, signed by an officer of fabricating firm, indicating that trusses to be supplied for project comply with indicated requirements.
 2. Submit evidence of participation in the TPI Inspection program.

- J. Shop Drawings: Submit shop drawings, showing species, sizes and stress grade of lumber to be used; pitch, span, camber, configuration and spacing for each type of truss required; type size, material, finish, design value and location of metal connector plates; and bearing and anchorage details.
 1. Electronic files of structural drawings **will not** be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review.
 2. **Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.**
 3. Truss Placement Plan: Provide drawings indicating truss layout.
 - a. Include all trusses and components, including girder trusses, piggyback trusses, and hangers.
 - b. Provided dimensions for layout, including bearing locations & widths, and truss spacing
 4. Design: Design shall be in accordance with the applicable provisions of the latest edition of the American Forest & Paper Association's (AF&PA's) National Design Specification for Wood Construction, ANSI/TPI 1, and all applicable legal requirements. Submit the following information in the calculation submittal for each truss or truss component. Calculations are to be prepared under the direct supervision of a Professional Engineer Licensed in the State of Maine. Calculations shall be signed and sealed by a Professional Engineer Licensed in the State of Maine. Truss designer is responsible for the design of the entire truss assembly, including permanent lateral bracing. Lateral loads shall be resolved into the building lateral load resisting system.
 - a. Loading: Include all loadings applied to the truss, including uniform, concentrated loads and locations. Include effects of mechanical equipment, drifted and

unbalanced snow. Indicate distribution of loads to top and bottom chords. The calculations shall clearly show these loads and their application to the trusses.

- b. Wind & Seismic Loading Criteria: Include all appropriate information wind & seismic loading criteria. Including design code, wind speed and exposure. Design code and wind speed shall be as indicated in the drawings.
 1. Provide uplift calculations and truss uplift reactions as appropriate.
 2. Design gable end trusses for wind and seismic loads. Vertical members in gable end trusses shall be at 16" o.c. maximum. End wall deflections shall not exceed L/240. Provide ganged trusses, strong backed studs or adequate bracing as required to provide a complete end wall system.
- c. Load Combinations: The calculations shall list all load combinations including all factors that apply.
- d. Adjustments to lumber and metal connector plate design values for conditions of use. Adjustment of value for duration of load or conditions of use shall be in accordance with AF&PA's National Design Specification for Wood Construction.
- e. Truss-to-Truss Connections: Provide hanger designs where applicable. Provide design of connectors in multi-ply trusses. Provide connection design for piggyback trusses.
- f. Stress and Deflection calculations: Provide member stresses and joint displacement for each load and load combination, and displacement to span ratio. Indicate camber independently from displacement calculations. Provide bearing stresses at supports.

Deflection Limits: Design trusses to limit deflection under design live or snow loads to L/360 for roof trusses.
- g. Reaction: Provide minimum and maximum reactions, including uplift as applicable. Indicate the load combination that produces these reactions.
- h. Girder truss bearing stress limitation: Bearing stress values at girder trusses shall be no greater than the values indicated below. Truss manufacturer shall provide additional truss plies, truss bearing enhancement devices or additional material as necessary to meet this requirement.

1.05.J.4.h.1 Girder trusses bearing stress maximum limit, unless noted otherwise: 425 psi

1.05.J.4.h.2 Girder truss bearing limit for truss bearing on Southern Yellow Pine material: 565 psi

- i. Net Section at Hanger Connections: Design shall account for the net section loss to truss members from hung mechanical, electrical, plumbing and fire protection systems. General contractor shall coordinate hanger systems with the truss designer. Hanger systems are not designed by the Engineer of Record. See the "Execution" portion of this specification for additional requirements.
5. Field built trusses: To the greatest extent possible, trusses are to be prefabricated. Truss field fabrication is subject to the approval of the Structural Engineer. Additional design, quality assurance and quality control procedures may be necessary based on the requirements of the Structural Engineer.
6. Truss Assembly Drawings: Provide drawings depicting how each truss is to be constructed. Provide all geometry, including length, height, joint locations, slope, camber, overhangs, metal plate connectors, and lumber grades
7. Permanent Member Bracing: The truss manufacturer shall specify all permanent bracing required for lateral support of tension and compression members, both webs and chords. Gable end wall bracing shall also be specified. Permanent bracing loads shall be resolved to the building lateral load resisting system.
8. With all copies of drawing submittal provide "BCSI 1 (latest edition) Guide to Good practice for Handling, Installing & Bracing of Metal Plate Wood Trusses", Jointly produced by the Wood Truss Council of America and the Truss Plate Institute.

1.06 DELIVERY, STORAGE, HANDLING:

- A. Handle and store trusses with care, and in accordance with manufacturer's instructions and TPI recommendations to avoid damage from bending, overturning or other cause for which truss is not designed to resist or endure.
- B. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying work of other trades whose work must follow erection of trusses.
- C. A copy of the BCSI (latest edition) Summary Sheet, "Guide for Handling, Installing and Bracing of Metal Plate Connected Wood Trusses" shall be provided to the installer at delivery.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering metal connector plates which may be incorporated in the work include, but are not limited to, the following:

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METAL PLATE CONNECTED
PRE-FABRICATED WOOD TRUSSES
06 19 00

Gang Nail Systems, Inc.
Hydro-Air Engineering, Inc.
Inter-Lock Steel Co., Inc.
Link-Wood Construction Systems
Robbins Manufacturing Co.
Tee-Lok Corp.
Truss Connectors of America
Truswall Systems Corp.

2.02 MATERIALS:

A. Lumber:

1. Factory mark each plate of lumber with type, grade, mill and grading agency.
2. Provide actual sizes as required by PS 20 for dressed lumber, S4S, unless otherwise indicated. Minimum member sizes (nominal) are as follows:
 - a. Chord members: 2x6 U.N.O.
 - b. Web members: 2x4
3. Provide seasoned lumber with a maximum moisture content of 19% at time of dressing, and the moisture content of lumber shall be no less than 7% at time of manufacturing.
4. Lumber Species: Eastern Woods (Spruce) graded by NLGA, NELMA or NHPMA. Southern Pine graded by SPIB. Douglass Fir Larch graded by NLGA.
5. Lumber Grade:
 - a. Chord Members: MSR 1650f-1.5E lumber for all chords.
 - b. Web Members: No. 2 or better visually graded lumber for all webs. MSR lumber is acceptable in lieu of visually graded lumber for web members.
6. Stress Rating: Provide lumber which has been either graded or tested and certified, at indicated moisture content, to have the following minimum values:
 - a. MSR: Fb = 1650 psi, Ft = 1020 psi, Fc = 1700 psi, E = 1,500,000 psi
 - b. No.2: Fb = 875 psi, Ft = 450 psi, Fc = 1150 psi, E = 1,400,000 psi
7. Pressure treated lumber shall not be used.

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PRE-FABRICATED WOOD TRUSSES
06 19 00

B. Metal Connector Plates, Fasteners and Anchorages:

1. Connector Plate Material: Metal complying with following requirements, unless otherwise indicated: Not less than 0.036" thick, coated thickness, and shall meet or exceed ASTM A653/ASTMA653M grade 33. Working stresses in steel are to be applied to effectiveness ratios for plates as determined by test and in accordance with ANSI/TPI 1.

a. Galvanized Sheet Steel: ASTM A924/924M, Coating G60.

b. Electrolytic Zinc Coated Steel Sheet: ASTM A 591, Coating Class C, with minimum structural quality equivalent to ASTM A 446, Grade A.

C. Hangers and Uplift Anchors: Hangers are to be designed and supplied as part of the truss package, and shall be manufactured by Simpson StrongTie. Preliminary uplift anchors are indicated on the Contract Documents. Final uplift connector type and/or quantity will be selected based on truss reactions. G.C. coordinate with engineer's marks on approved truss shop drawings.

2.03 FABRICATION:

A. Trusses shall be fabricated to meet the quality requirements of ANSI/TPI 1.

B. Cut truss members to accurate lengths, angles and sizes to produce close fitting joints with wood-to-wood bearing in assembled units.

C. Fabricate metal connector plates to size, configuration, thickness and anchorage details required for types of joint designs indicated.

D. Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with close fitting joints. Position members to produce design camber indicated.

E. Connect truss members by means of metal connector plates accurately located and securely fastened to wood members by means indicated or approved.

F. Permanent web member bracing locations shall be marked on the truss members by means of a paint mark or tag of contrasting color. Tags shall not be removed without the permission of the Architect.

G. All trusses shall bear the TPI Registered Mark, The TPI Quality Stamp, indicating current participation with the in-plant inspection program per the standards established in QAP-90.

PART 3 EXECUTION

3.01 GENERAL:

Erect and brace trusses to comply with recommendations of manufacturer and the Truss Plate Institute. Erection shall comply with current Occupational Safety & Health Administration (OSHA) requirements.

- A. Inspect trusses for damage prior to erection. Apparent damage to trusses, if any, shall be reported to Truss Manufacturer prior to erection.
- B. Truss Submittals and any supplementary information provided by the Truss Manufacturer shall be provided by the Contractor to the individual or organization responsible for the installation of the Trusses.
- C. Erect trusses with plane of truss webs vertical (plumb) and parallel to each other, located accurately at design spacing indicated. Where applicable, insure bearing wall studs and trusses are aligned. The maximum out-of-true plumb tolerance shall be the depth of the truss in inches divided by 100. The maximum bow tolerance from true straight shall be the length of the truss in inches divided by 400, at any point considering multiple curvature when applicable.
- D. Hoist units in place by means of lifting equipment suited to sizes and types of trusses required, applied at designated lift points as recommended by fabricator, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- E. Provide temporary bracing as required to maintain trusses plumb, parallel and in location indicated. Temporary bracing during construction is the responsibility of the contractor and the installer, as part of the contractor's "Means and Methods". TEMPORARY BRACING MUST BE PROVIDED IN THREE DIFFERENT PLANES OF THE TRUSS. BRACING SHALL BE INSTALLED ALONG THE BOTTOM CHORD, ALONG THE TOP CHORD AND WITHIN THE WEB MEMBERS. CONTRACTOR SHALL FOLLOW THE RECOMMENDATIONS OF SUMMARY SHEETS BCSI-B1/B2 FOR HANDLING, INSTALLING AND BRACING METAL CONNECTED WOOD TRUSSES. TEMPORARY BRACING SHALL BE LEFT IN PLACE AND BECOME PART OF THE PERMANENT BRACING FOR THE BUILDING. MAXIMUM BRACE SPACINGS INDICATED IN THIS DOCUMENT SHALL NOT BE EXCEEDED.
- F. Modifications required to the temporary bracing to comply with permanent bracing requirements, if any, shall be noted on the Structural Contract Documents. Install necessary supplemental permanent bracing and related components to enable trusses to maintain design spacing, withstand live and dead loads including lateral loads, and to comply with other indicated requirements.
- G. Anchor trusses securely at all bearing points to comply with methods and details indicated.
- H. Do not cut, notch, bore, drill or remove truss members.

- I. Hanging Loads: Hangers for mechanical, electrical, plumbing and fire protection systems, including but not by limitation, piping, conduit, ducting and mechanical equipment, shall be made to top of the bottom chord of the truss. Connections that require fasteners to penetrate the chord longitudinally shall not be utilized. Hanger loads shall be placed at truss panel points where required by the truss design.
- J. Metal plates shall not be removed and/or be replaced. Plates that are not fully pressed into the wood shall not be repaired without the direction of the Truss Manufacturer. The Architect and Truss Manufacturer shall be notified of deficient metal plate installation. Repairs shall be submitted to the Architect for review prior to implementation.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY & ARCHITECTURAL MILLWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Custom woodwork items including but not limited to:
 - 1. Reception desks and related counters and transaction counters.
 - 2. Custom cabinet work and related counters, including but not limited to, cubbies, benches, locker enclosures, and display cases.
 - 3. Fixed and adjustable wall shelving.
 - 4. End panels and cleats for counters.
 - 5. Plastic laminate window sills with wood nosings.
 - 6. Plastic laminate faced wall panels.
 - 7. Wood handrail caps, trims, base, sill nosings, custom wood floor tier nosing and step nosing, proscenium and entry trims.
 - 8. Tack panels.
 - 9. Other woodwork items as indicated on the Drawings.
 - 10. Retail display wall panel system.
 - 11. Plastic laminate wall caps and window sills.
 - 12. Wood ceiling trim panels.
 - 13. Custom Decorative Wood Grilles.
- B. Shop finishing of wood items.
- C. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 – Metal Fabrications: Part-Height Dowel Anchors.
- B. Section 05 51 00 – Metal Stairs and Railings: Wood handrails.
- C. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking.
- D. Section 08 80 00 - Glazing: Glass and glazing built into millwork.
- E. Section 09 64 29 – Wood Strip and Plank Flooring: Wood flooring system for custom nosings.
- F. Section 12 34 00 - Plastic Laminate Casework: Factory fabricated cabinet work.
- G. Section 12 36 00 - Countertops: Plastic laminate and solid surface countertops.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ANSI A208.2 - American National Standard for Medium Density Fiberboard; 2009.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. AWI/AWMAC/WI - Architectural Woodwork Standards; 2009.
- E. ANSI/BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
- F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2004.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's technical information for all factory fabricated products, hardware, and accessories specified herein.
- C. Shop Drawings: Indicate materials, elevations, construction, clearances, component profiles, fastening methods, jointing details, finishes, hardware locations and accessories.
 - 1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
 - 2. Provide the information required by AWI/AWMAC/WI (AWS).
- D. Samples:
 - 1. Submit confirmation samples and color chips for selected plastic laminate, solid surfacing, tack panel, retail display panels.
 - 2. Submit wood trim samples minimum of 8 inches long, illustrating full range of grain, finish and color.
 - 3. Submit wood veneer panel samples min 12"x 12" in size illustrating species, color and finish.
 - 4. Submit hardware samples upon request of Architect.
 - 5. Submit sample of cabinet construction upon request of Architect.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this Section with minimum five years of documented experience, with at least one project in the past 5 years with value of woodwork within 50 percent of cost of woodwork for this Project.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect woodwork and millwork during transit, delivery, storage and handling to prevent moisture and other damage, soiling and deterioration.
- B. Do not deliver woodwork and millwork until environmental conditions are suitable (enclosed, dry, with operating HVAC system), and painting and similar operations that could damage woodwork and millwork are complete.

1.08 PROJECT CONDITIONS

- A. Field Dimensions: The woodwork fabricator shall be responsible for coordinating the dimensions of all his work with actual field conditions, as well as with furniture, equipment and appliances to be furnished by others. The Contractor and fabricator shall cooperate to establish and maintain dimensions as required for a proper fit, without field modifications. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate measurements before being enclosed.

1.09 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY & ARCHITECTUREAL MILLWORK ITEMS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI Architectural Woodwork Standards for Custom Grade for plastic laminate faced items, and Premium Grade for hardwood items.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
 - 1. In general, finishes shall be Class C except Class B minimum shall be provided in exits, lobbies, corridors, auditorium, gymnasiums and cafeteria.

- C. Bench Design Requirements: Uniform live load of 95 PSF and concentrated load of 150 lb on an area of 4 sq ft. Top surface shall be designed for maximum deflection of L/600.

2.02 LUMBER MATERIALS

- A. Hardwood Lumber (for transparent finish): Select Maple species, Plain sawn, moisture content of 5 to 11%.
- B. Hardwood Lumber (for paint finish): Poplar species, Plain sawn, moisture content of 5 to 10 %. MDF is not acceptable for painted trim.

2.03 SHEET MATERIALS

- A. Plywood is defined as a panel manufactured with 3 or more layers (plys) of wood products composed of outer veneers or overlays and core materials laminated into a single sheet or panel.
 - 1. All plywood shall be manufactured in the United States or Canada.
 - 2. Cores shall comply with published industry standards for cores manufactured for use in architectural woodwork.
 - 3. Where a core is not specified, selection shall be at the option of the AWI woodworker.
- B. Hardwood Veneer Plywood: Face species select White maple, plain sawn, book matched, F.R.T. medium density fiberboard core, as indicated below.
- C. Panel Core: Medium density fiberboard (MDF); ANSI A208.2, class MD or MD-EXT as applicable, no urea formaldehyde-added, composed of wood chips, sawdust, or flakes of 47 pcf minimum density, made with water resistant adhesive; of grade to suit application; sanded faces.
 - 1. Applications: For plastic laminate facings, moisture resistant type at locations near or below sinks, window sills, and where otherwise indicated.
 - 2. Modulus of Elasticity: 405,000 psi minimum.
 - 3. Screw Holding Face: 250 lbs minimum.
 - 4. Screw Holding Edge: 225 lbs minimum.
- D. Panel Core: Particle board (PB), ANSI A208.1; Class M2; no urea formaldehyde-added, fire-resistant; composed of wood chips, sawdust, or flakes of 38.7 PCF minimum density, made with water resistant adhesive to suit application; sanded faces; thicknesses as required.
 - 1. Application: General use for plastic laminate facings.
 - 2. Panel Thickness: 3/4 inch unless otherwise indicated.
 - 3. Modulus of Elasticity: 290,100 PSI minimum.
 - 4. Screw Holding Face: 202 lbs. minimum.
 - 5. Screw Holding Edge: 180 lbs minimum.
- E. Panel Core: Fire-resistant Treated Particle board (PB), ANSI A208.1; Class M2; no urea formaldehyde-added, composed of wood chips, sawdust, or flakes of 38.7 pcf minimum density, made with water resistant adhesive to suit application; sanded faces; thicknesses as required.
 - 1. Applications: For plastic laminate facings for wall panels and casework located within corridors and egress area, and where indicated on the Drawings.
 - 2. Modulus of Elasticity: 290,100 psi minimum.
 - 3. Screw Holding Face: 202 lbs. minimum.
 - 4. Screw Holding Edge: 180 lbs minimum.
- F. Counter Substrate: Particle board; ANSI A208.1 Class M2; no urea formaldehyde-added.
 - 1. Application: Counters with no sinks.
 - 2. Density; 38.7 pcf min.
 - 3. Modulus of Elasticity: 290,100 psi minimum.
 - 4. Panel Thickness for Plastic Laminate Facing: 1-1/8 inches.
 - 5. Panel Thickness for Solid Surfacing: 3/4 inches minimum.

- G. Counter Substrate: Medium density fiberboard; ANSI A208.2; Grade 130; no urea formaldehyde-added; water resistant.
 - 1. Application: Counters with sinks.
 - 2. Density: 45 pcf min.
 - 3. Modulus of Elasticity: 405,000 psi minimum.
 - 4. Panel Thickness for Plastic Laminate Facing: 3/4 inches with built-up edges.
 - 5. Panel Thickness for Solid Surfacing: 3/4 inches minimum.
 - 6. Product: Medex by SierraPine.
- H. Melamine: Thermo-fused; NEMA LD 3, particle board core; surfaced both faced; color as selected from available options.
 - 1. Applications:
 - a. Drawer boxes.
 - b. Semi-concealed cabinet interiors, as allowed, see Laminate Materials.
- I. Panel thicknesses shall be as follows, unless otherwise indicated on the Drawings:
 - 1. Cabinet Tops and Bottoms: 3/4"
 - 2. Cabinet Ends, Supports and Divider Panels: 3/4"
 - 3. Shelves: 3/4" up to 36" long and 1" over 36" long.
 - 4. Concealed Cabinet Backs: 3/8".
 - 5. Exposed Cabinet Backs: 3/4".
 - 6. Exposed Panels: 3/4".
 - 7. Doors and Drawer Fronts: 3/4".
 - 8. Tall Cabinet Doors: 1".
 - 9. Stiles, Rails and Trim: 3/4".
 - 10. Cabinet Valances: 3/4".
 - 11. Cabinet Aprons: 3/4".
 - 12. Drawer Backs and Bottoms: 1/2".
 - 13. Wall Panels: 3/4".

2.04 LAMINATE MATERIALS

- A. High Pressure Decorative Laminate (HPDL): NEMA LD 3; indicated as 'PLam' on the Drawings. All panels shall be faced both sides for balanced construction.
 - 1. Manufacturers and Colors: See Finish Legend.
 - 2. Horizontal Surfaces: HGL, 0.039 inch nominal thickness.
 - a. Applications: Exposed horizontal surfaces.
 - 3. Vertical Surfaces: VGS, 0.028 inch nominal thickness.
 - a. Applications: Exposed vertical surfaces and semi-concealed surfaces.
 - 4. Laminate Backer: BKL; 0.020 inch nominal thickness; undecorated plastic laminate.
 - a. Applications: Concealed faces for balanced construction.
- B. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.05 SOLID SURFACING

- A. Solid Surfacing: Homogenous filled acrylic, meeting ANSI Z124.3 and Z124.6, Type VI.
 - 1. Thickness: 1/2 inch.
 - 2. Joint Adhesive: Manufacturer's standard two-part adhesive to create inconspicuous, non-porous joints, with a chemical bond.
 - 3. Panel Adhesive: Manufacturer's recommended silicone.
 - 4. Support Substrate: Type as required for plastic laminate facing; 3/4 inch thickness or as indicated.
 - 5. Manufacturers and Colors: See Finish Legend.

2.06 RETAIL DISPLAY WALL

- A. Display Wall System Type DSS: Pre-manufactured system of finished panels, aluminum standards and trims for system display hardware.
 - 1. Panels: 3/4" thickness; Class B minimum fire-rated; no formaldehyde-added, MDF core; faced surfaced with high-pressure plastic laminate. Panels shall be surfaced on the concealed face for balanced construction. Slat spacing: 4 inch centers.
 - 2. Finish: Color as selected by Architect from manufacturer's full line.
 - 3. Recessed vertical aluminum standards at 48 inches o.c and colored plastic slat inserts.
 - 4. Edge Trim: A770 Series by Marlite.
 - 4. Provide 2 catalogs of available display accessories for Owner's use.
 - 5. Products: (Basis of Design) 2000 Series Slatwall by Marlite
 - a. Slatwall by PAZ Systems.
 - b. Substitutions: See Section 01 60 00 – Product Requirements.

2.07 TACK PANELS FOR MILLWORK

- A. Tackable Wall Panel Type TWP-1 to TWP-4: Cork composition, 6 mm thickness; dense, fine grain, flame retardant.
 - 1. Roll Width: 1.22 m.
 - 2. Size: As required to cover surfaces with a minimum number of seams.
 - 3. Colors: As selected by Architect from manufacturer's full color line.
 - 4. Adhesive: Low VOC, as recommended by surfacing manufacturer.
 - 5. Product: Bulletin Board by Forbo.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 FASTENINGS AND ACCESSORIES

- A. Plastic Edge Banding for Plastic Laminate: Extruded or molded PVC or ABS, flat shaped with eased edges; smooth finish; of width to match component width. Banding thickness as follows:
 - 1. Edges at: Door fronts, drawer fronts, shelves, drawer boxes, end panels: 3 mm thickness.
 - 2. Edges at: Semi-exposed cabinet body behind doors or drawer fronts: 1 mm thickness.
 - 3. Color: As selected by Architect from manufacturer's standard range.
 - 4. Products:
 - a. Accent Edge by Dolken Woodtape.
 - b. Edge Banding by Charter Industries.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Metal Corner Trim: Extruded aluminum in configurations as indicated on the Drawings, including but not limited to, 135 degree corner, custom angle corners, 90 degree 1/2 inch radius heavy duty corner and 90 degree heavy duty corner.
 - 1. Manufacturers:
 - a. Eagle Aluminum. Basis of Design: E-5116 at 90 degree corners. E-5162 at other angles.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Adhesives: Suitable for the purpose; no urea formaldehyde or volatile organic compounds.
- C. Fasteners: Nails, screws and other anchoring devices of size, material, finish and type to suit application to provide secure attachment, concealed where possible; stainless steel or hot-dipped galvanized finish, complying with ASTM A153 in exposed locations of high humidity and at all exterior locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Sealants: Comply with requirements of Section 07 90 00 - Sealants.
- F. Lumber for Shimming, Cleats, Blocking, and Furring: Softwood or hardwood lumber, kiln dried to less than 15% moisture content.
- G. Decorative Glass: See Section 08 80 00.

H. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.09 HARDWARE

- A. Hardware: BHMA A156.9. Basis of Design products indicated. For substitutions see Section 01 60 00 - Product Requirements.
- B. Shelf Standards & Brackets: Heavy-duty; standards: 7/8" wide x 11/16" high x 14 gage cold rolled steel, single tracks, 2" slot spacing, back supported style, anochrome finish; bracket lengths as indicated on the Drawings. Provide one bracket at each shelf to standard location with #154 shelf fasteners for wood shelves.
 - 1. Product: 87 Standard and 186/187 Bracket by Knape & Vogt (KV).
- C. Shelf Support Pins: Standard side-mounted system using multiple holes for pin supports and coordinated shelf rests, anochrome finish, for nominal 1 inch spacing adjustments.
 - 1. Product: 345 by Knape & Vogt.
- D. Panel Support Clips: Interlocking metal Zee Clips. Total assembled clip thickness shall be 1/4".
- E. Coat Rods and Flanges: Heavy-duty; 1-1/16" diameter; chrome finished steel.
 - 1. Product: # 770-1 rods, #734 / 735 flanges by Knape & Vogt.
- F. Wiring Grommets: 2" outside diameter; plastic. Color selected from manufacturer's full range.
 - 1. Product: Series TG by Doug Mockett Co. Inc.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Counter Support Brackets: Sizes as required for counter depth (8" to 29"). Spacing as indicated on the Drawings, but in no case greater than 36" apart.
 - 1. Finish: Powder coat finish. Color as selected from manufacturer's standard range.
 - 2. Product: EH-1800 Series by Rakks.
- H. Silencers: Use two per door and drawer.
 - 1. Product: Glynn Johnson GJ65.
- I. Hinges: Barrel type, steel with satin finish.
 - 1. Products: Aximat.
- J. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
 - 1. Product: 4484 by Stanley.
- K. Drawer Slides: Telescoping on ball bearings; 100 pound, medium duty class; side mounted; integral stops; brushed zinc plated steel.
 - 1. Product: # 3834Grade 1HD-100 by Accuride.
- L. Slides With Integral Drawer Sides: (Fabricator's Option) Telescoping, ball bearing, full extension type; 100 pound capacity. Drawer height shall be maximum allowed by drawer front size as indicated on the Drawings.
 - 1. Product: MetaBox by Blum.
- M. Counter Legs: Powder coated tubular steel, 2-1/2" diameter, adjustable height, top mounting flange and floor mounting flange. Color selected from manufacturer's full range.
 - 1. Product: Adjustable Leg by A & M Hardware Inc.
- N. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.
 - 1. Product: 0730 by Corbin Lock.

2.10 FABRICATION - GENERAL

- A. The millwork details represented on the Drawings are not intended to indicate all of the framing, blocking and panel support required for the proper installation of millwork. It shall be the Contractor's responsibility to properly detail such work for lasting strength and stability, and to accurately represent it on shop drawings.
 - 1. Note: There shall be no unfinished wood products. If not covered with plastic laminate products or otherwise finished, all wood surfaces shall be receive a minimum of one coat of sealer in concealed or semi-concealed areas.

- B. In general, woodwork shall be assembled and installed using concealed fasteners, unless otherwise approved by the Architect. Fasteners shall be concealed, blind nailed, or countersunk with matching plugs. Secure woodwork to anchors or blocking built-in or directly attached to substrates.
- C. Joints in all work shall be tight and formed to conceal shrinkage. Running trim shall be in long lengths and joined only where solid fastenings can be made. End joints in built-up members shall be well distributed. Exterior corners shall be mitered, and interior corners and/or angles shall be coped. All edges shall be slightly eased; edges of solid wood members 3/4" thick or less to 1/16"; edges of rails and similar members more than 3/4" thick to 1/8".
- D. Complete fabrication in the shop, including assembly, finishing, and hardware application, to the maximum extent possible, before shipment to the site. Disassemble components only as necessary for shipment and installation. Pre-cut openings, where possible, to receive hardware, fixtures, electrical work and similar items.
- E. Fit exposed sheet material edges with edging as indicated on the Drawings. Use one piece for full length only.
- F. Condition woodwork to average prevailing humidity conditions in installation areas before installation. Install woodwork level, plumb, true and straight to a tolerance of 1/8" to 96 inches. Shim as required with concealed shims. Scribe and cut woodwork to fit, and refinish cut surfaces and repair damaged finish at plastic trim.
- G. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting. Closure panels/strips, end panels and trim shall be provided as required for a complete, finished installation.
- H. Shop prepare and identify components for book match grain matching during site erection. Provide continuous sequential use of veneer sheets from each flitch across each separate expanse of matched work.
- I. Tack surfaces shall be installed within woodwork as indicated on the Drawings, using adhesive, as recommended by the manufacturer. Provide miscellaneous anchors and trim as required.
- J. Solid Surfacing Fabrication Tolerances:
 - 1. Variation in component size: 1/8".
 - 2. Location of openings: 1/8" from indicated location.

2.11 CABINET FABRICATION

- A. Cabinet Style: Flush overlay.
- B. Cabinet Doors Fronts: Flush style.
- C. Drawer Construction Technique: Dovetail joints, fabricate for heavy duty use.
- D. Assembly: Construct cabinet bases separately from cabinets of pressure treated lumber. Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- E. Edging: Fit shelves, doors, and all edges with specified edging. Exposed and semi-exposed edges do not use more than one piece for any single length.
- F. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- G. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed plastic laminate finish edges with plastic trim.

- H. Note: There shall be no unfinished wood products. If not covered with plastic laminate products or otherwise finished, all wood surfaces shall be receive a minimum of one coat of sealer in concealed or semi-concealed areas.
- I. Wall Cleats: Provide an interlocking wall cleat system at the top of wall cabinets. Interlocking cleats shall be $\frac{3}{4}$ " x 2-1/2" with 45 degree cut. Cabinet mounted cleat shall be glued and doweled to cabinet ends and glued to top and back of cabinet. The bottom cabinet cleat shall be secured to the cabinet similarly to the upper interlocking cleat. See Installation paragraph, for wall cleat mounting requirements. An interior clear dimension of 12" shall be maintained for wall cabinets, unless indicated otherwise on the Drawings.
 - 1. All wall cleats shall be sealed.

2.12 COUNTER FABRICATION

- A. Fabricate in accordance with standards governing fabrication quality that are specified in herein. Field conditions shall be carefully measured prior to fabrication of countertops.
- B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using self-leveling metal splines to draw sections together.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- C. Provide back and end splashes wherever counter edge abuts vertical surface unless otherwise indicated. Fabricate splashes 4 inches high, unless otherwise indicated. Splashes shall be fabricated loose, unless indicated to be integral with the counter surface.
- D. Plastic Laminate Countertops:
 - 1. Fabricate up to 10 feet long without joints. Fabricate up to 5 feet wide without joints.
 - 2. All edges shall be tooled smooth and square.
 - 3. Provide backer surfacing on non-exposed substrate surfaces for balanced construction.
 - 4. Where materials meet at edges and corners, joints shall butt and overlapping members shall be filed off smooth, forming a slightly eased joint.
 - 5. All joints shall be shop-prepared. No joint shall be located within 12 inches of a sink or 3 inches of a corner.

2.13 PLASTIC LAMINATES

- A. Plastic laminates shall be installed in strict accordance with the manufacturer's recommendations. All edges shall be tooled smooth and square. Any scratched or defaced materials shall be completely replaced at no additional cost to the Owner. Where materials meet at edges and corners, joints shall butt and overlapping members shall be filed off smooth, forming a slightly eased joint.
- B. Cap exposed plastic laminate finish edges with plastic banding, or as detailed on the Drawings.
- C. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
- D. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.
- H. Back prime woodwork items to be field painted, prior to installation.

2.14 WOOD TREATMENT

- A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; Class A, capable of providing flame spread index of 25 maximum for hardwoods and softwoods, fuel contributed index of 15 maximum for hardwoods and 25 maximum for softwoods, and smoke developed index of 0, maximum for hardwoods and 15 maximum for softwoods, when tested in accordance with ASTM E84
 - 1. AWPA U1; cured organic resin solution, relatively insoluble in water and shall not bleed through or otherwise adversely affect types of finishes indicated. Treatment shall permit

milling of lumber after treatment and kiln drying by a plant certified by U.L. Maximum moisture content shall meet treatment manufacturer's standards.

2. Provide fire retardant treated wood products in the following locations:
 - a. Where wood members (lumber and plywood) are indicated to be Fire-Retardant Treated (F.R.T.) or Fire Retardant (F.R.) on the Drawings.

2.15 SHOP FINISHING

- A. Scope: It is intended that all millwork constructed of veneered and solid hardwood products shall be shop finished as specified herein.
- B. Comply with referenced quality standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork. Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of wood work. Apply 2 coats to back of panels and to end grain surfaces.
- C. Sand work smooth and set exposed nails and screws.
- D. Apply color matched wood filler in exposed nail and screw indentations.
- E. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- F. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for Grade specified and as follows:
 1. Transparent: Conversion varnish (formerly TR-4).
 - a. Exposed Surfaces: Stain coat, sealer, and 2 topcoats.
 - b. Semi-exposed Surfaces: stain coat, sealer, and 1 topcoat.
 - c. Concealed Surfaces: 1 coat sealer.
 - d. Sheen: Medium Rubbed.
 2. Opaque: 3 coats alkyd paint system; sheen to be confirmed with the Architect. Colors as selected by the Architect.
- G. Field touchup after installation: Acrylic Lacquer.
- H. Back prime woodwork items to be field painted, prior to installation.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Verify adequacy of backing and support framing. Verify type of support framing for determination of proper fastener type. A minimum load of 60 pounds/LF for wall cabinets shall be supported. Provide a safety factor of 2.
- B. Verify location and sizes of utility rough-in associated with work of this Section.
- C. See Section 06 10 54 – Wood Blocking and Curbing, for installation of concealed wood blocking.
- D. Acclimate millwork items to temperature and relative humidity of the installation site for at least 24 hours prior to installation.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Display wall panels: Condition panels for 72 hours in installation location prior to installation. Install panels in accordance with manufacturer's instructions. Hardware shall be straight, plumb and level. Anchor units rigidly and securely in place with appropriate fasteners into studs or concealed blocking.

3.03 CABINET INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level. Install to a tolerance of 1/8" in 8'-0" for plumb and level and with 1/16" maximum offset in flush adjoining surfaces, 1/8" maximum offsets in revealed adjoining surfaces.
- B. Wall Cleat System:
 - 1. Wall mounted portion of the interlocking cleat system shall be secured to continuous 2x6 wood blocking concealed within the partition that is anchored to studs. Fasten wall cleat with #12 pan head or wood screws, minimum 2-1/2" long, maximum 8" on center, or a minimum of 2 per cabinet. Pre-drill holes in cleats. Cleat shall be a continuous piece where multiple cabinets are installed in a row.
 - 2. Wall cleat securement to wall blocking shall be inspected and confirmed by the Owner prior to proceeding with wall cabinet installation.
 - 3. Secure cabinet by first interlocking the cleat system. Secure cabinet to wall cleat with #12 wood screws, minimum 2-1/2" long, minimum 2 per cabinet per cleat at top cleat and at bottom cleat, following industry best practices.
 - 4. Provide finished cabinet end panel if required to conceal end of wall cleat.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages. Scribe base toe-kick board to uneven floor surfaces.
- F. Install without distortion so that doors and drawers will fit openings properly and be accurately aligned.

3.04 COUNTERTOP INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners and with contact surfaces set in waterproof glue. Verify that cabinet top surfaces are level. Shim where required.
- B. Counter cleats shall be installed at walls where indicated and where required for counter support. Use moisture resistant MDF at counters with sinks.
- C. Plastic Laminate Countertops: Attach countertops using screws with minimum penetration into substrate board of 5/8 inch. Finish butt seams with matching sealant, as recommended by manufacturer.
- D. Loose plastic laminate and solid surface countertop back and side splashes shall be set in a continuous bead of silicone sealant at the countertop and at the wall. Provide a neat continuous bead of silicone at the joint between top of splash and vertical wall surface.

3.05 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.
- C. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- D. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- E. Countertop Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING AND PROTECTION OF WORK

- A. Erect and maintain temporary protective barriers until such time as permanent construction is in place and all danger of damage or defacement is past.

- B. Repair damaged and defective woodwork, where possible to eliminate functional and visual defects. Where not possible to repair, replace woodwork. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

3.06 ADJUSTING

- A. Adjust moving or operating parts to function smoothly and correctly. Touch-up finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bituminous dampproofing for the following applications:
 - 1. Structural steel columns and base plates in earth or concrete at the building perimeter.
 - 2. Earth-covered face of site retaining walls with earth on one side and outdoor space on the other.

1.02 REFERENCE STANDARDS

- A. ASTM D1187 - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 2011.
- B. ASTM D1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide properties of primer, bitumen, and mastics.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.04 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.01 DAMPPROOFING PRODUCTS

- A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
 - 1. Composition - Vertical Application: ASTM D1227 Type III or ASTM D1187 Type I.
 - 2. Composition - Horizontal and Low-Slope Application: ASTM D1227 Type II or III.
 - 3. VOC Content: Not more than permitted by local, State, and federal regulations.
 - 4. Applied Thickness: 1/16 inch, minimum, wet film.
 - 5. Products:
 - a. Sealmastic Emulsion Type II (brush/spray-grade) by WR Meadows Inc.
 - b. 920-AF Fibered Emulsion Mastic (trowel grade) by Karnak.
 - c. 220-AF Fibered Emulsion Dampproofing (brush or spray grade) by Karnak.
 - d. HE780 by Henry
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

- C. Verify that items that penetrate surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer. Do not apply over frost-covered surfaces.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.
- E. Use material as it comes in the container; thinning shall not be permitted.
- F. Do not apply dampproofing when temperature is below 40 degrees F.

3.03 APPLICATION

- A. Prime surfaces in accordance with manufacturer's instructions.
- B. Apply bitumen with mop (brush).
- C. Apply dampproofing in one coat, continuous and uniform, at a rate of 3 pounds/sq ft per coat.
- D. Apply from 2 inches below finish grade elevation down to top of footings.
- E. In general, dampproofing of retaining walls shall begin four (4) inches below finish grade and extend continuously to six (6) inches below level of finish grade on opposite side of wall.
- F. Seal items projecting through dampproofing surface with mastic. Seal watertight.
- G. Coordinate installation so that dampproofing may serve as mastic for insulation, where applicable.
- H. Immediately backfill against dampproofing to protect from damage.

END OF SECTION

SECTION 07 14 00
FLUID-APPLIED WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fluid applied membrane waterproofing.
 - 1. At earth-covered face of elevator pit walls.
 - 2. At earth-covered face of building walls with earth on one side and habitable space (Basement Level complete) on the other.
 - a. At column lines "A-H" & "B-A" where intersecting foundations prevent the continuation of waterproofing around basement perimeter foundations. Extend waterproofing 5 feet minimum beyond, both faces of intersecting foundation wall with earth on each side.
- B. Protection boards and water stops.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete substrate.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for membrane, surface conditioner, flexible flashings, joint cover sheet, and joint and crack sealants.
- C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of fluid-applied waterproofing membranes with fifteen years of experience.
- B. Installer Qualifications: Company specializing in installation of fluid-applied waterproofing with minimum ten years of experience.
- C. Mock-Up: Construct a mock-up consisting of 100 sq ft of horizontal waterproofed panel, including internal and external corners similar to those that will be present in the finished work.
 - 1. Accepted mock-up may remain as part of the work.

1.05 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

1.06 WARRANTY

- A. All materials and workmanship related to sprayed-on applications shall be warranted, on a single document, by manufacturer and the licensed applicator for ten (10) years against defects and failures in products and installation.
- B. Repair and replacement: Such defective work, and other work damaged thereby which becomes defective during the warranty term, without extra cost to the Owner.

PART 2 PRODUCTS

2.01 MEMBRANE AND FLASHING MATERIALS

- A. Fluid-Applied Waterproofing (Sprayed-on): Polymer-enhanced, single component, black, elastomeric membrane for vertical surfaces only.
 - 1. Vertical Cured Thickness: 60 mils, minimum.
 - 2. Solids Content: 60%
 - 3. Suitable for installation over concrete substrates and green concrete without adverse effect on adhesion.
 - 4. VOC: Complies with VOC limits established by the South Coast Air Quality Management District (California).
 - 5. Application Temperature: minimum of 40 degrees F; down to 20 degrees F with approval of manufacturer.
 - 6. Cure Time: 16 to 24 hours.
 - 7. Adhesion: Exceeds ASTM C794.
 - 8. Elongation: 800% per ASTM D412.
 - 9. Water Vapor Permeance: 0.09 perms for 40 mil dry coat per ASTM E 96.
 - 10. Protection / Drainage / Insulation Board: Tremco DPI.
 - 11. Products: Tremproof 260 by Tremco Sealants & Waterproofing Inc.
 - 12. Alternate Manufacturers:
 - a. W.R. Meadows.
 - b. Carlisle Coatings & Waterproofing, Inc.
 - c. Substitutes: See Section 01 60 00 - Product Requirements.
- B. Flexible Flashings: Type recommended by membrane manufacturer.

2.02 ACCESSORIES

- A. Surface Conditioner: Compatible with waterproofing membrane as recommended by membrane manufacturer.
- B. Sealant for Joints and Cracks in Substrate: Type compatible with waterproofing material and as recommended by waterproofing manufacturer.
- C. Protection Board: Protection, drainage and insulation board for vertical applications of fluid-applied membrane waterproofing; 2-3/8 inch thick fiber board.
 - 1. R value: 10 (2-3/8" thickness).
 - 2. Flow capacity per board thickness: 237gpm/ft. (Hydraulic gradient of 1.0)
 - 3. Product: TremDrain DPI by Tremco Inc.
 - 4. Substitutes: See Section 01 60 00 - Product Requirements.
- D. Waterstops: Bentonite with pressure sensitive adhesive. 1" x 1/2" rolls. For continuous use at all cold joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.
- C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.
- D. Verify that items that penetrate surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.

- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
- C. Do not apply waterproofing to surfaces unacceptable to manufacturer.
- D. For 260 System: Fill voids, honeycomb, rock pockets, etc. with non-shrink grout as recommended by the waterproofing manufacturer. Allow patching materials to cure.
 - 1. Repair and seal all cracks, non-moving control joints and penetrations per manufacturer's details and recommendations.

3.03 INSTALLATION

- A. Apply waterproofing in accordance with manufacturer's instructions to specified minimum thickness.
- B. Apply waterproofing in accordance with manufacturer's instructions to specified minimum thickness.
- C. Coating may be applied to damp or green concrete. Do not apply to frozen surfaces.
- D. Apply waterproofing by co-spraying or by two coat application with a tack coat applied horizontally, followed by the topcoat applied vertically.
- E. Apply extra thickness of waterproofing material at corners, intersections, and angles.

3.04 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

- A. For DPI System: Place protection board directly against set membrane as curing begins, starting at the bottom of the wall, butt joints. Supplement board adhesion to the membrane with adhesives or mechanical fasteners as recommended by the manufacturer. Scribe and cut boards around projections, penetrations, and interruptions.
- B. All surfaces shall be fully covered with protection board as recommended by the manufacturer.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rigid board insulation at cavity wall construction, perimeter foundation wall, underside of floor slabs, furred walls and exterior wall behind siding wall finish.
- B. Acoustic batt insulation in interior partitions.
- C. Thermal batt insulation at miscellaneous locations indicated per the Drawings.
- D. Firesafing insulation.
- E. Under-slab vapor retarder.
- F. Foam insulation sealant for joints and small gaps.
- G. Adhesives, stick clips, tape, spring clips, etc.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Installation of underslab vapor barrier and insulation boards.
- B. Section 07 21 19 - Foamed-In-Place Insulation: Plastic foam insulation other than boards.
- C. Section 07 25 00 - Weather Barriers: Separate air, water and vapor barrier materials.
- D. Section 07 53 00 - Elastomeric Membrane Roofing: Insulation specified as part of roofing system.
- E. Section 07 84 00 - Firestopping: Safing insulation as a component of firestopping assemblies.
- F. Section 09 21 16 - Gypsum Board Assemblies: Partitions for acoustic insulation.
- G. Section 033 46 10 – Soil Gas Depressurization System: Sub-grade vapor barrier and requirements for air-tight underslab vapor retarder.

1.03 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- C. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2014.
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- F. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Samples: Upon request, submit samples of each type of material to be used.

1.05 MOCK-UPS

- A. Mock-Ups: Provide insulation for exterior wall mock-ups specified in Section 04 20 00 and Section 07 42 13.
- B. Mock-up panels shall demonstrate actual wall construction, detailing and workmanship.
- C. No work shall progress until the Architect has reviewed mock-up panels. Panels shall be revised as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all related exterior wall work.
- D. Mock-up panels shall not be destroyed or moved until the Work is complete and accepted by the Architect. Upon completion of construction, mock-ups shall be removed.

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.07 PROTECTION, HANDLING AND STORAGE

- A. Protect plastic insulation from exposure to sunlight, except as necessary for period of installation and concealment. Protect plastic insulation against ignition at all times. Do not deliver plastic insulation materials before installation time. Complete installation and concealment of plastic materials as quickly as possible.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Rigid Under-slab Insulation Board: Extruded polystyrene board and high-density extruded polystyrene board.
- B. Rigid Perimeter Insulation Board at Foundations: Extruded polystyrene board.
- C. Rigid Insulation Board over Metal Stud Framed Walls with Sheathing, Continuous: Extruded polystyrene board.
- D. Rigid Cavity Wall Insulation Board: Extruded polystyrene board.
- E. Rigid Furred Insulation Board: Polyisocyanurate board.
- F. Thermal Mineral Fiber Batt Insulation: For miscellaneous locations in metal framed walls and filling void at top of partitions.
- G. Acoustic Glass Fiber Batt Insulation: For metal framed walls and above ceilings.
- H. Mineral Fiber Board Insulation: For miscellaneous locations indicated on the Drawings.
- I. Safing Insulation: Mineral fiber firestopping insulation.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene Board Insulation: ASTM C578, Type IV; Extruded polystyrene board with either natural skin or cut cell surfaces.
 - 1. Surface Burning Characteristics, ASTM E84: Flame Spread Index: 5 or less, Smoke Developed Index 145 or less.
 - 2. Board Size: 24 x 96 inch.
 - 3. Board Thickness:
 - a. Under-slab: 2 inches, continuous 4 feet coverage from perimeter edge.
 - b. Perimeter Foundation Walls: 2 layers of 1 inch, staggered joints, full height.
 - c. Slab Edge: 1 inch, continuous.
 - d. Cavity Wall: 3 inches, continuous.
 - e. Other Locations: Thickness for specific conditions as indicated on the Drawings.
 - 4. Board Edges: Square.
 - 5. Thermal Resistance at 75 degrees F: 5.0 per inch.
 - 6. Compressive Resistance: 25 psi, unless otherwise specified.

- a. Slab Edge: 60 psi.
 7. All joints and gaps between insulation board shall be sealed with foam sealant compatible with the insulation board
 8. Water Absorption, maximum: 0.1 percent, volume.
 9. Products for Under-slab and Rigid Perimeter Insulation:
 - a. Styrofoam by Dow Chemical Co.
 - b. Foamular 250 by Owens Corning Corp.
 10. Products for Rigid Cavity Wall Insulation:
 - a. Styrofoam Cavity Mate Ultra by Dow Chemical Co.
 - b. Foamular CW25 by Owens Corning.
 11. Substitutions: See Section 01 60 00 - Product Requirements.
- B. High Density Extruded Polystyrene Board Insulation: ASTM C578, Type VII; Extruded polystyrene board with either natural skin or cut cell surfaces.
1. Applications: Tractor Instruction 2072, Firefighting Science 2082, Incubator 2107, CTE Exploration Studio 2031, Building Trades 2036, Automotive Technology 2013, Automotive Collision 2015, Welding Fabrication 2021, Precision Manufacturing 2026 and where indicated.
 2. Surface Burning Characteristics, ASTM E84: Flame Spread Index 25 or less, Smoke Developed Index 150 or less.
 3. Board Size: 24 x 96 inch.
 4. Board Thickness: 2 inches, continuous 4 feet coverage from perimeter edge.
 5. Board Edges: Square.
 6. Thermal Resistance at 75 degrees F: 5 per inch.
 7. Compressive Resistance: 40 psi.
 8. Water Absorption, maximum: 0.1 percent, volume.
 9. Products:
 - a. Styrofoam 40 High Load by Dow Chemical Co.
 - b. Foamular Extruded Polystyrene (XPS) Insulation by Owens Corning.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Polyisocyanurate Insulation Board: Rigid cellular foam, complying with ASTM C1289; Type I, aluminum foil both faces; Class 1, non-reinforced foam core.
1. Application(s): Basement Level – foundation perimeter furred wall assembly, and as indicated per the Drawings.
 2. Surface Burning Characteristics, ASTM E84: Flame Spread Index 25 or less, Smoke Developed Index 450 or less.
 3. Board Size: 24 x 96 inch.
 4. Board Thickness: 1-1/2 inches, in 2 layers, for a total of 3 inches.
 5. Board Edges: Square.
 6. Thermal Resistance at 75 degrees F: 5.6 per inch.
 7. Compressive Resistance: 16 psi.
 8. Products:
 - a. Thermax by Dow Chemical Co.
 - b. AP Foil Faced by Johns Manville.
 - c. Xci Foil by Hunter Panels.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 FIBER BOARD INSULATION MATERIALS

- A. Mineral Fiber Board Insulation: Rigid or semi-rigid mineral fiber, ASTM C612 or C553; unfaced.
1. Applications: Where indicated on the Drawings.
 2. Surface Burning Characteristics, ASTM E84: Flame Spread Index 0, Smoke Developed Index: 0 (zero).
 3. Board Thickness: 3 inches.
 4. Thermal Resistance, ASTM C518: R-value of 4.2 deg F sq ft/Btu at 75 degrees F, min.

5. Dual Density: 6.1 outer and 4.2 inner lb/cu ft.min.
6. Products:
 - a. CavityRock DD by Roxul Inc.
 - b. Alternate Manufacturer's:
 - 1) Thermafiber Owens Corning.
 - 2) Johns Manville
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.

2.04 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: (Acoustic) ASTM C665; flexible preformed batt or blanket, friction fit; minimum 25% recycled content.
 1. Surface Burning Characteristics, ASTM E84: Flame Spread Index 25 or less; Smoke Developed Index 450 or less.
 2. Formaldehyde Content: Zero.
 3. Thicknesses:
 - a. Partitions: 3 inches
 - b. Above ceilings: 6 inches (Music and kitchen).
 4. Facing: Unfaced within stud walls. Poly wrapped above ceilings.
 5. Products:
 - a. Sound Shield Free by Johns Manville.
 - b. EcoBatt by Knauf.
 - c. ComfortTherm by Johns Manville. (poly wrapped)
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Mineral Fiber Batt Insulation: (Thermal) Flexible preformed batt or blanket, ASTM C665; friction fit, unfaced.
 1. Surface Burning Characteristics, ASTM E84: Flame spread index 0; Smoke developed index 0.
 2. Thermal Resistance: R-value of 4 per inch.
 3. Products:
 - a. Thermafiber, Inc.
 - b. ComfortBatt by Roxul.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 4. Where thickness is not indicated, furnish the maximum thickness appropriate for the proposed application.
- C. Fiber Firestopping Insulation (Safing Insulation): ASTM C665 Type 1, unfaced, high-melt mineral fiber batt and have the following properties:
 1. Thickness: 2 inch minimum thickness, and as required by tested assemblies.
 2. Density, ASTM D1622: 4 pcf.
 3. Surface Burning Characteristics, ASTM E84: Flame Spread Index 15, Smoke Developed Index 0.
 4. Water Absorption, ASTM C 272: 0.1% by volume
 5. Accessories: Manufacturer's "Z" impaling clips as required.
 6. Products:
 - a. Thermafiber by USG.
 - b. Safing Insulation / MW by Owens Corning Insulation
 - c. For Curtainwalls: Foil-faced Thermafiber Curtainwall Insulation by USG.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 FOAM INSULATION SEALANT

- A. Foam Insulation Sealant: Expanding, low VOC, HCFC-free, urethane foam sealant
 1. Products:
 - a. Pur Fil IG 750 Foam by Todol Products, Inc.
 - b. Great-stuff Pro by Dow Chemical Co.

- c. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 ACCESSORIES

- A. Fasteners and Adhesive: As recommended by the insulation manufactures and as approved by Factory Mutual, material manufacturers, and related codes where applicable. In general, adhesives and fasteners shall be "Construction Grade", corrosion resistant stainless steel or galvanized, as suitable for damp locations.
- B. Adhesive: Type recommended by insulation manufacturer for application.
- C. Tape: For furred wall insulation board; bright aluminum self-adhering type, reinforced, 2 inches wide.

2.07 UNDERSLAB VAPOR RETARDER

- A. Underslab Vapor Retarder: Multi-ply, reinforced polyethylene, ASTM E1745, stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.
 - 1. Water Vapor Permeance, ASTM E96: 0.03 perms max.
 - 2. Puncture Resistance, ASTM D1709: 475 min
 - 3. Tensile Strength, ASTM D882: 45 lbf/in min.
 - 4. Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations air-tight in vapor retarder.
- B. Products:
 - a. Griffolyn Type 65 by Reef Industries Co.
 - b. Moistop by Fortifiber Building Systems.
 - c. Ply-Bar Plus II by Firstline Corp.
 - d. Stego Wrap Class C by Stego Industries.

2.08 ACCESSORIES

- A. Fasteners and Adhesive: As recommended by the insulation manufactures and as approved by Factory Mutual, material manufacturers, and related codes where applicable. In general, adhesives and fasteners shall be "Construction Grade", corrosion resistant stainless steel or galvanized, as suitable for damp locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Exterior foundation wall perimeters shall have vertical rigid insulation installed from bottom of slab to top of footing. Coordinate with installation of sub-grade vapor barrier for soil gas depressurization system to be installed at least 12 inches below the slab and sealed to the foundation wall. See Section 33 46 10 – Soil Gas Depressurization System regarding sub-grade vapor barrier.
- B. Apply adhesive to back of boards in a pattern to ensure adhesion to the foundation, foundation waterproofing, and to other boards.
- B. Install boards horizontally on foundation perimeter, except where foundation is waterproofed and utilizes a thermal drainage board.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
 - 4. Install boards in 2 layers with joints staggered.

- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT CAVITY WALLS AND BEHIND SIDING

- A. Apply adhesive to back of boards in a pattern to ensure adhesion to the weather barrier or secure boards mechanically to studs with fasteners recommended by the manufacturer.
- B. At cavity walls, install boards to fit snugly between wall ties.
- C. Install boards horizontally on walls.
 - 1. Install in running bond pattern.
 - 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- E. All joints and gaps between insulation boards shall be sealed with foam sealant compatible with the insulation board.

3.04 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Exterior wall perimeters shall have horizontal rigid insulation installed for a width of four (4) feet, continuously placed below the underslab vapor retarder and on top of the soil gas crushed stone fill base for slabs.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and slab.

3.05 UNDERSLAB VAPOR RETARDER INSTALLATION

- A. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab. Vapor retarder shall be installed over entire area with seams lapped 12 inches and taped continuously. All penetrations shall be taped continuously to achieve a soil gas air-tight installation. Edge of retarder shall be sealed against foundation wall.
 - 1. NOTE: Under slab vapor retarder installation shall be inspected prior to concrete pour and all penetrations, tears, disturbed areas, loose seams shall be repaired and re-inspected prior to commencement of concrete pour.

3.06 BOARD INSTALLATION AT EXTERIOR FURRED WALLS

- A. Apply adhesive to back of boards against concrete walls in a pattern to secure in place during installation of Z furring in a horizontal orientation. Install second layer of insulation board between Z furring which is secured to the face of the inner line of Z furring. Tape all seams continuously for the layer of insulation directly behind the gypsum board finish.

3.07 FIBEROUS BATT AND BOARD INSTALLATION

- A. Install fibrous board and batt insulation in accordance with manufacturer's instructions.
- B. Install thermal insulation at miscellaneous exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Install acoustic insulation between studs and other materials. Friction fit to prevent sliding and sagging. Provide additional clips and fasteners as required.
- D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- E. Fit insulation completely to fill cavities and behind mechanical and electrical services within the plane of the insulation.
- F. All fibrous batt and board insulation shall be isolated from occupiable building spaces by gypsum board or other approved finish. Exposed insulation shall not be permitted in habitable areas.

3.08 SAFING INSULATION

- A. Install insulation as part of firestopping and smoke sealing in all floor/ceiling assembly penetrations, as required by fire sealant manufacturer's tested assemblies, as indicated on the Drawings, or as otherwise required for uninterrupted fire and smoke protection. Coordinate installation with Firestops and Smoke seals specified in Section 07 84 00 - Firestopping. NOTE:

Unless specifically noted otherwise, firesafing insulation shall serve as back-up firestopping at penetrations. The primary firestopping shall be firestops as specified in Section 07 84 00 - Firestopping.

- B. Insulation shall be cut to fit snugly and neatly with the smooth face toward the visible side. Where small pieces are used to close holes or gaps, they shall be neatly packed into the opening to be filled, out of view. Provide concealed mechanical fasteners as required.

3.09 FOAM INSULATION SEALANT INSTALLATION

- A. Install foam insulation sealant continuously to completely fill all gaps and voids at insulation boards, at voids in deck flutes, at voids around window and door frames, and at locations as indicated on the Drawings.
- B. Install foam insulation following manufacturer's instructions and recommendations. Exercise caution not to overfill voids. Insulation shall be permitted to expand without causing the deflection of adjacent materials. Use non-expanding foam at perimeters of doors and windows.

END OF SECTION

SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foamed-in-place insulation for miscellaneous locations at the exterior wall and roof edge as indicated on the Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 07 21 00 - Insulation: Foamed insulation sealant.

1.03 REFERENCE STANDARDS

- A. ASTM C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation; 2010.
- B. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- C. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2008.
- D. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene one month prior to commencing work of this Section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, insulation properties, preparation requirements, fire test reports, VOC content, MSDS sheets, certified test reports showing compliance with specified performance values and verification of minimum foam thickness to achieve the specified R-value.
- C. Samples:
 - 1. Submit 12" x 12" sample of insulation on specified substrate.
 - 2. Submit daily test shot samples of foamed-in-place insulation from each batch of foam.
- D. Certificates:
 - 1. Certify in writing that products of this section meet or exceed specified requirements.
 - 2. Certify in writing acceptance of all substrate surfaces prior to insulation installation.
 - 3. Certify in writing installer is approved by the manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this Section, with not less than fifteen years of documented experience.
- B. Applicator Qualifications: Applicator shall be trained and certified by the insulation manufacturer, shall specialize in performing work of the type specified, with minimum five years of experience.
- C. Conform to applicable code for flame and smoke limitations.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered in manufacturer's original sealed containers clearly labeled with manufacturer's name, product identification, safety information, net weight and expiration date.
- B. Materials shall be stored in a safe manner within temperature limits specified by the materials manufacturer.

1.08 FIELD CONDITIONS

- A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.
- B. Do not apply foam when temperature is within 5 F of dew point.
- C. Do not apply to unsatisfactory substrate conditions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Foamed-In-Place Insulation: 2-component closed cell spray polyurethane foam system, non-CFC or HCFC blowing agent, ASTM C1029 Type II.
 - 1. Installed Thickness: 3 inches or as indicated on the Drawings.
 - 2. Surface Burning Characteristics, ASTM E84: Flame Spread Index of 25 or less, Smoke Developed Index of 350 or less.
 - 3. Thermal Resistance R value aged, ASTM C518: 6.7 min. per inch.
 - 4. Water Vapor Transmission, ASTM E96: 0.7 perms max. at 2" thickness.
 - 5. Air Infiltration, ASTM E283: At 1.57 psf, <0.001 cfm/sq ft; At 6.24 psf, <0.001 cfm/sq ft.
 - 6. Water Absorption, ASTM D2842: 0.60% volume.
 - 7. Compressive Strength, ASTM D1621: 26 PSI min.
 - 8. Density, ASTM D1622: 2.0 PCF.
 - 9. Dimensional Stability, ASTM D2126: -0.47% at -20 F and 5.9% at 100 F.
 - 10. Products:
 - a. Walltite by BASF
 - b. Corbond III by Johns Manville.

2.02 ACCESSORIES

- A. Primer: Required, by insulation manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.
- C. Examine substrate surfaces to receive insulation system materials and conditions under which the system will be installed. Do not proceed with the Work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the system installer and in compliance with the system manufacturer's standards.
 - 1. Prior to beginning work, examine all substrates for soundness, such as tightness of connections, crumbling or looseness of surface, and other conditions that would affect the installation.
 - 2. Notify the Contractor and Architect of any adverse or unsatisfactory conditions. Work shall not proceed until such conditions are corrected and conditions are accepted by the insulation system contractor.
- D. The insulation contractor shall submit a certificate stating acceptance of all substrate surfaces prior to installation of the insulation system, including, but not limited to:
 - 1. Roof deck is clean, dry, free of ice and snow, free of oils or other contaminants, smooth, free of depressions, waves, projections and other detrimental features for the insulation system installation.
 - 2. Substrate surfaces are solidly supported and secured.
 - 3. Substrate surfaces are suitable for proper bonding of the insulation system materials.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.

- B. Ventilate area to receive insulation and follow manufacturer's instructions for safe working conditions for workers and where applicable, building occupants.
- C. Apply primer in accordance with manufacturer's instructions.
- D. Verify that window frames, door frames, wiring, conduit boxes, etc are secured appropriately so that expansion of foam does not cause their displacement.

3.03 APPLICATION

- A. Apply insulation in accordance with manufacturer's instructions. Insulation shall be installed at a thickness of no more than 2.75 inches per pass.
- B. Apply insulation by spray method, to a uniform monolithic density without voids, in consecutive passes. Observe installation tolerance from specified thickness.
- C. Measures shall be taken to contain field trimmings of over-sprayed areas. They shall be removed on a regular basis to minimize trimmings from being blown around the site.
- D. Monitor and maintain the component ratio and mix of the components of the urethane chemicals in accordance with the manufacturer's product requirements. See Field Quality Control below.
- E. Sealant is required at all locations requiring an infiltration seal, that are too small for foam sealant (1/8 inch or less).
- F. Apply to achieve minimum specified cured thickness.
- G. Patch damaged areas.
- H. It is intended that all areas of foam insulation within the building envelop shall be separated from the interior by gypsum board thermal barrier.

3.04 FIELD QUALITY CONTROL

- A. Field inspections and tests shall be performed by an independent testing agency under provisions of Section 01 40 00 and shall include:
 - 1. Verification of insulation and overcoat thickness and density.
- B. Field monitoring and testing shall be performed by the insulation system contractor under provisions of Section 01 40 00 and shall include:
 - 1. Insulation system contractor shall monitor and maintain the component ratio and mix; component temperatures; in accordance with the manufacturer's product recommendations to achieve the desired density and physical properties. Verify product component ratio with flow meters and programmable ratio monitoring equipment to ensure insulation product conforms to the manufacturer's prescribed limits.
 - a. Submit monitoring records during the progress of the work on a daily basis.
 - 2. Test samples: Insulation system contractor shall submit daily test shot samples of insulation from each batch of foam. Sample size shall comply with industry standards. Samples shall be marked for date, batch number, location where installed in the building.

3.05 PROTECTION

- A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Weather Barrier System Type 1: Membrane, transition membrane and wall flashings for a complete system to perform as a combined continuous air, water and vapor barrier.
- B. Weather Barrier System Type 2: Membrane, transition membrane and wall flashings for a complete system to perform as a combined continuous air and water barrier that is vapor permeable.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Drip flashing installed in conjunction with weather barrier membrane flashing.
- B. Section 05 40 00 - Cold Formed Metal Framing: Sheathing substrate for weather barrier.
- C. Section 07 21 00 - Thermal Insulation: Rigid cavity wall insulation board.
- D. Section 07 53 00 - Elastomeric Membrane Roofing: Air-vapor barrier installed as part of the roofing system.
- E. Section 07 90 05 - Joint Sealers: Sealant materials and installation techniques.

1.03 DEFINITIONS

- A. Air Barrier: Air-tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- B. Vapor Retarder: Air-tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
 - 1. Water Vapor Permeance: For purposes of conversion, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$.
- C. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture-resistant, to the degree specified, intended to send water to outside of the wall assembly.

1.04 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- C. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- D. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.
- E. ICC-ES AC208 - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing; ICC Evaluation Service, Inc.; 2015.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics, performance criteria, and limitations.
- C. Shop Drawings: Provide drawings of special joint conditions, terminations, flashings, penetrations, window and door openings and treatment of substrate joints and cracks.
- D. Manufacturer's Installation Instructions: Indicate preparation.
- E. Samples: Submit representative samples of sprayed coating, sheet seal, transition membrane, and membrane wall flashing.
- F. Certifications:

1. Submit certification by weather barrier manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
2. Submit weather barrier manufacturer's certification of compatibility of weather barrier with all materials in contact with it.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Weather barrier systems shall be manufactured and marketed by a firm with a minimum of 20 years of experience in the production and sales of waterproofing. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.
- B. Installer: A company with at least five years of experience with the installation of products specified herein and having successfully completed other Projects of similar scope, and approved by the weather barrier manufacturer.
 1. Written confirmation or certification from the Waterproofing Manufacturer that the installer has been trained and is recognized by the manufacturer as suitable for the execution of the work.
 2. List of at least three projects contracted within the past five years of similar scope and complexity to this Project carried out by the firm and site supervisor.
- C. Materials Source Limitations: For each type of material required for the work of this Section, provide primary materials and weather barrier accessories that are the products of one manufacturer.

1.07 PERFORMANCE REQUIREMENTS

- A. General: Weather Barrier Type 1 shall be capable of performing as a continuous vapor barrier air and water resistive barrier and Type 2 shall be capable of performing as a continuous air and water resistive barrier, flashed to discharge to the exterior incidental condensation or water penetration. Weather barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to embedded flashing, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.08 MOCK-UPS AND SAMPLE INSTALLATIONS

- A. Mock-Ups: Provide weather barrier Type 1 system in exterior wall mocks as specified in Section 04 20 00 - Unit Masonry and Section 07 42 13.
 1. Mock-up panels shall demonstrate actual wall construction, detailing and workmanship.
 2. No work shall progress until the Architect has reviewed mock-up panels. Panels shall be revised as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all related exterior wall work.
 3. Mock-up panels shall not be destroyed or moved until the Work is complete and accepted by the Architect. Upon completion of construction, mock-ups panels shall be removed.
- B. Sample Installation: Prior to commencement of the complete installation of the weather barrier system, a sample installation shall be provided to verify details, tie-ins and to demonstrate the required quality of materials, installation and workmanship.
 1. The sample installation shall be applied to a constructed exterior wall section, 8 feet long and 8 feet wide, at a location to be determined by the Architect, incorporating brick shelf, window and door frame head, jamb and sill flashing and masonry ties.
 2. No work shall progress until the Architect has reviewed the sample installation. Sample installation shall be revised as necessary to secure the Architect's acceptance.

1.09 PRE-INSTALLATION MEETING

- A. Pre-Installation Conference: A pre-installation conference shall be held at least two weeks prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include but not be limited to the following:

1. Review of submittals.
 2. Review of surface preparation, minimum curing period and installation procedures.
 3. Review of special details and flashings.
 4. Sequence of construction, responsibilities and schedule for subsequent operations.
 5. Review of mock-up requirements.
 6. Review of inspection, testing, protection and repair procedures.
- B. Manufacturer's Representative: Make arrangements necessary to have a trained employee of the manufacturer on-site prior to installation, at 25% completion, and final completion; as well as any other necessary re-inspections during membrane work to review installation procedures. A field report shall be issued to the Contractor and Architect after each visit; indicating the quality of the work and identifying any issues and resolutions.

1.10 DELIVERY, STORAGE AND PROTECTION

- A. Materials shall be delivered in manufacturer's original sealed containers clearly labeled with manufacturer's name, product identification, safety information, net weight, and expiration date.
- B. Materials shall be stored in a safe manner within temperature limits specified by the materials manufacturer.
- C. Avoid spillage. Immediately notify Owner and Architect if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.
- D. Observe safety and environmental measures indicated in manufacturer's MSDS, and mandated by federal, state and local regulations.

1.11 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

1.12 WARRANTY

- A. Provide the manufacturer's five year materials warranty, covering the primary weather barrier, accessory sealant and membrane materials against failure to cure, or achieve airtight and watertight seal, or to adhere.

PART 2 PRODUCTS

2.01 WEATHER BARRIER MATERIALS

- A. Weather Barrier Type 1 - Fluid-Applied Coating: Fire-resistant, liquid water drainage plane, air and vapor barrier system.
 1. Wet Film Thickness: 70 to 80 mils.
 2. Dry Film Thickness: 38 to 43 mils.
 3. Application Temperature: 40 degrees F. minimum.
 4. Color: Un-cured medium blue; cured dark blue.
 5. VOC Content: <10 g/L
 6. Air Permeance, ASTM E2178: 0.0010 L/s sq m at 75 Pa.
 7. Water Vapor Permeance, ASTM E96A: 0.05 perms
 8. Products:
 - a. FR Barritech NP by Carlisle Coatings & Waterproofing, Inc.
 - b. Air-Bloc 32 MR by Henry.
 - c. Substitutions: See Section 01 40 00 - Product Requirements.
- B. Weather Barrier Type 2 - Fluid-Applied Coating: Fire-resistant, air barrier, liquid water drainage plane and vapor permeable system.
 1. Wet Film Thickness: 70 mils.
 2. Dry Film Thickness: 30 mils.
 3. Application Temperature: 40 degrees F. minimum.
 4. Color: Un-cured medium blue; cured dark blue.
 5. VOC Content: <10 g/L

6. Air Permeance, ASTM E2178: 0.02 L/s* sq m at 75 Pa. (0.004 cfm/sq ft at 1.57 lbf/sq ft)
 7. Water Vapor Permeance, ASTM E96A: 10 perms min.
 8. Surface Burning Characteristics, ASTM E84: Flame Spread Index 25 max; Smoke Generated Index 450 max.
 9. Products:
 - a. FR Barritech VP by Carlisle Coatings & Waterproofing, Inc.
 - b. ExoAir 230 by Tremco.
 - c. Substitutions: See Section 01 40 00 - Product Requirements.
- C. Joint Filler: As recommended by coating manufacturer and suitable to the substrate.

2.02 SEALANTS

- A. Sealants: As recommended by the weather barrier system manufacturer for each application. Sealants shall have been tested for chemical and adhesive properties in relation to adjacent surface materials and approved in writing by the weather barrier system manufacturer.
- B. Sealant Backers: As specified in Section 07 90 05.
- C. Primers, Cleaners, and Other Sealant Materials: Required, as recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.

2.03 ACCESSORIES

- A. Membrane Flashing: 40 mils total thickness; 32 mils self-adhesive rubberized asphalt integrally bonded to 8 mils cross-laminated high-density polyethylene film with disposable silicone-coated release paper.
 1. Permeance, ASTM E96: 0.05 perms.
 2. Puncture Resistance, ASTM D570: 40 lb, min.
 3. Products:
 - a. ExoAir TWF by Tremco.
 - b. Blueskin TWF by Henry Company.
 - c. CCW-705 Self-Adhering Vapor/Air Barrier by Carlisle Coatings and Waterproofing.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Transition Membrane: 36 mils total thickness, 32 mils self-adhesive rubberized asphalt integrally bonded to 4 mil cross-laminated, high density polyethylene film with disposable silicone-coated release paper.
 1. Products:
 - a. ExoAir 110/110LT by Tremco.
 - b. Blueskin SA by Henry Company.
 - c. CCW-705 Self-Adhering Vapor/Air Barrier by Carlisle Coatings and Waterproofings.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Surface Conditioner / Primer: Required, as recommended by coating manufacturer and suitable to the substrate.
- D. Thinners and Cleaners: As recommended by material manufacturer.
- E. Drip Flashing: Membrane flashing termination at exterior of masonry veneer. See 04 20 00 - Unit Masonry.
- F. Perimeter Transition Flashing System: Factory-fabricated silicone transition system to seal weather barrier membrane to aluminum curtain wall framing. See Section 08 44 13 - Glazed Aluminum Curtain Walls.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this Section. Notify the Contractor, in writing, of circumstances detrimental to the proper completion of the Work. Do not proceed with work until unsatisfactory conditions are corrected.

- B. Aluminum window, curtainwall and louver framing perimeters shall receive perimeter transition flashing system as a part of the work of those Sections. Notify the Contractor if perimeter transition flashing system is unsatisfactory for the installation of weather barrier tie-ins.

3.02 PREPARATION

- A. Remove dust, dirt, oils, loose or foreign matter which might impair adhesion of materials.
- B. Masonry walls shall have mortar joints struck flush. All voids and holes, particularly in the mortar joints, shall be filled with lean mortar mix, non-shrink grout or parge coat.
- C. Exterior sheathing substrates shall be sufficiently stabilized with corners and edges fastened with appropriate fasteners. Pre-treat all board joints with 2 to 3 inch wide, reinforced self-adhesive tape or fiberglass mesh style wallboard tape. Gaps greater than 1/4 inch shall be filled with mastic or sealant, fully cured before application of tape and sprayed coating.
- D. Prime masonry substrate surfaces to receive adhesives and self-adhering membrane in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- C. Fluid-Applied Coatings:
 - 1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
 - 2. Install sprayed coating over entire exterior surface; seal to adjacent construction with compatible sheet.
 - a. Spray with overlapping passes for a continuous uniform film thickness.
 - b. Carry coating into any openings a minimum of 2 inches.
 - c. Seal all penetrations as work progresses.
 - 3. Where exterior masonry veneer is to be installed, install masonry anchors before installing weather barrier over masonry; seal around anchors air tight.
 - 4. Use flashing to seal to adjacent construction and to bridge joints as recommended by system manufacturer. Provide backer rods to support membrane at joints to be bridged where required.
- D. Openings and Penetrations in Weather Barrier:
 - 1. Transition Membrane: After allowing the sprayed coating to cure to tack-free, apply transition membrane to overlap perimeter transition flashing system installed by others at door and window framing perimeters, roof and floor intersections, and changes in substrate. Use pre-cut, easily handled lengths for each location.
 - a. Remove release paper and position membrane flashing carefully before placing it against the surface. When properly positioned, place against surface by pressing firmly into place by hand roller. Overlap adjacent pieces 2 inches, or manufacturer's recommended amount and roll all seams with a hand roller. Seal to edge of flashing with termination mastic.
 - 2. Perimeter Transition Flashing System (for curtain wall framing): Coordinate installation of system flashing in curtain wall framing glazing pockets by the glazer and adhere leg for sealing to weather barrier neatly and completely. Corners shall be made with manufacturer's premade units.
 - 3. Membrane Flashing: Locate at heads of openings, items that bridge the cavity and other locations as indicated on the Drawings. Fully adhere flashing to substrate to prevent water from migrating under the flashing and seal top edge with termination mastic.
 - a. Remove release paper and position membrane flashing carefully before placing it against the surface. When properly positioned, place against surface by pressing firmly into place by hand roller. Overlap adjacent pieces 2 inches and roll all seams with a hand roller. Seal to edge of flashing with termination mastic.

- b. Trim bottom edge 1/2 inch back from exposed face of the exterior wall. Flashing shall not be permanently exposed to sunlight. Flashing shall be adhered to top surface of metal flashing drip edge that shall project beyond face of exterior wall.
 - c. At heads, sills and all flashing terminations, turn up ends a minimum of 2 inches and make careful folds to form an end dam, with the seams sealed.
 - d. Do NOT allow the rubberized asphalt surface of the flashing membrane to come in contact with polysulfide sealants, creosote, uncured coat tar products or EPDM.
4. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.
 5. Treat construction joints and install flashing as recommended by manufacturer.

3.04 WASTE MANAGEMENT AND DISPOSAL

- A. Separate and recycle waste materials in accordance with the waste disposal plan. See Section 01 74 19. Place materials defined as hazardous or toxic waste in designated containers. Ensure emptied containers are stored safely for disposal.

3.05 FIELD QUALITY CONTROL

- A. Do not cover installed weather barriers until required inspections have been completed.
- B. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
- C. Contractor's Responsibilities: The Contractor shall appoint one individual who shall be responsible for achieving an acceptable, water and air barrier installation. This individual shall be on-site throughout the installation of the weather barrier and shall observe sealing of all penetrations, door, window, curtain wall, storefront openings and sealing of weather barrier to roof air-vapor barrier to help ensure a proper installation.
- D. Weather barrier shall not be concealed until the installation has been accepted by the Owner and Architect.

3.06 PROTECTION AND CLEANING

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Remove any masking materials after installation. Clean any stains on materials that would be exposed in the completed work using procedures as recommended by the manufacturer.
- C. Protect membranes to avoid damage from other trades, and construction materials during subsequent operations.
- D. For cavity insulation boards, bonding of the insulation may be achieved if the insulation products are installed when the membrane is tacky.
- E. Schedule work to ensure that the weather barrier is covered as soon as possible after installation. Protect the installation from damage during subsequent operations. If the installation cannot be covered within 30 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins.

END OF SECTION

SECTION 07 41 13
METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural roofing system of preformed steel panels.
- B. Fastening system.
- C. Factory finishing.
- D. Accessories and miscellaneous components.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 – Wood Blocking and Curbing.
- B. Section 06 19 00 – Wood Trusses: Roof framing trusses.
- C. Section 07 90 05 - Joint Sealers: Field-installed sealants.
- D. Section 09 21 16 – Gypsum Wall Assemblies: Interior framing to receive roofing systems.

1.03 REFERENCE STANDARDS

- A. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- B. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2013.
- C. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2012).
- D. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2011).
- E. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Storage and handling requirements and recommendations.
 - 2. Installation methods.
 - 3. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions for Project conditions. Shop drawings shall include isometric details to clearly show roofing conditions including roof-wall intersections, penetrations, ridges, valleys and other special conditions.
 - 1. Show work all to be field-fabricated or field-assembled.
 - 2. Include structural analysis signed and sealed by qualified structural engineer, licensed in the State the Project is located in, indicating conformance of roofing system to specified loading conditions.
- D. Shop Drawings: Submit shop drawings for snow guard layout.
 - 1. Prepared specifically for this project; showing dimensions of metal roof snow guards and accessories, fastening details and connections and interface with other products.
 - 2. Submit engineered manufacturer shop drawings showing quantities, layouts and spacing design specific to this project and in conformance with manufacturer guard tolerances and capabilities.

- E. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
 - 1. Include typical panel joint in sample.
 - 2. Include typical fastening detail.
- G. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the manufacture of roofing systems similar to those required for this Project.
 - 1. Not less than 10 years of documented experience.
- B. Installer Qualifications: Company specializing in the installation of metal roofing systems with at least five years of experience, trained and authorized by roofing system manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.07 WARRANTY

- A. See Section 01 78 10 - Warranties, for additional warranty requirements.
- B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 30 year period from date of Substantial Completion.
- C. Special Weathertight Warranty: Manufacturer's Platinum Plus warranty in which manufacturer agrees to repair or replace roof panel assemblies that fail to remain weathertight within the specified warranty period.
 - 1. Product Warranty Period: 20 years from date of Substantial Completion.
- D. Installer's warranty for weather-tightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: 2" Field-Lok by ATAS International, Inc.
- B. Acceptable manufacturers:
 - 1. Garland Roofing Co.
 - 2. Architectural Building Components.
 - 3. Firestone Building Products LLC.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ARCHITECTURAL METAL ROOF PANELS

- A. Architectural Metal Roofing: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system. Include clips, cleats, pressure plates, and accessories required for weathertight installation. Unless more stringent requirements are indicated, comply with ASTM E 1514.
- B. Metal Panels: Factory-formed panels with factory-applied finish.
 - 1. Steel Panels:
 - a. Steel Thickness: Minimum 24 gage (0.024 inch).

2. Profile: Standing seam, with minimum 2.0 inch seam height; concealed fastener system lapped seam in standing seam profile.
 3. Texture: Smooth.
 4. Length: Maximum possible length to minimize lapped joints. Where lapped joints are unavoidable, space laps so that each sheet spans over three or more supports.
 5. Width: Maximum panel coverage of 15 inches.
 6. Color: Selected by Architect from manufacturer's full line.
 - a. Interior Applications: Factory primed for field finishing.
- C. Performance Requirements:
1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads with manufacturer's standard safety factors.
 - a. Wind and Snow Loads: See Structural Drawings.
 2. Static Watertight System, ASTM E1592: Pass.
 3. Air Infiltration, ASTM E1680: Maximum 0.06 cfm/sq ft at air pressure differential of 6.24 lbf/sq ft. 120 MPH is 20 psi
 4. Water Penetration, ASTM E1646: No water penetration. Perform test immediately following air infiltration test.
 5. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 120 degrees F.
 6. Fire Rating Class A.

2.03 ATTACHMENT SYSTEM

- A. Concealed Attachment System: Provide manufacturer's standard 16 gage minimum galvalume steel concealed 1-piece anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement. Sealant at panel cap shall be isolated from clip to ensure sealant is not damaged as a result of panel movement. Clip shall provide clearance of panel to deck for ventilation.

2.04 SECONDARY FRAMING

- A. Miscellaneous Secondary Framing: Provide light gauge steel framing incidental to structural supports; fabricated from steel sheet.
- B. Framing Material: ASTM A 1011/A 1011M, Designation SS steel sheet.
1. Profile: Manufacturer's standard cee, zee, asymmetrical zee, hat channel, plain channel, single slope eave strut, double slope eave strut, and angle.
 2. Thickness: 12 gauge, 0.1046 inch.
 3. Finish: Galvanized per ASTM A653/A653M, G90.

2.05 PANEL FINISH

- A. (Exterior Applications) Fluoropolymer Coating System: Manufacturer's standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil; color and gloss as selected from manufacturer's standards.
- B. (Interior Applications) Manufacturer standard primer for field finish.

2.06 ACCESSORIES AND MISCELLANEOUS ITEMS

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, scuppers, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs factory fabricated of the same material, thickness, and finish as used for the roofing panels.
- B. Snow Guards: Prefabricated, non-corrosive units designed for compatibility with metal roof panels.
1. ColorGard/S-5 by Atas International, Inc.
 2. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Sealants:
1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.

2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
3. Seam Sealant: Factory-applied, non-skinning, non-drying type.
- D. Underlayment Membrane: Self-Adhering, High-Temperature Sheet: 45 mil homogeneous rubberized asphalt waterproofing compound, glass fiber reinforced designed specifically for use under sheet metal roofing.
 1. Thermal Stability: Resistant to 240 deg F; ASTM D 1970.
 2. Low Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 3. Basis of Design: ATAS ATA-Shield as supplied by ATAS International, Inc.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
 5. Protection Sheet: Asphalt free felt: Conforming to ASTM D 226, polyolefin based, 100 percent asphalt free, high strength reinforced roofing underlayment.
 - a. Basis for design ATAS ATA-Guard as furnished by ATAS International, Inc
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 6. Interior Applications: At interior applications provide Protection Sheet only.
- E. Ventilation Mat: Nylon mesh fabric.
 1. Applications: All exterior applications, full coverage.
 2. Thickness: 3/16 inch.
 3. Products:
 - a. Advanced Building Products, Inc.; R-Vent.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Fasteners, Clips, Adhesives, Primers and Accessories: As recommended by the roofing system manufacturer for a complete system.

2.07 FABRICATION

- A. Panels: Fabricate and finish panels and accessory items at factory, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Factory-install captive gaskets, sealants, or separator strips at panel joints to provide weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 2. For the record, prepare written report for the General Contractor, endorsed by Installer, listing conditions detrimental to performance of work.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
- B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
- C. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
 - 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
 - 2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
 - 3. Install roofing system in accordance with manufacturer warranty requirements.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

3.04 INSTALLATION OF UNDERLAYMENT (EXTERIOR APPLICATIONS)

- A. Underlayment Membrane; ATA-SHIELD™: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Provide complete coverage of roof sheathing substrate in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3.5 inches. Extend underlayment a minimum of 1.5 inches of fascia board. Roll laps with roller. Cover underlayment within 14 days.
- B. Protection Sheet: Polyethylene Sheet Underlayment; ATA-GUARD™: Install polyethylene sheet on underlayment membrane under ventilation mat. Use adhesive for anchorage to minimize use of mechanical fasteners under metal roof panels. Apply at locations indicated on Drawings, in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.
- C. Ventilation Mat: Install ventilation mat unrolling vertically from ridge to eave just ahead of metal roof panels as they are installed. At fascia detail roll ventilation mat down atop face of subfascia per the Drawings. At Ridge locations extend ventilation mat over the ridge and butt against same ventilation mat on opposing side. Where a ridge vent detail is shown follow ridge vent manufacturer recommendations for installation. Tack mat per manufacturer specifications.

3.05 INSTALLATION OF UNDERLAYMENT (EXTERIOR APPLICATIONS)

- A. Protection Sheet: Polyethylene Sheet Underlayment; ATA-GUARD™: Install polyethylene sheet atop plywood sheathing. Use adhesive for anchorage to minimize use of mechanical fasteners under metal roof panels. Apply at locations indicated on Drawings with lapped joints of not less than 2 inches.

3.06 INSTALLATION OF ROOF PANELS

- A. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.
 - 1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by the panel manufacturer.
 - 2. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.
 - 3. Fasteners: Use fasteners of size and length as required for compatibility with substrate.

3.07 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete sheet metal roofing assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual.

Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

- B. Snow Guards: Install guards per manufacturer recommendations in compliance with roof system manufacturer requirements.

3.08 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.09 PROTECTION

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before date of Substantial Completion.

END OF SECTION

SECTION 07 42 13
METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for walls, with related flashings and accessory components.
- B. Manufactured phenolic panels for walls and soffits, with related flashings and accessory components.
- C. Engineered thermally broken cold formed steel sub-girt system for support of exterior metal wall panels, consisting of vertical girts, horizontal girt, thermal isolators and associated fasteners.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Exterior wall framing and sheathing.
- B. Section 07 21 00 - Thermal Insulation: Exterior wall cavity insulation.
- C. Section 07 25 00 - Weather Barriers.

1.03 REFERENCE STANDARDS

- A. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- B. ASTM A792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data sheets on panels, supports, accessories, finish, trims and sealants.
- C. Shop Drawings:
 - 1. Wall & Soffit Panels: Indicate panel and soffit dimensions, materials, gages, layout, joints, construction details, sealant locations, locations and types of fastening and anchorage.
 - 2. Exterior Sub-Girt System: Submit engineered shop drawings indicating girt system components, interface with building framing and wall panels, dimensions, locations and types of fasteners, anchorage, opening details, design loading, and accessories. All shop shall bear the seal of a licensed structural engineer employed by the wall panel subcontractor, licensed in Maine.
 - a. In conjunction with shops required here-in, submit a record copy statement by the structural engineer employed by the CFMF subcontractor per Section 05 40 00. Statement shall confirm structural calculations pertaining to the design requirements of the sub-girt system engineered per this Section have been received, and that the design of supporting CFMF systems meet the design requirements and applicable code as applicable.
- D. Structural Calculations:
 - 1. Submit girt framing system manufacturer's comprehensive analysis of design loads, including dead loads, live loads, wind loads and thermal movement, signed and sealed by a licensed engineer in Maine, employed by the wall panel subcontractor.
- E. Samples:
 - 1. Submit manufacturer's full range of metallic and non-metallic colors, 3" x 3" minimum size on metal, for selection by the Architect.

2. Submit manufacturer's match sample, where specific colors are specified, 3" x 3" minimum size, for review by Architect.
3. Submit samples of wall panels, full width by 10 inches minimum long, illustrating panel profile, finish color, sheen, and texture.
4. Submit samples of girt system components.
5. Submit samples of all manufacturer trims, clips, fasteners (concealed and exposed) and accessories unless otherwise directed by Architect.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum fifteen years of documented experience.
- B. Designer Qualifications: Design girt system under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Maine, employed by the wall panel subcontractor.
- C. Installer Qualifications: Company specializing in installing the products specified in this Section with minimum five years of documented experience and approved by the panel manufacturer.

1.06 PRE-INSTALLATION MEETING

- A. At least two weeks prior to start of installation of exterior wall insulation board and exterior siding attachment systems, meet at project site with installers of other work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.
- B. Review metal wall framing assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.

1.07 MOCK-UP

- A. Construct exterior wall mock-up, six feet long by eight feet wide on a suitable base with lateral support. Include panel system, girt system, window frame, weather barrier systems, insulation, stud wall, flashings and sealants to demonstrate component assembly and workmanship.
- B. Make corrections to mock-up to achieve acceptance. Mock-up shall remain in place through the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.09 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. Correct defective work within a five year period after the Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Wall Panels Type 1, horizontal:
 1. Basis of Design: Versa Seam Panel by ATAS International Inc. 12 inches wide with 3/4 inch reveals in both directions as indicated on the Drawings. Panels shall have end folds at horizontal reveals as indicated on the Drawings.
 2. Acceptable Manufacturers:

- a. Profile Series by Centria. Concealed fastener IW-40A 11 inches wide with 1 inch reveals in both directions as indicated on the Drawings. Panels shall have end folds at horizontal reveals as indicated on the Drawings.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Phenolic Wall/Soffit Panels Type PWP-1 & PWP-2, vertical and horizontal:
1. Basis of Design: PURA by Trespa North America, Ltd.
 2. Acceptable Manufacturers:
 - a. VitraBond
 - b. Alcoa
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MANUFACTURED METAL PANELS

- A. Metal Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
1. Provide exterior panels and subgirt framing assembly.
 2. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall. See Structural Drawings for design wind speed.
 3. Design Pressure:
 - a. Interior Zone Design Pressure: +19.73 psf; - 21.37 PSF.
 - b. Corner Zone Design Pressure: +19.73 psf, - 26.31 PSF.
 4. Maximum Allowable Deflection of Panel: 1/180 of span.
 5. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 6. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 7. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 8. Corners: Factory-fabricated in one continuous piece with minimum 18 inch returns.
 9. Exterior Finish: AAMA 621; Kynar 500 or Hylar 5000 Fluorocarbon coating; film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mils.
 - a. Back of Panel Finish: Factory standard primer coating with a dry film thickness of 0.25 mil.
 - b. Finish shall conform to all Kynar 500 or Hylar 5000 tests for adhesions, flexibility and longevity.
 10. Expansion Joints: Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system.
 11. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- B. Exterior Panels:
1. Profile: Flush style.
 2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous bead of sealant.
 3. Material: Pre-coated aluminum sheet, 18 gage, 0.0403 inch minimum thickness.
 4. Panel Width: 12 inches.
 5. Reveal: 3/4 inches.
 6. Height: 1 inch.
 7. Colors: Sandstone 06 by ATAS International Inc.
- C. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- D. Anchors: Stainless steel.

- E. Pre-coated Aluminum Sheet: ASTM B209 3105 alloy, smooth surface texture; continuous, -coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.
- F. Trims and Caps: Manufacturer's standard type suitable for use with system, permanently resilient.
- G. Sealants:
 - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane. Proposed color shall be approved by the Architect.
 - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
- H. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
- I. Field Touch-up Paint: As recommended by panel manufacturer.

2.03 MANUFACTURED PHENOLIC PANELS

- A. Phenolic Wall Panel System, Type PWP-1 & PWP-2: Factory fabricated prefinished solid phenolic panel system using a combination of high pressure and temperature to create a flat panel created from thermosetting resins, homogenously reinforced with wood-based fibers and an integrated decorative surface and topcoat protective layer, site assembled.
 - 1. Provide exterior panels and sub-girt framing assembly.
 - 2. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall. See Structural Drawings for design wind speed.
 - 3. Design Pressure:
 - a. Interior Zone Design Pressure: +19.73 psf; - 21.37 PSF.
 - b. Corner Zone Design Pressure: +19.73 psf, - 26.31 PSF.
 - 4. Maximum Allowable Deflection of Panel: 1/180 of span.
 - 5. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 - 6. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 - 7. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 - 8. Thickness: 8 mm (approximately 5/16 inch).
 - 9. Panel Size(s): As indicated per the Drawings.
 - 10. Reveal: 1/4 inch, minimum.
 - 11. Colors:
 - a. PWP-1: Slate Ebony.
 - b. PWP-2: Classic Oak.
 - 12. All corner trims are to be Type PWP-1, unless specified otherwise per the Drawings.
 - 13. Surface Burning Characteristics, ASTM E84: Flame Spread Index Class A and Smoke Developed Index of less than 450 (vertical and horizontal applications).
 - 14. Warranty: 10 years, manufacturer's standard limited warranty.
 - 15. Fastener System: PURA Universal Concealed Clip System by Trespa.
 - a. Provide manufacturer standard fasteners and accessories unless otherwise indicated.
 - b. Exposed Face Fasteners: Trim Head Decking Screws #8 by Simpson Strong-Tie Fastening Systems.
 - 1) Submit fastener layout for Architect review and approval prior to manufacture.
 - 2) Color: Prefinished heads, selected from manufacturer's full range by architect.
 - c. Tape: Manufacturer standard EPDM tape.
 - d. Trim/Reveal: Manufacturer standard as indicated per the Drawings.

- 1) Finish: As selected by Architect from manufacturer's full range.

2.04 SUBGIRT SYSTEM

- A. Attachment system for exterior siding shall be capable of withstanding effects of load and stresses from dead loads, wind loads, snow loads and normal thermal movement without evidence of permanent defects of assemblies or components. See Structural Drawings for project load requirements and wall panel wind pressure requires above.
 1. Furnish and install exterior continuous insulated wall assembly with no thermal bridges other than fastener to effectively control thermal, air and water performance. System shall include the following:
 - a. Cold-formed steel support and attachment framing system installed to exterior of rigid insulation, consisting of vertical and horizontal girts, thermal isolators and associated fasteners.
 2. Structural Design: Exterior-insulated rain screen wall assemblies capable of withstanding effects of load and stresses from dead loads, wind loads, snow loads and normal thermal movement without evidence of permanent defects of assemblies or components.
 3. Provide assemblies that allow for thermal movements, preventing buckling, opening of joints, overstressing of components and other detrimental effects:
 4. Design and install sub-girt system to accommodate primary structural frame deflection criteria as indicated per the Drawings.
 5. Maximum allowable deflection of span: $L/180$.
 5. Submit façade attachment/support framing system manufacturer's comprehensive analysis of design loads, including dead loads, live loads, wind loads and thermal movement, signed and sealed by a licensed engineer in the applicable State.
 6. Fasteners and accessories as required for a complete system.
 7. Product (Basis of Design): CI System by Knight Wall Systems or equal.
 8. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect all panels.
- B. Verify that building framing members are ready to receive panels.
- C. Verify that weather barrier has been installed over substrate completely and correctly.

3.02 SUB-GIRT SYSTEM INSTALLATION

- A. Preparation: Verify vertical girt spacing and framing clearances relative to studs or other points of attachment.
- B. Install according to manufacturer's recommendations and engineering requirements.
 1. Mount vertical box girts, fastened at spacing as determined by engineering calculations overtop of installed rigid insulation as indicated by engineering.
 2. Check plumb of vertical girts both parallel and perpendicular to the structure.
- C. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated on the engineered shop drawings.

3.03 PANEL INSTALLATION

- A. Install panels on soffits in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports. Lap panel ends minimum 2 inches.

- E. Use concealed fasteners unless otherwise approved by Architect.

3.04 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.05 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION

SECTION 07 46 23
WOOD SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Panel siding for Walls.
- B. Soffits.
- C. Soffit vents.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 – Wood Blocking and Curbing: Siding substrate.
- B. Section 07 25 00 - Weather Barriers: Weather barrier under siding.
- C. Section 07 90 05 - Joint Sealers: Sealant at perimeter.
- D. Section 09 91 13 - Exterior Painting: Prime and finish painting.

1.03 REFERENCE STANDARDS

- A. APA B840 - 303 Siding Manufacturing Specifications; APA - The Engineered Wood Association; 2012.
- B. APA PRP-108 - Performance Standards and Qualification Policy for Structural-Use Panels (Form E445); 2001.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating materials, component profiles, fastening methods, sizes, and surface texture.
- C. Samples: Submit two samples 12 x 12 inch in size illustrating surface texture.

1.05 QUALITY ASSURANCE

- A. Plywood Specified by APA Grade or Type: Labeled by APA certified grading agency.

PART 2 PRODUCTS

2.01 SIDING

- A. Siding Panels: APA Rated Siding 303-6-S/W, Exterior exposure class, panel style.
 - 1. Panel Size: 48 x 96 inch size sheet, 19/32 inch thick.
 - 2. Span Rating: 16 inches o.c.
 - 3. Texture/Pattern: APA Texture 1-11.
- B. Trim boards: White Pine species, plain sawn, moisture content of 9 to 14 percent; No. 2, hand culled to select piece for tight knots, S4S.

2.02 ACCESSORIES

- A. Nails: Corrosion resistant type; non-staining, of size and strength to securely and rigidly retain the work.
- B. Soffits: Same material and finish as siding; in 48 inch wide sheets; non-vented type.

- C. Exterior Soffit Vents: One piece, perforated, ASTM B221 (ASTM B221M), 6063 alloy, T5 temper, aluminum, with flat panel edge and manufactured especially for soffit application. Provide continuous vent.
- D. Siding and Trim Flashing: Shall be Z shaped, or other shapes as required, 26 gage mill finished aluminum to build into siding and trim at all horizontal transitions. Color as selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready to receive work.
- B. Verify that water-resistive barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Prime paint all surfaces, faces and edges both concealed or exposed.
- B. Do not install materials until back priming is complete and dry.

3.03 INSTALLATION

- A. Install siding in accordance with manufacturer's instructions.
- B. Fasten siding in place, level and plumb.
 - 1. Arrange for orderly nailing pattern..
- C. Install panel siding sheets horizontally with edges and ends over firm bearing.
- D. Install metal flashings at internal and external corners, sills, and horizontal joints of sheet materials.
- E. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations shown on the drawings. Provide vent area specified.
- F. Sand work smooth and set exposed nails and screws.
- G. Prepare for site finishing specified in Section 09 90 00.

3.04 TOLERANCES

- A. Maximum Variation From Plumb and Level: 1/4 inch per 10 feet.
- B. Maximum Offset From Joint Alignment: 1/16 inch.

END OF SECTION

SECTION 07 53 00
ELASTOMERIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Elastomeric roofing membrane, adhered conventional application.
- B. Insulation, flat and tapered.
- C. Roof Air-vapor barrier.
- D. Deck sheathing.
- E. Membrane flashings.
- F. Roofing stack boots, roofing expansion joints, and walkway pads.

1.02 RELATED REQUIREMENTS

- A. Section 01 23 00 - Alternates: Roof protection board.
- B. Section 05 12 00 - Structural Steel: Roof dunnage for mechanical equipment.
- C. Section 06 10 54 - Wood Blocking and Curbing: P.T. wood nailers and curbs.
- D. Section 07 62 00 - Sheet Metal Flashing and Trim: Metalwork fascias, copings, counterflashings.
- E. Section 07 72 00 - Roof Accessories: Roof-mounted vents and hatches with integral curbs.
- F. Section 08 62 00 - Unit Skylights: integral curb.
- G. Section 08 62 23 - Tubular Skylights: Integral curb.
- H. Division 22 - Plumbing: Roof drains.
- I. Division 23 - HVAC: Mechanical equipment penetrating the roofing.

1.03 REFERENCE STANDARDS

- A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- B. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact; 2013.
- C. ASTM D4637 - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2012.
- D. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- E. FM DS 1-28 - Wind Design; Factory Mutual Research Corporation; 2007.
- F. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.
- G. UL - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of associated counterflashings installed under other Sections.
- B. Pre-installation Meeting: After the submission and review of roofing and flashing shop drawings, samples and printed data, convene a pre-installation meeting at least two weeks before starting installation. Review preparation and installation procedures, coordination and scheduling necessary for related work, determine access, staging and storage areas, establish working weather conditions, roofing protection provisions, considerations for safety of building occupants and other relevant issues.
 - 1. The following personnel shall be present:
 - a. Contractor (Project Manager, Superintendent)
 - b. Roofing Sub-Contractor (Project Manager, Foreman)

- c. Roofing and Flashing Materials Manufacturers
- d. Architect, Project Manager and Owner's Representative
2. Verify compatibility of all materials in contact with roofing, including but not limited to:
 - a. Treated lumber.
 - b. Sealants and adhesives.
 - c. Waterstop membrane.
 - d. Thru wall flashing
 - e. Insulations and roofing boards.
 - f. Vapor Retarders.
 - g. Sheathing.
 - h. Walkway pads.
 - i. All other roofing materials.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- C. Shop Drawings: Provide roofing details and roof layout plan.
 1. Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and paver layout.
 2. Indicate areas, slopes and thicknesses of tapered insulation on roof layout plan.
 3. Indicate roof mounted equipment, hatches, skylights, etc.
 4. Indicate thickness and dimensions of all parts, fastening and anchoring methods, details and locations of seams, joints, and provisions necessary for thermal expansion and contraction. Key in details on roof layout plan.
 5. Indicate details of roof flashing including jointing, expansion joint flashing, intersections, intersections with walls, transitions from cants to walls, transitions from curbs to gravel stops, and any other details required for a complete watertight installation. Key in details on roof layout plan.
- D. Samples:
 1. Submit samples illustrating insulation, roofing membrane, metal flashing, fasteners and underlayments.
- E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- F. Manufacturer's Certificate: Certify that all products, including insulation, underlayment and related fasteners are satisfactory for their intended applications..
 1. Submit final shop drawings to the roofing manufacturer for review as required by warranty requirements.
- G. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, supplementary instructions given, and manufacturer acceptance substrate surface is ready and acceptable to receive roof system.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum twenty years of documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this Section with minimum ten years documented experience, and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.
- C. Protect foam insulation from direct exposure to sunlight.
- D. Materials being stored on a roof surface shall not overload the deck or structural assembly.
- E. Lids shall be secured on cans of stored materials and all emulsions, coatings, adhesives, solvents, sealants, foams, etc. shall be stored at temperatures as recommended by the manufacturers.

1.08 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above manufacturer's recommendations degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.09 WARRANTY

- A. **Applicator/Contractor Warranty:** The roofing subcontractor hereby guarantees that all roofing items not covered by the roofing manufacturer's total system warranty shall be free from defective materials and workmanship for a period of two (2) years from the date of Substantial Completion. Upon notification of any such defects within said guarantee period the roofing subcontractor shall promptly make all necessary repairs and replacements at no cost or expense to the Owner. This warranty shall be signed and countersigned by the installer (Roofer) and the Contractor.
- B. **Manufacturer's System and Membrane Warranties:** Upon completion of the membrane roofing system work, the roofing materials manufacturer shall furnish the Owner a "Total System" warranty insuring a watertight roof for a period of twenty-five (25) years. The warranty shall cover all repairs necessary over the twenty-five (25) year period up to the original cost of the original roofing contract. The membrane shall also be warranted not to prematurely deteriorate to the point of failure because of weathering for a period of twenty-five (25) years. Warranty shall include maximum peak gust wind speed coverage of up to 55 mph.
- C. The manufacturer warranty shall also provide labor and material as required to cover leaks caused by accidental punctures: 32 man-hours per year for the specified system.
- D. Pro-rated System Warranties shall not be accepted.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. **EPDM Membrane Materials Basis of Design:**
 - 1. Sure-Tough EPDM by Carlisle SynTec.
- B. **Acceptable Manufacturers:**
 - 1. Johns Manville.
 - 2. Firestone Building Products Co.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. **Insulation:** Manufacturer as recommended by the roofing system manufacturer.
- D. **Fasteners, polymeric components, edgings, cover boards, accessories and components required to complete the specified system:** The roofing system membrane or accepted by the roofing system manufacturer as compatible.

2.02 ROOFINGSYSTEM DESCRIPTION

- A. Elastomeric Membrane Roofing System: Fully adhered Scrim Reinforced Ethylene Propylene Diene Monomer membrane.
 - 1. Comply with applicable local building code requirements.
- B. Roofing System - Type 1: Listed in order from the top of the roof down:
 - 1. Membrane: Thickness as specified, Fully adhered.
 - 2. Cover board (see Alternates).
 - 3. Insulation Board, Constant Thickness.
 - 4. Tapered Insulation.
 - 5. Roof Air-Vapor Barrier.
 - 6. Metal Roof Deck.
- C. Roofing Assembly Requirements:
 - 1. Basic Wind Speed: 100 MPH.
 - 2. Importance Factor: 1.15
 - 3. Exposure: B.
 - 4. Roof Design Pressures:
 - a. Field wind uplift pressure: 21.56 PSF.
 - b. Perimeter wind uplift pressure 36.17 PSF.
 - c. Corner wind uplift pressure: -54.44 PSF.
 - 5. Roof Fire Resistance Rating: 1 hour. Conform to UL Assembly Design No. P732.
 - 6. Roof Covering External Fire Resistance Classification: UL Class A.
 - 7. Factory Mutual Classification: Class I and windstorm resistance of I-90, in accordance with FM DS 1-28.
 - 8. Insulation Thermal Value (R), minimum: 33.6 6 inches minimum thickness.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: Ethylene-propylene-diene-terpolymer (EPDM); internally reinforced with fabric or scrim; complying with minimum properties of ASTM D4637.
 - 1. Thickness: 0.075 inch.
 - 2. NOTE IF FIRE RESISTIVE: TYPE LSFR
 - 3. Color: Black.
 - 4. Tear Strength, ASTM D751B: 70 lbf.
 - 5. Ultimate Elongation, ASTM D751: 500 percent.
 - 6. Water Absorption, ASTM D471: +5.5 percent, after 7 days immersion @ 158F
 - 7. Brittleness Temperature, ASTM D2137: -49 deg F.
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Roof Air-Vapor Barrier: Reinforced 3 ply laminated, fire-retardant sheet. Provide manufacturer's recommended tape for seams.
 - 1. Fire Resistance, ASTM E84: Class A, Flame spread 5, Smoke developed 35.
 - 2. Moisture Vapor Permeance, ASTM E96: <1.0 perm.
 - 3. Tensile Strength, ASTM D882: 90 lb-ft.
 - 4. Products:
 - a. Griffolyn Type 55-FR by Reef Industries Inc.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Flexible Flashing Material: Same material as membrane;
- E. Protective Overlayment: Cured, non-reinforced, black, 0.060 inch thick ECO/CO membrane to resist hydrocarbons, solvents, grease, and oils, as recommended by the roofing membrane manufacturer.
- F. Adhesives, primers, cleaners, splice tapes and sealants as recommended by membrane manufacturer.

2.04 DECK SHEATHING AND COVER BOARDS

- A. Bid Alternate Cover Board: Glass mat faced gypsum panels, ASTM C1177, fire resistant type, 1/4 inch thick.

2.05 INSULATION

- A. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C1289, Type II, Class 2, polymer bonded glass fiber mat both faces and with the following characteristics:
 - 1. Compressive Strength: 16 psi
 - 2. Provide tapered boards where indicated for sloping to drain. Fabricate with taper of 1/4 inch per foot minimum. All roof drains shall be sumped in a 4' x 4' area.
 - 3. Board Thickness: 3.0 inches in a minimum of 2 layers.
 - 4. Total Minimum Insulation Board Thickness: Six (6) inches.
 - 5. Long-term Thermal Resistance: R-value of 5.6 per inch min.
 - 6. Board Edges: Square.
 - 7. Manufacturer: As recommended by the roofing system manufacturer.

2.06 ACCESSORIES

- A. Roof Expansion Joint: For multi-directional movement; 60 mil black elastomeric bellows with closed cell foam backer and integral 4 inch wide 0.032 aluminum 0.018" flanges for 3 inch wide building expansion joint. Provide in roll length for no joints. Provide fire barrier insert for 1 hour roof assembly.
- B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- C. Cant Strips: Wood; pressure preservative treated.
- D. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.
- E. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
- F. Sealants: One-part urethane as recommended by roofing membrane manufacturer.
- G. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
 - 1. Composition: Molded rubber, slip resistant.
 - 2. Size: 18 by 18 inch.
- H. Sponge Tubing: Sized to suit job conditions; Ethafoam by Dow Chemical.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.
- F. Ensure that treated wood nailers are installed at the perimeter of each roof level, curb, expansion joint, and all roof penetrations as recommended by the membrane manufacturer. Nailers shall be firmly anchored to resist forces of not less than those prescribed by applicable codes and regulations. See Section 06 10 -54 - Wood Blocking and Curbing for additional information. The

thickness of the nailers shall be such that the top of the nailer is flush with the surface to which the membrane is attached at the horizontal plane. All preservative treated wood blocking shall be separated from all metals by use of membrane flashing, see Section 06 10 54.

- G. Inspect the substrates scheduled to receive the roofing and flashing systems. Notify the Contractor of any and all defects in the substrates and do not proceed with the work until such defects have been satisfactorily corrected. Before beginning the Work, a representative of the membrane manufacturer shall examine the roof surfaces in order to ensure that they are acceptable for application.

3.02 ROOF AIR-VAPOR BARRIER AND INSULATION - UNDER MEMBRANE

- A. Apply roof air-vapor barrier to deck surface with adhesive in accordance with manufacturer's instructions.
 - 1. Extend air-vapor barrier under blocking to deck edge.
 - 2. Install flexible flashing from air-vapor barrier to wall weather barrier to air seal, lap and seal to provide continuity of the air barrier plane.
- B. Ensure air-vapor barrier is clean and dry, continuous, and ready for application of insulation.
- C. Attachment of Insulation:
 - 1. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions.
- D. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- E. Lay subsequent layers of constant thickness insulation board with joints staggered minimum 6 inch from joints of preceding layer.
- F. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- G. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- H. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 24 inches.
- I. Do not apply more insulation than can be covered with membrane in same day.
- J. If separate cover board option is selected, install cover board over insulation boards with staggered joints, as recommended by the roofing system manufacturer.

3.04 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Membrane shall be fully-adhered except in areas directly over or within 3 inches of expansion joints. Overlap edges and seal seams in accordance with manufacturer's recommendations.
- D. At intersections with vertical surfaces:
 - 1. Extend membrane flashing up a minimum of 12 inches onto vertical surfaces.
 - 2. Provide securement strips and fasten as recommended by the membrane manufacturer.
- E. At fascias, extend membrane under fascia metalwork and to the outside face of the wall.
- F. Around roof penetrations, seal flanges and flashings with flexible flashing.
- G. Install roofing expansion joints where indicated. Make joints watertight.
 - 1. Install prefabricated joint components in accordance with manufacturer's instructions.
- H. Coordinate installation of roof drains and sumps and related flashings to ensure that drains are placed in low points of the roof.
- I. Coordinate installation of associated metalwork flashings installed under other Sections.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.
- B. System Manufacturer's Inspection: Inspection(s) shall be made by a technical representative of the system manufacturer to ascertain that the roofing system has been installed in accordance with the system manufacturer's published specifications and details.
 - 1. The purpose of this inspection is to determine whether a system warranty will be issued by the system manufacturer. Should the technical representative find that the roofing system has not been installed in a manner that qualifies for issuance of the specified system warranty, the system shall not be acceptable to the Owner until the installer has made corrections or repairs, the system has been re-inspected by the system manufacturer's technical representative and the specified roofing system warranty has been issued.
 - 2. Submit a copy of all inspection reports and follow-up reports to the Architect.
- C. Independent Roofing Inspection: During the course of the roofing installation, inspections may be conducted by an independent roofing inspector engaged by the Owner. The cost of independent roofing inspection shall be paid for by the Owner.

3.06 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this Section.

3.07 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured and shop fabricated sheet metal items, including flashings, counter-flashings, and scuppers.
- B. Sealants for joints within sheet metal fabrications.
- C. Reglets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking for metal flashings.
- B. Section 07 53 00 - Elastomeric Membrane Roofing: Membrane roofing system requiring metalwork for Total System warranty.
- C. Section 07 72 00 - Roof Accessories: Roof-mounted units.
- D. Section 08 62 23 - Tubular Skylights.

1.03 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- E. SMACNA - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene at least two weeks before starting work of this Section.

1.05 PERFORMANCE REQUIREMENTS

- A. General: Install flashings that are watertight; will not permit the passage of liquid water; and will withstand wind loads, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details. Key into roof plan shop drawing, see roofing Section.
- C. Samples:
 - 1. Submit samples each 4x4 inch in size, illustrating metal materials, thickness, and colors.
 - 2. Submit samples 8" long in size, illustrating roofing fascia system.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with ten years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

1.09 WARRANTY

- A. The flashing and roofing subcontractor hereby guarantees that roof metalwork, flashings, roofing, roof insulation and roof accessories will be free from defective materials and workmanship for a period of two (2) years from the date of Substantial Completion. Upon notification of any such defects within said guarantee period the roofing and flashing subcontractor shall promptly make all necessary repairs and replacements at no cost or expense to the Owner. This warranty shall be signed and countersigned by the installer (Roofer) and the Contractor.
- B. Metal Flashings Warranty under Roofing Manufacturer's Total System Warranty: See Section 07 53 00 - Elastomeric Membrane Roofing.
- C. Pre-finished Aluminum: Finish shall be warranted against premature failure for twenty years.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Manufactured Membrane Roofing Fascia System: Pre-finished aluminum. ANSI/SPRI ES-1 tested.
 - 1. Products: As approved by the selected roofing system manufacturer for a Total System Warranty. Examples include: SecurEdge 2000 by Carlisle Syn-Tec, Anchor-tite by Metal-era.
 - 2. Extruded anchor bar / cleat continuous 6063-T6 alloy aluminum.
 - 3. Fascia: 0.040 inch.
 - 4. Finish: Kynar 500. Color as selected from the manufacturer's full color range.
 - 5. Accessories: As recommended by the system manufacturer.
 - 6. Fasteners: Anchors with rubber washers as recommended by the system manufacturer.
 - 7. Sealant: Non-curing as recommended by the system manufacturer.
- B. Pre-Finished Aluminum: ASTM B209; 0.032 inch thickness or as otherwise indicated; plain finish shop pre-coated with fluoropolymer coating.
 - 1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; Kynar or Duranar by PPG.
 - 2. Color: As selected by Architect from manufacturer's standard colors.
 - 3. All roof edge metal work shall have been ANSI/SPRI ES-1 tested.
 - 4. For Total System Warranty projects, metalwork shall be as approved by the membrane roofing manufacturer.

2.02 ACCESSORIES

- A. Fasteners: Stainless steel.
- B. Protective Backing Paint: Zinc molybdate alkyd.
- C. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.
- D. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.
- E. Fasteners for Aluminum: Stainless steel ring nails; 12 gage with 1/4" diameter, flat head, annular threaded, needle point, length as required to obtain 1-1/4" embedment into blocking/framing and full depth into plywood.

- F. Anchors for Flashing to Concrete or Masonry: 1/4" diameter, lengths as required to obtain 1-1/2" penetration into masonry backup. Unless otherwise indicated, provide 3 inch edge distance.
 - 1. Product: Nylon Nail-in with stainless steel drive pin manufactured by Powers Fasteners Inc.
- G. Plastic Cement: ASTM D 4586, Type I.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.. Form on a bending brake. Perform shaping, trimming, and hand seaming in the shop to the maximum extent possible.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams. Form metal with full regard for expansion and contraction to avoid buckling or other deformation in service. All lines and arrisses shall be straight and crisp except where thickness of metal dictates radius bend.
- E. Immediately prior to soldering, mechanically clean all metal to be soldered with steel wool or other acceptable means, apply flux and pre-tin. Solder shop formed metal joints. Perform all soldering slowly with well heated heavy irons with properly tinned clean blunt tips. Do not use torches. Apply enough heat to sweat the solder completely through the full width of the seam. Close clinch lock seams gently with a block of wood and mallet, then flux and show at least one full inch of continuous and evenly flowed solder. Whenever possible, perform all soldering in flat position. All sloped and vertical seams shall be laced and soldered a second time. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal joints.
- F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- H. Pre-fabricate corners with joints locked, riveted and soldered watertight, and where indicated from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- I. Unless indicated otherwise, provide expansion joints at 24 feet on centers maximum and at 2 feet from all changes in flashing direction (each side) and from all terminations of flashing.
- J. Space rivets 1 inch on center unless indicated otherwise.
- K. Provide backer plates as required at through-wall flashing transitions and corners to fully solder watertight. Backer plates shall be continuous to cover gaps to be overlain by membrane flashing at all deck and column to wall transitions. Secure to framing or plywood at 6" centers and within 1/2" of corners and edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 GENERAL REQUIREMENTS FOR METAL FLASHING

- A. Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather, without failing. Fabricate and install flashings and roof edges to fully comply with the recommendations of Factory Mutual (FM) Loss Prevention Data Sheet 1-49 for the applicable wind zone.
- B. Schedule and coordinate sheet metal installations with the work of other trades where it is integral or continuous therewith. Materials furnished under this Section that are to be built-in by other trades shall be delivered to the site in sufficient time to avoid delays to construction progress. Instruct other trades concerning the location and placement of reglets, wood nailers, and cleats.
- C. Surfaces to which roofing and sheet metal are to be applied shall be even, smooth, sound, thoroughly clean and dry and free from projecting nail heads or other defects that would affect the application. Report in writing any unsatisfactory surfaces to the Contractor.
- D. Where flashing abuts or members into adjacent dissimilar metals, the juncture shall be executed in a manner that will facilitate drainage and thus minimize the possibility of galvanic action. Note: All metalwork shall be isolated from contact with pressure treated wood products, using roofing membrane, felts, or approved coatings.
- E. All accessories or other items essential to the completeness of the sheet metal installation, though not specifically shown or specified, shall be provided. All such items, unless otherwise indicated on Drawings or specified, shall be of the same kind of material as the item to which applied and the gauges shall conform to recognized industry standards of sheet metal practice.
- F. Provide expansion joints in sheet metal work at intervals not greater than forty (40') feet. Expansion joints shall be fabricated in accordance with the recommendations of the Architectural Sheet Metal Manual (SMACNA) and as specified herein.
 - 1. Begin expansion joint construction by setting an 8" wide cleat. Lapp ends of metal work over base sheet, leaving 1/2" clear space between butt ends. Set ends in full bed of sealant. Cover entire joint assembly with a 4 inch wide metal cover, finish to match other metal work and secured allowing for movement.
- G. Fabricate and install sheet metal with lines, arises, and angles sharp and true and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form a 1/2" wide hem on the side concealed from water leakage under all weather conditions. The workmanship and methods employed for framing, anchoring, cleating, and the expansion and contraction of sheet metal work shall conform to applicable details and description as indicated in current edition of the following publications unless other methods are indicated on project Drawings or specified herein.
 - 1. Architectural Sheet Metal Manual as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc., and hereinafter referred to as "The SMACNA Manual".
 - 2. Handbook of Sheet Copper Fundamentals, Design, Details and Specifications as published by Copper Development Association, Inc., latest Edition.
- H. All ferrous metal work shall be zinc coated and finished as specified elsewhere herein. Touch-up all field cuts and minor scratches with approved zinc rich primer and finish coat to match adjacent finishes.
- I. All metal work terminating on roofing shall be provided with flanges for nailing. Wood nailers shall be provided beneath flanges and roofing for nailing of the metal flanges.
- J. Provide cleats, edge and drip strips where sheet metal extends over edges and where necessary to secure sheet metal work at fascias and elsewhere. Form edge strips in lengths of 8' or 10'. The ends shall be butted together, leaving approximately 1/4" space for expansion. Secure to building construction with fasteners spaced not over 12" on centers. Install strips in continuous, long lengths to allow metal work to be hooked over lower edge at least 1/2".
- K. Flash intersections of roofs with vertical surfaces as detailed and indicated on the Drawings, or otherwise required to provide watertight construction and to suit job conditions.

- L. Seams shall always be made in direction of flow.
- M. Fabricated fascias shall be sized and shaped to profiles indicated, using sheets 8' to 10' long. Lower edge shall hook a minimum of 1/2" over previously placed continuous edge cleats.

3.04 INSTALLATION

- A. Conform to drawing details. Installations shall conform to SMACNA Architectural Sheet Metal Manual recommendations and National Roofing Association Manual recommendations.
- B. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.05 INSTALLATION OF TOTAL SYSTEM ROOFING METALWORK

- A. Confirm that roofing membrane shall extend over face of perimeter blocking and weather barrier transition membrane for wall / eave construction.
- B. Set anchor cleat in a continuous bead of sealant and secure with recommended fasteners.
- C. At end joints and corners of anchor cleat, install manufacturer's rubber splice material to maintain a continuous seal providing a watertight edge.
- D. Install fascia on the anchor cleat in accordance with manufacturer's recommendations.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.
- C. See Section 07 53 00 - Elastomeric Membrane Roofing, for field inspection requirements.

3.07 SCHEDULE

- A. Fascia: Aluminum:.040
- B. Cleats: Aluminum:.050
- C. Scuppers: Aluminum:.050
- D. Coping, Cap, Parapet, Sill and Ledge Flashings: Aluminum:.040
- E. Miscellaneous Flashings: Aluminum:.040 or as required, unless otherwise indicated on Drawings.

3.08 CLEANING AND PROTECTION

- A. Clean all metalwork to remove all fingerprints, oils, etc.
- B. Remove from roof surfaces all scraps and metal debris immediately. Extreme care shall be exercised to prevent sharp metal scraps or waste nails from coming into contact with membrane materials.

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof hatches and hatch guards, manual and automatic operation, including smoke vents.
- B. Fall protection rooftop anchors.

1.02 RELATED REQUIREMENTS

- A. Section 07 53 00 - Elastomeric Membrane Roofing.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.
- C. Division 28 - Electronic Safety and Security - Connection to fire alarm system.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Guarding floor and wall openings and holes; current edition.
- B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- C. ASTM A792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- E. UL - Building Materials Directory; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used and installation instructions.
 - 1. For smoke hatches, submit evidence of approval by evaluation agency specified.
- C. Shop Drawings: Submit shop drawings indicating type, configuration, and dimensions of all materials. Shop drawings shall indicate fastening and anchoring methods, flashing, details, and locations of all seams, joints, and other provisions necessary for thermal expansion and condensation control.
- D. Certificate: For smoke hatches, provide certificate of approval from authority having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. Provide manufacturer's standard product warranty for roof hatches and vents for a period of five (5) years against defects in materials and/or workmanship.

PART 2 PRODUCTS

2.01 ROOF HATCHES, MANUAL AND AUTOMATIC OPERATION

- A. Basis of Design: Bilco Co.
- B. Alternate Manufacturers:
 - 1. Babcock-Davis
 - 2. Milcor by Commercial Products Group of Hart & Cooley, Inc.
 - 3. Nystrom Products Inc.

4. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Roof Access and Stage Vent Hatches: Factory-assembled steel frame and cover, complete with operating and release hardware.
 1. Style: Provide flat metal covers unless otherwise indicated.
 2. Mounting: Provide frames and curbs suitable for mounting conditions indicated on the Drawings.
 3. Stage Vents and Smoke Hatches: Where "smoke" or "smoke/heat" operation is indicated, provide the following additional features:
 - a. Smoke Release Mechanism: Automatic opening on melting of replaceable UL-listed fusible link at 165 deg F.
 - b. UL-listed as automatically operated and re-settable smoke and heat vent.
 - c. Fire Alarm Connection: Provide separate resettable electrical link release mechanism and connection point for fire alarm system.
 - d. Sound Rating: STC-46 minimum.
 - e. Product: Type DSH (double leaf).
 4. Size(s): As indicated on Drawings; single-leaf style unless indicated as double-leaf.
 5. For Ladder Access: Single leaf; 36 by 36 inches. Class A.
 - a. Product: Type E-50T by Bilco Co.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 6. For Smoke Venting Without Access: 4' x 8' as indicated per the Drawings, Class A.
 - a. Product: Type ACDSH by Bilco Co.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Frames/Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 1. Material: Galvanized steel, G90, 14 gage, 0.0747 inch thick.
 2. Finish: Factory prime paint.
 3. Insulation: 1 inch rigid glass fiber, located on inside hollow curb.
 4. Curb Height: As indicated on drawings.
- E. Metal Covers: Flush, insulated, hollow metal construction.
 1. Capable of supporting 40 psf live load, with a maximum deflection of 1/150 of span or 20 psf wind uplift.
 2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch thick, liner 22 gage, 0.03 inch thick.
 3. Finish: Factory prime paint.
 4. Insulation: 1 inch rigid glass fiber.
 5. Gasket: Neoprene, continuous around cover perimeter.
- F. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load. Opening of hatch shall be in a controlled manner to avoid damage to surrounding roof surfaces.
 2. Hinges: Heavy duty pintle type. Cover shall automatically lock in open position with rigid hold open arm and grip handle to release.
 3. Hold open arm with vinyl-coated handle for manual release. Provide interior and exterior handles for stage vents.
 4. Latch: Upon closing, engage latch automatically and reset manual release. Latches shall withstand 30 psf wind uplift forces.
 5. Manual Release: Pull handle on interior and exterior.
 6. Stage Vents and Smoke Hatches: Manual release operation not to disturb automatic release mechanisms; easy resetting by Owner's maintenance personnel; provide latch

designed to prevent relatching unless the automatic release mechanism has been properly reset for automatic operation. Coordinate with the work of Division 26 - Electrical.

7. Roof Access Hatch Locking: Padlock hasp on interior.

2.02 HATCH SAFETY RAILING

- A. Hatch Safety Railing: Complying with OSHA and ANSI A1264 safety requirements and OSHA strength requirements with a factor of safety of two; corrosion resistant construction. Orientation of barriers shall suit job installation conditions.
 1. Products:
 - a. Bil-Guard by Bilco Company.
 - b. Kee Hatch by Kee Industrial Products Inc.,
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 SAFETY RAILING - NON-PENETRATING ROOFTOP ASSEMBLIES

- A. Safety Railing: Complying with OSHA and ANSI A1264 safety requirements and OSHA strength requirements with a factor of safety of two; corrosion resistant construction. Orientation of barriers shall suit job installation conditions.
 1. Applications: All exterior ladder locations, See Section 05 50 00.
 1. Design Loadings and Configurations: As required by applicable codes.
 2. Height: 42 inches minimum. Provide minimum clearance of 6 inches under supported items to top of roofing.
 3. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 4. Finish/Color: Factory finished powder coat. Color selected by Architect from manufacturer's full line.
 5. Hardware and accessories as recommended by manufacturer for a complete system.
 6. Length: 10 Feet, minimum. Measured from edge of roof.
 6. Products:
 - a. Ladder Defender OSHA Guardrail by BlueWater Manufacturing.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ROOFTOP ANCHORS

- A. Rooftop Anchors: Steel with epoxy coated base plate; stainless steel post and actuation element; zinc plated alloy steel D-ring. OSHA and ANSI Z359.1 compliant. See plan for locations.
- B. Size: Base plate: Nominal 21" x 14 5-8"; 12 3/8" high anchor mount.
- C. Capacity: 310 pounds
- D. Strength with concrete anchors: 5,500 pounds.
- E. Product: Model 2100075 by Capital Safety.
- F. Substitutes: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

- C. Prior to proceeding with an installation, verify that all necessary blocking, bracing, and supports have been provided.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.
- B. Position roof hatches as required to provide a minimum distance to roof edge of 30 inches at hatch ladder access side, as required by OSHA.

3.05 FIELD QUALITY CONTROL

- A. Test vents for proper operation and replace fusible links, if required.

END OF SECTION

SECTION 07 81 00
APPLIED FIREPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fireproofing of interior and exterior structural steel as indicated on the Drawings.
- B. Preparation of fireproofing for application of finish specified elsewhere.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing.
- B. Section 05 21 00 - Steel Joist Framing.
- C. Section 05 31 00 - Steel Decking.
- D. Section 07 81 23 - Intumescent Mastic Fireproofing.
- E. Section 07 84 00 - Firestopping.
- F. Section 09 90 00 - Painting and Coating: Color paint coat on exposed spray-applied fireproofing. Product subject to acceptance by fireproofing manufacturer.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- B. ASTM E605 - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2011.
- C. ASTM E736 - Standard Test Method For Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2011.
- D. ASTM E760 - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 2011.
- E. ASTM E859 - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2011.
- F. ASTM E937 - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2011.
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2013.
- H. UL - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with placement of ceiling hanger tabs, mechanical component hangers, and electrical components.
- B. Pre-installation Meeting: Convene one week before starting work of this Section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data indicating product characteristics. Submit independent testing agency reports for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, for:
 - 1. Bond Strength.
 - 2. Bond Impact.
 - 3. Compressive Strength.
 - 4. Fire tests using substrate materials similar those on Project.

5. Primers and other coatings applied to structural steel in the shop or field are compatible with fireproofing application.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Manufacturer's Certificate: Certify that sprayed-on fireproofing products meet or exceed requirements of contract documents.
- E. Manufacturer's Field Reports: Indicate environmental conditions under which fireproofing materials were installed. Certify each fireproofing product is fully compatible with adhesives, primers, and other surface coatings on substrates intended to receive fireproofing.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this Section, who was trained and approved by the manufacturer and with a minimum five years of documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Environmental Compliance: Provide fireproofing products containing no detectable asbestos as determined according to the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

1.08 MOCK-UP

- A. Construct a mock-up, 100 square feet in size, for evaluation of surface preparation techniques and application workmanship which conforms to Project requirements for fire-ratings. Locate where directed. Accepted mock-up will serve as a standard of comparison for subsequent work of this Section.
- B. Examine installation within one hour of application to determine variances from specified requirements due to shrinkage, temperature, and humidity.
- C. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary. Remove materials and re-construct mock-up as required until acceptance.
- D. Accepted mock-up may remain as part of the Work.

1.09 DELIVERY, STORAGE AND PROTECTION

- A. Delivery: Materials shall be delivered in original sealed containers, clearly marked with suppliers name, brand name and type of material, and bearing U.L. label.
- B. Storage and Handling: Materials shall be stored off the ground and protected from the weather, in strict compliance with the manufacturer's recommendations.

1.10 FIELD CONDITIONS

- A. Do not apply spray fireproofing when temperature of substrate material and surrounding air is below 40 degrees F or when temperature is predicted to be below said temperature for 24 hours after application.
- B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.
- C. Provide temporary enclosure to prevent spray from contaminating air.

1.11 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
 1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
 2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.01 FIREPROOFING ASSEMBLIES

- A. IBC Type I-B Construction. Provide fire resistance ratings for the following building elements as required by the building code:
 - 1. Primary structural frame, including columns, beams, girders, and trusses: 2 hours.
 - 2. Bearing walls, exterior: 2 hours.
 - 3. Bearing walls, interior: 2 hours.
 - 4. Nonbearing walls and partitions, exterior: As indicated per the Drawings.
 - 5. Nonbearing walls and partitions, interior: 0.
 - 6. Floor construction, including supporting beams and joists: 2 hours.
 - 7. Roof construction, including supporting beams and joists and deck: 1 hour.
 - a. Roof Construction, including secondary beams and deck and joists where every part of the roof construction is 20 feet or more above finish floor: 0 hours, where indicated on the Drawings.
- B. UL Assemblies: See tested assemblies appended to the end of this Section.
 - 1. Columns: UL No. Y710.
 - 2. Floors: UL No. D925. (No spray fire-proofing required at deck – just structure)
 - 3. Roofs: UL No. P732.

2.02 MATERIALS

- A. Sprayed Fire-Resistive Material: Manufacturer's standard factory mixed material, which when combined with water is capable of providing the indicated fire resistance.
 - 1. Applications: Concealed interior, exposed interior out of reach, exterior protected exposure.
 - 2. Bond Strength, ASTM E736: 150 psf, minimum, when set and dry.
 - 3. Dry Density ASTM E605: 15 lb/cu ft, minimum.
 - 4. Compressive Strength, ASTM E 761: 10% deformation at 100 psi.
 - 5. Effect of Impact on Bonding, ASTM E760: No cracking, spalling or delamination.
 - 6. Corrosivity, ASTM E937: No evidence of corrosion.
 - 7. Air Erosion Resistance, ASTM E859: Weight loss of 0.025 g/sq ft, after 24 hrs.
 - 8. Surface Burning Characteristics, ASTM E84: Maximum flame spread of 0 and maximum smoke developed of 0.
 - 9. Fungal Resistance, ASTM G21: No growth after 28 days.
 - 10. Products:
 - a. Monokote MK-6 by Grace Construction Products.
 - b. Cafco Blaze-Shield II by Isolatek International
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Sprayed Fire-Resistive Material: Manufacturer's standard factory mixed material, which when combined with water is capable of providing the indicated fire resistance.
 - 1. Applications: Exposed interior locations subject to impact (Horticulture and Auditorium).
 - 2. Bond Strength, ASTM E736: Minimum 1,000 psf when set and dry.
 - 3. Bond Impact, ASTM E760: No cracking, flaking or delamination.
 - 4. Dry Density, ASTM E605: Minimum 40 lb/cu ft.
 - 5. Compressive Strength, ASTM E761: Minimum 500 psi.
 - 6. Surface Burning Characteristics, ASTM E84: Flame Spread Index of 10 or less, and Smoke Developed Index of 10 or less.
 - 7. Combustion Characteristics, ASTM E136: Noncombustible.
 - 8. Fungal Resistance, ASTM G21: No growth for minimum of 28 days.
 - 10. Corrosion Resistance ASTM E937: No contribution to corrosion of steel.
 - 11. Products:
 - a. Monokote Z-146 by W.R. Grace & Co..
 - b. Cafco Fendolite M-II by Isolatek International.

- c. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

- A. Primer Adhesive: Of type recommended by fireproofing manufacturer.
- B. Metal Lath: Expanded metal lath; 3.4 lb/sq ft, galvanized finish.
- C. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive fireproofing.
- B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.
- C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.
- D. Verify that voids and cracks in substrate have been filled. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.02 PREPARATION

- A. Perform tests as recommended by fireproofing manufacturer in situations where adhesion of fireproofing to substrate is in question.
- B. Remove incompatible materials that could affect bond by scraping, brushing, scrubbing, or sandblasting.
- C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.
- D. Apply fireproofing manufacturer's recommended bonding agent on primed steel.
- E. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.
- F. Close off and seal duct work in areas where fireproofing is being applied.

3.03 APPLICATION

- A. Install metal lath over structural members as indicated or as required by UL Assembly Design Numbers.
- B. Apply primer adhesive in accordance with manufacturer's instructions.
- C. Apply fireproofing in thickness and density necessary to achieve required ratings, with uniform density and texture. Apply in one coat unless otherwise recommended in writing by the manufacturer.
- D. Metal Decks: Do not apply fireproofing to underside of metal floor deck until concrete, if any has been completed. Do Not apply fireproofing to underside of metal roof deck until roofing has been completed. Prohibit roof traffic during application and drying of fireproofing.
- E. Cure fireproofing according to manufacturer's written recommendations.
- F. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, tested and any required corrections have been made.
- G. Finishes: Apply fireproofing to product the following finishes:
 - 1. Standard Spray-Texture Finish: Finish according to manufacturer's written instructions for spray-application with no further treatment.
 - a. Applications: Fireproofing to be concealed.
 - 2. Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.

- a. Applications: Fireproofing to remain exposed located at least 10 feet above floor level.
3. Skip-Troweled Finish: Even leveled surface produced by troweling spray-applied finish to smooth out the texture and neaten edges.
 - a. Applications: Fireproofing to remain exposed less than 10 feet above floor level.

3.04 FIELD QUALITY CONTROL

- A. The Owner's testing and inspection agency shall field test and inspect fireproofing after application and curing, prior to its concealment.
- B. Fireproofing shall be tested in accordance with ASTM E605 and ASTM E736 in areas as described below. Do not proceed with fireproofing of next area until test results for previously completed work indicate compliance with requirements.
 1. Thickness: Floor, Roof and Wall Assemblies: Floor, roof and wall assembly thickness measurements shall be taken at not less than four (4) random locations for each 1,000 sf of floor, roof and wall surface.
 2. Thickness: Structural Framing Members: Structural framing members thickness measurements shall be taken at not less than 25% of the structural members on each floor.
 3. Density: Samples for density determination shall be taken at a rate of not less than one test for each 10,000 sf of sprayed areas in each story, but in no case shall there be less than two per story.
 4. Bond Strength: Floor, Roof, and Wall Assemblies: Samples for cohesion/adhesion shall be taken on thoroughly dried material at the rate of not less than one test for each 10,000 sf, or part thereof of the sprayed areas in each story.
 5. Bond Strength: Structural Framing Members: Samples for cohesion/adhesion shall be taken on thoroughly dried material at the rate of not less than one test for each type of structural framing member for each 10,000 sf of floor area or part thereof in each story.
- C. Testing agency shall report test results promptly and in writing to the Contractor, Owner, and Architect.
- D. Repair or replace fireproofing within areas where test results indicate fireproofing does not comply with requirements.
- E. Apply additional fireproofing per manufacturer's directions where test results indicate that the thickness does not comply with specified requirements.
- F. Where fireproofing is removed and replaced or repaired, additional testing will be performed to determine compliance with specified requirements. Any re-tests for areas not in compliance shall be paid for by the Contractor.

3.05 CLEANING

- A. Remove excess material, overspray, droppings, and debris.
- B. Remove fireproofing from materials and surfaces not required to be fireproofed.
- C. At exposed fireproofing, clean surfaces that have become soiled or stained, using manufacturer's recommended procedures.
- D. Remove overspray from piping, electrical devices, ductwork, etc. All floor areas shall be broom cleaned.

END OF SECTION

Design No. D925

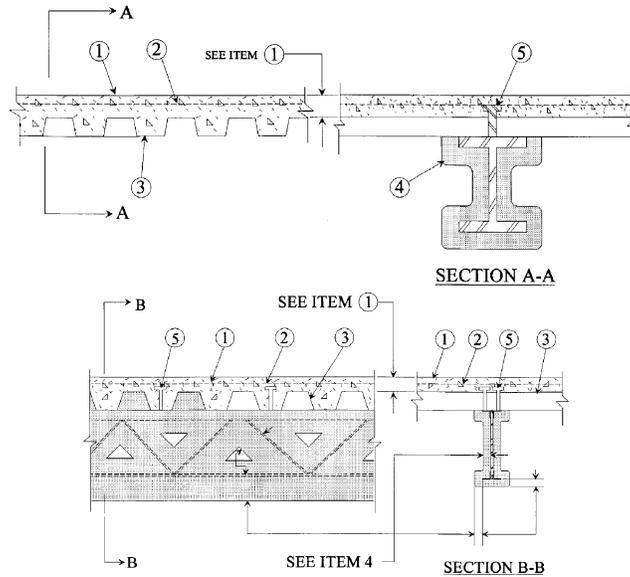
Restrained Assembly Ratings — 3/4, 1, 1-1/2, 2 or 3 Hr (See Items 1, 6 and 10)

Unrestrained Assembly Rating — 0 Hr (See Items 3, 4, 4A and 10)

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 and 4 Hr (See Items 4, 4A and 10)

Restricted Load Condition — See Supports and Item 4C

Load Restricted for Canadian Applications — See Guide BXUV7



Supports — W8x28, W12x16 or alternate (per Section IV.6 in the front of the Fire Resistance Directory) steel beam or min 8K1 steel joists when joist substitution applied.

- Normal Weight or Lightweight Concrete** — Normal weight concrete carbonate or siliceous aggregate, 3500 psi compressive strength, vibrated. Lightweight concrete, expanded shale, or slate aggregate by rotary-kiln method, or expanded clay aggregate by rotary-kiln or sintered-grate method, 3000 psi compressive strength, vibrated, 4 to 7 percent entrained air.

Restrained Assembly Rating Hr	Concrete (Type)	Concrete Unit Weight pcf	Concrete Thkns In.
1	Normal Weight	147-153	3-1/2
1-1/2	Normal Weight	147-153	4
2	Normal Weight	147-153	4-1/2
3	Normal Weight	147-153	5-1/4
3/4 or 1	Lightweight	107-113	2-1/2
1	Lightweight	107-120	2-5/8
1-1/2	Lightweight	107-113	3
2	Lightweight	107-113	3-1/4
2	Lightweight	107-116	3-1/4*
2	Lightweight	114-120	3-1/2
3	Lightweight	107-113	4-3/16
3	Lightweight	114-120	4-7/16

*For use with 2 or 3 in. steel floor and form units only.

- Welded Wire Fabric** — 6 x 6, 10 x 10 SWG.

2A. **Negative Reinforcement** — (Not Shown) — Optional — For 3/4, 1, 1-1/2 and 2 Hr Restrained Assembly Rating Only. Used in lieu of Item 2 and with Item 2B. For floor spans with concrete cast continuous over the supporting beams. Deformed bars designed to resist the support moments of the concrete slab in accordance with the latest ACI Building Code Specifications.

2B. **Fiber Reinforcement*** — (Not Shown) — For 3/4, 1, 1-1/2 and 2 Hr Restrained Assembly Rating Only. Required with Item 2A. Engineered synthetic fibers added to concrete mix to control shrinkage cracks in concrete. Fibers added to concrete mix at rate of 5 lbs of fiber for each cubic yard of concrete.

W R GRACE & CO - CONN — Type Strux 90/40.

- Steel Floor and Form Units*** — Composite 1-1/2, 1-5/8, 2 or 3 in. deep galv units or 4-1/2 in. deep noncomposite galv units. Fluted units may be uncoated or phosphatized/painted. Min gauges are 22 MSG for fluted and 20/20 MSG for cellular units. The following combinations of units may be used:

- All 18, 24, 26 28 or 36 in. wide cellular.
- All fluted.
- One or two 3 in. deep, 12 in. wide, 18/18 MSG min cellular units, alternating with 3 in. deep fluted or other cellular.
- Any blend of fluted and 18, 24, 26, 28, or 36 in. wide cellular.
- 3 in. deep, 30 in. wide cellular with 8-1/8 in. wide valley alongside joints may be used when 3/8 in. diam reinforcing bars are placed 1-1/2 in. to each side of side joints and 1 in. above bottom of units.
- Corrugated, 1-5/16 in. deep, 30 in. wide, 24 MSG min galv units with shear wires factory welded to deck corrugations. Welded to supports 12 in. OC. through welding washers. For shear wire spacing of 8 in. or less the steel deck stress shall not exceed 20 KSI. For shear wire spacing greater than 8 in. OC. but less than or equal to 12 in. OC. steel deck stress shall not exceed 12 KSI.

ASC STEEL DECK, DIV OF ASC PROFILES L

L C — 24, 30, or 36 in. wide, Types B Hi-Form, BF Hi-Form, N Hi-Form, NF Hi-Form, 2W Hi-Form, 2WF Hi-Form, 3W Hi-Form, 3WF Hi-Form, BR Hi-Form, BMOD Hi-Form, BRMOD Hi-Form, DGB Hi-Form, DGBF Hi-Form, DGN Hi-Form, DGN32 Hi-Form, DGNF Hi-Form, DGNF32 Hi-Form, DG2W Hi-Form, DG2WF Hi-Form, DG3W Hi-Form, and DG3WF Hi-Form; 32 in. wide Type N-32, NF32, DGN32, DGNF32; 24 or 30 in. wide Types ASC2 or ASC3. All units may be galvanized or Prime Shield.

CANAM STEEL CORP — 36 in. wide Type P-3623, P-3606, P-3615 and 24 in wide Type P-2432 composite.

CANAM STEEL CORP — 24 in. wide, Types 1-1/2, 2 or 3 in. LOK-Floor and LOK-Floor Cell; 36 in. wide, Types 2 or 3 in.

LOK-Floor and LOK-Floor Cells; 24 in. wide, Types N-LOK and N-LOK Cell; 24, 30 or 36 in. wide, Type 1-1/2 in. B-LOK and B-LOK Cell.

CONSOLIDATED SYSTEMS INC —24 in. wide Types CFD-2, CFD-3; 24, 30 or 36 in. wide Type CFD-1.5; 24 or 36 in. wide Types Mac-Lok 2, Mac-Lok 3; 24 in. wide, Types B2C, B2FC, NC, NFC; 30 in. wide Type B3C; 12 in. wide Mac-Way cellular 45 MOW, 2-633 MTWA, 3-633 MTWA, 3-633 MTWV, 3-633 MTWV+, 24 in. wide Type Versa-Dek.

DECK WEST INC — 36 in. wide Type B-DW, 2-DW or 3-DW. Side joints of 2-DW and 3-DW may be fastened together with min 1 in. long No. 12 x 14 self-drilling, self-tapping steel screw 36 in. OC.

DESIGN ASSISTANCE CONSTRUCTION

SYSTEMS INC —36 in. wide Type DACS1.5CD, or 24 in. wide Type DACS2.0CD, or DACS3.0CD.

EPIC METALS CORP —24 in. wide Types EC150, ECP150, EC300, ECP300, EC366, ECP366, EC150, EC300 inverted, Epicore A; 30 in. wide Types ECB150, ECBR150; 36 in. wide Types EC266.

H H ROBERTSON —QL Types, 24 in. wide 3 or 3 inverted, UKX, UKX-3, 2 in. 99, AKX, 21 or 21 inverted, 121, NKX, TKX; 24 or 30 in. wide GKX, GKX-A; 36 in. wide 99, AKX, WKX; 24 26, 94, 36 in. wide NKX; 1.5NKC, NKC, AKX, 2 or 3 in. TKC; 12 in. wide noncomposite Sec. 12; 17 in. wide 21; 26 or 28 in. wide UKX, 87.5 cm wide. Side joints of QL, 99, 121, WKX, TKX, TKC, and Metric units — QL-77-900; QLC-78-900; may be welded together 60 in. OC. Side joints of 99, AKX, WKX, GKX, GKX-A, TKX and Metric units — QL-77-900 and QLC-78-900 may be fastened together with min 1 in. long No. 12x14 self-drilling, self-tapping steel screws 36 in. OC.

HAMBRO STRUCTURAL SYSTEMS, DIV OF

CANAM STEEL CORP —36 in. wide, 1-1/2 in. Type P3615HB. The max superimposed loadings for Type P3615HB units shall not exceed 250 PSF. For single spans, the use of the units shall be limited to 5 ft. 6 in., 6 ft 0 in. and 6 ft 6 in. max spans for the 22, 20 and 18 gauge units, respectively. For multiple spans, 18 gauge units may be used on a max 7 ft 6 in. span with a max total superimposed loading of 240 PSF.

KAM INDUSTRIES LTD, DBA CORDECK —24 in. wide Types 2 or 3 in. WDR.

MARLYN STEEL DECKS INC —Type 1.5 CF, 2.0 CF or 3.0 CF.

NEW MILLENNIUM BUILDING SYSTEMS L L C — Type 1.5CD, 1.5CDI, 1.5CDR, 2.0CD or 3.0CD. Units may be phos/painted or galvanized.

VALLEY JOIST —24 or 36 in. wide Types WVC 1-1/2 or WVC 2.

VERCO DECKING INC - A NUCOR CO —24, 30 or 36 in. wide Types PLB, PLBCD, B, BCD, BR; 24 or 36 in. wide Types PLW2, PLW2CD, W2, W2CD, PLW3, PLW3CD, W3, W3CD; 24 in. wide Types PLN, PLNCD, N, NCD. 12 in. wide PLW2, W2, PLW3 or W3 units may be blended with 24 or 36 in. wide PLW2, W2, PLW3 or W3 units, respectively; or Types N3, PLN3, N3-CD, PLN3-CD. Fluted units may be phos/ptd.

VULCRAFT, DIV OF NUCOR CORP —24, 30 or 36 in. wide, Type 1.5 VL, 1.5 VLI, 1.5 VLP; 24 or 36 in. wide. Types 2VLI, 2VLP, 3VLI, 3 VLP. 36 in. wide Types 1.5 SB, 1.5 SBR; 24 or 36 in wide Types 2.0 SB, 3.0 SB, 36 in. wide Type High Strength 1.5 SBI, 36 in. wide Type High Strength 1.5 SBN.

Components for field-assembled cellular metal raceway units:

Raceway Bottom — 24 or 36 in. wide Types 212 VS, 312 VS .

Raceway Cover Plate — Types CP-12, CP-16.

Raceway Divider — Type DC-20, DC-25.

Racway Isolation Trough — Types T-20, T-25, T-30.

Spacing of welds attaching units to supports shall be 12 in. OC for 12, 24 and 36 in. wide units, four welds per sheet for 30 in. wide units, 6 in. OC for 18 in. wide and Sec. 12 units. Unless noted otherwise, adjacent units button-punched or welded together 36 in. OC alongside joints. Adjacent 18 in. wide units welded together 30 in. OC alongside joints. For 3 Hr Rating, units with overlapping type side joints welded together 24 in. OC max.

The Unrestrained Assembly Rating is equal to the Unrestrained Beam Rating for a max of 3 Hr and is limited to the following floor units and spans:

- (a) 1-1/2, 2 and 3 in. deep, 24 in. wide, 22 MSG or thicker fluted with clear spans not more than 7 ft, 8 in.
- (b) 1-1/2, 2 and 3 in. deep, 24 in. wide, 20 MSG or thicker fluted with clear spans not more than 8 ft, 8 in.
- (c) 1-1/2 and 2 in. deep, 24 in. wide, 16 MSG or thicker fluted and 18/18 MSG or thicker cellular with clear spans not more than 9 ft, 11 in.
- (d) 3 in. deep, 36 in. wide, 18 MSG or thicker fluted and 24 in. wide, 20/18 MSG or thicker cellular with clear spans not more than 13 ft, 2 in.

For assemblies utilizing 3-1/4 in. lightweight concrete topping with a max Restrained Assembly Rating of 2 Hr, the Unrestrained Assembly Rating is equal to the Unrestrained Beam Rating and is limited to the following floor units and spans:

- (a) 1-1/2, 2, and 3 in. deep, 24 or 36 in. wide, 22 MSG fluted and 20/20 MSG cellular with clear spans not more than 9 ft, 6 in.
- (b) 2 and 3 in. deep, 24 or 36 in. wide 20 MSG fluted and 20/20 MSG cellular with clear spans not more than 10 ft, 0 in.
- (c) 3 in. deep, 24 in. wide, 20 MSG fluted and 20/20 MSG cellular with clear spans not more than 13 ft, 2 in.

4. **Spray-Applied Fire Resistive Materials** — Applied by mixing with water and spraying in one or more coats to a final thickness as shown in the tables below, to steel beam surfaces which must be clean and free of dirt, loose scale and oil. Min avg and min ind density of 15/14 pcf, respectively for Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, RG. Min avg and min ind density of 22/19, respectively for Types Z-106, Z-106/G. For method of density determination, refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	W8x28 Beam (see Note #1)	W8x28 Beam Supporting (see Note #1)		W12x16 Beam Supporting All Fluted Floor Unit (see Note #1)	
				All Fluted Floor Units w/Light weight Concrete	Fluted Floor Units and Normal Weight Concrete Only		
1	1	1	1/2, 11/16#	5/16, 11/16#	5/16	11/16, 1-1/8#	5/8, 1#
1-1/2	1	1	1/2, 11/16#	5/16, 11/16#	5/16	11/16, 1-1/8#	5/8, 1#
1-1/2	1-1/2	1-1/2	13/16, 1-1/16#	11/16, 1#	5/8	1-1/8, 1-7/16#	1, 1-3/8#
2	1	1	1/2, 11/16#	5/16, 11/16#	5/16	11/16, 1-1/8#	5/8, 1#
2	2	2	1-1/16, 1-5/16#	1, 1-3/16#	7/8	1-7/16, 1-13/16#	1-3/8, 1-9/16#
3	1-1/2	1-1/2	13/16	11/16	5/8	1-1/8	1
3	3	3	1-9/16	1-5/16	1-7/16	2-1/8	1-3/4
3	3	4	2	1-5/8	2	2-11/16	2-3/16

Note #1: Joists from the N series designs may be substituted for the listed beam. When joists are substituted, the restrained rating of the joist must be equal to or greater than the restrained rating of the assembly. Additional joist substitution requirements are contained in the front of the Fire Resistance Directory.

#This thickness applies when optional Item 10 is used over 3-1/4 in. light weight concrete topping.

The thicknesses of Spray-Applied Fire Resistive Materials shown in the table below are applicable when the thickness applied to the beams' lower flange edges is reduced to one-half that shown in the table.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	W8x28 Beam	W8x28 Beam Supporting All Fluted Floor Units w/Lightweight Concrete	W12x16 Beam	W12x16 Beam Supporting All Fluted Floor Unit
1	1	1	9/16	7/16+	3/4	5/8
1-1/2	1	1	9/16	7/16+	3/4	5/8
1-1/2	1-1/2	1-1/2	7/8	3/4	1-3/16	1
2	1	1	9/16	7/16+	3/4	5/8
2	2	2	1-3/16	1	1-5/8	1-3/8
3	1-1/2	1-1/2	7/8	3/4	1-3/16	1
3	3	3	1-3/4	1-9/16	2-3/8	2-1/8
3	3	4	2-5/16	2-1/16	3-1/8	2-3/4

+Thickness applied to beams' lower flange edges shall be a minimum of 1/4 in.

ARABIAN VERMICULITE INDUSTRIES — Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, Z-106, Z-106/G.

GRACE KOREA INC —Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, Z-106/G, Z-106.

W R GRACE & CO - CONN —Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, RG, Z-106/G, Z-106.

4A. **Alternate Spray-Applied Fire Resistive Materials** — Applied by mixing with water and spraying in one or more coats to a final thickness as shown in the tables below to steel beam surfaces which must be clean and free of dirt, loose scale and oil. The thicknesses shown in the table below are applicable to beams supporting all fluted floor or form units. Min avg and min ind density of 22/19 pcf respectively for Z-106/HY. For density determination refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	All Fluted Floor Units w/Lightweight Concrete	W8x28 Beam Supporting (see Note #1)	Fluted Floor Units and Normal Weight Concrete Only
1	1	1	5/16, 11/16##		5/16
1-1/2	1-1/2	1-1/2	11/16, 1##		5/8
2	1	1	5/16, 11/16##		5/16
2	2	2	1, 1-3/16##		7/8
3	1-1/2	1-1/2	11/16		5/8
3	3	3	1-5/16		1-7/16
3	3	4	1-5/8		2

Note #1: Joists from the N series designs may be substituted for the listed beam. When joists are substituted, the restrained rating of the joist must be equal to or greater than the restrained rating of the assembly. Additional joist substitution requirements are contained in the front of the Fire Resistance Directory.

##This thickness applies when optional Item 10 is used over 3-1/4 in. light weight concrete topping.

ARABIAN VERMICULITE INDUSTRIES —Types Z-106/HY

W R GRACE & CO - CONN —Type Z-106/HY.

GRACE KOREA INC —Type Z-106/HY.

4B. **Alternate Spray-Applied Fire Resistive Materials** — Applied by mixing with water and spraying in one or more coats to a final thickness as shown in the tables below to steel beam surfaces which must be clean and free of dirt, loose scale and oil. The thicknesses shown in the table below are applicable to beams supporting all fluted floor or form units. Min avg and min ind density of 40/36 pcf respectively for Types AV-650, Z-146, Z-146PC and Z-146T cementitious mixture. Min avg and min ind density of 50/45 pcf respectively for Types AV800, Z-156, Z-156T and Z-156PC. For density determination refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	All Fluted Floor Units w/Lightweight Concrete	W8x28 Beam Supporting (see Note #1)	Fluted Floor Units and Normal Weight Concrete Only
1	1	1	5/16, 11/16##		5/16
1-1/2	1-1/2	1-1/2	11/16, 1##		5/8
2	1	1	5/16, 11/16##		5/16
2	2	2	1, 1-3/16##		7/8
3	1-1/2	1-1/2	11/16		5/8
3	3	3	1-5/16		1-7/16
3	3	4	1-5/8		2

Note #1: Joists from the N series designs may be substituted for the listed beam. When joists are substituted, the restrained rating of the joist must be equal to or greater than the restrained rating of the assembly. Additional joist substitution requirements are contained in the front of the Fire Resistance Directory.

##This thickness applies when optional Item 10 is used over 3-1/4 in. light weight concrete topping.

ARABIAN VERMICULITE INDUSTRIES —Types AV-650, AV-800 and Z-146 investigated for exterior use.

W R GRACE & CO - CONN —Type Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC investigated for exterior use.

GRACE KOREA INC —Type Z-146 investigated for exterior use.

5. **Shear-Connector-Studs-Optional** — Studs 3/4 in. diam by 3 in. long, for 1-1/2 in. deep form units to 5-1/4 in. long for 3 in. deep form units, headed type or equivalent per AISI specifications. Welded to the top flange of the beam through the steel form units.
6. **Electrical Inserts** — (Not shown) Classified as "Outlet Boxes and Fittings Classified for Fire Resistance".

H H ROBERTSON —Preset Inserts.

For use with 2-1/2 in. lightweight concrete topping over QL-WKX steel floor units. Installed over factory-punched holes in floor units per accompanying installation instructions. Spacing shall not be more than one insert in each 14 sq ft of floor area with spacing along floor units not less than 48 in. OC. The holes cut in insert cover for passage of wires shall be no more than 1/8 in. larger diam than wire. Restrained Assembly Rating is 3/4 hr with Tapmate II-FS-1 and 1 hr with Tapmate II-FS-2 inserts.

H H ROBERTSON —Tapmate II-FS-1, II-FS-2; Series KEB.

WIREMOLD CO —After set Inserts. Single-service after set inserts installed per accompanying installation instructions in 2-1/2 in. diam hole core-drilled through min 3-1/4 in. thick concrete topping to top of cell of any min 3 in. deep cellular steel floor unit specified under Item 3. Spacing shall be no more than one insert in each 10 sq ft of floor area in each span with a min center to center spacing of 16 in. If the high potential and low potential raceways of the cellular steel floor unit are separated by a valley filled with concrete, the center to center spacing of the high potential and low potential single-service after set inserts may be reduced to a min of 7-1/2 in. Restrained Assembly Rating is 2 hr or less with internally protected Type 436 after set insert with Type M4-, M6- or M8- Series single-service activation fitting.

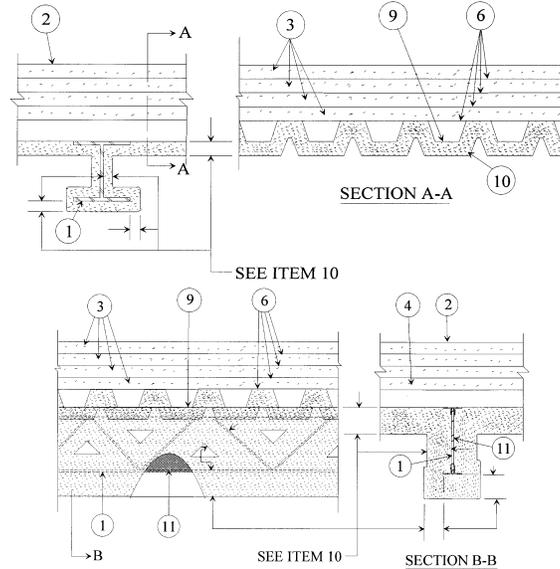
WIREMOLD CO — Internally protected Type 436 after set insert with Type M4-, M6- or M8- Series single-service activation fitting.

7. **Roof Covering Materials*** — (Optional, not shown) Consisting of materials compatible with insulations described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory - Roof Covering Materials (TEVT).
8. **Insulating Concrete** — (not shown) Optional. Various types of insulating concrete prepared and applied in the thickness indicated:
 - A. **Vermiculite Concrete** — (not shown) Optional.
 1. Blend 6 to 8 cu ft of Vermiculite Aggregate* to 94 lb Portland Cement and air entraining agent. Min thickness of 2 in. as measured to the top surface of the structural concrete or foamed plastic (Item 9) when it is used.
SIPLAST INC
VERMICULITE PRODUCTS INC
 2. Blend 3.5 cu ft. of Type NVC Concrete Aggregate* or Type NVS Vermiculite Aggregate* to 94 lb Portland Cement. Slurry coat, 1/8 in. thickness beneath foamed plastic (Item 9) when used, 1 in. min topping thickness.
SIPLAST INC
VERMICULITE PRODUCTS INC
 Vermiculite concrete may be covered with Roof Covering Materials (Item 7).
 - B. **Cellular Concrete-Roof Topping Mixture*** — Concentrate mixed with water and Portland Cement per manufacturers specifications. Min. thickness of 2-in. as measured to the top surface of the structural concrete or foamed plastic (Item 9) when used. 28-day min compressive strength of 190 psi as determined with ASTM C495-66.
CELCORE INC — Type Celcore with cast dry density of 31 (+ or - 3.0) pcf or Type Celcore MF with cast dry density of 29 (+ or - 3.0) pcf.
AERIX INDUSTRIES —Cast dry density of 37 (+ or -) 3.0 pcf.
ELASTIZELL CORP OF AMERICA —Type II. Mix #1 of cast dry density 39 (+ or -) 3.0 pcf, Mix #2 of cast dry density 40 (+ or -) 3.0 pcf, Mix #3 of cast dry density 47 (+ or -) 3.0 pcf.
LITE-CRETE INC —Cast dry density of 29 (+ or -) 3.0 pcf.
SIPLAST INC —Mix No. 1 or 2. Cast dry density of 32+3 (Mix No. 1) or 36+3 (mix No. 2) pcf.
 - C. **Perlite Concrete** — Mix consists of 6.2 cu ft Perlite Aggregate* to 94 lbs of Portland cement and 1-1/2 pt air entraining agent. Compressive strength 80 psi min.
 See Perlite Aggregate (CFFX) category for names of Classified companies.
 - D. **Cellular Concrete-Roof Topping Mixture*** — Foam Concentrate mixed with water, Portland Cement and UL Classified Vermiculite Aggregate per manufacturer's application instructions. Cast dry density of 33 (+ or -) 3.0 pcf and 28-day compressive strength of min 250 psi as determined in accordance with ASTM C495-86.
AERIX INDUSTRIES —Mix No. 3.
SIPLAST INC —Mix No. 3.
 - E. **Floor Topping Mixture* (Optional, not shown)** — Approx 4.5 gal of water to 41 lbs of NVS Premix floor topping mixture. Slurry coat 1/8 in. thickness beneath foamed plastic (Item 9) when used, 1 in. min topping thickness.
SIPLAST INC
 Floor Topping Mixture may be covered with Built-Up or Single Membrane Roof Covering.
9. **Foamed Plastic*** — (Optional-not shown) For use only with vermiculite or cellular concretes or Floor Topping mixture (Item 8E) -Rigid polystyrene foamed plastic insulation having slots and/or holes sandwiched between vermiculite concrete slurry which is applied to the normal or lightweight concrete surface and concrete topping.
SIPLAST INC
VERMICULITE PRODUCTS INC
10. **Roof Insulation-Mineral and Fiber Boards* or Foamed Plastic*** — (Optional, not shown) — Mineral and fiber boards or polyisocyanurate roof insulation applied over concrete floor with no restriction on board thickness. When mineral and fiber boards or polyisocyanurate roof insulation are used the unrestrained beam rating shall be increased by a min of 1/2 hr. See Mineral and Fiber Boards (CERZ) or Foamed Plastic (CCVW) category for names of Manufacturers.

*Bearing the UL Classification Mark

Design No. P732

Restrained Assembly Ratings — 1, 1-1/2, 2 or 3 Hr (See Item 10)
Unrestrained Assembly Ratings — 3/4, 1, 1-1/2, 2 or 3 Hr (See Item 10)
Unrestrained Beam Ratings — 1, 1-1/2, 2 or 3 Hr (See Item 10)
Restricted Load Condition — See Items 1 and 10C
Load Restricted for Canadian Applications — See Guide BXUV7



1. **Beam** — Min W6x16 or W8x28 or Steel Joist — 10K1 or 16K2 min size with a max tensile stress of 30,000 psi or 12K3 or 12K5 min size with a max tensile stress of 24,000 psi.
2. **Roof Covering*** — Consisting of hot mopped or cold application bituminous materials compatible with the insulation(s) described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory — Roof Covering Materials (TEVT).
- 2A. **In lieu of Item 2, roof covering consisting of single-ply Roofing Membrane*** — that is either ballasted, adhered or mechanically attached as permitted under the respective manufacturer's Classification. See Fire Resistance Directory — Roof Membrane (CHCI).
- 2B. **Metal Roof Deck Panels*** — (Not shown) — In addition to or in lieu of Item 2 or 2A, the roof covering may consist of a mechanically fastened metal roof deck panel assembly. See Fire Resistance Directory — Metal Roof Deck Panels (CETW).
3. **Roof Insulation — Foamed Plastic** — Polyisocyanurate foamed plastic insulation boards nom 48 by 48 or 96 in., to be applied in one or more layers. Boards to be installed with end joints staggered a min of 6 in. Min thickness shall be selected from the Table below. No limit on max overall thickness.

Restrained or Unrestrained Assembly Rating Hr	Min Insulation Thkns In.	
	With Gypsum Wallboard	Without Gypsum Wallboard
1	1	2
1-1/2	1-1/2	3
2	2	3
3	2	3

ATLAS ROOFING CORP —Type ACFoam II, ACFoam III, ACFoam-II SL, ACFoam IV.

BUILDING MATERIALS CORP OF AMERICA,

DBA GAF —EnergyGuard RH, Tapered EnergyGuard RH

BUILDING MATERIALS CORP OF AMERICA,

DBA GAF —Isotherm R.

CARLISLE SYNTEC INCORPORATED —Types HP, HP-H, HP-N, HP-W.

DOW ROOFING SYSTEMS L L C —"Dow Termico Polyisocyanurate Insulation", "Dow Termico ISO 3000 Insulation", "Dow Termico ISO HP-FR".

FIRESTONE BUILDING PRODUCTS CO L L C —"ISO 95+ GL", "ISO 95+ FK", "ISO 95+ GW", "ISO 300", "ISO 95+ CAN", "ISOGARD HD Composite Board" or "RESISTA".

GENFLEX ROOFING SYSTEMS L L C — "GenFlex ISO"

HUNTER PANELS —H Shield

JOHNS MANVILLE —ENRGY 3 25 psi, ENRGY 3, Tapered ENRGY 3, Tapered ENRGY 3 25 psi, ENRGY 3 AGF, Tapered ENRGY 3 AGF, ENRGY 3 25 psi AGF, Tapered ENRGY 3 25 psi AGF, ENRGY 3 CGF, Tapered ENRGY 3 CGF, ENRGY 3 25 psi CGF, Tapered ENRGY 3 25 psi CGF, ISO-3, Tapered ISO-3, ValuTherm, Tapered ValuTherm, ValuTherm 25 psi, Tapered ValuTherm 25 psi, ValuTherm AGF, Tapered ValuTherm AGF, ValuTherm 25 psi AGF, Tapered ValuTherm 25 psi AGF, ValuTherm CGF, Tapered ValuTherm CGF, ValuTherm 25 psi CGF, Tapered ValuTherm 25 psi CGF.

LOADMASTER SYSTEMS INC —Type Loadmaster polyisocyanurate insulation

RMAX OPERATING L L C —Type Multi-Max-3, Multi-Max FA-3, Ultra-Max, Ultra-Max Plus, Tapered Ultra-Max Plus, Tapered Thermo-roof-3, Tapered Thermo-roof FA-3, Tapered Ultra-Max.

SIKA SARNAFIL INC —Sarnatherm r, Sarnatherm r Ultra, Sarnatherm r Tapered, Sarnatherm r Ultra Tapered.

SOPREMA INC —Sopra-ISO s, Sopra-ISO s Tapered, Sopra-ISO+ s, Sopra-ISO+ s Tapered, Sopra-ISO H+ s, Sopra-ISO H+ s Tapered.

- 3A. **Building Units*** — Not Shown — As an alternate to Item 3, composite polyisocyanurate foamed plastic insulation board with an adhered nailing surface, nom 48 by 48 or 96 in. may be used with the following limitations. These composite building units have ventilation slots internal to the panels. The thickness of the panel depends upon the thinnest portion of the polyisocyanurate insulation. The following dimensions apply to the polyisocyanurate insulation, min thickness is as measured in accordance with Item 3. There is no limit on the max insulation thickness.

JOHNS MANVILLE —Type ISO-VENT.

- 3B. **Building Units*** — Polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with ori-

- ented strand board or plywood. Min thickness of the polyisocyanurate core is 1.3 in. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows. Adhesive (Item 6) may be applied between the building units and the vapor retarder (or gypsum wallboard if vapor retarder is not used).
- ATLAS ROOFING CORP** —ACFoam Nailbase Insulation and Vented R, CrossVent.
FIRESTONE BUILDING PRODUCTS CO L L C —Nail Base.
SOPREMA INC —Sopra-ISO CV s.
- 3C. **Roof Insulation-Mineral and Fiber Boards*** — (Not Shown) — Optional, Applied in one or more layers over the Foamed Plastic (Item 3) to be applied with adhesive (Item 6), asphalt or coal tar pitch (Item 7) or mechanically fastened (Item 8).
JOHNS MANVILLE
ROXUL INC —MonoBoard™, MonoBoard™ Plus, “MonoBoard Plus S”, TopRock®DD, TopRock® DD Plus or TopRock DD Plus S.
SOPREMA INC —SopraRock®MD, SopraRock®MD Plus, SopraRock®DD and SopraRock®DD Plus.
- 3D. **Building Units*** — As an alternate to Item 3, polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with oriented strand board. Min thickness of the polyisocyanurate core is 1.3 in. for the 1 hr rating without gypsum wallboard (Item 4) and for the 1, 1-1/2 and 2 hr ratings with gypsum wallboard and 2.6 for the 1-1/2 hr ratings without gypsum wallboard. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.
JOHNS MANVILLE —Nailboard.
- 3E. **Building Units*** — As an alternate to Item 3, polyisocyanurate foamed plastic insulation boards faced on the underside (or both sides) with mineral fiber board. Min thickness of the polyisocyanurate core is 1.3 in. for the 1 hr rating without gypsum wallboard (Item 4) and for the 1-1/2 and 2 hr ratings with wallboard and 2.6 in. for the 1-1/2 hr ratings without gypsum wallboard. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. adjacent rows. Adhesive (Item 6) may be applied between the building units and the vapor retarder (or gypsum wallboard if vapor retarder is not used).
FIRESTONE BUILDING PRODUCTS CO L L C — “ISO 95+ Composite”
JOHNS MANVILLE —Fesco-Foam.
- 3F. **Building Units*** — As an alternate to Item 3, polyisocyanurate foamed plastic insulation boards faced on the underside with wood fiber board. Min thickness of the polyisocyanurate core is 1.3 in. for the 1 hr rating without gypsum wallboard (Item 4) and for the 1-1/2 and 2 hr ratings with wallboard and 2.6 in. for the 1-1/2 hr ratings without gypsum wallboard. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.
FIRESTONE BUILDING PRODUCTS CO L L C — “ISO 95+ Composite” .
JOHNS MANVILLE —ENRGY-2 Plus.
- 3G. **Building Units*** — As an alternate to Item 3, polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with gypsum board. Min thickness of the polyisocyanurate core is 1.3 in. for 1 hr rating without gypsum wallboard (Item 4) and for the 1-1/2 and 2 hr ratings with wallboard (Item 4) and 2.6 in. for the 1-1/2 ratings without gypsum wallboard (Item 4). No limit on overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows. Adhesive (Item 6) may be applied between the building units and the vapor retarder (or gypsum wallboard if vapor retarder is not used).
JOHNS MANVILLE —ENRGY 2 Gypsum Composite.
- 3H. **Roof Insulation — Mineral and Fiber Boards*** — As an alternate to Item 3, to be applied in one or more layers with or without adhesive applied between vapor barrier and roof deck units, vapor barrier and board and each layer of board. When more than one layer is required, each layer of board to be offset in both directions from layer below a min of 6 in. in order to lap all joints. Min thickness is 2 in. when Item 2A or 2B is used. Min thickness is 1 in. otherwise.
BMCA INSULATION PRODUCTS INC —Permalite.
BUILDING MATERIALS CORP OF AMERICA,
DBA GAF —GARTEMP Perlite.
JOHNS MANVILLE
- 3I. **Roof Insulation - Foamed Plastic*** — (Not Shown) As an alternate to Item 3 through 3H, polystyrene foamed plastic insulation boards, applied in one or more layers over gypsum wallboard. Min. thickness is 1.0 in. with no max overall thickness max density 2.5 pcf. When applied in more than one layer, each layer to be offset in both directions from layer below a min. of 6 in. in order to lap all joints. Boards secured to gypsum wallboard (Item 4) with asphalt glaze coat or adhesive (Item 6). Adhesive and/or asphalt glaze coat may be omitted when Item 2A is used. See Foamed Plastic (BRYX) category in the Building Materials Directory or Foamed Plastic (CCVV) category in the Fire Resistance Directory of for names of manufacturers.
- 3J. **Fiber, Sprayed*** — (Not Shown) — For 1 hr rating only — As an alternate to Items 3 through 3I, Spray applied cellulose insulation material. The fiber is applied with water to a min. thickness of 10 in. as measured from the top plane of the roof deck in accordance with the application instructions supplied with the product. Minimum density of 2.6 pcf. Gypsum board not required over steel roof deck. Min. 1 in. thickness of Spray-Applied Fire Resistive Material* (Items 10, 10A, 10B) required on underside of steel deck. When Item 3J is used, Roof Covering (Items 2, 2A and 2B) shall not be directly applied over sprayed fiber.
U S GREENFIBER L L C — Cocoon stabilized cellulose insulation.
- 3K. **Roof Insulation - Foamed Plastic*** — (Not Shown) - Optional, a minimum of 1/4 in. thick - Placed over minimum 1-1/2 in. thick polyisocyanurate Foamed Plastic (Item 3) to be applied with adhesive (Item 6), asphalt or coat tar pitch (Item 7) or mechanically fastened (Item 8). Boards to be installed with end joints to be offset in both directions from layer below a min of 6 in. in order to lap all joints.
JOHNS MANVILLE —Invinsa
- 3L. **Foamed Plastic*** — Optional - (Not Shown) - Maximum 1 in. thick polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in. Boards may be applied as the top layer in addition to the specified minimum thickness of any roofing system described herein, as long as the roofing system states that there is no limit on maximum thickness. Joints offset in both directions from layer below.
FIRESTONE BUILDING PRODUCTS CO L L C —“ISOGARD HD”
- 3M. **Foamed Plastic*** — As an alternate to Items 3 - 3J, polyurethane foamed plastic roof insulation. When used, gypsum board (item 4) is required. Formed by the simultaneous spraying of two liquid components applied over the gypsum board (item 4) in accordance with the manufacturer’s instructions. Min thickness shall be selected from the table above. No limit on max overall thickness.
BASF CORP —Types FE 303 2.7, FE-348, FE348-2.5, FE348-2.7, FE348-2.8, FE348-3.0, ELASTOSPRAY 81255, ELASTOSPRAY 81275, ELASTOSPRAY 81285 or ELASTOSPRAY 81305.
BASF CORP —Elastospray 5100-2.0, Elastospray 5100-2.5, Elastospray 81302, Elastospray 81272, Elastospray Alpha System, Elastospray 81252
4. **Gypsum Board** — (Not shown) — (Classified or Unclassified) — May be used to obtain various Restrained or Unrestrained Assembly Ratings as described in Item 10. Supplied in sheets nom 4 by 8 or 12 ft by 5/8 in. thick. Min weight 2.2 psf. Applied perpendicular to steel roof deck direction with end joints staggered 2 ft in adjacent rows. End joints to occur over crests of steel roof units.
ACADIA DRYWALL SUPPLIES LTD —CKNX.R25370
AMERICAN GYPSUM CO —CKNX.R14196
BEIJING NEW BUILDING MATERIALS PUBLIC LTD CO —CKNX.R19374
CERTAINTED GYPSUM CANADA INC —CKNX.R15187
CERTAINTED GYPSUM INC —CKNX.R3660
CGC INC —CKNX.R19751
CONTINENTAL BUILDING PRODUCTS OPERATING CO, L L C —CKNX.R18482

GEORGIA-PACIFIC GYPSUM L L C —CKNX.R2717
 LOADMASTER SYSTEMS INC —CKNX.R11809
 NATIONAL GYPSUM CO —CKNX.R3501
 PABCO BUILDING PRODUCTS L L C, DBA
 PABCO GYPSUM —CKNX.R7094
 PANEL REY S A —CKNX.R21796
 SIAM GYPSUM INDUSTRY (SARABURI) CO LTD —CKNX.R19262
 THAI GYPSUM PRODUCTS PCL —CKNX.R27517
 UNITED STATES GYPSUM CO —CKNX.R1319
 USG MEXICO S A DE C V —CKNX.R16089

5. **Vapor Retarder — Sheathing Material*** — (Optional) — (Not shown) — Vinyl film or paper scrim vapor barrier, applied to steel roof deck or gypsum wallboard with adhesive (Item 6), hot asphalt (Item 7) or laid loosely, overlapped approx 2 in. on adjacent sheets. See **Sheathing Material** (CHIZ) category for names of manufacturers.
- 5A. **Sheathing Material*** — (Optional) — In lieu of Item 5, a self-adhered rubberized asphalt roofing underlayment membrane which may be placed on top of steel roof deck, gypsum wallboard or on the roof insulation.
W R GRACE & CO - CONN — Grace Ice and Water Shield, Grace Ice and Water Shield-HT®, Grace Select, Grace Ultra, and Grace Basik.
6. **Adhesive*** — (Optional) — The vapor retarder, the gypsum wallboard or the first layer of roof insulation may be secured with adhesive to the steel crest surfaces. Also used to attach the vapor retarder to gypsum wallboard, the first layer of insulation to vapor retarder or gypsum wallboard and each additional layer of insulation. Applied in 1/2 in. wide ribbons 6 in. OC at 0.4 gal/100 sq ft. See **Adhesives** (BYWR) category for names of manufacturers.
- 6A. **Adhesive* (Optional)** — (Bearing the UL Classification Marking for Roof Systems (TGFU)) - When FAST 100 adhesive is used, the Unrestrained Assembly Ratings are limited to 1, 1-1/2 and 2 hr. The vapor retarder, the gypsum wallboard or the first layer of roof insulation may be secured with adhesive to the steel crest surfaces. Also used to attach the vapor retarder to gypsum wallboard, the first layer of insulation to vapor retarder or gypsum wallboard and each additional layer of insulation. Applied at a max rate of 19.8 g/ft². When FAST 100 adhesive is used, additional **Spray-Applied Fire Resistant Materials* (CHPX)** is required on the deck for the 1-1/2 and 2 hr Unrestrained Assembly Ratings. The thickness specified for the deck shall be increased by 1/16 in. for 1-1/2 hr Unrestrained Assembly Rating and 1/4 in. for 2 hr Unrestrained Assembly Rating.
CARLISLE SYNTÉC INCORPORATED — FAST 100
7. **Asphalt or Coal Tar Pitch*** — (Optional) — (Not shown) — The vapor retarder, the gypsum wallboard of the first layer of roof insulation may be secured with asphalt or coal tar pitch to the steel crest surfaces at a max rate of 15 lb/100 sq ft. Also used to attach the vapor retarder to gypsum wallboard, the first layer of insulation to vapor retarder or gypsum wallboard and each additional layer of roof insulation, applied at a max rate of 25 lb/100 sq ft.
8. **Mechanical Fasteners — (Optional)** — (Not shown) — Mechanical screw-type fastener with metal or plastic washer designed for the purpose may be used to attach one or more layers of insulation to steel roof deck.
9. **Steel Roof Deck** — (Unclassified) — Min 1-1/2 in. deep and 36 in. wide galv fluted steel deck. Min gauge is No. 22 MSG. Ends overlapped at supports a min 1-1/2 in. and welded to supports 12 in. OC and at side laps. Side laps fastened with 1/2 in. long hex head, self-drilling, self-tapping steel screws spaced a max of 36 in. OC.
Classified Steel Floor and Form Units* — Noncomposite 1-1/2 to 3 in. deep, 24 to 36 in. wide, min 22 MSG galvanized steel fluted units. Ends overlapped at supports a min 1-1/2 in. and welded to supports 12 in. OC and at side laps. Side laps fastened with 3/4 in. long No. 12 self-drilling, self-tapping steel screws at 36 in. OC. As alternate to screw fasteners adjacent units may be button-punched or welded together 36 in. OC along side joints.
ASC STEEL DECK, DIV OF ASC PROFILES L
L C —24 through 36 in. wide, Types DGB Hi-Form, B Hi-Form, DGB, B, DGN Hi-Form, N Hi-Form, DGN, and N. All units may be galvanized or Prime Shield™.
CANAM STEEL CORP —Type P-3606, P-3615, P-2436, P-2404, P-2403, and P-2438 noncomposite.
CANAM STEEL CORP —Types B, F, N. Units may be phos./ptd or ptd/ptd.
CONSOLIDATED SYSTEMS INC —Types B, BI, F, N and NI. Units may be ptd/ptd.
NEW MILLENNIUM BUILDING SYSTEMS L L C —Types B, BI, F, N. Units may be phos/painted, ptd/ptd, or galvanized.
 Painted units may be used for ratings up to 2 h.
VERCO DECKING INC - A NUCOR CO —Types PLB, HSB, PLN and N; or Types PLN3, HSN3. Ptd/ptd units may be used for ratings up to 2 h.
VULCRAFT, DIV OF NUCOR CORP —Types BW, F, High Strength B, High Strength BW, N, ptd/ptd units may be used for ratings up to 2 h.
VULCRAFT, DIV OF NUCOR CORP —Galv Types 1.5B, 1.5BI, 1.5F, 3N and 3NI, ptd/ptd units may be used for ratings up to 2 h.

Note: Type Z-106 Spray-Applied Fire Resistive Materials to be used with galv steel roof units only.

10. **Spray-Applied Resistive Material*** — Applied by mixing with water and spraying in more than one coat to final thicknesses as shown in the illustration above and in the table below to steel surfaces which must be clean and free of dirt, loose scale and oil. Steel deck surface must be "spatter" coated with Type SK-3 Spray-Applied Fire Resistive Materials prior to application of spray-applied resistive material. Type SK-3 spray-applied resistive material applied in accordance with the manufacturer's application instructions. When steel deck is used the area between the steel deck and the beams top flange shall be filled. Min average and min individual density of 15/14 pcf, respectively. For method of density determination, see Design Information Section. Thickness of the spatter coat is included in the total final thickness of the protection material.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Steel deck thickness #		Beam Thickness	
			with Gypsum Wallboard	Without Gypsum Wallboard	full flange W8x28 Beam	1/2 flange## W8x28 Beam
1	0@	1	N/A	1	7/16	1/2
1	1	1	9/16***	1	7/16	1/2
1	1	1	5/8	1	7/16	1/2
1	1	1	1*	1-5/8*	7/16	1/2
1 1/2	1	1	3/4	1 1/4	9/16	13/16
1 1/2	1 1/2	1 1/2	13/16	1 3/8	5/8	13/16
1 1/2	1 1/2	1 1/2	1 1/2*	2 1/8*	5/8	13/16
2	1	1	1	1 1/2	3/4	1 1/16
2	1 1/2	1 1/2	1	1 1/2	3/4	1 1/16
2	2	2	1 1/8	1 11/16	7/8	1 1/16
2	2	2	2*	2 5/8*	7/8	1 1/16
3	1 1/2	1 1/2	1 1/2	2 1/8	1 3/16	1 5/8
3	2	2	1 1/2	2 1/8	1 3/16	1 5/8
3	3	3	1 5/8	2 3/8	1 3/8	1 5/8

The required minimum thickness of Spray-Applied Fire Resistive Materials on the steel deck is increased by 1/16 inch for 1-1/2 hr Un-restrained assembly rating and 1/4 inch for 2 hr Unrestrained Assembly rating when Item 6A is used.

FIRE RESISTANCE DIRECTORY - W R GRACE DESIGNS

When the thickness applied to the lower flange edges is reduced by one half, the 1/2 flange thickness is applicable.
 * No minimum insulation thickness required
 ***Minimum insulation thickness (Item 3) 2 inches.
 @ When the maximum clear span of the steel decking is 5 ft. 2 in. or less, the Unrestrained Assembly Rating is 1-hour.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Joist thickness 10K1 more than 4 ft OC	10K1 less than 4 ft OC	16K2 more than 4 ft OC	16K2 less than 4 ft OC
1	0@	1	1 1/8	1	15/16	15/16
1	1	1	1 1/8	1	15/16	15/16
1 1/2	1	1	1 5/16	1 5/16	1 1/4	1 3/16
1 1/2	1 1/2	1 1/2	1 7/16	1 7/16	1 1/4	1 3/16
2	1	1	1 7/16	1 7/16	1 9/16	1 1/2
2	1 1/2	1 1/2	1 7/16	1 7/16	1 9/16	1 1/2
2	2	2	2 3/16	2 3/16	1 9/16	1 1/2
3	1 1/2	1 1/2	3 1/4	2 13/16	2 1/4	2 1/8
3	2	2	3 1/4	2 13/16	2 1/4	2 1/8
3	3	3	3 1/4	2 13/16	2 1/4	2 1/8

@ When the maximum clear span of the steel decking is 5 ft. 2 in. or less, the Unrestrained Assembly Rating is 1-hour.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	W6x16 Beam Thickness
1	1	1	9/16
1 1/2	1	1	5/8
1 1/2	1 1/2	1 1/2	13/16
2	1	1	7/8
2	1 1/2	1 1/2	7/8
2	2	2	1 1/16
3	1 1/2	1 1/2	1 1/4
3	2	2	1 1/4
3	3	3	1 1/2

ARABIAN VERMICULITE INDUSTRIES —Types MK-6/HY, MK-6/HY Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-1000/HB, MK-1000/HB Extended Set, SK-3.

GRACE KOREA INC —Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, SK-3.

W R GRACE & CO - CONN —Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, RG, SK-3.

10A. Alternate Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying in one or more coats to final thicknesses as shown in the table below to steel beam surfaces which must be clean and free of dirt, loose scale and oil. When Type Z-106/G is used, the steel deck surface must be "spatter" coated with Type SK-3 Spray-Applied Fire Resistive Materials prior to application of spray-applied resistive material. Type SK-3 spray-applied resistive material applied in accordance with the manufacturer's application instructions. When steel deck is used the area between the steel deck and the beams top flange shall be filled. Min avg and min ind density of 22/19 pcf, respectively. For method of density determination, refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Steel deck thickness #		Beam Thickness	
			with Gypsum Wallboard	Without Gypsum Wallboard	full flange W8x28 Beam	1/2 flange W8x28 Beam
1	0@	1	N/A	1	7/16	1/2
1	1	1	9/16***	1	7/16	1/2
1	1	1	5/8	1	7/16	1/2
1	1	1	1*	1-5/8*	7/16	1/2
1 1/2	1	1	3/4	1 1/4	9/16	13/16
1 1/2	1 1/2	1 1/2	13/16	1 3/8	5/8	13/16
1 1/2	1 1/2	1 1/2	1 1/2*	2 1/8*	5/8	13/16
2	1	1	1	1 1/2	3/4	1 1/16
2	1 1/2	1 1/2	1	1 1/2	3/4	1 1/16
2	2	2	1 1/8	1 11/16	7/8	1 1/16
2	2	2	2*	2 5/8*	7/8	1 1/16
3	1 1/2	1 1/2	1 1/2	2 1/8	1 3/16	1 5/8
3	2	2	1 1/2	2 1/8	1 3/16	1 5/8
3	3	3	1 5/8	2 3/8	1 3/8	1 5/8

The required minimum thickness of Spray-Applied Fire Resistive Materials on the steel deck is increased by 1/16 inch for 1-1/2 hr Un-restrained assembly rating and 1/4 inch for 2 hr Unrestrained Assembly rating when Item 6A is used.

When the thickness applied to the lower flange edges is reduced by one half, the 1/2 flange thickness is applicable.

* No minimum insulation thickness required

***Minimum insulation thickness (Item 3) 2 inches.

@ When the maximum clear span of the steel decking is 5 ft. 2 in. or less, the Unrestrained Assembly Rating is 1-hour.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Joist thickness			
			10K1 more than 4 ft OC	10K1 less than 4 ft OC	16K2 more than 4 ft OC	16K2 less than 4 ft OC
1	0@	1	1 1/8	1	15/16	15/16
1	1	1	1 1/8	1	15/16	15/16
1 1/2	1	1	1 5/16	1 5/16	1 1/4	1 3/16
1 1/2	1 1/2	1 1/2	1 7/16	1 7/16	1 1/4	1 3/16
2	1	1	1 7/16	1 7/16	1 9/16	1 1/2
2	1 1/2	1 1/2	1 7/16	1 7/16	1 9/16	1 1/2
2	2	2	2 3/16	2 3/16	1 9/16	1 1/2
3	1 1/2	1 1/2	3 1/4	2 13/16	2 1/4	2 1/8
3	2	2	3 1/4	2 13/16	2 1/4	2 1/8
3	3	3	3 1/4	2 13/16	2 1/4	2 1/8

@ When the maximum clear span of the steel decking is 5 ft. 2 in. or less, the Unrestrained Assembly Rating is 1-hour.

FIRE RESISTANCE DIRECTORY - W R GRACE DESIGNS

FIRE-RESISTANCE RATINGS - ANSI/UL 263 (BXUV)

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	W6x16 Beam Thickness
1	1	1	9/16
1 1/2	1	1	5/8
1 1/2	1 1/2	1 1/2	13/16
2	1	1	7/8
2	1 1/2	1 1/2	7/8
2	2	2	1 1/16
3	1 1/2	1 1/2	1 1/4
3	2	2	1 1/4
3	3	3	1 1/2

ARABIAN Vermiculite Industries —Types Z-106, Z-106/G, Z-106/HY.

GRACE KOREA INC —Types Z-106, Z-106G, Z-106/HY.

W R GRACE & CO - CONN —Types Z-106, Z-106G, Z106/HY.

10B. Alternate Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying in one or more coats to final thicknesses as shown in the table below to steel beam surfaces which must be clean and free of dirt, loose scale and oil. When steel deck is used, the area between the steel deck and the beams top flange shall be filled. Application to steel roof deck requires the installation of expanded metal lath. See Item 11A. Min avg and min ind density of 40/36 pcf respectively for Types Z-146, Z-146PC and Z-146T cementitious mixture. Min avg and min ind density of 50/45 pcf respectively for Types Z-156, Z-156T and Z-156PC. For method of density determination, refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Steel deck thickness #		Beam Thickness	
			with Gypsum Wallboard	Without Gypsum Wallboard	full flange W8x28 Beam	1/2 flange# W8x28 Beam
1	0@	1	N/A	1-1/16	7/16	1/2
1	1	1	9/16***	1	7/16	1/2
1	1	1	5/8	1	7/16	1/2
1	1	1	1*	1-7/16*	7/16	1/2
1 1/2	1	1	3/4	1 1/4	9/16	13/16
1 1/2	1 1/2	1 1/2	13/16	1 3/8	5/8	13/16
1 1/2	1 1/2	1 1/2	1 1/2*	1-7/8*	5/8	13/16
2	1	1	1	1 1/2	3/4	1 1/16
2	1 1/2	1 1/2	1	1 1/2	3/4	1 1/16
2	2	2	1 1/8	1 1/16	7/8	1 1/16
2	2	2	2*	2-5/16*	7/8	1 1/16
3	1 1/2	1 1/2	1 1/2	2 1/8	1 3/16	1 5/8
3	2	2	1 1/2	2 1/8	1 3/16	1 5/8
3	3	3	1 5/8	2 3/8	1 3/8	1 5/8

The required minimum thickness of Spray-Applied Fire Resistive Materials on the steel deck is increased by 1/16 inch for 1-1/2 hr Un-restrained assembly rating and 1/4 inch for 2 hr Unrestrained Assembly rating when Item 6A is used.

When the thickness applied to the lower flange edges is reduced by one half, the 1/2 flange thickness is applicable.

* No minimum insulation thickness required

***Minimum insulation thickness (Item 3) 2 inches.

@ When the maximum clear span of the steel decking is 5 ft. 2 in. or less, the Unrestrained Assembly Rating is 1-hour.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Joist thickness			
			10K1 more than 4 ft OC	10K1 less than 4 ft OC	16K2 more than 4 ft OC	16K2 less than 4 ft OC
1	0@	1	1 1/8	1	15/16	15/16
1	1	1	1 1/8	1	15/16	15/16
1 1/2	1	1	1 5/16	1 5/16		1 3/16
1 1/2	1 1/2	1 1/2	1 7/16	1 7/16	1 1/4	1 3/16
2	1	1	1 7/16	1 7/16		1 1/2
2	1 1/2	1 1/2	1 7/16	1 7/16		1 1/2
2	2	2	2 3/16	2 3/16	1 9/16	1 1/2
3	1 1/2	1 1/2	3 1/4	2 13/16		2 1/8
3	2	2	3 1/4	2 13/16		2 1/8
3	3	3	3 1/4	2 13/16	2 1/4	2 1/8

@ When the maximum clear span of the steel decking is 5 ft. 2 in. or less, the Unrestrained Assembly Rating is 1-hour.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	W6x16 Beam Thickness
1	1	1	9/16
1 1/2	1	1	5/8
1 1/2	1 1/2	1 1/2	13/16
2	1	1	7/8
2	1 1/2	1 1/2	7/8
2	2	2	1 1/16
3	1 1/2	1 1/2	1 1/4
3	2	2	1 1/4
3	3	3	1 1/2

ARABIAN Vermiculite Industries —Type Z-146 investigated for exterior use.

GRACE KOREA INC —Type Z-146 investigated for exterior use.

W R GRACE & CO - CONN — Type Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC investigated for exterior use.

10C. Alternate Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying in more than one coat to final thicknesses as shown in the illustration above and in the table below to steel surfaces which must be clean and free of dirt, loose scale and oil. When steel deck is used the area between the steel deck and the beams top flange shall be filled. For minimum and

FIRE RESISTANCE DIRECTORY - W R GRACE DESIGNS

maximum density of: Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, SK-3, RG, SK-3 see Item 10; Types Z-106, Z-106/G, Z-106/HY, Z-106/G see Item 10A; Type Z-146 see Item 10B.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Joist thickness**	
			12K3 more than 4 ft OC	12K3 less than 4 ft OC
1	0@	1	15/16	15/16
1	1	1	15/16	15/16
1 1/2	1 1/2	1 1/2	1 1/4	1 3/16
2	2	2	1 9/16	1 1/2
3	3	3	2 1/4	2 1/8

**Design load shall stress the 12K3 joist to a maximum tensile strength of 24,000 psi, which represents 80% of the maximum allowable design loading. Based on the Steel Joist Institute (SJI) Publication, "Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders" for guidance on how to increase the design loading accordingly.

@ When the maximum clear span of the steel decking is 5 ft. 2 in. or less, the Unrestrained Assembly Rating is 1-hour.

ARABIAN VERMICULITE INDUSTRIES —Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, SK-3, Z-106, Z-106/G, Z-106/HY, Type Z-146 investigated for exterior use.

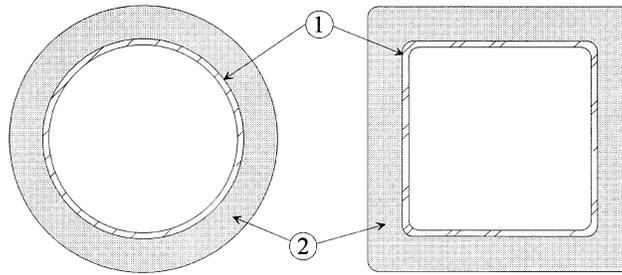
GRACE KOREA INC —Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, SK-3, Types Z-106, Z-106/G, Z-106/HY, Type Z-146 investigated for exterior use.

W R GRACE & CO - CONN —Types MK-6/HY, MK-6/HY Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, RG, SK-3, Types Z-106, Z-106/G, Z106/HY, Type Z-146 investigated for exterior use.

11. **Nonmetallic Fabric Mesh** — (Optional) — As an alternate to the optional use of metal lath, glass fiber fabric mesh, weighing approx 2.5 oz/sq yd, polypropylene fabric mesh, weighing approx 1.25 oz/sq yd or equivalent, may be used to facilitate the spray application. The mesh is secured to one side of each joist web member. The method of attaching the mesh must be sufficient to hold the mesh and the spray applied Spray-Applied Fire Resistive Materials material in place during application until it has cured. An acceptable method to attach the mesh is by embedding the mesh in min 1/4 in. long beads of hot melted glue. The beads of glue shall be spaced a max of 12 in. OC along the top chord of the bar joist. Another method to secure the mesh is by 1-1/4 in. long by 1/2 in. wide hairpin clips formed from No. 18 SWG or heavier steel wire. The method of attaching the mesh must be sufficient to hold the mesh and the spray applied Spray-Applied Fire Resistive Materials material in place during application until it has cured. An acceptable method to attach the mesh is by embedding the mesh in min 1/4 in. long beads of hot melted glue. The beads of glue shall be spaced a max of 12 in. OC along the top chord of the bar joist. Another method to secure the mesh is by 1-1/4 in. long by 1/2 in. wide hairpin clips formed from No. 18 SWG or heavier steel wire.
- 11A. **Metal Lath** — (Not Shown) — (Required with Item 10B, otherwise optional) — Metal lath shall be 3/8 in. expanded diamond mesh, weighing 2.5 lb per sq yd. Secured to underside of steel deck with No. 12 by 3/8 in. pan head self-drilling, self-tapping screws and steel washers with an outside diam of 1/2 in. screws spaced 12 in. OC in both directions with lath edges overlapped approx 3 in.
- 11B. **Metal Lath** — (Not Shown) — (Required on both sides of joists with Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC, otherwise optional) — Metal lath may be used to facilitate the spray application of Spray-Applied Fire Resistive Materials on steel bar joists and trusses. The diamond mesh, 3/8 in. expanded steel lath, 1.7 to 3.4 lb/sq yd is secured to one side of each steel joist with No. 18 SWG galv steel wire at joist web and bottom chord members spaced 15 in. OC max. When used, the metal lath is to be fully covered with Spray-Applied Fire Resistive Materials with no min thickness requirements.

*Bearing the UL Classification Mark

Design No. Y710
Ratings — 1, 1-1/2, 2, 3 and 4 Hr



- 1. Steel Pipe or Tube Column** — Steel circular pipe (SP) or steel square or rectangular tube (ST). The A/P ratio of the steel pipe or tube (see Item 2) shall range from 0.18 to 2.0.
- 2. Spray-Applied Fire Resistive Materials*** — Prepared by mixing with water according to instructions and applying in one or more coats to the thicknesses shown below, to steel surfaces which are clean and free of dirt, loose scale, and oil. Min avg and min ind density for Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set and RG of 15/14 pcf, respectively. Min avg and min ind density for Types Z-106, Z-106/G, Z-106/HY of 22/19 pcf, respectively.

Column Size In.	A/P	Min Thkns In.					
		1 Hr	1-1/2 Hr	2 Hr	3 Hr	4 Hr	
ST 3x3x3/16	.18	1	1-11/16	2-5/16	3-9/16	NA	
ST 3x3x5/16	.28	11/16	1-1/8	1-1/2	2-5/16	3-1/16	
ST 3x3x1/2	.42	7/16	3/4	1	1-1/2	2-1/16	
ST 8x8x5/8	.58	3/8	5/8	3/4	1-1/8	1-1/2	
ST 20x20x3/4	.72	1/4	3/8	9/16	7/8	1-3/16	
ST 20x20x1	.95	1/4	5/16	7/16	11/16	15/16	
ST 32x32x1-1/4	1.20	1/4	1/4	3/8	9/16	3/4	
ST 32x32x1-1/2	1.43	1/4	1/4	5/16	1/2	5/8	
ST 32x32x1-3/4	1.65	1/4	1/4	1/4	7/16	9/16	
ST 32x32x2	1.88	1/4	1/4	1/4	3/8	1/2	
SP 3x.216	.20	15/16	1-1/2	2-1/16	3-1/8	NA	
SP 8x.322	.31	5/8	1	1-5/16	2-1/16	2-13/16	
SP 6x.432	.40	1/2	3/4	1	1-9/16	2-1/8	
SP 10x.50	.48	3/8	5/8	7/8	1-3/8	1-13/16	
SP 6x.864	.74	1/4	3/8	9/16	7/8	1-3/16	

The hourly rating of the structural member is dependent upon the ratio of A/P and the thickness of Spray-Applied Fire Resistive Materials, where A is the cross sectional area of the pipe or tube and P is the heated perimeter.
 The A/P ratio of a circular pipe is determined by:

$$A/P \text{ pipe} = \frac{t(d-t)}{d}$$

Where:

d = the outer diam of the pipe (in.)
 t = the wall thickness of the pipe (in.)

The A/P ratio of a rectangular or square tube is determined by:

$$A/P \text{ tube} = \frac{t(a+b-2t)}{a+b}$$

Where:

a = the outer width of the tube (in.)
 b = the outer length of the tube (in.)
 t = the wall thickness of the tube (in.)

The thickness of Spray-Applied Fire Resistive Materials for rating of 3/4, 1, 1-1/2, 2, 3 and 4 h of a steel pipe or tube can be determined by the equation:

$$h = \frac{R-0.20}{4.43(A/P)}$$

Where:

R = the hourly rating (hrs)
 h = the thickness of Spray-Applied Fire Resistive Materials, minimum 1/4 in., maximum 3-7/8 in.

ARABIAN VERMICULITE INDUSTRIES — Type MK-6GF, MK-6 GF Extended Set, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set.

GRACE KOREA INC — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-10 HB, MK-10 HB Extended Set, MK-6/HB, MK-6s, MK-6GF, MK-6 GF Extended Set, MK-1000/HB, MK-1000/HB Extended Set, Monokote Acoustic 1, Monokote Acoustic 5, Z-106, Z-106/G, Z-106/HY.

W R GRACE & CO - CONN — Types MK-4, MK-5, MK-6/HY, MK-10 HB, MK-10 HB Extended Set, MK-6/HB, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-1000/HB, MK-1000/HB Extended Set, Monokote Acoustic 1, Monokote Acoustic 5, RG, Z-106, Z-106/G, Z-106/HY.

*Bearing the UL Classification Mark

SECTION 07 81 23
INTUMESCENT MASTIC FIREPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thin-film intumescent fire-resistive coatings for exposed structural steel with decorative topcoat where indicated on the Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing.
- B. Section 05 21 00 - Steel Joist Framing.
- C. Section 07 81 00 - Applied Fireproofing: Conventional cementitious fire-proofing.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used including performance characteristics, preparation instructions, installation, storage and handling recommendations. Submit test results of fire-resistive designs for structural elements of the types required for the project, indicating hourly ratings of each assembly.
- C. Samples:
 - 1. Selection Samples: For decorative top coat, color chips representing manufacturer's full range of available colors and sheens.
 - 2. Verification Samples: For each thickness, color, sheen, and finish required, samples not less than 4 inches square on steel substrate, illustrating finished appearance.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company that specializes in manufacturing the type of products specified, with minimum of 10 years of documented experience.
- B. Installer Qualifications: Approved, certified, or supervised by manufacturer of intumescent fireproofing, with not less than 5 years of documented experience.

1.06 MOCK-UP

- A. Construct a mock-up, 100 square feet in size in area designated by the Architect, for evaluation of surface preparation techniques and application workmanship which conforms to Project requirements for fire-ratings. Locate where directed. Accepted mock-up will serve as a standard of comparison for subsequent work of this Section.
 - 1. Evaluate mock-up for compliance with specified requirements, including thickness and finish texture.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are accepted by Architect. Refinish mock-up area as required to produce acceptable work.
 - 3. Accepted mock-up may remain as part of the Project.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers with identification labels and testing agency markings intact and legible.
- B. Store products in manufacturer's unopened packaging until ready for installation.
 - 1. Store at temperatures not less than 50 degrees F in dry, protected area.
 - 2. Protect from freezing, and do not store in direct sunlight.

3. Dispose of any materials that have come into contact with contaminants of any kind prior to application.
- C. Dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 FIELD CONDITIONS

- A. Protect areas of application from windblown dust and rain.
- B. Maintain ambient field conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under ambient conditions outside manufacturer's absolute limits.
 1. Provide temporary enclosures as required to control ambient conditions.
 2. Do not apply intumescent fireproofing when ambient temperatures are below 50 degrees F without specific approval from manufacturer.
 3. Maintain relative humidity between 40 and 60 percent in areas of application.
 4. Maintain ventilation in enclosed spaces during application and for not less than 72 hours afterward.

PART 2 PRODUCTS

2.01 SYSTEM REQUIREMENTS

- A. Fireproofing: Provide intumescent thin-film fire-resistive coating systems tested by an independent testing agency in accordance with ASTM E119 and acceptable to Authority Having Jurisdiction.
 1. IBC Type I-B construction. See the Drawings for areas of structure to remain exposed to receive intumescent fire-resistive coating system. Provide fire-resistance ratings for building elements as follows:
 - a. Primary structural frame, including columns, girders, and trusses: 2 hours.
 - b. Floor construction, including supporting beams and joists: 2 hours.
 - c. Roof construction, including supporting beams and joists: 1 hour.
- B. Exterior Steel: See tested assemblies appended to the end of this Section.
 1. Columns - 2-hour: UL X-601, X-615.
 2. Beams - 2-hour: UL N-601.
- C. Interior Steel: See tested assemblies appended to the end of this Section.
 1. Columns - 2 hour: UL X-625, X-628.
 2. Beams - 2 hour: UL N-607.

2.03 MATERIALS

- A. Interior Fire-Resistive Coating System: Thin film, water-based intumescent coating system for the fire protection of interior structural steel.
 1. Surface Burning Characteristics, ASTM E84: Flame Spread Index of 25, maximum and Smoke Developed Index of 50, maximum.
 2. Hardness, Shore D: 45-50.
 3. Compressive strength, ASTM D695: 300 psi.
 4. Bond Strength, ASTM D952: 40 psi.
 5. Abrasion Resistance, ASTM D1044: 0 grams loss.
 6. Dry Applied Density: 85 pcf.
 7. Products:
 - a. Firefilm III by Carboline Co.
 - b. Albi-Clad TF by Albi Manufacturing.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Exterior Fire-Resistive Coating System: Thin film intumescent coating system for the fire protection of exterior structural steel.

1. Surface Burning Characteristics, ASTM E84: Flame Spread Index of 15, maximum and Smoke Developed Index of 40.
 2. Hardness, Shore D: 65-70.
 3. Compressive strength, ASTM D695: 2,100 psi.
 4. Bond Strength, ASTM D952: 40 psi.
 5. Abrasion Resistance, ASTM D1044: 0.40 gm loss 1000 cycles.
 6. Dry Applied Density: 68 pcf.
 7. Thermal Expansion Coefficient, ASTM D696: 1.44×10^{-5} in/in/oF.
 8. Impact Resistance, ASTM D256: 0.54 ft lbs of notch.
 9. Products:
 - a. Albi-Clad 800 by Albi Manufacturing.
 - b. Nullifire by Carboline Co.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Decorative Top Coating: As recommended by fireproofing manufacturer for exposure conditions.
1. Color and Gloss: As selected by the Architect.
- D. Sealers and Primers: As recommended by the manufacturer for the applications.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates to determine if they are in satisfactory condition to receive intumescent fireproofing. Verify that they are clean and free of oil, grease, incompatible primers, or other foreign substances capable of impairing bond to fireproofing system.
- B. Do not begin installation until substrates have been properly prepared. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Thoroughly clean surfaces to receive fireproofing.
- B. Repair substrates to remove surface imperfections that could affect uniformity of texture and thickness of fireproofing system. Remove minor projections and fill voids that could telegraph through the finished work.
- C. Cover or otherwise protect other work that might be damaged by fallout or overspray of fireproofing system. Provide temporary enclosures as necessary to confine operations and maintain required ambient field conditions.

3.03 INSTALLATION

- A. Comply with manufacturer's instructions for particular conditions of installation in each case.
- B. Apply manufacturer's recommended primer to required coating thickness.
- C. Apply fireproofing to full thickness over entire area of each substrate to be protected. Apply coats at manufacturer's recommended rate to achieve dry film thickness required for fire resistance ratings designated for each condition.
- D. Apply intumescent fireproofing by spraying to maximum extent possible. If necessary, complete coverage by roller application or other method acceptable to manufacturer.
- E. Apply protective / decorative topcoats as recommended by the manufacturer. Achieve uniform finished appearance complying with approved mock-up.

3.04 FIELD QUALITY CONTROL

- A. The Owner's testing and inspection agency shall field test and inspect intumescent fireproofing after application and curing.

1. Intumescent fireproofing thickness shall be tested in accordance with SSPC-PA2 by magnetic thickness gage.
- B. Testing agency shall report test results promptly and in writing to the Contractor, Owner, and Architect.
- C. Repair or replace fireproofing at locations where test results indicate fireproofing does not meet specified requirements. Where fireproofing is removed and replaced or repaired, additional testing will be performed to determine compliance with specified requirements. Any re-tests for areas not in compliance shall be paid for by the Contractor.

3.05 CLEANING

- A. Immediately after installation of fireproofing in each area, remove overspray and fallout from other surfaces and clean soiled areas.

3.06 PROTECTION

- A. Protect installed intumescent fireproofing from damage due to subsequent construction activities, so fireproofing is without damage or deterioration at time of Substantial Completion.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION



Design No. N601
BXUV.N601
Fire-resistance Ratings - ANSI/UL 263

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Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
 - Authorities Having Jurisdiction should be consulted before construction.
 - Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
 - When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
 - Only products which bear UL's Mark are considered Certified.
-

BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

[See General Information for Fire-resistance Ratings - ANSI/UL 263](#)

[See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada](#)

Design No. N601

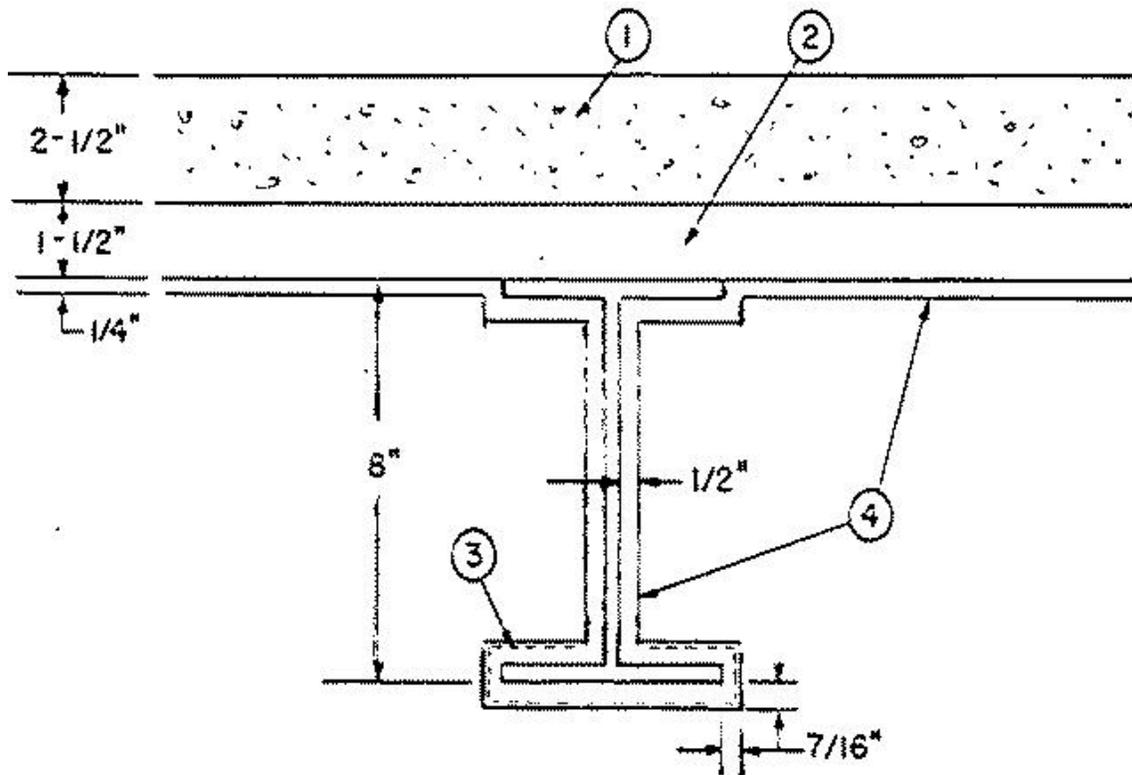
July 11, 2011

Restrained Beam Rating — 2 Hr.

Unrestrained Beam Rating — 1 Hr.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide **BXUV or **BXUV7****

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



Steel Beam — Min size W8x17 with outside dimensions of 8x5 1/4 in. with a flange thickness of 5-1/4 in., a web thickness of 5/16 in., and a cross-sectional area of 5.01 sq in.

1. **Normal Weight Concrete** — 150 pcf.
2. **Steel Floor and Form Units*** — 1-1/2 in. cellular type, welded to beam.
3. **Glass Cloth** — Multifilament mesh with approx 14 threads per in., placed between last two coats of mastic and intumescent coating. The cloth is adhered to by applying a light brushing or spraying of mastic and intumescent coating to beam and pressing the cloth in place.
4. **Mastic and Intumescent Coating*** — The use of this coating requires proper ventilation during application and drying to minimize the possibility of an accumulation of flammable vapors. Such accumulation may be indicated by strong solvent odors. Applied in three coats to a min wet film thickness of 1/2 in. Because of solvent evaporation, the wet film thickness may be reduced to a max of 20 percent after the coating has cured a min of 5 days.

ALBI MFG, DIV OF STANCHEM INC — Type 89S intumescent mastic coatings for Interior General Purpose only; Type AC800 intumescent mastic coating for Interior General Purpose and Exterior Use. Flash point (closed cup) of coatings: 45 F (7 C). Coated beam surfaces are to be painted with type 144 coating where subjected to washing.

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Last Updated on 2011-07-11

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BXUV.N607
Fire Resistance Ratings - ANSI/UL 263

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 - Only products which bear UL's Mark are considered Certified.
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BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

[See General Information for Fire-resistance Ratings - ANSI/UL 263](#)

[See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada](#)

Design No. N607

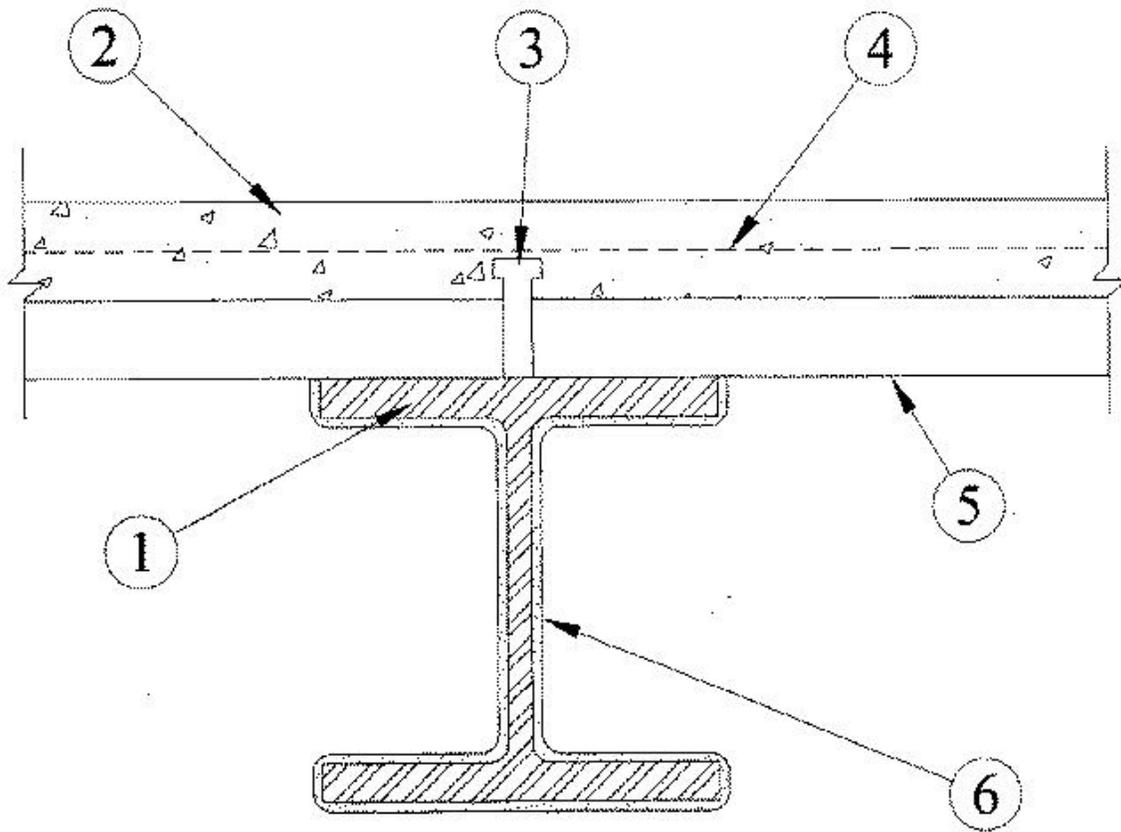
December 13, 2007

Restrained Beam Rating - 1-1/2, 2 Hr. (See Item 6)

Unrestrained Beam Rating - 1, 1-1/2 Hr. (See Item 6)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide **BXUV or **BXUV7****

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Steel Beam** — Minimum sizes shown in the table below. Steel beam surface to be free of loose scale and oil and shall be primed with a red oxide primer.
2. **Normal Weight Concrete** — Compressive strength, 3000 psi. For normal weight concrete either carbonate or siliceous aggregate may be used. Unit weight, 148 pcf.
3. **Shear Connector (Optional)** — Studs, 3/4 in. diam headed type or equivalent per AISC specifications. Welded to the top flange of beam through the steel floor units.
4. **Welded Wire Fabric (Optional)** — 6x6-10/10 SWG.
5. **Steel Floor and Form Units** — 1-1/2, 2, 3 in. deep fluted, welded to beam per SDI specification.
6. **Mastic and Intumescent Coating*** — Coating spray applied directly to the beam in multiple applications to the desired final dry thickness. Flutes above the beam to be completely filled with mineral wool insulation having a min avg density of 6 lbs/ft³. Coating may be sprayed on to the mineral wool insulation. After each application the surface may be lightly brushed or lightly rolled with a paint roller. See table below for thicknesses:

Beam Size	W/D	Material Thickness In.	Unrestrained Rating Hr.	Restrained Rating Hr.
W8x31	0.8	0.09	1	1-1/2
W8x31	0.8	0.14	1	2
W10x88	1.75	0.149	1-1/2	2

ALBI MFG, DIV OF STANCHEM INC — Types ACTF, ACFP, and CITEX TF Investigated for Interior General Purpose.

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Last Updated on 2007-12-13

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Design No. X601
BXUV.X601
Fire-resistance Ratings - ANSI/UL 263

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 - When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
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-

BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

[See General Information for Fire-resistance Ratings - ANSI/UL 263](#)

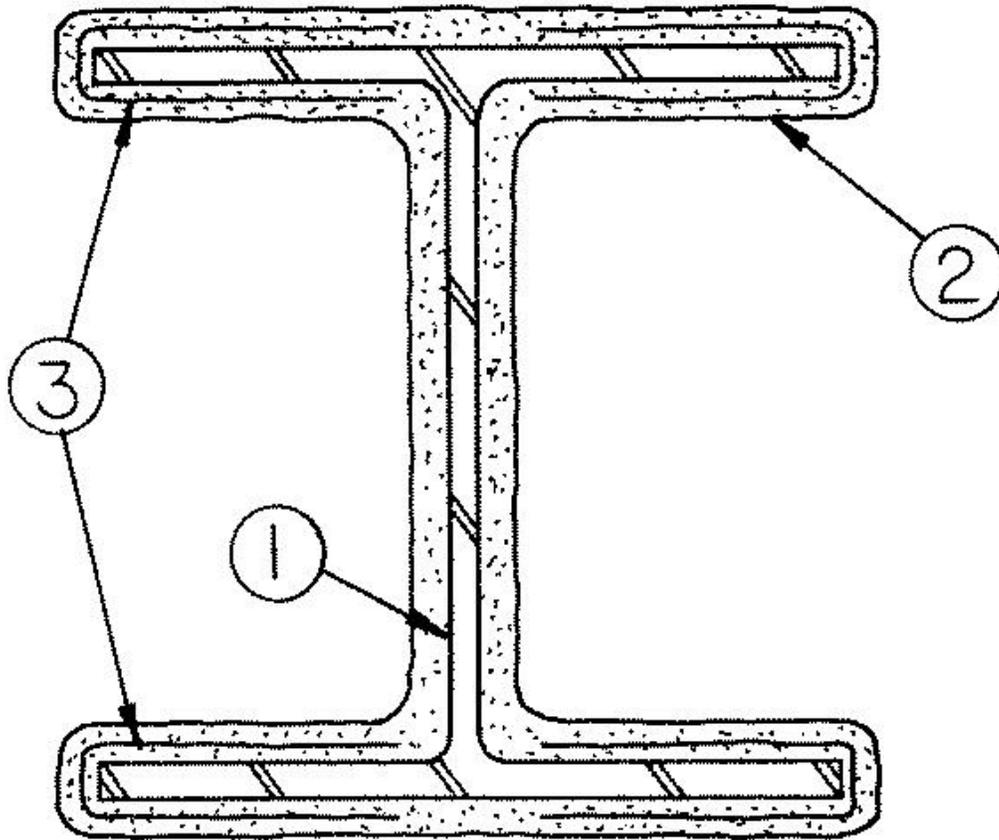
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Design No. X601

November 29, 1999

Rating — 2 Hr.

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1. **Mastic and Intumescent Coatings*** — The use of this coating requires proper ventilation during application and drying to minimize the possibility of an accumulation of flammable vapors. Such accumulation may be indicated by strong solvent odors. Spray applied in three coats. First coat sprayed to a min wet film thickness of 3/8 in. and allowed to dry. Glass fiber gauze applied with thinned out mastic and intumescent coating using a paint brush. Two additional coats sprayed to a min wet film thickness of 1/16 in. each applied and allowed to dry after each coat to bring the total thickness to a min of 1/2 in. Because of solvent evaporation, the wet film thickness may be reduced a max of 20 percent after the coating has cured a min of 5 days.

ALBI MFG, DIV OF STANCHEM INC — Type 89S intumescent mastic coating for Interior General Purpose only; Type AC800 intumescent mastic coating for Interior General Purpose and Exterior Use. Coating column surfaces are to be painted with Type 144 coating where subjected to washing.

2. **Steel Column** — Min size of column, W10x49, with outside dimensions of 10 by 10 in. with a flange thickness of 9/16 in., a web thickness of 5/16 in., and a cross-sectional area of 14.4 sq in.

3. **Glass Fiber Gauze** — Nom 10 in. wide, 6.8 grams per ft embedded in mastic and intumescent coating around flange tips and applied to the entire length of the column.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 1999-11-29

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Design No. X615
BXUV.X615
Fire-resistance Ratings - ANSI/UL 263

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- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
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BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

[See General Information for Fire-resistance Ratings - ANSI/UL 263](#)

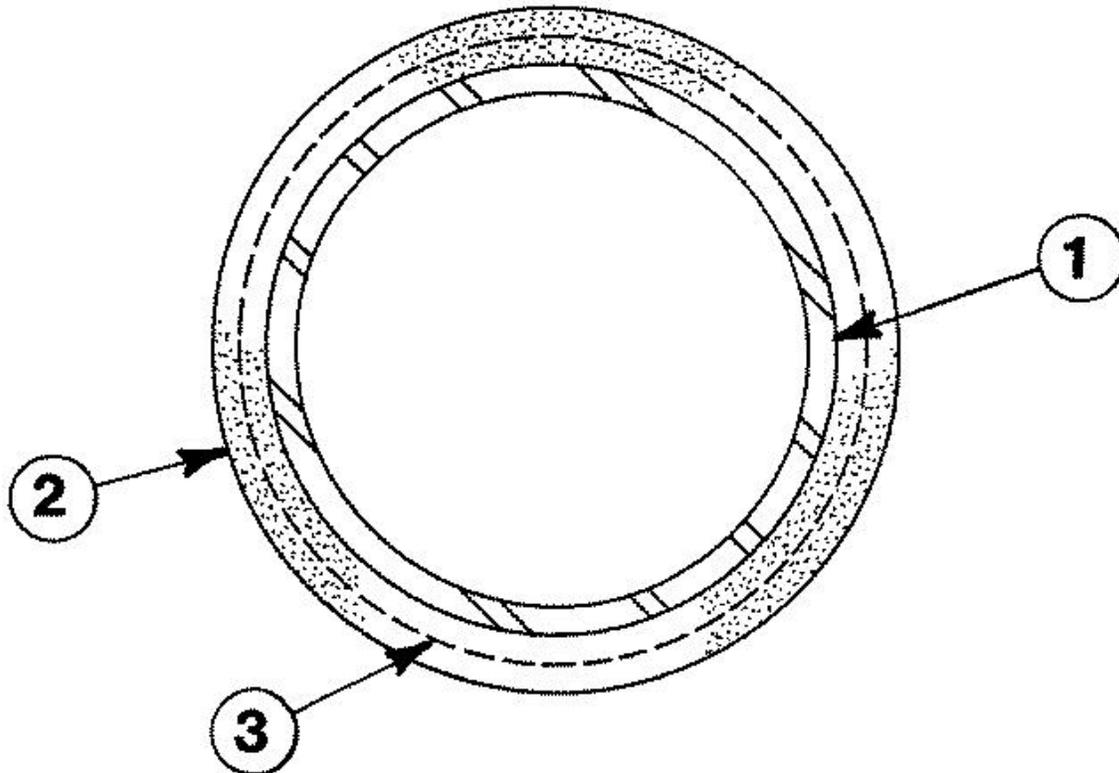
[See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada](#)

Design No. X615

November 29, 1999

Ratings — 1, 1-1/2 and 2 Hr. (See Item 2)

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



1. **Steel Columns** — Steel pipe columns with a minimum inside diameter of 4 in., a minimum wall thickness of 0.237 in. and a minimum weight of 10.79 lb. per foot. The column shall be free of dirt, loose scale and oil.
2. **Mastic and Intumescent Coating*** — Spray applied to desired thickness in multiple 1/8 in. thick (wet) coats. See table below for appropriate final dry thickness. After each coat, the surface shall be lightly rolled with a paint roller. Steel surfaces to be primed as required per application instructions.

Rating Hr	Min Thkns In.
1	0.38
1-1/2	0.61
2	0.85

ALBI MFG, DIV OF STANCHEM INC — Type 89S intumescent mastic coating for Interior General Purpose Use; Type AC800 intumescent mastic coating for Interior General Purpose and Exterior Use.

3. **Reinforcing Mesh** — 1 in. hexagonal wire mesh (No. 20 SWG galvanized steel wire), tied together using the ends of the wire mesh. Mesh is embedded in the coating prior to application of final two (min.) coats in accordance with manufacturer's recommendations.

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Design No. X625
BXUV.X625
Fire-resistance Ratings - ANSI/UL 263

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 - When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
 - Only products which bear UL's Mark are considered Certified.
-

BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

[See General Information for Fire-resistance Ratings - ANSI/UL 263](#)

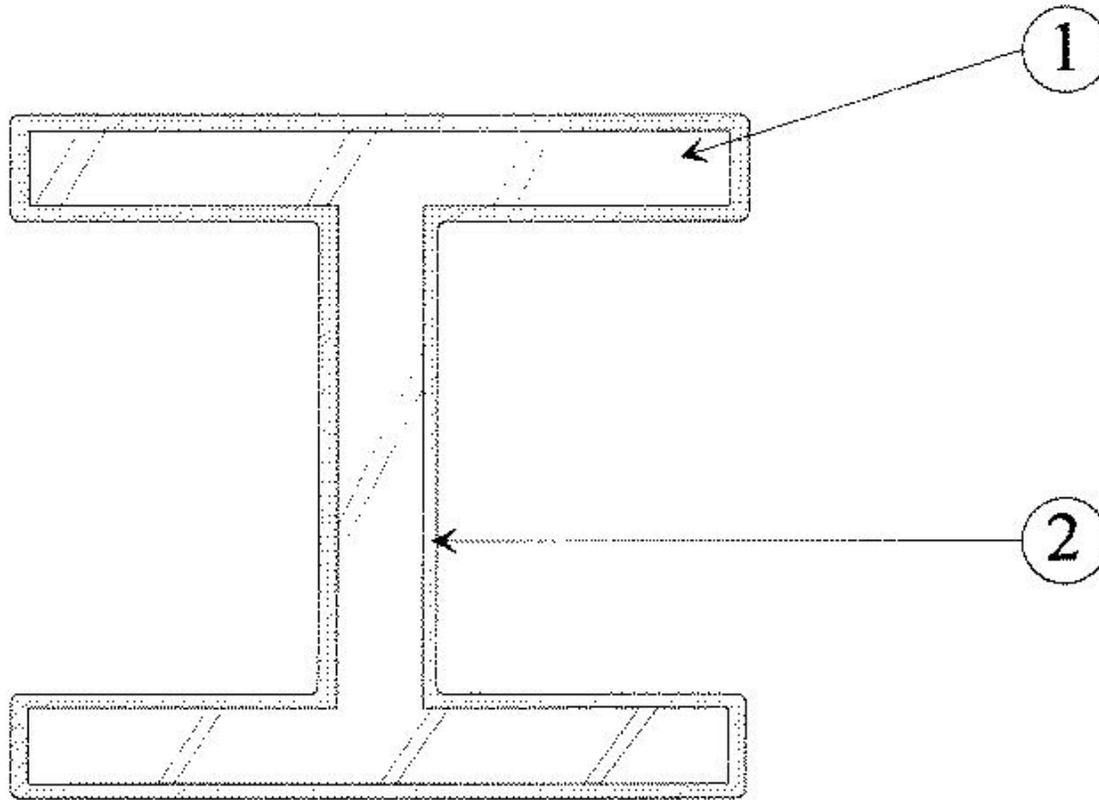
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Design No. X625

August 15, 2000

Ratings — 1, 1-1/2, 2, 2-1/2, 3 and 3-1/2

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Steel Column** — Min size shown in table below. The column surfaces shall be free of dirt, loose scale and oil. Steel surfaces to be primed with a red oxide primer as required per manufacturer's application instructions.
2. **Mastic and Intumescent Coating*** — Coating spray applied directly from containers to desired thickness. See table below for appropriate final dry thickness. After each coat, the surface shall be lightly rolled with a paint roller.

Size	Rating (hr)	Min. Thickness(in.)
W8x24	2	0.313
W10x49	1	0.055
W10x49	1-1/2	0.132
W10x49	2	0.310
W10x49	2-1/2	0.430
W10x49	3	0.550
W10x49	3-1/2	0.670
W12x120	1-1/2	0.108

ALBI MFG, DIV OF STANCHEM INC — Types AC900, AC900 NEW, ACTF, CITEX TF , Investigated for Interior General Purpose only.

3. **Flange Edge Reinforcement** — (Not Shown) — Glass fiber mesh, 3/16 by 3/16 in. square pattern, weighing 147 g/m sq. Glass fiber mesh must be applied for the 3 and 3-1/2 h ratings.

3A. **As an alternate to Item 3,** — Glass Fiber Gauze-Nom 10 in. wide, 6.8 grams/ft embedded in mastic and intumescent coating around flange tips and applied to the entire length of the column.

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Last Updated on 2000-08-15

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Design No. X628
BXUV.X628
Fire-resistance Ratings - ANSI/UL 263

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 - When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
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-

BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

[See General Information for Fire-resistance Ratings - ANSI/UL 263](#)

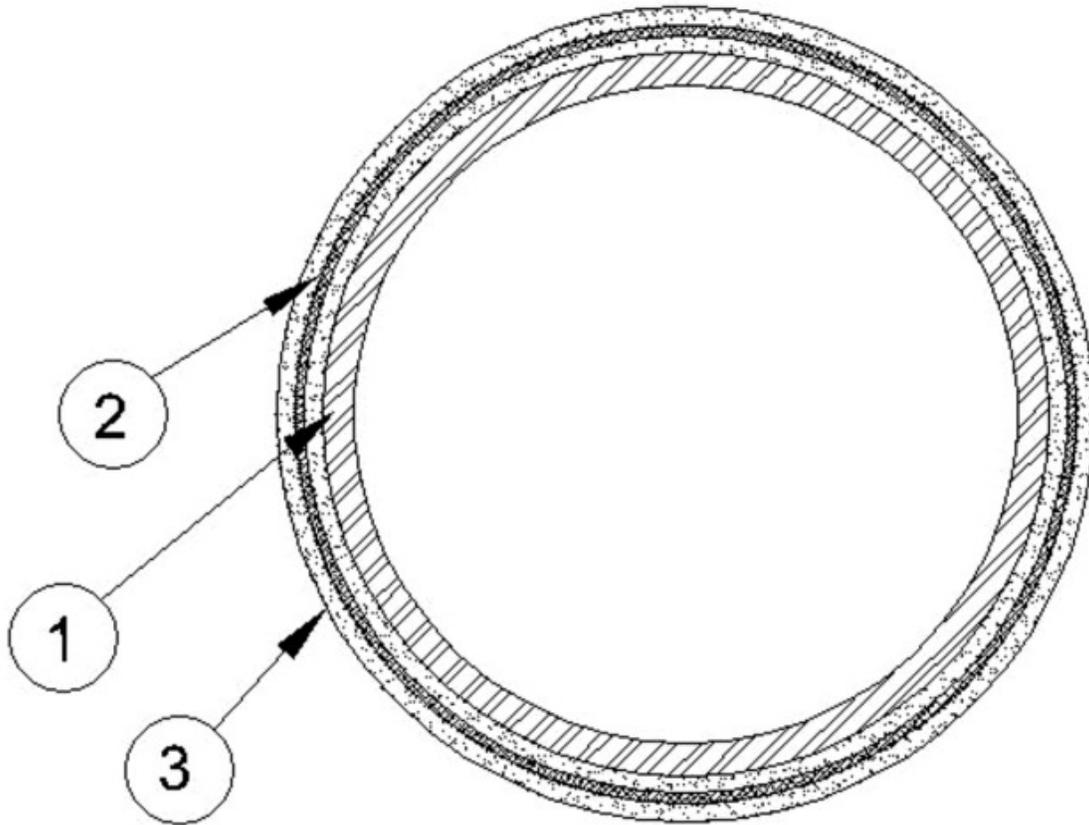
[See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada](#)

Design No. X628

May 03, 2007

Ratings — 1, 1-1/2, 2, 2-1/2 and 3 Hr. (See Item 3)

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Steel Column** — Steel pipe columns 8 in. diameter Schedule 60 or 100 (0.406 in. wall thickness, 8-5/8 in. outer diameter). Column shall be free of dirt, loose scale and oil.
2. **Reinforcing Mesh** — Glass fiber mesh, 3/16 by 3/16 in. square pattern weighing 147 g per sq. m. Glass fiber mesh to be applied at mid depth of the coating.
3. **Mastic and Intumescent Coating** — Coating spray applied directly from containers to desired thickness. See table below for appropriate final dry thickness. After each coat, the surface shall be lightly rolled with a paint roller.

Rating, Hr	Schedule	Mtl Thkns, In.
1	60	0.12
1-1/2	60	0.23
2	60	0.37
2-1/2	60	0.52
3	60	0.66
3	100	0.625

ALBI MFG, DIV OF STANCHEM INC — Types AC900, AC900 NEW, ACTF, CITEX TF, Investigated for Interior General Purpose only.

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SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems for all penetrations and interruptions to fire-rated assemblies, smoke barriers, non-fire rated floor assemblies, whether indicated on drawings or not, and other openings indicated. See the Drawings for assembly fire ratings.
- B. Identification signage.

1.02 RELATED REQUIREMENTS

- A. Section 07 21 00 - Insulation: Fiber Firestopping Insulation.
- B. Section 07 81 00 - Applied Fireproofing.
- C. Section 07 81 23 - Intumescent Mastic Fireproofing.
- D. Section 07 95 13 – Expansion Joints.
- E. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing and deflection head track types.
- F. Division 21 - Fire Protection: Firestopping of fire protection work.
- G. Division 22 - Plumbing: Firestopping of plumbing work.
- H. Division 23 - HVAC: Firestopping of heating, ventilating and air conditioning work.
- I. Division 26 - Electrical: Firestopping of electrical work.
- J. Division 27 – Communications: Firestopping of communications work.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2014.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- C. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2011.
- D. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2015a.
- E. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.
- F. ITS - Directory of Listed Products; current edition.
- G. FM P7825 - Approval Guide; current edition.
- H. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; 2004.
- I. UL - Fire Resistance Directory; current edition.

1.04 DEFINITIONS

- A. Annular Space is the opening around an item (pipe, duct, etc.) penetrating a construction assembly.
- B. Fire-resistance is the property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases, or flames under conditions of use.
- C. Fire-resistive joint system is the assemblage of specific materials or products that are designed, tested and fire-resistance rated in accordance with ASTM E119 to resist for a prescribed period of time the spread of fire through joints in or between fire-resistance rated assemblies.

- D. Firestopping is a specific assembly of materials or products fill openings and annular spaces around penetrating items (such as cables, cable trays, conduits, ducts, pipes) and their means of support through the wall, floor, ceiling or roof to prevent spread of fire and includes fire-resistive joint systems and through-penetration firestop systems.
- E. Through-penetration is an opening that passes entirely through a fire-resistance rated assembly.
- F. Through-penetration firestop system is a specific assembly of materials that are designed, tested and installed to prevent the spread of fire through openings in fire-resistive rated floors and walls to accommodate through-penetrations of electrical, mechanical, plumbing, and communications systems.
- G. "F" rating indicates the period of time that the through-penetration firestop system is capable of preventing the passage of flame to the unexposed (non-fire) side of the assembly in conjunction with an acceptable hose stream test performance.
- H. "T" rating indicates the period of time that the through-penetration firestop system is capable of preventing the passage of flame and temperature rise of 325 degrees F. above ambient temperature on the unexposed (non-fire) side of the assembly in conjunction with an acceptable hose stream test performance.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations. A coordinated submittal shall be prepared for all firestopping used on the Project.
- C. Shop Drawings: Submit manufacturer's illustrated test assembly shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system and fire-resistant joint system, each construction condition and type of penetration or joint. Include firestop design designation from the approved testing agency (UL, for example).
 - 1. For those firestop applications for which no tested system is available from the manufacturer, the manufacturer's engineering judgment derived from similar tested system designs or other tests shall be submitted to the Authority Having Jurisdiction for their review and approval prior to installation.
 - 2. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
 - 3. One firestopping submittal shall cover products used for all phases of multi-phase projects.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Installer Qualifications: Submit qualification statements for installing mechanics.

1.06 QUALITY ASSURANCE

- A. Single Source: If the Contractor determines that individual trades (i.e. mechanical, plumbing, fire protection, electrical) shall be responsible for firestopping their penetrations, instead of all firestopping provided by a single contractor, products used shall be coordinated among the various trades by the Contractor so that multiple products or manufacturers are NOT used for the same type of application.
 - 1. The Contractor shall provide a coordinated submittal for all firestopping used on the Project.
- B. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.

3. For those firestop applications that exist for which no approved tested system is available through a manufacturer, an engineered judgment derived from similar system designs or other approved tests shall be submitted to the local Authority Having Jurisdiction for review and approval prior to installation. Engineering judgment drawings shall follow requirements set forth by the International Firestop Council.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.
- D. Installer Qualifications: Company or personnel specializing in performing the work of this Section, trained by the firestop manufacturer(s) and with a minimum of 3 years documented experience installing work of this type. Submit written qualifications statements for installing mechanics.

1.07 MOCK-UP

- A. Install one firestopping assembly representative of each fire rating design required on Project.
 1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
 2. Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft.
- B. Obtain approval of authority having jurisdiction and testing agency before proceeding.
- C. Remove and replace unsatisfactory mock-ups. Accepted mock-ups shall represent minimum standards for the Work.
- D. Accepted mock-ups may remain as part of the Work.

1.08 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING GENERAL REQUIREMENTS

- A. Firestopping: All products shall be by one of the following acceptable manufacturers and shall be specific for each construction condition, fire-resistance requirement, and annular size. Multiple products shall not be used for the same application. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Basis of Design: Hilti Inc.
- C. Acceptable Manufacturers:
 1. 3M Fire Protection Products.
 2. Tremco.
 3. AD Fire Protection Systems, Inc.
 4. Nelson FireStop Products.
 5. Specified Technologies, Inc.
 6. BioShield.
 7. Metacaulk - RectorSeal Corp
 8. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.
- E. Fire Ratings: See Drawings for required systems and ratings.

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Provide firestop systems manufactured and installed to resist spread of fire, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated for:
 - 1. Fire rated load-bearing walls and non-load bearing partitions.
 - 2. Fire rated floor assemblies and roof assemblies
 - 3. Fire rated smoke barriers.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa). Fire-resistance-rated walls include fire walls and fire-barrier walls.
 - 1. F-ratings as determined by ASTM E814, but not less than that equaling or exceeding fire resistance rating of the construction penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - 1. Horizontal assemblies include floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
 - 2. F-Rating: At least 2 hour, but not less than the fire-resistance rating of constructions penetrated.
 - 3. T-Rating: At least 2 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 - 4. Provide firestop systems with T-ratings in addition to F-ratings as determined by ASTM E814, where systems protect penetrations located outside wall cavities, located outside fire-resistive shaft enclosures, located in construction containing fire protection rated openings and at penetrating items larger than 4 inches in diameter pipe or 16 sq inches cross sectional area.
- D. For firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide firestop systems not requiring removal of insulation.
 - 4. For firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed.
- E. Provide firestop systems that are compatible with one another and the substrates they are in contact with based on testing and field experience.
- F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the VOC limit contents per 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- G. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- H. Mold Resistance: Provide firestopping materials with mold and mildew resistance rating of 0 as determined by ASTM G21.
- I. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.

1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
 - a. Coordinate with Section 09 21 16 - Gypsum Board Assemblies for deflection head tracks at fire-rated assemblies with greater than 1/2 inch of movement.

2.03 OTHER MATERIALS

- A. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with performance requirements. Use only components specified by firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - e. Substrate primers.
 - f. Collars.
 - g. Steel sleeves
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrating item.
- E. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags.
- I. Silicone Foam: Multi-component, silicone-based liquid elastomer that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants, pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and non-sag formulation for openings in vertical and other surfaces requiring a non-slumping, gunnable sealant, unless indicated firestop system limits use to non-sag grade for both opening conditions.
- K. Caulking Compound (fire sealant): Material approved by the safing insulation manufacturer for sealing joints between foil backing of safing insulation and edge of concrete floor slab against smoke penetration.
- L. Safing Clips: Galvanized steel safing clips approved by the safing insulation manufacturer for holding insulation in place.
- M. Sleeves for through-penetrations shall be of non-combustible materials and securely fastened to the assembly penetrated. Sleeves through floors in exposed locations, behind kitchen cooking line equipment for piping and conduit, for example, shall extend 1" above the floor surface to stop water seepage to floor below.

- N. Identification Signage: Pressure sensitive self-adhesive, preprinted vinyl labels; including the following information on labels:
 - 1. "Warning - Through Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, phone number.
 - 3. Firestop system designation of applicable testing and inspecting agency (UL or WH).
 - 4. Date of installation.
 - 5. Firestop system manufacturer's name.
 - 6. Installer's name.
- O. Primers: Type required for tested assembly design.
- P. Fiber Firestopping Insulation (Safing Insulation): Mineral fiber batt, unfaced insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to ASTM C 665 Type 1.
 - 1. Density, ASTM D 1622: 4 lb/cu ft min.
 - 2. Max. Water Absorption, ASTM C 272: 0.1% by volume.
 - 3. Durability and Longevity: Permanent.
 - 4. Fire Resistance, ASTM E84: Flame spread: 15; Smoke Developed: 0.
 - 5. Manufacturer's "Z" impaling clips as required
 - 6. Product for Curtainwalls: Foil faced Thermafiber Curtainwall Insulation by USG.
 - 7. Products:
 - a. Thermafiber by United States Gypsum Co.
 - b. Safing Insulation / MW by Owens Corning Insulation.
 - c. FBX Safing Insulation by Fibrex Insulations, Inc.
 - d. Safe by Roxul Inc.

2.04 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.
 - 1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
 - 2. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.

2.05 FIRESTOPPING FOR FLOOR-TO-FLOOR, WALL-TO-FLOOR, AND WALL-TO-WALL JOINTS

- A. Concrete and Concrete Masonry Walls and Floors:
 - 1. Floor to Floor Joints:
 - a. 2 Hour Construction: UL System FF-D-1013; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - 2. Top of Wall Joints at Concrete/Concrete Masonry Wall to Concrete Over Metal Deck Floor:
 - a. 2 Hour Construction: UL System HW-D-1037; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - 3. Top of Wall Joints at Concrete/Concrete Masonry Wall to Concrete Floor:
 - a. 2 Hour Construction: UL System HW-D-0268; Hilti CP 606 Flexible Firestop Sealant.
 - 4. Concrete/Concrete Masonry Wall to Wall Joints:
 - a. 2 Hour Construction: UL System WW-D-0032; Hilti CP 606 Flexible Firestop Sealant.
- B. Gypsum Board Walls:
 - 1. Wall to Wall Joints:
 - a. 2 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
 - b. 1 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
 - 2. Top of Wall Joints at Underside of Steel Beam and Concrete Over Metal Deck Floor with Sprayed On Fireproofing:

- a. 2 Hour Construction: UL System HW-D-0259; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
- b. 1 Hour Construction: UL System HW-D-0259; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
3. Top of Wall Joints at Concrete Over Metal Deck, Wall Parallel to Ribs:
 - a. 2 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - b. 1 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
4. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Cut to Fit Ribs:
 - a. 2 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.
 - b. 1 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.
5. Top of Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Not Cut to Fit:
 - a. 2 Hour Construction: UL System HW-D-0042; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
 - b. 1 Hour Construction: UL System HW-D-0042; Hilti CFS-SP WB Firestop Joint Spray and CP 672.

2.06 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

- A. Blank Openings:
 1. In Floors or Walls:
 - a. 2 Hour Construction: UL System C-AJ-0090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- B. Penetrations Through Floors or Walls By:
 1. Multiple Penetrations in Large Openings:
 - a. 2 Hour Construction: UL System C-AJ-8143; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System C-AJ-1421; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 604 Self-Leveling Firestop Sealant.
 3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System C-AJ-2567; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
 4. Cable Trays with Electrical Cables:
 - a. 2 Hour Construction: UL System C-AJ-4094; Hilti CFS-BL Firestop Block.
 5. Insulated Pipes:
 - a. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-5048; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CP 601S Elastomeric Firestop Sealant, or CP 604 Self-Leveling Firestop Sealant.
 6. HVAC Ducts, Uninsulated:
 - a. 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-7084; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CP 601S Elastomeric Firestop Sealant, or CP 604 Self-Leveling Firestop Sealant.
- C. Penetrations Through Floors By:
 1. Multiple Penetrations in Large Openings:

- a. 2 Hour Construction: UL System F-A-8012; Hilti CFS-S SIL GG Firestop Silicone Sealant Gun-Grade or CFS-S SIL SL Firestop Silicone Sealant Self-Leveling.
2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System F-A-1016; Hilti CP 680-P/M Cast-In Device.
- D. Penetrations Through Walls By:
 1. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 2. Insulated Pipes:
 - a. 2 Hour Construction: UL System W-J-5041; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-J-5041; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 3. HVAC Ducts, Uninsulated:
 - a. 2 Hour Construction: UL System W-J-7109; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 606 Flexible Firestop Sealant.
 4. HVAC Ducts, Insulated:
 - a. 2 Hour Construction: UL System W-J-7112; Hilti FS-ONE MAX Intumescent Firestop Sealant.

2.07 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

- A. Blank Openings:
 1. 2 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
 2. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
- B. Penetrations By:
 1. Multiple Penetrations in Large Openings:
 - a. 2 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System W-L-8071; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 2 Hour Construction: UL System W-L-8079; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - d. 2 Hour Construction: UL System W-L-8013; Hilti CFS-BL Firestop Block.
 - e. 1 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - f. 1 Hour Construction: UL System W-L-8071; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - g. 1 Hour Construction: UL System W-L-8079; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant. MAX
 - d. 1 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
 - b. 2 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.

- c. 1 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
- d. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 4. Electrical Cables Not In Conduit:
 - a. 2 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
 - b. 2 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
 - c. 1 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
 - d. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
- 5. Cable Trays with Electrical Cables:
 - a. 2 Hour Construction: UL System W-L-4011; Hilti CFS-BL Firestop Block.
 - b. 2 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-4011; Hilti CFS-BL Firestop Block.
 - d. 1 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 6. Insulated Pipes:
 - a. 2 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System W-L-5029; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - c. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - d. 1 Hour Construction: UL System W-L-5029; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 7. HVAC Ducts, Insulated:
 - a. 2 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this Section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Coordinate with mechanical, fire protection, electrical, and other trades to assure that all pipes, conduits, cable trays, cables, ducts, and other items that penetrate fire-resistant construction are properly firestopped.
- C. Install dams where recommended or required by tested fire-resistive joint assemblies and through-penetration firestop systems. Combustible damming material and other accessories not indicated as permanent components of firestop systems shall be removed after appropriate curing.

- D. Install firestopping materials in conjunction with fiber firestopping insulation (firesafing insulation) as required by tested assemblies.
- E. Where cable trays penetrate fire-resistant wall assemblies, provide pillow type firestop product. All cabling /wiring sleeves whether empty or utilized for wiring through fire-resistant assemblies shall be firestopped.
- F. Do not cover installed firestopping until inspected by Authority Having Jurisdiction and/or testing agency.
- G. In general, for fire containment at perimeter curtainwall systems, firesafing insulation shall be mechanically attached to curtainwall mullions and transoms using impaling pins, screws or other positive mechanical attachment as required. Install in strict accordance with the manufacturer's tested assemblies and recommendations. Firesafing insulation shall be compression fit into the floor line void between floor structure and curtainwall firesafing, supported with "Z" clips. Coordinate with the work of Section 07 84 00 - Firestopping
 - 1. Install a light gage steel angle or channel continuously behind the insulation and attached to the vertical mullions at the floor firesafing line to prevent bowing of the curtainwall insulation due to compression of the firesafing insulation at the floor line. Exposed curtainwall mullions shall be protected with firesafing mullion covers.
 - 2. Install insulation between aluminum framing members and other surfaces with insulation fitting snugly to prevent settling. All voids and gaps shall be completely filled.
 - 3. Firestopping shall be installed on the floor line firesafing insulation. Installations shall be in accordance with UL tested assemblies.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 IDENTIFICATION

- A. Identify all firestop system locations with pressure sensitive self-adhesive, pre-printed vinyl labels.
 - 1. Attach labels permanently to both sides of penetrated construction surfaces and joints in fire-rated construction.
 - 2. Labels shall be visible to anyone seeking to disturb or remove penetrating items or firestop system. Where possible, labels shall be installed above finished ceilings. Where installed in exposed locations, labels shall be neatly located.
 - 3. Labels for horizontal joints shall be installed at a maximum spacing of ten (10) feet.

3.06 FIELD QUALITY CONTROL

- A. Prepare and install firestopping systems in accordance with manufacturer's shop drawings, tested assemblies and instructions
 - 1. Follow safety procedures recommended in Material Safety Data Sheets.
 - 2. Finish all firestopping surfaces that are to remain exposed in the completed Work to a uniform and level condition.
- B. Firestopping materials and installations at joints and penetrations in fire-resistive rated assemblies and smoke barrier assemblies shall not be concealed from view until inspected and approved by the Authority Having Jurisdiction or, if designated, by the Owner's testing agency. Such inspection shall include partial destructive inspection to determine compliance with tested firestop assembly requirements. All such locations shall be repaired or replaced by the Contractor at no additional cost to the Owner.
 - 1. All firestopping locations shall be visually inspected.
 - 2. At a minimum, not less than 5% of all firestopping joints and penetrations shall be inspected by removal of materials to determine conformance to assembly requirements.
- C. Inspections by the AHJ and /or the testing agency shall not relieve the Contractor of responsibility for providing his own inspections and quality control in compliance with specified requirements.

- D. Inspections shall be performed as required by the building code, the Construction Documents or as otherwise directed by the Architect.
- E. The Contractor shall cooperate with individuals conducting such inspections. The Contractor shall notify inspectors at least five (5) days in advance of requested inspection date. All identification labeling, firestopping and smoke sealing work shall be completed prior to inspection.
- F. Any non-compliant materials shall be removed and replaced. Any locations missing required protection shall be corrected by the Contractor and re-inspected prior to concealing such areas with other construction. Any material or workmanship that is rejected shall be corrected and /or replaced promptly by the Contractor to the satisfaction of the inspector and/or Architect, and at no additional cost to the Owner.

3.07 PROTECTION

- A. Clean adjacent surfaces of firestopping materials. Leave work in a neat and clean condition.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 90 05
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Compressible fillers.

1.02 RELATED REQUIREMENTS

- A. Section 07 21 00 - Thermal Insulation: Firestop insulation.
- B. Section 07 25 00 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders:
- C. Section 07 84 00 - Firestopping: Firestopping sealants.
- D. Section 08 80 00 - Glazing: Glazing sealants and accessories.
- E. Section 09 21 16 - Gypsum Board Assemblies: Acoustic construction.
- F. Section 09 30 00 - Tiling: Sealant used as tile grout.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other Sections referencing this Section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.
- C. Samples: Submit samples 2 inch in size illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum twenty five years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this Section with minimum five years of experience. Where applicable, applicators shall be approved by their respective material manufacturers as licensed applicators. All applicators shall be skilled personnel who are thoroughly trained and experienced in the necessary skills, completely familiar with the specific requirements of the Work.

1.07 MOCK-UPS AND SAMPLE INSTALLATIONS

- A. Mock-Ups: Provide sealants for exterior wall mock-ups specified in Section 04 20 00 and Section 07 42 13.
 - 1. Mock-up panels shall demonstrate actual wall construction, detailing and workmanship.

2. No work shall progress until the Architect has reviewed the mock-up panels. Panels shall be revised as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all related exterior wall work.
 3. Mock-up panels shall not be destroyed or moved until the Work is complete and accepted by the Architect. Upon completion of construction, mock-up panel) shall be removed.
- B. Sample Installations:
1. Provide sealant joints in conjunction with sample window installations.
 2. Provide sample exterior sealant installation at brick masonry. No work shall progress until the Architect has reviewed the sample installation. Make revisions as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all related exterior wall work.
 - a. Locate where directed.
 - b. Accepted sample installations may remain as part of the Work.

1.08 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
- B. Do not proceed with application of materials when surface or air temperatures are less than 40 degrees F or likely to drop to below 40 degrees F in the following 24 hours after sealant installation.
- C. Do not apply materials unless surface to receive coating is clean and dry, or if precipitation is imminent.
- D. Coordination: It shall be the responsibility of the Contractor to properly coordinate the Work of this Section with that of all other trades in order to ensure the providing of complete and continuous sealing and consistent use of products specified herein.

1.09 WARRANTY

- A. See Section 01 78 10 - Warranties, for additional warranty requirements.
- B. Warranty:
 1. Include coverage for installed sealants and accessories which fail to achieve airtight seal and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.
 - a. Urethane Sealants: Five years.
 - b. Silicone Sealants: Twenty years, unless otherwise indicated with product description.
 2. Provide manufacturer's non-stain warranty.
- C. The installer shall provide an installation warranty that all Sealing shall be free of defects of materials and workmanship for two (2) years; and shall repair and/or replace such defective work, during the warranty term, without extra cost to the Owner.
 1. The following types of sealing failures will be considered defective Work: Leakage, loosening, loss of bond, hardening, cracking, crumbling, melting, shrinking, running, sagging, improper tooling, discoloration, or staining of adjacent work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gunnable and Pourable Sealants:
 1. Dow Corning.
 2. Pecora Cop.
 3. Tremco Global Sealants.
 4. Sika Corp.
 5. Substitutions: See Section 01 60 00 – Product Requirements.

2.02 SEALANTS

- A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
1. Sealant Types:
 - a. M - Multi-component.
 - b. S- Single component.
 - c. P - Pourable or self-leveling for traffic joints
 - d. NS - Non-sage or gunnable for vertical and non-traffic joints.
 - e. FC - Fast cure.
 2. Sealant Classes:
 - a. 25, 50 and 100/50 (extension/compression) represent movement capability in percent of joint width.
 3. Sealant Uses:
 - a. T - Traffic
 - b. NT - Non-Traffic
 - c. I - Immersion
 - d. M - Mortar
 - e. A - Aluminum
 - f. O - Other (includes steel, painted surfaces, wood, brick, stone, tile)
- B. General Purpose Exterior Sealant: Silicone, ASTM C920, Grade NS, Class 100/50, Uses T, NT, A, G, M, O; single component, neutral curing, non-sagging, non-staining, non-bleeding, ultra-low-modulus.
1. Color: To be selected by Architect from manufacturer's standard range.
 2. Shore A Hardness Range: 15.
 3. Applications: High movement joints.
 - a. Joints between concrete and other materials.
 - b. Joints between metal frames and other materials.
 - c. Joints between dissimilar materials and building construction.
 - d. Control, expansion, and soft joints in stone, masonry, pre-cast concrete.
 4. Joint size: 1/4" min to 3" max width and 1/4" min to 1/2" max depth.
 5. Note: Compatibility with materials sealant shall be in contact with shall be verified prior to use.
 6. Limitations: Not for use in structural applications, below grade or to materials that outgas, on brass, copper, or materials that can corrode, at joints continuously immersed in water, interior firestop sealing, at materials that bleed oils, plasticizers, or solvents, in confined spaces, to surfaces that will be painted, to surfaces in contact with food, to wet surfaces, to architectural finishes without prior testing, and as otherwise limited by the manufacturer.
 7. Basis of Design: 756 by Dow Corning Corp.
- C. Exterior Sealant: Silicone, for cavity wall locations requiring intumescent sealant.
1. Application: Seal exterior wall cavity to curtain wall openings.
 2. Basis of Design: CP-601S or CFS-LSILGC by Hilti.
- D. Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
1. Face color: Gray.
 2. Size as required to provide weathertight seal when installed.
 3. Provide product recommended by manufacturer for traffic-bearing use.
 4. Applications: Use for:
 - a. Exterior garage/shop bay floor slab to concrete apron joints.
 5. Products:
 - a. EMSEAL Joint Systems, Ltd; DSM System.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Interior Sealant: Polyurethane; ASTM C920, Grade NS, Class 50, Uses T, NT, I, M, O, and A; chemically curing, multi- component, low modulus.

1. Color: Multiple colors selected from manufacturer's standard range.
 2. Movement Capability: Plus 50 percent, minus 50 percent.
 3. Shore A Hardness Range: 25-35.
 4. Interior Applications:
 - a. Smoke and acoustic sealant at high movement joints.
 5. Joint size: Up to 3.5 ". Note at top of partition conditions, mineral fiber insulation is backer.
 6. Note: Compatibility with materials sealant shall be in contact with shall be verified prior to use.
 7. Product: Spectrem 1 by Tremco Inc.
- F. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
1. Applications: For minimal movement.
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces, where minimal movement is expected and will receive field painting.
 - c. Interior sound sealing, non-fire rated smoke sealing where little movement is anticipated.
 - d. Other interior joints for which no other type of sealant is indicated.
 2. Note: Compatibility with materials sealant shall be in contact with shall be verified prior to use.
 3. Limitations: Not for use at joints subject to dynamic movement, submerged in water, and as otherwise limited by the manufacturer.
 4. Products:
 - a. Acrylic Latex 834 by Tremco Inc.
 - b. AC-20 + Silicone Acrylic Latex Caulking Compound by Pecora Corp.
- G. Interior Silicone Sealant: Silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
1. Color: As selected from the manufacturer's full color range.
 2. Applications: Sanitary
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between all countertops to splashes to wall surfaces.
 - c. Control, expansion, and corner joints within non-porous quarry and ceramic tile.
 - d. Joints between countertops and backsplashes when they are separate assemblies.
 3. Note: Compatibility with materials sealant shall be in contact with shall be verified prior to use.
 4. Limitations: Not for use at joints submerged in water, at porous materials like masonry, and as otherwise limited by the manufacturer.
 5. Products:
 - a. 786 Silicone Sealant by Dow Corning.
 - b. Tremsil 200 by Tremco Global Sealants.
- H. Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
1. Color: Match adjacent finished surfaces.
 2. Applications: Use for:
 - a. Expansion joints in floors.
 - b. Other interior concrete floor joints for which no other type of sealant is indicated.
 3. Products:
 - a. Tremco; Vulkem 45SSL
 - b. Pecora Corp; NR-201 Self-Leveling Traffic and Loop Sealant
- I. Butyl Sealant: ASTM C1311; single component, solvent release, non-skinning, non-sagging.
1. Color: To be selected by Architect from manufacturer's standard range.
 2. Service Temperature Range: -13 to 180 degrees F.

3. Applications: Exterior thresholds.
4. Products:
 - a. Pecora Corp.

2.02 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing (Exterior): Closed-cell polyethylene, non-bleeding neoprene or butyl rod, diameter approximately 30% greater than width of the joint, as recommended by the sealant manufacturer.
- D. Joint Backing (Interior): Open-cell polyurethane foam rod, diameter approximately 30% greater than width of the joint, as recommended by the sealant manufacturer.
- E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- F. Compressible Filler: Compressible, open-cell polyurethane foam saturated with stabilizing acrylics, with a waterproof sealing compound/release agent. Size appropriately to fill void geometry, as recommended by the sealant manufacturer.
 1. Products - general:
 - a. Polytite Standard by Polytite Manufacturing Corp.
 - b. Grayflex by Emseal Joint Systems Ltd., or as recommended by the sealant manufacturer.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Products - for secondary seal to sealant with joint backing:
 - a. Polytite B by Polytite Manufacturing Corp.
 - b. Backerseal by Emseal Joint Systems Ltd., or as recommended by the sealant manufacturer.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Notify the Contractor of conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected by the Contractor to meet acceptable industry standards in a manner acceptable to the Architect.
- C. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement. Mask off adjoining surfaces as needed to prevent surface damage.
- E. Exposed Concrete Floor Joints: Test joint filler in inconspicuous area of floor slab. Verify specified product does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.

- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Sealing at Acoustical Construction: At construction designated "Acoustical Construction" seal around all joints and pipe, conduit, structural member, duct, and electrical box openings to gypsum wallboard or masonry as applicable. Seal bottom of gypsum wallboard partitions to floor slabs. Seal tops of masonry and gypsum wallboard partitions to decks (including voids at fluted decks), and seal sides of partitions to abutting construction. Note: Sealing related to installation of partition framing members and gypsum wallboard is specified under Section 09 21 16 - Gypsum Board Assemblies.
- E. Non-Fire Rated Smoke Sealing: At building assemblies identified as non-fire rated smoke barriers, seal all joints and pipe, conduit, structural member, duct and electrical box openings. Openings above finish ceilings or other concealed locations may be sealed on one side only. All openings and annular spaces shall be backed with fire safing insulation prior to installation of sealant.
- F. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- G. Do not leave gaps between ends of joint backers. Do not twist, stretch or tear backers.
- H. Install bond breaker where joint backing is not used. Back rods shall be 25% wider than the joint width.
- I. Application of Sealant: Sealant shall be gun-applied through a nozzle opening of such diameter so that the full bead of sealant is gunned into the joint, filling the joint completely. A superficial or skin bead will not be acceptable.
 - 1. Sealant geometry (depth to width ratios) shall be as recommended by the manufacturer for each specific application.
 - 2. Beads shall be tooled immediately after application to ensure firm, full contact with the inner faces of the joint. Excess material shall be struck off with a tooling stick or knife.
 - 3. The finished bead shall be smooth, properly contoured and flush with the adjacent surface, or as otherwise indicated.
 - 4. Remove all excess materials and smears adjacent to the joint as work progresses. All materials shall be used in accordance with the manufacturer's printed instructions.
- J. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- K. Apply sealant when joint is cool to minimize chances of delamination and wrinkles.
- L. Tool joints concave.
- M. Fillers: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.
- N. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. Perform stain tests in accord with manufacturer's instructions and ASTM C1248 on mock-up joints prior to start of job installation.
- B. Perform adhesion tests in accord with manufacturer's instructions and ASTM C1193, Method A, Field Applied Sealant Joints Hand Pull Test.
 - 1. Perform tests on mock-up joints prior to start of job installation.
 - 2. Perform a minimum of 1 test for every 200 linear feet of applied sealant and one (1) test per floor per building elevation minimum.
 - 3. For sealant applied to dissimilar materials, test both sides of the joint.
- C. Sealant failing test shall be removed, surfaces cleaned, resealed and retested.
- D. Maintain a test log and submit report to the Architect indicating tests, locations, dates, results and remedial action.

3.05 CLEANING AND PROTECTION

- A. Clean adjacent soiled surfaces. Protect sealants until cured.

END OF SECTION

SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion joint cover assemblies for floor, wall, ceiling, and soffit surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Expansion and contraction joints in exterior concrete joints.
- B. Section 07 53 00 - Elastomeric Membrane Roofing: Roof expansion joints.
- C. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES: Gypsum board control joint trim.
- D. Section 09 51 00 - Acoustical Ceilings: Ceiling grid expansion devices.

1.03 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- B. ASTM B308 - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
- C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, effected adjacent construction and anchorage locations.
- D. Samples: Submit two samples 6 inch long, illustrating profile, dimension, color, and finish selected.
- E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.01 EXPANSION JOINT COVER ASSEMBLIES

- A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
 - 1. Joint Dimensions and Configurations: As indicated on drawings.
 - 2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
 - 3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
 - 4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.
- B. Covers In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.
 - 1. Acceptable Evaluation Agencies: UL, ULC, and Intertek.
- C. General: Refer to the Drawings and Code Analysis Plans for fire-rating hourly requirements at expansion joint assemblies. See Section 07 84 00 - Firestopping.
 - 1. Finishes: Colors as selected by the Architect from manufacturer's full range.

2.02 MATERIALS

- A. Anchors and Fasteners: As recommended by cover manufacturer.

- B. Type 1 - Exterior Walls:
 - 1. Product for non-rated locations: Seismic Colorseal by Emseal.
 - 2. Product for fire-rated locations: WFR2 by Emseal.
 - 3. Where indicated on the Drawings, seal at back-up construction with compressible filler.
 - 4. Finish: Color as selected by the Architect from manufacturer's full range.
- C. Type 2 - Interior Walls and Gypsum Soffits / Ceilings: 2" joint for 1" movement.
 - 1. Product: ASM-200 and FWFC-200 by CS Group.
 - 2. Finish: Factory finished, Kynar 500. Color as selected by the Architect from manufacturer's full range.
 - 3. Provide RFX-2FW fire barrier and 2 mm SS foil for fire-rated locations.
- D. Type 3 - Gypsum Soffits / Ceilings: 2" joint for 1" movement.
 - 1. Product: FWF-200 by CS Group.
 - 2. Finish: Factory finished, Kynar 500. Color as selected by the Architect from manufacturer's full range.
- E. Type 4 - Ceiling ACT to Ceiling ACT: 2" joint for 1" movement. See Section 09 51 00.
- F. Type 5 – Floor: 2" joint for 1" movement.
 - 1. Product: RFA-200 by CS Group.
 - 2. Finish: Mill finish aluminum.
 - 3. Provide RFX-2F fire barrier and 2 mm SS foil and heat shield for fire-rated locations.
- G. Type 6 - Floor to Wall: 2" joint for 1" movement.
 - 1. Product: RFWA-200 by CS Group.
 - 2. Finish: Mill finish aluminum.
 - 3. Provide RFX-2F fire barrier and 2 mm SS foil and heat shield for fire-rated locations.
- H. Type 7 - Ceiling ACT to Wall: 2" joint for 1" movement. See Section 09 51 00.

2.03 FABRICATION

- A. Back paint components in contact with cementitious materials.
- B. Provide joint components in single length wherever practical. Minimize site splicing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.02 INSTALLATION

- A. Install components and accessories in accordance with manufacturer's instructions.
- B. Align work plumb and level, flush with adjacent surfaces.
- C. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION

- A. Do not permit traffic over unprotected floor joint surfaces.
- B. Provide strippable coating to protect finish surface.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel doors and frames.
- B. Steel frames for wood doors.
- C. Steel frames (borrowed lites) for glazing.
- D. Sound-rated steel doors and frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 14 16 - Flush Wood Doors.
- B. Section 08 34 73 - Sound Control Wood Door Assemblies.
- C. Section 08 71 00 - Door Hardware.
- D. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
- E. Section 09 90 00 - Painting and Coating: Field painting.
- F. Division 26 - Electrical: Security system interface with doors and frames.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- F. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- G. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- I. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- J. ASTM E1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; 2000.
- K. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014 (ANSI/BHMA A156.115).
- L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- M. ITS - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- N. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

- P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- Q. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- R. UL - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- S. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- T. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- U. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.
- V. SDI 117: Manufacturing Tolerances for Standard Steel Doors and Frames.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, cores, sound ratings, profiles, anchorage and fastening methods, and finishes. Submit test data for sound rated units.
- C. Shop Drawings: Details of each opening, showing elevations, fire-ratings, glazing, frame profiles, anchors, and identifying location of different finishes, if any.
- D. Samples: Submit samples of typical frame, door section, glazing frame and loose stop, upon request.
- E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.
- B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840. Store all materials upright, in a protected dry area, at least 1" or more off the ground or floor and at least 1/4" between individual pieces. Materials shall not be permitted to rust or corrode.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Doors and Frames:
 - 1. Ceco.
 - 2. Republic Doors
 - 3. Steelcraft.
 - 4. Curries Door Co.
 - 5. Pioneer.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Sound-Rated Steel Frames:
 - 1. Quietlite Sound Control Series HM by Noise Barriers LLC.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A653, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A653, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180 or A60 (ZF180) metallic coating.

2.03 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653, cold-rolled steel conforming to ASTM A1008, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011, Commercial Steel (CS) Type B for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Door Top Closures: Welded, flush with top of faces and edges.
 - 4. Door Edge Profile: Manufacturers standard for application indicated.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Glazed Lights: Non-removable stops on secure side; sizes and configurations as indicated on Drawings.
 - a. NOTE: Bottom of glazed lights must extend to within 43" of the floor and shall be at least 10" above the floor.
 - 7. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 - 8. Galvanizing for Units in Wet Areas: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653, with manufacturer's standard coating thickness
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.
- C. Fire-Rated Door Assemblies:
 - 1. All fire-rated doors and frames shall conform to and/or be tested by the requirements of:
 - a. UL 10C - Pressure Fire Test of Door Assemblies.
 - b. NFPA 252 - Methods of Fire Tests of Door Assemblies.
 - 1) After 5 minutes in the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
 - c. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
 - d. NFPA 101 - Life Safety Code, 2009.
 - e. International Building Code, 2009.
 - f. NFPA 105 - Standard for Installation of Smoke and Draft Control Assemblies.
 - g. ASTM E119 - Standard Method for Testing Construction Assemblies.
 - h. UL 1784: Smoke and draft control air leakage not to exceed 3.0 cu ft / min / sq ft of door opening at 0.10 inch of water for ambient and elevated temperature tests.
 - 2. All components of a fire-rated assembly (door, glazing, locks, closers, latches, lite frames, louvers, hinges, frames, etc.) shall be rated at or exceed the intended fire protection rating indicated for the assembly.
 - 3. Exit Enclosure Door Temperature Rise Rating: Max transmitted temperature of 450 degrees F. above ambient with 30 minutes of fire exposure, except for fully sprinkled buildings.
 - 4. Fire-rated doors and door frames shall be labeled in accordance with NFPA 80; permanently labeled and listed by UL, Intertek or Warnock Hersey.

- a. Oversize fire-rated door assemblies: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, provide a certificate and label from an approved independent testing and inspection agency, indicating that the door and frame assembly conforms to the requirements of design, materials, and construction as established by individual listings for tested assemblies.
 - b. If any door or frame specified by the Architect to be fire-rated cannot qualify for appropriate labeling because of its design, hardware or any other reason, the Architect shall be so advised before proceeding with fabrication.
- D. Fire-Rated Window Assemblies: Comply with NFPA 80. Assemblies shall be identical to assemblies tested per NFPA 257 and shall be listed and labeled by UL, Intertek or Warnock Hersey.
- E. Fire-Ratings for Door, Door Frame and Borrowed Lite Assemblies: As indicated on Door and Frame Schedule on the Drawings.

2.04 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. General:
1. Doors shall be strong, rigid and neat in appearance, free of warpage or buckle. Corner bends shall be true, straight, and of minimum radius for the gauge of metal specified.
 2. Door faces shall be joined at their vertical edges by continuously welding the faces to the internal stiles extending the full height of the doors. Welds shall be ground and dressed to make them invisible, providing a smooth finish surface.
 3. Tops and bottoms of the doors shall have an inverted channel made of 18-gauge galvanized steel; spot-welded five (5") inches on center to the door faces. Exterior doors shall receive an additional closed top made of 16-gauge galvanized steel, welded, ground smooth and dressed to seal the top of the door. Openings shall be provided in the bottom channel to permit the escape of entrapped moisture.
- C. Exterior Doors: Thermally insulated.
1. Grade: ANSI A250.8 - SDI-100; Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 2 - Seamless (16 gage).
 - a. Exception: Grade for all doors in frame openings over 72" wide: Level 4, physical performance Level A, Model 2, seamless (14 gage).
 - b. Thermal Performance: U 0.29; R 3.4 for door, thermally-broken frame and threshold assembly.
 2. Non-Fire Rated Door Core: Polystyrene foam block, spanning the full thickness of the interior spaces of the door and securely attached to the faces using an epoxy glue.
 3. Fire Rated Door Core: Non-asbestos mineral fiberboard.
 4. Door Thickness: 1-3/4 inch, nominal.
 5. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653, with A60/ZF180 coating.
- D. Interior Doors, Non-Fire-Rated:
1. Grade: ANSI A250.8 - SDI-100; Level 2 - Heavy-Duty, Physical Performance Level B, Model 2 - Seamless. (18 gage).
 2. Core: Vertical steel stiffeners, minimum 20 gage and 8 " apart, securely attached to both face sheets by spot welds not more than 4" on center. Provide sound deadening batt type mineral wool between each stiffener for the full length of the door.
 3. Door Thickness: 1-3/4 inch, nominal.
- E. Interior Doors, Fire-Rated:
1. Grade: ANSI A250.8 - SDI-100; Level 2 - Heavy-Duty, Physical Performance Level B, Model 2 - Seamless (18 gage).
 2. Fire Ratings: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure"). All fire-rated doors shall be smoke and draft control labeled.

- a. Provide units listed and labeled by UL, WH, or other State of Maine approved testing laboratory.
 - b. Attach fire rating label to each fire rated unit indicating hourly rating, temperature rise rating and smoke / draft control "S" label.
 3. Core Material: Manufacturer's standard core material/construction in compliance with requirements.
 4. Door Thickness: 1-3/4 inch, nominal.
- F. Sound-Rated Interior Doors:
1. Grade: ANSI A250.8 - SDI-100; Level 2 - Heavy-Duty, Physical Performance Level B, Model 1 - Full Flush, (18 gage).
 2. Acoustic Rating of Assembled Door, Frame, and Seals: STC of minimums shown on Door and Frame Schedule, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.
 3. Door Thickness: As required to meet acoustic requirements indicated.
 4. Opening Force of Sound-Rated Doors, Non-Fire Rated: 5 lbs. maximum, in compliance with ADA Standards.
 5. Sound Seals: Integral, concealed in door and/or frame.

2.05 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. General:
 1. Frames for Hollow Metal Doors:
 - a. ANSI A250.8 Level 2 Doors: 16 gage frames.
 - b. ANSI A250.8 Level 3 Door Frames: 14 gage, 0.067 inch, minimum thickness.
 - c. ANSI A250.8 Level 4 Doors: 14 gage frames.
 2. Frames for Wood Doors:
 - a. Interior Opening 42 inches and less: 16 gage frames.
 - b. Interior Openings exceeding 42 inches wide: 14 gage frames.
 3. Frames for Sound-Rated Wood Doors:
 - a. Sound Rating: STC 48 minimum.
 - b. Comply with frame requirements specified in ANSI A250.8 for Level 3, 14 gage, face welded. Factory glazed with 3/8 inch laminated glass minimum, or as required to achieve STC rating.
 - c. Applications: As scheduled on the Drawings.
 4. Frames for Sound-Rated Borrowed Lites:
 - a. Sound Rating: STC 57 minimum.
 - b. 12 gage frames with 16 gage stops. Factory glazed sloped dual glazed design with 1" laminated safety glass per manufacturer standard.
 - c. Applications: Video Production Classroom 2044 and Video Production 2045 (Control Room).
 5. Provide minimum 16 gage mortar guard boxes at hardware cut-outs in frames for masonry walls and at strike reinforcement in frames for stud partitions.
 6. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units, unless detailed otherwise.
 7. Frames Wider than 48 Inches: Reinforce with steel channel, minimum 12 gage, factory welded to the frame head, flush with top. Such stiffeners shall not be used as lintels or load-carrying members.
 8. Provide welded continuous 12 gage reinforcement for continuous hinges.
- D. Exterior Door Frames, Non-Fire-Rated: Fully welded type.
 1. Thermally broken.

2. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653, with A60/ZF180 coating.
- E. Exterior Door Frames, Fire Rated: Fully welded type. Fire rating label shall match door.
 1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653, with A60/ZF180 coating.
- F. Interior Door Frames Non-fire rated: Face welded type.
- G. Interior Door Frames Fire rated: Fully welded type. Fire rating label shall match door.
- H. Sound-Rated Door Frames and Borrowed-Lite Frames: Face welded.
- I. Borrowed-Lite Frames: Construction and face dimensions to match door frames, and as indicated on the Drawings.
- J. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.
- K. Corner joints shall be die mitered. Exterior frames shall have all contact edges closed tight and continuously welded. Interior frames shall have all contact edges closed tight and faces continuously welded.
- L. Frame, trim and profiles shall be as scheduled by the Architect and verified by the Contractor. All frame depths shall be coordinated with partition type depths by the Contractor. Frames for drywall partitions shall have 1/2 inch backbends with hooked profile, unless detailed otherwise.
- M. Minimum depth of stops shall be 5/8". Use 3/4" only where required for fire rating or security.
- N. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designed for splicing in the field. All splicing locations and details shall be clearly identified on shop drawings.
- O. Frames for multiple or special openings shall have mullion and/or rail members that are closed tubular shapes having no visible seams or joints. All joints between faces of abutting members shall be securely welded and finished smooth.
- P. Frames shall be provided with supplemental internal concealed steel reinforcement, as engineered by the manufacturer.
- Q. Floor Anchors: Shall be securely welded inside each jamb, with 2 holes provided at each jamb for floor anchorage. Where required adjustable floor anchors, providing not less than 2" height adjustment, shall be provided. Minimum thickness of floor anchors shall be 14 gage, zinc coated per ASTM A591.
- R. Masonry Jamb Anchors: Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the T-strap type, 16 gage minimum, zinc coated per ASTM A591. Provide 3 anchors for frames up to 7'-6" high, 4 anchors for frames up to 8'-0" high and 1 additional anchor for each 2'-0" of height over 8'-0".
- S. Stud Partition Jamb Anchors: Shall be steel anchors, compatible with the actual stud used, minimum 18 gage thickness, zinc coated per ASTM A-591 Provide 4 anchors for frames up to 7'-6" high, 5 anchors for frames up to 8'-0" high and 1 additional anchor for each 2'-0" of height over 8'-0".
- T. Frames may be anchored to previously placed concrete, masonry or structural steel only with the prior approval of the Architect. Such frames shall be provided with anchors and fasteners of suitable design. Provide a minimum of 4 anchors per jamb plus additional anchors in quantities as scheduled above for frames in stud partitions.
- U. Electrical Knock-out Boxes: Factory weld 18 gauge electrical knock-out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified in hardware sets.
 1. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.

2. Conduit shall be coordinated and field installed under Division 26 from middle hinge box and strike box to door position box.
3. Electrical knock-out boxes shall comply with NFPA requirements and fit electrical door hardware as specified in hardware sets.
4. Electrical knock-out boxes for continuous hinges shall be located in the center of the vertical dimension on the hinge jamb.

2.06 ACCESSORIES

- A. Glazing: As specified in Section 08 80 00 - Glazing, field installed.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Fixed Stops: Custom full-flush with no apparent seams on the face of the door at the outside of spaces to be secured.
- D. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
- E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- F. Temporary Frame Spreaders: Provide for all factory or shop-assembled frames.

2.07 FINISHES

- A. Primer: Factory applied, rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.
- B. After fabrication, all tool marks and surface imperfections shall be dressed, permanently filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities. Doors shall be primed to ensure maximum paint adhesion, on all exposed surfaces with a rust-inhibitive primer in accordance with ANSI A250 - Test Procedure and Acceptance Criteria for Primed Painted Steel Surfaces.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. The Contractor shall take all measurements, make all investigations, and in general, provide field work and coordination as required to ensure the proper fit of all Work specified herein. Frames shall be sized, positioned, and installed in accordance with the design intent represented on the Drawings. The design intent shall not be modified due to the Contractor's failure to provide coordination or obtain properly fabricated materials. Such coordination shall be provided sufficiently in advance so as to avoid delays in the construction schedule.
- B. Verify that opening sizes and tolerances are acceptable. It shall be the responsibility of the Contractor to coordinate frame thicknesses with each wall and partition type to ensure proper fit.
- C. Verify that finished walls are in plane to ensure proper door alignment.
- D. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80 and ASTM E119.

- C. Coordinate frame anchor placement with wall construction. Wherever possible, leave frame spreader bars intact until frames are set perfectly square and plumb, and anchors are securely attached. Verify that frames are square and plumb following removal of temporary spreaders.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Coordinate installation of hardware in accordance with hardware manufacturer's templates and instructions. Doors and frames fabricated with hardware cutouts and reinforcing which will not properly accommodate finish hardware shall be rejected and replaced at no additional cost to the Owner.
- F. Coordinate installation of glazing.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Immediately after erection, areas where prime coat or galvanizing has been damaged shall be sanded smooth and touch up with same primer or zinc rich rust-inhibitor primer as applied at the factory. Remove rust before touch-up is applied.

3.04 TOLERANCES

- A. Clearances Between Door and Frame:
 - 1. Between steel doors and frame, at head and jambs: 1/8", with maximum 1/16" +/- variation.
 - 2. Between wood doors and frame, at head and jambs: 1/8" maximum.
 - 3. At door bottoms: 3/4" maximum
 - 4. At smoke-rated door bottoms: 3/8" maximum.
 - 5. Between meeting edges of pairs of doors: 1/8" maximum.
 - 6. Between face of door and stop: 1/8".
 - 7. Note: Door sills, except at fire-rated doors, may be undercut greater than the clearances indicated above if so scheduled on the Drawings and/or on the Door & Frame Schedule. Note sound-rated doors may require under-cuts less than maximums indicated above.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.
- C. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.
- D. Protect installed doors, frames and accessories against damage from other construction work. Any damage prior to acceptance shall be repaired or replaced, if such action complies with the requirements and shows no evidence of repair or refinishing.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the Drawings.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Factory finished flush wood doors.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 34 73 – Sound Control Wood Doors.
- B. Section 08 71 00 - Door Hardware.
- C. Section 08 80 00 - Glazing: Site glazing of doors.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- C. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2012.
- D. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- E. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics. Submit manufacturer's certification of compliance with quality standards.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Specimen warranty.
- E. Samples:
 - 1. Upon request, submit one sample of door construction, 8x8 inch in size cut from top corner of door and samples of lite frame section.
 - 2. Submit one full set of manufacturer's standard stain colors on specified veneer for selection.
 - 3. Submit two samples of door veneer, 6x6 inch in size illustrating selected wood grain, stain color, and sheen.
 - 4. Samples submitted and accepted shall serve to reflect the entire range of (color, texture, grain and sapwood/heartwood variation and shall be used as the standard for acceptance or rejection of installed materials.
- F. Manufacturer's certification that products are manufactured in the United States.
- G. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years of documented experience.
- B. Fire Rated Door Assemblies: Conform to the following standards for fire rated class as indicated.
 - 1. UL 10c UBC-10 Pressure Fire Test of Door Assemblies
 - 2. NFPA 252 Methods of Fire Tests of Door Assemblies
 - 3. NFPA 80 Standard for Fire Doors and Windows

4. NFPA 101 Life Safety Code
 5. NFPA 105 Standard for Smoke and Draft Control Assemblies
 6. Fire & Smoke/Draft labeled and listed by Underwriters Laboratories or Warnock Hersey.
- C. All components of a fire-rated assembly (door, glazing, locks, closers, latches, lite frames, louvers, hinges, etc.) shall be rated at or exceed the intended fire protection rating indicated for the assembly.
1. Temperature Rise Rating: At exit enclosures, provide doors that have a temperature rise rating of 450 degrees F maximum in 30 minutes of fire exposure.
 2. Pressure Test: After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
 3. Wood doors with fire rating requirements exceeding 20 minutes shall be Category A doors with integral intumescent strips.
- D. Sound Rated Door Assemblies: Sound (acoustic) rated door and frames with appropriate sound seal hardware shall provide a minimum rating of STC 45 per ASTM E-90 and E-413 and shall be verified by independent test laboratory certification.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials during transit, storage, and handling to prevent deterioration, damage and soiling. Package each door at the factory in a separate heavy sealed poly bag. Mark each bag at top and bottom of doors for location to correspond with opening number on the Drawings.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage. In the event of damage, immediately make all repairs and replacements necessary for approval of the Architect and at no additional cost to the Owner.
- C. Protect doors with resilient packaging. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation. Deliver door to job site only when building is dry and has reached average prevailing relative humidity of locality.
- D. Coordinate the work with door opening construction, door frame and door hardware installation. The Contractor shall take all measurements, make all investigations, and in general provide field work and coordination as required to ensure the proper fit of all Work specified herein. Doors and frames shall be sized, positioned and installed in accordance with the design intent represented on the Drawings. The design intent shall not be modified due to the Contractor's failure to provide coordination or obtain properly fabricated materials. Such coordination shall be provided sufficiently in advance so as to avoid delays in the construction schedule.

1.07 WARRANTY

- A. See Section 01 78 10 - Warranties for additional warranty requirements.
- B. Include coverage for delamination of veneer, defective materials, telegraphing core construction, and warping. Unsatisfactory warpage shall be more than 1/4" in a 42" x 84" section and telegraphed core construction shall be defined as exceeding 0.01 inch in a 3 inch span. The warranty shall also include refinishing and reinstalling which may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 1. Graham Wood Doors
 2. Eggers Industries.
 3. Marshfield Door Systems, Inc.
 4. Buell Door Co.
 5. Algoma Hardwoods, Inc.
 6. VT Industries.

7. Mohawk Flush Doors.
8. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS

- A. All Doors: Wood veneer faced doors; 5-ply; 1-3/4 inch thickness; solid core flush construction. AWI Custom grade.
 1. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10B - Negative (Neutral) Pressure; Underwriters Laboratories Inc. (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 2. Smoke and Draft Control Doors: All door assemblies shall be tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch w.g. pressure at both ambient and elevated temperatures; if necessary, provide additional gasketing or edge sealing.
 3. Sound Retardant Doors: Minimum STC as indicated on drawings, calculated in accordance with ASTM E413, tested in accordance with ASTM E90.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire-Rated Doors: Mineral core, Type FD, plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.
 1. 20 min Particle Core: AWI Type FD 1/3.
 2. Fire-rated Mineral Core C Label: AWI Type FD 3/4. Category A with integral intumescent strips. Fire-resistive particle board core C Label also allowed.
 3. Fire-rated Mineral Core B Label: AWI Type FD 1-1/2. Category A with integral intumescent strips.
 4. Cores for fire-rated doors shall be non-combustible mineral board, 30.8 to 34.7 pcf, containing no asbestos, as required for scheduled fire-resistance.
 5. Provide fire-rated pairs of doors with fire-retardant stiles of labeled and listed matching face veneer without formed steel edges and astragals.
- C. Doors scheduled to receive closers and /or exit devices shall have solid lumber rails, without compromising labeling or listing requirements. Thru-bolting of finish hardware shall not be permitted, unless specifically noted elsewhere in the Construction Documents.
- D. Sound Retardant Doors: Equivalent to Type PC construction with core as required to achieve rating specified; species and faces as indicated above.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 1. Vertical Edges: Same species as face veneer.
 2. "Running Match" each pair of doors and doors in close proximity to each other.
 3. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.

2.05 ACCESSORIES

- A. Glazing: As specified in Section 08 80 00.
- B. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for concealed tamperproof fasteners at wood and countersunk oval head screws at metal frames. Fill fastener holes with color matching filler in the field.
 1. Note: The bottom edge of all lites shall be at least 10 inches above the floor and not more than 43 inches above the floor.
- C. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

2.06 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 - 1. Provide solid blocks at lock edge and top of door for closer and other hardware reinforcement as required.
 - 2. Provide solid blocking for other throughbolted hardware.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with the quality standard specified.

2.07 FACTORY FINISHING - WOOD VENEER DOORS

- A. Factory finish doors in accordance with specified quality standard:
 - 1. Transparent Finish: Transparent catalyzed polyurethane, Premium quality, AWI TR-6 equal to Algoma Hardwoods "Univar" Catalyzed Polyurethane or Eggers Industries "Gardall II".
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine all doors before hanging and reject doors with defects.
- B. Verify existing conditions before starting work.
- C. Verify that opening sizes and tolerances are acceptable.
- D. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Install fire-rated doors in accordance with NFPA 80 requirements.
- C. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- D. Use machine tools to cut or drill for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.
- F. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Conform to specified quality standard for telegraphing, warp, and squareness.
- B. Edge Clearances shall be provided as follows:
 - 1. Between wood doors and steel frames at heads and jambs: 1/8" maximum.
 - 2. At door bottoms: 3/4" maximum.
 - 3. Between meeting edges of pairs of doors: 1/8" max.
 - 4. Note: Doors that are not fire or smoke rated may be undercut greater than the clearances indicated above if so indicated on the Drawings and/or Door Schedule. Undercutting shall be performed as part of factory fabrication process to prevent excessive removal of bottom rail. Doors with sound-ratings may require undercut less than maximum indicated above.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.

- B. Adjust closers for full closure.
- C. Align in frames for uniform clearance at each edge. Restore finish before installation if on-site fitting or machining is required. Replace or re-hang any doors which do not swing or operate freely, or are warped or twisted. Pre-finished doors damaged prior to acceptance shall be repaired or replaced. Doors may be prepared or refinished if work complies with requirements and show no evidence of repair or refinishing.

3.05 SCHEDULE

- A. Refer to Door and Frame Schedule on the Drawings.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling access door and frame units.
- B. It is not intended that the Drawings or Specifications identify specific access door sizes or locations. Subcontractors whose work requires access panels in wall, floor, and ceiling assemblies shall thoroughly examine all Construction Documents and provide suitable access to all equipment, hardware, accessories and all other items that may require adjustment, observation or maintenance. Note: Access doors located in mechanical equipment or ductwork are provided as part of the work of Division 23 - HVAC.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry:: Openings in masonry.
- B. Section 09 21 16 - Gypsum Board Assemblies: Openings in partitions and ceilings.
- C. Section 08 71 00 - Door Hardware: Mortise cylinder and core hardware.
- D. Section 09 90 00 Painting and Coating: Field paint finish.
- E. Division 22 - Plumbing
- F. Division 23 - HVAC
- G. Division 26 - Electrical

1.03 REFERENCE STANDARDS

- A. ITS - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- B. UL - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide materials, construction, profiles, types, finishes, hardware, locking provisions, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of all access door units.
- D. Project Record Documents: Record actual locations of all access units.

PART 2 PRODUCTS

2.01 WALL AND CEILING UNITS

- A. Manufacturers:
 - 1. Karp Associates, Inc.
 - 2. Milcor.
 - 3. Nystrom Products.
 - 4. Larsens Manufacturing Co.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies that units are to be installed in.
 - 1. Material: Steel.
 - a. At locker Room F131 and Locker Room F141 provide aluminum.
 - 2. Style: Exposed frame with door surface flush with frame surface.
 - a. In Gypsum Board: Use drywall bead type frame.
 - b. In Plaster: Use plaster bead type frame.

- c. In Masonry: Provide adjustable metal masonry anchors.
3. Door Style: Single thickness with rolled or turned in edges.
4. Door Style for separating heated from non-heated areas: Double wall with integral non-combustible insulation filler.
5. Door Style for Fire-rated locations: Double wall with integral non-combustible insulation filler.
6. Frames: 16 gage, 0.0598 inch, minimum.
7. Single Thickness Steel Door Panels: 0.070 inch, minimum.
8. Double-Skinned Hollow Steel Door Panels: 16 gage, 0.059 inch, minimum, on both sides and each edge.
9. Insulation: Non-combustible mineral or glass fiber.
10. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly that access doors are being installed.
 - a. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated (labeled for horizontal or vertical installation).
11. Finish: Factory prime painted for field finish painting.
12. Size: As required for each condition, minimum size 8" x 8".
13. Hardware:
 - a. Hardware for Fire Rated Units: As required for listing.
 - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
 - c. Latch/Lock: Cylinder lock operated cam latch, two keys for each unit.
 - 1) Mortise cylinder and core specified in Section 08 71 00.
 - d. Inside Latch Release: For all doors intended to allow a person to fully pass through, provide Mechanism that allows the panel to be opened from the inside without the use of a tool or key
 - e. Gasketing: For all doors that separate heated and unheated space. Extruded neoprene, around the perimeter of the door panel.
 - f. Horizontal Applications: Equip with restraints to prevent doors from falling open or closed upon release. All doors greater in size than 300 square inches and installed horizontally shall be provided with the following sign in 1/2" high red letters adjacent to the door lock: "Caution: Door will drop upon lock release".

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings for door and frame are correctly sized and located.
- B. Door locations that may physically or visually conflict with adjacent construction or building features shall be brought to the attention of the Architect prior to 'roughing-in'. Doors installed in locations objectionable to the Architect shall be removed, patched, and relocated at no additional cost to the Owner.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.
- D. Adjust hardware and panels after installation for proper operation.
- E. Door lock keys shall be labeled and turned over to the Owner per Project Close-out requirements.

END OF SECTION

SECTION 08 33 13
COILING COUNTER DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated coiling counter doors and operating hardware motorized operation.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Support walls.
- B. Section 05 12 00 - Structural Steel: Support framing.
- C. Section 05 50 00 – Metal Fabrications: Frames, brackets and supports.
- C. Section 08 33 26 - Overhead Coiling Doors.
- D. Section 08 36 13 - Overhead Sectional Doors.
- E. Section 08 71 00 - Door Hardware: Cylinder cores and keys.
- F. Division 26 – Electrical: Electrical connection and integration with fire alarm systems.

1.03 REFERENCE STANDARDS

- A. ASTM A36 - Standard Specification for Carbon Structural Steel; 2008.
- B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ITS - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- F. UL - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general construction, component connections and details, electrical equipment, UL listings.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details. Include weights at each anchorage location for review by structural engineer.
- D. Maintenance Data: Indicate lubrication requirements and frequency, periodic adjustments required.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this Section with a minimum of ten years of experience in the fabrication and installation of security closures.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry. Store materials in a dry, warm, ventilated weather-tight location.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

- B. Provide manufacturer's warranty against defects in material and workmanship for a period of two (2) years beginning on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Counter Fire Model 640 by Overhead Door Corp.
- B. Acceptable Manufacturers:
 - 1. Cornell Iron Works, Inc.
 - 2. The Cookson Company.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COILING COUNTER DOORS

- A. Coiling Counter Doors, Fire-Rated: Stainless steel slat curtain.
 - 1. Applications and Sizes: Dish Wash C102A and Concessions/Cafe A178. See Drawings for sizes.
 - 2. Mounting: Between jambs and face of wall, as indicated. Provide solid grouted jambs. Assemblies shall provide for deflection connections to overhead building structural steel.
 - 3. Provide integral frame and sill of same material and finish, fire-rated. Coordinate with custom stainless steel food service equipment.
 - 4. Fire Rating: For 1 hour fire rated construction; 60 minute minimum required; comply with NFPA 80. Provide product listed and labeled by UL or ITS (Warnock Hersey).
 - 5. Nominal Slat Size: 1-1/2 inches wide.
 - 6. Slat Profile: Flat.
 - 7. Finish: Satin stainless steel.
 - 8. Guides: Formed track; same material and finish unless otherwise indicated.
 - 9. Hood: Stainless Steel.
 - 10. Provide UL listed brush-type smoke seals.
 - 11. Fire Release Mechanism: Automatically self-closing with governed closing speed, actuated by fire alarm system.
 - 12. Non-Fire Operation: Electric motor, with wall switch and interlock.

2.03 MATERIALS

- A. Curtain Construction: Interlocking, single thickness slats.
 - 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 - 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
 - 3. Slats: Stainless steel; minimum thickness 22 gage, 0.03 inch.
- B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
- C. Hood Enclosure: Internally reinforced to maintain rigidity and shape.
- D. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.04 ELECTRIC OPERATION

- A. Electrically Operated Doors: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Electric Operators:
 - 1. Mounting: Side mounted motor enclosure for interior applications.
 - 2. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 3. Controller Enclosure: NEMA 250 Type 1.

4. Motor Rating: 1/3 hp; continuous duty.
 5. Motor Voltage: 120 volt, single phase, 60 Hz.
 6. Opening Speed: 12 inches per second.
 7. Brake: Adjustable friction clutch type, activated by motor controller. Manual override in case of power failure.
- C. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each operator.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. In addition, install fire-rated doors in accordance with NFPA 80.
- C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- F. Install perimeter trim as indicated.

3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead coiling doors, operating hardware, fire-rated and motorized operation.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Support wall.
- B. Section 05 12 00 - Structural Steel: Support Framing
- C. Section 08 3313 - Coiling Counter Doors
- D. Section 08 36 13 - Overhead Sectional Doors
- E. Section 08 71 00 - Door Hardware: Cylinder cores and keys.
- F. Section 09 91 23 - Interior Painting: Field paint finish.
- G. Division 26 – Electrical: Electrical connection and integration with fire alarm systems.

1.03 REFERENCE STANDARDS

- A. ASTM A36 - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- C. ITS - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- E. UL - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general construction, electrical equipment, component connections and details, and UL listings.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details. Include weights at each anchorage location for review by structural engineer.
- D. Samples: Submit manufacturer's full line of color chips for selection.
- E. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.05 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of ten years of experience in the fabrication and installation of security closures.
- C. Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry. Store materials in a dry, warm, ventilated weather-tight location.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

- B. Provide manufacturer's warranty against defects in material and workmanship for a period of two (2) years beginning on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Model 631 Fire Rated Rolling Service Door by Overhead Door Corp.
- B. Acceptable Manufacturers
 - 1. Cornell Iron Works, Inc.
 - 2. The Cookson Company.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COILING DOORS

- A. Fire-Rated Coiling Doors: Steel slat curtain; conform to NFPA 80.
 - 1. Applications and Sizes: Servery C100 and Greenhouse D154E. See Drawings for size.
 - 2. Fire Rating: comply with NFPA 80. Provide product listed and labeled by UL or ITS (Warnock Hersey).
 - a. For 1 hour fire rated construction; 60 minute minimum required.
 - 1) Applications: Servery C100.
 - b. For 3 hour fire rated construction; 3 hour minimum required.
 - 1) Applications: Greenhouse D154E.
 - 3. Oversized Openings: Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated units and operating hardware assembly.
 - 4. Finish: PowderGuard by Overhead Door Corp.
 - 5. Color: As selected by Architect from manufacturer's standard colors.
 - 6. Guides: Angles; factory primed steel. Formed guides and brackets to support counterbalance, curtain, and hood. Provide intermediate support brackets as required. Coordinate with structural steel mounting conditions. Guide fastening per UL listed for fire-rating in accordance with manufacturer's listing.
 - 7. Hood Enclosure: Painted steel.
 - 8. Provide UL listed brush-type smoke seals.
 - 9. Fire Release Mechanism: Automatically self-closing with governed closing speed, actuated by fire alarm system.
 - 10. Mounting: Surface mounted.
 - 11. Non-Fire Operation: Electric motor, with wall switch and interlock.

2.03 MATERIALS

- A. Curtain Construction: Interlocking slats.
 - 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 - 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
- B. Steel Slats: Minimum thickness, 24 gage; ASTM A653 galvanized steel sheet.
- C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- D. Steel Guides: Formed from galvanized steel sheet, 3/16 inch thick, minimum; complying with ASTM A653.
- E. Hood Enclosure: Internally reinforced to maintain rigidity and shape. Minimum thickness, 24 gage.
- F. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.04 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by UL or Intertek.
- B. Electric Operators:
 - 1. Mounting: Side mounted; motor enclosure for interior applications.
 - 2. Motor Rating: 1/3 hp; continuous duty.
 - 3. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 4. Controller Enclosure: NEMA 250, Type 1.
 - 5. Opening Speed: 12 inches per second.
 - 6. Brake: Adjustable friction clutch type, activated by motor controller. Manual override in case of power failure.
- C. Control Station: Standard keyed three button (OPEN-STOP-CLOSE) momentary control for each operator.
- D. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

PART 3 EXECUTION

2.01 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

2.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. In addition, install fire-rated doors in accordance with NFPA 80.
- C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- F. Complete wiring from fire alarm system.

2.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

2.04 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

2.05 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

SECTION 08 34 73
SOUND CONTROL WOOD DOOR ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustic swinging sound control wood doors with perimeter seals, door bottoms, astragals, thresholds and cam-lift hinges or other items required by the tested assembly.

1.02 RELATED SECTIONS:

- A. Section 04 20 00 - Unit Masonry: Embedding anchors for hollow metal frames into masonry construction.
- B. Section 08 11 16 - Hollow Metal Doors and Frames.
- C. Section 08 14 16 - Flush Wood Doors.
- D. Section 08 71 00 - Finish Hardware.
- E. Section 08 80 00 - Glazing; Glass for doors.
- F. Division 26 Electrical.
- G. Division 28 Electronic Safety and Security. Access control devices installed at door openings and provided as part of a security access system.

1.03 REFERENCE STANDARDS

- A. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- B. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
- C. ASTM E 413 - Classification for Rating Sound Insulation.
- D. Architectural Woodwork Standards - Edition 1.
- E. ANSI/BHMA A156.15 - Hardware Preparation in Doors and Frames.
- F. ANSI/SDI 124 - Maintenance of Standard Steel Doors and Frames.
- G. NFPA 80 - Standard for Fire Doors and Fire Windows.
- H. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies
- I. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.
- J. WDMA I.S.1-A Architectural Wood Flush Doors.

1.04 TESTING AND PERFORMANCE

- A. Sound control assemblies to be identical to those tested at an independent acoustical laboratory qualified under the National Voluntary Laboratory Accreditation Program (NVLAP) by the National Institute for Science and Technology (NIST) in accordance with ASTM E90 and ASTM E413.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data including construction details, core and edge construction, hardware reinforcements, profiles, door configurations, anchors, fire-resistance rating and finishes.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, frame reinforcements, glazing, fire-ratings, stops, factory machining, factory finishing, cutouts for glazing. Provide requirements for power, signal and control systems.

- D. Samples: Submit sample of door finish of manufacture's full line for selection. Submit confirmation sample of selected finish, minimum 3" x 3" in size.
- E. Test Reports: Submit test reports from a qualified accredited testing agency to demonstrate sound control testing results to comply with specification requirements. Provide laboratory name, test report number and date of test. The submitted document shall include the entire test report from the testing agency.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sound control door assemblies protected and crated in transit to the Project site.
- B. Deliver frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Mark each door on the top rail with opening number used on Shop Drawings.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.
- B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.08 COORDINATION

- A. Coordinate installation of anchorages for sound control hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.09 WARRANTY

- A. Provide manufacturer's standard written warranty in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified two year minimum warranty period.
 - 1. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements:
 - 1. Noise Barriers LLC
 - 2. Ambico Products
 - 3. Krieger Specialty Products.
 - 4. Overly Door Company.
 - 5. Security Metal Products.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Application(s): Video Production Classroom 2044, Video Production 2045 (Control Room) and where indicated per the Drawings.

2.02 MATERIALS

- A. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- B. Door Hardware: Provide required door hardware including cam-lift hinges, perimeter seals, door bottoms, astragals, thresholds and hardware standoff brackets required to meet the specified STC rating.
 - 1. See Section 08 71 00 - Finish Hardware for locksets and closers.
- C. Glazing: Glazing shall comply with types used in tested assemblies meeting the specified STC rating. See Section 08 80 00 - Glazing.

2.03 SOUND CONTROL WOOD DOORS

- A. General: Provide minimum 5-ply construction, 1-3/4" thickness with seamless construction. No visible joints shall be permitted on the exposed faces. Face and edge veneer or laminate to be as selected from manufacturer's samples.
 - 1. Core Construction: Manufacturer's standard sound control door core construction designed and tested for the specified STC rating.
 - a. Fire Door Core: As required to provide fire-protection level specified.
 - 2. Vertical Edges: Beveled both edges, 1/8 inch in 2 inches.
- B. Sound control assemblies to be identical to those tested at an independent acoustical laboratory qualified under the National Voluntary Laboratory Accreditation Program (NVLAP) by the National Institute for Science and Technology (NIST) in accordance with ASTM E90 and ASTM E413.

2.04 FABRICATION

- A. Factory fit doors to suit frame opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 1. Comply with requirements in NFPA 80 for fire rated doors.
- B. Sound Control Wood Doors:
 - 1. Factory Installed Glazed Lites: Factory cut opening and install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material and allow for independent removal of each pane of glass.
 - 2. Astragals: Provide overlapping astragals as required on one leaf of pairs of doors where required for specified STC rating or by NFPA 80 for fire-performance rating. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted.
- C. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, ANSI/DHI A115 series standards, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining. Reinforce frames to receive non-template, mortised and surface-mounted door hardware.
 - 2. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.05 FINISHES

- A. Wood Door Finishes:
 - 1. For flush wood veneer faced doors, see Section 08 14 16.
 - 2. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
 - 3. Transparent Finish: Provide a clear protective coating over the wood veneer allowing the natural color and grain of the selected wood species to provide the appearance specified. Stain is applied to the wood surface underneath the transparent finish to add color and design flexibility.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded sound control hollow metal frames for squareness, alignment, twist, and plumbness.
- C. Prepare wood doors and hollow metal frames to receive non-template, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Install sound control wood door assemblies work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Sound Control Wood Doors: Fit sound control wood doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jamb and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Standard bottom clearance as required by manufacturer.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 3. Factory Glazing: Factory install glazing in doors as indicated.
- C. Install perimeter seals, door bottoms, astragals and thresholds in accordance with manufacturer's written installation instructions.

3.04 FIELD QUALITY CONTROL

- A. The Owner may hire a qualified independent testing agency to test specific wood door sound control assembly installations in accordance with ASTM E336. Installed products shall perform no less than five ASTC or NIC rating points below the specified laboratory STC rating. Installations that do not meet criteria, shall be adjusted and retested until compliance is obtained.

3.05 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including sound control wood door assemblies work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- C. Finished Doors: Replace doors that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

**SECTION 08 35 13.23
FOLDING FIRE DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Horizontal sliding, accordion folding fire rated doors.
- B. Related construction.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel: Structural steel supports for door.
- B. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking for track mounting.
- C. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES: Fire rated gypsum board partition forming opening, track mounting, and storage pocket, if any.
- D. Section 09 91 23 - Interior Painting: Finish painting.
- E. Division 26 - Electrical: Power wiring to motor, control equipment and LCD door status displays.
- F. Division 28 - Electronic Safety and Security: Fire detection and alarm system connections for activating automatic closing operation.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2014.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- D. UL 10B - Standard for Fire Tests of Door Assemblies; Underwriters Laboratories; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's technical literature; include UL listing data.
- C. Shop Drawings: Indicate construction and installation details and dimensions, including layout, electrical requirements, required stacking depth, height of header above finished floor; and requirements for anchorage and support of each door.
- D. Selection Samples: Submit color charts for selection of finish color.
- E. Operation and Maintenance Data: Operating procedures, troubleshooting and repair methods, wiring diagrams, parts lists, and identification of authorized maintenance firms located in vicinity of project. Provide two sessions of manufacturer's approved training.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Installers are to be local subcontractors approved by manufacturer; minimum three years of documented experience and certified by the manufacturer to install and maintain the product.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site in manufacturer's original, unopened packaging, labeled to show name, brand and type.
- B. Store products in a protected dry location, in manufacturer's original packaging, in accordance with manufacturer's instructions.

1.07 WARRANTY

- A. See Section 01 78 10 - Warranties.
- B. Materials and installation shall be warranted against defects in workmanship for a period of (5) five years from the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Accordion Folding Fire Doors:
 - 1. Basis of Design: Won-Door Corporation; Fireguard.

2.02 ACCORDION FIRE DOORS - GENERAL

- A. Provide self-closing fire doors of configurations indicated on the Drawings.
- B. Accordion Folding Fire Doors:
 - 1. 1 Hour FireGuard Cross Corridor/Compression Stack FG-CC/CS 60 by Won-Door Corp.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Fire Rating:
 - 1. Atrium Cross Corridor - 1 hour fire rated: 60 minutes minimum, with limited temperature rise; provide products listed and labeled by UL as a fire door under UL 10B.
 - 2. Fire doors shall be capable of resisting an air pressure differential up to .05 inches of water column.
- D. Folding Fire Door Closing and Opening Operation: System shall be listed by UL in accordance with UL864 requirements and listed for use with door assembly in compliance with NFPA 80.
 - 1. Closing Operation: Automatic motor-operated closing upon activation by fire alarm system and by low battery charge.
 - a. Obstruction Detection: Contact with an obstruction causes the door to stop and pause before attempting to re-close.
 - b. Allow manual closing of door at any time.
 - 2. Opening Operation: Provide exit hardware on both sides of door.
 - a. When door has been manually closed, operation of exit hardware shall open door completely.
 - b. When door has been automatically closed, operation of exit hardware shall open door at least 72 inches, width programmable up to full opening width; pause for 3 seconds, then automatically close.
- E. Configuration: Single; straight; recessed in pocket.
 - 1. Clear Opening Width: As indicated on drawings
 - 2. Clear Opening Height: As indicated on drawings.
 - 3. Pocket Depth: As indicated on drawings.
 - 4. Striker Mounting: Recessed.

2.03 COMPONENTS

- A. Door Construction: Two parallel, accordion-type walls of panels independently suspended, 6 to 8 inches apart, with no pantographs or interconnections except at the lead-post.
 - 1. Panels: 24 gage, 0.0239 inch steel, V-grooved; connected by full height 24 gage (0.0239 inch) steel hinges.
 - 2. Insulation: Ceramic liner, 8 lb/cu ft.
 - 3. Lead Posts: 24 gage, 0.0239 inch cold rolled steel, factory primed for field painting. Color chosen by Architect; internally mounted stabilizer bar; spring-loaded cap with PVC seals at top and bottom to fit into striker wall cavity; positive latching at striker wall.
 - 4. Smoke and Draft Seals: Continuous PVC sweeps attached at top and bottom.
 - 5. Hanging Weight: 5.5 pounds per sq ft, maximum.
 - 6. Finish: All steel parts factory-applied enamel.
 - 7. Color: Manufacturer's standard platinum..

- B. Suspension System and attachment to building structure: Two tracks, on 8 inch centers, attached to steel track hangers engineered by door manufacturer, attached to overhead structural support.
 - 1. Tracks: 14 gage, 0.0747 inch cold rolled steel.
 - 2. Panel Hangers: Each panel individually suspended from a steel hanger pin and a 1/4 inch ball bearing roller.
 - 3. Lead Post Hangers: 8 wheel ball bearing trolley.
- C. Motor Operator Assembly: Chain drive attached to stabilizer bar trolley with DC gear-motor, drive sprocket and clutch.
- D. Power Supply: 12-volt maintenance-free DC battery, automatically maintained at capacity by continuous charger, 120 V AC.
- E. Automatic Closing System: UL 864 listed, including capability to send and receive signals from the Fire Control Panel, and shall consist of the following:
 - 1. Microprocessor Based Electronic Control box with the ability to:
 - a. Monitor dual power sources continually for peak performance including detection of a missing battery, bad battery, or low battery condition; detection if the charging circuit is bad; detection of fuse failures; and detection of high or low AC conditions.
 - b. Monitor the health of the drive train.
 - c. Monitor inputs of sticky door block, exit hardware, patron hardware, and key switches.
 - d. Run a "watch dog" monitoring circuit which will force a software restart in the event the software hangs, including the ability to track the number of resets that occur for diagnostic purposes.
 - e. Withstand voltages up to 120 volts AC on the fire alarm input circuit without damage including the ability to indicate that the alarm circuit has not been wired as a dry contact, "no voltage" circuit when errant voltages are applied to the circuit.
 - f. Communicate with other microprocessors in the assembly via an internal buss system.
 - g. Indicate trouble or supervised information both locally and at a remote location.
 - 2. Motor Operator Assembly including: A DC gear motor, drive sprocket, clutch, and position sensors. The motor shall drive the fire door by means of a chain attached to a stabilizer bar trolley. The motor shall be rated for continuous use with unlimited cycle duty.
 - 3. Leading Edge Obstruction Detector shall be pressure sensitive such that contact with an obstruction shall cause the door to stop, pause for 3 seconds, then re-close when in alarm mode. The obstruction detection system shall be fully functional at all times.
 - 4. Exit hardware shall be located on both sides of the fire door. Coordinate cores for master keying system with hardware subcontractor.
- F. The header shall be provided as an integrated part of the door assembly. It shall include integrated self-supporting track, threaded rods and mechanical attachment hardware.
- G. Controls: Microprocessor logic board, interconnect board, motor control relays, and limit switches; provide loud audible signal if sensors indicate high or low voltage, AC or DC; drive train, limit switch, or key switch malfunction; or ROM or RAM check-sum error.
- H. Key Switches: Recessed wall-mounted within line-of-sight of door. Location as directed by Architect.
- I. Access Control: Shall inactivate Fire Exit Hardware and sound an audible alarm in an attempt is made to manually operate the door assembly. A key switch shall be provided for authorized operation of the door assembly. A signal from the smoke detector or fire alarm will automatically override the access control feature.
- J. Remote Operation and Monitoring. Fire doors shall be remotely monitored and controlled through a building monitoring system (BMS) and interface with the BMS using MODBUS communication.

1. MODBUS Door Controls shall Include: Open, Close, Set Fire Mode for Testing, Reset, Lock (with Access Control Option), Unlock (with Access Control Option).
2. MODBUS Monitor Status: Door position across opening width, Door Status (OPEN, CLOSED, OPENING, CLOSING), Errors, Battery Voltage, AC Voltage.

2.04 RELATED CONSTRUCTION

- A. Track Support Construction: Provide supports attached to structure and mounting surface for tracks; comply with door manufacturer's instructions and recommendations.
- B. Pocket Construction: As indicated on the Drawings, which shall comply with door manufacturer's instructions and recommendations to ensure pocket and soffit are built to the dimensions specified, plumb and level.
- C. Striker Recess: Mount striker in wall recess deep enough to prevent striker from protruding beyond face of wall; construct recess to maintain fire rating of wall.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that adjacent construction is suitable for installation of door.
- B. Verify that electrical utilities have been installed and are accessible.
- C. Verify access to, and proper clearance for, motor operators in wall cavity.
- D. Verify that door opening is plumb and header is level and of correct dimensions.
- E. Notify Architect of any unacceptable conditions or varying dimensions.
- F. Commencement of work indicates acceptance of substrate and opening.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions, shop drawings, and NFPA 80.
- B. Install fire doors plumb and level.
- C. Install wiring in accordance with applicable codes and NFPA 70.

3.03 ADJUSTING

- A. Adjust door installation to provide uniform clearances and smooth, quiet, non-binding operation.
- B. Test door closing functions under all anticipated conditions.
- C. Verify that all operations are functional and meet the requirements of the authorities having jurisdiction.

3.04 FIELD TESTING

- A. Units shall be tested for proper operation in conjunction with the fire alarm system. Following testing, they shall be reset to their original open position.

3.05 CLEANING AND PROTECTION

- A. Clean surfaces using manufacturer's recommended means and methods.
- B. Protect installed work from damage.
- C. Repair or replace defective work prior to Substantial Completion.

END OF SECTION

SECTION 08 36 13
OVERHEAD SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated, including hardware, supports, motor operators and electrical controls.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.
- B. Section 07 90 05 - Joint Sealers: Perimeter sealant and backup materials.
- C. Section 08 71 00 - Door Hardware: Lock cylinders.
- D. Division 26 - Electrical.

1.03 REFERENCE STANDARDS

- A. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- C. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- D. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; Door & Access Systems Manufacturers' Association, International; 2011.
- E. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Show component construction, anchorage method, and hardware.
- C. Shop Drawings: Indicate wind load reinforcements, opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Samples:
 - 1. Submit color chips in manufacturer's full color range for selection.
 - 2. Upon request, submit a 12" x 12" minimum size corner section of overhead door typical panels.
- E. Manufacturer's Installation Instructions: Include any special procedures required by Project conditions.
- F. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years of documented experience.
- B. Installer: Company specializing in performing the work of this Section with minimum five years of experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified.

1.06 WARRANTY

- A. See Section 01 78 00 - Project Close-out for warranty requirements.

- B. Provide manufacturer's warranty to correct defective Work within a three year period after Date of Substantial Completion. Include coverage for electric motor and transmissions.
 - 1. Thermal Overhead Doors: Provide manufacturer's ten year warranty against delamination of foam from steel face.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sectional Steel Doors - Basis of Design: Series 596 Thermacore Insulated Steel Doors by Overhead Door Corp.
 - 1. Applications: All exterior overhead sectional doors unless otherwise indicated.
- B. Other Acceptable Manufacturers:
 - 1. Clopay Corporation.
 - 2. Wayne-Dalton
 - 3. Cookson Company, Inc.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Sound Transmission Class: 26.
 - 2. Door Nominal Thickness: 2 inches thick.
 - 3. Exterior Steel: 20 gauge galvanized.
 - 4. End Stiles: 16 gauge with thermal break.
 - 5. Exterior Finish: Factory finished with acrylic baked enamel; color as selected by Architect.
 - 6. Interior Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
 - 7. Glazed Lights: Maximum lite size, full width, two rows or as indicated on the Drawings; set in place with resilient glazing channel.
 - 8. Operation: Electric.
- B. Structural Performance: Overhead door assembly shall be capable of withstanding positive and negative wind loads in accordance with the following without undue deflection or damage to components:
 - 1. Basic Wind Speed: 100 MPH, see Structural Drawings.
 - 2. Wall Design Wind Pressures: +19.73 PSF / -21.37. At wall corners: +19.73 PSF / -26.31 PSF.
- C. Thermal Performance: R value of 17.4; U value of 0.057.
- D. Air Infiltration Performance: 0.08 cfm at 25 mph.
- E. Door Panels: Flush steel construction; outer and inner steel sheet of 20 gauge, flat profile; core reinforcement as required to meet performance requirements, rabbeted weather joints at meeting rails; insulated.
- F. Glazing: Fully tempered glass; insulated; clear; 1 inch thick.
- G. Interior mount slide lock with interlock switch for automatic operator

2.03 DOOR COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
 - 1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.

- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.
- I. Lock Cylinders: See Section 08 71 00.

2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653, with G60/Z180 coating, plain surface.
- B. Float Glass:
 - 1. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
- C. Insulation: CFC-free and HCFC-free, rigid polyurethane, bonded to facing, fully encapsulated.
 - 1. Same thickness as core framing members.

2.05 ELECTRICAL OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by a testing agency acceptable to authorities having jurisdiction.
- B. Electrical Characteristics: 120 volts, single phase; horsepower as determined by the door manufacturer for proper operation.
- C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- D. Disconnect Switch: Factory mount disconnect switch in control panel.
- E. Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.
- F. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
 - 1. Entrapment Protection: Required for momentary contact, includes radio control operation.
- G. Safety Edge: UL325 compliant; at bottom of door panel, full width; electro-mechanical sensitized type, wired to stop door upon striking object; hollow neoprene covered to provide weatherstrip seal.
- H. Control Station: Standard three button (open-close-stop) continuous pressure type control for each electric operator.
 - 1. 24 volt circuit.
 - 2. Recess mounted.
 - 3. Located adjacent door, or where indicated on the Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.04 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.
- B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.05 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 43 13
ALUMINUM STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed thermally broken storefront, with vision glass.
- B. Aluminum thermally broken casement windows with vision glass in storefront framing.
- C. Aluminum doors, weatherstripping, and installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 21 00 - Foamed-in-Place Insulation: Perimeter membrane seal between glazing system and adjacent construction.
- B. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
- C. Section 07 90 05 - Joint Sealers: Perimeter sealant and back-up materials.
- D. Section 08 44 13 - Glazed Aluminum Curtain Walls.
- E. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
- F. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; 2009 (part of AAMA 501).
- C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- G. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2012.
- H. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- I. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2009.
- J. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Pre-installation Meeting: Conduct a pre-installation meeting at least two weeks before starting work of this Section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details and manufacturer's test data.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples 3 x 3 inches in size illustrating finished aluminum surface, glass, glazing materials.
- E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- G. Report of field testing for water leakage.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Maine.
- B. Manufacturer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum 15 years of documented experience.
- C. Installer's Qualifications: Company specializing in the installation and fabrication of aluminum glazing systems with a minimum of 10 years of documented experience and approved by the manufacturer.

1.07 MOCK-UPS AND SAMPLE INSTALLATIONS

- A. Sample Installation: Upon the commencement of the storefront framing installation, the first unit, complete with all perimeter flashings and sealants shall be installed at a location as directed by the Architect.
 - 1. Sample installation shall demonstrate actual wall construction, detailing and workmanship.
 - 2. No work shall progress until the Architect has reviewed the sample installation. Installation shall be revised as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all similar units.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. Provide three year manufacturer's warranty against defects in materials and workmanship for windows from date of Substantial Completion.
- C. Provide ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 STOREFRONT MANUFACTURERS

- A. Basis of Design: System 403 T Thermal Storefront by EFCO.
- B. Acceptable Manufacturers:
 - 1. C.R. Laurence Co., Inc.; U.S. Aluminum.
 - 2. Kawneer North America; Product Tribfab VersaGlaze 451 T
 - 3. YKK AP America Inc; Product YES 45 TU
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STOREFRONT

- A. Aluminum -Framed Storefront: Factory fabricated, factory finished tubular aluminum sections, thermally broken with drainage holes and internal weep drainage system and related flashings, anchorage and attachment devices. Framing members for interior applications need not be thermally broken. Structurally reinforced members of extruded aluminum with internal reinforcement of structural steel member.
 - 1. Glazing: Front-set. Dry glazed from the exterior.
 - a. Exterior: 1 inch insulating glass panels, see Section 08 80 00.
 - b. Interior: 5/8 inch laminated clear single glass, see Section 08 80 00.
 - 2. Glazing stops: Flush.
 - 3. Cross Section: 2 inches wide by 4-1/2 inches deep; nominal dimension, or as required by manufacturer for sizes shown.
 - 4. Framing members for interior applications need not be thermally broken.
 - 5. Thermal Barrier: All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. Barrier material shall be poured-in-place, two-part polyurethane.
 - 6. Finish: Class I natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 - 7. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 8. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 10. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 11. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 12. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 - 13. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
 - 14. Open back filler: Manufacturer standard to suite application. Continuous, full width of unit frame.
- B. Performance Requirements:

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Basic Wind Speed: 100 MPH, see Structural Drawings.
 - b. Wall Design Wind Pressures: +19.73 PSF / -21.37. At wall corners: +19.73 PSF / -26.31 PSF.
 - c. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Water Penetration Resistance, ASTM E331: No uncontrolled water on interior face at pressure differential of 10 psf.
3. Air Leakage, ASTM E283: Maximum of 0.06 cu ft/min/sq ft of wall area at 6.27 psf pressure differential across assembly.
4. Condensation Resistance Factor of Framing, AAMA 1503: 56, minimum.
5. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
6. Air Infiltration (Framing), ASTM E283: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at 6.24 psf differential pressure across assembly.
7. Air Infiltration (Entrance Doors), ASTM E283: Limit air infiltration through assembly to 1.0 cu ft/min/linear ft of crack length, measured at 1.56 psf differential pressure across assembly.
8. Thermal Transmittance (High-performance Entrance Doors), AAMA 1503, AAMA 507: 0.43 BTU/hr/fts²/degreeF.
9. Condensation Resistance Factor, AAMA 1503 (High-performance Entrance Doors): 57 for frame and 71 for 1 inch insulating glass installed.

2.03 WINDOWS

- A. Performance Requirements:
 1. Performance Validation: ANSI/AAMA/NWDA 101/I.S.2/NAFS performance requirements as indicated by having AAMA, WDMA, or CSA certified label.
 2. Wind Loads:
 - a. Basic Wind Speed: 100 MPH, see Structural Drawings.
 - b. Wall Design Wind Pressures: +19.73 PSF / -21.37. At wall corners: +19.73 PSF / -26.31 PSF.
 3. Air Infiltration Test, ASTM E283: 0.10 cfm/SF (.50 l/s•m²) of unit maximum with ventilators closed and locked, test at a static air pressure difference of 6.24 psf (299 Pa).
 4. Water Resistance Test, ASTM E331: No uncontrolled water leakage with ventilators closed and locked, at a static air pressure difference of 12.0 psf (575 Pa).
 5. Uniform Load Structural Test, ASTM E330: No breakage or permanent damage with ventilators closed and locked at a static air pressure difference of 90.0 psf (4309 Pa), both positive and negative.
 6. Condensation Resistance Test (CRF), AAMA 1503.1: 59 (frame).
 7. Thermal Transmittance Test (U-Factor), NFRC 100: U 0.39 BTU/hr•ft²•°F
- B. Windows:
 1. Windows: Factory fabricated, factory finished thermally broken, tubular extruded aluminum 6063-T6 frames and vent extrusions. Framing members for interior applications need not be thermally broken. Minimum 0.080" thickness.
 2. Frame Depth: 3-1/16 inch
 3. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. Barrier material shall be poured-in-place, two-part polyurethane.
 4. Fabrication: Miter cut frame components, screw spline.
 5. Ventilator: Tubular, miter cut frame and screw spline with two rows of EPDM weatherstripping in dovetail grooves.
 6. Glazing: Glazed with butyl tape, silicone cap seal, and extruded snap-in aluminum glazing bead with vinyl gasket.
 - a. Glass (Exterior): 1 inch insulating glass panels as specified in Section 08 80 00.

- b. Glass (Interior): 5/8" laminated clear single glass as specified in Section 08 80 00.
7. Screens: Manufacturer's standard extruded aluminum frames, finished to match exterior windows with aluminum screen mesh.
8. Hardware: Locking cam type handles, cam type of white bronze alloy and US 25D brushed finish. Hinges shall be 4-bar stainless steel arms.
9. Finish: Same as for storefront.
10. Basis of Design: WV410 by EFCO.
11. Acceptable Manufacturers:
 - a. Kawneer.
 - b. YKK America.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ENTRANCE DOORS

- A. Doors: High performance glazed aluminum, wide stile.
 1. Applications: Exterior doors at Main Entrance, Auditorium/Gymnasium Entrance, Gymnasium/Locker Room Entrance and Public Lobby Entrance.
 2. Thickness: 2 inches.
 3. Top Rail: 6 1/2 inches wide.
 4. Vertical Stiles: 5 inches wide.
 5. Bottom Rail: 10 inches wide.
 6. Mid-rail: 6 inches wide.
 7. Member Thickness: 0.188 inch.
 8. Glazing Stops: Square.
 9. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 10. Finish: Same as storefront.
 11. Products:
 - a. Durastile Heavy Duty by EFCO Corp
 - b. Heavy Wall Entrances by Kawneer Company, Inc.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Doors: Glazed aluminum, wide stile.
 1. Applications: All other exterior doors, except as indicated, and interior vestibule doors.
 2. Thickness: 1-3/4 inches.
 3. Top Rail: 5 inches wide.
 4. Vertical Stiles: 5 inches wide.
 5. Bottom Rail: 10 inches wide.
 6. Glazing Stops: Square.
 7. Finish: Same as storefront.
 8. Air Infiltration, ASTM E283: Limit air infiltration through assembly to 1.0 cu ft/min/linear ft of crack length, measured at 1.56 psf differential pressure across assembly.
 9. Thermal Transmittance, AAMA 1503, AAMA 507: 0.43 BTU/hr/ft²/degree F.
 10. Condensation Resistance Factor, AAMA 1503: 57 for frame and 71 for 1 inch insulating glass installed.
 11. Products:
 - a. Wide Stile Standard Door by EFCO.
 - b. Wide Stile 500 by Kawneer.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Doors: Glazed aluminum, medium stile.
 1. Applications: Greenhouse exterior doors.
 2. Thickness: 1-3/4 inches.
 3. Top Rail: 3-1/2 inches wide.
 4. Vertical Stiles: 3-1/2 inches wide.
 5. Mid-rail: 3-1/2 inches.
 6. Bottom Rail: 10 inches wide.

7. Glazing Stops: Square.
 - a. Exterior: 1" clear insulating glass, see Section 08 80 00.
 - b. Interior: 1/4" clear glass, see Section 08 80 00.
8. Finish: Class I, clear anodized, match greenhouse framing.
9. Air Infiltration, ASTM E283: Limit air infiltration through assembly to 1.0 cu ft/min/linear ft of crack length, measured at 1.56 psf differential pressure across assembly.
10. Thermal Transmittance, AAMA 1503, AAMA 507: 0.43 BTU/hr/ft²/degree F.
11. Condensation Resistance Factor, AAMA 1503: 57 for frame and 71 for 1 inch insulating glass installed.
12. Products:
 - a. Medium Stile Standard Door by EFCO.
 - b. Medium Stile 350 by Kawneer.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221.
- B. Sheet Aluminum: ASTM B209.
- C. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.
- D. Fasteners: Stainless steel.
- E. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.
- F. Concealed Flashings: Sheet aluminum, 26 gage, 0.017 inch minimum thickness.
- G. Sealant for Setting Thresholds: Non-curing butyl type.
- H. Perimeter Sealant: Type specified in Section 07 90 05.
- I. Glass: As specified in Section 08 80 00.
 1. Glass in Exterior Framing: Type IG-1, 1" thickness, unless otherwise indicated per the Drawings.
 2. Glass in Interior Framing: Type S-1, 5/8" thickness.
- J. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- K. Glazing Accessories: As specified in Section 08 80 00.

2.06 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.07 HARDWARE

- A. For each door, include weatherstripping. All other hardware shall be furnished as part of Section 08 71 00 - Finish Hardware.
- B. Other Door Hardware: As specified in Section 08 71 00.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.

- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Coordinate attachment and seal of perimeter air and vapor barrier materials. See Section 07 25 00.
- I. Install foamed-in insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- J. Set thresholds in bed of sealant and secure.
- K. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
- L. Install perimeter sealant in accordance with Section 07 90 05.
- M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.
- N. Door installer shall coordinate his work with the Work of Division 26 - Electrical, for complete concealment of internal raceways in door frames and strikes for security systems.

3.03 WINDOW INSTALLATION

- A. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.
- B. Adjust windows for proper operation after installation.
- C. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.
- D. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.
- B. Test installed windows for water penetration, in accordance with AAMA 501.2 - Hose Nozzle Water Spray Test. A 100 sq ft area of window shall be selected including edge of glass and where frame is horizontal, vertical and intersecting. Test shall be conducted prior to installation of interior finish. A constant pressure of between 30 and 35 psi shall be applied from a 3/4" diameter hose fitted with a 1/2" diameter nozzle at varying distances in accordance with the test standard. No uncontrolled leakage shall occur.
 - 1. If any window fails, test additional windows. Correct all leaking conditions. Replace windows that have failed field testing and retest until performance is satisfactory.
- C. Test installed storefront for water leakage in accordance with AAMA 501.2.

3.06 ADJUSTING

- A. Adjust operating hardware for smooth operation and to be weathertight when closed and locked. Hardware and parts shall be lubricated as necessary.

3.07 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by method acceptable to sealant manufacturer.

3.08 PROTECTION

- A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed curtain wall, with vision glazing and glass and metal infill panels.
- B. Perimeter sealant.
- C. Firestopping between curtain wall and edge of floor slab.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel: Steel attachment members.
- B. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
- C. Section 07 84 00 - Firestopping: Firestop at system junction with structure.
- D. Section 07 90 05 - Joint Sealers: Perimeter sealant and back-up materials.
- E. Section 08 43 13 - Aluminum Storefronts: Entrance framing and doors.
- F. Section 08 51 13 - Aluminum Windows: Operable sash within glazing system.
- G. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2012.
- B. AAMA 501.1 - Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure; 2005.
- C. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; 2009 (part of AAMA 501).
- D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- F. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- G. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2011.
- H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- J. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).
- K. ASTM C793 - Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants; 2005 (Reapproved 2010).
- L. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2015.
- M. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- N. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).
- O. ASTM C1135 - Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants; 2000 (Reapproved 2011).
- P. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2014.

- Q. ASTM C1249 - Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications; 2006 (Reapproved 2010)
- R. ASTM C1401 - Standard Guide for Structural Sealant Glazing; 2014.
- S. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- T. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- U. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- V. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential; 2000 (Reapproved 2009).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Pre-installation Meeting: Conduct a pre-installation meeting at least 2 weeks before starting work of this Section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Submit curtainwall system product data including materials, component dimensions, describe components within assembly, anchorage and fasteners, glazing and infill, internal drainage details .
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
 - 1. Include the design engineer's stamp or seal on each sheet of shop drawings.
- D. Shop Drawings: Provide details of proposed structural sealant glazing (SSG) and weather sealant joints indicating dimensions, materials, bite, thicknesses, profile, and support framing.
- E. Design Data: Submit framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure, sealed and signed by a qualified professional structural engineer, licensed in the State of Maine.
- F. Samples: Submit two samples 3 x 3 inches in size illustrating finished aluminum surface, glazing, infill panels, and glazing materials.
- G. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure.
- H. Structural Sealant Glazing (SSG): Submit product data and calculations showing compliance with performance requirements.
- I. Field Quality Control Submittals: Report of field testing for water leakage.
- J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State in which the Project is located.

- B. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.
- C. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum fifteen years of documented experience.
- D. Fabricator / Installer: Company specializing in the work of this Section with a minimum of ten years of documented experience and approved by the manufacturer.

1.07 MOCK-UP AND SAMPLE INSTALLATIONS

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-ups.
- B. Sample Installation: Upon the commencement of the curtain wall installation, provide a minimum 10 linear feet sample installation including all components occurring on the Project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors and perimeter sealant.
 - 1. Sample installation shall demonstrate actual wall construction, detailing and workmanship.
 - 2. No work shall progress until the Architect has reviewed the sample installation. Installation shall be revised as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all similar units.
- C. Locate where directed. Accepted sample installation may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. Provide (10) ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- C. Provide (20) twenty year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Series 5600 Outside Glazed by EFCO.
- B. Acceptable Manufacturers:
 - 1. Series 3150 by U.S. Aluminum, capable of providing SSG as indicated on the Drawings.
 - 2. YCW 700 Outside Glazed and YUW 750 XT by YKK AP America Inc. System shall be capable of providing SSG as indicated on the Drawings.
 - 3. 1600 Wall System 2 Series by Kawneer North America.

2.02 CURTAIN WALL

- A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Systems:
 - a. Outside glazed, with pressure plate and mullion cover, where indicated on drawings.
 - 1) Type 1: Manufacturer standard mullion cover.
 - 2) Type 2: EFCO 13F0 13E9 (13 inch) pin on cover.

- b. Structural sealant glazing (SSG) adhesive on two (2)-sides, with temporary glazing stops, and pressure plate and mullion cover on 2-sides, where indicated on drawings.
- c. Structural sealant glazing (SSG) adhesive on four (4)-sides, with temporary glazing stops, where indicated on drawings.
2. Vertical Mullion Face Width: 2 inches.
3. Vertical Mullion Depth From Face of Glazing to Back of Frame: 6 inches.
4. Custom Vertical Mullion: As indicated per Drawing Details. Termination post at SSG units where detailed. 6 inch x 6 inch post, reinforced as required, finished two sides for exposure. Coordinate weather barrier system flashing and extension angle attachment as indicated per Drawings.
5. Finish: Class I natural anodized.
 - a. Factory finish surfaces that will be exposed in completed assemblies.
 - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
6. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
7. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
8. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
9. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
 1. Basic Wind Speed: 100 MPH, see Structural Drawings.
 2. Wall Design Wind Pressures: +19.73 PSF / -21.37. At wall corners: +19.73 PSF / -26.31 PSF.
 3. Seismic Loads: Design and size components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
 4. Movement: Accommodate the following movement without damage to components or deterioration of seals:
 - a. Expansion and contraction caused by 180 degrees F surface temperature.
 - b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
 - c. Movement of curtain wall relative to perimeter framing.
 - d. Deflection of structural support framing, under permanent and dynamic loads.
 5. Structural Sealant Glazing (SSG) System: For individual glass lites, design framing members to not exceed a deflection normal to the wall of L/175 between supports with 3/4 inch maximum, and a deflection parallel to the wall of L/360 with 1/8 inch maximum, whichever is less.
- B. Water Penetration Resistance: No uncontrolled water on indoor face when tested as follows:
 1. Test Pressure Differential: 10 psf.
 2. Test Method: AAMA 501.1.
- C. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.
- D. Thermal Performance Requirements:
 1. Condensation Resistance Factor of Framing, AAMA 1503: 50, minimum.

2. Overall U-value Including Glazing: 0.36 Btu/(hr sq ft deg F), maximum.

2.04 COMPONENTS

- A. Aluminum-Framed Curtain Wall: High performance, improved thermal break system, factory fabricated, factory finished aluminum framing members, and related flashings, anchorage and attachment devices.
- B. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 - 1. Framing members for interior applications need not be thermally broken.
- C. Glazing: As specified in Section 08 80 00.
- D. Infill Panels: As specified in Section 08 80 00.
- E. Operable Sash: Thermally broken, aluminum project-out; minimal sitemlines; finished to match curtain wall; turn handle latch, 4-bar Anenburg hinges, opening stops and wicket screens in color matched aluminum frames with dark aluminum screening.
 - 1. Basis of Design: WV410 by EFCO.
- F. Doors: See Section 08 43 13 - Aluminum Storefronts.
- G. Subsills: Prefinished aluminum, shapes as indicated on the Drawings.
- H. Interior Snap Trim: Aluminum extrusions; finish shall match curtain wall; sizes as indicated on the Drawings.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221.
- B. Sheet Aluminum: ASTM B209.
- C. Structural Steel Sections: ASTM A36; galvanized in accordance with requirements of ASTM A123.
- D. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.
- E. Fasteners: Stainless steel. Any exposed fasteners shall match curtainwall finish.
- F. Exposed Flashings: 0.032 inch thick aluminum sheet; finish to match framing members.
- G. Firestopping: As specified in Section 07 84 00.
- H. Structural Sealant Glazing (SSG) Adhesive: Neutral curing, silicone sealant formulated for SSG applications in compliance with ASTM C1184 and structural glazing industry guidelines, ASTM C1401.
 - 1. SSG adhesive in compliance with ASTM C920; Type S - Single-component, Grade NS, Class 50, Use NT, G, and A.
 - 2. Ultimate Tensile Strength: Minimum of 50 psi as determined by test method ASTM C1135 under the following conditions.
 - a. Exposure to air temperatures of 190 degrees F and minus 20 degrees F.
 - b. Water immersion for seven (7) days, minimum.
 - c. Exposure to weathering for 5,000 hours, minimum.
 - 3. Sealant Design Tensile Strength: 20 psi, maximum.
 - 4. Hardness: 20 to 60 with Type A-2 durometer in compliance with test method ASTM C661.
 - 5. SSG sealant tested for compatibility with glazing accessories in compliance with ASTM C1087, tested for accelerated weathering in compliance with ASTM C793, and in compliance with insulating glass secondary sealant design standards of ASTM C1249.
- I. Perimeter Sealant: Silicone as specified in Section 07 90 05.
- J. Glazing Accessories: Gaskets high thermal efficiency type; and as specified in Section 08 80 00.

2.06 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other related work.
- B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
- C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

- A. Curtainwall Framing Installation:
 - 1. Install curtain wall system in accordance with manufacturer's instructions.
 - 2. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
 - 3. Provide alignment attachments and shims to permanently fasten system to building structure.
 - 4. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
 - 5. Provide thermal isolation where components penetrate or disrupt building insulation.
 - 6. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
 - 7. Coordinate attachment and seal of perimeter air and vapor barrier materials. See Section 07 25 00.
 - 8. Install firestopping at each floor slab edge.
 - 9. Install foamed-in insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
 - 10. Install operating sash.
- B. Pressure Plate Framing: Install glazing and infill panels in accordance with Section 08 80 00, using exterior dry glazing method.
- C. Structural Sealant Glazing (SSG) Adhesive: Install structural sealant glazing adhesive and weatherseal sealant in accordance with manufacturer's instructions.
- D. Install perimeter sealant in accordance with Section 07 90 05.
- E. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
- C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 FIELD QUALITY CONTROL

- A. Provide the services of the manufacturer's field representative to observe installation and make report.
- B. See Section 01 40 00 - Quality Requirements, for general requirements for testing and inspection.
- C. The manufacturer's structural engineer shall inspect the curtain wall installation, component type, size, spacing and placement for conformance with the approved curtain wall system design and check member-to member connections and connections to adjacent steel support elements, once during performance of the work and once after completion of the work.
- D. Test installed curtain wall for water leakage in accordance with AAMA 501.2.

- E. Replace curtain wall components that have failed field testing and retest until performance is satisfactory.

3.05 ADJUSTING

- A. Adjust operating sash for smooth operation.

3.06 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum windows with fixed sash, operating sash, and infill panels.
- B. Factory glazing.
- C. Operating hardware.
- D. Insect screens.
- E. Miscellaneous anchors, reinforcements, copings, adapters, mullions, sills, receptors and all other trim and hardware for window systems.
- F. Sealing of all joints around windows to adjacent building surfaces.
- G. Perimeter transition system for window wall framing tie-in to building weather barrier system.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Wood perimeter blocking and shims.
- B. Section 07 25 00 - Weather Barriers: Sealing frame to weather barrier installed on adjacent construction.
- C. Section 07 90 05 - Joint Sealers: Perimeter sealant and back-up materials.
- D. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors; 2011.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- E. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2012.
- F. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- H. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- I. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- J. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene at least 2 weeks before starting work of this Section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories,. Provide AAMA accredited laboratory test reports certifying window conformance to test criteria.
 - 1. Submit product data and installation details pertinent to job conditions for perimeter transition system.
- C. Performance Validation: Provide specified performance validation before submitting shop drawings or starting fabrication.
- D. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, method of glazing, miscellaneous trim, mullion and muntin details, hardware, and installation requirements.
- E. Samples: Submit two samples, 4x4 inch in size illustrating typical corner construction, accessories, and finishes, including a complete set of manufacturer's color chips.
- F. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
 - 1. Evidence of AAMA Certification.
 - 2. Evidence of WDMA Certification.
 - 3. Evidence of CSA Certification.
 - 4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
- G. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.
- H. Certificates: Certify that windows meet or exceed specified requirements.
- I. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture and fabrication of commercial aluminum windows of types required, with not fewer than fifteen years of experience.
- B. Installer Qualifications: Company specializing in the installation of units similar to this scope with not less than five years' experience and certified by the manufacturer.

1.07 MOCK-UPS AND SAMPLE INSTALLATIONS

- A. Sample Installation: Upon the commencement of the window installation, the first window, complete with all panning, trim, perimeter flashings shall be installed at a location as directed by the Architect.
 - 1. Sample installation shall demonstrate actual construction, detailing and workmanship.
 - 2. No work shall progress until the Architect has reviewed the sample installation. Installation shall be revised as necessary to secure the Architect's acceptance and shall then become the standard of comparison for all similar windows.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.10 WARRANTY

- A. See Section 01 78 10 - Warranties, for additional warranty requirements.
- B. Provide a written two (2) year warranty executed by the window manufacturer and installer, agreeing to replace or repair units due to failure in weathertightness of the completed installations, air and water infiltration, structural adequacy of unit frames and panning. Failures to be covered by guarantee shall include, but not necessarily be limited to:
 - 1. Structural failures including, but not limited to excessive deflection.
 - 2. Noise or vibration caused by thermal movements.
 - 3. Failure of system to meet performance requirements.
 - 4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 5. Failure of operating components to function normally.
 - 6. Water leakage.
 - 7. Excessive condensation.
 - 8. Glazing breakage.
- C. Provide ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: EFCO Series PX32 Thermal Project Out/Fixed Windows.
- B. Other Acceptable Manufacturers: (if equivalent products)
 - 1. YKK AP America Inc.
 - 2. Kawneer
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 WINDOWS

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Frame Depth: 3 1/4 inches.
 - 2. Operable Units: Double weatherstripped.
 - 3. Provide units factory glazed.
 - 4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
 - 5. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 - 6. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 - 7. System Internal Drainage: Drain to the exterior, by means of a weep drainage network, any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- B. Performance Requirements:
 - 1. Fixed, ASTM E283: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at 6.24 psf differential pressure across assembly.
 - 2. Fixed, Casement, Project-Out, Project-In, ASTM E331: None with a test pressure difference of 11 lbf/sq ft for Casement and 7.5 lbf/sq ft for other types.
 - 3. Thermal Transmittance: U not more than 0.49 BTU/hr/sf/degree F.
 - a. All operable window types: U not more than 0.62 BTU/hr/sf/degree F.
 - 1) Condensation Resistance Factor: Min 51.

- b. Fixed: U not more than 0.47 BTU/hr/sf/degree F.
 - 1) Condensation Resistance Factor: Min 56.
- 4. Uniform Load Structural Test, ASTM E330: No glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanism, nor any other damage to cause the window not to be operable, at the following static air pressure differences:
 - a. Casement, Project-Out, Project-In: 75.0 psf positive and negative pressures.
- 5. Thermal Movement: Design to accommodate thermal movement caused by 180 degrees F surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.
- C. Performance Requirements: Provide products that comply with the following:
 - 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - a. Performance Class (PC): R.
 - b. Performance Grade (PG): 15, with minimum design pressure (DP) of 15.04 psf.
 - 2. Performance Validation: Windows shall comply with AAMA/WDMA/CSA 101/I.S.2/A440 performance requirements as indicated by having AAMA, WDMA, or CSA certified label, or an independent test report for indicated products itemizing compliance and acceptable by authorities having jurisdiction.
 - 3. Design Pressure (DP): In accordance with applicable codes.
 - 4. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 12.11 psf.
 - 5. Air Leakage: Maximum of 0.1 cu ft/min sq ft per unit area of outside frame dimension, with 6.27 psf differential pressure when tested in accordance with ASTM E283.
 - 6. Condensation Resistance Factor of Frame: 50, measured in accordance with AAMA 1503.
 - 7. Design Wind Speed: See Structural Drawings.
- D. Windows shall be of the types and configurations as identified on the Window Schedule. It shall be the responsibility of the window installer/fabricator to field verify all quantities, dimensions, and conditions prior to fabrication, and to provide all windows and related components required to completely and properly fill all actual exterior window openings.
- E. Fixed, Non-Operable Type (Fix):
 - 1. Construction: Thermally broken.
 - 2. Glazing: 1" Insulated, see Section 08 80 00.
 - 3. Exterior Finish: Class I natural anodized.
 - 4. Interior Finish: Class I natural anodized.
 - 5. Frame profile and glass sight lines to match Casement. See item F below.
- F. Outswinging Casement Type:
 - 1. Construction: Thermally broken.
 - 2. Provide screens.
 - 3. Glazing: Double; 1" Insulated glass, clear; low-e. See Section 08 80 00 - Glazing.
 - 4. Exterior Finish: Class I natural anodized.
 - 5. Interior Finish: Class I natural anodized.

2.03 COMPONENTS

- A. Frames and Sash:
 - 1. Project-Out/Project-In Frames: 3 1/4 inch deep profile, of 0.90 inch thick section; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.
 - 2. Glazing: As specified in Section 08 80 00.
- B. Mullions: Sizes and profiles as indicated on the Drawings; extruded aluminum with integral reinforcement of shaped steel structural section. Provide concealed mechanical joint fasteners. Finish shall match window units.

- C. Sills: Shall be extruded aluminum; sloped for positive wash; fit under sash leg to 1/2 inch beyond wall face; one piece full width of opening jamb angles to terminate sill end.
- D. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
 - 1. Hardware: Spring loaded steel pins; four per screen unit.
 - 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
 - 3. Frame Finish: Same as frame and sash.
- E. Subframes: 0.062 inch thick, extruded aluminum, of profiles and size as indicated on the Drawings. Miter or cope corners, weld and dress smooth with concealed mechanical joint fasteners. Finish shall match window units.
- F. Interior Trim: 0.062 inch thick, extruded aluminum shapes, attached with snap-clips at a maximum of 18" apart, profiles as detailed on the Drawings, or as necessary to conceal interior wall construction from window frame to wall finish. Finish shall match windows.
- G. Insect Screen Frame: All operating vent windows shall be provided with screens. Rolled aluminum frame of rectangular sections; integral screen track; nominal size similar to operable glazed unit. Frames shall be sufficiently rigid and cross-braced as required to lie flat against window and prevent excess bow and sag in screen cloth. Finish shall match window frames.
- H. Operable Sash Weatherstripping: Jacketed foam type or pile type; permanently resilient, profiled to achieve effective weather seal. Jacketed foam weatherstripping, where used, shall conform to AAMA 701.2.
- I. Fasteners: Stainless steel.
- J. Glass and Glazing Materials: Type IG-1, 1" inch thickness. See Section 08 80 00.
- K. Sealant and Backing Materials: As specified in Section 07 90 05.
- L. Perimeter Transition System: Flexible system to transition between exterior aluminum curtainwall framing members and wall weather barrier system to maintain air, water and vapor seal. System includes dense translucent silicone transition panels, molded corners, extruded aluminum adaptors and silicone sealant for connection to aluminum framing, if required.
 - 1. Product: Tremco Proglaze ETA - System 3 typical or as details require.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221, 6063 alloy, T5 temper.
- B. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A 123/A 123M.

2.05 HARDWARE

- A. Sash Locks:
 - 1. SHR Locks: Cam lock at meeting rail, built-in or surface applied. One sash per unit operating, others are fixed.
- B. Limit Stops: Resilient rubber.

2.06 FABRICATION

- A. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly that will enable window installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices.
- D. Arrange fasteners and attachments to ensure concealment from view.
- E. Prepare components with internal reinforcement for operating hardware.
- F. Provide steel internal reinforcement in mullions as required to meet loading requirements.
- G. Provide internal drainage of glazing spaces to exterior through weep holes.

- H. Factory glaze window units.
- I. Double weatherstrip operable units.
- J. Assemble insect screen frames with mitered and reinforced corners. Secure wire mesh tautly in frame.

2.07 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- B. Apply 1 coat of bituminous coating to concealed aluminum and steel surfaces in contact with dissimilar materials.
- C. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

- A. Perimeter Transition System: Install the system in accordance with manufacturer's recommended practices. Note, a 3-D installation guide is available from the manufacturer.
 - 1. Install system aluminum extrusions to curtainwall framing if system does not engage into curtainwall framing glazing pocket.
 - 2. Install perimeter transition system panels and pre-fabricated corners into extrusions or glazing pockets, as applicable, and seal continuously with silicone sealant.
 - 3. Following installation of curtainwall framing, tie-in the transition system to the weather barrier on the perimeter blocking of openings per transition system manufacturer's recommendations in a full bead of silicone. Cut back panel widths as required to fit to adjacent blocking surfaces.
- B. Install windows in accordance with manufacturer's instructions.
- C. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- D. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- E. Install sill and sill end angles.
- F. Provide thermal isolation where components penetrate or disrupt building insulation. Install foamed-in insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- G. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials. See Section 07 25 00.
- H. Provide separation of aluminum components to all preservative treated (PT) lumber.
- I. Install operating hardware not pre-installed by manufacturer.
- J. Install glass and infill panels in accordance with requirements specified in Section 08 80 00.
- K. Install perimeter sealant in accordance with requirements specified in Section 07 90 05.

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

- A. Test installed windows for water leakage in accordance with AAMA 501.2.

3.05 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.
- C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08 53 13
VINYL WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vinyl-framed, factory-glazed windows.
- B. Operating hardware.
- C. Insect screens.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Blocking for window installations.
- B. Section 09 21 16 - Gypsum Board Assemblies: Framing to receive windows.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; American Architectural Manufacturers Association/Window & Door Manufacturers Association/Canadian Standards Association; 2011.
- B. AAMA 701/702 - Voluntary Specification for Pile Weather-stripping and Replaceable Fenestration Weatherseals; American Architectural Manufacturers Association; 2011.
- C. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2002 (Reapproved 2010).

1.04 PERFORMANCE REQUIREMENTS

- A. Provide window units independently tested and found to be in compliance with ANSI/AAMA/NWDA 101/I.S.2-97.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product descriptions, component dimensions, anchorage and fasteners, glass, installation guides.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, glazing type, window type, head, jamb and sill details, and installation requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Jig, brace, and box the window frame assemblies for transport to minimize flexing of members or joints.
- B. Store products in manufacturer's unopened packaging, out of direct sunlight or high temperature locations, until ready for installation.

1.08 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Vinyl Windows:
 - 1. Pella Corporation; Encompass by Pella.
 - 2. Silver Line by Andersen.

3. Builders Vinyl (V-2500 Series) by JeldWen Windows & Doors.
4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DESCRIPTION

- A. Vinyl Windows: Factory fabricated frame and sash members of extruded, hollow, ultra-violet-resistant, polyvinyl chloride (PVC) with integral color; with factory-installed glazing, hardware, related flashings, anchorage and attachment devices.
 1. Configuration: As indicated on drawings.
 2. Color: White.
 3. Size to fit openings with minimum clearance around perimeter of assembly providing necessary space for perimeter seals.
 4. Operable Units: Double weatherstripped.
 5. Framing Members: Fusion welded corners and joints, with internal reinforcement where required for structural rigidity; concealed fasteners.
 6. Glazing Stops, Trim, Flashings, and Accessory Pieces: Formed of rigid PVC, fitting tightly into frame assembly.
 7. Mounting Type: Replacement type windows, fastened at jambs and head allowing easy replacement of window units without requiring disassembly or damage to surrounding wall system assemblies.
 8. Insect Screens: Tight fitting for operating sash location.
 9. Note: Vinyl windows specified in this Section are a portion of an interior constructed training program feature of the building. Though the specified unit is intended for an interior application this specification requires that all window units meet the specified performance requirements as required in order to mimic typical exterior window applications elsewhere.
- B. Performance Requirements: Provide products that comply with the following:
 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - a. Performance Class (PC): R.
 2. Performance Validation: Windows shall comply with AAMA/WDMA/CSA 101/I.S.2/A440 performance requirements as indicated by having AAMA, WDMA, or CSA certified label, or an independent test report for indicated products itemizing compliance and acceptable by authorities having jurisdiction.
 3. Design Pressure: In accordance with applicable codes.
 - a. In general, comply with applicable code requirement standards pertaining to a hypothetical two story residential home located within Sanford, Maine.

2.03 COMPONENTS

- A. Glazing: Insulated double pane, annealed glass, clear, low-E coated, argon filled, with glass thicknesses as recommended by manufacturer for specified wind conditions.
- B. Windows: Extruded, hollow, tubular, ultra-violet resistant polyvinyl chloride (PVC) with integral color; factory fabricated; with vision glass, related flashings, anchorage and attachment devices.
 1. Configuration Performance Requirements: AAMA/WDMA/CSA 101/I.S.2/A440.
 - a. Double hung: H-R40 at 60.0 psf positive and negative per ASTM E330.
 2. Air Infiltration: ASTM E 283.
 - a. Double hung: Max. 0.14 cfm/sq ft at 1.57 psf (25 mph)
 3. Water Resistance: ASTM E 547.
 - a. Double hung: No leakage at 6.0 psf.
 4. Thermal Transmittance per NRFC 100: U 0.32 / R 3.13.
 5. Color: White.
- C. Jamb extensions: Pre-primed pine, depth as required for wall construction.
- D. Insect Screens: Aluminum, extruded or roll-formed frame with mitered and reinforced corners; apply screen mesh taut to frame; secure to window with hardware to allow easy removal.

1. Hardware: Manufacturer's standard; quantity as required per screen.
 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's 18 x 16 mesh.
 3. Frame Finish: Manufacturer's standard, color to match window frame and sash color.
- E. Operable Sash Weather-stripping: Wool pile; permanently resilient, profiled to maintain weather seal in accordance with AAMA 701/702.
- F. Fasteners: Stainless steel.
- G. Accessories: Provide related anchorage and attachment devices as necessary for full assembly.
- H. Glass Materials: Factory installed, 7/8" thickness insulating glass with warm edge technology, Low E/Argon, EnergyStar rated. Provide tempered glass units at all windows.

2.04 HARDWARE

- A. Double Hung Sash: Each sash, each jamb, factory calibrated block and tackle, complying with AAMA-902.
- B. Double Hung Sash lock: Lever handle with cam lock.
- C. Finish For Exposed Hardware: Matching baked enamel.

2.05 FABRICATION

- A. Fabricate framing, mullions and sash members with fusion welded corners and joints, in a rigid jig. Supplement frame sections with internal reinforcement where required for structural rigidity.
- B. Form sills in one piece. Slope sills for wash.
- C. Form snap-in glass stops, closure molds, weather stops, and flashings of extruded PVC for tight fit into window frame section.
- D. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- E. Arrange fasteners to be concealed from view.
- F. Assemble insect screen frame, miter and reinforced frame corners. Fit mesh taut into frame and secure. Fit frame with four spring loaded steel pin retainers.
- G. Double weatherstrip operable units.
- H. Factory glaze window units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify wall openings are ready to receive this work.

3.02 INSTALLATION

- A. Install window units in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities as necessary.
- C. Align window plumb and level, free of warp or twist, and maintain dimensional tolerances and alignment with adjacent work.
- D. Install operating hardware.

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.

3.04 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.05 CLEANING

- A. Remove protective material from pre-finished surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

END OF SECTION

SECTION 08 62 23
TUBULAR SKYLIGHTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tubular skylights, consisting of skylight dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 53 00 - Elastomeric Membrane Roofing: Flashing-in of skylight base.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- C. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.
- D. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2013a.
- E. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics; 2010.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2011.
- H. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- K. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Submit shop drawings for each type of unit indicating materials, components, installation and adjacent construction.
- D. Test Reports: Independent testing agency reports verifying compliance with specified performance requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engaged in manufacture of tubular skylights for minimum of 10 years.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. Skylights: Manufacturer's standard warranty for 10 years.

PART 2 PRODUCTS

2.01 TUBULAR SKYLIGHTS

- A. Tubular Skylights: Transparent roof-mounted skylight dome and curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces.
 - 1. Components shall be made and assembled by one manufacturer.
 - 2. Size: 21 inches; 29 inches for Solatube.
 - 3. Curb: Minimum 10" high insulated seamless aluminum.
 - 4. Glazing: Impact modified acrylic dome with scatter disk and dust seal.
 - 5. Frame with rolled lock aluminum retainer ring; seamless 0.080 gage aluminum flashing.
 - 6. Diffuser: 2'x2' round to square transition sleeve with max glow diffuser, dual glazed.
 - 7. Light Tube: ASTM B209 aluminum, extension and elbows as required for each installation.
 - 8. No dimmer required.
 - 9. Accessories: Flashing sleeve, light tube elbows, housing, flashings, as required
 - 10. Warranty: Part of Total System Roofing Warranty for Carlisle. Manufacturer's standard for Solatube and Drylight.
 - 11. Products:
 - a. (Basis of Design) Sunpath Tubular Skylight by Carlisle.
 - 12. Alternate Manufacturers:
 - a. Solatube
 - b. Drylight
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Performance Requirements: Provide products that comply with the following:
 - 1. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of tubular skylight without breakage or permanent damage to any parts, when tested in accordance with ASTM E330/E330M:
 - a. Design Pressure (DP): In accordance with applicable codes.
 - b. No permanent deflection in excess of 0.2 percent of span.
 - 2. Skylights: OSHA Fall Protection Standard 1910.23 and International Building Code roof live load for roof surfaces subject to maintenance workers (1607.1) compliant.
 - 3. Air Infiltration: Maximum 0.10 cu ft/min sq ft per unit area of outside frame dimension at 6.27 psf pressure differential when tested in accordance with ASTM E283.
 - 4. Water Resistance: No uncontrolled water leakage at 6.27 psf pressure differential with water rate of 5 gallons/h/sf, when tested in accordance with ASTM E331; design to ensure that water will not accumulate inside assembly.
 - 5. Thermal Movement: Fabricate to allow for thermal movement resulting from temperature differential from minus 30 to 180 degrees F.
 - 6. Flammability: Non-metal parts complying with the following:

- a. Roof-Top Components: Class B when tested in accordance with ASTM E108 or UL 790.
 - b. Self-Ignition Temperature: Greater than 650 degrees F, when tested in accordance with ASTM D1929.
 - c. Smoke Developed Index: Maximum of 450, when tested in accordance with ASTM E84; or maximum rating of 75, when tested in accordance with ASTM D2843.
 - d. Combustibility - Light Transmitting Parts: Burning extent of 1 inch or less (ICC Class CC-1), when tested in accordance with ASTM D635 in the thickness intended for use.
 - e. Combustibility - Non-Light Transmitting Parts: Minimum 2.5 inches/min (ICC Class CC-2), when tested in accordance with ASTM D635.
- C. Reflective Tube: ASTM B209 (ASTM B209M) aluminum sheet, thickness between 0.015 inch and 0.020 inch.
- D. Diffuser Assemblies: Supporting light transmitting surface at bottom termination of tube, with compression seal to minimize condensation and bug or dirt infiltration.
1. Ceiling Ring: Edge trim for ceiling opening; injection molded high impact ABS.
 2. Diffuser Trim: Edge and attachment trim for diffuser lens; injection molded high impact ABS.
 3. Diffuser Shape in Lay-In Ceiling Grid: Square, 24 by 24 inches, to fit grid; metal transition box.
 4. Lens: Flush frosted lens.
 5. Lens Material: Polycarbonate plastic
 6. Visible Light Transmission: 90 percent, minimum.
 7. Seal: Closed cell EPDM foam rubber

2.02 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Sealant: Elastomeric, silicone or polyurethane; compatible with materials being sealed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Set roof assembly flashing in continuous bead of sealant.
- C. Seal joints exposed to weather in accordance with sealant manufacturer's written instructions.
- D. Conduct field test for water tightness; conduct water test in presence of Architect. Correct defective work and re-test until satisfactory.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 08 63 00
METAL-FRAMED SKYLIGHTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum skylight framing system.
- B. Skylight glazing.
- C. Fasteners, anchors, reinforcement, and flashings.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel: Structural support framing for system.
- B. Section 06 10 54 - Wood Blocking and Curbing: Wood support curbs.
- C. Section 07 53 00 - Elastomeric Membrane Roofing: Flashing-in of skylight base.
- D. Section 07 62 00 - Sheet Metal Flashing and Trim: Skylight counterflashing.
- E. Section 07 90 05 - Joint Sealers.

1.03 REFERENCE STANDARDS

- A. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 2012.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- I. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).
- J. ASTM C793 - Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants; 2005 (Reapproved 2010).
- K. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2015.
- L. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- M. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).
- N. ASTM C1135 - Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants; 2000 (Reapproved 2011).
- O. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2014.
- P. ASTM C1249 - Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications; 2006 (Reapproved 2010)
- Q. ASTM C1401 - Standard Guide for Structural Sealant Glazing; 2014.

- R. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2012)e1.
- S. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- T. Skylights: OSHA Fall Protection Standard 1910.23 and International Building Code roof live load for roof surfaces subject to maintenance workers (1607.1) compliant.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's specifications, standard details, and installation requirements.
- C. Shop Drawings: Indicate framed opening requirements and tolerances, spacing of all members, anticipated deflection under load, affected related work, expansion and contraction joint locations and details, and sizes and locations for field welding.
 - 1. Show field measurements on shop drawings.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.
- D. Shop Drawings: Provide details of proposed structural sealant glazing (SSG) and weather sealant joints indicating dimensions, materials, bite, thicknesses, profile, and support framing.
- E. Design Data: Submit framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations, sealed and signed by a qualified professional structural engineer, licensed in the State in which the Project is being built.
- F. Samples: Submit two samples, not less than 12 by 12 inch in size illustrating appearance of prefinished aluminum and specified glazing system, including glazed edge and corner.
- G. Structural Glazing Adhesive: Submit product data and calculations showing compliance with performance requirements.
- H. Manufacturer's Installation Instructions: Indicate special procedures, safety precautions, and perimeter conditions requiring special attention.
- I. Field Quality Control Submittals: Report of field testing for water leakage.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design skylight system under direct supervision of a professional structural engineer experienced in design of work of the type specified in this Section and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not fewer than (10) ten years of documented experience.
- C. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.
- D. Installer Qualifications: Company specializing in performing the type of work specified in this section.
 - 1. Minimum 5 years of documented experience.
 - 2. Approved by skylight manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide wrapping to protect prefinished aluminum surfaces. Do not use adhesive papers or spray coatings that bond when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.08 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. Correct defective work, including leaks, discoloration, failure of seal at insulated glazing units, and excessive thermal or structural movement, within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal-Framed Skylights - Single sloped:
 - 1. (Basis of Design) Wasco Pinnacle Series 600.
 - 2. Kawneer 2000 Skylight.
 - 3. Oldcastle Building Envelope: BMS-3000.
 - 4. Super Sky Products Enterprises, LLC: Basic Glass Skylight / EPDM.
- B. Metal-Framed Skylights - Pyramidal:
 - 1. (Basis of Design) Wasco Pinnacle Series 300.
 - 2. Kawneer 2000 Skylight.
 - 3. Oldcastle Building Envelope: BMS-3000.
 - 4. Super Sky Products Enterprises, LLC: Basic Glass Skylight / EPDM.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 METAL-FRAMED SKYLIGHTS

- A. Metal Framed Skylights: Factory-fabricated, glazed.
 - 1. Frame: Extruded aluminum structural members with integral condensation collection and guttering system thermally separated from exterior pressure bar.
 - 2. Glazing System: Pressure glazing bar system for sloped joints and two (2)-sided structural sealant glazing (SSG) for horizontal joints.
 - 3. Glazing: Insulating glass, laminated glass on interior face.
 - 4. Aluminum Finish: Class I natural anodized.
 - 5. Fabricate to prevent harmonic vibration, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.
 - 6. Field built curb height shall be 12" minimum above roof surface.
- B. Performance Requirements: Provide products that comply with the following:
 - 1. Structural Design: Design and size components to withstand dead loads and specified live loads without damage or permanent set.
 - 2. Design Pressure (DP): See Structural Drawings.
 - 3. Snow Load: See Structural Drawings.
 - 4. Concentrated Load: Design to withstand 250 lb concentrated load at any location on framing members without permanent set.
 - 5. Glazing Support Member Deflection Under Wind Load: 1/180 of span, maximum.
 - 6. Thermal Movement: Design system to accommodate thermal expansion and contraction over ambient temperature range of 100 degrees F, dynamic loading and release of loads, creep of concrete structural members, and deflection of structural support framing without damage to skylight system components or loss of weathertightness.
 - 7. Thermal Resistance of Skylight Framing System: U-value of 0.60, maximum.
 - 8. Air Leakage: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft for glazed area, measured at a reference differential pressure across assembly of 1.57 psf in accordance with ASTM E283.
 - 9. Structural Sealant Glazing (SSG) System: For individual glass lites, design framing members to not exceed a deflection normal to the wall of L/175 between supports with 3/4

inch maximum, and a deflection parallel to the wall of L/360 with 1/8 inch maximum, whichever is less.

10. Water Leakage: AAMA 501.2 - Passes.
11. Comply with OSHA Fall Protection Standard 1910.23 and International Building Code roof live load for roof surfaces subject to maintenance workers (1607.1).

2.03 MATERIALS

- A. Aluminum Extrusions: Alloy 6063-T5, 6063-T6, or 6061-T6 members complying with ASTM B221 (ASTM B221M), with minimum thickness 1/8 inch for structural members and 1/16 inch for non-structural members.
- B. Formed Aluminum: Sheet material of alloy 5052, 5005, or 6061-T651 members complying with ASTM B209 (ASTM B209M), with minimum thickness 1/8 inch for structural members and 1/16 inch for non-structural members.
- C. Internal Reinforcement: ASTM A36/A36M; steel shapes as required for strength and mullion size limitations, hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
- D. Insulating Glass: Sealed insulated units, outer pane of tinted transparent, laminated glass; inner pane of tinted transparent, laminated glass; space of sealed air, metal edge frame.
- E. Glazing Accessories: As recommended by manufacturer of skylight system.
- F. Structural Sealant Glazing (SSG) Adhesive: Neutral curing, silicone sealant formulated for SSG applications in compliance with ASTM C1184 and structural glazing industry guidelines, ASTM C1401.
 1. SSG adhesive in compliance with ASTM C920; Type M - Multicomponent, Grade NS, Class 50, Use NT, G, and A.
 2. Ultimate Tensile Strength: Minimum of 50 psi as determined by test method ASTM C1135 under the following conditions.
 - a. Exposure to air temperatures of 190 degrees F and minus 20 degrees F.
 - b. Water Immersion for seven (7) days, minimum.
 - c. Exposure to weathering for 5,000 hours, minimum.
 3. Sealant Design Tensile Strength: 20 psi, maximum.
 4. Hardness: 20 to 60 with Type A-2 durometer in compliance with test method ASTM C661.
 5. SSG sealant tested for compatibility with glazing accessories in compliance with ASTM C1087, tested for accelerated weathering in compliance with ASTM C793, and in compliance with insulating glass secondary sealant design standards of ASTM C1249.
- G. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.
- H. Touch-Up Primer for Galvanized Steel Surfaces: Zinc rich type.
- I. Protective Back Coating: Asphaltic mastic, ASTM D4479/D4479M Type I.
- J. Fasteners: Stainless steel.
- K. Anchorage Devices: Type recommended by manufacturer, concealed.

2.04 FABRICATION

- A. Rigidly fit and secure joints and corners with screw and spline. Make joints rigid, with connections that are flush, hairline, and weatherproof.
- B. Fabricate components to allow for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly.
- C. Maintain continuous air and vapor barrier throughout assembly, with the barrier plane aligned with inside pane of glazing continuing to a heel bead of glazing sealant.
- D. Drain to exterior any water entering exterior joints, condensation occurring in glazing channels, or migrating moisture occurring within system.

- E. Prepare components to receive concealed anchorage devices. Ensure that fasteners and anchorage devices will be concealed upon completion of installation.

2.05 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick; exterior surfaces only.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that structural curb is ready to receive skylight system. Coordinate installation of roofing and other adjacent work to ensure weathertight construction.

3.02 PREPARATION

- A. Apply 1 coat of protective coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

3.03 INSTALLATION

- A. Install metal-framed skylights in accordance with manufacturer's instructions.
- B. Set skylight structure plumb, level, and true to line, without warp or rack of frames or glazing panels. Anchor securely in place in accordance with approved shop drawings.
- C. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Install base flashings in accordance with Section 07 62 00.
- E. Pack fibrous insulation in shim spaces at perimeter of assembly to ensure continuity of thermal barrier.
- F. Install glazing in accordance with Section 08 80 00.
- G. Structural Sealant Glazing (SSG) Adhesive: Install structural sealant glazing adhesive and weatherseal sealant in accordance with manufacturer's instructions.
- H. Touch up damaged finishes so repair is imperceptible from 6 feet. Remove and replace components that cannot be satisfactorily touched up.

3.04 TOLERANCES

- A. Maximum Variation from Plumb, Level, or Line: 1/8 inch per 10 feet, or 3/8 inch total in overall dimension.
- B. Alignment of Two Adjoining Members Abutting in Plane: Within 1/16 inches.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and inspection.
- B. General: Skylight materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified testing agency. Such inspections and tests shall not relieve the Contractor of responsibility for providing his own inspections, quality control and materials and fabrication procedures in compliance with specified requirements. Any non-compliant materials or fabricated components shall be removed and replaced.
- C. The fabricator's structural engineer shall inspect the skylight installation, component type, size, spacing and placement for conformance with the approved skylight system design and check member-to member connections and connections to adjacent steel support elements, once during performance of the work and once after completion of the work.
- D. Testing and inspection shall be performed by the Owner's testing agency as identified in the Statement of Special Inspections.
- E. If Work is found not to conform to the Contract Documents, the Contractor shall be responsible for the cost of all further testing.

F. Test installed skylight for water leakage in accordance with AAMA 501.2.

3.06 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down exposed surfaces; wipe surfaces clean.
- C. Remove excess sealant by methods recommended by skylight manufacturer.

END OF SECTION

SECTION 08 71 00
FINISH HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood, hollow steel, and aluminum doors.
- B. Electro-mechanically operated and controlled hardware, power supplies, back-ups and surge protection.
- C. Automatic door operators.
- D. Lock cylinders for doors for which hardware is specified in other Sections.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 14 16 - Flush Wood Doors.
- C. Section 08 33 13 – Coiling Counter Doors: Lockable coiling counter doors.
- D. Section 08 33 23 - Overhead Coiling Grilles: Lockable coiling grilles.
- E. Section 08 34 73 – Sound Control Wood Door Assemblies.
- F. Section 08 35 13.23 – Folding Fire Doors.
- G. Section 08 36 13 - Overhead Sectional Doors: Lockable sectional doors.
- H. Section 08 43 13 - Aluminum-Framed Storefronts: Hardware for same except cylinders; installation of cylinders.
- I. Section 08 44 13 - Glazed Aluminum Curtain Walls: Hardware for integral doors and frames except lock cylinders; installation of cylinders.

1.03 REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- B. ANSI/BHMA A156 Series - Certified Product Standards, most current edition.
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, 2011; current edition
- D. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; Door and Hardware Institute; 1993; also in WDHS-1/WDHS-5 Series, 1996.
- E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2010.
- F. NFPA 101 - Life Safety Code, 2009.
- G. NFPA 105 - Smoke and Draft Control Door Assemblies, latest edition.
- H. UL 10B - Fire Tests of Door Assemblies.
- I. UL 305 - Panic Hardware.
- J. UL - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.
 - 1. Name and manufacturer of each item, type, style, function, size and finish for each item.
 - 2. Door and frame sizes, thicknesses, materials, hand, degrees of opening for doors, with closers and/or overhead holders, and labeling.
 - 3. Explanation of all abbreviations, symbols, and codes used on schedules, and any other relevant information.
 - 4. The schedule shall be reviewed prior to submission by a certified Architectural Hardware Consultant (AHC).
- C. Samples:
 - 1. Upon request, submit 1 sample of hinge, latchset, lockset, and closer illustrating style, color, and finish.
 - 2. Approved samples will be incorporated into the Work. Rejected samples will be returned to the contractor and shall be re-submitted.
- D. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.
- E. Keying Schedule: It shall be the responsibility of the hardware supplier to meet with the Owner to determine and coordinate keying with door hardware for the Project. Submit separate detailed schedule, indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
 - 1. Function of door, flow of traffic, degree of security required, lockset function and future expansion plans.
 - 2. Preliminary key system schematic diagram.
 - 3. Requirements for key control system.
 - 4. Address for delivery of keys.
- F. Wiring Diagrams: Submit complete and detailed system operation and electrical diagrams specially developed for each opening with electrified hardware, except openings where only magnetic hold-opens or door position switches are specified.
- G. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- H. Close-out Documents:
 - 1. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
 - 2. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
 - 3. Catalog pages for each product, contact information for local representative for each manufacturer.
 - 4. As-installed hardware schedule, as-installed wiring diagrams and final keying schedule.
 - 5. All warranties and certification that electronic security hardware has been inspected and proper operation has been verified.

- I. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.
- J. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- K. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Products, for additional provisions.
 - 2. Tools: One set of all special wrenches or tools applicable to each different or special hardware component, whether supplied by the hardware component manufacturer or not.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum twenty years of documented experience.
- B. Hardware Supplier/Installer Qualifications: Company specializing in supplying commercial door hardware with at least five years of experience.
 - 1. Installers shall be trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
 - 2. Employ an Architectural Hardware Consultant (AHC) to assist in the work of this Section.
- C. Electronic Security Hardware: The hardware supplier shall employ an individual knowledgeable in electrified components and systems who shall:
 - 1. Produce wiring diagrams and consulting as needed,
 - 2. Coordinate installation of the electronic security hardware with related sub-contractors,
 - 3. Verify that all components are working properly upon completion of the electronic security hardware installation.
- D. Quantities: Furnish appropriate hardware for all doors in the Project. Approval of incomplete hardware schedule or acceptance of incorrect quantities at the job site will not alter this requirement. It is the intent of the hardware sets, indicated on the Drawings, to accurately list the hardware required for each door on this Project. However, should any doors have been inadvertently omitted from the sets it will be the hardware supplier's responsibility to furnish hardware for these doors that is of the same quality, type, size, function, and finish as that specified for similar doors on the Project.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. All hardware shall be brought to the job site in the manufacturer's original packaging, with each hardware item individually labeled and identified with door opening code to match hardware schedule.

1.08 WARRANTY

- A. See Section 01 78 10 - Warranties, for additional warranty requirements.
- B. All finish hardware shall be warranted against manufacturing defects and faulty workmanship for a period of two years from the date of Substantial Completion, except for the following:
 - 1. Non-electronic door closers shall be warranted for twenty-five years.
 - 2. Non-electrified exit devices shall be warranted for five years.
 - 3. Hinges shall be warranted for the life of the building.
 - 4. Continuous hinges shall be warranted for ten years.
 - 5. Mortised locks and latches shall be warranted for ten years.
 - 6. Overhead concealed closers shall be warranted for two years.
 - 7. Electromechanical door hardware shall be warranted for two years.

- C. The hardware supplier, at his expense, shall adjust, repair, or replace, including labor for installation, any finish hardware supplied under this Section, which is found to be malfunctioning or defective during the above warrantee periods, except due to abuse.

PART 2 PRODUCTS

2.01 DOOR HARDWARE - GENERAL

- A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide all items of a single type of the same model by the same manufacturer.
- C. Provide products that comply with the following:
1. Applicable provisions of federal, state, and local codes.
 2. ADA Standards for Accessible Design.
 3. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
 4. NFPA 101, Life Safety Code.
 5. Fire-Rated Doors: NFPA 80.
 6. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
 7. Hardware for Smoke and Draft Control Doors: Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.
 8. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- D. Electrically Operated and/or Controlled Hardware: Provide all power supplies, power transfer hinges, relays, and interfaces required for proper operation; provide wiring between hardware and control components and to building power connection.
- E. Finishes: All door hardware the same finish unless otherwise indicated.
1. In general, all hardware shall be US26D (satin chromium), unless noted otherwise.
 2. Exit devices, pulls, push plates, and kick plates shall be US32D (satin stainless steel).
 3. Closers shall be sprayed enamel or baked epoxy powder to match.
- F. Fasteners:
1. All hardware shall be installed with fasteners provided by the hardware manufacturer. Exposed fasteners shall be finished to match the hardware finish. Generally, fasteners for hardware shall be concealed when the door is closed.
 2. Closers shall not be thru-bolted except at high use/abuse locations as determined by the Architect.
 3. Mineral Core Wood Doors: Sex bolts.
 4. Concrete and Masonry Substrates: Stainless steel machine screws and lead expansion shields.
- G. Acceptable Manufacturers: Only hardware manufactured by one of the companies indicated below shall be accepted for use in the Project, and acceptance is limited only to the category of hardware for which the manufacturer is specified or listed as an acceptable equal.

Item	Scheduled Manufacturer	Acceptable Alternate Manufacturer
Hinges	IVES (IVE)	McKinney, Hager, Stanley
Continuous Hinges	Ives (IVE)	Stanley, Markar, McKinney
Locksets & Deadlocks	Schlage (SCH)	Best, Sargent
Cylinders & Keying	Schlage (SCH)	Best, Sargent, Medeco
Push & Pull Plates & Bars	Ives (IVE)/Rockwood (ROC)	Hager, Burns

Flush Bolts & Coordinators	Ives (IVE)	Hager, Rockwood
Protection Plates	Ives (IVE)	Hager, Rockwood
Exit Devices	Von Duprin (VON)	Sargent, Precision
Closers	LCN (LCN)	Sargent, Norton, Yale
Electro-Hydraulic Automatic Operators	LCN (LCN)	Norton, Besam, Stanley, Precision
Pneumatic Automatic Operators –Smoke Blow-open	LCN (LCN)	As Pre-Approved by Architect
Electric Strikes	Von Duprin (VON)	HES
Power Supplies	Von Duprin (VON)	Schlage (SCH), Precision
Stops & Holders	Ives (IVE)	Hager, Rockwood
Overhead Stops	Glynn-Johnson (GLY)	Sargent, Rixson
Silencers	Ives (IVE)	Hager, Rockwood
Thresholds	National Guard (NGP)	Zero, Pemko, Reese
Weatherstrip	Zero	NGP, Pemko, Reese
Electric Strikes	Schlage Electronics (SCE)	Folger Adams, HES
Key Cabinets	Telkee (TEL)	Lund, HPC
Magnetic Holders	LCN (LCN)	Rixson, ABH

- H. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
- I. Where the hardware specified is not adaptable to the finished shape or size of the members requiring hardware, furnish suitable types having the same operation and quality as the type specified, subject to the Owner's approval.

2.03 MATERIALS

- A. Hinges:
 - 1. Provide ball bearing hinges on every swinging door.
 - a. 1 3/4" thick doors up to and including 3'-0" wide:
Exterior: Standard weight, ball bearing, bronze/stainless steel, 4 1/2" high.
Interior: Standard weight, ball bearing, steel, 4 1/2" high.
 - b. 1 3/4" thick doors over 3'-0" wide:
Exterior: Heavy weight, ball bearing, bronze/stainless steel, 5" high.
Interior: Heavy weight, ball bearing, steel, 5" high.
 - 2. Provide 3 hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.
 - 3. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Interior Doors: Non-rising pins
 - 4. The width of hinges shall be 4 1/2" or as required for clearance.
 - 5. Basis of Design: Ives 5BB Series
 - 6. Acceptable Products: Hager BB Series, McKinney TA/T4A Series, Stanley FBB Series.
- B. Continuous Hinges: ANSI/BHMA A156.26, heavy duty.
 - 1. At Aluminum Doors: Extruded aluminum 6063-T6 alloy with .25" diameter stainless steel hinge pin.
 - 2. At Wood and Hollow Metal Doors: 14 gauge, 304 stainless steel, with .25" diameter stainless steel hinge.
 - 3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.

4. Hinges shall be capable of supporting door weights up to 600 pounds, and shall be successfully tested for 1,500,000 cycles.
 5. On fire-rated doors, provide continuous hinges that are classified for use on rated doors by a testing agency acceptable to the AHJ.
 6. Install hinges with fasteners supplied by manufacturer with a symmetrical hole pattern.
 7. Basis of Design: Ives.
 8. Acceptable Manufacturers: Hager-Roton, Mckinney, Stanley.
- C. Flush Bolts:
1. Automatic and manual flush bolts shall have forged bronze face plates with extruded brass levers and with wrought brass guides and strikes. Flush bolts for hollow metal doors shall be extension rod type, and wood doors shall have corner-wrap type. Hollow metal doors up to 7'-6" in height shall have 12" steel or brass rods. Manual flush bolts for doors over 7'-6" in height shall be increased by 6" for each additional 6" of door height. Provide dust-proof strikes where scheduled.
- D. Coordinators;
1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide a bar-type coordinating device, surface applied to the underside of the stop at the frame head.
 2. Provide a filler bar of the correct length for the unit to span the entire width of the opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.
- E. Cylindrical Locks:
1. ANSI A156.2 Series 4000, Grade 1. Cylinders: Refer to 2.04 KEYING.
 2. Provide locksets able to withstand 1500 inch pounds of torque applied to the locked outside lever without gaining access per ANSI A156.2 Abusive Locked Lever Torque Test and cycle tested to 3 million cycles per ANSI A156.2 Cycle Test.
 3. Provide solid steel rotational stops to control excessive rotation of the lever.
 4. Lockset to be completely refunctionable. Lockset design shall allow function of lock to be changed into over twenty other common functions by swapping easily accessible parts.
 5. Provide locks with a standard 2-3/4 inches backset, unless noted otherwise, with a 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.
 6. Provide locksets with a separate anti-rotation through-bolts, and shall have no exposed screws. Levers shall operate independently, and shall have two external return spring cassettes mounted under roses to prevent lever sag.
 7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 8. Provide standard ASA strikes unless special strikes are necessary to match existing conditions.
 9. Lever trim shall be solid cast levers without plastic inserts, and wrought roses on both sides. Locksets shall be thru-bolted to assure proper alignment. Provide knurled surface at trim on doors serving hazardous areas.
 - a. Lever Design: Schlage Sparta.
 10. Basis of Design: Schlage ND Series.
 11. Acceptable Manufacturers: Best 93K Series, Sargent 10-Line.
- F. Exit Devices
1. ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit and/or Fire Exit Hardware. Cylinders: Refer to 2.4 KEYING.
 2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to the standard architectural finishes to match the balance of the door hardware.
 3. Exit devices shall incorporate a fluid damper or other device that eliminates noise associated with exit device operation. Touchpad shall extend a minimum of one half of the door width, but not the full length of the exit device rail. End-cap will have two-point attachment to door. Touch-pad shall match exit device finish, and shall be stainless steel for US26, US26D, US28, US32, and US32D finishes; for all other

- finishes, the touch-pad finish shall be of compatible finish to exit device. Only compression springs will be used in devices, latches, and outside trims or controls.
4. Devices to incorporate a dead-latching feature for security and/or for future addition of alarm kits and/or other electrical requirements.
 5. Vertical rod devices shall be capable of being field modified to less bottom rod devices by removal of bottom rod and adding firing pin(s), if required at fire rated openings.
 6. Provide manufacturer's standard strikes.
 7. Provide exit devices cut to door width and height. Locate exit devices at a height recommended by the exit device manufacturer, allowable by governing building codes, and approved by the Architect.
 8. Mechanism case shall sit flush on the face of all flush doors, or spacers shall be furnished to fill gaps behind devices. Where glass trim or molding projects off the face of the door, provide glass bead kits.
 9. Non-fire-rated exit devices shall have cylinder or hex key dogging as specified in sets.
 10. Removable mullions shall be a 2 inches x 3 inches steel tube. Where scheduled, mullion shall be of a type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
 11. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to a 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
 - a. Lever style will match the lever style of the locksets.
 - b. Lever trim on doors serving rooms considered by the authority having jurisdiction to be hazardous shall have a tactile warning.
 12. Exit devices for fire rated openings shall be UL labeled fire exit hardware.
 13. Field drill weep holes per manufacturer's recommendation for exit devices used in full exterior application, highly corrosive areas, and where noted in the hardware sets.
 14. Provide electrical options as scheduled.
 15. Basis of Design: Von Duprin 99/33 Series.
 16. Acceptable Manufacturers: Precision Apex Series, Sargent 80 Series with dead-latching.
- G. Closers – Heavy Duty
1. ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
 2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
 3. Closer Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
 7. Pressure Relief Valve (PRV) Technology: Not permitted.
 8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
 9. Basis of Design: LCN 4050 Series
 10. Acceptable Manufacturers: Norton 7500 Series, Yale 4400 Series, Sargent 351 Series, Stanley CLD-4550 series.
- H. Closers – Standard Duty
1. ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.

2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
 3. Closer Body: 1-1/4 inch (32 mm) diameter, with 5/8 inch (16 mm) diameter heat-treated pinion journal and full complement bearings.
 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
 7. Pressure Relief Valve (PRV) Technology: not permitted.
 8. Provide stick on and special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
 9. Basis of Design: LCN 1450 Series.
 10. Acceptable Manufacturers: Norton 8501/8501BF Series, Sargent 1331 series, Yale 3501/3501BF Series, Stanley CLD-3550 series.
- I. Electro-Hydraulic Automatic Operators:
1. Provide low energy automatic operator units with hydraulic closer complying with ANSI A156.19 where automatic operators are specified.
 2. Provide hydraulic fluid of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F. Fluid shall be fireproof and shall pass the requirements of the UL10C "positive pressure" fire test.
 3. Provide units with conventional door closer opening and closing forces unless the power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
 4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
 5. Provide units with conventional door closer opening and closing forces unless the power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check valve, sweep valve, latch valve to control door.
 6. Provide drop plates, brackets, or adapters for arms as required for details.
 7. Provide hard-wired actuator switches for operation as specified. Actuators shall be weather-resistant type at exterior applications.
 8. Provide key switches, with LED's, recommended and approved by the manufacturer of the automatic operator as required for the function as described in the operation description of the hardware group with the provisions below. Cylinders: Refer to 2.04 KEYING.
 9. Where automatic operators are scheduled, provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by the manufacturer of the automatic operator for each individual leaf. Actuators shall control both doors simultaneously at pairs. Exterior and vestibule doors with automatic operators shall be sequenced to allow ingress or egress through both sets of openings as directed by the Architect. Locate the actuators, key switches, and other controls as directed by the Architect.
 10. Provide units with vestibule inputs, which allow sequencing operation of two units, and a SPDT relay for interfacing with latching or locking devices.
 11. Basis of Design: LCN 4600 Series.
 12. Acceptable Manufacturers: Norton 6900 Series, Besam Power Swing, Precision CLD-4990 series.
- J. Pneumatic Automatic Operators:
1. Provide low energy automatic operator units that are pneumatically powered complying with ANSI A156.19 where automatic operators are specified.
 2. Provide units with conventional door closer opening and closing forces unless the power operator motor is activated. Provide door

- closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door:
- a. Provide door closer with hydraulic fluid of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F. Fluid shall be fireproof and shall pass the requirements of the UL10C "positive pressure" fire test.
 - b. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed, and backcheck.
3. Power operator systems shall include the following features and functions:
 - a. Provisions for separate conduits to carry high and low voltage wiring in compliance with the National Electric Code, section 725-31.
 - b. When an obstruction or resistance to the opening swing is encountered, the operator will continue attempting to open the door.
 - c. The operator will be designed to prevent damage to the mechanism if the system is actuated while the door is latched or if the door is forced closed during the opening cycle.
 4. Locate power unit and exhaust away from door to minimize noise and vibration in pedestrian areas.
 5. Provide drop plates, brackets, or adapters for arms as required for details.
 6. Provide hard-wired actuator switches for operation as specified. Actuators shall be weather-resistant type at exterior applications.
 7. Where automatic operators are scheduled, provide complete assemblies of compressor, control boxes, tubing (consult factory for applications where tubing is run in rated plenums), switches, power supplies, relays, and parts/material recommended and approved by the manufacturer of the automatic operator for each individual leaf. Actuators shall control both doors simultaneously at pairs. Exterior and vestibule doors with automatic operators shall be sequenced to allow ingress or egress through both sets of openings as directed by the Architect. Locate the actuators and other controls as directed by the Architect.
 8. Provide control box or module with inputs and outputs, which allow sequencing operation, fire alarm system connections, actuators, swing side sensors, stop sensors, and a SPDT relay for interfacing with latching or locking devices. Where required provide control box for "blow open" operation controlled by smoke evacuation system.
 9. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, a presence detector input, which prevents a closed door from opening or a door that is fully opened from closing, a hold open toggle input, which allows remote activation for indefinite hold open and close the second time the input is activated, vestibule inputs, which allow sequencing operation of two units, and a SPDT relay for interfacing with latching or locking devices.
 10. Acceptable manufacturers and/or products: LCN 4820 series, As Pre-Approved by Architect.

- K. Electric Strikes:
1. Provide electric strikes designed for use with the type locks shown at each opening.
 2. Provide electric strikes UL Listed as burglary-resistant electric door strikes and where required shall be UL Listed as electric strikes for fire doors and frames. Provide fail-secure type electric strikes, unless specified otherwise.
 3. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.
 4. Basis of Design: Von Duprin 6000 Series.
 5. Acceptable Manufacturers: Folger Adam 300 Series, HES 1006 series.
- L. Power Supplies:
1. Power Supplies: Provide power supplies, recommended and approved by the manufacturer of the electrified locking component, for the operation of electrified locks, electrified exit devices, magnetic locks, electric strikes, and other components requiring a power supply.
 2. Provide the appropriate quantity of power supplies necessary for the proper operation of the electrified locking component and/or components as recommended by the manufacturer of the electrified locking components with consideration for each electrified component utilizing the power supply, the location of the power supply, and the approved wiring diagrams. Locate the power supplies as directed by the Architect.
 3. Provide a power supply that is regulated and filtered 24 VDC, or as required, and UL class 2 listed.
 4. Provide a power supply, where specified, with the internal capability of charging optional sealed backup batteries 24 VDC, or as required, in addition to operating the DC load.
 5. Provide a power supply complete requiring only 120VAC to the fused input and shall be supplied in an enclosure.
 6. Provide a power supply with emergency release terminals, where required, that allow the release of all devices upon activation of the fire alarm system complete with fire alarm input for initiating "no delay" exiting mode.
 7. Acceptable manufacturers and/or products: Von Duprin PS900 series, Schlage PS900 series, Precision MLR/PS series.
- M. Push Plates: 8" wide x 16" high x .050" thick. Where door stile does not allow 8" wide plates, 4" wide plates may be used.
- N. Door Pulls & Push Bars: Solid bar stock, diameter and length as scheduled. Push bars shall be of sufficient length to span from center to center of each stile.
- O. Protection Plates: Provide kick, mop, or armor plates as scheduled, with 4 beveled edges. Furnish with machine or wood screws, finished to match plates. Sizes of plates shall be as follows:
1. Kick Plates - 8" high x 2" LWOD on single doors, 1" LWOD on pairs
 2. Mop Plates - 4" high x 2" LWOD on single doors, 1" LWOD on pairs
 3. Armor Plates - 36" high x 2" LWOD on single doors, 1" LWOD on pairs
- P. Door Stops and Holders
1. It shall be the responsibility of the hardware supplier to provide door stops for all doors in accordance with the following requirements:
 - a. Wall stops shall be used wherever possible.
 - b. Where wall stops cannot be used, provide dome type floor stops of the proper height.
 - c. At any opening where a wall or floor stop cannot be used, a heavy duty overhead stop must be used.
- Q. Thresholds and Weatherstrip: Furnish as scheduled and per architectural details. Match finish of other items as closely as possible. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available. Concealed auto door bottoms to include mounting brackets with no bottom screws to allow easy access to the door bottom.

- R. Silencers: "Push-in" type silencers for each hollow metal or wood frame, 3 for each single frame, 2 for each pair frame. Omit where gasketing is scheduled.
- S. Magnetic Holders: Provide wall- or floor-mounted electromagnetic door release with a minimum of 25 pounds of holding force, and a positive release button to initiate the closing motion. Projection of holder and armature must be coordinated with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Where magnetic holders are used on fire-rated doors, they must be wired into the fire control panel for fail-safe operation.

2.04 FINISHES

- A. Finish of all hardware shall be US26D (BHMA 626/652) with the exceptions as follows:
 - 1. Continuous Hinges: US28 (BHMA 628).
 - 2. Overhead Stops and Holders: US32D (BHMA 630).
 - 3. Door Closers: Powder Coat to Match.
 - 4. Wall Stops: US32D (BHMA 630).
 - 5. Latch Protectors: US32D (BHMA 630).
 - 6. Weatherstripping: Clear Anodized Aluminum.
 - 7. Thresholds: Mill Finish Aluminum.

2.05 KEYING

- A. Provide a NEW Schlage Everest 29 "S" keying system (New district wide system) conforming to the following requirements:
 - 1. Provide high security patented removable core cylinders at all exterior keyed devices, exterior removable mullions, and exterior exit device trim. High security cores shall incorporate a double-locking feature through the use of a side bar or second set of pins. Restricted shall control the access to the products by requiring a signed letter of authorization and/or authorization form from the Owner or authorized agent of the Owner. Patent shall protect against the unauthorized manufacturing and duplication of the products. High security patented cores shall not be operable by non-patented key blanks and will not be allowed if they can be compromised by removing material from the manufacturers non-patented key blank. High security patented cores shall incorporate a mechanism to check for the patented features on the keys. Provide construction cores with construction master keying for use during construction. The hardware supplier, accompanied by the Owner or Owner's security agent, shall install permanent keyed cores upon completion of the project. The temporary construction cores are to be returned to the hardware supplier.
 - 2. Provide patented removable core cylinders at interior removable mullions and interior exit device trim. Patent shall protect against the unauthorized manufacturing and duplication of the products. Patented cores shall not be operable by non-patented key blanks. Patented cores shall incorporate a mechanism to check for the patented features on the keys. Provide construction cores with construction master keying for use during construction. The hardware supplier, accompanied by the Owner or Owner's security agent, shall install permanent keyed cores upon completion of the project. The temporary construction cores are to be returned to the hardware supplier.
 - 3. Provide permanent cores and cylinders keyed by the manufacturer or authorized distributor as directed by the Owner. Provide owner with a copy of the bitting list, return receipt requested.
 - 4. The hardware supplier, accompanied by a qualified factory representative for the manufacturer of the cores and cylinders, shall meet with Owner and Architect to review keying requirements and lock functions prior to ordering finish hardware. Submit a keying schedule to Architect for approval.
 - 5. Provide cores and cylinders, unless noted otherwise, operated by a Great Grand Master Key System to be established for this project. Allow for ten Grand Master Keys under the Great Grand. Do not use the letter "I", "O", or "X" for any of the grand

masters. Allow for twenty-four Master Keys under each Grand Master, and sixty-four changes under each master key. All cylinders shall be keyed in alike or different sets as noted by their respective key set number. Do not use the letter "I" or "O" in any of the master key sets.

6. Provide patented keys as follows:
 - a. Ten grand master keys for each set.
 - b. Ten master keys for each set.
 - c. Three keys per core.
 - d. Two construction core control keys
 - e. Two permanent core control keys
 - f. Six construction master keys for each type (Contractor is to provide one set of construction keys to Architect)
7. Visual key control:
 - a. Keys shall be stamped with their respective key set number and stamped "DO NOT DUPLICATE".
 - b. Grand master and master keys shall be stamped with their respective key set letters.
 - c. Do not stamp any keys with the factory key change number.
 - d. Do not stamp any cores with key set on face (front) of Core. Stamp on back or side of cores so not to be visible when core is in cylinder.
8. Deliver grand master keys, master keys, change keys, and/or key blanks from the factory or authorized distributor directly to the Owner in sealed containers, return receipt requested. Failure to comply with these requirements may be cause to require replacement of all or any part of the keying system that was compromised at no additional cost to the Owner.
9. Basis of Design: New Patented FSIC Schlage Everest 29 "S".
10. Acceptable Manufacturers: Best Peaks, Medeco Keymark, Sargent Signature.

2.06 KEY CONTROL SYSTEM

- A. Provide a key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of the number of locks required for the Project.
 1. Provide complete cross index system set up by the hardware supplier, and place keys on markers and hooks in the cabinet as determined by the final key schedule.
 2. Provide hinged-panel type cabinet for wall mounting.

2.07 FIRE DEPARTMENT LOCK BOX

- A. Supplier to submit product data to Fire Department for approval. Submit AHJ written approval to Architect for record.
- B. Verify final location and position in field with Sanford Fire Department and the Architect prior to installation.
- C. Fire Department Secure Exterior Key Box:
 1. Key Boxes: Six locations, exterior mounted, U.L. Listed, black, fully recessed, 4"H x 5"W x 3-³/₄" D, high security key box. Provide key box tamper switch connected to fire alarm, wiring provided by the Electric Contractor.
 - a. Product: Knox-Box 3271 Series by Knox. No Substitutions, as directed by Sanford Fire Department.
 2. Large Capacity Key Boxes: Two exterior mounted, U.L. Listed, black, fully recessed, 47" H x 7" W x 5" D, high security large capacity key box. Provide key box tamper switch connected to fire alarm, wiring provided by the Electric Contractor.
 - a. Product: Knox-Box 4431 Series by Knox. No Substitutions, as directed by Sanford Fire Department.
- D. Keys: Supply a minimum of (20) twenty Master Keys.
 - a. Key Delivery: All change keys, masters and grandmaster keys shall be shipped directly from the factory to the Owner, registered mail, confidential.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Prior to installation of any hardware, examine all doors, frames, walls and related items for conditions that would prevent proper installation of finish hardware. Correct all defects prior to proceeding with installation.

3.02 INSTALLATION

- A. A pre-installation meeting shall be held to instruct installers on proper installation and adjustment of finish hardware. Representatives of each major hardware category shall be present if requested. Provide at least 10 days notice to representatives.
- B. All hardware will be installed by qualified tradesmen, skilled in the application of commercial grade hardware. For technical assistance if necessary, installers may contact the manufacturer's rep for the item in question, as listed in the hardware schedule.
- C. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
- D. Install each hardware item in compliance with the manufacturer's instructions and recommendations, using only the fasteners provided by the manufacturer.
- E. Do not install surface mounted items until finishes have been completed on the substrate. Protect all installed hardware during painting.
- F. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- G. All operating parts shall move freely and smoothly without binding, sticking, or excessive clearance.

3.03 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door, to insure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.
- B. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make a final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- C. Clean adjacent surfaces soiled by hardware installation.
- D. Instruct Owner's personnel in the proper adjustment, lubrication, and maintenance of door hardware and hardware finishes.

3.04 FIELD QUALITY CONTROL

- A. Prior to Substantial Completion, the installer, accompanied by representatives of the manufacturers of latchsets and locksets, door control devices, and of other major hardware suppliers, shall perform the following work:
 - 1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
 - 2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
 - 3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.

4. Prepare a written report of current and predictable problems of substantial nature in the performance of the hardware.

3.05 PROTECTION

- A. Provide for the proper protection of all items of hardware until the Owner accepts the project as complete. Damaged or disfigured hardware shall be replaced or repaired by the responsible party.

3.06 HARDWARE SCHEDULE

- A. Provide hardware for each door to comply with requirements of Section "Finish Hardware," hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.
- B. It is intended that the following schedule includes all items of finish hardware necessary to complete the work. If a discrepancy is found in the schedule, such as a missing item, improper hardware for a frame, door or fire codes, the preamble will be the deciding document.

HARDWARE SET NO. 001

FOR USE ON DOOR #(S):

A112	A126	A144	A205	A212A	A218A
A239	A244	B204	B211A	B212	B214
B215	D210B	E224B	E241		

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

AT OPENING D210B PRINT LAB 210 IS THE SECURE SIDE.

HARDWARE SET NO. 003

FOR USE ON DOOR #(S):

A118	A133A
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EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	4050 RW/PA	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 004

FOR USE ON DOOR #(S):

A116	A241A	B114	B115	B215D	
B247A	C124A	C134C	C202B	D132B	D227
E214					

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
3	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 005

FOR USE ON DOOR #(S):

A131A	E150	E250A
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EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-99-L-NL-17	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 006

FOR USE ON DOOR #(S):

A106	A143A	A178
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EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
3	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 007

FOR USE ON DOOR #(S):

A185D C111

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954	VON
1	EA	PANIC HARDWARE	CD-99-EO	VON
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	VON
4	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
4	EA	FSIC CORE	.	SCH
2	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
2	EA	SURFACE CLOSER	4050 CUSH	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	SEALS	429A	ZER
1	EA	MULLION SEAL	8780N	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
2	EA	DOOR CONTACT	679-05HM	SCE

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
MULLION TO HAVE SAME FINISH AS DOOR FRAME.
OPENING A185D IS AN EXTRA LARGE OPENING.

HARDWARE SET NO. 008

FOR USE ON DOOR #(S):

A151 A151A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-9927-L-DT-17	VON
1	EA	PANIC HARDWARE	CD-9927-L-NL-17	VON
3	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
3	EA	FSIC CORE	.	SCH
2	EA	SURFACE CLOSER	4050 HCUSH	LCN
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

HARDWARE SET NO. 009

FOR USE ON DOOR #(S):

C209 F112 F112A F112B

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 010

FOR USE ON DOOR #(S):

B050

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954	VON
2	EA	PANIC HARDWARE	CD-99-EO	VON
3	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
3	EA	FSIC CORE	.	SCH
2	EA	SURFACE CLOSER	4050 CUSH	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	SEALS	429A	ZER
1	EA	MULLION SEAL	8780N	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
2	EA	DOOR CONTACT	679-05HM	SCE

EXIT ONLY OPENING.

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.

MULLION TO HAVE SAME FINISH AS DOOR FRAME.

HARDWARE SET NO. 011

FOR USE ON DOOR #(S):

B142D D118A F122D

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954	VON
1	EA	PANIC HARDWARE	CD-99-EO	VON
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	VON
4	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
4	EA	FSIC CORE	.	SCH
2	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
2	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	MULLION SEAL	8780N	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
2	EA	DOOR CONTACT	679-05HM	SCE
1	EA	REMAINING GASKETING	BY DOOR MANUFACTURER	BYO

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
MULLION TO HAVE SAME FINISH AS DOOR FRAME.
COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY.

HARDWARE SET NO. 012

FOR USE ON DOOR #(S):

C100A

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	SET	CONST LATCHING BOLT	FB51P/FB61P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 013

FOR USE ON DOOR #(S):

A104	B215C	C104B	C104C	C125C	C133C
C134E	C138C	C139D			

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	PRIVACY LOCK	ND40S SPA	SCH
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
3	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 014

FOR USE ON DOOR #(S):

A237B	A237C	D105C	D107A	E144
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EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	HOSPITAL PRIVACY	ND44S SPA	SCH
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
3	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 015

FOR USE ON DOOR #(S):

A115	A240C	B213	C125B	D143	D145
E160	E161	E257	E258	F127A	

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	PRIVACY LOCK	ND40S SPA	SCH
1	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 016

FOR USE ON DOOR #(S):

A161	A163	A261	A263	B136	B138
B230	B232	C116	C118	C213	C215
D232	D234	E132	E134	E232	E234
F133	F143				

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	FAC RESTRM W/IND CYL	ND85PD SPA	SCH
1	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

FSIC CORE CYLINDER NOT AVAILABLE WITH THIS FUNCTION.

HARDWARE SET NO. 017

FOR USE ON DOOR #(S):

C111A

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR	VON
1	EA	FIRE EXIT HARDWARE	9927-L-BE-F-LBR-996-17	VON
2	EA	SURFACE CLOSER	4050 RW/PA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 018

FOR USE ON DOOR #(S):

A123	A125A	A125B	A141	B055	B113
B202	B203	C103A	C107	C108	C115
C136	C204	D125	D134	D158A	D214
E122	E124	F132A	F134A	F142A	F144A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	COAT AND HAT HOOK	582	IVE
3	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 019

FOR USE ON DOOR #(S):

A165	A174A	B057	B228A	B228B	C114D
C137	C223A	C223B	D146A	D247	D247A
E127B	E127C	E227B	E227C		

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA 8SP	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 020

FOR USE ON DOOR #(S):

D120

EACH TO HAVE:

5	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
2	EA	ELECTRIC HW HINGE	5BB1HW 4.5 X 4.5 TW8	IVE
2	EA	ELEC PANIC HARDWARE	RX-2-CD-9927-EO-LBR-499F-SNB	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	DELAYED EGRESS MAG	M490DEP	SCE
2	EA	SURFACE CLOSER	4050 RW/PA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
2	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 FA900	VON

CARD READER AT OPENING. OPENING TIED TO FIRE ALARM. ACTIVATION OF FIRE ALARM TO BOTH RELEASE MAGNETIC DOOR HOLDERS AND UNLOCK OPENING FROM PULL SIDE. OPENING TO NOW INCLUDE DELAYED EGRESS MAGNETIC LOCK ON PUSH SIDE DOOR LEAF FROM PUBLIC LOBBY D140. CARD READER TO BE WIRED TO DEACTIVATE AS WELL AS RESET DELAYED EGRESS MAGNETIC LOCK

HARDWARE SET NO. 021

FOR USE ON DOOR #(S):

A185A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR	VON
1	EA	FIRE EXIT HARDWARE	9927-L-BE-F-LBR-996-17	VON
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 022

FOR USE ON DOOR #(S):

A175 A275A B150 B250 C122 C222
D118 D218 E139 E239

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR	VON
1	EA	FIRE EXIT HARDWARE	9927-L-BE-F-LBR-996-17	VON
2	EA	SURFACE CLOSER	4050 RW/PA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 023

FOR USE ON DOOR #(S):

A120 C220 F111B F111C

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR	VON
1	EA	FIRE EXIT HARDWARE	9927-L-F-LBR-17-499F-SNB	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
2	EA	SURFACE CLOSER	4050 RW/PA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 024

FOR USE ON DOOR #(S):

E118A E128A

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	HOSPITAL PRIVACY	ND44S SPA	SCH
2	EA	OH STOP & HOLDER	100H	GLY
2	EA	KICK PLATE	8400 2" LDW	IVE
3	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 025

FOR USE ON DOOR #(S):

A185E

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 026

FOR USE ON DOOR #(S):

A154 A191 F102B

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 027

FOR USE ON DOOR #(S):

B149 C117B C121B

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 028

FOR USE ON DOOR #(S):

C104

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 029

FOR USE ON DOOR #(S):

A170A A187 F102A

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
1	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 030

FOR USE ON DOOR #(S):

A140A	A185	A214A	A283A		
A283B	B053	B105B	B228	B233	C207A
D103	D201	E246B	F132	F134	
F142	F144				

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 031

FOR USE ON DOOR #(S):

A224B	A239A	B058	B105A	C101A	C105A
C113B	C127B	C134B	C138D	D150C	E126A
E242A	F122A				

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	SILENCER	SR64	IVE

DOOR E242A: LOCK ON E242 FIRE DRILL AREA ROOM SIDE.

HARDWARE SET NO. 032

FOR USE ON DOOR #(S):

A124	A208	A216	B127A	B141A	C127C
C133B	C134D	C139B	C139C		

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
3	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 033

FOR USE ON DOOR #(S):

A152	B222A	B222B	C115A	C126	C217
D101	D203	E131	E244	F116	

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	SURFACE CLOSER	1450 DEL REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 034

FOR USE ON DOOR #(S):

A102	A103	A105	A107	A107A	A109
A111	A113	A117	A202	A203	A204
A206	A207	A211A	A211B	A211C	
A211D	A211E	A211F	A211G	A211H	A232
A233	A234A	A282	A282A	B102	B103A
C135	C135A	D106	E145A	E145B	F106B

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	COAT AND HAT HOOK	582	IVE

HARDWARE SET NO. 035

FOR USE ON DOOR #(S):

A234	B107	B130	B231	C119	C125
C132	D158	E151	E158	E159	E215
E259	F100	F106A	F106C		

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	COAT AND HAT HOOK	582	IVE

HARDWARE SET NO. 036

FOR USE ON DOOR #(S):

D107

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	PASSAGE SET	ND10S SPA	SCH
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	COAT AND HAT HOOK	582	IVE

HARDWARE SET NO. 037

FOR USE ON DOOR #(S):

D150B

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	SET	CONST LATCHING BOLT	FB51P/FB61P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	EA	SEALS	429A	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER

HARDWARE SET NO. 038

FOR USE ON DOOR #(S):

C101C	C117D	C127E	C133D	C134F	C138F
C139E	D150D	E140A	E140B		

EACH TO HAVE:

1	EA	DOOR CONTACT	674-OH	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

ROLL-UP DOOR. DOOR CONTACT LISTED PROVIDED IN SEPARATE SECTION. MOTORIZED OVERHEAD DOOR, ASSUMED NO CYLINDERS REQUIRED.

HARDWARE SET NO. 039

FOR USE ON DOOR #(S):

A178B B052B C100B C102A D154E E146

EACH TO HAVE:

1 EA ALL HARDWARE BY DOOR MANUFACTURER EXI

ROLL-UP DOOR ALL HARDWARE BY DOOR MANUFACTURER

HARDWARE SET NO. 040

FOR USE ON DOOR #(S):

B215A

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
2	EA	OH STOP & HOLDER	450H	GLY
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 041

FOR USE ON DOOR #(S):

A176

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 042

FOR USE ON DOOR #(S):

A174 A193 B054 C114B D146

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	FIRE EXIT HARDWARE	99-L-NL-F-17	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

KNURLED OUTSIDE LEVER

HARDWARE SET NO. 043

FOR USE ON DOOR #(S):

C106 D212A D233A E143A

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 044

FOR USE ON DOOR #(S):

C119A

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	MORTISE LOCK	MS1850SN-050	ADA
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
1	EA	MORTISE CYL TURN	09-904 118	SCH
1	EA	FSIC CORE	.	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 045

FOR USE ON DOOR #(S):
B052

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
2	EA	ARMOR PLATE	8400 36" X 1" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 046

FOR USE ON DOOR #(S):
A178A B101B D131 D133

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
3	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 047

FOR USE ON DOOR #(S):
A266 C104D F111A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 048

FOR USE ON DOOR #(S):

A151D	A201	A210	A231A	B201	D105
F125	F125A	F127			

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 049

FOR USE ON DOOR #(S):

A211

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	SMOKE GASKETING	BY DOOR MANUFACTURER	EXI

HARDWARE SET NO. 050

FOR USE ON DOOR #(S):

F122	F122B	F122C	F126
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EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-9927-EO-LBR	VON
1	EA	PANIC HARDWARE	CD-9927-L-NL-LBR-17	VON
3	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
3	EA	FSIC CORE	.	SCH
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 051

FOR USE ON DOOR #(S):

F102D F102E F102H F102J

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-9927-EO-LBR	VON
1	EA	PANIC HARDWARE	CD-9927-L-NL-LBR-17	VON
4	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
4	EA	FSIC CORE	.	SCH
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	SURFACE CLOSER	4050 RW/PA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

CUSH ARM CLOSER AT CLOSEST TO SINGLE OPENING.

HARDWARE SET NO. 052

FOR USE ON DOOR #(S):

D147

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 053

FOR USE ON DOOR #(S):

B139 B241 D211 E148

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	DOOR SWEEP	39A	ZER
1	EA	SMOKE GASKETING	BY DOOR MANUFACTURER	EXI

HARDWARE SET NO. 054

FOR USE ON DOOR #(S):

A170 A270 B120 B220 D120A D220
E120 E220

EACH TO HAVE:

1	EA	RIM OR MORTISE CYLINDER . HOUSING AS REQUIRIED		SCH
1	EA	FSIC CORE		SCH
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

FOLDING FIRE DOOR, ALL HARDWARE BY DOOR MANUFACTURER

HARDWARE SET NO. 055

FOR USE ON DOOR #(S):

A101A A110A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	ELECTRIC STRIKE	6400 FSE	VON
1	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DOOR CONTACT	679-05WD	SCE
1	EA	MOTION SENSOR	SCANII	SCE
1	EA	POWER SUPPLY	PS902	VON

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
ELECTRIC STRIKE, POWER SUPPLY, AND DOOR CONTACT ALL TIED TO SECURITY/ACCESS
CONTROL SYSTEM.

HARDWARE SET NO. 056

FOR USE ON DOOR #(S):

D154A D154D

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	LOCK GUARD	LG10	IVE
1	EA	OH STOP & HOLDER	90H	GLY
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	546A	ZER
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

NO STEEL BASED HARDWARE AT THESE OPENINGS. ALL STAINLESS STEEL AND ALUMINUM. DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.

HARDWARE SET NO. 057

FOR USE ON DOOR #(S):

F102 F102C F102F F102G

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-99-L-NL-17	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	SURFACE CLOSER	4050 RW/PA	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 058

FOR USE ON DOOR #(S):

E243

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
2	EA	SURFACE CLOSER	4050 HW/PA / HEDA AS REQ.	LCN
2	EA	ARMOR PLATE	8400 36" X 1" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	SILENCER	SR64	IVE

HARDWARE SET NO. 059

FOR USE ON DOOR #(S):

AOB1 AOB2 AOB3 AOB4

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	LOCK GUARD	LG10	IVE
2	EA	OH STOP & HOLDER	90H	GLY
2	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	SEALS	429A	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	546A	ZER

HARDWARE SET NO. 060

FOR USE ON DOOR #(S):

B052A B057A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	LOCK GUARD	LG10	IVE
2	EA	OH STOP & HOLDER	90H	GLY
2	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	SEALS	429A	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	546A	ZER
2	EA	DOOR CONTACT	679-05HM	SCE

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.

HARDWARE SET NO. 061

FOR USE ON DOOR #(S):

F131 F135 F141 F145

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 062

FOR USE ON DOOR #(S):

D127 D129 D132C F123B F125B F131A
F136A F141A F146B

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	CLASSROOM DEAD LOCK	L463R 10-078	SCH
1	EA	PUSH PLATE	8200 8" X 16"	IVE
1	EA	PULL PLATE	8303 10" 6" X 16"	IVE
1	EA	SURFACE CLOSER	4050 HW/PA / HEDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 063

FOR USE ON DOOR #(S):

C128 C130 C219 C221

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	CLASSROOM DEAD LOCK	L463R 10-078	SCH
1	EA	PUSH PLATE	8200 8" X 16"	IVE
1	EA	PULL PLATE	8303 10" 6" X 16"	IVE
1	EA	SURFACE CLOSER	4050 HW/PA / HEDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 064

FOR USE ON DOOR #(S):

B054A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	PANIC HARDWARE	CD-9975-L-NL-996-17	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	LOCK GUARD	LG10	IVE
1	EA	OH STOP & HOLDER	90H	GLY
1	EA	SURFACE CLOSER	4050 HCUSH	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	SEALS	429A	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	546A	ZER
2	EA	DOOR CONTACT	679-05HM	SCE

KNURLED OUTSIDE LEVER

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.

HARDWARE SET NO. 065

FOR USE ON DOOR #(S):

D154B D154C

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	LOCK GUARD	LG10	IVE
2	EA	OH STOP & HOLDER	90H	GLY
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	546A	ZER
2	EA	DOOR CONTACT	679-05HM	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

NO STEEL BASED HARDWARE AT THESE OPENINGS. ALL STAINLESS STEEL AND ALUMINUM. DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.

HARDWARE SET NO. 066

FOR USE ON DOOR #(S):

D154

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
2	EA	OH STOP & HOLDER	90H	GLY
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	546A	ZER
2	EA	DOOR CONTACT	679-05HM	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

NO STEEL BASED HARDWARE AT THESE OPENINGS. ALL STAINLESS STEEL AND ALUMINUM. DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.

HARDWARE SET NO. 067

FOR USE ON DOOR #(S):

A122 A122A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264 36" 20" STD	IVE
1	EA	SURFACE CLOSER	4050 HCUSH	LCN
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

COORDINATE LOCATION OF PULL AND CYLINDER TO ALLOW USE OF KEY.

HARDWARE SET NO. 068

FOR USE ON DOOR #(S):

A118A

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 069

FOR USE ON DOOR #(S):

A228A

EACH TO HAVE:

3	EA	CAM LIFT HINGES	BY DOOR MANUFACTURER	EXI
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	4050 HW/PA / HEDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	SOUND GASKETING	BY DOOR MANUFACTURER	EXI
1	EA	THRESHOLD	BY DOOR MANUFACTURER	EXI

STC-47 OPENING. CAM LIFT HINGES, GASKETING AND THRESHOLDS BY ACOUSTICAL DOOR MANUFACTURER.

HARDWARE SET NO. 070
FOR USE ON DOOR #(S):

A143	B141B	B243A	B245A	C114C	D219B
E118B	E152A	E214A			

EACH TO HAVE:

3	EA	CAM LIFT HINGES	BY DOOR MANUFACTURER	EXI
1	EA	PASSAGE SET	ND10S SPA	SCH
1	EA	SURFACE CLOSER	4050 HEDA	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	THRESHOLD	BY DOOR MANUFACTURER	EXI
1	EA	SOUND GASKETING	BY DOOR MANUFACTURER	EXI

STC-47 OPENINGS. CAM LIFT HINGES, GASKETING AND THRESHOLDS BY ACOUSTICAL DOOR MANUFACTURER.

HARDWARE SET NO. 071

FOR USE ON DOOR #(S):

B247	D111	D221	E142	E143
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EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	DOOR SWEEP	39A	ZER
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

HARDWARE SET NO. 072

FOR USE ON DOOR #(S):

A135	A268	B235	B237	B244	C218
C225	D112A	D132A	D210	D225	D240
D241	E216	E224A	E248	F123	F123A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 073

FOR USE ON DOOR #(S):

A185C	C101D	C113C	C117C	C127D	C133E
C134H	C138E	C139F	D148	D150E	

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 HCUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
COORDINATE LOCATION OF PULL AND CYLINDER TO ALLOW USE OF KEY.

HARDWARE SET NO. 074

FOR USE ON DOOR #(S):

B210A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	TIME OUT LOCK	ND45 SPA	SCH
1	EA	SURFACE CLOSER	4050 HW/PA / HEDA AS REQ.	LCN
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

CLOSER MOUNTED ON CORRIDOR SIDE OF ROOM. SPECIAL PRIVACY FUNCTION (ND45) AT
OPENING.

HARDWARE SET NO. 075

FOR USE ON DOOR #(S):

B112 B127B C105C

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	SET	CONST LATCHING BOLT	FB51P/FB61P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	PANIC HARDWARE	CD-9975-NL	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
2	EA	SURFACE CLOSER	4050 HCUSH	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
COORDINATE LOCATION OF PULL AND CYLINDER TO ALLOW USE OF KEY.

HARDWARE SET NO. 076

FOR USE ON DOOR #(S):

B053A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	LOCK GUARD	LG10	IVE
1	EA	SURFACE CLOSER	4050 HCUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	DOOR CONTACT	679-05HM	SCE

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
COORDINATE LOCATION OF PULL AND CYLINDER TO ALLOW USE OF KEY.

HARDWARE SET NO. 077

FOR USE ON DOOR #(S):

A184A	B056	B132	C114A	C223	D144
D210A	E127A	E227A			

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	ELECTRIC STRIKE	6400 FSE	VON
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DOOR CONTACT	679-05WD	SCE
1	EA	MOTION SENSOR	SCANII	SCE
1	EA	POWER SUPPLY	PS902	VON

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
ELECTRIC STRIKE, POWER SUPPLY, AND DOOR CONTACT ALL TIED TO SECURITY/ACCESS
CONTROL SYSTEM.

HARDWARE SET NO. 078

FOR USE ON DOOR #(S):

A182

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	ELECTRIC STRIKE	6400 FSE	VON
1	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DOOR CONTACT	679-05WD	SCE
1	EA	MOTION SENSOR	SCANII	SCE
1	EA	POWER SUPPLY	PS902	VON

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
ELECTRIC STRIKE, POWER SUPPLY, AND DOOR CONTACT ALL TIED TO SECURITY/ACCESS
CONTROL SYSTEM.

HARDWARE SET NO. 079

FOR USE ON DOOR #(S):
A131

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	99-L-F-2SI-17-SNB	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 080

FOR USE ON DOOR #(S):
B050A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-996-17	VON
1	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 081

FOR USE ON DOOR #(S):
E154A E254

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC FIRE EXIT HARDWARE	99-L-F-2SI-E996-17-FS-SNB	VON
1	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DOOR CONTACT	679-05WD	SCE
1	EA	POWER SUPPLY	PS902 FA900	VON

CARD READER AT OPENING

HARDWARE SET NO. 082

FOR USE ON DOOR #(S):

A255 A255A A255B

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-996-17	VON
1	EA	FIRE/LIFE CLOSER	4040SE WMS	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 083

FOR USE ON DOOR #(S):

A185B

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-996-17	VON
1	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 084

FOR USE ON DOOR #(S):

A101B A110B

EACH TO HAVE:

4	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 085

FOR USE ON DOOR #(S):
C110A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER

HARDWARE SET NO. 086

FOR USE ON DOOR #(S):
C207

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 087

FOR USE ON DOOR #(S):
A193A B054B F111D

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA 8SP	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER

HARDWARE SET NO. 088

FOR USE ON DOOR #(S):

A122B B210 C101 C101B C101E

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	SET	CONST LATCHING BOLT	FB51P/FB61P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 089

FOR USE ON DOOR #(S):

D151

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	99-L-F-2SI-17-SNB	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER

HARDWARE SET NO. 090

FOR USE ON DOOR #(S):

B147A C122A D151A E141 F119G F119J
 F126A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	VON
2	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIRIED		
2	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
 COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY.
 DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 091

FOR USE ON DOOR #(S):

C122B F119H F119I

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-99-EO	VON
1	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIRIED		
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	REMAINING GASKETING	BY DOOR MANUFACTURER	BYO

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. DRIP
 CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 092

FOR USE ON DOOR #(S):

A175B

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY.
DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 093

FOR USE ON DOOR #(S):

A175A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-99-EO	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 100

FOR USE ON DOOR #(S):

A148 A151G A155B E154 F119D

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
 CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN
 SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH
 SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER SUPPLY FOR
 EACH PAIR OF DOORS.

COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY.
 DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 101

FOR USE ON DOOR #(S):

A155 A155A E139A F119A F119B F119C

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-CD-99-EO	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
 OPENING MONITORED ONLY, NO ACCESS CONTROL. DRIP CAP AND THRESHOLD TO
 EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 102
FOR USE ON DOOR #(S):

A171A D140A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
1	EA	OH STOP	100S	GLY
1	EA	SURF. AUTO OPERATOR	4642	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852T	LCN
2	EA	SURFACE MOUNT BOX	8310-869S	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DESK MOUNT BUTTON	660-PB	SCE
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS904 900-4RL	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. SPECIAL POWER SUPPLY FOR OPENING WITH AUTO OPERATOR

COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK. ELECTRIFIED OPENINGS WITH AUTO OPERATOR AT ACTIVE DOOR. CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. EXTERIOR PRESS WALL SWITCH DISABLED DURING SECURE MODE. INTERIOR PRESS WALL SWITCH ALWAYS ACTIVE. OPENING NOT INTERCONNECTED WITH ANY OTHER OPENING. ELECTRIFIED LATCH RETRACTION EXITS, POWER SUPPLY, DOOR CONTACTS AND REX ALL TIED TO SECURITY/ACCESS CONTROL SYSTEM. OPENING TO ALSO INCLUDE REMOTE RELEASE BUTTON (LOCATION TO BE DETERMINED BY ARCHITECT) TO REMOTELY UNLOCK DOOR AND ALLOW USE OF AUTO DOOR OPERATOR AT OPENING. AUTO OPERATOR AND CARD ACCESS AT THIS OPENING ONLY. OPENING ALSO TIMER CONTROLLED BY ACCESS CONTROL SYSTEM TO BE UNLOCKED DURING BUS ARRIVAL AND DEPARTURE TIMES.

HARDWARE SET NO. 103

FOR USE ON DOOR #(S):

A171B	A171C	A171D	A171E	A171F	A171G
D140B	D140C	D140D			

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIRIED		
1	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. ACCESS CONTROL SYSTEM CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER SUPPLY FOR EACH PAIR OF DOORS. COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK. DOORS ELECTRIFIED BUT TIMER CONTROLLED BY ACCESS CONTROL SYSTEM TO BE UNLOCKED DURING BUS ARRIVAL AND DEPARTURE TIMES

HARDWARE SET NO. 104

FOR USE ON DOOR #(S):

A171N D140H

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIRIED		
1	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
1	EA	OH STOP	100S	GLY
1	EA	SURF. AUTO OPERATOR	4642	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852T	LCN
2	EA	SURFACE MOUNT BOX	8310-869S	LCN
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DESK MOUNT BUTTON	660-PB	SCE
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS904 900-4RL	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. SPECIAL POWER SUPPLY FOR OPENING WITH AUTO OPERATOR. COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK. ELECTRIFIED OPENINGS WITH AUTO OPERATOR AT ACTIVE DOOR. CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. EXTERIOR PRESS WALL SWITCH DISABLED DURING SECURE MODE. INTERIOR PRESS WALL SWITCH ALWAYS ACTIVE. OPENING NOT INTERCONNECTED WITH ANY OTHER OPENING. ELECTRIFIED LATCH RETRACTION EXITS, POWER SUPPLY, DOOR CONTACTS AND REX ALL TIED TO SECURITY/ACCESS CONTROL SYSTEM. OPENING TO ALSO INCLUDE REMOTE RELEASE BUTTON (LOCATION TO BE DETERMINED BY ARCHITECT) TO REMOTELY UNLOCK DOOR AND ALLOW USE OF AUTO DOOR OPERATOR AT OPENING. AUTO OPERATOR AND CARD ACCESS AT THIS OPENING ONLY. OPENING ALSO TIMER CONTROLLED BY ACCESS CONTROL SYSTEM TO BE UNLOCKED DURING BUS ARRIVAL AND DEPARTURE TIMES.

HARDWARE SET NO. 105

FOR USE ON DOOR #(S):

A171H	A171I	A171J	A171K	A171L	A171M
D140E	D140F	D140G			

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIRIED		
1	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. ACCESS CONTROL SYSTEM CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER SUPPLY FOR EACH PAIR OF DOORS.

COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

DOORS ELECTRIFIED BUT TIMER CONTROLLED BY ACCESS CONTROL SYSTEM TO BE UNLOCKED DURING BUS ARRIVAL AND DEPARTURE TIMES

HARDWARE SET NO. 106

FOR USE ON DOOR #(S):

F128B

EACH TO HAVE:

2	EA	CONT. HINGE	112HD TWP	IVE
1	EA	KEYED REMOVABLE	KR4954	VON
		MULLION		
2	EA	ELEC PANIC HARDWARE	RX-2-CD-99-EO	VON
3	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIRIED		
3	EA	FSIC CORE	.	SCH
2	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
2	EA	SURFACE CLOSER	4050 CUSH	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	MULLION SEAL	8780N	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
2	EA	DOOR CONTACT	679-05HM	SCE

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 107
FOR USE ON DOOR #(S):
C120A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD TWP	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954	VON
1	EA	ELEC PANIC HARDWARE	RX-2-CD-99-EO	VON
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
3	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
3	EA	FSIC CORE	.	SCH
2	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
2	EA	SURFACE CLOSER	4050 CUSH	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	MULLION SEAL	8780N	ZER
2	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
2	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN
SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED AT ACTIVE
DOOR THROUGH SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER
SUPPLY FOR EACH PAIR OF WITH QEL DOORS. COORDINATE INSTALLATION OF CYLINDER
AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND
ENTIRE LENGTH OF BANK. QEL EXIT AT ACTIVE DOOR ONLY.

HARDWARE SET NO. 108

FOR USE ON DOOR #(S):
F119E F119F

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
2	EA	PUSH/PULL BAR	9103EZ-12"-STD	IVE
2	EA	SURFACE CLOSER	4050 HEDA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	SET	SEALS	488S	ZER
1	EA	REMAINING GASKETING	BY DOOR MANUFACTURER	BYO
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

HARDWARE SET NO. 109

FOR USE ON DOOR #(S):
E139B

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIED		
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON
1	EA	VIDEO INTERCOM	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN
SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH
SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER SUPPLY FOR
EACH PAIR OF DOORS. VIDEO INTERCOM AT OPENING.
COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY.
DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 110

FOR USE ON DOOR #(S):

F128A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER SUPPLY FOR EACH PAIR OF WITH QEL DOORS. COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 111

FOR USE ON DOOR #(S):

F128C

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-CD-99-EO	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	DRIP CAP	142A	ZER
1	EA	SEALS	429A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 112
FOR USE ON DOOR #(S):
A183

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR	VON
1	EA	FIRE EXIT HARDWARE	9927-L-F-996-17	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
1	EA	FSIC CORE	.	SCH
2	EA	SURFACE CLOSER	4050 EDA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 113

FOR USE ON DOOR #(S):
A183A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	ASTRAGAL	40AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER
1	EA	THRESHOLD	663A-MSLA-10	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 114

FOR USE ON DOOR #(S):

C121A

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM LOCK	ND70RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	ASTRAGAL	40AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER
1	EA	THRESHOLD	663A-MSLA-10	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 115

FOR USE ON DOOR #(S):

B140A B140B B140C B140D B140E

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
1	EA	SURFACE CLOSER	1450 DEL REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	328AA	ZER
1	SET	SEALS	488S	ZER
1	EA	DOOR BOTTOM	351AA6	ZER
1	EA	THRESHOLD	663A-MSLA-10	ZER

STC 40 AND FIRE RATED OPENING.

HARDWARE SET NO. 116

FOR USE ON DOOR #(S):

B103 B107B B144A B144B

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
1	EA	SURFACE CLOSER	1450 H OR HEDA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	328AA	ZER
1	SET	SEALS	488S	ZER
1	EA	DOOR BOTTOM	351AA6	ZER
1	EA	THRESHOLD	663A-MSLA-10	ZER

STC 40 AND FIRE RATED OPENING.

HARDWARE SET NO. 117

FOR USE ON DOOR #(S):

A245A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	1450 H OR HEDA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	328AA	ZER
1	SET	SEALS	488S	ZER
1	EA	DOOR BOTTOM	351AA6	ZER
1	EA	THRESHOLD	663A-MSLA-10	ZER

STC 40 AND FIRE RATED OPENING.

HARDWARE SET NO. 118

FOR USE ON DOOR #(S):

B105 B142 B142B B144

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
2	EA	ASTRAGAL	40AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER
1	EA	THRESHOLD	663A-MSLA-10	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 119

FOR USE ON DOOR #(S):

A245 B146 B212A B216 C117 C127
C133 C134 C138 C139 E140 E242

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	328AA	ZER
1	SET	SEALS	488S	ZER
1	EA	DOOR BOTTOM	351AA6	ZER
1	EA	THRESHOLD	663A-MSLA-10	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 120

FOR USE ON DOOR #(S):

A148A A148B

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	1450 H OR HEDA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER

STC 30 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 121

FOR USE ON DOOR #(S):

A108A A127 A224 A231 A237

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	4050 DEL REG / DEL EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER

HARDWARE SET NO. 122

FOR USE ON DOOR #(S):

A112A	A140	A143B	A160	A212	A227
A260	B101	B112A	B127	B238	B246
C105	C110	C113	C114	C122C	C124
C124B	C202	C202A	C206	C208	C212
C214	C224	D112	D122	D128	
D130	D130A	D132	D150		
D212	D222	D228	D230	D233	
D237	D238	D242	D243	D244	D245
D249	E104	E118	E128	E152	E153
E155	E156	E157	E212	E213	E222
E222A	E228	E251	E252	E255	E256
F121					

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER

STC 30 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 123

FOR USE ON DOOR #(S):

B142A

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 124

FOR USE ON DOOR #(S):

B122A B122B C203

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	COORDINATOR	COR X FL X MB	IVE
2	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 125

FOR USE ON DOOR #(S):

A108 A144A A218 A241 A242A A243
C113A C117A C127A C133A C138A C139A
D150A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER

STC 30 AND NON-RATED.

HARDWARE SET NO. 126

FOR USE ON DOOR #(S):

C134A

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5	IVE
2	EA	MANUAL FLUSH BOLT	FB458/FB358 AS REQUIRED	IVE
1	EA	DUST PROOF STRIKE	DP2	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER

STC 40 AND NON-RATED, PAIR

HARDWARE SET NO. 127

FOR USE ON DOOR #(S):

B141	B143A	B143B	B147	B243B	B245
B249	D113	D117A	D117B	D213	D217
D219	E121	E123A	E123B	E127	
E221	E223	E225	E227		

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	DOOR BOTTOM	351AA6	ZER
1	EA	SOUND GASKETING	AT HEAD AND JAMBS BY DOOR MANUFACTURER	EXI

STC 30 AND A SMOKE PARTITION

HARDWARE SET NO. 128

FOR USE ON DOOR #(S):

A228 A242

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
1	EA	SURFACE CLOSER	4050 RW/PA	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER

HARDWARE SET NO. 129

FOR USE ON DOOR #(S):
D123A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	ELEC FIRE EXIT HARDWARE	RX-ALK-9927-EO-F-AR6-SNB	VON
1	EA	ELEC FIRE EXIT HARDWARE	RX-ALK-9927-L-F-17-AR6-SNB	VON
3	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
3	EA	PRIMUS XP CORE	.	SCH
2	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER

EXIT DEVICES WITH 6 MINUTE AUTO RESET BATTERY POWERED DOOR ALARMS.

HARDWARE SET NO. 130

FOR USE ON DOOR #(S):

A180 A180A A188 A188A A280 A288

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR	VON
1	EA	FIRE EXIT HARDWARE	9927-L-F-996-17	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
1	EA	FSIC CORE	.	SCH
2	EA	SURFACE CLOSER	4050 EDA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 131

FOR USE ON DOOR #(S):

A181A A181B A181C A181D A280A A288A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	PANIC HARDWARE	CD-9927-EO-LBR	VON
1	EA	PANIC HARDWARE	CD-9927-L-LBR-17	VON
3	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
3	EA	FSIC CORE	.	SCH
2	EA	SURFACE CLOSER	4050 EDA	LCN
2	EA	KICK PLATE	8400 2" LDW	IVE
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	GASKETING	475AA	ZER
1	SET	SEALS	488S	ZER
1	SET	MEETING STILE GASKETING	8217S	ZER
1	EA	ASTRAGAL	155AA X 55AA	ZER
2	EA	DOOR BOTTOM	351AA6	ZER

STC 40 AND SMOKE PARTITION OR FIRE RATED OPENING.

HARDWARE SET NO. 132

FOR USE ON DOOR #(S):

A240

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	99-L-F-2SI-17-SNB	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER

HARDWARE SET NO. 133

FOR USE ON DOOR #(S):
A240A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	FIRE EXIT HARDWARE	99-L-F-2SI-17-SNB	VON
2	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
2	EA	FSIC CORE	.	SCH
1	EA	SURFACE CLOSER	4050 CUSH	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER

HARDWARE SET NO. 134

FOR USE ON DOOR #(S):
B107A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	STOREROOM LOCK	ND80RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER

HARDWARE SET NO. 135

FOR USE ON DOOR #(S):
A236 A238 B101A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER
1	EA	COAT AND HAT HOOK	582	IVE

HARDWARE SET NO. 136

FOR USE ON DOOR #(S):

A222 A225 B128 C112 E102

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	IVE
1	EA	OFFICE LOCK	ND50RD SPA	SCH
1	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	188S	ZER
1	EA	DOOR BOTTOM	369A X Z49	ZER
1	EA	COAT AND HAT HOOK	582	IVE

HARDWARE SET NO. 137

FOR USE ON DOOR #(S):

D248

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	IVE
1	EA	ELEC FIRE EXIT HARDWARE	RX-ALK-99-L-BE-F-17-AR1.5	VON
1	EA	SURFACE CLOSER	4050 REG OR EDA AS REQ.	LCN
1	EA	KICK PLATE	8400 2" LDW	IVE
1	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	SET	SEALS	488S	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	DOOR CONTACT	679-05WD	SCE

OPENING MONITORED. TIED TO ALARM SYSTEM TO ALERT IF IT IS OPENED FROM EITHER DIRECTION IN A NON-EMERGENCY EVENT.

HARDWARE SET NO. 138

FOR USE ON DOOR #(S):
 B110A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIRIED		
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURF. AUTO OPERATOR	4822	LCN
500	FT	PNEUMATIC TUBING	925	LCN
1	EA	CONTROL BOX	7902ES	LCN
2	EA	BLOW-OPEN BOX	7949ES	LCN
1	EA	COMPRESSOR	922 115V	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

SMOKE BLOW OPEN OPENING. COORDINATE WIRING OF OPERATORS AND ELECTRIFIED HARDWARE WITH SMOKE EVACUATION SYSTEM. PNEUMATIC AUTO OPERATOR. MAIN OPENING FOR BANK. MANY ITEMS IN THIS SET ARE SHARED WITH OPENINGS B100, A151F AND A151E SEQUENTIAL OPERATION. MANIFOLD COVER FOR COMPRESSOR WILL BE REQUIRED (BY OTHERS). COMPRESSOR WILL NEED TO BE WITHIN A 100' TUBING RUN OF EACH. COMPRESSOR WILL NEED A DEDICATED POWER CIRCUIT. TUBING COUPLINGS AS REQUIRED.

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER SUPPLY FOR EACH PAIR OF DOORS.

COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

HARDWARE SET NO. 139

FOR USE ON DOOR #(S):

A151E A151F B110

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-CD-99-EO	VON
1	EA	RIM OR MORTISE CYLINDER	.	SCH
		HOUSING AS REQUIRIED		
1	EA	FSIC CORE	.	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
1	EA	SURF. AUTO OPERATOR	4822	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

DOOR CONTACTS AND REX TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION.
OPENING MONITORED ONLY, NO ACCESS CONTROL. DRIP CAP AND THRESHOLD TO
EXTEND ENTIRE LENGTH OF BANK. SMOKE BLOW OPEN OPENING. COORDINATE WIRING
OF OPERATORS AND ELECTRIFIED HARDWARE WITH SMOKE EVACUATION SYSTEM.
PNEUMATIC AUTO OPERATOR. MAIN OPENING FOR BANK IS OPENING B100A, SET 138.

HARDWARE SET NO. 140

FOR USE ON DOOR #(S):
 A100A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRID	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
1	EA	OH STOP	100S	GLY
1	EA	SURF. AUTO OPERATOR	4822	LCN
500	FT	PNEUMATIC TUBING	925	LCN
1	EA	CONTROL BOX	7902ES	LCN
3	EA	BLOW-OPEN BOX	7949ES	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852T	LCN
2	EA	SURFACE MOUNT BOX	8310-869S	LCN
1	EA	COMPRESSOR	923 115V	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DESK MOUNT BUTTON	660-PB	SCE
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS904 900-4RL	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. SPECIAL POWER SUPPLY FOR OPENING WITH AUTO OPERATOR

SMOKE BLOW OPEN OPENING. COORDINATE WIRING OF OPERATORS AND ELECTRIFIED HARDWARE WITH SMOKE EVACUATION SYSTEM. PNEUMATIC AUTO OPERATOR. MAIN OPENING FOR BANK. MANY ITEMS IN THIS SET ARE SHARED WITH OPENINGS A100B, A100C, A100D, A100E AND A100F SEQUENTIAL OPERATION. COMPRESSOR ALSO SHARED WITH OPENINGS A100G, A100H, A100I, A00J, A100K, AND A100L. MANIFOLD COVER FOR COMPRESSOR WILL BE REQUIRED (BY OTHERS). COMPRESSOR WILL NEED TO BE WITHIN A 100' TUBING RUN OF EACH. COMPRESSOR WILL NEED A DEDICATED POWER CIRCUIT. TUBING COUPLINGS AS REQUIRED.

COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK. ELECTRIFIED OPENINGS WITH AUTO OPERATOR AT ACTIVE DOOR. CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. EXTERIOR PRESS WALL SWITCH DISABLED DURING SECURE MODE. INTERIOR PRESS WALL SWITCH ALWAYS ACTIVE. OPENING NOT INTERCONNECTED WITH ANY OTHER OPENING. ELECTRIFIED LATCH RETRACTION EXITS, POWER SUPPLY, DOOR CONTACTS AND REX ALL TIED TO SECURITY/ACCESS CONTROL SYSTEM. OPENING TO ALSO INCLUDE REMOTE RELEASE BUTTON (LOCATION TO BE DETERMINED BY ARCHITECT) TO REMOTELY UNLOCK DOOR AND ALLOW USE OF AUTO DOOR OPERATOR AT OPENING. AUTO OPERATOR AND CARD ACCESS AT THIS OPENING ONLY. OPENING ALSO TIMER CONTROLLED BY ACCESS CONTROL SYSTEM TO BE UNLOCKED DURING BUS ARRIVAL AND DEPARTURE TIMES.

HARDWARE SET NO. 141

FOR USE ON DOOR #(S):

A100B A100C A100D A100E A100F

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
1	EA	SURF. AUTO OPERATOR	4822	LCN
1	EA	DRIP CAP	142A	ZER
1	EA	DOOR SWEEP	39A	ZER
1	EA	THRESHOLD	626A-MSLA-10	ZER
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

SMOKE BLOW OPEN OPENING. COORDINATE WIRING OF OPERATORS AND ELECTRIFIED HARDWARE WITH SMOKE EVACUATION SYSTEM. PNEUMATIC AUTO OPERATOR. MAIN OPENING FOR BANK IS OPENING A100A, SET 140.

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. ACCESS CONTROL SYSTEM CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER SUPPLY FOR EACH PAIR OF DOORS.

COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

DOORS ELECTRIFIED BUT TIMER CONTROLLED BY ACCESS CONTROL SYSTEM TO BE UNLOCKED DURING BUS ARRIVAL AND DEPARTURE TIMES

HARDWARE SET NO. 142

FOR USE ON DOOR #(S):
 A100G

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRID	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
1	EA	OH STOP	100S	GLY
1	EA	SURF. AUTO OPERATOR	4822	LCN
500	FT	PNEUMATIC TUBING	925	LCN
1	EA	CONTROL BOX	7902ES	LCN
3	EA	BLOW-OPEN BOX	7949ES	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852T	LCN
2	EA	SURFACE MOUNT BOX	8310-869S	LCN
1	EA	CARD ACCESS	SPECIFIED IN SEPERATE SECTION	BYO
1	EA	DESK MOUNT BUTTON	660-PB	SCE
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS904 900-4RL	SCE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

SMOKE BLOW OPEN OPENING. COORDINATE WIRING OF OPERATORS AND ELECTRIFIED HARDWARE WITH SMOKE EVACUATION SYSTEM. PNEUMATIC AUTO OPERATOR. MAIN OPENING FOR BANK. MANY ITEMS IN THIS SET ARE SHARED WITH OPENINGS A100H, A100I, A100J, A100K AND A100L SEQUENTIAL OPERATION. COMPRESSOR IN SET 140 ALSO SHARED WITH OPENINGS A100G, A100H, A100I, A00J, A100K, AND A100L. COMPRESSOR WILL NEED TO BE WITHIN A 100' TUBING RUN OF EACH OPENING. TUBING COUPLINGS AS REQUIRED.

CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. SPECIAL POWER SUPPLY FOR OPENING WITH AUTO OPERATOR. COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK. ELECTRIFIED OPENINGS WITH AUTO OPERATOR AT ACTIVE DOOR. CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. EXTERIOR PRESS WALL SWITCH DISABLED DURING SECURE MODE. INTERIOR PRESS WALL SWITCH ALWAYS ACTIVE. OPENING NOT INTERCONNECTED WITH ANY OTHER OPENING. ELECTRIFIED LATCH RETRACTION EXITS, POWER SUPPLY, DOOR CONTACTS AND REX ALL TIED TO SECURITY/ACCESS CONTROL SYSTEM. OPENING TO ALSO INCLUDE REMOTE RELEASE BUTTON (LOCATION TO BE DETERMINED BY ARCHITECT) TO REMOTELY UNLOCK DOOR AND ALLOW USE OF AUTO DOOR OPERATOR AT OPENING. AUTO OPERATOR AND CARD ACCESS AT THIS OPENING ONLY. OPENING ALSO TIMER CONTROLLED BY ACCESS CONTROL SYSTEM TO BE UNLOCKED DURING BUS ARRIVAL AND DEPARTURE TIMES.

HARDWARE SET NO. 143

FOR USE ON DOOR #(S):

A100H A100I A100J A100K A100L

EACH TO HAVE:

1	EA	CONT. HINGE	112HD TWP	IVE
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
1	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRIED	.	SCH
1	EA	FSIC CORE	.	SCH
1	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
1	EA	SURF. AUTO OPERATOR	4822	LCN
1	EA	DOOR CONTACT	679-05HM	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

SMOKE BLOW OPEN OPENING. COORDINATE WIRING OF OPERATORS AND ELECTRIFIED HARDWARE WITH SMOKE EVACUATION SYSTEM. PNEUMATIC AUTO OPERATOR. MAIN OPENING FOR BANK IS OPENING A100G, SET 142.

DOOR CONTACTS TIED TO SECURITY SYSTEM SPECIFIED IN SEPARATE SECTION. ACCESS CONTROL SYSTEM CARD READER ACCESS CONTROL SYSTEM USED TO TRANSFER OPENING BETWEEN SECURE AND UNSECURE MODE. ELECTRIC LATCH RETRACTION POWERED THROUGH SPECIFIED POWER SUPPLY. AT BANKS OF DOORS PROVIDE ONE POWER SUPPLY FOR EACH PAIR OF DOORS.

COORDINATE INSTALLATION OF CYLINDER AND PULL TO ALLOW EASY ACCESS TO KEY. DRIP CAP AND THRESHOLD TO EXTEND ENTIRE LENGTH OF BANK.

DOORS ELECTRIFIED BUT TIMER CONTROLLED BY ACCESS CONTROL SYSTEM TO BE UNLOCKED DURING BUS ARRIVAL AND DEPARTURE TIMES

HARDWARE SET NO. 144

FOR USE ON DOOR #(S):
 A151C

EACH TO HAVE:

2	EA	CONT. HINGE	112HD TWP	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954	VON
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-EO	VON
1	EA	ELEC PANIC HARDWARE	RX-2-QEL+-99-NL-OP-110MD	VON
3	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
3	EA	FSIC CORE	.	SCH
2	EA	SURF. AUTO OPERATOR	4822	LCN
200	FT	PNEUMATIC TUBING	925	LCN
1	EA	BLOW-OPEN BOX	7949ES	LCN
1	EA	COMPRESSOR	920	LCN
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	POWER SUPPLY	PS902 900-4RL	VON
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

SMOKE BLOW OPEN OPENING. COORDINATE WIRING OF OPERATORS AND ELECTRIFIED HARDWARE WITH SMOKE EVACUATION SYSTEM. PNEUMATIC AUTO OPERATOR WITH SEQUENTIAL OPERATION. MANIFOLD COVER FOR COMPRESSOR WILL BE REQUIRED (BY OTHERS). COMPRESSOR WILL NEED TO BE WITHIN A 100' TUBING RUN OF EACH. COMPRESSOR WILL NEED ITS OWN DEDICATED POWER CIRCUIT. TUBING COUPLINGS AS REQUIRED. MULLION TO MATCH FRAME FINISH.

HARDWARE SET NO. 145

FOR USE ON DOOR #(S):
 A151B

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	IVE
1	EA	KEYED REMOVABLE MULLION	KR4954	VON
1	EA	PANIC HARDWARE	CD-99-EO	VON
1	EA	PANIC HARDWARE	CD-99-NL-OP-110MD	VON
3	EA	RIM OR MORTISE CYLINDER HOUSING AS REQUIRED	.	SCH
3	EA	FSIC CORE	.	SCH
2	EA	LONG DOOR PULL	9264F 36" 20" STD	IVE
2	EA	SURFACE CLOSER	4050 HCUSH	LCN
2	EA	STOP	WS407CCV OR FS436/FS438	IVE
1	EA	REMAINING HARDWARE	BY DOOR MANUFACTURER	EXI

MULLION TO MATCH FRAME FINISH.

MISCELLANEOUS ITEMS

1	EA	CONT. HINGE	112HD TWP	IVE
6	EA	HINGE	5BB1 4.5 X 4.5	IVE
6	EA	HW HINGE	5BB1HW 4.5 X 4.5	IVE
1	EA	PASSAGE SET	ND10S SPA	SCH
2	EA	OFFICE LOCK	ND50RD SPA	SCH
4	EA	CLASSROOM SECURITY	ND75RD SPA	SCH
2	EA	STOREROOM LOCK	ND80RD SPA	SCH
30	EA	FSIC CORE	.	SCH
250	EA	KEY BLANK	35-270 EVEREST 29 S	SCH
1	EA	DOOR PULL, 1" ROUND	8103EZHD 12" O	IVE
3	EA	SURFACE CLOSER	1450 REG OR PA AS REQ	LCN
2	EA	SURFACE CLOSER	4050 HCUSH	LCN
1	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES (WALL)	LCN
1	EA	DOOR CONTACT	674-OH	SCE
2	EA	DOOR CONTACT	679-05HM	SCE
1	EA	DOOR CONTACT	679-05WD	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	VON
8	EA	KNOX BOX	AS SPECIFIED	EXI
1	EA	KEY CABINET	AS SPECIFIED	EXI

END OF SECTION 08710

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass, mirrors, insulating glass panels, and plastic films for glass.
- B. Insulated metal glazing panels, glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 20 00 - Finish Carpentry: Millwork components with requirement for glass.
- B. Section 07 90 05 - Joint Sealers: Sealant and back-up material.
- C. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- D. Section 08 14 16 - Flush Wood Doors: Glazed doors.
- E. Section 08 36 13 - Sectional Doors: Glazing furnished by door manufacturer.
- F. Section 08 43 13 - Aluminum-Framed Storefronts: Glazed framing and entrance doors.
- G. Section 08 44 13 - Glazed Aluminum Curtain Walls: Glazed curtainwall framing.
- H. Section 08 51 13 - Aluminum Windows: Glazing furnished by window manufacturer.
- I. Section 10 28 00 - Toilet Accessories: Framed mirrors.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI Z97.1 - Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- D. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- G. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- H. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- I. GANA - GANA Glazing Manual; Glass Association of North America; 2009.
- J. GANA - GANA Sealant Manual; Glass Association of North America; 2008.
- K. SIGMA TM-3000 - Glazing Guidelines for Sealed Insulating Glass Units; 2004.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene a pre-installation meeting at least two weeks before starting work of this Section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Glass and Plastic Film Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

2. Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- C. Shop Drawings:
 1. Submit glazing schedule indicating all openings to be glazed, type of glazing, type of film and side upon which the film will be applied.
 2. Submit structural analysis and certification sealed and signed by a qualified professional structural engineer, licensed in the State of Maine, that glazing panels specified to meet load requirements for guards comply with applicable code.
- D. Samples:
 1. Upon request, submit 8x8 inch samples of glass units.
 2. Submit 8x8 inch samples of films.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.
- B. Installer Qualifications: Company specializing in performing the work of this Section with minimum five years documented experience.
- C. All heat strengthened, tempered and laminated glass shall be permanently labeled by such means as etching, sandblasting, firing of ceramic materials on the glass, or by other suitable means so as to be easily visible and legible. The label shall identify the nominal thickness, glass type and compliance with requirements of ANSI Z97.1 and with a certification label of the Safety Glazing Certification Council (SGCC) or other certifying agency acceptable to the Authority Having Jurisdiction.
 1. Fire-protection-rated glazing shall be permanently labeled per IBC requirements with name of manufacturer, test standard and rating identification.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. Sealed Glass Units: Provide a ten (10) year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same. The warranty shall ensure that coatings will not crack, flake, peel or otherwise fail or degrade.
- C. Laminated Glass: Provide a ten (10) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 INSULATING GLASS UNITS

- A. Type IG-1 & -1A - Sealed Insulating Glass Units: Vision glass, double glazed.
 1. Application: All exterior glazing unless otherwise indicated.
 2. Outboard Lite: Heat-strengthened float glass, or tempered glass where required by code or where indicated, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
 3. Inboard Lite: Annealed float glass or tempered glass where required by code or where indicated, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 4. Total Thickness: 1 inch.

5. Tempered Glass Applications: Provide this type of glazing in the following locations:
 - a. Glazed lites in exterior doors.
 - b. Glazed sidelights and panels next to doors.
 - c. Other locations required by applicable federal, State, and local codes and regulations.
 - d. Other locations indicated on the Drawings.
 6. Performance Requirements:
 - a. Visible Light Transmittance (VLT): 70%, nominal.
 - b. Winter U Value: 0.25 max.
 - c. Summer U Value: 0.25 max.
 - d. Light to Solar Gain Ratio (LSG): 1.85
 - e. Solar Heat Gain Coefficient (SHGC): 0.38 percent, nominal.
 7. Glazing Method: Gasket glazing.
- B. Type IG-2 - Sealed Insulating Glass Units: Spandrel glazing.
1. Application: Exterior glazing where indicated.
 2. Outboard Lite: Heat-strengthened float glass and tempered glass where required by code or where indicated, 1/4 inch thick, minimum.
 - a. Coating: Same as on vision units, on #2 surface.
 3. Inboard Lite: Heat-strengthened float glass and tempered glass where required by code or where indicated, 1/4 inch thick.
 - a. Opacifier: On #4 surface.
 - b. Opacifier Color: To be selected by Architect from manufacturer's full range.
 4. Total Thickness: 1 inch.
 5. Safety (tempered) Glazing Applications: Provide this type of glazing in the following locations:
 - a. Glazed sidelights and panels next to doors.
 - b. Other locations required by applicable federal, State, and local codes and regulations.
 6. Glazing Method: Gasket glazing.
- C. Type IG-3: Sealed Insulating Glass Units: Obscure (frosted) glazing.
1. Applications: Main and Practice Gymnasiums and locker rooms.
 2. Outboard Lite: Heat-strengthened float glass, or tempered glass where required by code or where indicated, 1/4 inch thick, minimum.
 - a. Tint: Clear
 - b. Coating: Low-E type on #2.
 3. Inboard Lite: Tempered glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - b. Acid Etched Frost, pattern to be determined.
 4. Total Thickness: 1 inch.
 5. Tempered Glass Applications: Provide this type of glazing in the following locations:
 - a. Glazed lites in Gymnasium areas.
 - b. Locations required by applicable federal, State, and local codes and regulations.
 - c. Other locations indicated on the Drawings.
 6. Glazing Method: Gasket glazing.
- D. Type S-1 - Single Vision Glazing: Non-fire-rated, fully tempered.
1. Applications: All non-fire-rated interior glazing unless otherwise indicated.
 2. Types: Fully tempered.
 3. Tint: Clear.
 4. Thickness: 1/4 inch.
- E. Type S-2 - Fire-Rated Safety Glazing: Glass ceramic fire-stop type; clear.
1. Application: Interior fire-rated locations.
 2. Thickness: as required for fire-rating.

3. Frames: Hollow metal, labeled and listed according to opening requirements and fire-rated frames as part of a total fire-rated assembly as indicated.
 4. Applications and IBC Fire Protection Ratings:
 - a. Glazed lites in fire doors at 2 hour exit enclosures: D-H-T-90. T rating not required if sprinkled.
 - b. Glazed lites in fire doors at 1 hour exit enclosures: D-H-T-60. T rating not required if sprinkled.
 - c. Glazed lites in fire doors at 1 hour fire barriers: D-H-T-45 minimum. T rating not required if sprinkled.
 - d. Glazed fire windows, borrowed lites, sidelights, transom lites in 1 hour fire barriers: OH-45.
 5. Fire Protection Ratings: As indicated on the Drawings.
 6. Glazing Method: As required for fire rating.
- F. Type S-3 – Laminated Safety Glass: Non-fire rated; clear.
1. Applications: All non-fire-rated interior glazing where indicated in the Drawings and butt-glazed locations, unless otherwise indicated on the Drawings.
 2. Thicknesses: 5/8 inch minimum and as required for application.
 - a. The thickness specified above has been derived from manufacturer provided literature as a recommended minimum thickness required to meet applicable code requirements for “guards”. Glass panels shall be rigid and able to withstand a horizontal concentrated force of 200 pounds applied on one square foot at any point in the system including panels, intermediate rails, vertical frames, or other elements. Engineered glazed panels shall be designed by a qualified professional structural engineer employed by the glazing subcontractor, licensed in the State of Maine
 3. Dining Room Sign Panel: Anti-reflective, clear laminated, minimum thickness ½ inch and as required for panel size; ground edges.
 4. Butt-Glazed Panels:
 - a. Outboard Lite: Clear tempered 1/4 inch thick, minimum.
 - b. Inboard Lite: Laminated, outer-ply tempered glass, 0.060 interlayer, inner ply, tempered glass, 3/8 inch thickness minimum, or as required for strength and to limit deflection for the panel size
 - c. Interlayer material: Polyvinyl Butyral sheets.
- G Type S-4 – Dual Glazed Vision: STC 40 acoustic, clear, non-fire rated, safety glass.
1. Applications: Glazing units scheduled for Control Room B103.
 2. Assembly: Outer pane ¼” laminated, 1 inch air space; inner layer ¼” laminated glass.
 3. Total Thickness: 1.5 inches.
- H. Type S-5– Laminated Safety Spandrel Glass: Opaque interlayer.
1. Applications: Non-fire-rated interior glazing as indicated on the Drawings.
 2. Interlayer Color: As selected by the Architect from the manufacturer’s full range.
 3. Outboard Lite: Clear tempered ¼ inch thickness, inboard lite tempered 3/8 inch glass with 0.060 polyvinyl butryl interlayer.
 3. Thickness: 5/8 inch minimum and as required for application.
- I. Type S-6 – One-Way Mirror Glass: Tempered.
1. Applications: Locations indicted on the Drawings.
 2. Thickness: ¼ inch.
- J. Type S-7- Mirror Glass: Tempered.
1. Applications: Wall mounted at locations indicted on the Drawings.
 2. Thickness: ¼ inch.
- K. Type S-8 - Sliding Glass Door Panels:
1. Application: Interior display cases.
 2. Type: Clear, laminated glass with polished ground edges and corners.
 3. Thickness: 1/4" minimum, thickness as determined by fabricator's engineering.

- L. Type S-9 - Glass Shelves:
 - 1. Locations: Display cases.
 - 2. Fully tempered float glass with polished ground edges and corners.
 - 3. Thickness: 1/4" for shelves supported no more than 18" on center; 3/8" for shelves supported no more than 24" on center.
- M. Type S-10 – Laminated Safety Glass: Non-fire rated; clear.
 - 1. Applications: Interior glazing where indicated in the Drawings.
 - 2. Thicknesses: 3/8 inch.

2.03 EXTERIOR GLAZING ASSEMBLIES

- A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with International Building code, 2009 edition.
 - 1. Wind Loads: See Structural Drawings.
 - a. Basic Wind Speed (3-second gust): 100 mph.
 - b. Wind Importance Factor: 1.15.
 - c. Building Category: III
 - D. Wind Exposure Category: B.
 - d. Horizontal Wind Pressures:
 - 1) Interior Zone: +19.73 / -21.37 PSF
 - 2) Exterior Zone: +19.73 / - 26.31 PSF
 - 2. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
 - 3. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
 - 4. Glass thicknesses listed are minimum.
- B. Thermal and Optical Performance: Provide glass products with performance properties specified above. Performance properties shall be manufacturer's published data as determined according to the following procedures:
 - 1. Center of glass U-Value: NFRC 100 methodology using LBNL WINDOW 5.2 computer program.
 - 2. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 5.2 computer program.
 - 3. Solar optical properties: NFRC 300.
- C. Insulating Glass shall comply with ASTM D 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation. Unit shall be certified for compliance by the IGCC.
- D. Unit Overall Thickness Tolerance: - 1/16" / + 1/132".
- E. Comply with ASTM E546 Standard Test Method for Frost Point of Sealed Insulating Glass Units and ASTM E576 for insulating glass units in the vertical position.
- F. Insulating glass units shall be double sealed with a primary seal of polyisobutylene and a secondary seal of silicone.
 - 1. Minimum thickness of secondary seal: 1/16".
 - 2. Target width of primary seal: 5/32".
 - 3. No primary seal voids or skips allowed.
 - 4. Gaps or skips between the primary and secondary sealants are permitted to a maximum width of 1/16" by maximum length of 2" with gaps separated by at least 18". Continuous contact between the primary seal and the secondary seal shall be provided.
 - 5. Primary and secondary sealant adhesion shall exhibit continuous, tenacious adhesion to both glass and spacer contact areas.
- G. Lite spacer shall be a plastic hybrid stainless steel spacer or structural aluminum polyurethane thermal barrier spacer with three bent corners and one keyed-soldered corner or four bent corners and one straight key joint to provide a hermetically sealed and dehydrated space. Color as selected by the Architect.

1. Products: TGI-Spacer by Technoform.
 2. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
1. In conjunction with vapor retarder and joint sealer materials described in other Sections.
 2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.04 GLASS MATERIALS

- A. Float Glass: All glazing shall be float glass unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
 3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
 4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.
 5. Manufacturers:
 - a. AGC Glass Company North America, Inc.
 - b. Cardinal Glass Industries.
 - c. Guardian Industries Corp.
 - d. Pilkington North America Inc.
 - e. PPG Industries, Inc.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
 2. Plastic Interlayer: 0.060 inch thick, minimum.
 3. Where fully tempered is specified or required, provide glass that has been tempered by the tong-less horizontal method.
 4. Manufacturers:
 - a. AGC Flat Glass North America, Inc.
 - b. Cardinal Glass Industries.
 - c. Substitutions: Refer to Section 01 60 00 - Product Requirements.
- C. Mirrored Glass: Laminated safety glass; ASTM C1503; ASTM C1036, Type 1, Class 1 quality Q1, single-side silver coated, hermetically sealed with uniform electroplated copper coating, protected by a coat of mineral oxide oil base paint.
1. Pre-drill holes as required.
 2. Ground edges.
- D. One-way Mirror Glass: Mirror quality float glass, Type 1 Class 1, quality Q3, with pyrolite metal oxide factory coating applied to one face to create a reflective, silver gray appearance. Fully tempered where required for safety or where indicated on the Drawings.
1. Product: Mirropane Two –Way Mirror by Pilkington North American Inc.
- E. Fire-Protection-Rated Glazing: Type, thickness, and configuration as required to achieve indicated ratings.
1. IBC Fire Protection Rating: As indicated on drawings.
 2. Provide products listed by Underwriters Laboratories or Intertek Warnock Hersey.
 3. Safety Certification: 16 CFR 1201 Category II.
 4. Labeling: Provide permanent label on each piece giving the IBC rating and other information required by the applicable code.
 5. Product:
 - a. Basis of Design: Pyrostop by Pilkington - Technical Glass Products.
 - b. Firelite Plus by Technical Glass Products.
 - c. Substitutions: Refer to Section 01 60 00 - Product Requirements.

2.05 SEALED INSULATING GLASS UNITS

- A. Sealed Glass Assemblies Basis of Design:
1. IG-1: Sunguard Light Blue 63 on Clear Low-E (#2) and Sunguard 15 (#4); panels fabricated by Guardian Sunguard Advanced Architectural Glass.
 1. IG-1A: Sunguard Super Neutral 68 on Clear Low-E (#2) and Sunguard 15 (#4); panels fabricated by Guardian Sunguard Advanced Architectural Glass.
 2. IG-2: Sunguard Light Blue 63 on Clear Low-E (#2) and opacifier panel by Guardian (#4); panels fabricated by Guardian Sunguard Advanced Architectural Glass.
 3. IG-3: Sunguard Light Blue 63 on Clear Low-E (#2) and satin-deco etched panel by Guardian (#3); panels fabricated by Guardian Sunguard Advanced Architectural Glass.
- B. Acceptable Manufacturers:
1. Cardinal Glass Industries.
 2. Viracon, Apogee Enterprises, Inc.
 3. PPG Industries, Inc.
 4. Substitutions: Refer to Section 01 60 00 - Product Requirements.

2.06 INSULATED SOLID GLAZING PANELS

- A. Type IG-4 – Insulated Aluminum Glazing Panels: Opaque panels of balanced laminated construction; 1 inch thickness.
1. Panel Surface: Exterior and interior surfaces 0.032 inch aluminum anodized to match curtainwall and storefront framing.
 2. Adhesive: Permanently elastic type; neoprene or rubber base suitable for exterior use and covering 100% of the surfaces to be laminated.
 3. Panel Core Composition:
 - a. 1/8 inch thermoplastic core.
 - b. As required for custom profile, polyisocyanurate foam, 5/8 inch minimum.
 - c. 1/8 inch thermoplastic core.
 4. Profile: Custom profile as indicated on the Drawings. Design intent is a panel profile with panel exterior face flush to curtain wall glazing cap face. Provide continuous formed smooth welded returns to create formed panel edges to fit glazing channel as required.
 5. Basis of Design: Endurex 500 Series Architectural Panels by Nudo.
 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 PLASTIC FILMS

- A. Plastic Film Type A, B and C: Decorative plastic film for application on glass; Class A fire-rated.
1. Patterns/Colors:
 - a. Type A: SH2MACRX Mat Crystal.
 - b. Type B: SH2MAML Milky White.
 - c. Type C: SH2MAMM Milky.
 2. Locations: Interior locations indicated on the Drawings.
 3. Provide custom laser cut lettering; scale, layout and font as indicated on the Drawings.
 4. Product: Fasara Glass Decorative / Privacy Film by 3M Window Film.
 - a. Substitutions: Refer to Section 01 60 00 - Product Requirements.

- B. Plastic Film Type Polarized: Polarized window film, 0.2 mm thickness. Neutral gray with peel-off protective face layer and peel-off layer on pressure sensitive adhesive backing.
1. Applications: Interior windows on opposing walls with film transmission axes crossed to stop view from outboard spaces to each other. (Locker room offices.)
 2. Installation: Shop-applied with laminating equipment.
 3. Mounting Side: Office.
 4. Minimum Sheet Size: 24" x 39.5"
 5. Transmission Requirements:
 - a. Single: 38.7%
 - b. Parallel: 30.1%
 - c. Crossed: 0.0045%
 6. Polarizing Coefficient: 99.985%.
 7. Product: PFA-AD by Alight.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 MISCELLANEOUS ACCESSORIES

- A. Miscellaneous Hardware: Provide all hardware required for intended glass applications.
- B. Sliding Glass Door Hardware: Clear anodized aluminum with ball bearing steel rollers.
1. Manufacturer: Knappe and Vogt or Style Mark.
 3. Provide components as follows in quantities recommended by the manufacturer for each application:
 - a. Upper Channels K&V # 1093
 - b. Shoes K&V # 1095
 - c. Rollers K&V # 1097
 - d. Guides K&V # 1085
 - e. Bumpers K&V # 1087
 - f. Lower Track K&V #1099
 - g. Pulls K&V # 836 one per door, bright chrome.
 - h. Barrel Locks for all doors, keyed alike.
- C. Insulated Sliding Glass Door: Clear anodized aluminum horizontal slider.
1. Frame: 2 1/16 inch.
 2. Sash Depth: 1 1/8 inch.
 3. Glazing: Insulated Glass Units: ASTM E 774, Class A, 3/4 inch thick overall, clear.
 4. Frame and Sash Color: Clear Anodized (Both sides)
 5. Hardware & Accessories: Manufacturer standard for a complete window system.
 6. Product (Basis of Design): 1180H Series by Milgard Manufacturing.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Glazing Channels: Top and bottom channels for interior vertical butt-glazed panels; 2-1/4" W x 1-11/16"
1. Sealant to be clear at but glazed joints.
 2. Finish: Brushed stainless steel.
 3. Glazing: Type S-2, butt glazed
 4. Provide with roll in EPDM Gasket all sides
 5. Product: NH3BSSL by C.R. Laurence Co.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Glass Shelving Cable System: Stainless steel cable system with chrome plated fittings and brackets.

1. Base Fittings: CRL Series CB88 Long Round Floor Base.
 2. Ceiling Mount: CRL Series CB74 Plated Ceiling Mount.
 3. Glass Shelf Brackets: CRL Series CB108 Drilled Glass Shelf Brackets.
 4. Hardware & Accessories: Manufacturer standard for a complete shelf system in configurations as indicated per the Drawings.
 5. Product: CRL Cable Display System by C.R. Laurence Co.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Glass Stand-off Hardware: Brushed stainless steel.1/2 inch diameter standoff cap assembly.
1. Product: CRL 316.
- G. Mirror Trim: Brushed stainless steel "J" trim, wrapping all exposed perimeter edges and lapping approximately 1/4" onto face of glass. Trim shall fit snugly, without damaging mirror coating.

2.09 GLAZING COMPOUNDS

- A. Glazing Compound: Elastic type.
1. Bostik Inc.
 2. Momentive Performance Materials, Inc.
 3. Pecora Corporation.
 4. BASF Construction Chemicals-Building Systems.
 5. DAP Inc.
 6. Dow.
 7. Substitutions: Refer to Section 01 60 00 - Product Requirements.

2.10 GLAZING ACCESSORIES

- A. Glazing Materials: Select glazing compounds, sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
- B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance. Glass sizes indicated on the Drawings are approximate only.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. All frames shall be checked prior to glazing to make certain openings are square, plumb and secure in order that uniform face and edge clearances are maintained.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.
- E. Install sealant in accordance with manufacturer's instructions.

3.03 GLAZING METHODS

- A. All glazing shall be performed in accordance with standards of FGMA, AAMA and SIGMA, latest editions. Glass clearance dimensions shall be based on the type and thickness of the glass as determined by the FGMA Glazing Manual, or as hereinafter specified.

- B. No glass shall be installed where it may be damaged unless it is properly protected at all times. Any damaged or defective glass shall be removed and replaced with new perfect glass at no additional cost to the Owner.
- C. Install fire-rated glass in strict accordance with tested assemblies and the manufacturer's instructions and recommendations.

3.04 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - EXTERIOR BUTT GLAZED METHOD (SEALANT ONLY)

- A. Temporarily brace glass in position for duration of glazing process. Mask edges of glass at adjoining glass edges and between glass edges and framing members.
- B. Temporarily secure a small diameter non-adhering foamed rod on back side of joint.
- C. Apply sealant to open side of joint in continuous operation; thoroughly fill the joint without displacing the foam rod. Tool the sealant surface smooth to concave profile.
- D. Permit sealant to cure then remove foam backer rod. Apply sealant to opposite side, tool smooth to concave profile.
- E. Remove masking tape.

3.06 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- F. Knife trim protruding tape.

3.07 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

- A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.
- D. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.
- E. Fill gaps between pane and applied stop with appropriate sealant to depth equal to bite on glazing, to uniform and level line.
- F. Trim protruding tape edge.

3.08 MIRRORS

- A. Mirrors shall be adhered directly to back-up walls as recommended by the manufacturer. Provide additional mechanical fastening devices as required and approved by the Architect.
- B. Mirrors shall be installed with top and bottom continuous chrome glazing channels

3.09 INSTALLATION – FILM

- A. In general, films shall be installed on the room side, NOT on the corridor side. Application side for films shall be confirmed as part of the glazing schedule submittal.
- B. Clean application surfaces thoroughly prior to installation. Install in accordance with manufacturer's instructions. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch from window sealant. Spray slip solution on glass and adhesive to facilitate proper positioning of film. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
- C. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.10 LAMINATED AND INSULATED ALUMINUM PANELS

- A. Panels shall be installed into frames in strict accordance with the manufacturer's instructions and recommendations. Provide a continuous bed of sealant around all edges, preventing moisture contact with panel edges.

3.11 CLEANING

- A. Remove glazing materials from finish surfaces. Remove labels after Work is complete. Clean glass and adjacent surfaces.

END OF SECTION

SECTION 08 91 00
LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Louvers, frames, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing.
- B. Section 07 25 00 - Weather Barriers: Sealing frames to weather barrier installed on adjacent construction.
- C. Section 09 21 16 - Gypsum Board Assemblies: Wall partitions to receive interior louvers.
- D. Division 23 - Mechanical.

1.03 REFERENCE STANDARDS

- A. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.
- D. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum fifteen years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wall Louvers:
 - 1. Interior Applications: (Basis of Design) Airolite Company, LLC; Louver Type K666
 - 2. Exterior Applications: (Basis of Design) Airolite Company, LLC; Louver Type K605
- B. Alternate Manufacturers:
 - 1. Construction Specialties, Inc.
 - 2. Nystrom, Inc. 666
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
 - 1. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf (100 MPH) without damage or permanent deformation.
 - 2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
 - 3. Screens: Provide bird screens at all louvers.
- B. Stationary Louvers: Horizontal blade, formed galvanized steel sheet construction, with intermediate mullions matching frame.

1. Interior Aluminum Louvers:
 - a. Free Area: 53 percent, minimum.
 - b. Blades: Slanted, 30 degrees.
 - c. Frame: 4 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
 - d. Aluminum Thickness: Frame 13 gage, 0.081 inch minimum base metal; blades 13 gage, 0.081 inch minimum base metal.
 - e. Steel Finish: See Finish Legend.
2. Exterior Aluminum Louvers:
 - a. Free Area: 51 percent, minimum.
 - b. Blades: V-shaped, sight-proof.
 - c. Frame: 5 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
 - d. Aluminum Thickness: Frame 13 gage, 0.081 inch minimum base metal; blades 13 gage, 0.081 inch minimum base metal.
 - e. Steel Finish: See Finish Legend.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), Alloy 6063-T5.

2.04 FINISHES

- A. As indicated per the Finish Schedule.

2.05 ACCESSORIES

- A. Bird Screen: Interwoven wire mesh of steel, 14 gage, 0.0641 inch diameter wire, 1/2 inch open weave, diagonal design.
 1. Applications: Exterior louvers only.
- B. Fasteners and Anchors: Stainless steel.
- C. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive work and opening dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Coordinate with installation of flashings by others.
- C. Install louvers level and plumb.
- D. Set sill members and sill flashing in continuous bead of sealant.
- E. Align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- F. Secure louver frames in openings with concealed fasteners.
- G. Coordinate with installation of mechanical ductwork.

3.03 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

END OF SECTION

SECTION 09 05 61
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of new concrete floor slabs for installation of floor coverings.
- b. Testing of concrete floor slabs for moisture and pH.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds and finish for concrete slabs to receive finish flooring.
- C. Section 09 64 29 – Wood Strip and Plank Flooring.
- D. Section 09 65 00 - Resilient Flooring.
- E. Section 09 65 66 – Resilient Athletic Flooring.
- F. Section 09 68 00 – Carpeting.
- G. Section 09 68 13 – Tile Carpeting.
- H. Section 12 48 13 – Entrance Floor Mats.

1.03 REFERENCES

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.
- F. RFCI - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.04 SUBMITTALS

- A. Product Data: Floor covering and adhesive manufacturers' product data for each specific combination of substrate, floor covering, and adhesive to be used, submit:
 - 1. Manufacturer's recommended slab moisture and pH limits.
 - 2. Manufacturer's required bond/compatibility test procedure.
- B. Field Reports:
 - 1. Submit visual observation report for existing floor coverings to be removed.
 - 2. Submit contractor's field adhesive bond and compatibility test results.

1.05 QUALITY ASSURANCE

- A. Moisture and pH testing shall be performed by an independent testing agency employed and paid for by Owner.
- B. Contractor may perform adhesive and bond test with his own personnel or hire a testing agency.
- C. Contractor's Responsibility Relating to Independent Agency Testing:
 - 1. Provide access for and cooperate with testing agency.
 - 2. Confirm date of start of testing at least 10 days prior to actual start.
 - 3. Allow at least 4 business days on site for testing agency activities.
 - 4. Achieve and maintain specified ambient conditions.
 - 5. Notify Owner when specified ambient conditions have been achieved and when testing will start.
- D. Applicator Qualifications: Companies specializing in performing the work of this Section with minimum five years of experience and approved by the manufacturer.

1.06 PRE-INSTALLATION MEETING

- A. Convene a pre-installation meeting after the results of slab testing are available and at least two weeks before starting finish flooring installation; require attendance by the Contractor, a technical representative from each flooring manufacturer, flooring installer, Architect and Owner, to review slab moisture levels, floor surface conditions and preparation requirements, materials, installation procedures and coordination of related work.
 - 1. A field report summarizing the findings and recommendations from this meeting shall be issued by the technical representatives and copied to the Owner and Architect.
 - 2. Written certification from each flooring manufacturer that condition of sub-floor is acceptable for flooring installation shall be issued and copied to the Owner and Architect.
 - 3. If a slab moisture sealer or other remedial work is required to make the condition of the sub-floor acceptable for the flooring installation, such measures shall be reviewed with the manufacturer's technical representatives and the Contractor shall be instructed to procure pricing.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.08 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compounds: Cementitious type recommended by adhesive material manufacturer and flooring manufacturer. Calcium sulphate, plaster or gypsum based toppings, leveling and patching compounds are not acceptable.
 - 1. Product:
 - a. K-15 by Ardex. (Slope / Build-up Product: SD-P by Ardex).
 - b. Drytek Premium Skimcoat Patch Underlayment with Primer by Laticrete.
 - c. Substitutions: See Section 01 60 00 – Product Requirements.
- B. Self-leveling Cementitious Underlayment: Portland cement-based self-leveling underlayment.
 - 1. Substrate preparation and conditions shall be reviewed and confirmed with the manufacturer's technical representative prior to installation.
 - 2. Slab primer as recommended by the underlayment manufacturer.
 - 3. Products:
 - a. K-15 by Ardex.
 - b. Premium Self-Levelign Underlayment by Loster American Corp.
 - c. Supercap by Laticrete.
 - d. Substitutions: See Section 01 60 00 – Product Requirements.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION AND TESTING

- A. Perform following operations in the order indicated:
 - 1. Visual observation of floor slab for adhesion, water damage, alkaline deposits, and other defects.
 - 2. Preliminary cleaning for all slabs.

- B. Owner's testing agency shall test concrete slab surfaces. Test results shall be made available to the contractor for determination of acceptability by the flooring and adhesives manufacturers. Contractor shall obtain instructions from flooring manufacturers if test results are not within their recommendation limits. Testing shall include:
 - 1. Internal relative humidity rates per ASTM F2170
 - 2. Alkalinity, pH rates per ASTM 710.
- C. Contractor shall verify that concrete slabs conforms to ASTM F710. Perform adhesive bond tests and water absorption tests.
- D. Testing Agency's Report: Include description of areas tested; include floor plans and photographs if helpful; summary of conditions encountered; copies of specified test methods; certification of accuracy by authorized official of testing agency; and:
 - 1. Moisture and pH test reports.
 - 2. Recommendations for remediation of unsatisfactory surfaces.
 - 3. Submit report directly to Owner not more than two business days after conclusion of testing.
- E. Subfloor surfaces shall not vary more than plus or minus 1/8" in any 10' dimension. Neither shall they vary at a rate greater than 1/16" per running foot. Leveling compound shall be used for larger areas. For subfloor surfaces intended to slope to floor drains, build-up product shall be installed precisely to create proper pitch. Floor pitch shall be laser verified with results submitted to the Architect and Owner.
- F. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.

3.02 SUBSTRATE PREPARATION

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond. Do not use solvents or other chemicals for cleaning. Do not fill expansion joints or other moving joints.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate. Verify slab substrates conform to ASTM F710.
- C. Subfloor surfaces shall not vary more than plus or minus 1/8" in any 10' dimension. Neither shall they vary at a rate greater than 1/16" per running foot. Leveling compound shall be used for larger areas and for floor areas to receive large format ceramic tile.
 - 1. For subfloor surfaces intended to slope to floor drains, build-up product shall be installed precisely to create proper pitch. Floor pitch shall be laser verified with results submitted to the Architect and Owner.
 - 2. Substrate surface pitch shall be confirmed with a laser level for conformance to pitch requirements. Report results to Architect and Owner.
- D. Prepare subfloor surfaces as recommended by flooring and adhesive manufacturers.
- E. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.
- E. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor patching compound to achieve smooth, flat, hard surface. Provide

transition strips directly over construction joints between new and existing floor slabs where applicable.

3.02 UNDERLAYMENT PREPARATION & INSTALLATION

- A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.
- B. Vacuum clean surfaces. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- C. Install products in accordance with manufacturer's instructions.
- D. Once underlayment starts to set, prohibit foot traffic until final set has been reached.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES
(Trade Bid Required)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Interior metal stud wall framing.
- C. Ceiling and soffit framing.
- D. Acoustic Construction, including installation of acoustic insulation and sealing of joints at framing and gypsum board.
- E. Gypsum wallboard products and ceiling board for Portland cement plaster.
- F. Horizontal and vertical shaftwall systems.
- G. Marking and identification of fire-rated assemblies.
- H. Joint treatment, expansion and control joints, special shapes and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 1-B – School Bid Depository Conditions and Regulations
- B. Section 05 40 00 - Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing and exterior sheathing.
- C. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking for support of wall-mounted equipment.
- D. Section 07 21 00 - Thermal Insulation: Acoustic batt insulation in stud walls and mineral fiber batt insulation at tops of partitions.
- E. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.
- F. Section 07 90 05 - Joint Sealants: Sealants.
- G. Section 09 24 00 - Portland Cement Plastering: Plaster finish over backer board.
- H. Section 09 30 00 - Tiling: Tile backer board.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2012.
- B. ANSI S200 - North American Standard for Cold-Formed Steel Framing - General Provisions.
- C. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).
- D. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2010.
- E. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- F. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic-Coated and Nonmetallic-Coated for Cold-Formed Framing Members; 2005.
- G. ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2007.
- H. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 2008.
- I. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.

- J. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- K. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.
- L. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- M. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- N. ASTM C1396- Standard Specification for Gypsum Board; 2011.
- O. ASTM C1629 - Standard Classification for Abuse-Resistant Non-decorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2006.
- P. ASTM C1658 - Standard Specification for Glass Mat Gypsum Panels; 2012.
- Q. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- R. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- S. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- T. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- U. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.
- V. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2012.
- W. ICC - International Building Code; 2009.
- X. UL - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Trade Bids for work under this Section shall be for the complete work of this Section and shall be filed under the provisions and requirements specified under Division 01 – General Requirements.
 - 1. Special attention is directed to Section 1-B – School Bid Depository Conditions and Regulations and all Sections within Division 01 – General requirements which are hereby made a part of this Section of the Specifications.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Provide data on metal framing, runners, head tracks, shaftwall assemblies, gypsum board, accessories, and joint finishing systems.
 - 2. Submit manufacturer's shaft wall tables for loading and deflection criteria, where no special loads are present, identifying stud height, size and thickness selections.
 - 3. Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- C. Shop Drawings:
 - 1. Submit fully engineered shop drawings for all partitions which shall accommodate lateral and required special loading conditions specified herein. Submit design criteria, calculations, size and thickness designations, type, location, spacing, connection to building structure, supplemental bracing or accessories, fasteners and details required for proper installation. All shop drawings shall bear the seal of the licensed structural engineer licensed employed by the gypsum board assemblies subcontractor, licensed to practice in Maine.

- a. Provide calculations for loadings and stresses of all framing that bear the seal of the licensed structural engineer.
 2. Submit color coded floor plans with partition colors keyed to stud manufacturer's color coding system indicating extents of each stud / partition assembly type.
 3. Submit details associated with fire-rated partition head tracks coordinated with Section 07 84 00 - Firestopping, products submittal.
- D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.
- E. Samples: Upon request, submit samples of all materials and accessories.

1.06 QUALITY ASSURANCE

- A. Panel Products and Finishing Manufacturer: Unless otherwise indicated, gypsum board and other panel products, accessories and finishing materials shall be from a single manufacturer.
- B. Metal Framing Manufacturer: Unless otherwise indicated, steel framing for gypsum board assemblies shall be from a single manufacturer.
- C. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.
- D. Framing components and assemblies required to be engineered and detailed on shop drawings shall include proper accommodations for all live and dead loads, differential building movement, etc. Provide industry standard safety factors as suited to specific job conditions. To the extent that component types and sizes are indicated in the Contract Documents, they shall be considered minimum requirements to be verified and increased (but not decreased) as determined to be necessary by the metal stud contractor's engineer. Framing member depths indicated on the Drawings shall not be altered without the Architect's prior written authorization.
- E. All procedures and workmanship shall be in accordance with Gypsum Association GA-216 "Application and Finishing of Gypsum Board" and Gypsum Association Specifications for the Installation of Screw-Type Steel Framing Members to Receive Gypsum Board.

1.07 PRE-INSTALLATION MEETING

- A. At least 3 weeks prior to start of installation of metal framing systems, meet at the Project site with installers of other work including door and window frames, mechanical and electrical work. Review areas of potential interference and conflicts, coordinate layout, and support provisions for interfacing work.

1.08 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be delivered to the job site in their original unopened containers or bundles, stored flat under conditions providing adequate protection from damage and exposure to elements and adequately protected from foul weather conditions.
- B. Steel framing and related accessories shall be stored and handled in accordance with AISI Code of Standard Practice.
- C. All fire-rated materials shall bear testing agency labels and required classification numbers.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216. See PART 3 for finishing requirements.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with STC ratings as indicated on the Drawings, calculated in accordance with ASTM E413 by a qualified independent testing agency, based on tests conducted in accordance with ASTM E90.
- C. Shaft Walls: Provide completed assemblies with the following characteristics:

1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- D. Fire Rated Assemblies: Provide complete assemblies as indicated on the Drawings. Materials and construction shall be identical to assemblies whose fire resistance rating has been determined per ASTM E119 by a testing and inspection service acceptable to the Authority Having Jurisdiction. Materials provided shall meet or exceed flame, fuel and smoke requirements of ASTM E84 surface burning characteristics for finish materials.
1. UL Assembly Numbers: Comply with requirements listed for each particular assembly. See tested assemblies appended to the end of this Section.
- E. Design Requirements:
1. Steel stud maximum spacing: 16 inches on center.
 2. All partitions at a minimum, shall be capable of sustaining the uniform lateral load and the special loading imposed by wall cabinets as defined below.
 3. Steel stud lateral deflection for partitions:
 - a. Typical gypsum board faced partitions: L/240.
 - b. Ceramic tile faced partitions: L/720.
 - c. Masonry veneer faced partitions: L/720.
 4. Steel stud vertical deflection for soffits and ceilings:
 - a. Typical gypsum board facing: L/240.
 - b. Portland cement veneer plaster facing: L/360.
 5. Steel stud uniform lateral loads for partitions:
 - a. Typical gypsum board faced partitions: 5 PSF.
 - b. Ceramic tile faced partitions: 8 PSF.
 - c. Masonry veneer faced partitions: 15 PSF.
 6. Steel stud special loads in addition to uniform lateral loads for partitions:
 - a. Wall mounted cabinets: Minimum 60 PLF applied vertically 6" from the face of the wall (for a 12" deep cabinet).
 - b. Wall mounted shelving: Minimum 20 PLF per shelf applied vertically 6" from the face of the wall for (4) four shelves spaced 12" apart with top shelf at 6 feet AFF (for a 12" deep shelf).
 - c. Wall mounted counters: Minimum 100 PLF applied vertically 12" from the face of the wall (for a 24" deep counter) and applied vertically 15" from the face of the wall (for a 30" deep counter).
 - d. Wall mounted handrails: Minimum concentrated force of 200 pounds applied at any point in any direction and, but not simultaneously, a uniform load of 50 PLF applied in any direction 4" from the face of the wall.
 - e. Wall mounted stationary grab bars: Minimum concentrated force of 250 pounds applied at any point in any direction 4" from the face of the wall.
 - f. Retail display walls: Minimum 20 PSF applied vertically 6" from the face of the wall (for 12" deep display support brackets).
 - g. Wall mounted shower seats: Minimum concentrated force of 400 pounds applied at any point in any direction 12" from the face of the wall (for a 24" deep seat).
 - h. Wall supported gypsum board framed ceiling: Ceiling dead load of 7 PSF.
 - i. Wall mounted monitors: Minimum concentrated force of 60 pounds applied at any point in any direction 8" from the face of the wall.
 - j. Maintenance load for horizontal soffit shelves: 40 PSF

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
1. Dietrich Metal Framing.
 2. Marino\Ware.

3. EB Metals.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Framing System Components: ASTM C645, roll-formed steel.
1. Protective Coating: ASTM A653 minimum G60 (Z180) hot-dip galvanized corrosion resistant coating.
 - a. Provide galvanizing in accordance with ASTM A653 G690/Z275 coating at the following locations: Locker Room F131, Faculty Bathroom F133, Locker Room F135, Locker Room F141, Faculty Bathroom F143 and Locker Room F145.
 2. Sizes: Sizes and properties necessary to comply with ASTM C754 and for the spacing, deflection and load conditions indicated, but in no case less than 18 mils (0.0179 inches) minimum thickness.
 3. Studs: C shaped with flat or formed webs, 1-1/4" legs (flanges) with knurled faces; web depths as indicated on the Drawings.
 4. Studs for heights exceeding C shaped formed web type stud capabilities: ASTM A1003 sheet steel, structural grade, Type H; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height. Thickness as required to meet specified performance levels, but in no case less than 43 mils thickness. Stud spacing shall not exceed 16 inches on center. Coating shall be ASTM A653 G60/Z180.
 5. Runners: U shaped, sized to match studs.
 6. Furring Channels: Hat-shaped sections, depth of 7/8 inch with 1/2 inch wide flanges; 22 gage (0.269 inch).
 7. Resilient Furring Channels: 1/2 inch depth, designed to reduce sound transmission, for attachment to substrate through one leg only; minimum 20 mils (0.0195 inch)
 - a. Products:
 - 1) Same manufacturer as other framing materials.
 - 2) Phillips Manufacturing Co.
- C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
1. Shaft wall assemblies shall be engineered by the manufacturer/fabricator and shall be tested by an approved testing agency for horizontal and vertical applications and fire-rating requirements as indicated on the Drawings. Deflection and load requirements as per paragraph 2.01 above.
 2. All materials shall come from a single source.
 3. Products: Same manufacturer as other framing materials.
- E. Ceiling and Soffit Suspension Systems: Comply with ASTM C754.
1. Flat and Rod Steel Hangers: Zinc coated sheet steel; type and size as specified in ASTM C754 for spacing required; minimum flats size 1 inch x 3/16 inch by length required.
 2. Wire Hangers: ASTM A641, Class 1 zinc coating, soft temper, sized for the specific application, but in no case less than 0.162 inch diameter.
 3. Anchorage Devices: Corrosion resistant screws, clips, bolts, power-actuated fasteners compatible with support substrates, whose suitability has been proven through standard construction practices or by certified test data. Fasteners shall be capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488.
 4. Framing System:
 - a. Main Runners: Cold-rolled, C shaped steel channels, 16 gauge min. Galvanized with G40 hot-dip coating per ASTM A525.
 - b. Cross Furring: Hat-shaped steel furring channels, ASTM C645; 7/8 inch high, 25 gauge galvanized.
 - c. Furring Anchorages: ASTM C754; 16 gauge galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws as recommended by furring manufacturer.

- d. Provide compression posts and other accessories as required to comply with seismic requirements.
- 5. Alternate Proprietary Framing System:
 - a. Main and Cross Tees: Heavy duty classification 1-1/2" high integral reversible splice with knurled face. Cross tees 1-1/2" high with 1-1/2" wide face; quick release cross tees for positive locking and removability.
 - b. Provide all necessary accessories, splice clips, compression posts and moldings.
 - c. Exposed framing members shall be finished with manufacturer's standard enamel paint finish.
 - d. System Deflection Criteria: L/360 maximum.
 - e. Products:
 - 1) USG Drywall Suspension System.
 - 2) Drywall Furring System by Armstrong World Industries, Inc.
- 6. Acoustic Isolators For Ceiling Hangers: Required in music rooms. Space in accordance with manufacturer's load carrying recommendations based on the weight of the ceiling assembly including; framing, gypsum board, acoustic panels and lighting.
 - a. Products:
 - 1) Model AF-200 by Peabody Noise Control.
 - 2) ARH-1 by L.D. Peters & Sons.
 - 3) Resilmount A50R by Resilmount Sound Isolation Solutions.
 - 4) HNW Series by Sound Isolation Company.
- F. Acoustic Isolators For Partitions and Soffits: Neoprene. Required at music rooms.
- G. Framing Clips for Fireproofing: To secure head tracks and light gauge framing to structural components intended to receive sprayed-on fireproofing: Galvanized steel, depth as required for thicknesses of fireproofing, size and thickness as determined by system engineering.
- H. Partition Head To Structure Connections (Deflection Head Tracks) Non-fire Rated:
 - 1. Primary steel deflection is 1 inch and secondary steel (bar joist) deflection is 1-5/8 inches. Movement joints with sealant shall accommodate the 50% movement ability of sealant, thereby setting the deflection gap at joints with sealant at primary steel 2 inches and at secondary steel (bar joist) 3-1/4 inches.
 - 2. Provide track fastened to structure with legs of sufficient length to accommodate movement required, for friction fit of studs cut short and fastened as determined by the fabricator/installer's engineering. In no case shall tracks be less than 33 mils; ASTM C653 sheet steel, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating. Options include:
 - a. Single Long-Leg Runner System: Leg depth and gage as required by engineering but in no case shall gage be less than stud gage, installed with studs friction fit into top runner, with continuous bridging located within 12 inches of the top of studs or other mechanical anchorage to allow vertical movement but prevent rotation of studs while maintaining structural performance of the partition.
 - b. Double-Runner System: Leg depth and gage as required by engineering and fastened to studs, with an outer runner sized to friction fit inside runner and in gage as required by engineering but not less than stud gage.
- I. Partition Head to Structure Connections (Deflection Head Tracks) Fire Rated:
 - 1. Primary steel deflection is 1 inch and secondary steel (bar joist) deflection is 1-5/8 inches.
 - 2. For fire rated assemblies:
 - a. Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and/or anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 - b. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, evaluated in accordance with AISI SG02-1.
 - c. Material: ASTM A653 steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.

- d. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems of fire rating and movement required.
- e. Deflection and Firestop Track:
 - 1) Products:
 - a) Fire Trak by Fire Trak Corp (for movement < 2")
 - b) Blaze Frame DSL Series by Clark Dietrich (for movement 1/2" to 1-1/2")
 - c) Substitutions: See Section 01 60 00 - Product Requirements.

2.03 BOARD MATERIALS

- A. Gypsum Wallboard: ASTM C1396, 5/8" thickness, Type X paper-faced gypsum panels; sizes to minimize joints in place; ends square cut.
 - 1. Applications: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Mold Resistant Gypsum Wallboard, ASTM D3273: Score of 10.
 - a. Applications: At wet areas, restrooms, kitchens and other locations indicated on the Drawings.
 - 3. Products:
 - a. ProRoc Brand Gypsum Board by Certain Teed Corp.
 - b. ToughRock Fireguard X by G-P.
 - c. Gold Bond Brand Gypsum Wallboard by National Gypsum Co.
 - d. Sheetrock Brand Gypsum Panels by USG Corp.
 - 4. Mold Resistant Products:
 - a. ProRoc Brand Moisture & Mold Resistant Gypsum Board by CertainTeed Corp.
 - b. ToughRock Mold-Guard Type X Gypsum Wallboard by G-P.
 - c. Gold Bond Brand XP FireShield Gypsum Board by National Gypsum Co.
 - d. Sheetrock Brand Mold Tough Gypsum Panels by USG Corp.
- B. Impact Resistant Wallboard: ASTM C1396, 5/8 inch thickness, Type X gypsum panels; sizes to minimize joints in place; ends square cut, tapered edges.
 - 1. Applications: All vertical surfaces at Lobbies/Vestibules, Common Areas, Corridor Areas, Stair Areas, libraries or other spaces open to the corridor, ceilings at locker rooms and team rooms, ceilings at multi-user restrooms, and as indicated on the Drawings.
 - 2. Surface Abrasion, ASTM C1629: Level 3.
 - 3. Indentation, ASTM C1629: Level 1
 - 4. Soft Body Impact, ASTM C1629: Level 3.
 - 5. Hard Body Impact, ASTM C1629: Level 2.
 - 6. Type: Fire resistance rated Type X, UL or WH listed.
 - 7. Products:
 - a. DensArmor Plus Impact-Resistant by G-P.
 - b. Gold Bond HI-Impact XP Gypsum Board by National Gypsum Co.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Ceiling Board for Portland Cement Plaster Ceilings: ASTM C1178, Type X, 5/8" thickness, coated inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.
 - 1. Applications: Shower rooms and some toilet rooms and as indicated on the Drawings.
 - 2. Products:
 - a. Densshield Tile Backer by G-P.
 - b. Gold Bond e2XP Tile Backer by National Gypsum Co.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Shaftwall Linerboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut; lengths as required.
 - 1. Paper Faced Type: ASTM C1396, gypsum shaftliner board; water-resistant faces.
 - a. Applications: General use.
 - b. Mold-Resistant, ASTM D3273, score of 10; Applications: Wet areas, restrooms, kitchens and other locations indicated on the Drawings.

2. Glass Mat Faced Type: ASTM C1658, glass mat shaftliner gypsum panel. ASTM D3273 mold resistance of 10.
 - a. Applications: Extended weather exposure during construction other locations indicated on the Drawings.
3. Products:
 - a. ProRoc Brand Shaftliner Type X by CertainTeed Corp.
 - b. ToughRock Shaftliner by G-P.
 - c. Gold Bond Brand Fire-Shield Shaftliner by National Gypsum Co.
 - d. Sheetrock Gypsum Liner Panels by USG Corp.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
4. Mold-Resistant Products:
 - a. Gold Bond Brand Fire-Shield Shaftliner XP by National Gypsum Co.
5. Glass-mat Faced Products
 - a. DensGlass Shaftliner (mold-resistant) by G-P.
 - b. Gold Bond Brand e2XP Shaftliner by National Gypsum Co.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

- A. Acoustic Insulation and Insulation at Partition Tops: As specified in Section 07 21 00.
- B. Acoustic and Smoke Sealant: As specified in Section 07 90 05.
- C. Firestopping: As specified in Section 07 84 00.
- D. Finishing Accessories for Wallboard: ASTM C1047, galvanized steel or rolled zinc, not less than 26 gage, unless otherwise indicated.
 1. General Types: As detailed or required for finished appearance.
 2. "J" Beads: Channel shaped with a concealed wing not less than 1-1/8" wide and an exposed wing, equal to Type 400. "J" beads may be used only where specifically identified on the Drawings or otherwise approved by the Architect. All other edge trim shall be Casing Beads.
 3. Casing and Trim Beads: Channel and angle types as required, screwed into place and suitable for finishing with joint compound, equal to Type 200.
 - a. Vinyl Rip Bead L Trim is acceptable.
 4. Corner Beads: Angle-shaped with 1-1/4" width wings, and perforated for screwing and joint treatment, equal to Type 103. Use Multi-Flex, steel reinforced, tape bead for corners less than or greater than ninety degrees.
 5. Edge Beads: (For use at perimeter of ceilings) Channel or angle-shaped with wings not less than 3/4" wide. Exposed wing edge shall be folded flat, with bead for taping and floating, equal to Type 200.
 6. Reveal Trim: Channel shaped extruded aluminum with wings for screwing and joint treatment. Finished reveal shall be depth of wallboard by 3/8" wide. Finish: Clear anodized.
 - a. Product: Reveal DRM Series by Fry Reglet or equal.
 7. "L" Trim: L Shaped extruded aluminum edge trim with wings for screwing and joint treatment. Depths as indicated per the Drawings. Finish: Clear anodized.
 - a. Product: "L" Trim Molding DRML Series by Fry Reglet or equal.
 8. Control Joints: Zinc extrusions equal to Type 093, or deep rigid PV extrusions equal to Type 093V by Trimtex for larger joints.
 9. Miscellaneous Shapes: In addition to conventional cornerbead and control joints, provide other configurations indicated or as otherwise required for a complete and proper job. At exterior locations provide exterior grade rigid PVC trims.
 10. Products:
 - a. Same manufacturer as framing materials, unless otherwise specified.
- E. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.

1. Tape: 2 inch wide, creased paper tape for joints and corners for all interior locations.
 2. Ready-mixed vinyl-based joint compound.
- F. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish for semi-gloss painted surfaces.
- G. Screws for gypsum board attachment to Steel Members Less Than 0.03 inch In thickness; to Wood Members; ASTM C1002; self-piercing tapping type, Type W for wood studs and Type S for steel studs, 1-1/4" length.
1. Coatings: Black oxide coated for general use; Zinc plated chromate for areas of potential dampness.
- H. Screws for gypsum board attachment to Steel Members From 0.033 to 0.112 Inch in thickness: ASTM C 954; steel drill screws for application of gypsum board to loadbearing steel studs.
1. Size, penetration and spacing shall be in strict accordance with the stud manufacturer's recommendations and the stud fabricator's engineering requirements. Penetration through joined steel materials shall not be less than 3 exposed threads or 3/8".
 2. Coatings:
 - a. General interior areas: Corrosion resistant, zinc plated with chromate complying with ASTM B633 and B117.
 - b. Potentially damp interior areas: High performance polymer coating, complying with ASTM B117; salt spray test result of no rust or other base metal corrosion after a minimum of 800 hours.
- I. Anchorage to Substrate: Anchorage of tracks to the structure (size, penetration, type and spacing) shall be in strict accordance with the stud fabricator/installer's engineering requirements for the specific application and shall rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this Section to commence.

3.02 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
 2. Install firestopping sealant in a continuous application at the perimeter of the shaftwall in coordination with framing installation and Section 07 84 00.
 3. Install J-runners or E-studs on columns and beams before fireproofing installation. Remove all fireproofing over-spray from shaft wall framing before installing gypsum liner panels.
 4. Install studs at spacing required to meet performance requirements. C-H studs shall be sized 3/8 inch to 1/2 inch less than the floor-to-ceiling height, and installed between liner panels. Install full length E-studs or J-runners vertically at T intersections, corners, door jambs, and columns. Install full length E-studs over gypsum liner panels both sides of closure panels. For openings, frame with vertical E-stud or J-runner at edges and horizontal J-runner at head and sill. Frame all openings as required to maintain structural support of wall. Isolate framing from transfer of lateral and vertical structural loading to the system. Provide movement relief type joints per manufacturer's instructions to attain proper lateral support.
 5. For openings, frame with vertical E-stud or J-runner at edges and horizontal J-runner at head and sill. Frame all openings as required to maintain structural support of wall.
 6. Support elevator hoistway door opening equipment independently of shaftwall framing system. Frame opening for elevator hoistway door frame in accordance with requirements of elevator and shaftwall manufacturer.

7. Install supplemental framing and bracing to support fixtures, equipment, services, heavy trim, etc. which cannot be adequately supported directly on shaftwall framing.
- B. Shaftwall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
- C. Horizontal Shaftwall Systems: I-Studs for horizontal systems shall be sized to accommodate spans and dead loads. Other live loads and applied loads shall be independently supported, as required by the shaftwall manufacturer.
- D. Seal perimeter of shaft wall and penetrations with firestop sealant.
- E. Shaftwall With Finish on One Side:
 1. Install gypsum board in a double layer on one side, either horizontally or vertically.
 2. Install the first layer of gypsum board horizontally with approved fasteners spaced 24 inches o.c. and 3 inches from all edges.
 3. Offset the horizontal joints minimum 12 inches from any splice joints in the liner board panels.
 4. Install the face layer of gypsum board parallel to the framing with approved fasteners spaced minimum 12 inches o.c. and 6 inches from all edges.
 5. Finish joints with tape and compound.

3.03 FRAMING INSTALLATION

- A. Metal Framing: Comply with ASTM C754, fabricator's engineering drawings and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated and in accordance with fabricator's engineering drawings. Suspend carrying channels from structure above at not more than 4 feet on center and within 6 inches of walls. Attach furring channels to the carrying channels at no more than 16 inches on center and within 2 inches of walls.
 1. Level ceiling system to a tolerance of 1/8" in 12'.
 2. Install hangers plumb and free of contact with other objects that are not part of the supporting system for the ceiling. Install supplemental suspension members where width of ducts or other construction interferes with hanger locations.
 3. Provide control and expansion joints as indicated on the Drawings, or otherwise required.
 4. Laterally brace entire suspension system. Reinforce openings in suspension system which interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing a minimum of 24 inches past each opening.
 5. Install bracing as required at exterior locations to resist wind uplift.
 6. NOTE: At the Contractor's option, drywall direct suspension systems may be used, in lieu of the carrying/furring channel system, subject to review and acceptance by the Architect. Direct (proprietary) suspension systems shall be complete with main beams, cross channels, wall angles, clips, and hangers, and shall be as recommended by the gypsum board manufacturer for the proposed installations. Systems shall be suitable for fire-rated installations as required.
 7. Exterior Soffits: Suspend as determined by the fabricator's engineering. Rigidly brace to structure above as required to eliminate deflections due to dead weight or vertical wind loads. Provide continuous drip/reveal along outside edge and control joints at 20 feet o.c. or as otherwise indicated on the Drawings. Joint locations shall be reviewed by the Architect prior to proceeding with the Work. Vent strips shall be installed prior to soffit board installation where indicated on the Drawings.
 8. Fasteners for hanger wires shall be of types and sizes that will resist corrosion, and provide lasting anchorage without pullout or failure. Verify compatibility with structure to receive fasteners prior to proceeding. Do not attach hangers to steel roof deck or steel deck tabs.
- C. Runner Tracks: Install continuous tracks sized to match stud, aligned accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer and engineered design for type of construction involved.

- D. Coordination with sprayed on fireproofing: Before sprayed on fireproofing is applied, attach offset clips to steel surfaces per engineered shop drawings.
 - 1. At existing fireproofing, remove only as much fireproofing as needed to complete installation of offset clips for support of new steel studs. Spray fireproofing shall be touched up to maintain required coverage and thickness for fire resistive rating as part of the scope of Section 07 81 00. Do not conceal conditions by installation of gypsum board prior to required spray fireproofing touch-up.
- E. Studs: Space studs at 16 inches on center unless closer spacing is required by the fabricator's engineering. Spacing shall not exceed 16 inches without the Architect's prior written authorization.
 - 1. Extend partition framing to structure in all locations.
 - 2. Partitions Terminating at Structure: Provide deflection head track at all locations where metal framing is attached to or otherwise affected by the deflection of other structural building components. Secure the top of studs in such a way as to allow movement of the deflection head track with respect to the studs. Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging, or as otherwise required by the fabricator's engineering drawings.
 - 3. Provide minimum clear space as indicated on the partition types on the Drawings for deflection.
- F. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs of all window and door openings and shall be located not more than 2 inches from frames jambs. Two jamb studs shall be used for any opening larger than 2 feet square. Over door frames install a cut-to-length section of runner with flanges slit and web bent to allow flanges to overlap adjacent vertical studs and securely screw-attached to adjacent studs. A cut-to-length stud extending from door frame header to ceiling runner shall be positioned over the door frame.
 - 1. Provide additional framing as required by engineered design to reinforce headers for adequate stability.
 - 2. Unless otherwise indicated on the Drawings, partitions above and below door and window openings shall be the same construction as adjacent partitions.
- G. Blocking: As part of the scope of Section 06 10 54 - Wood Blocking and Curbing, install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall mounted cabinets.
 - 3. Toilet partitions.
 - 4. Toilet accessories.
 - 5. Grab bars and hand rails
 - 6. Wall mounted countertops
- H. Supplemental Framing: Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the walls or partitions. Where type of supplementary support is not otherwise indicated by the engineered design, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported, for firm and rigid construction.
- I. Penetration and Opening Insulation: Install firesafing insulation as required to meet firestop product manufacturer's tested assemblies for all openings and penetrations in fire-rated construction, smoke partitions and at acoustic sealing. Openings shall include steel deck flutes, structural penetrations, mechanical, electrical, piping, etc. Provide any necessary extra studs, furring channels or stick-clips to ensure that insulation will remain in proper alignment and fit around items penetrating partitions.

- J. Expansion and Control Joints: Provide studs at each side of all horizontal and vertical joints. Space studs to align with width of joints. Stuff voids between studs full with firesafing insulation at all locations.
 - 1. Coordinate with the installation of expansion joint covers. See Section 07 95 13 - Expansion Joint Cover Assemblies.
- K. Fire-resistive Wall and Ceiling Assemblies: Where fire-rated assemblies are required, provide materials and construction identical to the Underwriters Laboratories (U.L.) tested assemblies as referenced on the Drawings.

3.04 ACOUSTICAL CONSTRUCTION

- A. The following requirements shall apply to all non-fire rated ceilings and partitions indicated on the Drawings to be "Acoustical Construction". Special attention shall be paid to the proper installation of acoustical construction components.
- B. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions. Prior to installation of gypsum board, verify that acoustical insulation is in place and secure, completely filling all voids.
- C. Acoustic Sealant (at non-fire-rated construction): Install in accordance with manufacturer's instructions. Seal all cracks, joints, deck flutes, piping, conduit, duct penetrations and voids in "Acoustical Construction" air tight with sound sealing products. See Section 07 91 05 for products.
 - 1. Place continuous bead at perimeter of each layer of gypsum board.
 - 2. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.
- D. At partition heads, install mineral fiber insulation in all voids at deck flutes and deflection head tracks which will act as backer for acoustic sealant. Top of partition joints to building structure are high movement joints and shall be sealed in accordance with Section 07 91 05 - Sealants.

3.05 BOARD INSTALLATION

- A. General: Inspect materials to which gypsum board is to be applied. Remedy all defects prior to installation of gypsum materials. Maintain a uniform room temperature between 55 and 65 degrees F during application and until completely dry or occupied. Provide adequate ventilation to carry off excess moisture.
- B. Field verify the layout of all walls and partitions prior to proceeding with the Work, in order to avoid dimensional errors and confirm proper placement. Verify that all required insulations are properly in place prior to covering up.
- C. Where the Drawings indicate multiple partition or wall types back-to-back, each scheduled type shall be complete. Inner layers of insulation or gypsum board shall not be omitted.
- D. Comply with ASTM C840 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
 - 1. Gypsum wallboard shall be cut by scoring and breaking, or by sawing, working from the face side. Scribe neatly to projecting surfaces and fit wallboard neatly around pipes, ducts and other penetrations.
 - 2. Apply wallboard first to soffits (ceilings) then to walls. Allow 1/4" maximum space between bottom of wall sheets and floor, unless otherwise noted. Apply wallboard at interior soffits with long dimensions of board perpendicular to axis of supports.
 - 3. At ductwork and piping provide a 1/2 inch gap between the drywall and the penetrating element to minimize any vibrational noise transmission to the partition. Void shall be acoustically sealed.
- E. Single-Layer Non-Rated: Install gypsum board perpendicular to framing, with ends and edges occurring over firm bearing.
- F. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board

at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

- G. Fastening Gypsum Wall and Soffit Board: Wallboard shall be held in firm contact with the supports while the fasteners are being driven. Fasteners shall proceed from central portion of board towards ends and edges. Fasteners shall be driven home with the heads slightly below the surface of the board in a dimple formed by the driving tool. Care shall be taken to avoid breaking the paper face. Improperly driven fasteners shall be removed.
 - 1. In general, drywall screws shall be spaced not to exceed 16 inches o.c. At fire-resistive construction, space screws 12 inches o.c. in field and 8 inches o.c. at board perimeters, unless otherwise required by the applicable U. L. fire-rated assembly.
- H. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces, as recommended by the gypsum board manufacturer, and as indicated. Locations not indicated on the Drawings shall be located by the Contractor subject to the Architect's prior approval. Provide control joints or expansion joints where partitions, walls, ceilings, or soffits cross construction or building joints in stud framing or other supporting materials.
 - 1. At building expansion joints,
 - 2. At intersections of dissimilar substrates or finish materials,
 - 3. At floor lines,
 - 4. At ceiling and soffit intersections with a structural element or the vertical penetration,
 - 5. At ceiling wings of "L", "U" and "T" shaped ceiling areas,
 - 6. At openings more than 6 feet long,
 - 7. Adjacent to corners and intersections of walls within a distance equal to half the general control joint spacing noted above.
 - 8. At walls not more than 30 feet apart and ceilings over 30 feet long without relief,
 - 9. At walls with tile finish, no more than 16 feet apart in either direction,
 - 10. At exterior soffits, not more than 20 feet apart in both directions,
 - 11. At locations where concentrated stress or movement is anticipated,
 - 12. At all locations identified on the Drawings,
 - 13. At locations as recommended by the board manufacturer.
- B. Control joint width shall be as required to accommodate anticipated movement.
- C. Control joint in fire-rated construction shall meet requirements of the fire-resistive tested assemblies.
- D. Wall boards shall be discontinuous at the joint, sealant shall fill the gap and control joint trim shall be fastened at both flanges along the entire length of the joint.
- E. Corner Beads: Install with screws at external corners, using longest practical lengths.
- F. Casing Beads: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.07 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Walls and ceilings to receive semi-gloss paint finish and other areas specifically indicated.
 - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.

4. Level 1: Wall areas above finished ceilings and in attics, whether or not accessible in the completed construction.
 5. Level 0: Temporary partitions.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 2. Taping, filling and sanding is not required at base layer of double layer applications, except as required in fire-rated applications.
- D. All wallboard in fire-rated and smoke sealed construction shall be sealed when penetrated by pipes, conduits, wire, structure, etc.
1. Smoke sealed assemblies shall be sealed tight to abutting construction with sealant products.
 2. Fire-rated assemblies shall be sealed tight to abutting construction with firestopping products in order to provide continuous, uninterrupted fire protection.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.08 MARKING OF FIRE AND SMOKE RESISTIVE CONSTRUCTION

- A. Prepare stenciled signs for painted marking of all fire walls, fire barriers and smoke partitions as indicated on the Code Analysis Drawings, above accessible ceilings, in attics and in accessible concealed floor spaces, at intervals not exceeding ten (10) feet measured horizontally.
1. Lettering shall be 3 inches high, of contrasting color to the application surface.
 2. Sign text shall be as follows, as applicable:
 - a. FIRE WALL - PROTECT ALL OPENINGS
 - b. FIRE BARRIER - PROTECT ALL OPENINGS
 - c. SMOKE PARTITION - PROTECT ALL OPENINGS

3.09 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION



Design No. U411 BXUV.U411 Fire Resistance Ratings - ANSI/UL 263

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Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263

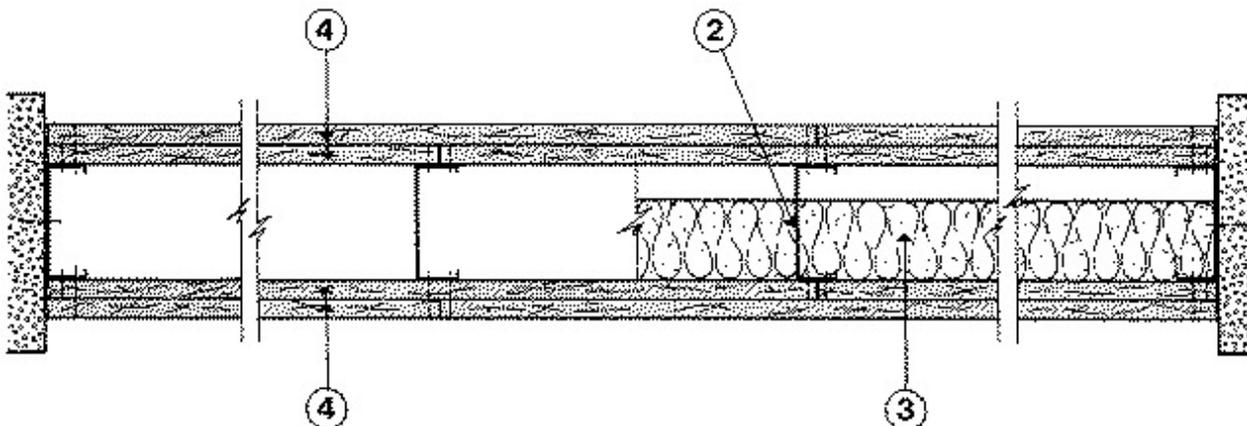
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. U411

September 10, 2014

Nonbearing Wall Rating — 2 HR.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.



1. **Floor and Ceiling Runner** — (Not Shown) — Min. 25 MSG galv steel, 1 in. return legs, 2-1/2 in. deep (min), attached to floor and ceiling with fasteners 24 in. OC max.

1A. **Framing Members***— **Floor and Ceiling Runners** — (Not shown) — As an alternate to Item 1 - For use with Item 2A, channel shaped, min 2-1/2 in. deep, attached to floor and ceiling with fasteners 24 in. OC. max.

ALLSTEEL & GYPSUM PRODUCTS INC — Type SUPREME Framing System

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper20™ Track

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV — Type SUPREME Framing System

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™ Track

PHILLIPS MFG CO L L C — Viper20™ Track

QUAIL RUN BUILDING MATERIALS INC — Type SUPREME Framing System

SCAFCO STEEL STUD MANUFACTURING CO — Type SUPREME Framing System

STEEL CONSTRUCTION SYSTEMS INC — Type SUPREME Framing System

UNITED METAL PRODUCTS INC — Type SUPREME Framing System

1B. **Floor and Ceiling Runners** — (Not shown)—For use with Item 2B- Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, min width to accommodate stud size, with min 1 in. long legs, attached to floor and ceiling with fasteners spaced max 24 in. OC.

1C. **Framing Members*— Floor and Ceiling Runners** — (Not shown) — As an alternate to Item 1 - For use with Item 2C, channel shaped, min 2-1/2 in. wide fabricated from min 0.015 in. thick galv steel, attached to floor and ceiling with fasteners 24 in. OC. max.

CLARKDIETRICH BUILDING SYSTEMS — CD ProTRAK

DMFCWBS L L C — ProTRAK

MBA METAL FRAMING — ProTRAK

RAM SALES L L C — Ram ProTRAK

SOUTHEASTERN STUD & COMPONENTS INC — ProTRAK

STEEL STRUCTURAL SYSTEMS L L C — Tri-S ProTRAK

1D. **Framing Members*— Floor and Ceiling Runners** — (Not shown) — As an alternate to Item 1 - For use with Item 2D, channel shaped, min 2-1/2 in. wide fabricated from min 0.018 in. thick galv steel, attached to floor and ceiling with fasteners 24 in. OC. max.

TELLING INDUSTRIES L L C — TRUE-TRACK™

1E. **Framing Members*— Floor and Ceiling Runners** — (Not shown) — As an alternate to Item 1 - For use with Item 2E, channel shaped, min 2-1/2 in. wide fabricated from min 25 MSG steel, attached to floor and ceiling with fasteners 24 in. OC. max.

KIRII (HONG KONG) LTD — Type KIRII

1F. **Floor and Ceiling Runners** — (Not shown) — Channel shaped, fabricated from min 0.02 in. galv steel, min width to accommodate stud size, with min 1 in. long legs, for use with studs specified below and fabricated from min 0.02 in. galv steel or thicker, attached to floor and ceiling with fasteners spaced max 24 in. OC.

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™ Track VT100.

1G. **Framing Members*— Floor and Ceiling Runners** — (Not shown) — As an alternate to Item 1 - For use with Item 2G, channel shaped, min 2-1/2 in. deep, attached to floor and ceiling with fasteners 24 in. OC. max.

TELLING INDUSTRIES L L C — Viper20™ Track

2. **Steel Studs** — Min 2-1/2 in. deep, formed of min 25 MSG galv steel max stud spacing 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

2A. **Framing Members*— Steel Studs** — As an alternate to Item 2 - For use with Item 1G, channel shaped studs, min 2-1/2 in. deep, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

ALLSTEEL & GYPSUM PRODUCTS INC — Type SUPREME Framing System

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper20™

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV — Type SUPREME Framing System

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™

PHILLIPS MFG CO L L C — Viper20™

QUAIL RUN BUILDING MATERIALS INC — Type SUPREME Framing System

SCAFCO STEEL STUD MANUFACTURING CO — Type SUPREME Framing System

STEEL CONSTRUCTION SYSTEMS INC — Type SUPREME Framing System

UNITED METAL PRODUCTS INC — Type SUPREME Framing System

2B. **Steel Studs** — (As an alternate to Item 2, For use with Item 4D) Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, 3-1/2 in. min depth, spaced a max of 16 in. OC. Studs friction-fit into floor and ceiling runners. Studs to be cut 5/8 to 3/4 in. less than assembly height.

2C. **Framing Members*— Steel Studs** — As an alternate to Item 2 - For use with Item 1C, channel shaped studs, min 2-1/2 in. wide fabricated from min 0.015 in. thick galv steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

CLARKDIETRICH BUILDING SYSTEMS — CD ProSTUD

DMFCWBS L L C — ProSTUD

MBA METAL FRAMING — ProSTUD

RAM SALES L L C — Ram ProSTUD

SOUTHEASTERN STUD & COMPONENTS INC — ProSTUD

STEEL STRUCTURAL SYSTEMS L L C — Tri-S ProSTUD

2D. **Framing Members*— Steel Studs** — As an alternate to Item 2 - For use with Item 1D, channel shaped studs, min 2-1/2 in. wide fabricated from min 0.018 in. thick galv steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

TELLING INDUSTRIES L L C — TRUE-STUD™

2E. **Framing Members*— Steel Studs** — As an alternate to Item 2 - For use with Item 1E, channel shaped studs, min 2-1/2 in. wide fabricated from min 25 MSG steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

KIRII (HONG KONG) LTD — Type KIRII

2F. **Framing Members*— Steel Studs** — As an alternate to Item 2 - For use with Item 1G, channel shaped studs, min 2-1/2 in. deep, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

TELLING INDUSTRIES L L C — Viper20™

3. **Batts and Blankets*** — (Optional) — Mineral wool or glass fiber batts partially or completely filling stud cavity.

See **Batts and Blankets** (BZJZ) category for names of manufacturers.

3A. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 3) — (100% Borate Formulation) — Spray applied cellulose material. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product with a nominal dry density of 2.7 lb/ft³. Alternate Application Method: The fiber is applied without water or adhesive at a nominal dry density of 3.5 lb/ft³, in accordance with the application instructions supplied with the product.

U S GREENFIBER L L C — INS735 & INS745 for use with wet or dry application. INS765LD and INS770LD are to be used for dry application only.

3B. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 3) and Item 3A - Spray applied cellulose insulation material. The fiber is applied with water to interior surfaces in accordance with the application instructions supplied with the product. Applied to completely fill the enclosed cavity. Minimum dry density of 4.3 pounds per cubic ft.

NU-WOOL CO INC — Cellulose Insulation

3C. **Fiber, Sprayed*** — As an alternate to Batts and Blankets (Item 3) - Spray applied cellulose fiber. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product. The minimum dry density shall be 4.30 lbs/ft³.

INTERNATIONAL CELLULOSE CORP — Celbar-RL

4. **Gypsum Board*** — 5/8 in. thick, outer layer paper, glass mat or vinyl surfaced. (Laminated System) Gypsum board applied vertically in two layers. Inner layer attached to studs with 1 in. long Type S steel screws spaced 8 in. OC along vertical edges, and 12 in. OC in the field and outer layer laminated to inner layer with joint compound, applied with a notched spreader producing continuous beads of compound about 3/8 in. in diameter, spaced not greater than 2 in. OC. Joints of laminated outer layer offset 12 in. from inner layer joints. Outer layer gypsum board attached to floor and ceiling runner track with 1-5/8 in. long Type S steel screws spaced 12 in. OC.

Optional, (Direct Attached System), Inner layer attached to studs with 1 in. long Type S steel screws spaced 16 in. OC in the field and along the vertical edges. Outer layer attached to the studs over the inner layer with 1-5/8 in. long Type S steel screws spaced 16 in. OC in the field and along the vertical edges and 12 in. OC to the floor and ceiling runners. Joints of screw-attached outer layer offset from inner layer joints. Joints of outer layer may be taped or untaped.

Nom 3/32 in. thick gypsum veneer plaster may be applied to the entire surface of Classified veneer baseboard. Joints reinforced.

ACADIA DRYWALL SUPPLIES LTD — Type X, 5/8 Type X, Type Blueglass Exterior Sheathing

AMERICAN GYPSUM CO — Types AG-C, AGX-1, M-Glass, AGX-11.

BEIJING NEW BUILDING MATERIALS PUBLIC LTD CO — Type DBX-1.

CERTAINTED GYPSUM INC — Types 1, FRPC, EGRG, GlasRoc, Type X or Type C, 5/8" Easi-Lite Type X.

CGC INC — Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRC or WRX.

CONTINENTAL BUILDING PRODUCTS OPERATING CO, L L C — Types LGFC2A, LGFC6A, LGFC-C/A, LGFC-WD, LGLLX.

GEORGIA-PACIFIC GYPSUM L L C — Types 5, 6, 9, C, DAP, DD, DA, DAPC, DGG, DS, GPFS6, LS, TG-C, Type X, Veneer Plaster Base-Type X, Water Rated-Type X, Sheathing Type-X, Soffit-Type X, GreenGlass Type X, Type X ComfortGuard Sound Deadening Gypsum Board, Type LWX, Veneer Plaster Base-Type LWX, Water Rated-Type LWX, Sheathing Type-LWX, Soffit-Type LWX, Type DGLW, Water Rated-Type DGLW, Sheathing Type- DGLW, Soffit-Type DGLW, Type LW2X, Veneer Plaster Base - Type LW2X, Water Rated - Type LW2X, Sheathing - Type LW2X, Soffit - Type LW2X, Type DGL2W, Water Rated - Type DGL2W, Sheathing - Type DGL2W.

NATIONAL GYPSUM CO — Types FSK, FSK-C, FSW, FSW-3, FSW-5, FSW-6, FSW-8, FSW-C, FSW-G, FSMR-C, FSL, SoundBreak XP Type X Gypsum Board.

PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM — Type C, PG-3, PG-5, PG-9, PG-11, PG-C, PGS-WRS.

PANEL REY S A — Types GREX, PRX, RHX, MDX, ETX or PRC.

SIAM GYPSUM INDUSTRY (SARABURI) CO LTD — Type EX-1

THAI GYPSUM PRODUCTS PCL — Type C or Type X

UNITED STATES GYPSUM CO — Type AR, C, FRX-G, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SGX, SHX, WRC, WRX, USGX.

USG MEXICO S A DE C V — Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRC or WRX.

4A. **Gypsum Board*** — (As an alternate to Item 4) — Nom 3/4 in. thick, installed as described in Item 4 with 1-1/4 in. long Type S screws for inner layer and 2-1/4 in. long Type S screws for outer layer.

CGC INC — Types AR, IP-AR.

UNITED STATES GYPSUM CO — Types AR, IP-AR.

USG MEXICO S A DE C V — Types AR, IP-AR.

4B. **Gypsum Board*** — (As an alternate to Item 4 and 4A) — 5/8 in. thick, 24 to 54 in. wide, applied horizontally as the outer layer to one side of the assembly. Horizontal joints need not be backed by steel framing. Secured as described in Item 4 for the direct attached system. When used in widths other than 48 in., gypsum panels to be installed horizontally.

CERTAINTED GYPSUM INC — Type X, Type C.

CGC INC — Type SHX.

THAI GYPSUM PRODUCTS PCL — Type X, Type C.

UNITED STATES GYPSUM CO — Type SHX, FRX-G.

USG MEXICO S A DE C V — Type SHX.

4C. **Gypsum Board*** — (As an alternate to Items 4, 4A and 4B) — Two layers of 5/8 in. thick gypsum board applied horizontally or vertically. Inner layer attached to studs with No. 6 by 1 in. long Type S bugle head screws spaced 24 in. OC along the top and bottom tracks starting 2 in. and then 12 in. from the vertical edge. Inner layer screws spaced 24 in. OC along the studs, starting 2 in. and then 12 in. from the top and bottom of the studs and starting 1-1/4 in. from the horizontal joints when installed horizontally. Outer layer attached to studs with 1-5/8 in. long Type S bugle head screws spaced 16 in. OC along the top and bottom tracks starting 1-3/4 in. from the vertical edge. Outer layer screws spaced 16 in. OC along the studs, starting 1-3/4 in. and then 8 in. from the top and bottom of the studs and starting 1-1/4 in. and then 8 in. from the horizontal joints when installed horizontally. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers staggered a min of 12 in. When outer layers are installed horizontally, vinyl or casein, dry or premixed joint compound shall be applied in two coats to joints and screw heads of outer layer. Paper tape, nom 2 in. wide, embedded in first layer of compound over all joints of outer layer panels. Nom 3/32 in. thick gypsum veneer plaster may be applied to the entire surface of Classified veneer baseboard. Joints reinforced.

GEORGIA-PACIFIC GYPSUM L L C — Types 5, 6, 9, C, DAP, DD, DA, DAPC, DGG, DS, GPFS6, LS, TG-C, Type X, Veneer Plaster Base-Type X, Water Rated-Type X, Sheathing Type-X, Soffit-Type X, GreenGlass Type X, Type X ComfortGuard Sound Deadening Gypsum Board, Type LWX, Veneer Plaster Base-Type LWX, Water Rated-Type LWX, Sheathing Type-LWX, Soffit-Type LWX, Type DGLW, Water Rated-Type DGLW, Sheathing Type- DGLW, Soffit-Type DGLW, Type LW2X, Veneer Plaster Base - Type LW2X, Water Rated - Type LW2X, Sheathing - Type LW2X, Soffit - Type LW2X, Type DGL2W, Water Rated - Type DGL2W, Sheathing - Type DGL2W.

4D. **Gypsum Board*** — (Not Shown) - (As an alternate to Item 4 when used as the base layer on one or both sides of wall. For direct attachment only to steel studs Item 2B) - Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Gypsum board secured to studs with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field.

RAY-BAR ENGINEERING CORP — Type RB-LBG

4E. **Gypsum Board*** — (As an alternate to Items 4 through 4D) — Nominal 5/8 in. thick, 4 ft wide panels, applied vertically and secured as described in Item 4.

PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM — Types QuietRock ES.

4F. **Gypsum Board*** — (As an alternate to Items 4 through 4E) - 5/8 in. thick, 4 ft. wide, paper surfaced, applied vertically and secured as described in Item 4.

CERTAINTED GYPSUM INC — Type SilentFX

4G. **Gypsum Board*** — As an alternate to Item 4- Nom. 5/8 in. thick, inner layer attached vertically to studs with 1 in. long Type S steel screws spaced 16 in. OC in the field and along the vertical edges. Outer layer attached to the studs horizontally over the inner layer with 1-5/8 in. long Type S steel screws spaced 16 in. OC in the field and along the vertical edges and 12 in. OC to the floor and ceiling runners. Joints of outer layer must be taped. Nom 3/32 in. thick gypsum veneer plaster may be applied to the entire surface of Classified veneer baseboard.

ACADIA DRYWALL SUPPLIES LTD — Type Blueglass Exterior Sheathing

PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM — Types C, PG-11, PGS-WRS.

4H. **Gypsum Board*** — (Not Shown) - (As an alternate to Items 4) For Direct Application to Studs Only- For use as the base layer on one or both sides of the wall. Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-5/8 in. long Type S 12 steel screws spaced 8 in. OC at perimeter and 12 in OC in the field. Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Fasteners for face layer gypsum panels when installed over lead backed board to be min 2-1/2 in. Type S-12 bugle head steel screws spaced as described in Item 4. To be used with Lead Batten Strips (see Item 5A) or Lead Discs (see Item 6A).

MAYCO INDUSTRIES INC — Type X-Ray Shielded Gypsum

4I. **Gypsum Board*** — (As an alternate to Item 4, not for use with Items 1C and 2C) - Nom. 5/8 in. thick gypsum panels with beveled, square or tapered edges installed as described in Item 4.

CGC INC — Type ULX

UNITED STATES GYPSUM CO — Type ULX.

USG MEXICO S A DE C V — Type ULX

4J. **Gypsum Board*** — (As an alternate to Item 4 when used as the base layer on one or both sides of wall. For direct attachment only to steel studs Item 2B). Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws gypsum panel steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Lead batten strips, min 2 in. wide, max 8 ft long with a max thickness of 0.14 in. placed on the face of studs and attached to the stud with construction adhesive and two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead discs, nominal 3/8 in. diam by max 0.085 in. thick. Compression fitted or adhered over the screw heads. Lead batten strips and discs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

RADIATION PROTECTION PRODUCTS INC — Type RPP - Lead Lined Drywall

4K. Gypsum Board — (As an alternate to Items 4 through 4J, not for use with Items 1C and 2C). Two layers of nominal 15 mm thick gypsum board applied vertically. Inner layer attached to studs with No. 3.5 x 1-3/8 in. long bugle head, self-drilling screws spaced 23-5/8 in. OC in the field and 15-3/4 in. OC in the perimeter, with the first screw 2 in. from the edge. Outer layer attached to the studs over the inner layer with No. 3.5 x 1-3/4 in. long bugle head, self-drilling screws spaced 11-13/16 in. OC in the field and 7-7/8 in. OC in the perimeter, with the first screw 3/4 in. from the edge. Outer layer screws staggered from inner layer screws. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layer staggered one stud cavity. Self-adhesive fiberglass mesh (9x9 mesh) tape, nom 2 in. wide, applied over all joints of outer layer panels. Dry or premixed joint compound applied in two coats to joints over the mesh tape and screw heads of outer layer.

GYPSEMNA CO LLC — Types MRFW, FW, TF.

4L. Gypsum Board* — (As an alternate to Items 4 through 4K) - Two layers of 5/8 in. thick gypsum board applied vertically or horizontally. Inner layer attached to studs with #6 x 1 in. long bugle head screws spaced 12 in. OC along the top and bottom tracks and 16 in. OC in the field and along the vertical edges. Outer layer attached to studs with #6 x 1-5/8 in. long bugle head screws spaced 12 in. OC along the top and bottom tracks and 16 in. OC in the field and along the vertical edges. Vertical joints are centered over studs and staggered between layers and on opposite sides of the wall. Horizontal joints on the face layer are staggered 12 in. from the base layer. Horizontal joints need not to be backed by steel framing.

CONTINENTAL BUILDING PRODUCTS OPERATING CO, L L C — Type LGFC6A, LGFC-C/A.

4M. Wall and Partition Facings and Accessories* — (As an alternate to Items 4 through 4L) — Nominal 5/8 in. thick, 4 ft wide panels, applied vertically and secured as described in Item 4.

PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM — Type QuietRock 527.

4N. Gypsum Board* — (As an alternate to Item 4 through 4M) - For direct application to studs only - Four layers nom. 5/16 in. thick gypsum panels applied vertically or horizontally. When applied horizontally, base layer secured to studs with 1 in. Type S screws spaced 24 in. OC. Second layer installed with joints offset 12 in. from base layer and secured with 1 in. Type S screws spaced 24 in. OC. Third layer installed with joints in line with base layer and secured with 1-1/2 in. Type S screws spaced 16 in. OC. Fourth layer installed with joints in line with second layer and secured with 1-5/8 in. Type S screws spaced 12 in. OC. For all layers, screws offset 4 in. from previous layer. When applied vertically, base layer secured with 1 in. Type S screws spaced 24 in. OC. Second layer secured with joints offset one stud cavity and secured with 1 in. Type S screws spaced 24 in. OC. Third layer installed with joints in line with base layer and secured with 1-1/2 in. Type S screws spaced 12 in. OC. Fourth layer secured with joints in line with second layer and secured with 1-5/8 in. Type S screws spaced 8 in. OC along vertical edges and 12 in. OC in the field. For all layers, screws offset 4 in. from previous layer.

NATIONAL GYPSUM CO — Type FSW

5. Lead Batten Strips — (Not Shown, For Use With Item 4D) - Lead batten strips, min 1-1/2 in. wide, max 10 ft long with a max thickness of 0.125 in. Strips placed on the interior face of studs and attached from the exterior face of the stud with two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum board (Item 4D) and optional at remaining stud locations. Required behind vertical joints.

5A. Lead Batten Strips — (Not Shown, for use with Item 4H) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.140 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 6) and optional at remaining stud locations.

6. Lead Discs or Tabs — (Not Shown, For Use With Item 4D) - Used in lieu of or in addition to the lead batten strips (Item 5) or optional at other locations - Max 3/4 in. diam by max 0.125 in. thick lead discs compression fitted or adhered over steel screw heads or max 1/2 in. by 1-1/4 in. by max 0.125 in. thick lead tabs placed on gypsum boards (Item 4D) underneath screw locations prior to the installation of the screws. Lead discs or tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

6A. Lead Discs — (Not Shown, for use with Item 4H) Max 5/16 in. diam by max 0.140 in. thick lead discs compression fitted or adhered over steel screw heads. Lead discs to have a purity of 99.5% meeting the Federal Specification QQ-L-201f, Grades "B, C or D".

7. Mineral and Fiber Board* — (Optional, Not shown) — For optional use as an additional layer on one side of wall. Nom 1/2 in. thick, 4 ft wide with long dimension parallel and centered over studs. Attached to studs and floor and ceiling runners with 1-5/8 in. long Type S steel screws, spaced 12 in. OC. The required UL Classified gypsum board layer(s) is/are to be installed as indicated as to fastener type and spacing, except that the required fastener length shall be increased by a minimum of 1/2 in. Not evaluated or intended as a substitute for the required layer(s) of UL Classified Gypsum Board.

HOMASOTE CO — Homasote Type 440-32

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2014-09-10

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Design No. U417
BXUV.U417
Fire Resistance Ratings - ANSI/UL 263

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Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Listed or Classified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered as Classified, Listed, or Recognized.

Fire Resistance Ratings - ANSI/UL 263

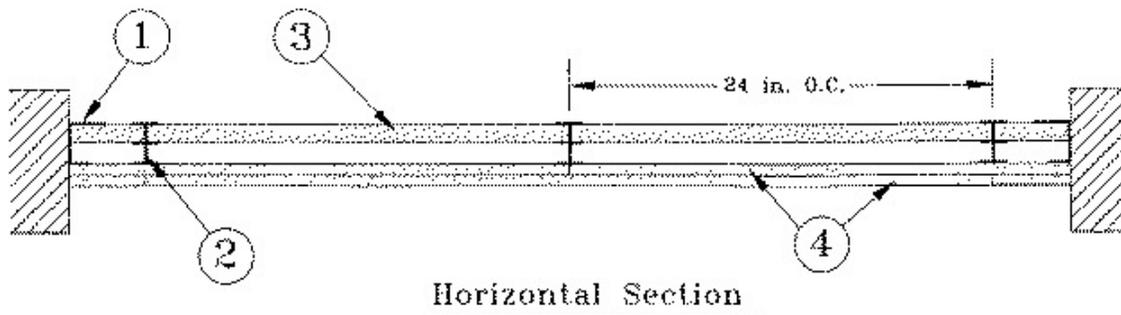
See General Information for Fire Resistance Ratings - ANSI/UL 263

Design No. U417

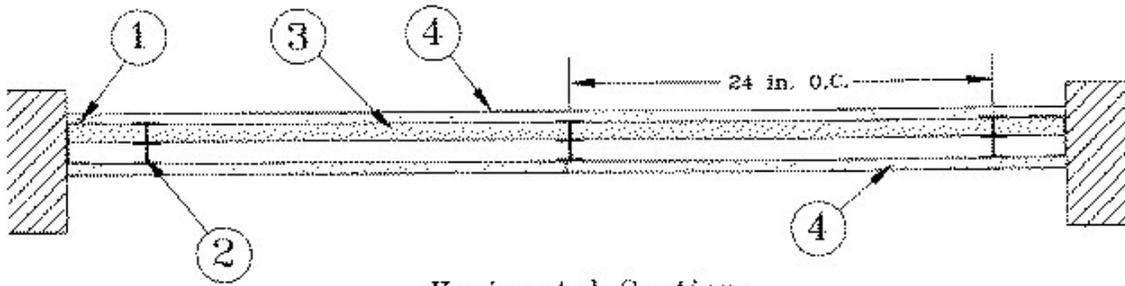
October 06, 2011

Nonbearing Wall Ratings – 1, 2 or 3 Hr

System A – 2 Hr.

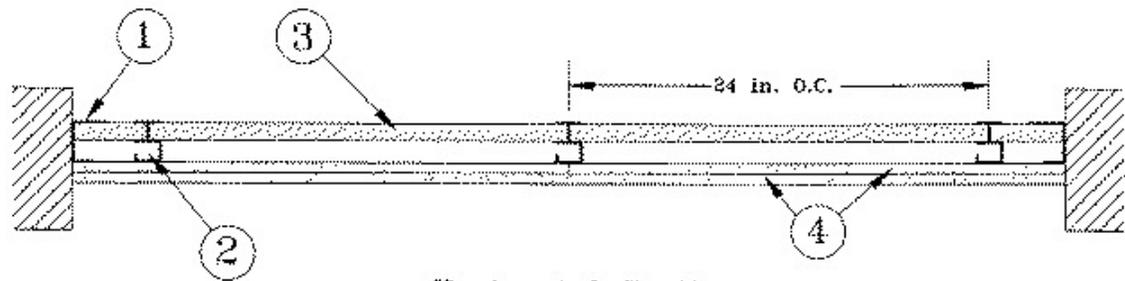


System B - 2 Hr.



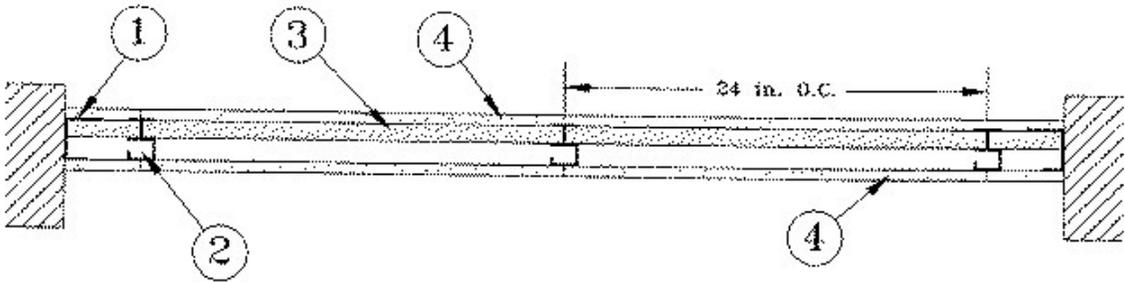
Horizontal Section

System C - 2 Hr.



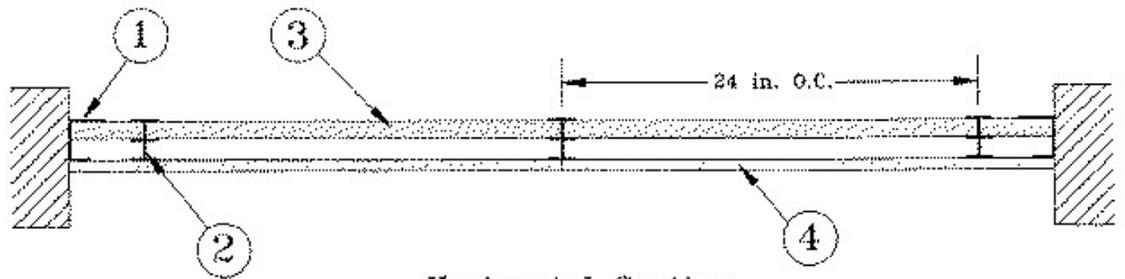
Horizontal Section

System D - 2 Hr.



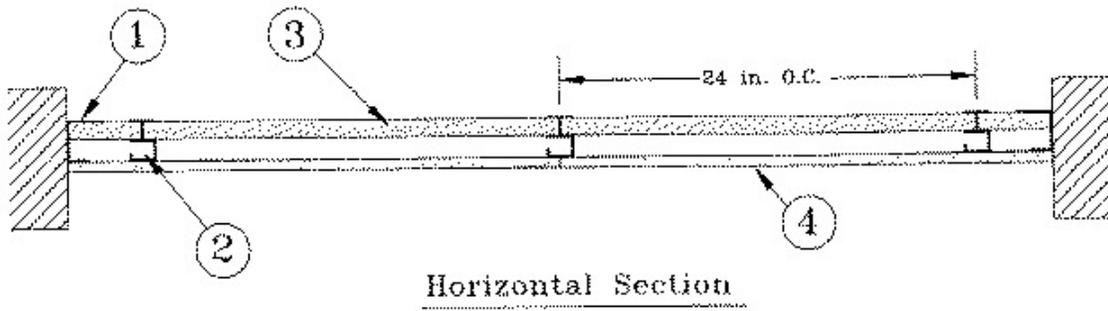
Horizontal Section

System E - 1 Hr.

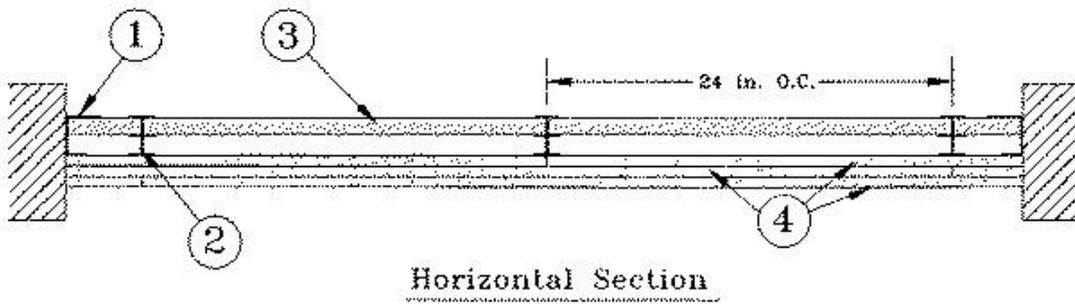


Horizontal Section

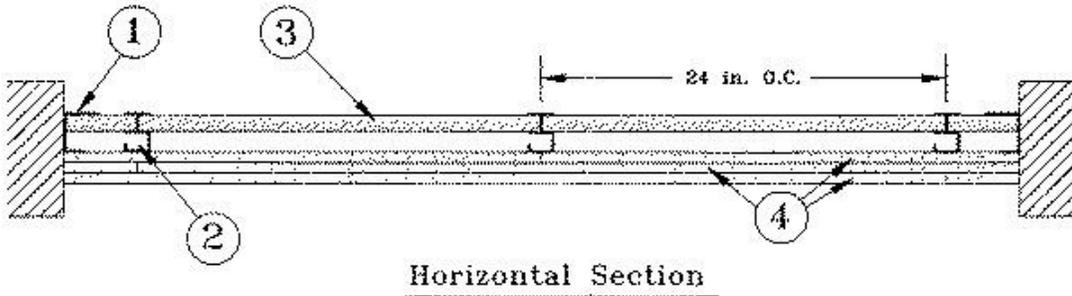
System F - 1 Hr.



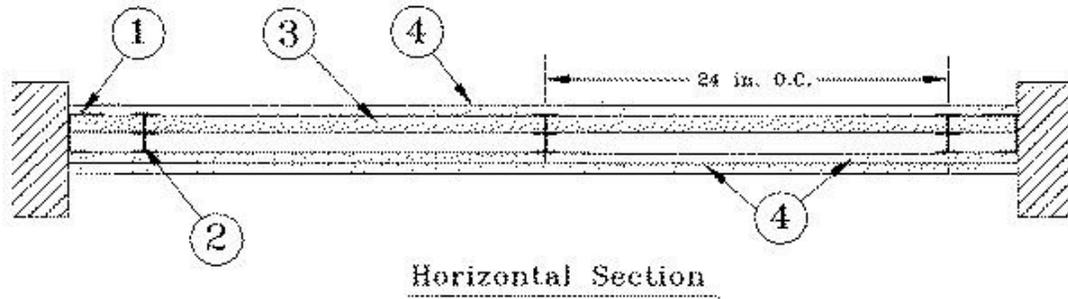
System G - 3 Hr.



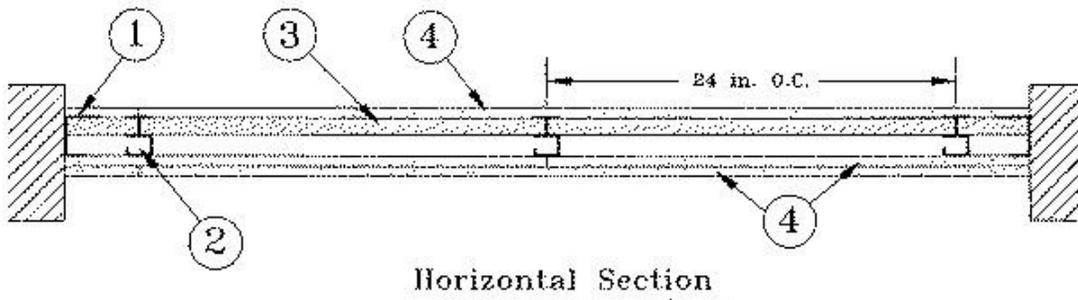
System H - 3 Hr.



System I - 3 Hr.



System J - 3 Hr.



1. Floor, Side and Ceiling Runners — "J"-shaped runner, min 2-1/2 in. deep, with unequal legs of 1-1/8 in. and 2-1/8 in., fabricated from min 25 MSG galv steel. Runners positioned with short leg toward finished side of wall. Runners attached to structural supports with steel fasteners located not greater than 2 in. from ends and not greater than 24 in. OC.

2. Steel Studs —

Systems A, B, E, G and I

"I"-shaped studs fabricated from min 25 MSG galv steel, min 2-1/2 in. deep, 1-1/2 in. wide. Studs contain 3/4 in. wide by 2-1/4 in. high holding tabs spaced 2-3/4 in. OC. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in.

Systems C, D, F, H and J

"C-T"-shaped studs, min 2-1/2 in. deep, 1-1/2 in. wide, fabricated from min 25 MSG galv steel. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in. or

"C-H" - shaped studs, min 2-1/2 in. deep, fabricated from min 25 MSG galv steel. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in. OC.

3. Gypsum Board* — Gypsum liner panels, nom 1 in. thick, 24 in. wide. Panels cut max 1 in. less in length than floor to ceiling height. Vertical edges inserted in "T"-shaped section of "C-T" studs, the "H"-shaped section of "C-H" studs or tabs holding tabs of "I" studs. Free edge of end panels attached to long leg of "J"-runners with 1-5/8 in. long Type S self-drilling, self-tapping bugle head steel screws spaced not greater than 12 in. OC.

CERTAINTED GYPSUM INC — Types Shaftliner, EGRG Shaftliner, GlasRoc Shaftliner. Types EGRG and GlasRoc Shaftliner limited to 1 and 2 hour systems.

4. Gypsum Board* —

Systems A and C

For use with **Type Shaftliner** liner panels - Gypsum panels, nom 1/2 or 5/8 in. thick, 48 in. wide, applied in one of the following methods. Method 1 — Base layer installed horizontally to steel studs with 1 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. Face layer installed vertically to steel studs with 1-5/8 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 24 in. OC, staggered 12 in. from base layer screws. Method 2 — Base layer installed vertically to steel studs with 1 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. Face layer installed horizontally to steel studs with 1-5/8 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 24 in. OC, staggered 12 in. from base layer screws. Additionally, Type G screws to be installed at the center of each stud cavity, 1-1/2 in. from both sides of the horizontal joint. For the 1/2 in. thick and 5/8 in. thick boards, the Type G screw length shall be 1-1/4 in. and 1-1/2 in. long, respectively.

For use with **Type EGRG or GlasRoc Shaftliner** liner panels - Gypsum panels, nom 1/2 or 5/8 in. thick, 48 in. wide, applied in one of the following methods. Method 1 — Base layer installed horizontally to steel studs with 1 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. with the 1st screws installed 12 in. from the board edge. Face layer installed vertically to steel studs with 1-5/8 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 12 in. OC. with the 1st and 2nd screws spaced 3/4 in. and 6-3/4 in. from the board edge, staggered 12 in. from base layer screws. Method 2 — Base layer installed vertically to steel studs with 1 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 24 in. OC. with the 1st screws installed 12 in. from the board edge. Face layer installed horizontally to steel studs with 1-5/8 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 24 in. OC., with the 1st and 2nd screws installed 3/4 in. and 6-3/4 in. from the board edge, staggered 12 in. from base layer screws. Additionally, Type G screws to be installed at the center of each stud cavity, spaced 12 in. OC., 1-1/2 in. from both sides of the horizontal joint. For the 1/2 in. thick and 5/8 in. thick boards, the Type G screw length shall be 1-1/4 in. and 1-1/2 in. long, respectively.

CERTAINTED GYPSUM INC — 1/2 in. thick Type C, 5/8 in. thick Type C or 5/8 in. thick Type X

CERTAINTED GYPSUM CANADA INC — Type X or Type Abuse-Resistant

Systems B and D

Gypsum panels, nom 1/2 or 5/8 in. thick, 48 in. wide, applied vertically to steel studs with 1 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 12 in. OC. Vertical joints on opposite sides of wall staggered a min of 24 in.

CERTAINTED GYPSUM INC — 1/2 in. thick Type C, 5/8 in. thick Type C or 5/8 in. thick Type X

CERTAINTED GYPSUM CANADA INC — Type X or Type Abuse-Resistant

Systems E and F

Gypsum panels, nom 5/8 in. thick, 48 in. wide, applied vertically with edges centered over studs, with 1 in. long Type S self-drilling, self-tapping bugle head steel screws spaced 12 in. OC.

CERTAINTED GYPSUM INC — Type X, SilentFX or Type C

CERTAINTED GYPSUM CANADA INC — Type X or Type Abuse-Resistant

Systems G and H

Gypsum panels, nom 5/8 in. thick, 48 in. wide applied in three layers to one side of the assembly. Base layer applied vertically, remaining layers applied vertically or horizontally. Base layer attached to studs with 1 in. long Type S steel screws spaced 24 in. OC. Middle layer attached to studs with 1-5/8 in. long Type S steel screws spaced 24 in. OC when installed vertically or 16 in. OC when installed horizontally. Face layer attached to studs with 2-1/4 in. long Type S steel screws spaced 16 in. OC when installed vertically or 12 in. OC when installed horizontally. Screws offset 6 in. from layer below. Horizontal joints on adjacent layers staggered a min of 12 in. When applied horizontally, 1-1/2 in. long Type G screws to be installed at the center of each stud cavity, 1-1/2 in. from both sides of the horizontal joint. Vertical joints centered over studs and staggered 24 in. on adjacent layers.

CERTAINTED GYPSUM INC — Type C

Systems I and J

Gypsum panels, nom 5/8 in. thick, 48 in. wide applied in two layers to one side of the assembly and one layer to the other side. On the two layer side, base layer applied vertically, face layer applied vertically or horizontally. Base layer attached to studs with 1 in. long Type S steel screws spaced 24 in. OC. Face layer attached to studs with 1-5/8 in. long Type S steel screws spaced 24 in. OC when installed vertically or 16 in. OC when installed horizontally. Screws offset 6 in. from layer below. When applied horizontally, 1-1/2 in. long Type G screws to be installed at the center of each stud cavity, 1-1/2 in. from both sides of the horizontal joint. Vertical joints centered over studs and staggered 24 in. on adjacent layers. On the one layer side, panels applied vertically and attached to studs with 1 in. long Type S steel screws spaced 12 in. OC. Vertical

joints on opposite sides of wall staggered min 24 in. OC.

CERTAINEED GYPSUM INC — Type C

5. Joint Tape and Compound —

(Not shown) — Joints covered with joint compound and paper or mesh tape. Screw heads covered with joint compound.

*Bearing the UL Classification Mark

Last Updated on 2011-10-06

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**Design No. U419
BXUV.U419
Fire Resistance Ratings - ANSI/UL 263**

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- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263

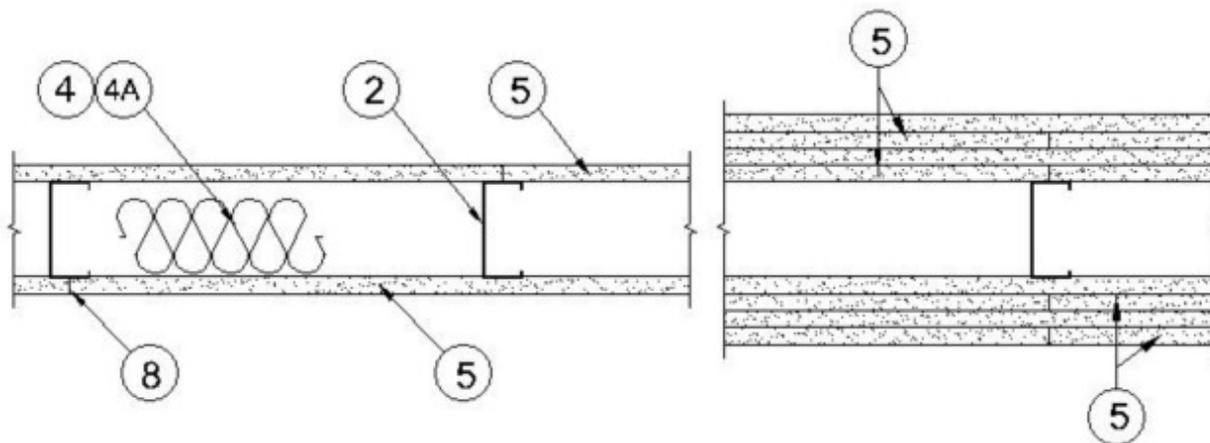
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

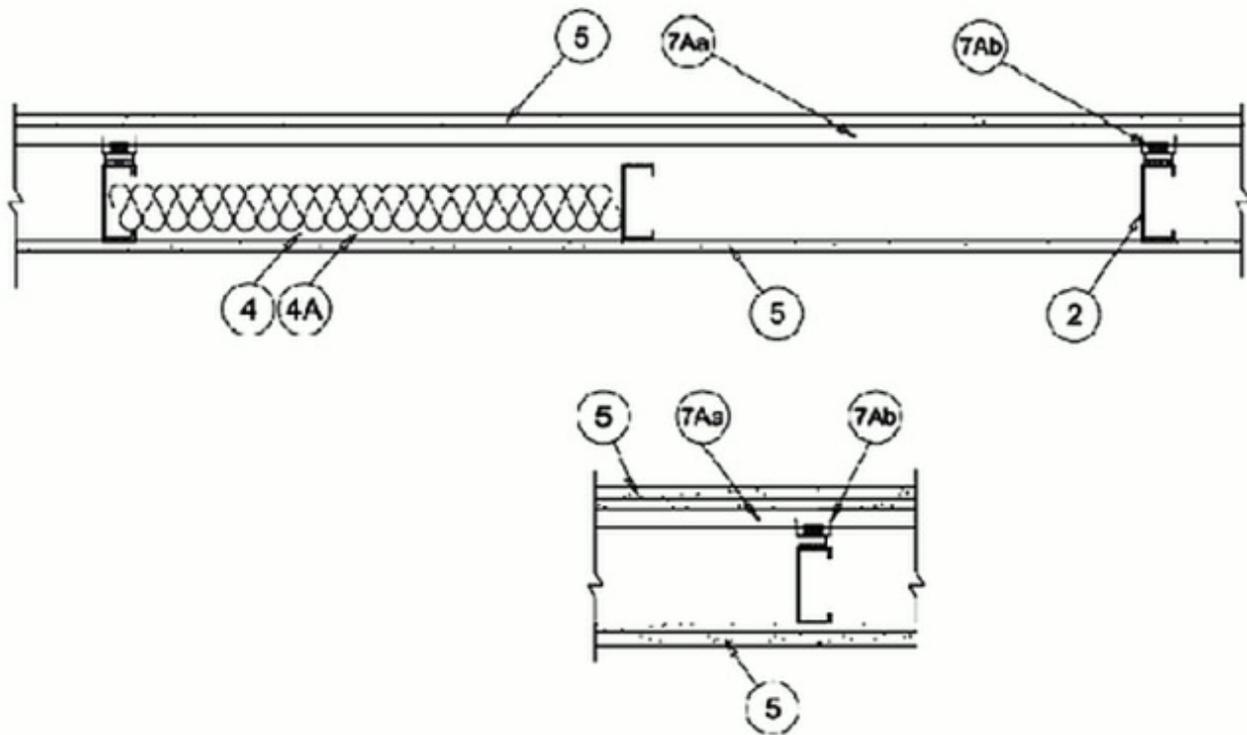
Design No. U419

May 14, 2014

Nonbearing Wall Ratings — 1, 2, 3 or 4 Hr (See Items 4 & 5)

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**





1. **Floor and Ceiling Runners** — (Not shown) — For use with Item 2 - Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth to accommodate stud size, with min 1-1/4 in. long legs, attached to floor and ceiling with fasteners 24 in. OC max.

1A. **Framing Members* - Floor and Ceiling Runner** — Not shown - In lieu of Item 1 — For use with Item 2B, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper25™ Track

CRACO MFG INC — SmartTrack25™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper25™ Track

PHILLIPS MFG CO L L C — Viper25™ Track

1B. **Framing Members* - Floor and Ceiling Runner** — Not shown - In lieu of Item 1 — For use with Item 2C, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.020 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper20™ Track

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™ Track

PHILLIPS MFG CO L L C — Viper20™ Track

1C. **Framing Members*— Floor and Ceiling Runners** — (Not shown) — In lieu of Item 1 - Channel shaped, attached to floor and ceiling with fasteners 24 in. OC. max.

ALLSTEEL & GYPSUM PRODUCTS INC — Type SUPREME Framing System

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV — Type SUPREME Framing System

QUAIL RUN BUILDING MATERIALS INC — Type SUPREME Framing System

SCAFCO STEEL STUD MANUFACTURING CO — Type SUPREME Framing System

STEEL CONSTRUCTION SYSTEMS INC — Type SUPREME Framing System

UNITED METAL PRODUCTS INC — Type SUPREME Framing System

1D. **Floor and Ceiling Runners** — (Not shown)—For use with Item 2A- Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, min depth to accommodate stud size, with min 1 in. long legs, attached to floor and ceiling with fasteners spaced max 24 in. OC.

1E. **Framing Members*— Floor and Ceiling Runners** — (Not shown, As an alternate to Item 1) — For use with Items 2E, 5F or 5G or 5I only, channel shaped, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, attached to floor and ceiling with fasteners 24 in. OC. max.

CLARKDIETRICH BUILDING SYSTEMS — CD ProTRAK

DMFCWBS L L C — ProTRAK

MBA METAL FRAMING — ProTRAK

RAM SALES L L C — Ram ProTRAK

SOUTHEASTERN STUD & COMPONENTS INC — ProTRAK

STEEL STRUCTURAL SYSTEMS L L C — Tri-S ProTRAK

1F. **Framing Members* - Floor and Ceiling Runner** — Not shown - In lieu of Item 1 — For use with Item 2F, proprietary channel shaped runners, minimum width to accommodate stud size, with 1- 1/8 in. long legs fabricated from min 0.015 in. (min bare metal thickness) galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

SUPER STUD BUILDING PRODUCTS — The Edge

1G. **Framing Members* - Floor and Ceiling Runner** — For use with Item 2G, proprietary channel shaped runners, minimum width to accommodate stud size attached to floor and ceiling with fasteners 24 in. OC max.

STUDCO BUILDING SYSTEMS — CROCSTUD Track

1H. **Floor and Ceiling Runners** — (Not shown) — Channel shaped, fabricated from min 0.02 in. galv steel, min width to accommodate stud size, with min 1 in. long legs, for use with studs specified below and fabricated from min 0.02 in. galv steel or thicker, attached to floor and ceiling with fasteners spaced max 24 in. OC.

MARINO /WARE, DIV OF WARE INDUSTRIES INC — Viper20™ Track VT100.

1I. **Framing Members*— Floor and Ceiling Runners** — (Not shown, As an alternate to Item 1) — For use with Items 2H, channel shaped, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, attached to floor and ceiling with fasteners 24 in. OC. max.

TELLING INDUSTRIES L L C — TRUE-TRACK™

1J. **Framing Members* - Floor and Ceiling Runner** — Not shown - In lieu of Item 1 — For use with Item 2I, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.

TELLING INDUSTRIES L L C — Viper25™ Track

1K. **Framing Members* - Floor and Ceiling Runner** — Not shown - In lieu of Item 1 — For use with Item 2J, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.020 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

TELLING INDUSTRIES L L C — Viper20™ Track

2. **Steel Studs** — Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

2A. **Steel Studs** — (As an alternate to Item 2, For use with Items 5B, 5E, 5H and 5J) Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, 3-1/2 in. min depth, spaced a max of 16 in. OC. Studs friction-fit into floor and ceiling runners. Studs to be cut 5/8 to 3/4 in. less than assembly height.

2B. **Framing Members* - Steel Studs** — (As an alternate to Item 2, For use with Items 5C or 5I) - Proprietary channel shaped studs, 3-5/8 in. deep spaced a max of 24 in. OC. Studs to be cut 3/4 in less than the assembly height and installed with a 1/2 in. gap between the end of the stud and track at the bottom of the wall. For direct attachment of gypsum board only.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper25™

CRACO MFG INC — SmartStud25™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper25™

PHILLIPS MFG CO L L C — Viper25™

2C. **Framing Members* - Steel Studs** — Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max if 24 in. OC, fabricated from min 0.020 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper20™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™

PHILLIPS MFG CO L L C — Viper20™

2D. **Framing Members*— Steel Studs** — In lieu of Item 2 - Channel shaped studs, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

ALLSTEEL & GYPSUM PRODUCTS INC — Type SUPREME Framing System

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV — Type SUPREME Framing System

QUAIL RUN BUILDING MATERIALS INC — Type SUPREME Framing System

SCAFCO STEEL STUD MANUFACTURING CO — Type SUPREME Framing System

STEEL CONSTRUCTION SYSTEMS INC — Type SUPREME Framing System

UNITED METAL PRODUCTS INC — Type SUPREME Framing System

2E. **Framing Members*— Steel Studs** — (Not shown, As an alternate to Item 2) —For use with Items 5F or 5G or 5I only, channel shaped studs, min depth as indicated under Item 5F, 5G or 5I, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

CLARKDIETRICH BUILDING SYSTEMS — CD ProSTUD

DMFCWBS L L C — ProSTUD

MBA METAL FRAMING — ProSTUD

RAM SALES L L C — Ram ProSTUD

SOUTHEASTERN STUD & COMPONENTS INC — ProSTUD

STEEL STRUCTURAL SYSTEMS L L C — Tri-S ProSTUD

2F. **Framing Members* - Steel Studs** — Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, minimum width indicated under Item 5, 1-1/4 in. deep fabricated from min 0.015 in. (min bare metal thickness) galvanized steel. Studs 3/8 in. to 3/4 in. less in lengths than assembly heights.

SUPER STUD BUILDING PRODUCTS — The Edge

2G. **Framing Members* - Steel Studs** — Not shown - In lieu of Item 2 - proprietary channel shaped studs, minimum width indicated under Item 5, Studs to be cut 3/8 to 3/4 in less than the assembly height.

STUDCO BUILDING SYSTEMS — CROCSTUD

2H. **Framing Members*— Steel Studs** — (Not shown, As an alternate to Item 2) — Fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

TELLING INDUSTRIES L L C — TRUE-STUD™

2I. **Framing Members* - Steel Studs** — (As an alternate to Item 2, For use with Items 5C or 5L) - Proprietary channel shaped studs, 3-5/8 in. deep spaced a max of 24 in. OC. Studs to be cut 3/4 in less than the assembly height and installed with a 1/2 in. gap between the end of the stud and track at the bottom of the wall. For direct attachment of gypsum board only.

TELLING INDUSTRIES L L C — Viper25™

2J. **Framing Members* - Metal Studs** — Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max if 24 in. OC, fabricated from min 0.020 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights

TELLING INDUSTRIES L L C — Viper20™

3. **Wood Structural Panel Sheathing** — (Optional, For use with Item 5 Only.)- (Not Shown) - 4 ft wide, 7/16 in. thick oriented strand board (OSB) or 15/32 in. thick structural 1 sheathing (plywood) complying with DOC PS1 or PS2, or APA Standard PRP-108, manufactured with exterior glue, applied horizontally or vertically to the steel studs. Vertical joints centered on studs, and staggered one stud space from wallboard joints. Attached to studs with flat-head self-drilling tapping screws with a min. head diam. of 0.292 in. at maximum 6 in. OC. in the perimeter and 12 in. OC. in the field. When used, fastener lengths for gypsum panels increased by min. 1/2 in.

4. **Batts and Blankets*** — (Required as indicated under Item 5) — Mineral wool batts, friction fitted between studs and runners. Min nom thickness as indicated under Item 5. See **Batts and Blankets (BKNV or BZJZ) Categories** for names of Classified companies.

4A. **Batts and Blankets*** — (Optional) — Placed in stud cavities, any glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. See **Batts and Blankets (BKNV or BZJZ) Categories** for names of Classified companies.

5. **Gypsum Board*** — Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) staggered a min of 12 in. The thickness and number of layers for the 1 hr, 2 hr, 3 hr and 4 hr ratings are as follows:

Gypsum Board Protection on Each Side of Wall

Rating, Hr	Min Stud Depth, in. Items 2, 2C, 2D, 2F and 2G	No. of Layers & Thkns of Panel	Min Thkns of Insulation (Item 4)
1	3-1/2	1 layer, 5/8 in. thick	Optional

1	2-1/2	1 layer, 1/2 in. thick	1-1/2 in.
1	1-5/8	1 layer, 3/4 in. thick	Optional
2	1-5/8	2 layers, 1/2 in. thick	Optional
2	1-5/8	2 layers, 5/8 in. thick	Optional
2	3-1/2	1 layer, 3/4 in. thick	3 in.
3	1-5/8	3 layers, 1/2 in. thick	Optional
3	1-5/8	2 layers, 3/4 in. thick	Optional
3	1-5/8	3 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 1/2 in. thick	Optional
4	2-1/2	2 layers, 3/4 in. thick	2 in.

CGC INC — 1/2 in. thick Type C, IP-X2 or IPC-AR; WRC, 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX or WRC; 3/4 in. thick Types IP-X3 or ULTRACODE

UNITED STATES GYPSUM CO — 1/2 in. thick Type C, IP-X2, IPC-AR or WRC; 5/8 in. thick Type SCX, SGX, SHX, WRX, IP-X1, AR, C, WRC, FRX-G, IP-AR, IP-X2, IPC-AR ; 3/4 in. thick Types IP-X3 or ULTRACODE

USG MEXICO S A DE C V — 1/2 in. thick Type C, IP-X2, IPC-AR or WRC; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX, WRC or; 3/4 in. thick Types IP-X3 or ULTRACODE

When Item 7B, Steel Framing Members*, is used, Nonbearing Wall Rating is limited to 1 Hr. Min. stud depth is 3-1/2 in., min. thickness of insulation (Item 4) is 3 in., and two layers of gypsum board panels (1/2 in. or 5/8 in. thick) shall be attached to furring channels as described in Item 6. One layer of gypsum board panels (1/2 in. or 5/8 in. thick) attached to opposite side of stud without furring channels as described in Item 6.

5A. **Gypsum Board*** — (As an alternate to Item 5) — 5/8 in. thick, 24 to 54 in. wide, applied horizontally as the outer layer to one side of the assembly. Secured as described in Item 6.

CGC INC — Type SHX.

UNITED STATES GYPSUM CO — Type FRX-G, SHX.

USG MEXICO S A DE C V — Type SHX.

5B. **Gypsum Board*** — (Not Shown) - As an alternate to Item 5 when used as the base layer on one or both sides of wall when 5/8 in or 3/4 in. thick products are specified. For direct attachment only to steel studs Item 2A, (not to be used with Item 3) - Nom 5/8 in. or 3/4 in. may be used as alternate to all 5/8 in. or 3/4 in. shown in Item 5, Wallboard Protection on Each Side of Wall table. Nom 5/8 in. or 3/4 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Gypsum board secured to 20 MSG steel studs Item 2A with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. To be used with Lead Batten Strips (see Item 11) or Lead Discs or Tabs (see Item 12).

RAY-BAR ENGINEERING CORP — Type RB-LBG

5C. **Gypsum Board*** — (For Use With Item 2B) Rating Limited to 1 Hour. 5/8 in. thick, 48 in. wide, Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. (Vertical Application) - The gypsum board is to be installed on each side of the studs with 1 in. long Type S coated steel screws spaced 8 in. OC starting 4 in. from the edge of the board at the vertical edges and 12 in. OC starting 6 in. from the edge of the board at the center of each board. Gypsum boards are to be secured to the top and bottom track with screws spaced 8 in. OC starting 4 in. from the board edge. Fasteners shall not penetrate through both the stud and the track at the same time. Vertical joints are to be centered over studs and staggered one stud cavity on opposite sides of studs. (Horizontal Application) - The gypsum board is to be installed on each side of the studs with 1 in. long Type S coated steel screws spaced 8 in. OC starting 4 in. from the edge of the board at the vertical edges and 12 in. OC starting 6 in. from the edge of the board at the center of each board. Gypsum boards are to be secured to the top and bottom track with screws spaced 8 in. OC starting 4 in. from the board edge. Fasteners shall not penetrate through both the stud and the track at the same time. All horizontal joints are to be backed as outlined under section VI of Volume 1 in the Fire Resistive Directory.

CGC INC — Type SCX.

UNITED STATES GYPSUM CO — Type SCX, SGX.

USG MEXICO S A DE C V — Type SCX.

5D. **Gypsum Board*** — (As an alternate to Item 5) — 5/8 in. thick, 48 in. wide, applied vertically or horizontally. Secured as described in Item 6. For use with Items 1 and 2 only.

UNITED STATES GYPSUM CO — Type USGX.

5E. **Gypsum Board*** — (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 1/2 in. or 5/8 in thick products are specified, For direct attachment only to steel studs Item 2A, not to be used with Item 3). Nominal 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 (or No. 6 by 1-1/4 in. long bugle head fine driller) steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field.

NEW ENGLAND LEAD BURNING CO INC, DBA NELCO — Nelco

5F. **Gypsum Board*** — (As an alternate to Item 5) — For use with Items 1E and 2E and limited to 1 Hour Rating only, Gypsum panels with beveled, square or tapered edges, applied vertically, and fastened to the steel studs with 1 in. long Type S screws spaced 8 in. OC along vertical and bottom edges and 12 in. OC in the field. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Steel stud depth shall be a minimum 3-5/8 in.

UNITED STATES GYPSUM CO — 5/8 in. thick Type SCX, SGX.

5G. **Gypsum Board*** — (As an alternate to Item 5) — For use with Items 1E and 2E only, Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally, as specified in the table below and fastened to the steel studs as described in Item 6. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) staggered a min of 12 in. The thickness and number of layers for the 2 hr, 3 hr and 4 hr ratings are as follows:

Gypsum Board Protection on Each Side of Wall

Rating, Hr	Min Stud Depth, in. Item 2E	No. of Layers & Thickness of Panel	Min Thkns of Insulation (Item 4)
2	1-5/8	2 layers, 1/2 in. thick	Optional
2	1-5/8	2 layers, 5/8 in. thick	Optional
3	1-5/8	3 layers, 1/2 in. thick	Optional
3	1-5/8	3 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 1/2 in. thick	Optional

CGC INC — 1/2 in. thick Type C, IP-X2 or IPC-AR; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, or; 3/4 in. thick Types IP-X3 or ULTRACODE

UNITED STATES GYPSUM CO — 1/2 in. thick Type C, IP-X2, IPC-AR or; 5/8 in. thick Type SCX, SGX, SHX, IP-X1, AR, C, , FRX-G, IP-AR, IP-X2, IPC-AR ; 3/4 in. thick Types IP-X3 or ULTRACODE

USG MEXICO S A DE C V — 1/2 in. thick Type C, IP-X2, IPC-AR or; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, or; 3/4 in. thick Types IP-X3 or ULTRACODE

5H. **Gypsum Board*** — (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 5/8 or 3/4 in thick products are specified. For direct attachment only to steel studs Item 2A, (not to be used with Item 3) - Nom 5/8 or 3/4 in. may be used as alternate to all 5/8 or 3/4 in. shown in Item 5, Wallboard Protection on Each Side of Wall table. Nom 5/8 or 3/4 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over 20 MSG steel studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in.

OC in the field. Gypsum board secured to 20 MSG steel studs Item 2B with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. For Joint Compound see Item 5. To be used with Lead Batten Strips (see Item 11A) or Lead Discs (see Item 12A).

MAYCO INDUSTRIES INC — Type X-Ray Shielded Gypsum

5I. **Gypsum Board*** — (As an alternate to Item 5) - Nom. 5/8 in. thick gypsum panels with beveled, square or tapered edges installed as described in Item 5. Steel stud minimum depth shall be as indicated in Item 5.

CGC INC — Type ULX

UNITED STATES GYPSUM CO — Type ULX

USG MEXICO S A DE C V — Type ULX

5J. **Gypsum Board*** — (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 1/2 in. or 5/8 in thick products are specified, For direct attachment only to steel studs Item 2A, not to be used with Item 3). Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws gypsum panel steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Lead batten strips, min 2 in. wide, max 8 ft long with a max thickness of 0.14 in. placed on the face of studs and attached to the stud with construction adhesive and two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead discs, nominal 3/8 in. diam by max 0.085 in. thick. Compression fitted or adhered over the screw heads. Lead batten strips and discs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

RADIATION PROTECTION PRODUCTS INC — Type RPP - Lead Lined Drywall

6. **Fasteners** — (Not shown) — For use with Items 2 and 2F - Type S or S-12 steel screws used to attach panels to studs (Item 2) or furring channels (Item 7). **Single layer systems:** 1 in. long for 1/2 and 5/8 in. thick panels or 1-1/4 in. long for 3/4 in. thick panels, spaced 8 in. OC when panels are applied horizontally, or 8 in. OC along vertical and bottom edges and 12 in. OC in the field when panels are applied vertically. **Two layer systems:** First layer- 1 in. long for 1/2 and 5/8 in. thick panels or 1-1/4 in. long for 3/4 in. thick panels, spaced 16 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels or 2-1/4 in. long for 3/4 in. thick panels, spaced 16 in. OC with screws offset 8 in. from first layer. **Three-layer systems:** First layer- 1 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Third layer- 2-1/4 in. long for 1/2 in., 5/8 in. thick panels or 2-5/8 in. long for 5/8 in. thick panels, spaced 12 in. OC. Screws offset min 6 in. from layer below. **Four-layer systems:** First layer- 1 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Third layer- 2-1/4 in. long for 1/2 in. thick panels or 2-5/8 in. long for 5/8 in. thick panels, spaced 24 in. OC. Fourth layer- 2-5/8 in. long for 1/2 in. thick panels or 3 in. long for 5/8 in. thick panels, spaced 12 in. OC. Screws offset min 6 in. from layer below.

7. **Furring Channels** — (Optional, not shown, for single or double layer systems) — Resilient furring channels fabricated from min 25 MSG corrosion-protected steel, spaced vertically a max of 24 in. OC. Flange portion attached to each intersecting stud with 1/2 in. long Type S-12 steel screws. Not for use with Item 5A and 5E.

7A. **Framing Members*** — (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Item 5A and 5E.

b. **Steel Framing Members*** — Used to attach furring channels (Item 7Aa) to studs (Item 2). Clips spaced max. 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. RSIC-V and RSIC-V (2.75) clips secured to studs with No. 8 x 9/16 in. minimum self-drilling, S-12 steel screw through the center hole. Furring channels are friction fitted into clips. RSIC-1 and RSIC-V clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) and RSIC-V (2.75) clips for use with 2-23/32 in. wide furring channels.

PAC INTERNATIONAL INC — Types RSIC-1, RSIC-V, RSIC-1 (2.75), RSIC-V (2.75).

7B. **Framing Members*** — (Optional, Not Shown) — As an alternate to Item 7, for single or double layer systems, furring channels and Steel Framing Members on only one side of studs as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Batts and Blankets placed in stud cavity as described in Item 5. Two layers of gypsum board attached to furring channels as described in Item 5. Not for use with Item 5A and 5E.

b. **Steel Framing Members*** — Used to attach furring channels (Item 7Ba) to one side of

studs (Item 2) only. Clips spaced 48 in. OC., and secured to studs with two No. 8 x 2-1/2 in. coarse drywall screws, one through the hole at each end of the clip. Furring channels are friction fitted into clips.

KINETICS NOISE CONTROL INC — Type Isomax

7C. Framing Members* — (Not Shown) — (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel. 2-3/8 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Item 5A and 5E.

b. **Steel Framing Members*** — Used to attach furring channels (Item 7Aa) to studs (Item 2). Clips spaced max. 48 in. OC. GENIECLIPS secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. Furring channels are friction fitted into clips.

PLITEQ INC — Type GENIECLIP

7D. Steel Framing Members — (Optional, Not Shown)* - Furring channels and resilient sound isolation clip as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel. Spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Ends of adjoining channels overlapped 6 in. and secured together with four self-tapping No. 8x1/2 Self Drilling screws (2 per side 1 in. and 4 in. from overlap edge). Gypsum board attached to furring channels as described in Item 4. Side joint furring channels shall be attached to studs with RESILMOUNT Sound Isolation Clips - located approximately 2 in. from each end of length of channel. Both Gypsum Boards at side joints fastened into channel with screws spaced 8 in. OC, approximately 1/2 in. from joint edge. Not for use with Item 5A and 5E.

b. **Steel Framing Members*** — Resilient sound isolation clip used to attach furring channels (Item 7Da) to studs. Clips spaced 24 in. OC., and secured to studs with No. 10 x 2-1/2 in. coarse drywall screw through the center hole. Furring channels are friction fitted into clips.

STUDCO BUILDING SYSTEMS — RESILMOUNT Sound Isolation Clips - Type A237 or A237R

8. Joint Tape and Compound — Vinyl or casein, dry or premixed joint compound applied in two coats to joints and screw heads of outer layers. Paper tape, nom 2 in. wide, embedded in first layer of compound over all joints of outer layer panels. Paper tape and joint compound may be omitted when gypsum panels are supplied with a square edge.

9. Siding, Brick or Stucco — (Optional, not shown) — Aluminum, vinyl or steel siding, brick veneer or stucco, meeting the requirements of local code agencies, installed over gypsum panels. Brick veneer attached to studs with corrugated metal wall ties attached to each stud with steel screws, not more than each sixth course of brick.

10. Caulking and Sealants* — (Optional, not shown) — A bead of acoustical sealant applied around the partition perimeter for sound control.

UNITED STATES GYPSUM CO — Type AS

11. Lead Batten Strips — (Not Shown, For Use With Item 5B) - Lead batten strips, min 1-1/2 in. wide, max 10 ft long with a max thickness of 0.125 in. Strips placed on the interior face of studs and attached from the exterior face of the stud with two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5B) and optional at remaining stud locations. Required behind vertical joints.

11A. Lead Batten Strips — (Not Shown, For Use With Item 5H) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.140 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations.

12. Lead Discs or Tabs — (Not Shown, For Use With Item 5B) - Used in lieu of or in addition to the lead batten strips (Item 11) or optional at other locations - Max 3/4 in. diam by max 0.125 in. thick lead discs compression fitted or adhered over steel screw heads or max 1/2 in. by 1-1/4 in. by max 0.125 in. thick lead tabs placed on gypsum boards (Item 5B) underneath screw locations prior to the installation of the screws. Lead discs or tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

12A. Lead Discs — (Not Shown, for use with Item 5H) Max 5/16 in. diam by max 0.140 in. thick lead discs compression fitted or adhered over steel screw heads. Lead discs to have a purity of 99.5% meeting the Federal Specification QQ-L-201f, Grades "B, C or D".

13. Lead Batten Strips — (Not Shown, For Use With Item 5E) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.142 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min.

Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5E) and optional at remaining stud locations.

14. **Lead Tabs** — (Not Shown, For Use With Item 5E) 2 in. wide, 5 in. long with a max thickness of 0.142 in. Tabs friction-fit around front face of stud, the stud folded back flange, and the back face of the stud. Tabs required at each location where a screw (that secures the gypsum boards, Item 5E) will penetrate the steel stud. Lead tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead tabs may be held in place with standard adhesive tape if necessary.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

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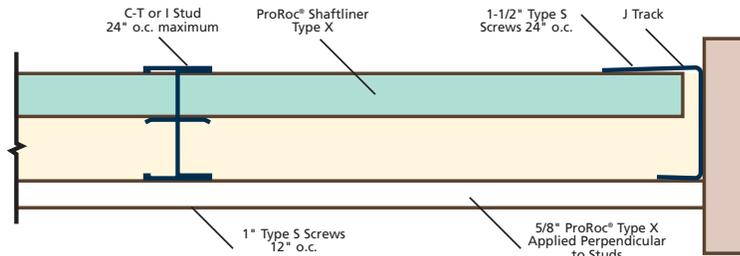
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Horizontal Systems

1 and 2 hour Fire Resistance Rating

FIRE RATED SYSTEM DESIGNS



This system is installed in a horizontal orientation. ProRoc® Shaftliner Type X gypsum boards are inserted between 2-1/2", 4" or 6" C-T or I-Studs. A single layer of 5/8" ProRoc® Type X gypsum board is applied at right angles to the C-T or I-Studs, with 1" No. 6 Type S screws spaced 12" o.c. (Non-Load Bearing)

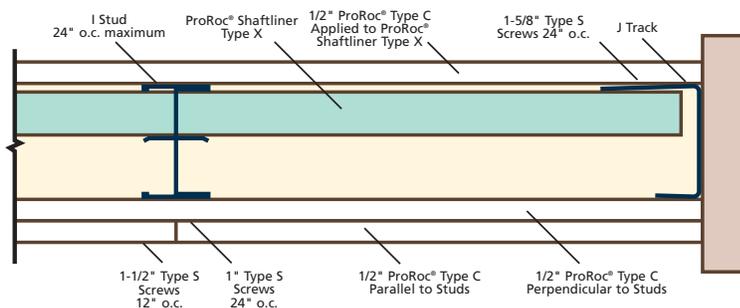
1 HR

HORIZONTAL
CEILING SYSTEM

FIRE TEST
WHI 651- 0306.1
1989

THICKNESS*
3-1/8"
(80 mm)

APPROX. WT.
6-1/2 #/sf
(32 kg/m²)



ProRoc® Shaftliner Type X gypsum boards are inserted between 2-1/2", 4" or 6" I-Studs. A single layer of 1/2" ProRoc® Type C gypsum board is progressively installed on top of the ProRoc® Shaftliner. Two layers of 1/2" ProRoc® Type C gypsum board are installed on the open-stud-face with the first layer installed at right angles to the I-Studs, and the second layer installed parallel to the I-Studs. (Non-Load Bearing)

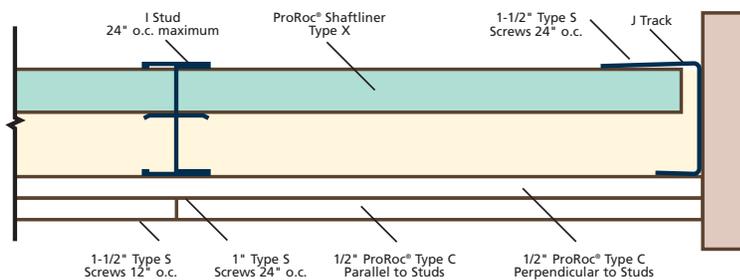
2 HR

HORIZONTAL MEMBRANE
AND DUCT PROTECTION SYSTEM

FIRE TEST
WHI 651- 0306.4
1989

THICKNESS*
4"
(102 mm)

APPROX. WT.
10-1/2 #/sf
(52 kg/m²)



ProRoc® Shaftliner Type X gypsum boards are inserted between 2-1/2", 4" or 6" I-Studs. Two layers of 1/2" ProRoc® Type C gypsum board are installed on the open-stud-face with the first layer installed at right angles to the I-Studs, and the second layer installed parallel to the I-Studs. (Non-Load Bearing)

2 HR

HORIZONTAL
SYSTEM

CORRIDOR

FIRE TEST
WHI 651- 0306.4
1989

THICKNESS*
3-1/2"
(89 mm)

APPROX. WT.
9 #/sf
(45 kg/m²)

*Diagrams shown with 2-1/2" stud configurations. System thickness varies according to stud size application.

SECTION 09 24 00
PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Portland cement plaster for installation over solid surfaces for interior ceilings, where indicated.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies: Board substrate, metal stud framing and furring for plaster finish.

1.03 REFERENCE STANDARDS

- A. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2014a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide a complete list of all materials to be used, all related technical data, job-specific details, installation instructions, installer's current certificate of training and manufacturer's warranty.
- C. Samples:
 - 1. Submit manufacturer's full color line for selection of color range and 4 x 4 inch actual samples of texture range for selection.
 - 2. Submit samples 8 x 8 inches in size demonstrating selected texture(s) and color range to narrow final selection.
 - 3. Submit confirmation samples, 8 x 8 inch in size for each selected finish color and texture.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years documented experience.
- B. Unless otherwise indicated, cement plaster finish system shall be the products of or licensed by a single manufacturer. All materials shall be approved by the manufacturer and certified compatible with related materials and suitable for the proposed application.

1.06 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be delivered to the job site in their original unopened containers and shall be provided with adequate protection from damage and exposure to the elements. Stored materials shall be protected from the sun and frost. Temperature of stored materials shall be not less than 40 degrees F and not more than 90 degrees F. Portland cement based materials shall be kept away from moisture and humidity.

1.07 FIELD CONDITIONS

- A. Do not apply plaster when substrate or ambient air temperature is under 50 degrees F or over 80 degrees F.
- B. The system and adjacent materials shall be protected from weather and other damage during installation and curing.
- C. Maintain minimum ambient temperature of 50 degrees F during installation of plaster and until cured.

PART 2 PRODUCTS

2.01 PORTLAND CEMENT PLASTER SYSTEM

- A. Interior Ceiling Finish: ASTM C926, direct-applied finish system (DEFS) of Portland Cement and aggregates and other materials.
 - 1. Applications: Shower ceilings and other locations indicated on the Drawings.
 - 2. Surface Burning Characteristics, ASTM E84: Flame spread index less than 25, Smoke Developed less than 450.
 - 3. Base Coat: Two-part fiber reinforced acrylic waterproof base coat with portland cement. Provide primer if recommended by the system manufacturer.
 - 4. Standard reinforcing mesh, 4.5 oz/sq yd. open weave glass fiber fabric.
 - 5. Finish Coat: Acrylic based textured finish, factory mixed with integral color.
 - 6. Basis of Design: Quik Gold System by Sto Corp.
 - 7. Acceptable Manufacturers: Dryvit, Parex.
 - 8. Substitutions: See 01 60 00 - Product Requirements.
- C. Interior Ceiling Board: Backer Board. See Section 09 21 16 - Gypsum Board Assemblies.
- D. Water: Clean, fresh, potable and free of mineral or organic matter that could adversely affect plaster.
- E. Sealant: As specified in Section 07 90 05 - Joint Sealants. Provided backer rods, bond breakers, primers and accessories as recommended by the manufacturer.
- F. Accessories: PVC trims, casing beads, starter tracks, and as required as recommended by the system manufacturer.
- G. Fasteners: Stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify the suitability of existing conditions before starting work. Surfaces to receive materials shall be sound, well attached, clean and dry. Surfaces shall be free of oils, dust, paint, water, wax, etc. and shall be accepted by the Contractor prior to application. All unsatisfactory conditions shall be corrected prior to proceeding. Surface smoothness shall meet a tolerance of 1/4 inch per 8 feet or less.
- B. Surfaces to receive materials shall not be below 40 degrees F.
- C. Inspect application surfaces for:
 - 1. Contamination including algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances.
 - 2. Cracks; measure crack width and record location of cracks.
 - 3. Damage and deterioration.
 - 4. Moisture content and moisture damage. Measure by moisture meter to determine if the surface is acceptable for installation. Record and report moisture readings and any moisture damage.
 - 5. Compliance with substrate tolerances; record areas that are greater than 1/8 inch in 10-0 feet deviation in plane.
 - 6. Do not proceed with installation until conditions are corrected. Areas of damage sheathing shall be replaced.
- D. Mechanical and Electrical: Verify services concealed behind surfaces to receive plaster have been tested and approved.

3.02 PREPARATION

- A. Provide expansion joints as recommended by the manufacturer. In general, joints shall be located where dissimilar materials abut and at all movement joints in the substrate. Dissimilar metals shall be properly isolated.
 - 1. Provide 3/8 inch minimum wide expansion joints in the system where they exist in the substrate or supporting construction, at a minimum of every 30 feet, for maximum 900 sq ft areas, and where the system adjoins dissimilar construction or materials. If the soffit board manufacturer has more stringent requirements follow the board manufacturer's recommendations.
 - 2. Provide 3/8 inch minimum wide perimeter sealant joints at the soffit to wall transition and around all penetrations through the system (lights, vents, etc.).
- B. Install accessories in accordance with the manufacturer's specifications.
- C. Attach a strip of detail mesh to the substrate at all system terminations except where starter track is used. Embed strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.

3.03 PLASTERING

- A. Apply plaster in accordance with ASTM C926.
- B. Apply base coat over glass mesh mortar board with spray equipment or a trowel to a uniform thickness of approximately 1/8". Immediately embed the mesh onto the wet base coat. Re-skim with additional base coat if mesh color is visible.
- C. Apply primer by brush roller or spray to the base coat and allow to dry.
- D. Apply finish coat over the dried primed base coat. Avoid direct sunlight during finish application. Apply finish in a continuous application and work the wet edge. Do not apply finish over sealant joints. Do not apply finish over irregular surfaces or surfaces not in compliance with manufacturer's recommendations.
- E. Finish Texture: Float to a consistent and smooth finish.
- F. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.

3.04 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet.

3.05 CLEANING, PROTECTION, REPAIR AND MAINTENANCE

- A. Clean and maintain the ceiling finish for a fresh appearance and to prevent water entry into and behind the finish system. Repair cracks, impact damage, spalls or delamination promptly.
- B. Upon completion of the Work, all waste and excess materials shall be removed from the site. Thoroughly clean all adjacent materials and surfaces.

END OF SECTION

SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Floor tile and base, tile for stairs and wall tile.
- B. Tile backer board.
- C. Non-ceramic trim, accessories, setting materials and grout.
- D. See ID Drawings for details, patterns, alternate colors, etc.

1.02 RELATED REQUIREMENTS

- A. Section 01 23 00 - Alternates.
- B. Section 03 30 00 - Cast-in-Place Concrete: Slab finish. Note slabs to receive quarry tile shall be steel troweled with a fine broom finish.
- C. Section 07 90 05 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- D. Section 09 21 16 - Gypsum Board Assemblies: Metal stud walls for tile backer board.

1.03 REFERENCE STANDARDS

- A. ANSI A108 Series / A118 Series / A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2012.1.
- B. ANSI A137.1 – American National Standard Specifications for Ceramic Tile, current version.
- C. ASTM C1178 - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2011.
- D. TCNA - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene a pre-installation meeting after the results of slab testing are available and at least two weeks before starting work of this Section; require attendance by the Contractor, a technical representative from each flooring manufacturer, flooring installer, Architect and Owner, to review slab moisture levels, floor surface conditions and preparation requirements, materials, installation procedures and coordination of related work.
 - 1. A field report summarizing the findings and recommendations from this meeting shall be issued by the technical representatives and copied to the Owner and Architect.
 - 2. Written certification from each flooring manufacturer that condition of sub-floor is acceptable for flooring installation shall be issued and copied to the Owner and Architect.
 - 3. If a slab sealer or other remedial work is required to make the condition of the sub-floor acceptable for the flooring installation, slab preparation and slab sealer product installation shall be field reviewed by the manufacturer's technical representatives and application tested (thickness, adhesion, etc.) to confirm compliance with product recommendations.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, backer board and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, setting details, and metal accessories.
 - 1. Proposed joint expansion and control joint details and locations shall be submitted to the Architect for review.
- D. Samples: Submit confirmation samples of each tile and color selected. Submit samples of each grout color selected.

- E. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.
- F. Maintenance Materials (Attic Stock): Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Tile: 1 percent of each size, color, and surface finish combination, but not less than 25 of each type.
 - 3. Place materials in clean marked cartons exclusively for the Owner's use. Send written notice to the Architect identifying the quantity and location of extra tile furnished.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA Handbook on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this Section, with minimum ten years of documented experience.
- C. Installer Qualifications: Company specializing in performing commercial tile installation, with minimum of 5 years of documented experience.

1.07 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Construct 4' x 4' minimum size floor tile, wall tile and flooring transition mock-ups in locations as directed to demonstrate standard of workmanship and materials. Incorporate grout, leveling and shimming products, flooring on both sides of transitions, and all components specified for a complete installation at the location. Flooring transitions shall provide smooth, bump-free transitions.
 - 1. Remove, reconstruct or modify mock-ups as required for acceptance by the Architect. Accepted mock-ups may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.
- B. Deliver all products to job site in manufacturer's unopened, original containers with grade seals and marking intact. Keep tile cartons dry.

1.09 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during installation of tilework and for 7 days after completion.
- C. Provide adequate lighting for good grouting and cleanup.

1.10 OWNER TRAINING

- A. If requested by the Owner, a ceramic tile cleaning and maintenance training session shall be held at the completed facility conducted by qualified representatives of the tile manufacturers. Printed tile maintenance instructions shall be provided to the Owner in advance of the training session.

1.11 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional requirements.
- B. Provide manufacturer's product warranty, but in no case less than two (2) years.

PART 2 PRODUCTS

2.01 TILE

- A. Floor Tile Type CT-1: ANSI A137.1, Porcelain.
 - 1. Basis of Design: Keystones by Dal-Tile Corp.

2. Acceptable Manufacturers:
 - a. Crossville.
 - b. Best Tile.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 3. Size and Colors: See Finish Legend.
 4. Thickness: 1/4 inch
 5. Grout: Epoxy.
 6. Joint: 1/8 inch.
 7. Moisture Absorption, ASTM C373: 0 to 0.5 percent.
 8. D.C.O.F Coefficient of Friction, A137.1: > 0.42.
- B. Base Tile Type CTB-1: ANSI A137.1 Porcelain.
1. Basis of Design: Keystones by DalTile.
 2. Acceptable Manufacturers: Matching acceptable manufacturer floor tile product.
 3. Size and Color: See Finish Legend
- C. Floor Tile Type PT-1, PT-2: ANSI A137.1 Porcelain.
1. Basis of Design: Concrete Connection by Dal-Tile Corp.
 2. Acceptable Manufacturers:
 - a. Bluestone by Crossville.
 - b. Volume 1.0 by DalTile.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 3. Sizes, Shapes and Colors: See Finish Legend.
 4. Thickness: 3/8 inch
 5. Grout Joint: 1/8 inch.
 6. Moisture Absorption, ASTM C373: 0 to 0.5 percent.
 7. D.C.O.F Coefficient of Friction, A137.1: > 0.42.
- D. Wall Tile Type PT-3:
1. Basis of Design: Invoke Colorbody Porcelain by Dal-Tile Corp.
 2. Acceptable Manufacturers:
 - a. Bluestone by Crossville.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 2. Size, Shape and Colors: See Finish Legend.
 3. Thickness: 3/8 inch.
 4. Grout Joint: 1/8 inch.
 5. Moisture Absorption, ASTM C373: 0 to 0.5 percent.
 6. Breaking Strength, ASTM C648: > 275 lbs
- E. Wall Tile Type PT-4, PT-5: ANSI A137.1 Porcelain.
1. Basis of Design: Color By Numbers by Crossville.
 2. Acceptable Manufacturers:
 - a. DalTile.
 - b. See Section 01 60 00 – Product Requirements.
 3. Moisture Absorption, ASTM C373: 0 to 0.5 percent.
 4. Sizes, Shapes and Colors: See Finish Legend.
 5. Edges: Square.
 6. Bond Strength, ASTM C482: > 200 psi.
 7. Surface Finish: Matte glazed.
- F. Floor Tile Type PT-6, PT-7, PT-8: ANSI A137.1, Porcelain.
1. Basis of Design: Pangea by Stonepeak
 2. Acceptable Manufacturers:
 - a. Volume 1.0 by DalTile.
 - b. Moonstruck by Crossville.
 - c. See Section 01 60 00 – Product Requirements.

2. Sizes, Shapes and Colors: See Finish Legend.
- G. Base Tile Type PTB: ANSI A137.1 Porcelain.
 1. PTD-1 Basis of Design: Concrete Connection by DalTile.
 2. PTD-2 Basis of Design: Color By Numbers by Crossville.
 3. PTD-3 Basis of Design: Invoke Color body Bullnose 4" x 18".
 4. Acceptable Manufacturers: Matching acceptable manufacturer floor tile product.
 5. Sizes, Shapes and Colors: See Finish Legend.
- H. Quarry Tile Type QT-1: ANSI A137.1
 1. Basis of Design: Quarry Tile by Dal-Tile Corp.
 2. Acceptable Manufacturers:
 - a. American Olean.
 - b. Summitville Tiles, Inc.
 3. Color and Size: See Finish Legend.
 4. Water Absorption: 0.5 to 3.0 percent.
 5. Thickness: 1/2 inch.
 6. Grout Joint Width: 3/8 inch.
 7. Grout: Epoxy. Tile shall be provided with grout release coating.
 8. Breaking Strength, ASTM C648: > 350 lbs.
 9. Coefficient of Friction: ≥ 0.42 dynamic wet, ≥ 0.60 static wet. (no abrasive grain).
 10. Floor Service Performance Level: Heavy
- G. Quarry Tile Base Type QTB-1:
 1. Product: Quarry Tile Cove Base, manufacturer shall match quarry tile flooring.
 2. Color and Size: See Finish Legend.

2.02 TRIM AND ACCESSORIES

- A. Types Trim-1 to Trim-5: Brushed stainless steel, style and dimensions to suit application, for setting using tile mortar or adhesive.
 1. NOTE: All flooring transitions, except at sealed concrete, shall be executed to provide a smooth and level floor surface.
 2. Applications:
 - a. Open edges of wall tile: L type.
 - b. Open edges of floor tile: Ramp type.
 - c. Wall corners, outside: Bullnose.
 - d. Transition between floor finishes and at door openings: L type.
 - e. Transition between concrete floor and other floor finishes: Ramp type.
 - f. Expansion and control joints, floor and wall L type.
 - g. Borders and other trim as indicated on drawings.
 - h. Stair tread nosings: Flush contrasting type.
 3. Products:
 - a. Schiene, Reno Ramp, Rondec and TREP by Schluter-Systems.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 SETTING MATERIALS

- A. Basis of Design: Laticrete International, Inc.
- B. Acceptable Manufacturers:
 1. Bostik Inc.
 2. ProSpec.
 3. Mapei.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Self-Leveling Underlayment: Cement-based; minimum thickness 1/8".
 1. Applications: For all large-format ceramic tile floor areas except toilet rooms.
 2. Tensile Strength, ASTM C1583: 270-340 PSI.

3. Flexural Strength, ASTM C1708: 840-1100 PSI at 28 days.
 4. Compressive Strength, ASTM C1708: 4,400 PSI at 28 days.
 5. Product: Drytek 7200 by Laticrete.
- D. Underlayment: Cement-based; feather-edge to 1/2 inch.
1. Applications: Pottery B147.
 2. Tensile Strength, ASTM C1583: 480 PSI.
 3. Flexural Strength, ASTM C1708: 1300 PSI at 28 days.
 4. Compressive Strength, ASTM C1708: 2550 PSI at 28 days.
 5. Product: Drytek Skimcoat by Laticrete.
- E. Primer For Self-leveling Underlayment.
1. Product Drytek Multipurpose Primer by Laticrete.
- F. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
1. Applications: Where indicated and where no other type of bond coat is indicated.
 2. Product: 254 Platinum by Laticrete.
- G. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
1. Applications: Where epoxy grout is specified.
 2. Product: Latapoxy 300 Adhesive by Laticrete.
- H. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.
1. Product: 3701 Fortified Mortar Bed by Laticrete.

2.04 GROUTS

- A. Basis of Design: Laticrete International, Inc.
- B. Acceptable Manufacturers:
1. Bostik Inc.
 2. ProSpec.
 3. Mapei.
 4. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Polymer Modified Grout: ANSI A118.7.
1. Applications: Small format wall tile, where no other type of grout is indicated.
 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 3. Colors: See Finish Legend.
 4. Product: PermaColor by Laticrete.
- D. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Applications: Floor tile.
 2. Colors: See Finish Legend.
 3. Product: SpectraLock Pro by Laticrete.
- E. Sealant: Two-part, Shore A hardness of 35, meeting Federal Specification TT-S-00227E. Use Type 1 (self-leveling) on horizontal surfaces and Type II (non-sag) on all vertical surfaces. Prime joints as recommended by the manufacturer. Colors shall match grout colors.
1. Product: As recommended by the grout manufacturer.
- F. Backup Filler: Flexible and compressible type as recommended by sealant manufacturer for its intended use. Provide materials in sizes and shapes required. Materials shall be non-staining and compatible with the sealant used.

2.05 ACCESSORY MATERIALS

- A. Concrete Floor Slab Crack Isolation Membrane: ANSI A118.12; not intended as waterproofing.
1. Thickness: 20 mils, maximum.
 2. Crack Resistance: No failure at 1/16 inch gap, minimum.
 3. Product: Blue 92 Anti-Fracture Membrane by Laticrete.
 - a. Substitutions: See Section 01 60 00 - Product Requirements

- B. Waterproofing Membrane: ANSI A118.10; specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile.
 - 1. Applications: Wet areas including toilet rooms, shower room floors, and Kitchens.
 - 2. Product: Hydro Ban by Laticrete.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Uncoupling Membrane and Crack Bridging: As recommended by the tile setting materials manufacturer for field conditions.
- D. Tile Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced, 5/8 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
 - 1. Products:
 - a. WonderBoard Backerboard by Custom Building Products.
 - b. Durock Cement Board by USG.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Mesh Tape: 2-inch wide self-adhesive fiberglass mesh tape.
- F. Tile and Grout Cleaners / Sealers: As recommended by the tile and grout manufacturers.

PART 3 EXECUTION

3.01 FLOOR TILE - EXAMINATION AND PREPARATION

- A. Before installing any ceramic tile inspect surfaces to receive tile and accessories. Notify the Architect and Contractor in writing of any defects or conditions that will prevent a satisfactory tile installation. Do not proceed with installation until satisfactory corrections have been made. Start of work implies acceptance of surfaces to receive tile.
- B. See Section 09 05 61 - Common Work Results for Flooring Preparation, for concrete slab preparation and testing prior to flooring installation.
- C. In general, tile floors shall slope to floor drains. Whether floor pitches are created by slab pitch or depressed slabs for mud set tile, verify that conditions and floor drain elevations will produce proper floor pitches prior to start of the Work. Elevation adjustment coat shall be provided as required. All conditions requiring adjustments shall be reviewed with the Architect prior to start of Work. Floor pitch shall be laser verified with results submitted to the Architect and Owner.
- D. Small Format Floor Tile: Verify that sub-floor surfaces are smooth and flat, within tolerances of not more than 1/8" in 10 feet and are ready to receive tile. Leveling coat shall be provided as required.
- E. Large Format Floor Tile with 1/8" Grout Joints: Sub-floor surfaces shall receive self-leveling underlayment.
 - 1. Applications: PT-6, PT-7 and PT-8.
 - 2. Concrete slab surface shall be roughened prior to installation and meet an ICRI CSP Profile 3 – 5.
 - 3. Surface shall be clean and free from dirt, dust, sealer or other surface contaminants. Prime all areas and allow to dry prior to installation of self-leveling underlayment.
 - 4. Install self-leveling underlayment. Materials may be installed from 1/16" to 1.5" thickness at one time. Allow to properly cure prior to proceeding with installation.
- F. Adjust sub-floor surfaces at transitions to other flooring materials to provide a smooth transition of floor surfaces as accepted in floor transition mock-ups.
- G. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- H. Floor slabs to receive quarry tile shall be steel troweled with a fine broom finish.

3.02 WALL TILE - EXAMINATION AND PREPARATION

- A. Do not start work until blocking, electrical, and mechanical work in or behind tile have been installed. Protect surrounding work from damage.

- B. Install tile backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
 - 1. Use galvanized or corrosion resistant coated fasteners.
 - 2. Installation of tile backing board for tile-faced design walls shall provide a flat and even surface to help ensure a proper installation of this appearance critical wall surfacing.
- C. Before installing any ceramic tile inspect surfaces to receive tile and accessories. Notify the Contractor and Architect in writing of any defects or conditions that will prevent a satisfactory tile installation. Do not proceed with installation until satisfactory corrections have been made. Start of work implies acceptance of surfaces to receive tile.
- D. Verify that wall surfaces are smooth and flat, with square corners, within the tolerances specified for that type of work, are dust-free, and are ready to receive tile. Leveling coat shall be provided as required. Vacuum clean surfaces and damp clean.
- E. Small Format Wall Tile: Wall surface tolerance shall be not more than 1/8" in 8 feet out of flat.
- F. Large Format Wall Tile: Wall substrate shall meet tile manufacturer's requirements for wall substrate flatness and shall be verified by laser prior to tile installation. Confirm results with Owner and Architect.
- G. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Install tile, setting adhesives, membranes and grout in accordance with best current practice of the industry and applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
- B. Field verify all layouts and patterns with the Architect prior to proceeding. Lay tile to pattern indicated. Do not interrupt tile pattern through openings. Align joints when adjoining tiles on floor, base, walls and trim are the same size.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Make all cuts on the outer edges of the field. Smooth all cut edges with a carborundum stone, and install no tile with jagged or flaked edges. Form corners and bases neatly. Align floor joints.
- D. Extend tile into recesses and under equipment and fixtures to form a complete covering without interruption.
- E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- F. All ceramic tile finish for stair treads shall be configured to create a contrasting strip at the tread nosing. Installation of tread tiles shall not proceed without confirmation by the Architect of proper contrast.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Expansion and Control Joints:
 - 1. Provide expansion joints at the following locations:
 - a. Directly over all building movement joints, expansion joints and control joints.
 - b. Wherever tile abuts to restraining surfaces.
 - c. Not more than 20 feet on center each way in large tile fields.
 - 2. Proposed joint details and locations shall be submitted to the Architect for review.
 - 3. Keep expansion and control joints free of adhesive and grout. Apply sealant to joints.
 - 4. Expansion joints over movement joints shall be equal in width to the joints below. Other expansion joints shall be width of grout joint or 1/8", whichever is greater.
 - 5. Install in accordance with TCA Handbook Method EJ171.
- J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

- K. Grout tile joints. Epoxy grout shall be removed from tile surfaces immediately during grouting operations.
- L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
- M. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes. All inside corners of ceramic wall tile in wet areas shall be kept free of grout and shall be sealed with a continuous bead of silicone, color to match grout.

3.04 INSTALLATION - FLOOR THIN-SET METHODS

- A. Over interior concrete substrates:
 - 1. Use concrete floor slab crack isolation membrane under all tile unless other underlayment is indicated.
 - 2. For wet areas (toilet rooms, shower rooms and kitchens), provide waterproofing membrane, install in accordance with TCNA Method F122, with latex-Portland cement mortar and epoxy grout, TCNA F115.
 - 3. For quarry tile, install with epoxy bond coat and grout, install in accordance with TCNA Method F131.
 - 4. For tiles where self-leveling underlayment is required, install in accordance with TCNA F205 and with latex-Portland cement mortar and epoxy grout, Method F115.
- B. Install tile-to-tile floor movement joints in accordance with TCNA (HB) Method EJ171F.
- C. NOTE: For kitchens, surface of finished grout shall be flush with face of quarry tile to provide a smooth floor plane. Sharp tile edges, voids or eroded grout will not be acceptable. The occurrence of such conditions shall be considered grounds for the rejection of the entire flooring installation.

3.05 INSTALLATION - FLOOR MUD-SET METHODS

- A. Application(s): Cooler C102C, Freezer C102B, Refrigerator D123B and Freezer D123C.
- B. Over interior concrete substrates install in accordance with TCNA Method F132 bonded.
- C. NOTE: Surface of finished grout shall be flush with face of quarry tile to provide a smooth floor plane. Sharp tile edges, voids or eroded grout will not be acceptable.

3.06 INSTALLATION - WALL TILE

- A. Over cementitious tile backer units on studs, install in accordance with TCA Handbook Method W244, using membrane at shower rooms.

3.07 CLEANING

- A. Upon completion of setting and grouting, sponge and wash tile thoroughly, diagonally across joints. Use tile and grout cleaners as recommended by the manufacturer. Finally polish with clean, dry cloths.
- B. Epoxy grout shall be removed from tile surfaces immediately during grouting operations.
- C. Do not use acid or acid cleaners to clean glazed tile. Acid cleaning of unglazed tile shall not be done before 10 days after setting, and then only when approved by the tile manufacturer.
- D. Clean and seal all floor tile surfaces with product recommended by the manufacturer for each type of tile and anticipated traffic just prior to Substantial Completion.

3.08 PROTECTION

- A. Do not permit traffic over finished floor surfaces for at least 4 days after installation is completed. Protect installed tile work as recommended by the manufacturer during construction to prevent damage.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling systems with acoustical tiles.

1.02 RELATED REQUIREMENTS

- A. Section 05 31 00 - Steel Decking: Execution requirements for placement of attachment anchors to structure above.
- B. Section 07 21 00 - Thermal Insulation: Encapsulated acoustical batt insulation above ceilings.
- C. Section 09 54 23 - Metal Ceilings & Wall Panels.
- D. Section 09 21 16 - Gypsum Board Assemblies: Drywall ceilings and soffits.
- E. Division 21 - Fire Suppression: Sprinkler heads in ceilings.
- F. Division 23 - HVAC: Air diffusers in ceilings.
- G. Division 26 - Electrical: Light fixtures and other devices in ceiling.

1.03 REFERENCE STANDARDS

- A. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2008.
- C. ASTM E580 - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2011.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- E. UL - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate work of this Section with installation of mechanical and electrical components and with other construction activities affected by work of this Section.
- B. Supply hanger clips during steel deck erection. Supply additional hangers and inserts as required.
- C. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- D. Do not install acoustical tiles until after interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical tiles.
- C. Shop Drawings: Submit installation details for types and locations of ceiling system seismic restraints.
- D. Samples:
 - 1. Submit samples 4x4 inch minimum in size, of selected acoustical tiles.
 - 2. Submit samples 8 inches minimum long, of suspension system main runner.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of Project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Acoustical Tiles: Quantity equal to 5 percent of total installed.
3. Extra stock shall match products installed and shall be packaged in protective covers for storage and identified with labels describing contents. Store as directed by the Owner. Send written notice to the Architect identifying the quantity and location of extra tile furnished. The tile shall not be used by the Contractor for corrective work during the warranty period.

1.06 QUALITY ASSURANCE

- A. Suspension System and Acoustical Tile Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum fifteen years documented experience. Seismic design of ceiling system shall be under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Maine.
- B. Installer Qualifications: Company specializing in performing the work of this Section with a minimum of five years of experience and authorized by the ceiling system manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept factory-finished products on site in manufacturer's unopened factory packaging only; reject opened packages.
- B. Protect factory-finished products from damage to appearance by storing products in manufacturer's unopened factory packaging in dry storage area.

1.08 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of no more than 70 percent prior to, during, and after acoustical unit installation. Acoustic materials shall reach room temperature and moisture content prior to installation. Operate ventilation system for not less than 48 hours beginning acoustical panel ceiling installation.

1.09 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. Provide manufacturer's standard one year warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Armstrong World Industries, Inc.
- B. Acceptable Manufacturers:
 1. CertainTeed Corp.
 2. USG.
 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACOUSTICAL TILES

- A. Acoustical Tiles - General: ASTM E1264, Class A.
 1. VOC Content: Certified as Low Emission by GreenGuard Children and Schools or CHPS. Low-Emitting Materials.
- B. Acoustical Tile Type ACT-1: Painted mineral fiber, ASTM E1264 Type III.
 1. Size: 24 inches x 48 inches.
 2. Thickness: 5/8 inches.
 3. Composition: Wet felted.
 4. Light Reflectance: not less than 0.80.
 5. NRC: not less than 0.70
 6. Edge: Square.
 7. Surface Color: White.
 8. Surface Pattern: Non-directional fissured.

9. Suspension System: Exposed grid Type 1.
 10. Product: Fine Fissured High NRC/High CAC by Armstrong World Industries.
- C. Acoustical Tile Type ACT-2A & ACT-2B: Painted mineral fiber, ASTM E1264 Type III.
1. Size: 24 inches x 96 inches.
 2. Thickness: 1 inch.
 3. Composition: Wet felted.
 4. Light Reflectance: not less than 0.90.
 5. NRC: not less than 0.95
 6. Edge: Square.
 7. Surface Color: White.
 8. Surface Pattern: Non-directional fissured.
 9. Suspension System: Exposed grid Type 1.
 10. Grid Layout:
 - a. ACT-2A: Standard.
 - b. ACT-2B: Staggered.
 11. Product: Optima by Armstrong World Industries.
- D. Acoustical Tile Type ACT-3: Vinyl faced mineral fiber, ASTM E 1264 Type IV, highly scrubbable.
1. Size: 24 inches x 48 inches.
 2. Thickness: 5/8 inches.
 3. Composition: Wet felted.
 4. Light Reflectance: not less than 0.80.
 5. Edge: Square.
 6. Surface Color: White.
 7. Surface Pattern: non-perforated, stippled.
 8. Suspension System: Exposed grid Type 2.
 9. Miscellaneous Accessories: Hold-Down clips.
 10. Product: Clean Room VL by Armstrong World Industries.
- E. Acoustical Tile Type ACT-4: Painted mineral fiber, ASTM E 1264 Type III.
1. Size: 24 inches x 48 inches.
 2. Thickness: 5/8 inch.
 3. Composition: Wet felted.
 4. NRC: Not less than 0.55
 5. Edge: Square.
 6. Surface Color: Black.
 7. Surface Pattern: Non-directional fissured.
 8. Suspension System: Exposed grid Type 1.
 9. Product: Fine Fissured by Armstrong World Industries.

2.03 SUSPENSION SYSTEMS

- A. Manufacturer: Same as for acoustical tiles.
- B. Suspension Systems - General: ASTM C635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- C. Exposed Steel Suspension System Type 1: Formed steel, commercial quality cold rolled; intermediate-duty.
1. Profile: Tee; 15/16 inch wide face.
 2. Construction: Double web.
 3. Finish: White painted and black where indicated.
 4. Product: Prelude XL 15/16 by Armstrong World Industries, Inc.
- D. Exposed Steel Suspension System Type 2: (Environmental) Formed galvanized steel, with aluminum cap commercial quality cold rolled; intermediate-duty.
1. Profile: Tee; 15/16 inch wide face.

2. Construction: Double web.
3. Finish: White painted.
4. Product: Prelude Plus XL by Armstrong World Industries, Inc.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
 1. Hanger wire: Galvanized soft temper, pre-stretched steel wire, per ASTM A641, with yield strength of at least 3 times design load, but not less than 12-gage diameter.
- B. Perimeter Moldings: Same material and finish as grid, size suitable for suspension system and ceiling unit profile.
 1. At Exposed Grid for Seismic Design Category C: 2" L-shaped molding for mounting at same elevation as face of grid.
- C. Specialty Perimeter System: Extruded 6063-T5 aluminum; braced if required; including splice plates, clips and brackets. Color shall match ceiling suspension grid system.
 1. Perimeter Trim Size: Heights as indicated on the Drawings.
 2. Configuration: Straight.
 3. Product: Axiom Classic Trim by Armstrong World Industries, Inc.
- D. Accessory Moldings: Inside and outside corner pieces, and where applicable, matching fillers at bullnose corners.
- E. Stiffening Braces: As manufactured by the suspension system manufacturer to provide grid stabilization.
- F. Other Accessories: As required, specifically designed for intended use with suspension components employed, in accordance with ASA specifications. Provide all special hardware required for fire-rated, sloped and vertical installations, as necessary to comply with applicable codes and standards of good practice.
- G. Expansion Joint Moldings: For non-fire rated ceiling-wall interface or ceiling-to-ceiling interface at building expansion joints, sized as required.
 1. Product: Series DXX by MM Systems.
- H. Acoustical Insulation: Specified in Section 07 21 00.
- I. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Verify existing conditions before starting work. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that layout of hangers will not interfere with other work.
- C. Any questions or conflicts shall be brought to the attention of the Architect prior to proceeding with the Work.
- D. Provide hanger clips during steel deck erection. Do not support ceiling directly from steel roof deck or tabs. Provide additional hangers and inserts as required. Connect hanger wires directly either to structure, or to inserts, eye screws or other devices that are secure and appropriate for the substrate. All hangers and supports shall be secured in such a way that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636, ASTM E580, and manufacturer's instructions and as supplemented in this Section.

- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- D. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Install hangers plumb. Angle hangers only where required to miss obstructions. Any non-plumb hangers that result in horizontal forces shall be braced. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three (3) tight turns. Secure bracing wire to ceiling suspension members and to supports with a minimum of four (4) tight turns.
- G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance. Alternatively, install supplemental suspension members and hangers in the form of trapeze or equivalent devices, sized to support ceiling loads.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
 - 1. Provide supplemental supports for grid where cubicle curtain tracks are attached to grids shall support a vertical test load of 50 lbs. without visible deflection or damage to supports and safely support moving loads.
- J. Do not eccentrically load system or induce rotation of runners.
- K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap corners.
- L. Provide additional hangers for the suspension system at each corner of light fixtures if independent support of fixtures is not required by Electrical documents. All light fixtures in excess of 56 lbs. shall be independently supported.
- M. Provide additional hangers for air terminal units or services weighing more than 20 lbs. but less than 56 lbs. in addition to positively attaching them to the ceiling suspension system. Units weighing more than 56 lbs. shall be independently supported to the building structure.
- N. Provide framing for recessed light fixtures, air outlets, diffusers, etc. See Architectural, Mechanical, and Electrical Drawings.
- O. Expansion Joint Moldings: Install at intersection of ceilings and firewalls, building expansion joints, and where indicated on the Drawings.
- P. Where approved by the Architect and where field conditions require lowering a portion of a ceiling to conceal piping or ductwork, the ceiling contractor shall provide a ceiling height change and transition at no additional cost to the Owner.

3.03 INSTALLATION - SUSPENSION SYSTEM SEISMIC REQUIREMENTS

- A. Provide suspension, bracing, and attachments in strict accordance with ASCE7-05, and referenced editions of ASTM C635, ASTM C636 and CISCA Recommendations For Direct-Hung Acoustical Tile and Lay-in Panel Ceilings. The requirements for seismic bracing shall generally include, but not be limited to the following features:
 - 1. This Project is a Seismic Design Category C.
 - 2. For Seismic Design Category C: CISCA requirements for Seismic Zones 0-2 and provisions in ASCE 7.

- a. For suspended ceiling areas equal to or less than 144 sq. ft. in size that are surrounded by walls or soffits that are laterally braced to the structure: Standard installation per ASTM C636, no seismic restraint is required.
- b. For suspended ceiling areas more than 144 sq. ft in size that are not surrounded by walls or soffits that are laterally braced to the structure:
 - 1)
 - 2) The suspension system (grid) shall be designed, tested, and rated for ultimate load capacity as per ASCE 7.
 - 3) All sides of the space shall have tees cut back 3/8" at the perimeter to accommodate movement and shall not be attached to the perimeter molding. Perimeter moldings shall provide a minimum supporting ledge of 7/8" for tees or all tees shall be independently supported within 8" of the perimeter. All ends of main runners and cross members shall be tied together or shall have stabilizer/spacer bars attached to members to prevent spreading. Permanent attachment (i.e. pop rivets) for grid alignment shall not be permitted.
 - 4) Openings for sprinkler heads shall provide a minimum of 1/4" clearance on all sides of the piping. All other ceiling penetrations shall provide a minimum of 3/8" clearance.
- c. For spaces 144 sq. ft. and greater in size, in general provide:
 - 1) The total weight of the suspension system (grid), tiles, and other ceiling components (light fixtures, air terminals, etc.) shall be no greater than 2.5 PSF, or other ceiling components shall be independently supported.
 - 2) The suspension system (grid) shall be designed, tested, and rated for ultimate load capacity as per ASCE 7.
 - 3) All sides of the space shall have tees cut back 3/8" at the perimeter to accommodate movement and shall not be attached to the perimeter molding. Perimeter moldings shall provide a minimum supporting ledge of 7/8" for tees or all tees shall be independently supported within 8" of the perimeter. All ends of main runners and cross members shall be tied together or shall have stabilizer/spacer bars attached to members to prevent spreading. Permanent attachment (i.e. pop rivets) for grid alignment shall not be permitted.
 - 4) Openings for sprinkler heads shall provide a minimum of 1/4" clearance on all sides of the piping. All other ceiling penetrations shall provide a minimum of 3/8" clearance.

3.04 INSTALLATION - ACOUSTICAL TILES

- A. Owner's Inspection: All areas above suspended ceilings shall be inspected by the Owner prior to installation of ceiling tiles. The Contractor shall obtain written permission from the Owner to proceed with ceiling tile installation. Failure to follow this procedure shall result in removal and reinstallation of ceiling panels to facilitate inspection at no additional cost to the Owner.
- B. Install acoustical tiles in accordance with manufacturer's instructions.
- C. Fit acoustical tiles in place, free from damaged edges or other defects detrimental to appearance and function.
- D. Lay directional patterned tiles with pattern parallel to longest room axis.
- E. Fit border trim neatly against abutting surfaces.
- F. Install tiles after above-ceiling work is complete. Do not install tile until mechanical and electrical systems are tested and complete and all firestopping and smoke seals have been inspected and accepted.
- G. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- H. Cutting Acoustical Tile:
 1. Cut to fit irregular grid and perimeter edge trim.
 2. Make field cut edges of same profile as factory edges.

3. Double cut and field paint exposed reveal edges.
 - I. Where round obstructions occur, provide preformed closures to match perimeter molding.
 - J. Install acoustic batt insulation for complete coverage above ceiling tiles in rooms as scheduled. Batts shall be installed perpendicular to the cross tees with the grid supporting the weight of the insulation.

3.05 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 CLEANING

- A. Clean soiled exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members as recommended by the manufacturer. Remove and replace damaged ceiling components that cannot be successfully cleaned and repaired.

END OF SECTION

SECTION 09 54 23
METAL CEILING & WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed metal ceiling panels supported from a suspended metal grid system.
- B. Formed metal wall panels supported by a rail system attached to wall.

1.02 RELATED REQUIREMENTS

- A. Section 05 31 00 - Steel Decking: Execution requirements for placement of attachment anchors to structure above.
- B. Section 09 51 00 – Acoustical Ceilings.
- C. Section 09 21 16 – gypsum Board Assemblies: Drywall ceilings and soffits.
- D. Division 21 – Fire Protection: Sprinkler heads in ceilings.
- E. Division 23 - HVAC: Air diffusers in ceilings.
- F. Division 26 - Electrical: Light fixtures and other devices in ceiling.

1.03 REFERENCE STANDARDS

- A. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2008.
- B. ASTM E580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint; 2011.
- C. UL - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate work of this Section with installation of mechanical and electrical components and with other construction activities affected by work of this Section.
- B. Supply hanger clips during steel deck erection. Supply additional hangers and inserts as required.
- C. Pre-installation Meeting: Convene at least two weeks before starting work of this Section. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Furnish for component profiles, materials, and perimeter and integral trim.
- C. Shop Drawings: Indicate location of mechanical and electrical components, details of junction with dissimilar materials, and points of suspension. Submit installation layout plans and details for types and locations of ceiling system seismic restraints.
- D. Samples: Submit samples 8 x 8 inch minimum size illustrating selected colors and finishes of surfaces exposed to view.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 QUALITY ASSURANCE

- A. Suspension System and Panel Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum fifteen years documented experience. Seismic design of ceiling system shall be under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Maine.

- B. Installer Qualifications: Company specializing in performing the work of this Section with a minimum of five years of experience and authorized by the ceiling system manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept factory-finished products on site in manufacturer's unopened factory packaging only; reject opened packages.
- B. Protect factory-finished products from damage to appearance by storing products in manufacturer's unopened factory packaging in dry storage area.

1.08 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of no more than 70 percent prior to, during, and after acoustical unit installation. Acoustic materials shall reach room temperature and moisture content prior to installation. Operate ventilation system for not less than 48 hours beginning acoustical panel ceiling installation.

1.09 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. Provide manufacturer's standard one year warranty.

PART 2 PRODUCTS

2.01 METAL PANEL CEILINGS

- A. Metal Ceiling System: Panels, suspension members, trim and accessories as required to provide a complete system.
- B. Performance Requirements:
 - 1. Design to support imposed loads of indicated items without eccentric loading of supports.
 - 2. Design for maximum deflection of 1/360 of span.
 - 3. Design to resist seismic load by using practices specified in ASTM E 580, for Seismic Design Class C.
- C. Basis of Design: Metalworks Torsion Spring by Armstrong World Industries.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Metal Ceiling System Type ACT-5 and ACT-5A: ASTM E1264, Type XX, Pattern C, non-perforated, smooth aluminum panels with acoustical fleece, wood-look vinyl-faced membrane finish, including mounting suspension system, trim and accessories as required to provide a complete system.
 - 1. Material: Non-perforated M1 aluminum, 0.040 inch thickness.
 - 2. Panel Sizes: See Finish Legend.
 - 3. NRC: N.A. (sound reflective).
 - 4. Fire Performance, ASTM E84: Class A.
 - 5. Panel Finishes: (Auditorium) ACT-5 Wild Cherry. (Presentation area) ACT-5A Rock Maple.
 - 6. Torsion Spring Perimeter Trim Finishes: ACT-5 Black. ACT-5A Rock Maple.
 - 7. Box Molding Finishes: Black.
 - 6. Edge Profile: Square 15/16".
 - 7. Suspension System: Type 1.
 - 8. Panel accessories including but not limited to: box molding, torsion spring perimeter trim, bulkheads and torsion spring access tool.

2.02 METAL PANEL CEILING SUSPENSION SYSTEM

- A. Ceiling Suspension System Type 1: ASTM C635; Formed steel, commercial quality cold rolled; heavy-duty die cut and interlocking components, with stabilizer bars, clips, j-bars hangers, J-bars, foam gaskets, plug-in clip, splices as required.

1. Profile: Main Beams: 15/16 inch wide face, slotted for torsion spring panel system as required. Cross tees spaced as required by panel size.
2. Construction: Double web.
3. Finish: Black.
4. Product: Prelude XL HD 15/16 by Armstrong World Industries, Inc.

2.03 METAL WALL PANELS

- A. Basis of Design: Metalworks WH1000 Suspension System and Custom Metal Wall Panels by Armstrong World Industries.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Metal Wall Panel System: Smooth aluminum panels with acoustical fleece, including mounting system, trim and accessories as required to provide a complete system.
 1. Application: Presentation area.
 2. Material: Non-perforated 0.040 inch thickness aluminum.
 3. Panel Sizes: See Finish Legend. Thickness: 1.2 mm.
 4. Edge Detail: All edges returned, spacer buttons installed to create 5 mm reveals. Two adjacent sides notched for installation on wall rail.
 5. Fire Performance, ASTM E84: Class A.
 6. Finish: Wood-look vinyl-faced membrane finish, Rock Maple to match ceiling panels.
 7. Torsion spring Perimeter Trim: 12" finish to match panels.
- C. Mounting System: WH1000 wall rail including wall base anchors and panel support pads.
 1. Finish: all steel parts shall be chemically cleansed hot dipped galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that layout of hangers will not interfere with other work.
- C. Any questions or conflicts shall be brought to the attention of the Architect prior to proceeding with the Work.
- D. Verify that field measurements are as indicated.

3.02 INSTALLATION – CEILING SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636, ASTM E580, and manufacturer's instructions and as supplemented in this Section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- D. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Install hangers plumb. Angle hangers only where required to miss obstructions. Any non-plumb hangers that result in horizontal forces shall be braced. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- E. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three (3) tight turns. Secure bracing wire to ceiling suspension members and to supports with a minimum of four (4) tight turns.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance. Alternatively, install supplemental suspension members and hangers in the form of trapeze or equivalent devices, sized to support ceiling loads.

- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
 - 1. Provide supplemental supports for grid where cubicle curtain tracks are attached to grids shall support a vertical test load of 50 lbs. without visible deflection or damage to supports and safely support moving loads.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Light fixtures and air terminal units or services shall be independently support to the building structure.

3.03 INSTALLATION - SUSPENSION SYSTEM SEISMIC REQUIREMENTS

- A. Provide suspension, bracing, and attachments in strict accordance with ASCE 7, current edition, ASTM C635, ASTM C636 and CISCA Recommendations For Direct-Hung Acoustical Tile and Lay-in Panel Ceilings, most recent edition. The requirements for seismic bracing shall generally include, but not be limited to the following features:
 - 1. This Project is located at a Seismic Site Class D. Requirements of Items 2 and 3 below apply:
 - 2. For Seismic Design Categories A, B and C: CISCA requirements for Seismic Zones 0-2 and provisions in ASCE 7 Section 13.5.6.2.1.
 - a. For spaces less than 144 sq. ft. in size, no seismic restraint is required.
 - b. For spaces 144 sq. ft. and greater in size, in general provide:
 - 1) The total weight of the suspension system (grid), tiles, and other ceiling components (light fixtures, air terminals, etc.) shall be no greater than 2.5 PSF, or other ceiling components shall be independently supported.
 - 2) The suspension system (grid) shall be designed, tested, and rated for ultimate load capacity as per ASCE 7.
 - 3) All sides of the space shall have tees cut back 3/8" at the perimeter to accommodate movement and shall not be attached to the perimeter molding. Perimeter moldings shall provide a minimum supporting ledge of 7/8" for tees or all tees shall be independently supported within 8" of the perimeter. All ends of main runners and cross members shall be tied together or shall have stabilizer/spacer bars attached to members to prevent spreading. Permanent attachment (i.e. pop rivets) for grid alignment shall not be permitted.
 - 4) Openings for sprinkler heads shall provide a minimum of 1/4" clearance on all sides of the piping. All other ceiling penetrations shall provide a minimum of 3/8" clearance.
 - 3. For Seismic Design Category D: CISCA requirements for Seismic Zones 3-4 and provisions in ASCE 7 Section 13.5.6.2.2:
 - a. In addition to the requirements above, all grid members shall be hung with wire to building structure within 8 inch of perimeter wall molding. Ceiling areas over 1,000 sq. ft. shall have horizontal restraint wire or rigid bracing to the structural system.
 - b. For ceiling areas exceeding 2,500 sq. ft., a seismic separation joint or full height partition that breaks the ceiling up into areas not exceeding 2,500 sq. ft. unless structural analyses are performed of the ceiling bracing system for prescribed seismic forces.

3.04 INSTALLATION – METAL CEILING PANELS

- A. Owner's Inspection: All areas above suspended ceilings shall be inspected by the Owner, Architect and AHJ, as applicable, prior to installation of ceiling tiles. The Contractor shall obtain written permission from the Owner to proceed with ceiling tile installation. Failure to follow this procedure shall result in removal and reinstallation of ceiling panels to facilitate inspection at no additional cost to the Owner.

- B. Install metal panels and other system components in accordance with manufacturer's instructions, at locations, configurations and pitches, as indicated on the Drawings.

3.05 INSTALLATION – METAL WALL PANELS

- A. Install metal wall panels with rail support system in locations indicated on the Drawings with vertical surfaces and edges plumb, top edges level, and in alignment with other panels, scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's printed instructions for installation of panels and panel rail mounting system with accessories recommended by the manufacturer for a complete installation. Rail system shall be securely fastened to wall studs.
- C. Concealed aluminum panel clips shall be factory-attached to the back of the panels. Adhesively mounted clips are not acceptable. Attach panels to rail system, as recommended by the manufacturer. All panel reveals shall look equal and even.
- D. Remove and replace panels which are damaged and are unacceptable to Architect.
- E. Panels shall be spot cleaned to remove any finger marks or soil.

3.06 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.
- C. Maximum Variation From Dimensioned Position: 1/4 inch.

3.07 CLEANING

- A. Clean surfaces as recommended by the manufacturer.
- B. Replace damaged or abraded components.

END OF SECTION

SECTION 09 64 29
WOOD STRIP AND PLANK FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sports and stage wood strip flooring systems, field finishing and sports game markings and logo for gymnasiums.
- B. Presentation area wood strip flooring system, field finishing where indicated on the Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Recessed concrete subfloor surface and formed depressions for deep floor sockets.
- B. Section 06 20 00 - Finish Carpentry and Architectural Millwork: Custom wood nosings for wood strip flooring.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, cleaning, and preparation.
- D. Section 11 66 23 - Athletic Equipment: Recessed floor anchors.

1.03 REFERENCE STANDARDS

- A. ASTM F2772 - Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems - 2011
- B. MFMA - Guide Specifications for Maple Flooring Systems; Maple Flooring Manufacturers Association; current edition.
- C. NWFA - Installation Guidelines; National Wood Flooring Association
- D. NFAA - National Federation Athletic Association, current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for each flooring system including: flooring, floor finish materials, and cushion blocks, as applicable.
 - 1. Submit sport flooring ASTM F2772 Class 5 compliance data or DIN 18032 Part II compliance.
- C. Shop Drawings:
 - 1. Sports and Stage Flooring: Following a meeting with the Owner to review striping layout and color selections, submit a sports striping diagram representing the configuration and color(s) of all striping. Indicate flooring joint pattern and termination details. Coordinate with the location of volleyball post inserts provided under Section 11 66 23 - Gymnasium Equipment. Striping shall conform to the requirements of the National Federation Athletic Association rules.
 - 2. Presentation Area Strip Flooring: Indicate floor joint pattern and termination details.
- D. Samples: Submit samples 12 x 12 inch in size illustrating floor materials, finish, color, and sheen.
 - 1. Sport and Stage Flooring: Submit samples 12 x 12 inches in size illustrating flooring system, floor materials, finish, color and sheen.
 - 2. Presentation Room Stripe Flooring: submit samples 12 inches long illustrating flooring materials, quality.
- E. Installation Instructions: Indicate standard and special installation procedures for each flooring system.
- F. Certification and Field Reports:

1. Submit flooring manufacturer's certificate indicating approval of the flooring installer.
 2. Prior to installation of flooring, submit written certification by each flooring manufacturer that condition of sub-floor is acceptable.
 3. Submit copies of manufacturer's technical representative's field reports for each field visit.
- G. Maintenance Data: Include maintenance procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Companies specializing in manufacturing products specified in this Section with minimum ten years documented experience.
- B. Installer Qualifications: Companies specializing in performing work of this Section approved by manufacturer, with a minimum of five years of experience. Submit a list of at least three other similar flooring installations.
- C. All flooring products shall be obtained from a single source manufacturer. Flooring system installation shall be in strict accordance with the manufacturer's printed instructions. Maple flooring shall meet standards of the Maple Flooring Manufacturer's Association.

1.06 PRE-INSTALLATION MEETING

- A. Convene a pre-installation meeting at least two weeks before starting work of this Section; require attendance by the Contractor, a technical representative from each flooring manufacturer, flooring installer, Architect and Owner, to review slab moisture levels, floor surface conditions and preparation requirements, materials, installation procedures and coordination of related work.
 1. A field report summarizing the findings and recommendations from this meeting shall be issued by the technical representatives and copied to the Owner and Architect.
 2. Written certification from each flooring manufacturer that condition of sub-floor is acceptable for flooring installation shall be issued and copied to the Owner and Architect.

1.07 FIELD CONDITIONS

- A. Permanent heat, light, and ventilation shall be installed and operating during and after the flooring installation.
- B. Store materials in area of installation for five days prior to installation. Open packages to permit natural adjustment of moisture content. Flooring shall be stored, installed and maintained at maximum moisture content as recommended by the manufacturer.
- C. Maintain minimum room temperature of 65 degrees F and humidity within a range of 35% to 50% for a period starting two days prior to delivery of materials to installation space, during storage, installation, and after installation.
- D. Do not install flooring system until the concrete slab vapor transmission meets flooring manufacturer's recommendations.

1.08 WARRANTY

- A. All flooring systems shall be warranted by the manufacturer for all materials to be free from manufacturing defects for a period of two (2) year from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SPORT AND STAGE WOOD STRIP FLOORING SYSTEM

- A. Type WDF-1 and WDF-2 - Wood Strip Flooring: White Hard Maple, MFMA Second and better. Inspect and stamp species and grade on underside of each piece of wood flooring at factory. 8 %, maximum moisture content.
 1. Actual Size: 25/32 inch thickness x 2-1/4 inches width.
 2. Edges: Tongue and Groove.
 3. Length: Robbins "Continuous Strip XL" graded to exceed MFMA-FJ rules.
- B. System Components:

1. Vapor Barrier: 6 mil polyethylene with continuously taped joints.
 2. Underlayment and Pad: Bio Cradle subfloor assembly comprised of EPDM Bio-pads, softwood 2x4 inch lumber sleepers and 23/32 inch thick APA T&G Exposure 1, sanded plywood substrate, factory pre-assembled.
 3. Flooring Fasteners and Anchors: As recommended by the manufacturer.
 4. Type VCB - Wall Base: Molded rubber, 4 inch high with a 3 inch toe, ventilating type, with adhesives and accessories, black. Product as recommended by the flooring system manufacturer.
- C. Finish: WDF-1 clear and WDF-2 flat black.
- D. Basis of Design: Mach I Classic by Robbins Sports Surfaces.
- E. Acceptable Manufacturers, pending review of proposed system:
1. Horner.
 2. Action Floor Systems.
 3. Substitutions: Section 01 60 00 - Product Requirements.

2.02 STRIP WOOD FLOORING SYSTEM – PRESENTATION AREA

- A. Type HDW-1 - Wood Strip Flooring: White Maple, Select & Better, quarter sawn; moisture content 7-9 %, tongue and groove, end matched.
1. Size (actual): 3/4" thickness x 3.5" wide.
 2. Minimum Length: 32 inches.
 3. Field Finished.
- B. Underlayment Panel: 3/4 inch thickness C-DX plugged plywood.
- C. Vapor Retarder: Black polyethylene sheet, [6] mil thick; 2 inch wide tape for joint sealing.
- D. Sleepers: 3/4 inch thickness C-DX plywood.
- E. Wood Base: Same species as flooring; profile to cover expansion gap at wall edges. See Section 06 20 00– Finish Carpentry & Architectural Millwork.
- F. Wood Nosing: Custom sloped profile for ADA compliance at steps and custom flat profile at tiers, T&G joint to interface with flooring, same species and finish as flooring. See Section 06 20 00 – Finish Carpentry & Architectural Millwork.

2.03 ACCESSORIES

- A. Aluminum Thresholds: Mill finished aluminum, flat plate, min 1/8" thickness; with holes for recessed fasteners, length to match door wall opening, width as required to extend from 1" on wood flooring to face of door threshold provided as part of Section 08 71 00 - Finish Hardware, or to centerline of door if no other threshold at the door.
- B. Sports and Strip Wood Floor Finish: Polyurethane, to achieve high gloss surface.
1. Basis of Design: Gold Medalist by Hillyard.
 2. Acceptable Manufactures:
 - a. WP-11 Urethane System by Valspar Federal International.
 - c. Substitutions: 01 60 00 - Product Requirements.
- C. Stage Strip Wood Floor Finish: 3-coat acrylic flat black paint.
- D. Sports Floor Marking Paint: As recommended by flooring system installer/finisher.

PART 3 EXECUTION

3.01 EXAMINATION - GENERAL

- A. Verify existing conditions before starting work.
- B. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/8 inch in 10 feet. Provide sheet shimming materials as required.

3.02 CONCRETE SLAB PREPARATION AND MOISTURE TESTING

- A. See Section 09 05 61 - Common Work Results for Flooring Preparation, for concrete slab moisture testing requirements and slab preparation for flooring.
- B. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.

3.03 SPORTS AND STAGE FLOORING INSTALLATION

- A. Verify that new floor-mounted sports equipment anchors are in correct location.
- B. Starting installation constitutes acceptance of sub-floor conditions. Prepare substrate to receive wood flooring in accordance with manufacturer's, MFMA, and NWFA instructions. Broom clean substrate.
- C. If required by field conditions, place continuous vapor retarder over entire surface, lapping joints six inches and sealing continuously as recommended by the floor system manufacturer.
- D. Place foam over vapor barrier, butting and taping all seams and joints with tape as recommended by flooring system manufacturer.
- E. Place AnchorFlex LP panels end-to-end in a brick pattern at a 45 degree angle to the direction of the finish flooring, leaving ¼" gap at perimeter of panels. Allow 2" expansion voids at perimeter and all vertical obstructions.
- F. Secure panels using drive pins.
- G. Machine nail strip flooring approximately 12" on center. End joints shall be properly driven up. Provide adequate expansion at regular intervals across the floor during installation as required by average humidity conditions according to the recommendations of the flooring system manufacturer. Provide 2 inch expansion space at perimeter and at all vertical obstructions.
- H. Following field finishing of the floor, install wall base at all walls and thresholds at wall openings. Affix rubber base to wall with recommended adhesive or screws. Miter all corners carefully. Use pre-molded outside corners.

3.04 STRIP WOOD FLOORING INSTALLATION

- A. Vapor Retarder, Sleepers and Shims:
 - 1. Place vapor retarder over subfloor surface, lapping edges and ends minimum 6 inches and tape seal; staple in place.
 - 2. Place sleepers over vapor retarder; space sleepers at 12 inches on center.
 - 3. Shim underside of sleepers to achieve level line of plus or minus 1/4 inch in 10 feet.
 - 4. Anchor sleepers to concrete substrate with explosive driven concrete nails; place nails at 16 inches on center.
- B. Secondary Subflooring: Place one layer plywood subflooring over sleepers. Lay perpendicular to the sleepers, with end joints over sleepers, and nail at 12 inches on center.
- C. Fasten wood strip flooring to subfloor assembly, perpendicular to subfloor assembly with end joints properly driven up. Provide proper spacing for humidity conditions.
- D. Allow an adequate expansion gap at perimeter and vertical obstructions.
- E. Wood Flooring:
 - 1. Install in accordance with manufacturer's, MFMA, and NWFA instructions; predrill and blind nail to sleepers.
 - 2. Lay flooring parallel to length of room areas. Verify alignment as work progresses.
 - 3. Arrange flooring with end matched grain set flush and tight.
 - 4. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar; provide divider strips and transition strips in accordance with flooring manufacturer's recommendations and as indicated.

5. Install custom millwork nosings (see Section 06 20 00) at exposed edges, and where flooring terminates.
- F. Following field finishing of floor, install base at floor perimeter to cover expansion space in accordance with manufacturer's instructions. Miter inside and use pre-molded outside corners.

3.05 SPORTS, STAGE AND STRIP WOOD FLOOR FINISHING

- A. Sand, finish and stripe floor as indicated on the Drawings and specified herein.
- B. Floors shall be machine sanded by traversing several times, working the first traverse across the grain and then lengthwise with the grain. Start with coarse, medium then fine grade sandpaper. Buff entire floor surface using 100-grit screen.
- C. Floor shall be smooth with no evidence of sander marks, gouges, streaks or shiners. Take precautions to contain dust. Remove dust by vacuum.
- D. Inspect entire area of floor to ensure that the surface is acceptable for finishing, completely free from sanding dust and perfectly clean.
- E. Apply finish in accordance with floor finish manufacturer's, and for sports floor per MFMA instructions.
- F. Do not apply finish products when temperature is below 65 degrees F or above 90 degrees F, or if relative humidity is greater than 80%.
- G. Sports and Strip Wood Flooring: Apply one coat of Hillyard Gold Medalist Seal and two coats of Hillyard Gold Medalist Finish. Buff and vacuum between each coat after fully dry.
- H. Stage Wood Flooring: Apply one coat of primer and two coats of finish paint, flat sheen, black color. Buff and vacuum between each coat after fully dry.
- I. Apply first coat, allow to dry, then buff lightly with steel wool to remove irregularities. Vacuum clean and wipe with damp cloth before applying succeeding coat. After appropriate drying time, lightly buff between coats with steel wool and vacuum clean before applying succeeding coat.
- J. At sports floor, line floor in accordance with accepted shop drawings. Games line widths may vary per shop drawings. Lines shall be straight with sharp edges in colors selected by the Owner. Game line paint shall be fully compatible with the flooring finish. Multiple colors shall be required.
- K. At sports floor, apply colored logo per final approved shop drawings.
- L. At sports floor, following strip and logo painting, apply last coat of finish.

3.06 CLEANING AND PROTECTION

- A. Clean and polish floor surfaces in accordance with floor finish manufacturer's instructions.
- B. Prohibit traffic on floor finish for 48 hours after installation, or per manufacturer's recommendations.
- B. Place protective coverings over finished floors; do not remove coverings until final cleaning prior to Substantial Completion. Protective coverings shall be comprised of paper, drop cloth, or other means to ensure minimization of scratches, paint splatters, and other damage to the floor surface.

END OF SECTION

**SECTION 09 65 00
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring, wall base, stair nosing and installation accessories.
- B. Substrate preparation.
- C. Note: See ID Drawings for flooring pattern layouts.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements: Concrete slab moisture testing.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, cleaning, and substrate preparation.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2012.
- E. CAL - Low-Emitting Materials Product List; California Collaborative for High Performance Schools.
- F. GEI - GREENGUARD "Children and Schools" Certified Products.
- G. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Verification Samples: Submit samples, 3 x 3 inch in size illustrating colors and patterns for each resilient flooring product specified.
- D. Certification and Field Reports:
 - 1. Prior to installation of flooring, submit written certification by each flooring manufacturer that condition of sub-floor is acceptable.
 - 2. Submit copies of manufacturer's technical representative's field reports for each field visit.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, and Section 01 78 00 - Project Close-out, for additional provisions.
 - 2. Extra Flooring Material: 2% of each type and color.
 - 3. Extra Wall Base: 50 linear feet of each type and color.

4. Materials shall be provided in unbroken packaging when job is complete. Notify the Architect in writing of the quantity and location of materials furnished. These materials may not be used by the Contractor for corrective work during the warranty period.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system, with a minimum of five years of experience in the field.
- B. All resilient flooring shall comply with ASTM E84 Flame Spread Rating of Class II (75 or less) and ASTM E662 Smoke Developed (450 or less) unless otherwise indicated.
- C. All colors shall match as directed by the Architect and shall be from the same "color run" or "dye lot".
- D. All adhesives shall be as recommended by the flooring product manufacturer and shall be formulated asbestos-free.

1.06 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Construct mock-up for each type of flooring transition to include leveling and shimming products, flooring on both sides of the transition and transition strips. The Owner shall test each mock-up for ease of movement for wheeled equipment. Flooring transitions shall provide smooth, bump-free transitions to facilitate movement of wheeled equipment and minimize tripping hazards.
 1. Approved mock-ups may remain as part of the Work.

1.07 PRE-INSTALLATION MEETING

- A. Convene a pre-installation meeting after the results of slab testing are available and at least two weeks before starting work of this Section; require attendance by the Contractor, a technical representative from each flooring manufacturer, flooring installer, Architect and Owner, to review slab moisture levels, floor surface conditions and preparation requirements, materials, installation procedures and coordination of related work.
 1. A field report summarizing the findings and recommendations from this meeting shall be issued by the technical representatives and copied to the Owner and Architect.
 2. Written certification from each flooring manufacturer that condition of sub-floor is acceptable for flooring installation shall be issued and copied to the Owner and Architect.
 3. If a slab sealer or other remedial work is required to make the condition of the sub-floor acceptable for the flooring installation, slab preparation and slab sealer product installation shall be field reviewed by the manufacturer's technical representatives and application tested (thickness, adhesion, etc) to confirm compliance with product recommendations.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store all materials off of the floor in an acclimatized, weather-tight space. Protect roll materials from damage and store as directed by the manufacturer. All resilient flooring materials shall be stored in undamaged condition as packaged by the manufacturer, with manufacturer's seals and labels in-tact.

1.09 FIELD CONDITIONS

- A. See Section 01 00 00 - General Requirements, for minimum indoor air quality improvement requirements.
- B. Maintain temperature in storage area between 65 degrees F and 90 degrees F.
- C. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.10 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional requirements.
- B. Provide manufacturer's product warranty. See product listing for term.

PART 2 PRODUCTS

2.01 TILE FLOORING

- A. Textile Composite Tile Type RF-1: Cushioned polyester felt backing thermally fused to a face fiber wear layer.
 - 1. Critical Radiant Flux, ASTM E648: Class 1, minimum 0.45 watt per. sq. cm..
 - 2. Smoke Generation, ASTM E662: Pass, 450 or less.
 - 3. Air Quality Certification: CRI Green Label Plus.
 - 4. Size: See Finish Legend.
 - 5. Thickness: 0.185 inch.
 - 6. Wear Layer: Solution Dyed Polyester.
 - 7. Backing: Polyester Felt Cushion.
 - 8. Total Weight: 4.5 - 5.2 oz/sq ft.
 - 9. Patterns and Colors: See Finish Legend.
 - 10. Warranty: Lifetime product performance, colorfastness to light, stain removal and static protection. Lifetime backing edge ravel, delamination and dimensional stability.
 - 11. Basis of Design: Umbra Kinetex by J+J Invision.
 - 12. Acceptable Manufacturers:
 - a. Linear Flotex by Forbo.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Luxury Vinyl Tile Type RF-2, RF-3, RF-4, RF-5, RF-6: ASTM F1700 Class III, Type A, commercial multi-layer floor tile with backer, base layer, decorative print film, wear layer and urethane finish.
 - 1. Critical Radiant Flux, ASTM E648: Class 1, minimum 0.45 watt per. sq. cm..
 - 2. Smoke Density, ASTM E662: Pass, 450 or less.
 - 3. Size: 12 x 24 inches.
 - 4. Surface: Smooth.
 - 5. Thickness: 0.10 inch.
 - 6. Wear Layer: 20 mils.
 - 7. Static Load, ASTM F970: Passes; 1500 psi.
 - 8. Colors: See Finish Legend.
 - 9. Warranty: 10 years.
 - 10. Basis of Design: Matuto Style Global Entry by Mohawk.
 - 11. Acceptable Manufacturers:
 - a. Amtico by Manninton.
 - b. Centiva by Tandus.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STAIR COVERINGS

- A. Photoluminescent Stair Nosings Type ST-1: Vinyl; FS RR-T650; nosing not less than 1-5/8 inch deep.
 - 1. Critical Radiant Flux: Class 1, minimum 0.45 watt per sq cm per ASTM E 648.
 - 2. Nominal Thickness: 0.1875 inch.
 - 3. Size: Full width and depth of stair tread in one piece. Provide equal length units for stairs exceeding manufacturer's maximum manufactured lengths.
 - 4. Nosing: Square.
 - 5. Style: Photo luminescent co-extruded nosing strip.
 - a. Luminescent Material Photometric, DIN 67510-1: 3-1/2 hours minimum.

6. Colors: See Finish Legend.
7. Products:
 - a. Saf-T-First Photoluminescent Stair Nosings by Johnsonite, Inc
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 RESILIENT BASE

- A. Resilient Base Type RB-1, RB-2 & RB-3, RB-4, RB-5, RB-6, RB-7: Type TP; rubber coated PVC; field made outside corners.
 1. Provide cove base at resilient flooring and carpet.
 2. Surface Burning Characteristics, ASTM E84: Class A.
 3. Critical Radiant Flux, ASTM E648: Class 1; minimum 0.45 watt per sq cm.
 4. Height: 4 inches.
 5. Thickness: 0.125 inch thick.
 6. Finish: Satin.
 7. Length: Roll.
 8. Colors: See Finish Legend.
 9. Warranty: Two years.
 10. Basis of Design: Traditional Rubber Wall Base by Johnsonite, Inc.
 11. Acceptable Products:
 - a. Profiles Rubber Wall Base by Burke Flooring.
 - b. Color Integrated Rubber Base by Armstrong World Industries, Inc.
 - c. Wall Base by Nora.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Resilient Base Type RB-8:
 1. Surface Burning Characteristics, ASTM E84: Class A.
 2. Critical Radiant Flux, ASTM E648: Class 1; minimum 0.45 watt per sq cm.
 3. Height: 8 inches.
 4. Length: Roll.
 5. Color: See Finish Legend.
 6. Warranty: Two years.
 7. Products:
 - a. Reveal by Johnsonite, Inc.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

- A. Subfloor Patching Compound and Self-Leveling Underlayment: See Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Primers, Adhesives, and Seaming Materials: Waterproof; low VOC types recommended by flooring manufacturers.
- C. Flooring Transitions:
 1. Resilient to resilient flooring: No transition strip. Use scribing felt at unequal thickness products.
 2. Carpet to resilient flooring: Vinyl transition strip. Adjust resilient substrate surface to match bottom elevation of carpet pile.
 3. Concrete to resilient flooring: Vinyl transition strip.
 5. Concrete to carpet: Vinyl transition strip.
 4. Ceramic & quarry tile to resilient flooring: Metal transition strip. Adjust substrate surface for resilient flooring surface to match top of ceramic tile.
 5. Ceramic & quarry tile to concrete: Metal transition strip.
 6. Wood flooring to resilient: Aluminum thresholds, plate or slope type as indicated.
 7. Wood flooring to concrete: Aluminum thresholds, plate or slope type as indicated.
 8. Colors and Finishes: See Finish Legend.

9. Transition configurations shall suit job conditions, subject to Architect's selection or prior approval.
10. Metal Products: See Section 09 30 00 – Tiling.
11. Vinyl Products: Vinyl: Wheeled Traffic Transitional Moldings by Johnsonite, Inc.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 GENERAL

- A. Floor tile pattern layouts shall be as designed by the Architect. Flooring shall be placed so that fields or patterns center on area. The Architect shall select the pattern (direction of grain) to be used.
- B. Base shall be continuous as scheduled unless otherwise approved by the Architect. Base shall return to door or window frames at all openings.
- C. Unless otherwise approved by the Architect, flooring materials shall extend below all fixed lockers, casework and millwork to cover the entire floor areas.
- D. Work shall not be started until work of other trades, which goes through resilient flooring, has been completed.
- E. Thoroughly clean the flooring substrate.
- F. Flooring work shall not be started until flooring substrate is prepared, slab surface level and required pitches have been confirmed by the contractor and accepted by the Architect, and work of other trades, which penetrates flooring area, has been completed.
- G. All flooring surface transitions shall be as smooth and level as possible. Resilient flooring shall be laid flush with all adjacent flooring materials. Fill edge of subfloor adjacent to higher flooring with approved crack and leveling filler as required to provide a smooth transition. Filler shall be feathered back to subfloor a minimum of one foot for each 1/16" of thickness.
- H. Prohibit traffic until filler is cured.

3.02 CONCRETE SLAB PREPARATION AND MOISTURE TESTING

- A. See Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install terminations as identified above. In general, flooring substrates shall be shimmed to provide a level transition between flooring surfaces without transition strips.
- H. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- I. Scribe flooring to walls, columns and other appurtenances to produce tight joints.

3.04 TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise. Lay tile in pattern and grain direction as directed by the Architect. Follow manufacturer's installation instructions.

3.05 RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints. Install wall base in lengths as long as without gaps at seams and with tops of adjacent pieces aligned. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. Special attention shall be paid to firmly securing base around bull nose corners.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions. Install base on all built-in cabinets, locker bases, etc., unless specifically indicated otherwise. Base shall extend around all sides of cabinetwork.

3.06 STAIR NOSINGS

- A. Stairs shall be filled with crack and leveling filler as required to properly form and level. Fill and grind tread and nosings as required.
- B. Install stair nosings in one piece for full width of tread. A full width nosing shall be provided for the top nosing of all stairs.
- C. For stair widths that exceed the maximum manufactured length of treads, splice locations shall be reviewed with and approved by the Architect.
- D. Adhere nosing completely. Fit accurately and securely.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Manufacturer's Inspections: Following the requirements for pre-installation field meeting and sub-floor preparations for the flooring installation, inspections shall be made by technical representatives of each flooring system manufacturer at the following points in the flooring installation:
 - 1. First, early in the installation process to ascertain that flooring procedures and details discussed at the pre-construction meeting are being followed.
 - 2. Second, at the completion of the installation, to review the completed installation. Manufacturer's technical representative's field reports for each site visit shall be copied to the Owner and Architect.

3.08 CLEANING

- A. Immediately after installation, remove excess adhesive and other blemishes from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's instructions.

3.09 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation. Protect flooring against marks and damage from construction operations utilizing methods recommended by the flooring manufacturer. Cover tiles with undyed building paper until inspection for Substantial Completion.

END OF SECTION

SECTION 09 65 66
RESILIENT ATHLETIC FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rubber tile flooring, direct-glued.
- B. Substrate preparation and installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, cleaning, and substrate preparation.

1.03 REFERENCE STANDARDS

- A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2013.
- B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2010.
- C. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2010e1.
- D. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- E. GEI - GREENGUARD "Children and Schools" Certified Products.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets with testing results for products specified and installation details.
- C. Verification Samples: Actual flooring material specified, not less than 12 inches square.
- D. Certification and Field Reports:
 - 1. Prior to installation of flooring, submit written certification by each flooring manufacturer that condition of sub-floor is acceptable.
 - 2. Submit copies of manufacturer's technical representative's field reports for each field visit.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, and Section 01 78 00 - Project Close-out, for additional provisions.
 - 2. Extra Flooring Material: 2% of each type and color.
 - 3. Materials shall be provided in unbroken packaging when job is complete. Notify the Architect in writing of the quantity and location of materials furnished. These materials may not be used by the Contractor for corrective work during the warranty period.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer certified in writing by the flooring manufacturer to be qualified for installation of specified flooring system, with a minimum of five years of experience in the field.
- B. All resilient flooring shall comply with ASTM E84 Flame Spread Rating of Class II (75 or less) and ASTM E662 Smoke Developed (450 or less) unless otherwise indicated.
- C. All adhesives shall be as recommended by the flooring product manufacturer and shall be formulated asbestos-free.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store materials in dry and clean location until needed for installation, maintaining a minimum of 55 degrees F and less than 50% relative humidity. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.07 FIELD CONDITIONS

- A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70-95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 PRODUCTS

2.01 PRE-FORMED ATHLETIC FLOORING

- A. Type RF-7 - Tile Flooring: Smooth, matte finish, rubber tile comprising rubber granules encapsulated in a zero-mercury polyurethane binder
 - 1. Air Quality Certification: Certified as Low Emission by GreenGuard Children and Schools.
 - 2. Critical Radiant Flux, ASTM E648: Class 1, minimum 0.45 watt per. sq. cm.
 - 3. Smoke Generation, ASTM E662: Pass, 450 or less.
 - 4. Hardness, ASTM D2240: Minimum 60, Shore A.
 - 5. Tensile Strength, ASTM D412: >220 PSI.
 - 6. Water Absorption, ASTM D570: 0.19%.
 - 7. Elongation at Break, ASTM D412: >145%.
 - 8. Compression, ASTM D395B: 85%
 - 9. Coefficient of Friction, ASTM D1894: Static 1.20
 - 10. Density, ASTM D3678: 60 PCF.
 - 11. Color: As selected by Architect.
 - 12. Basis of Design: Galaxy Classic iLock Tiles by Robbins Flooring.
 - 13. Acceptable Manufacturer:
 - a. Gerflor.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

- A. Patching Compounds and Self-Leveling Underlayment: See Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Primer, Adhesive and Seaming Materials: Waterproof; Low VOC types recommended by flooring manufacturer.
- C. Wall Base and Flooring Transitions: See Section 09 65 00 - Resilient Flooring.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

3.02 CONCRETE SLAB PREPARATION AND MOISTURE TESTING

- A. See Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Concrete slab shall be properly finished, cured and etched in compliance with the surfacing manufacturer's specifications. Curing compounds, hardeners, and sealers shall not be allowed on the concrete slab.
- C. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.

3.03 GENERAL

- A. Work shall not be started until work of other trades, which goes through resilient flooring, has been completed.
- B. Flooring work shall not be started until flooring substrate is prepared, moisture levels acceptable and slab surface level.
- C. All flooring surface transitions shall be as smooth and level as possible. Resilient flooring shall be laid flush with all adjacent flooring materials. Fill edge of subfloor adjacent to higher flooring with approved crack and leveling filler as required to provide a smooth transition. Filler shall be feathered back to subfloor a minimum of one foot for each 1/16" of thickness.
- D. Prohibit traffic until filler is cured.

3.04 FLOORING INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Comply with manufacturer's recommendations for adhered tile installation.
 - 1. Resilient base and edge strips at transitions to other flooring shall be furnished and installed under Section 09 65 00 - Resilient Flooring.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Manufacturer's Inspections: Following the requirements for pre-installation field meeting and sub-floor preparations for the flooring installation, inspections shall be made by technical representatives of each flooring system manufacturer at the following points in the flooring installation:
 - 1. Early in the installation to ascertain that flooring procedures and details discussed at the pre-construction meeting are being followed.
 - 2. At completion to review the completed installation. Manufacturer's technical representative's field reports for each site visit shall be copied to the Owner and Architect.

3.06 PROTECTION

- A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion. No traffic shall be permitted on the completed floor until authorized by the installer.

END OF SECTION

SECTION 09 68 00
CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet, direct-glued.
- B. Substrate preparation and installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements: Concrete slab moisture testing.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied carpet.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, cleaning and substrate preparation.
- D. Section 09 65 00 - Resilient Flooring: Base finish.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2011.
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- C. CRI - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate seaming plan, method of joining seams, direction of carpet pile and pattern, location of edge moldings and edge bindings. No carpet shall be ordered until shop drawings have been reviewed by the Architect.
- D. Samples:
 - 1. Submit confirmation samples 18" x 24" inch in size illustrating selected color and pattern for each carpet material specified.
 - 3. Submit 6 inch long samples of edge strip for each color specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Certification and Field Reports:
 - 1. Prior to installation of flooring, submit written certification by each flooring manufacturer that condition of sub-floor is acceptable.
 - 2. Submit copies of manufacturer's technical representative's field reports for each field visit.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet with minimum of 15 years of documented experience.
- B. Installer Qualifications: Company specializing in commercial carpet installations with minimum 5 years of experience.

- C. All carpet shall meet or exceed the Carpet and Rug Institute's Indoor Air Quality labeling standards and shall bear labeling indicating compliance with these standards. Under these standards, volatile organic compounds given off by carpets shall be less than 0.6 milligrams per square meter per hour.

1.06 MOCK-UPS

- A. Sample Installation: Before proceeding with the carpet installation, prepare a completely carpeted sample room at a location agreeable with the Architect. Install carpet in accordance with the Specifications and in the color selected. The sample installation shall be reviewed by the Architect. Rejected sample installations shall be removed and replaced at no additional cost to the Owner.
 - 1. When approved, it shall serve as a standard for workmanship, appearance, and materials throughout this Project.
 - 2. Rejected sample installations shall be removed and replaced at no additional cost to the Owner.
- B. Construct mock-up for each type of flooring transition to include leveling and shimming products, flooring on both sides of the transition and transition strips. The Owner shall test each mock-up for ease of movement for wheeled equipment. Flooring transitions shall provide smooth, bump-free transitions to facilitate movement of wheeled equipment and minimize tripping hazards.
 - 1. Approved mock-ups may remain as part of the Work.

1.07 PRE-INSTALLATION MEETING

- A. Convene a pre-installation meeting after results of slab testing are available and at least two weeks before starting work of this Section; require attendance by the Contractor, a technical representative from each carpet manufacturer, carpet installer, Architect and Owner, to review slab moisture levels, floor surface conditions and preparation requirements, materials, installation procedures and coordination of related work.
 - 1. A field report summarizing the findings and recommendations from this meeting shall be issued by the technical representatives and copied to the Owner and Architect.
 - 2. Written certification from each carpet manufacturer that condition of sub-floor is acceptable for flooring installation shall be issued and copied to the Owner and Architect.
 - 3. If a slab sealer or other remedial work is required to make the condition of the sub-floor acceptable for the flooring installation, slab preparation and slab sealer product installation shall be field reviewed by the manufacturer's technical representatives and the Contractor shall be directed to provide pricing.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Store all materials off of the floor in an acclimatized, weather-tight space.
- B. Protect roll materials from damage. Store roll material as directed by the manufacturer. All materials shall be stored in undamaged condition as packaged by the manufacturer, with manufacturer's seals and labels intact.

1.09 FIELD CONDITIONS

- A. Comply with the CRI Manual regarding the storage and handling of carpet products. Store materials in area of installation for minimum period of 24 hours prior to installation.
- B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.
- C. Ventilate installation area during installation and for 72 hours after installation.

1.10 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional requirements.
- B. Manufacturer's Warranty: Lifetime limited warranty against excessive surface wear, static, delamination, edge ravel, zippering and backing resiliency loss.

- C. The installer shall be required to re-lay or replace all carpet that does not provide an attractive, wrinkle-free appearance or which exhibits open seams, loss of adhesion or other installation defects for a period of two (2) years from the date of Substantial Completion.

PART 2 PRODUCTS

2.01 CARPET

- A. Carpet Type CPT-1: Patterned Loop, manufactured in one color dye lot.
 - 1. Basis of Design: Nano Series by Tandus.
 - 2. Acceptable Manufacturers: Note: Backing must meet performance of Tandus Powerbond.
 - a. Emerging ILights II by Mohawk
 - b. Spatial Progressions by Mannington.
 - c. Substitutions: See Section 01 60 00 – Product Requirements.
 - 2. Roll Width: 6 ft.
 - 3. Patten / Color: See Finish Legend.
 - 4. Dye Method: 100% Solution Dyed.
 - 5. Fiber System: Dynex SD Nylon.
 - 6. Primary Backing: Non-woven synthetic fiber
 - 7. Secondary Backing: Powerbond Medfloor.
 - 8. Face Weight: 19 oz/sq yd.
 - 9. Gauge: 5/64 inch.
 - 10. Critical Radiant Flux, ASTM E648 or NFPA 253: Minimum of 0.22 watts/sq cm.
 - 11. Surface Flammability Ignition, ASTM D2859: Pass ("pill test").

2.02 ACCESSORIES

- A. Patching Compounds and Self-Leveling Underlayment: See Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Resilient Base and Flooring Transitions: See Section 09 65 00 - Resilient Flooring. Colors as selected.
- C. Adhesives: As recommended by the flooring manufacturer; first quality, water resistant, non-toxic, non-staining, compatible with materials being adhered; low VOC; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable. Adhesives and cements shall comply with flammability requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Acceptance by Carpet Subcontractors: The carpet installer shall inspect the condition of substrates prior to commencement of work and shall notify the Contractor immediately of any conditions that could adversely affect the carpet installation for resolution, prior to proceeding with the Work. Commencement of the installation of flooring without such notification shall be considered acceptance of the adequacy of the substrates and carpet installation environment as being suitable for the intended application
- B. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- D. Field check all dimensions and other conditions to ensure proper fitting of carpet.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 CONCRETE SLAB PREPARATION AND MOISTURE TESTING

- A. See Section 09 05 61 - Common Work Results for Flooring Preparation.

- B. Concrete slab shall be properly finished, cured in compliance with the surfacing manufacturer's specifications. Curing compounds, hardeners, and sealers shall not be allowed on the concrete slab.
- C. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.

3.03 INSTALLATION - GENERAL

- A. Carpet shall be laid flush with adjacent flooring materials. Fill edge of sub-floor adjacent to higher flooring with approved leveling filler as required to provide a smooth transition. Filler shall be feathered back to subfloor a minimum of one foot for each 1/16" of thickness. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- B. Starting installation constitutes acceptance of sub-floor conditions. Install carpet in accordance with manufacturer's instructions.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Lay out carpet and locate seams in accordance with shop drawings.
 - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
 - 2. Do not locate seams perpendicular through door openings.
 - 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
 - 4. Locate change of color or pattern between rooms under door centerline.
 - 5. Provide monolithic color, pattern, and texture match within any one area.
- E. Install carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance.
- F. Extend carpeting into adjoining closets and alcoves unless otherwise indicated on the Drawings.
- G. Do not bridge building expansion joints with carpet.

3.04 DIRECT-GLUED CARPET

- A. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven carpet immediately.
- B. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.
- C. Apply seam adhesive to the base of the edge glued down. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
- D. Roll with appropriate roller for complete contact of adhesive to carpet backing.
- E. Trim carpet neatly at walls and around interruptions.
- F. Provide continuous resilient base where ever scheduled or indicated. Provide carpet edge strips or joiners wherever carpet abuts a dissimilar floor materials. Complete installation of edge strips, concealing exposed edges. See Section 09 65 00 - Resilient Flooring.

3.05 INSTALLATION ON STAIRS

- A. Use one piece of carpet for each tread and the riser below. Apply seam adhesive to all cut edges.
- B. Install carpet with pile direction in the length of the stair.
- C. Adhere carpet tight to stair treads and risers.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.

- B. Manufacturer's Inspection: Inspections shall be made by technical representatives of each carpet manufacturer at two points in the installation. Manufacturer's technical representative's field reports for each site visit shall be copied to the Owner and Architect.
 - 1. First, early in the installation process to ascertain that flooring procedures and details discussed at the pre-construction meeting are being followed
 - 2. Second, at the completion of the installation, to review the completed installation.

3.07 CLEANING AND PROTECTION

- A. Remove excess adhesive from floor and wall surfaces without damage. Remove yarns that protrude from carpet surface.
- B. Clean and vacuum carpet surfaces using a commercial machine with face-beater element. Clean again immediately prior to final acceptance.
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of the construction period. Use protection methods recommended in writing by the carpet manufacturer.

END OF SECTION

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.
- B. Substrate preparation and installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements.
- B. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, cleaning, and substrate preparation.
- D. Section 09 65 00 - Resilient Flooring: Base and transition accessories.

1.03 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2011.
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- C. CRI - Carpet Installation Standard; 2011.
- D. CRI - Green Label Plus Testing Program - Certified Products; Current Edition.
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2011.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit full sized confirmation carpet tile samples illustrating colors and patterns selected.
- D. Certification and Field Reports:
 - 1. Prior to installation of flooring, submit written certification by each flooring manufacturer that condition of sub-floor is acceptable.
 - 2. Submit copies of manufacturer's technical representative's field reports for each field visit.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum fifteen years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 PRE-INSTALLATION MEETING

- A. Convene a pre-installation meeting at least two weeks before starting work of this Section; require attendance by the Contractor, a technical representative from each carpet manufacturer, carpet installer, Architect and Owner, to review slab moisture levels, floor surface conditions and preparation requirements, materials, installation procedures and coordination of related work.
 - 1. A field report summarizing the findings and recommendations from this meeting shall be issued by the technical representatives and copied to the Owner and Architect.
 - 2. Written certification from each carpet manufacturer that condition of sub-floor is acceptable for flooring installation shall be issued and copied to the Owner and Architect.

1.07 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

1.08 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional requirements.
- B. Manufacturer's Warranty: Lifetime protection from moisture penetration, delamination failure, dimensional stability, tuft bind strength, performance for wear, fiber performance for static, colorfastness to light and contaminants, stain removal.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Tile Carpeting Type CPT-2 and CPT-3: Patterned Loop, manufactured in one color dye lot.
 - 1. Basis of Design: Inception by J&J Invision.
 - 2. Acceptable Manufacturers:
 - a. Denim by Mohawk.
 - b. Arcade Legend by Bentley.
 - c. Substitutions: See Section 01 60 00 – Product Requirements.
 - 2. Tile Size: See Finish Legend.
 - 3. Colors: See Finish Legend.
 - 4. Lay Pattern: See Finish Legend.
 - 5. Critical Radiant Flux, ASTM E648 or NFPA253: Minimum of 0.22 watts/sq cm.
 - 6. Surface Flammability Ignition, ASTM D2859: Pass ("pill test").
 - 7. VOC Content: Provide CRI (GLP) certified product.
 - 8. Face Weight: 20 oz/sq yd.
 - 9. Primary Backing: Polypropylene.
 - 10. Fiber: BCF Nylon.
 - 11. Dye Method: Solution/ Space Dyed.
 - 12. Secondary Backing: Nexus Modular.

2.02 ACCESSORIES

- A. Patching Compounds and Self-Leveling Underlayment: See Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Resilient Base and Transition Strips: See Section 09 65 00 – Resilient Flooring. Colors as selected.
- C. Adhesives: As recommended by the carpet tile manufacturer, compatible with materials being adhered; Low VOC. CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable. Adhesives and cements shall comply with flammability requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Acceptance by Carpet Subcontractors: The carpet installer shall inspect the condition of substrates prior to commencement of work and shall notify the Contractor immediately of any conditions that could adversely affect the carpet installation for resolution, prior to proceeding with the Work. Commencement of the installation of flooring without such notification shall be considered acceptance of the adequacy of the substrates and carpet installation environment as being suitable for the intended application
- B. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- D. Field check all dimensions and other conditions to ensure proper fitting of carpet.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 CONCRETE SLAB PREPARATION AND MOISTURE TESTING

- A. See Section 09 05 61 - Common Work Results for Flooring Preparation
- B. Concrete slab shall be properly finished, cured in compliance with the surfacing manufacturer's specifications. Curing compounds, hardeners, and sealers shall not be allowed on the concrete slab.
- C. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.

3.03 INSTALLATION

- A. Carpet shall be laid flush with adjacent flooring materials. Fill edge of sub-floor adjacent to higher flooring with approved leveling filler as required to provide a smooth transition. Filler shall be feathered back to subfloor a minimum of one foot for each 1/16" of thickness. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- B. Starting installation constitutes acceptance of sub-floor conditions.
- C. Install carpet tile in accordance with manufacturer's instructions and CRI (CIS).
- D. Blend carpet from different cartons to ensure minimal variation in color match.
- E. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- F. Lay carpet in pattern indicated in the Finishes Legend.
- G. Locate change of color or pattern between rooms under door centerline.
- H. Fully adhere carpet tile to substrate.
- I. Trim carpet tile neatly at walls and around interruptions.
- J. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 72 00
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall coverings and trims.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies: Wall substrate.
- B. Section 09 90 00 – Painting and Coating: Preparation and priming of substrate surfaces.
- C. Section 10 11 01 – Visual Display Boards: Framed white boards and tack boards.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall coverings, accessories and adhesive.
- C. Shop Drawings: Indicate wall elevations with seaming layout.
- D. Samples:
 - 1. Submit samples of wall covering, 12 x 12 inch in size illustrating selected colors and finish.
 - 2. Submit sample of trim, tray and end caps.
- E. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.
- F. Manufacturer's Installation Instructions: Indicate special procedures.
- G. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this Section with minimum ten years of experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this Section with minimum five years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability. Wallcoverings shall be delivered to site in unbroken and undamaged original factory packaging, clearly identified. Store materials in a clean, dry area with temperature maintained about 55 degrees F. Do not store roll goods on end.

1.06 WARRANTY

- A. See Section 01 78 10 – Warranties, for further information.
- B. Provide manufacturer's five year warranty against manufacturing defects.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.
- B. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces. Maintain continuous ventilation and heating for air and substrate surfaces above 55 degrees F and less than 40% relative humidity.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Presentation Dry Erase: Pigmented vinyl with non-woven backing capped with dry erase low glass film; 17 mils thick; suitable for dry erase markers and image projection.
 - 1. Surface Burning Characteristics, ASTM E84: Class A.
 - 2. Provide one manufacturer's presentation starter kit for each location.
 - 3. Sizes: 49/50 inches width; lengths as indicated on the Drawings.
 - 4. Color: White.
 - 5. Primer: As recommended by wall covering manufacturer.
 - 6. Adhesive: Low VOC type as recommended by the wall covering manufacturer.
 - 7. Accessories: Manufacturer's clear satin anodized aluminum trim, tray and end caps; top rail with tack insert and 6 hooks per insert for each marker surface location.
 - 8. Warranty: Manufacturer's five year standard.
 - 9. Product: Walltalkers Erase-Rite by Koroseal Interior Products, LLC.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Tackable Wall Panel: Cork composition, 6 mm thickness; dense, fine grain, flame retardant.
 - 1. Roll Width: 1.22 m.
 - 2. Size: As required to cover surfaces with a minimum number of seams.
 - 3. Colors: As selected by Architect from manufacturer's full color line.
 - 4. Adhesive: Low VOC, as recommended by surfacing manufacturer.
 - 5. Product: Bulletin Board by Forbo.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are finished to a GA-214-M Level 4 finish, prime painted and are ready to receive wall covering. Surfaces shall conform to requirements of the wall covering manufacturer prior to starting the work.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.
- C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.
- D. Report any deficiencies to the Contractor for correction prior to starting installation of wall covering. Beginning of the installation means acceptance of surface conditions.

3.02 PREPARATION

- A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- B. Wall covering shall be acclimatized in the area of installation a minimum of 24 hours prior to installation. All wall surfaces shall be clean and dust-free.

3.03 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Apply dry erase wall covering horizontally using a level line and in the same sequence as cut from the roll. Do not crease or bend the wall covering. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tightly.

- C. Install dry erase wall covering sheets in exact order as they are cut from the bolt. Reverse hand alternate strips. Double cut seams. Do not score drywall when cutting material. Where seams are required, seam out of the main writing and viewing areas of the wall.
- D. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.04 CLEANING AND PROTECTION

- A. Clean wall coverings of excess adhesive, dust, dirt, Do not permit construction activities at or near finished wall covering areas.

END OF SECTION

SECTION 09 84 00
ACOUSTIC ROOM COMPONENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass core panels with facings or coverings and mounting accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details, panel layout, and fabric orientation.
- D. Samples:
 - 1. Submit fabricated samples of each type of panel specified; 12 x 12 in, showing construction, edge details and finish or fabric covering.
 - 2. Submit confirmation samples, 12" x 12" min size of all selected fabrics.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company with not less than fifteen years of experience in manufacturing acoustical products similar to those specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect acoustical panels from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until panels are needed for installation.
- B. Do not deliver materials to the building until wet and dust generating work, such as concrete, drywall finishing and plaster is completed and cured.
- C. Store panels flat, in dry, well-ventilated space; do not stand panels on end.
- D. Protect panel edges from damage.

PART 2 PRODUCTS

2.01 ACOUSTICAL PANELS

- A. Sound Absorbing Panels Type AWP-1: Glass fiberboard panels 6-7 PCF, with resin hardened edges.
 - 1. Applications: Cafeteria and as indicated on the Drawings.
 - 2. Panel Sizes: As indicated on the Drawings.
 - 3. Panel Thickness: 1 inch.
 - 4. Surface Burning Characteristics, ASTM E84: Class A.
 - 5. Corners: Square.
 - 6. Wall Mounting: Back mounting, with Z-clips.
 - 7. Finish: Fabric wrapped; see Finish Legend.
 - 8. Warranty: 3 years.
 - 9. Products:
 - a. Respond A Series by Conwed Designscape.

- b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Sound Absorbing Panels Type AWP-2, AWP-4 and ACP-1: Glass fiberboard panels 6-7 PCF, with resin hardened edges and laminated with 1/8 inch molded fiberglass face for extra durability.
 - 1. Applications: Auditorium, Music and as indicated on the Drawings.
 - 2. Size: As indicated on the Drawings.
 - 3. Thickness: 2 inches.
 - 4. Surface Burning Characteristics, ASTM E84: Class A.
 - 5. Corners: Square.
 - 6. Wall Mounting: Back mounting, with Z-clips.
 - 7. Ceiling Mounting: Z-Bar
 - 7. Finish: Fabric wrapped; see Finish Legend.
 - 8. Warranty: 3 years.
 - 9. Product: Respond IR Series by Conwed Designscapes.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Sound Absorbing Panels Type AWP-3: High-abuse type; fiberglass core with impact resistant pan of perforated co-polymer.
 - 1. Applications: Gymnasiums and as indicated per the Drawings.
 - 2. Sizes: As indicated on the Drawings.
 - 3. Thickness: 2".
 - 4. Surface Burning Characteristics, ASTM E84: Class A.
 - 5. Edges: Square hardened.
 - 6. Wall Mounting: Back mounting; Z-clips for high-abuse secure mounting.
 - 7. Finish: Co-polymer color. See Finish Legend.
 - 8. Warranty: 3 years.
 - 9. Product: Metro Rebound Panels by Conwed DesignScape.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Fabric Covering: Seamless polyester fabric facing material, for stretched covering of core material; NFPA 260 Class 1.
 - 1. Fabric: See Finish Legend.

2.02 SOUND DIFFUSERS

- A. Barrel Diffusers Type AWP-5 and SBD-1: Thermoset fire-resistive rigid molded plastic finished with a laminated fabric facing at wall units and finish gel coat for ceiling mounted units.
 - 1. Panel Size: 48" x48" x 7" deep variable.
 - 2. NRC Rating, ASTM C423: 0.10 average.
 - 3. AWP-5 Wall Mounting: L-angles and hook / loop fasteners
 - 4. SBD-1 Ceiling Mounting on Gypsum Ceiling: L-angles for surface mounting.
 - 5. SBD-1 Ceiling Mounting on ACT Grid Ceiling: Flanged units for support by T grid. See Section 09 51 00.
 - 6. SBD-4 Finish: White gel coat.
 - 7. AWP-5 Finish: Fabric wrapped to match wall acoustic panels in the space. See Finish Legend.
 - 8. Products:
 - a. Respond Barrel Diffusers by Conwed DesignScapes.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 FABRICATION

- A. Fabric Wrapped, General: Fabricate panels to sizes and configurations indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
- B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width, and squareness from corner to corner.

2.04 ACCESSORIES

- A. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, and as follows:
 - 1. Two-part clip and base-support bracket system; brackets designed to support full weight of panels and clips designed for lateral support, with one part mechanically attached to back of panel and the other attached to substrate.
 - 2. Hook and loop strips adhered to substrate and to back of panels.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of acoustical panels. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install acoustical panels in locations indicated, following installation recommendations of panel manufacturer. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.
- B. Install panels to construction tolerances of plus or minus 1/16 inch for the following:
 - 1. Plumb and level.
 - 2. Flatness.
 - 3. Width of joints.
- C. All panel handling shall be done using clean white gloves.

3.03 CLEANING

- A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.
- B. Remove surplus materials, trimmed portions of panels, and debris resulting from installation.

3.04 PROTECTION

- A. Provide protection of installed acoustical panels until completion of the work.
- B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. All necessary surface preparation.
- B. Field application of paints and other coatings.
- C. Scope: Finish all interior surfaces exposed to view, unless fully factory-finished.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Roofing and flashing.
 - 6. Floors, unless specifically so indicated.
 - 7. Ceramic and other tiles.
 - 8. Glass.
 - 9. Acoustical materials, unless specifically so indicated.
 - 10. Concealed pipes, ducts, and conduits.
- E. Surface preparation, patching and repainting of existing interior walls, partitions, and ceilings disturbed by the Work, as indicated on the Drawings or as otherwise required.
- F. Painting of exposed piping, pipe insulation, ductwork, conduit, wiremold, etc.
- G. Painting of safety floor striping in Shops, Labs and where indicated on the Drawings.
- H. Field testing for substrate moisture content and alkalinity.
- I. Field testing compatibility of new paint with shop-applied primers, existing paint or finishes to be covered.
- J. Verification of compatibility of shop primers (mechanical equipment, structural steel, steel fabrications, etc.) with finish coatings specified herein.
- K. The painting subcontractor shall examine all the Sections of the Specifications and shall thoroughly familiarize himself with all their provisions regarding painting and finishing.
 - 1. All surfaces that are primed or left unfinished by the requirements of other Sections of the Specifications shall be painted or finished as a part of this Section, unless specifically indicated otherwise.
- L. Finish Schedule: Refer to the Interior Design Drawings, Finish Legend and Schedule for color selections and product types.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- D. GreenSeal GS-11 - Paints and Coatings; 2013.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, VOC content, and general product category (e.g. "acrylic enamel").
 - 2. Cross-reference submittal to specified paint systems; include description of each system.
 - 3. Manufacturer's installation instructions.
- C. Samples: Submit paper color chip samples, 4 x 4 inch in size illustrating selected colors and sheens as scheduled.
- D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.
- F. Maintenance Manual: Provide a typed paint and coatings maintenance manual including area summary with finish schedule, area detail designating location where each product, color, finish was used, product data pages, MSDS sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this Section with minimum five years of experience and shall have completed similar painting system applications with a record of successful in-service performance.
- B. Material Data Sheet product information for all painting products shall be kept on file on the job site before work begins.
- C. All materials shall be thoroughly stirred. No materials shall be reduced or changed in any way. Any tinting or matching of colors shall be done to the satisfaction of the Architect. In all cases a sample shall be applied on the job and Architect must approve before work is actually begun. Execute work in accordance with manufacturer's printed instructions.

1.05 REGULATORY REQUIREMENTS

- A. All field applied paints and coatings shall meet state VOC standards.

1.06 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide a finished sample room, complete or in part, with all finish items completed in accordance with the Specification and in selected colors. Items not accepted shall be re-finished. When accepted, they shall serve as a standard for workmanship, appearance and materials for similar areas throughout this Project.
- C. Accepted mock-ups may remain as part of the Work.

1.07 PRE-INSTALLATION MEETING

- A. A pre-installation meeting at least two weeks before start of painting shall be held at the jobsite, including: Contractor, painting subcontractor, paint manufacturer's technical representative, Owner's representative and Architect. The purpose of the meeting shall be to review existing conditions. The paint manufacturer's technical representative shall perform an on-site inspection to confirm compatibility and suitability of specified materials, following which he shall provide written certification that all materials specified are entirely suitable for their proposed applications.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's sealed and labeled containers; inspect to verify acceptability.

- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.
- D. Store all materials used on the job in a single place. Keep storage place neat, dry and clean. All soiled or used rags, waste and trash must be removed from the building every night, and every precaution taken to avoid the danger of fire. All materials shall be protected from freezing.

1.09 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.
- F. The Owner and all subcontractors shall be kept informed of the use of products that may generate fumes in advance of the use of such products.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Basis of Design: Sherwin Williams Co.
- C. Acceptable Manufacturers:
 - a. Benjamin Moore & Co.
 - b. PPG Architectural Finishes, Inc.
 - c. Tnemec Coatings.
 - d. California Paints.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

- A. All materials used on the Work shall be as specified in brand and quality. No claims as to unsuitability or unavailability of any materials specified, or unwillingness to use same, or inability to produce first class work with same, will be entertained unless such claims are made in writing and submitted prior to the receipt of proposals.
- B. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- C. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

- D. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of Maine.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Ferrous Metals, heavy duty, Acrylic, 3 Coat:
1. Applications: Hollow metal doors and frames.
 2. Primer 1st coat; SW Pro-Cryl Universal Acrylic Primer, B66-310. 2-4 mils DFT.
 3. Semi-gloss: 2nd and 3rd coats; SW Sher-Cryl HPA Acrylic B66-350. 2.5-4 mils DFT/coat.
- B. Wood, Opaque, Latex, 3 Coats:
1. Primer 1st Coat; SW A-100 Ext Alkyd Stain Blocker Y24W20. 1.4 mils.
 2. Satin: 2nd and 3rd coats; SW SuperPaint Exterior Latex A89-1100. 1.5 mils DFT/coat.

2.04 PAINT SYSTEMS - INTERIOR

- A. Concrete/Masonry, Opaque, Latex, 3 Coats.
1. Application: For general painted walls where no other product is indicated.
 2. Filler/Primer 1st coat: SW Block Filler B42W46.
At all light-weight aggregate CMU: Two coats Filler/Primer)
 3. Egg-Shell: 2nd and 3rd coats; SW Harmony Low Odor Latex Eg-Shel B9. 1.6 mil DFT/coat.
- B. Concrete/Masonry, Opaque, Water-based Epoxy, 3 Coats.
1. Application: Special Paint "SP" designation for walls as indicated on Finish Schedule.
 1. Filler/Primer 1st coat; SW Heavy Duty Block Filler B42W46.
At all light-weight aggregate CMU: Two coats Filler/Primer.
 2. Semi-gloss: 2nd and 3rd coats; SW Water Based Catalyzed Epoxy B70. 3-4 mil DFT/coat.
 3. Gloss: 2nd and 3rd coats; SW Water Based Catalyzed Epoxy B70. 3-4 mil DFT/coat.
- C. Concrete Floor Safety Paint, Opaque, Water Based Epoxy, 2 Coat.
1. For laboratories, shops and other areas indicated. See Drawings for striping layout.
 2. Semi-Gloss: 2 Coats; Tnemec Series 287 Enviro-Pox, Water Based Epoxy-Amine 2-4 mils DFT/coat.
 3. Coordinate with the work of Section 03 35 13 Concrete Floor Finishing.
- D. Cementious Spray-applied Fireproofing; 1 coat, latex.
1. Application: Areas of exposed cementious fire-proofing indicated to be painted.
 2. 1st coat; SW Harmony Low Odor Latex Flat. Thickness to completely coat surface but not soak the fire-proofing. Product shall be subject to acceptance by the fireproofing manufacturer.
- E. Ferrous Metals, Pre-primed, Acrylic, 3 Coats:
1. Applications: Hollow metal frames and doors, stair structures.
 2. Primer 1st coat; Re-prime with compatible primer.
 3. Semi-gloss: 2nd and 3rd coats; SW ProClassic Waterborne Acrylic. B31 Series, 1.4 mils DFT/coat.
- F. Ferrous Metals, Water-based urethane, 3 Coats:
1. Applications: Handrails and railings.
 2. Primer 1st coat; Re-prime with SW Pro Industrial Pro-Cryl Universal Primer, B66-310, 2 to 4 mils DFT;

3. Semi-gloss: 1st and 2nd coats: SW Water-based Acrolon 100 and Part B Hardener B65-720, 2 to 4 mils DFT.
- G. Ferrous Metals, Acrylic, 3 Coats:
 1. Applications: Exposed structural steel, piping. Confirm required sheen with Architect.
 - a. NOTE: Special attention shall be paid to proper surface preparation.
 2. Primer 1st coat; SW Pro-Cryl Universal Acrylic Primer B66-310. 2-4 mils DFT.
 3. Satin: 2nd and 3rd coats; SW Pro Industrial Zero VOC Satin Acrylic B66-660, 2.5-4 mils DFT.
 4. Semi-gloss: 2nd and 3rd coat; SW Pro Industrial Zero VOC Semi-Gloss B66-650, 2.5-4 mils DFT.
- H. Ferrous Metals, Pre-primed structural steel, Acrylic, 1 Coat: Confirm sheen with architect.
 1. Application: Exposed pre-primed overhead structure and galvanized roof deck.
NOTE: Special attention shall be paid to proper field surface preparation for shop applied paint where adversely affected by shop and field welds. Special attention shall be paid to proper surface preparation to remove metal deck oils and other materials which affect paint bond to deck.
 2. Flat: 1st coat; SW Low VOC Waterborne Acrylic Dryfall B-42 Series, 2 to 2.5 mils DFT
 3. Semi-Gloss: 1st coat; SW Low VOC Waterborne Acrylic Dryfall B-42 Series, 2 to 2.5 mils DFT
- I. Gypsum Board, Latex, 3 Coats:
 1. Applications:
 - a. Eggshell: For general walls.
 - b. Flat: For ceilings and soffits.
 - c. Semi-gloss: For toilet rooms.
 2. 1st coat primer; SW Harmony Interior Latex Primer, B11W00500, 1.3 mils DFT
 3. Semi-gloss: 2nd and 3rd coats; SW Harmony Low Odor Latex, B10-900 Series, 1.6 mils DFT/coat.
 4. Eggshell: 2nd and 3rd coats; SW Harmony Low Odor Latex, B09-500 Series, 1.6 mils DFT/coat.
 5. Flat: 2nd and 3rd coats; SW Harmony Low Odor Latex B05-500 Series, 1.8 mils DFT/coat.
- J. Gypsum Board, Acrylic-Epoxy, 3 Coats:
 1. Applications: Special Paint "SP" designation as indicated on Finish Schedule and at ceilings in all restrooms.
 2. 1st coat primer; SW Prep-Rite 200 Latex Primer.
 3. Semi-gloss: 2nd and 3rd coats; SW Water Based Catalyzed Epoxy B70. 3-4 mil DFT/coat.
- K. Fabrics/Insulation Jackets, Water-based Enamel, 3 Coat:
 1. 1st coat primer sealer; SW PrepRite 200 Latex Primer B28W200.
 2. Semi-gloss: 2nd and 3rd coats; SW ProClassic Waterborne Enamel B31. 1.4 mil DFT
- L. Acoustical Tile Coating Vinyl Acrylic Resin, 2 Coat:
 1. 1st coat Grid/Tile Cleaner; Type as recommended by acoustical tile coating manufacturer.
 2. 2nd coat; Procooustic Acoustical Tile and Ceiling Coating by ProCoat Products, Inc.
 3. Fire Rating, ASTM E84: Class A.
 4. Locations: At Cosmetology Areas D132- refer to drawing A1.56.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Other materials not specifically indicated but required to achieve the finishes specified; commercial quality, "best grade" of "first line" made by reputable, recognized manufacturers, shall be compatible with related products and shall bear manufacturer's labels.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 WORKMANSHIP

- A. Employ skilled mechanics to ensure the very best workmanship. Quality workmanship is required. Materials shall be applied by craftsmen experienced in the use of the specific product involved.
- B. All materials shall be applied in strict accordance with the manufacturer's printed instructions.
- C. Finish work shall be uniform and of the approved color. Paint and stain shall completely cover, be smooth and free from runs, sags, clogging, excessive flooding, or brush marks. Make edges of paint and stain adjoining other materials or colors sharp and clean without overlapping.

3.02 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
- F. Submit test results and action taken to the Architect prior to the application of paint products.
- G. Prime coats specified herein will not be required on items delivered with shop or factory prime coats already applied, providing that shop prime coats are equal in quality to those specified and the painting subcontractor determines their total compatibility with finish coats.

3.03 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. General: Do not begin painting on any surface until it is in proper condition to receive the paint or as specified. Should any surface be found unsuitable to produce a proper finish, the Architect and product manufacturer shall be notified in writing and no material shall be applied until the unsuitable surfaces have been made satisfactory.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. New Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry. Fill all minor irregularities with approved patching materials and rub to a texture similar to adjacent surfaces. New concrete and masonry shall not be coated for at least 28 days.
 - 1. Testing: Determine alkalinity and moisture content of surfaces by performing appropriate tests. Submit results to the Architect. If the alkalinity of the surfaces could cause the paint to blister and burn, correct this condition before application. Do no paint surfaces where moisture content exceeds that permitted by the paint manufacturer.

- H. New Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound and sand to smooth level surface. Exercise care to avoid raising nap of paper. Spot prime defects after repair.
 - 1. Note special preparation of surfaces to receive wall coverings. See Section 09 72 00 - Wall Coverings.
- I. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
- J. New Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs. Coordinate preparation and products with steel provider.
- K. New Shop-Primed Interior Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Coordinate preparation and products with steel provider.
- L. New Shop-Primed Exterior Steel Surfaces to be Finish Painted: Sand-blast to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Touch-up primer where disturbed. Coordinate preparation and products with steel provider.
- M. Previously Painted Ferrous Metal: Remove grease, dirt, rust, and other foreign materials as necessary to receive paint. Sandpaper surfaces to a smooth, even surface and dust off. Touch-up any chipped or abraded surfaces and fill all holes and other surface imperfections with metal repair bondo, sand smooth and prime.
- N. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.
- O. Non-compatible Shop Primers: Cover with suitable barrier coat or remove primer and reprime as required.
 - 1. Testing: Apply a test patch of the new painting system to test for adhesion. Allow to dry one week before testing per ASTM D3359. If new painting system lifts, completely remove the existing finish.

3.04 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Spray painted wall surfaces shall be back-rolled.
- C. No interior painting or finishing shall be permitted until the building has been thoroughly dried out. See Environmental Requirements for application air temperature requirements. Relative humidity shall be 75% maximum. Moisture levels for painting shall be within 5 degrees F of the dew point and shall be determined by use of an electronic moisture meter.
- D. The atmosphere shall be relatively free of airborne dust. Each coat of paint shall be applied smoothly, worked out evenly and allowed to dry completely before the subsequent coat is applied. Follow manufacturer's labeled instructions for drying time between coats
- E. Apply products in accordance with manufacturer's instructions.
- F. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- G. Before painting, remove hardware, accessories, plates, lighting fixtures and similar items or provide ample protection of such items. On completion of each area, replace items removed.

- H. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- I. Sand metal surfaces, enamels and varnishes lightly between coats to achieve required finish.
- J. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- K. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- L. All closets shall be finished the same as adjoining rooms, unless otherwise indicated.
- M. All doors and frames shall have the same finish and number of coats on both interior and exterior sides. Do not paint over door and frame fire-rating labels.
- N. All exposed structures (columns, trusses, beams, joist, deck, etc.) shall be painted the same color selected by the Architect, unless specifically indicated otherwise.
- O. All exposed steel stair components shall be painted, unless otherwise indicated, including but not limited to stringers, stair and landing pans, support structure, and railings.
- P. Upon completion, touch up and restore finish where damaged and leave in good condition.
- Q. Paint shop-primed equipment.
- R. Access panels, registers, cabinet heaters, radiators, and electrical panels and similar equipment shall be painted in colors as selected by the Architect.
- S. Exposed piping, conduit, wiremold, ductwork, pipe insulation, and hangers shall be painted in colors selected by the Architect.
- T. Access panel doors and frames shall be painted to match wall color.
- U. Upon completion of painting, reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- V. Wall surfaces to receive wall protection panels shall be primed.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field testing.
- B. The Owner may provide field testing during the period that paint is being applied to sample paint materials being used and verify paint application thickness.
- C. If test results show material being used does not comply with the specified requirements, the Contractor may be directed to stop painting, remove non-complying paint, pay for testing and repaint surfaces coated with the rejected product.

3.06 CLEANING AND PROTECTION

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Provide drop cloths in all areas where painting is being done to protect floors and other work from damage during painting. Mask or otherwise protect smaller objects adjacent to painted surfaces.
- C. Waste materials shall not be disposed of in the existing sanitary system.
- D. When the Work of this Section is completed, remove all surplus materials and scaffolding from the premises and clean off all misplaced paint, varnish, stain and the like so as to leave the premises in perfect condition, free of all paint.

END OF SECTION

SECTION 10 11 01
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Marker boards and tack boards.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking for visual display boards and for Owner furnished projectors and interactive display system.
- B. Section 06 20 00 - Finish Carpentry: Tack panels related to finish carpentry millwork.
- C. Section 09 72 00 - Wall Coverings: Presentation dry erase type panels and tack panels.

1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ASTM A424 - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. Porcelain Enamel Institute Specifications.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on marker board, tack board, trim, and accessories. Include surface burning test results. Submit sample warranty.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
 - 1. Take field measurements prior to fabrication and installation to ensure proper fitting and coordinate / confirm locations of any mechanical and electrical wall mounted devices.
- D. Samples: Submit color charts for marker board and tack board.
- E. Maintenance Data: Include data on regular cleaning and stain removal.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.

1.06 WARRANTY

- A. See Section 01 78 01 - Warranties, for additional warranty requirements.
- B. Provide twenty (20) year warranty for marker board to include warranty against discoloration due to cleaning, crazing or cracking, and staining.
 - 1. Warranty shall cover replacement cost of the boards.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Marker Boards:
 - 1. Claridge Products and Equipment, Inc.
 - 2. Nelson Adams - Polyvision Corp.
 - 3. Aarco Products Inc.
- B. Tack Boards:
 - 1. Forbo.

- C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 VISUAL DISPLAY BOARDS

- A. Marker Boards: Porcelain enamel on steel, laminated to core.
1. Color: White.
 2. Steel Face Sheet Thickness: 24 gage, 0.0239 inch.
 3. Core: Particleboard, 3/8 inch thick, laminated to face sheet.
 4. Backing: Aluminum sheet, laminated to core.
 5. Size: As indicated on the Drawings. Boards shall be maximum possible lengths to eliminate vertical seams.
 6. Frame: Min 0.062 inch thickness Extruded aluminum, with concealed fasteners.
 7. Frame Profile: Snap-on trim, manufacturer's standard.
 8. Frame Finish: Anodized, natural.
 9. Accessories: Provide chalk tray, map rail, and flag holder. (One flag holder per room)
- B. Tack Boards: Composition cork, dense, fine gran, flame retardant, size to cover surfaces with a minimum number of seams. Perimeter frame to match marker boards.
1. Cork Thickness: 1/4 inch.
 2. Color: As selected from manufacturer's full range.
 3. Surface Burning Characteristics, ASTM E84: Flame spread 25, maximum; Smoke developed 450, maximum.
 5. Size: As indicated on the Drawings.
 6. Product: Bulletin Board by Forbo.
 7. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MATERIALS

- A. Porcelain Enameled Steel Sheet: ASTM A424, Type I, Commercial Steel, with fired-on vitreous finish.
- B. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).
- C. Particleboard: ANSI A208.1; Grade 1-M-1, wood flakes, no urea-formaldehyde added waterproof resin binder, sanded faces.
- D. Aluminum Sheet Backing: 27 gage, 0.014 inch thick.
- E. Exposed Aluminum Finish: Comply with NAAMM Metal Finish Manual for Architectural and Metal Products.

2.04 ACCESSORIES

- A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.
- B. Map Supports: Formed aluminum sliding hooks and roller brackets to fit map rail.
1. Provide one pair roller brackets per board.
 2. Provide four display hooks per board.
 3. Provide map rail end caps.
- C. Flag Holders: Cast aluminum bored to receive 1 inch diameter flag staff, bracketed to fit top rail of board.
1. Provide one flag holder per room.
- D. Tray: Aluminum manufacturer's standard profile one piece full length of marker board, molded, concealed fasteners, same finish as frame.
- E. Mounting Brackets: Concealed.

2.05 FABRICATION

- A. Face and backer sheets of marker boards shall be laminated to the core material under heat and pressure with manufacturer's standard flexible waterproof adhesive.

- B. Coordinate factory assembled units with trim and accessories. Join parts with a neat, precise fit. Make joints only where total length exceeds maximum manufactured length. Fabricate with a minimum number of joints, balanced around the center of the board. Provide manufacturer's standard vertical joint spline system between abutting sections of boards within a unified perimeter frame. Provide manufacturer's standard mullion trim at joints between boards in combination units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. See Drawings for mounting height of boards. Any questions or conflicts shall be brought to the attention of the Architect.
- C. Secure units level and plumb.

3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10 14 24
INTERIOR SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior ADA compliant signage.
- B. Interior vinyl wall graphics.
- C. Interior aluminum letters.
- D. Interior stainless steel laser cut sign panels.

1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature.
- C. Shop Drawings:
 - 1. Interior Signs: Submit shop drawings showing to scale all sign types including lettering, layout and dimensions.
 - 2. Sign Schedule: Submit a sign schedule with all signs listed by door number location. Sign schedule shall include sign type, side of wall for mounting by room number, and sign text.
 - 3. Vinyl Wall Graphics and laser cut sign panels: Submit dimensioned shop drawings for all locations showing layouts for text and custom graphics. Show joint locations for vinyl wall graphics.
- D. Samples:
 - 1. Selection Samples: Submit complete set of plastic color chips representing manufacturer's full range of available colors.
 - 2. Verification Samples: Submit full size sample signs of each type, representing type, style, color and method of attachment specified.
 - 3. Vinyl wall graphics: Submit 12" x 12" minimum in size samples demonstrating material, colors and graphics.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements of ANSI/ICC A117.1 and ADAAG.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Inspect products upon receipt. Store products in manufacturer's packaging until ready for installation.

1.05 WARRANTY

- A. See Section 01 78 10 - Warranties for additional warranty requirements.
- B. Vinyl Wall Graphics: Provide manufacturer and fabricator/installer's joint three year warranty covering full adhesion of graphics to wall surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ADA Signs Basis of Design: HC300 ADA System by Best Sign Systems.
- B. Wall Graphics Basis of Design: Scotchcal Graphic Film by 3M
- C. Acceptable Manufacturers / Sign Fabricators:
 - 1. Mohawk Sign Systems.
 - 2. Welch Architectural Signs.
 - 3. Gemini Signs.

3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 INTERIOR SIGNS

- A. ADA-Compliant Interior Signage with Raised Borders:
 1. Type: Four-in one construction with raised borders; three-ply melamine plastic laminate with phenolic core signs with lettering and symbols raised 1/32 inch from sign plate face; and 3/8 inch wide, 1/32 inch raised perimeter border with 1/8 inch inside radius.
 2. Sign Thickness: 1/8 inch thick or 1/4 inch thick as required.
 3. Construction: One-piece; added-on or engraved characters not acceptable.
 4. Lettering Style: Helvetica Medium, upper case.
 5. Braille: Grade 2 Braille, placed directly below last line of letters or numbers.
 6. Performance: Non-static, fire-retardant, and self-extinguishing.
 7. Contrast: Letters numbers and symbols shall contrast with background.
 8. Corners: Outside radius, 1/2 inch.
 9. Color of Plastic: As selected from manufacturer's standard colors.
 10. Finish of Plastic: Matte.
 11. Color of Background: As selected from manufacturer's standard paint colors.
 12. Sign Margins: Letters and numbers centered on sign with 1/2 inch side margins and 3/8 inch top/bottom margins.
 13. Sign Sizes:
 - a. Restroom and symbol signs, 8 by 8 inches.
 - b. Room identification signs, 9-1/2 by 4-3/4 inches.
 - c. Room number signs, 4-3/4 by 4-3/4 inches.
 - d. Exit signs, 8 by 4 inches.
- B. Sign Types: Numbers and text may change at a later date, but the Contractor's bid shall be based on the following:
 1. Room Number Signs: One sign with room number for every door scheduled on the Door Schedule. (Exception: Toilet Rooms).
 2. Toilet Room Signs: Instead of room number text, all toilet rooms shall be identified as "Student Women", "Student Men", "Restroom", "Staff Women", or "Staff Men" as scheduled.
 - a. Accessible toilet room signs shall include a 6" x 6" International Symbol of Access.
 3. Exit Signs: One sign with "EXIT" text at every door with a lighted exit sign. See the Electrical Drawings for locations of lighted exit signs.
 4. Room Name Signs: In addition to room numbers, provide text signs at all doors for these uses: (Text may be adjusted during submittals.)
 - a. Sprinkler
 - b. Mechanical
 - c. Electrical
 - d. CTE Office
 - e. Guidance
 - f. Main Office
 - g. Nurse
 5. Building Entrance Signs: Required if all entrances are not accessible. Signs shall be provided adjacent to all building entrance doors or door groups, signs to be located on the exterior.
 - a. Accessible Entrances: Text: "Entrance" and the International Symbol of Accessibility.
 - b. Non-accessible Entrance: Text "Entrance" with directional arrow to accessible entrance.
 6. Room Occupancy Capacity Signs: Required for all assembly spaces, including but not limited to: gyms, library, presentation area, cafeteria, dining room, other spaces with occupant load over 49 people. Text: "Capacity XXX Persons". Located sign near the main entrance within the space.

7. Stair Signs: Required within the stair enclosure at all floor landings of all stairs serving three or more stories. Signs shall indicate:
 - a. Stair identifying name and floor level.
 - b. Terminus level of the top and bottom of the stair enclosure.
 - c. Floor level of and direction to exit discharge.
- C. Delayed Egress Signs: Required at delayed egress door hardware locations (3 locations)
 1. Text: "Delayed Egress. Keep Pushing. This door will open in 15 seconds. Alarm will sound." Mount on door.

2.03 INTERIOR VINYL WALL GRAPHICS

- A. Vinyl Wall Graphics: U.V. resistant custom wall graphics composed of letters and custom logo graphics. Custom graphic images and text shall be furnished by Owner/Architect in electronic format for sign preparation. All signage sheet joints shall be minimized in both directions.
 1. Wall Areas to be Covered: See Drawings for locations.
 2. Wall Surface Finish at Graphics: Painted gypsum board and painted concrete block units.
 3. Colors: Multiple colors as selected from full standard range.
 4. Product for CMU Locations: 3M Scotchcal Graphic Film for Textured Surfaces.
 5. Product for Gypsum Board Locations: 3M Scotchcal Graphic Film.
 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 LAZER-CUT STAINLESS STEEL SIGN PANELS

A.

2.05 ALUMINUM LETTER SIGNS

- A. Cut Aluminum Letters: Aluminum letter router or similarly cut. 1/4" minimum thickness, adhered to wall surface. Locations, font size, font type and text as indicated on the Drawings.
 1. Satin finish, color as selected by Architect from manufacturer's full standard range.
 2. Manufacturer: Gemini Signs Inc.
 3. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine installation areas to ensure that conditions are suitable for installation.
- B. Examine signage for defects prior to installation. Do not install damaged signage.

3.02 PREPARATION

- A. Verify mounting heights and locations for interior signage will comply with referenced standards.
- B. Clean mounting locations of dirt, dust, grease or similar conditions that would prevent proper installation.

3.03 SIGNAGE INSTALLATION

- A. Install signs level, plumb, without distortion, and in proper relationship with adjacent surfaces using manufacturer's recommended standard mounting system.
 1. Mount signs with taper-resistant screws, minimum 4 per sign. All signs over ten inches in length shall be furnished with additional intermediate screws (top and bottom).
 2. Mount signs with double-sided foam tape to smooth, non-porous surfaces. On cork surfaces, screw fastens same color and size backer plate through cork surface into wall. Use foam-tape over backer sign plate to mount room sign.
 3. Mount signs at cork surfaces with color matching screws and backer plate to match sign size. Use double-sided foam tape to secure sign to backer plate.
 4. Mount signs on glass with double-sided foam tape and provide matching sized blank sign panel for back side of glass.

- B. Mounting Height and Locations:
 - 1. Mounting locations shall be as determined by the Architect.
 - 2. In general, signs shall be mounted at 60" above the floor to the base line of the upper line of text. This is a maximum limit and shall not be exceeded.
 - a. For locations where this cannot be done, the acceptable mounting height range is at least 48" above the floor to the base line of the lowest line of text to a maximum of 60" above the floor to the base line of the upper line of text.
 - 3. For door signs, mounting shall be within 18" laterally of the door latch jamb. Signs shall not be located so as to be obscured by doors in the open position.
 - 4. Signs shall be located so that a person can approach a sign within three (3") inches without encountering obstacles or standing within the swing of the door.
- C. Clean signs and remove adhesive from exposed sign surfaces after installation as recommended by manufacturer.
- D. Replace damaged products before Substantial Completion.

3.04 WALL GRAPHICS INSTALLATION

- A. Field verify conditions at all graphics locations, including compatibility of primers and paint with graphic materials. Clean and prepare wall surfaces to meet requirements and recommendations of the graphic wall material manufacturer. Report any unacceptable conditions and conflicting locations of wall mounted items to the Contractor prior to any installations. Commencement of installation shall mean acceptance of wall conditions by the installer.
- B. Install vinyl graphics in locations and at elevations as designated by the Architect. Installation shall be level, plumb, smooth, without distortion.
- C. Replace damaged product prior to Substantial Completion.

END OF SECTION

SECTION 10 14 26
EXTERIOR SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building mounted signage.
- B. Granite monumental signage.
- C. Exterior LED signage.

1.02 RELATED REQUIREMENTS

- A. Section 01 23 00 – Alternates.
- B. Section 03 30 00 - Cast-in-Place Concrete: Foundations and footings.
- C. Section 03 45 00 – Precast Architectural Concrete.
- D. Section 04 20 00 - Unit Masonry.
- E. Section 07 90 05 - Joint Sealers: Perimeter joints with sealant and backing.
- F. Division 26 - Electrical: Coordination of electrical utilities associated with signage.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature.
- C. Shop Drawings: Submit shop drawings showing to scale all sign types including fastening methods, lettering, layout and dimensions.
- D. Samples:
 - 1. Submit manufacturer's full range of colors for selection. A minimum of 40 colors shall be available for selection.
 - 2. Submit sign letter sample in color, size and font selected.

1.04 WARRANTY

- A. See Section 01 78 10 - Warranties, for term and other warranty requirements.

PART 2 PRODUCTS

2.01 EXTERIOR BUILDING MOUNTED SIGNAGE

- A. Cast Letters: Cast aluminum letters with baked enamel finish; 18" inch high capital letters and approximately 1 inch deep with Lexan back covers. Font style and color to be selected from manufacturer's full range. Concealed fasteners for rear stud installation with projected spacers to hold letters off building wall surface.
 - 1. Signs Required: Exact text may change, but the following shall be assumed for bidding purposes:
 - a. (1) sign: SANFORD HIGH SCHOOL AND TECHNICAL CENTER
 - 2. Manufacturers:
 - a. Welch Signage.
 - b. Gemini Sign Company.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Cast Numbers: Cast aluminum numbers with baked enamel finish; 10" inch high numbers and approximately 5/8 inch deep. Font style and color to be selected from manufacturer's full range. Concealed fasteners for rear stud installation with projected spacers to hold letters off building wall surface.

1. Signs Required: Exact schedule to be determined by the State of Maine, Department of Education. For bidding purposes subcontractors shall presume a two digit number for each exterior door indicated per the plans.
2. Manufacturers:
 - a. Welch Signage.
 - b. Gemini Sign Company.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Granite Sign: Custom, laser engraved – back painted, natural granite slab.
 1. Sign Required: See Drawings.
 2. Dimensions: 8 inches (D) x 54 inches (H – see Drawings) x 144 inches (L). Intent of design is to utilize a single uniform slab without seams and/or joints. See Drawings.
 3. Stone/Color: Final selection shall be by Architect from manufacturer resources available in slab thicknesses and size specified above. Basis of Design shall assume Kitledge Grey by Fletcher Granite, Smithfield, RI or equal.
 4. Font Style: Selected by Architect from manufacturer's full range.
 5. Finish: Polished both faces and all exposed edges / tops. Ease edges.
 6. Fasteners, Anchors & Accessories: Concealed type as detailed per the shop drawings.
- D. LED Sign: Single sided, 3 color programmable LED Sign, 20mm pixel pitch. Long range wireless. Waterproof.
 1. Color: 3 color combination; red, green and yellow.
 2. Size: 40 inches x 91 inches.
 3. Brightness: 2500 - 8000 nits (adjust 1-10 level)
 4. Subcontractor shall include all necessary software, hardware and accessories for a complete and functional system. PC will be provided by the Owner however the subcontractor shall include all required installations and programming for a functioning system. Coordinate PC requirements with Owner IT coordinator.
 5. Anchors, fasteners, inset frame and accessories as required per manufacturer specifications.
 5. Warranty: Manufacturer Standard 1 year warranty. 10 year warranty: LED bulb Lifespan.
 2. Manufacturers:
 - a. Basis of Design: Blinky Signs; Product: Outdoor Message Programmable LED Sign Bright 3 Color.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine installation areas to ensure that conditions are suitable for installation.
- B. Verify that utilities are in place and ready to receive precast units with embedded conduit in coordination with electrical requirements.
- C. Examine signage for defects prior to installation. Do not install damaged signage.

3.02 PREPARATION

- A. Verify mounting heights and locations for exterior signage with Architect.

3.03 INSTALLATION

- A. Install signs level, plumb, without distortion, and in proper relationship with adjacent surfaces using manufacturer's recommended concealed mounting system.
- B. Clean signs after installation if required as recommended by manufacturer.
- C. Replace damaged products prior to Substantial Completion.

END OF SECTION

SECTION 10 21 13
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments and urinal screens.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking.
- B. Section 10 28 00 - Toilet Accessories: Accessories mounted on compartments.

1.03 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, interior finish classification certification and accessories.
- D. Samples: Submit one set of samples of partition panel material, 3 x 3 inch in size illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 QUALITY ASSURANCE

- A. Materials shall meet interior finish classification Class C as tested in accordance with NFPA 286 Standard Method of Test of Surface Burning Characteristics of Building Materials.

1.07 WARRANTY

- A. Submit a fifteen (15) year manufacturer's warranty covering all plastic components against breakage, corrosion, and delamination.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Solid Plastic Toilet Compartments:
 - 1. Ampco Products, Inc.
 - 2. Santana and Comtec by Scranton Products.
 - 3. Global Polymer by Global Steel Products.
 - 4. Substitutions: Section 01 60 00 - Product Requirements.

2.02 SOLID PLASTIC TOILET COMPARTMENTS

- A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), floor-mounted headrail-braced.
 - 1. Colors: Two colors minimum, shall be selected by Architect from manufacturer's full line.
- B. Door, Panel and Pilaster Thickness: 1 inch.
- C. Door Widths: 24" typical inswing; 36" at accessible cubicles, outswing.
- D. Door and Panel Height: 55".

- E. Cubicle Depth: As indicated on the Drawings.
- F. Pilaster Width: As required to fit space; minimum 3 inches.
- G. Urinal Screens: Wall mounted with continuous U bracket. For screens wider than 18 inches, provide floor-to-ceiling vertical upright consisting of pilaster anchored to floor and ceiling. Construction shall match compartment partitions.

2.03 ACCESSORIES

- A. Pilaster Shoes: ASTM A666, Type 304 stainless steel with No. 4 finish, 3 inches high, concealing floor fastenings. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Shoes shall be anchored to floor with stainless steel fasteners.
- B. Head Rails: Hollow anodized aluminum, 1 x 1-1/2 inches size, with anti-grip profile and cast socket wall brackets.
- C. Pilaster Brackets: Natural anodized aluminum.
- D. Wall Brackets: Continuous U type, natural anodized aluminum.
- E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- F. Hardware:
 - 1. Hinges: With nylon bearings, adjustable for door close positioning; two per door. Out-swinging doors shall be adjusted to return to the fully closed position, in-swinging doors shall be adjusted to return to the partially open position.
 - 2. Door Latch: Zamak, Slide type with exterior emergency access feature.
 - 3. Door Strike and Keeper: Zamak with rubber bumper; mounted on pilaster in alignment with door latch.
 - 4. Coat Hook: Zamak with rubber bumper; one per compartment, mounted on door.
 - 5. Door Pull: Zamak, provide two (inside and outside) for out-swinging doors.
- G. Heat Sink Strips: Aluminum; secure to the bottom edge of all panels and doors with vandal resistant stainless steel fasteners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing. Start of Work constitutes acceptance of job conditions.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions. Conceal evidence of drilling in floors and walls in finish work.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters. Maintain 1/4 inch between pilasters and doors.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING AND CLEANING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.
- D. After completion of installation, clean and polish exposed compartment and screen surfaces. Remove all protective masking and clean surfaces, leaving them free of soil and imperfections.

END OF SECTION

SECTION 10 21 23
CUBICLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface mounted and suspended overhead metal curtain track and guides.
- B. Cubicle curtains.

1.02 RELATED REQUIREMENTS

- A. Section 09 51 00 - Acoustical Ceilings: Suspended ceiling system to support track.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for curtain fabric characteristics and track system.
- C. Shop Drawings: Indicate a reflected ceiling plan view of curtain track, hangers, attachment details, schedule of curtain sizes.
- D. Samples:
 - 1. Submit manufacturer's standard fabric swatches of full fabric line.
 - 2. Submit 12 x 12 inch sample patch of curtain cloth with representative hem stitch detail, heading with reinforcement, and carrier attachment to curtain header.
- E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- F. Maintenance Data: Include recommended cleaning methods and materials and stain removal methods.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept curtain materials on site and inspect for damage.
- B. Store curtain materials on site and deliver to Owner for installation when requested.

PART 2 PRODUCTS

2.01 CURTAIN TRACKS AND TRACK COMPONENTS

- A. Track: Extruded aluminum straight and curved sections of lengths to minimize joints; I-beam profile.
 - 1. Applications: Nurse 1023, Health Occupations 2090, Health Occupations 2091 and Trainers Rooms.
 - 2. Structural Performance: Capable of supporting vertical test load of 50 lbs. without visible deflection of track or damage to supports, safely supporting moving loads, and sufficiently rigid to resist visible deflection and without permanent set.
 - 3. Track End Stop: To fit track section.
 - 4. Track Bends: Factory bends, configurations as indicated on the Drawings; minimum 12 inch radius; fabricated without deformation of track section or impeding movement of carriers.
 - 5. Suspension Rods: Tubular aluminum sections, sized to support design loads and designed to receive attachment from track and ceiling support. Provide escutcheons for rods. Rod length shall maintain track elevation at transition from low to high ceiling. Track

shall be ceiling mounted on low ceiling. Provide all required clips, attachments and other accessories.

6. Finish on Exposed Surfaces: White enamel finish.
 7. Track Size: 3/4" H x 1-3/8" W.
 8. Products:
 - a. Optitrac Track System by InPro Corp.
 - b. Track with 1026N Carrier by General Cubicle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Curtain Carriers: Nylon roller to accurately fit track; designed to eliminate bind when curtain is pulled; fitted to curtain to prevent accidental curtain removal; 2.2 carriers per foot of track length. Ball and chain with metal hooks.

2.02 CURTAINS

- A. Cubicle Curtains Type PCC-1:
1. Materials: Close weave polyester; anti-bacterial, self- deodorizing, sanitized, preshrunk.
 1. ASTM E84: Flame Spread Index of 25, max; Smoke Developed Index of 450, max. NFPA 701 passing.
 2. Open Mesh Cloth: Open weave to permit air circulation; flameproof material, same color as curtain.
 3. Color: See Finish Legend.
 4. Fabric: Layover by Standard Textile.
 5. Substitutions: See Section 01 60 00 – Product Requirements.
- B. Curtain Fabrication:
1. Manufacture curtains of one piece, sized 10 percent wider than track length. Terminate curtain 15 inches from floor.
 2. Include open mesh cloth at top of solid portion of curtain.
 3. Curtain Heading: Triple thickness 2 inches wide, with stitched button holes for carriers 6 inches on center, double fold bottom hem 2 inches wide with lead weights included. Lock stitch seams in two rows. Turn seam edges and lock stitch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and supports above ceiling are ready to receive work of this Section.
- B. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Install curtain track to be secure, rigid, and true to ceiling line.
- B. Install end cap and stop device.
- C. Install curtains on carriers ensuring smooth operation.

END OF SECTION

SECTION 10 22 26.33
FOLDING PANEL PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Folding panel partitions.
- B. Ceiling track, ceiling guards, and operating hardware.

1.02 RELATED REQUIREMENTS

- A. Section 05 21 00 - Structural Steel Framing: Overhead track structural support framing.
- B. Section 09 72 00 - Wall Coverings: Product requirements for vinyl fabric finish for installation by this section.
- C. Section 09 21 16 - Gypsum Board Assemblies: Concealed overhead sound rated construction.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- C. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- D. ASTM E557 - Standard Guide for Architectural Design and Installation Practices for Sound Isolation between Spaces Separated by Operable Partitions; 2012.
- E. ASTM F793 - Standard Classification of Wallcovering by Use Characteristics; 2010a.
- F. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on partition materials, operation, hardware and accessories, track switching components, colors and finishes available.
- C. Shop Drawings: Indicate opening sizes, track layout, details of track and required supports, static and dynamic loads, location and details of pass door and frame, adjacent construction and finish trim and stacking depth.
- D. Samples for Selection: Submit two samples of full manufacturer's color range for selection of colors.
- E. Samples for Review: Submit two samples of surface finish, 12 by 12 inches size, illustrating quality, colors selected, texture, and weight.
- F. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention, and installation sequence.
- G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods. Describe cleaning materials detrimental to finish surfaces and hardware finish.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified this Section with minimum fifteen years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this Section with minimum five years of experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Model 932 by Modernfold.
- B. Other Acceptable Manufacturers, pending submission and review of equivalent products:
 - 1. Hufcor, Inc.
 - 2. Panelfold, Inc.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 COMPONENTS

- A. Operable Panel Partition: Side opening; paired panels; center stacking; manually operated.
 - 1. Panel Finish: Whiteboard from 3'-0" above finish floor to 7'-0" above finish floor. Vinyl coated fabric above and below specified in Section 09 72 00.
 - 2. Panel Size: Height and width as indicated on the Drawings.
 - 3. Sound Transmission Class (STC): 48-52 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90, on panel size of 100 sq ft.
 - 4. Surface Burning Characteristics of Panel Finish: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
 - 5. Installed partition system track capable of supporting imposed loads, with maximum deflection of 1/360 of span.
- B. Panel Construction:
 - 1. Panel Substrate Facing: Steel sheet.
 - 2. Core: Gypsum board construction utilizing manufacturer's standard fabrication methods.
- C. Core: 16 gage, 0.0598 inch thick formed sheet steel frame top, bottom, jambs, and intermediates; welded construction, with acoustical insulation fill.
 - 1. Thickness with Finish: 3 inches.
 - 2. Factory applied surface finish.
 - 3. Trim: Trimless.
 - 4. Hinges: Continuous piano type, manufacturer's standard.
 - 5. Panel to Panel Seals: Grooved and gasketed astragals, with continuous flexible ribbed vinyl seal fitted to panel edge construction; color to match panel finish.
- D. Track: Formed steel; 1-1/4 by 1-1/4 inch size; thickness and profile designed to support loads, steel sub-channel and track connectors.
- E. Carriers: Nylon wheels on trolley carrier at top of every second panel, sized to carry imposed loads, with threaded pendant bolt for vertical adjustment.
- F. Acoustic Seals: Flexible acoustic seals at jambs, meeting mullions, ceilings, retractable floor and ceiling seals, and above track to structure acoustic seal.
- G. Vinyl Coated Fabric: ASTM F 793 Category VI, polyvinyl fluoride finish for washability and improved flame retardance color as selected from manufacturer's standard range.
- H. Accessories: White enameled ceiling closure; aluminum jamb and head molding, fittings and attachments, and intermediate meeting posts.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify track supports are laterally braced and will permit track to be level within 1/4 inch of required position and parallel to the floor surface.
- C. Verify floor flatness of 1/8 inch in 10 feet, non-cumulative.

- D. Verify wall plumbness of 1/8 inch in 10 feet, non-cumulative.

3.02 INSTALLATION

- A. Install partition in accordance with manufacturer's instructions and ASTM E557.

3.03 ADJUSTING

- A. Adjust partition assembly to provide smooth operation from stacked to full open position. Do not over-compress acoustic seals.
- B. Visually inspect partition in full extended position for light leaks to identify a potential acoustical leak.

3.04 CLEANING

- A. Clean finish surfaces and partition accessories.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of partition and identify potential operational problems.

END OF SECTION

SECTION 10 26 01
WALL AND CORNER PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards and wall protection panels.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Support blocking for wall anchors.
- B. Section 09 21 16 - Gypsum Board Assemblies: Metal stud wall construction.

1.03 REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
- C. Shop Drawings: Submit seaming diagrams for all wall protection panels.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: InPro Corp.
- B. Acceptable Manufacturers:
 - 1. Construction Specialties, Inc.
 - 2. ProTek Series by Pawling.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements

2.02 COMPONENTS

- A. Corner Guards Type 43B, 44A, 44B, 45A, 45B - Surface mounted: Stainless steel.
 - 1. Material: Type 304 stainless steel, No. 4 finish; 16 gauge.
 - 2. Fire Resistance: ASTM E84, Flame spread 25 or less and Smoke developed 450 or less.
 - 3. Corner: Square angle.
 - 4. Size: 1-1/2 inches.
 - 5. Length: One piece.
 - 6. Product: Type 430 by InPro.
- B. Corner Guards Type 40B, 41B, 42B - Surface Mounted: High impact non-PVC cover with extruded aluminum full height retainer and integral impact absorbing device.
 - 1. Provide at all outside corners where Impact Resistant Wallboard is scheduled.
 - 2. Size: 2 inches.
 - 3. Corner: Square and custom angles. Note: All corner angles shall be field verified.
 - 4. Color: See Finish Legend.
 - 5. Length: One piece.
 - 6. Product: G160 Series by InPro.

- C. Wall Protection Panels Types WPP-1 & WPP-2: 0.060" thickness, PETG vinyl; manufacturer's accessories.
 - 1. Fire-rating: UL723 Class A; Flame Spread 20 or less; Smoke Developed 400 or less.
 - 2. Top Edge: Beveled top edge without trim.
 - 3. Seams: Matching sealant for butt joints, except where contrasting color H trim is indicated.
 - 4. Panel Size: Maximum sheet size to minimize seams, and panel layout as identified on interior elevation Drawings, as applicable.
 - 5. Colors / Texture: See Finish Legend. Panels shall be color matched.
 - 6. Adhesive: Water-based, low odor, as recommended by the panel manufacturer.
 - 7. Product: High Impact Wall Covering by InPro.

2.03 FABRICATION

- A. Fabricate components with tight joints, corners and seams.
- B. Pre-drill holes for attachment.
- C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- B. Verify that field measurements are as indicated on Drawings.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, at proper height.
- B. Install bumpers, handrails, corner guards securely to wall framing members only.
- C. Wall Protection Panels:
 - 1. Verify wall surfaces are primed.
 - 2. Clean substrate surfaces to remove dust, debris and loose particles.
 - 3. Locate panel seams per approved shop drawings.
 - 4. Adhere panels to substrate with troweled on adhesive as recommended by the panel manufacturer. Smooth roll the surface.
 - 5. Clean-up surfaces in accordance with manufacturers maintenance instructions.

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/8 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/8 inch.

END OF SECTION

SECTION 10 28 00
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accessories for toilet rooms, showers, utility rooms and for fixtures at locations indicated on the Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking.
- B. Section 08 80 00 - Glazing: Unframed mirrors.
- C. Section 09 21 16 - Gypsum Board Assemblies: Metal stud partitions for special loading imposed by grab bars, shower seats, diaper changing stations, etc.
- D. Section 10 21 13 - Plastic Toilet Compartments.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; current edition.
- B. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2014e1.
- C. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- E. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2011e1.
- F. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- H. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2010.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods. Provide verification by an independent testing organization of grab bar strength and installation.
- C. Samples: Upon request, submit one sample of each accessory, illustrating color and finish.
- D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.
- E. Close-out Requirements: Submit maintenance data, operating instructions and keys required for each type of equipment and lock.

1.06 PRODUCT HANDLING

- A. Deliver items in manufacturer's original unopened protective packaging. Store materials as required to prevent soiling, damage, or wetting. Maintain protective covers on all units. Remove protective covers at final clean-up of installation.

1.07 WARRANTY

- A. Provide manufacturer's standard product warranty for mirrors against silver spoilage for ten (10) years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Bobrick Washroom Equipment, Inc..
- B. Acceptable Manufacturers:
 - 1. Bradley Corp.
 - 2. McKinney Parker.
 - 3. Substitutions: Section 01 60 00 - Product Requirements.
- C. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Stainless Steel Sheet: ASTM A666, Type 304, 0.034 inch (22 gage) minimum thickness, unless otherwise indicated.
- C. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- D. Adhesive: Two component epoxy type, waterproof.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof and of same materials as accessory where exposed.

2.03 FINISHES

- A. Stainless Steel: No. 4 Brushed finish.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.

2.04 TOILET ROOM ACCESSORIES

- A. NOTE: Accessory item numbers correspond to accessory symbol numbers on the Drawings.
- B. Item 1C - Toilet Paper Dispenser: Surface mounted.
 - 1. Product: Furnished by Owner; installed by Contractor.
- C. Item 2A - Paper Towel Dispenser: Surface mounted.
 - 1. Product: Furnished by Owner, installed by Contractor.
- D. Item 4A - Waste Receptacle: Semi-recessed; Seamless welded stainless steel with trash liner; 15-7/8 W x 26-1/4 " H x 4" D recess, 4" D projection.
 - 1. Product: B-43644
- E. Item 4B - Waste Receptacle: Surface-mounted; Seamless welded stainless steel with trash liner; 15-1/8" W x 32" H x 8.5" D.
 - 1. Product: B-277 by Bobrick.
- F. Item 6A - Napkin Receptacle: Stainless steel, surface-mounted, All welded construction.
 - 1. Product: B-254 by Bobrick.

- G. Item 7A & 7B - Mirror: Stainless steel welded framed, 6 mm thick tempered glass mirror; non-absorptive backing filler and galvanized sheet steel backer plate; surface mounted.
 - 1. Item 7A Size: 18" W x 36" H, unless otherwise indicated..
 - 2. Item 7B Size: 20" W x 60" H, unless otherwise indicated.
 - 3. Product: B-290 Series by Bobrick.
- H. Item 7C - Mirror with Shelf: Stainless steel frame and shelf. 18" W x 36" H, unless otherwise indicated.
 - 1. Product: B-292 by Bobrick.
- I. Item 10C - Soap Dispenser: Surface mounted.
 - 1. Product: Furnished by Owner, installed by Contractor.
- J. Item 11A - Robe Hook: Heavy-duty stainless steel, single-prong, rectangular-shaped bracket and back-plate for concealed attachment, satin finish. Provide 2 hooks at each location, at different heights.
 - 1. Product: B-76717 by Bobrick.
- K. Item 13B and 13E - Grab Bars: Stainless steel, nonslip grasping surface finish. 250 lbs. force minimum rated point load; 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar. Lengths and configurations as indicated on the Drawings.
 - 1. Product: B-5806 Series by Bobrick.
- L. Item 14A - Mop & Broom Holder: Surface mounted; stainless steel, 24" L, 3 spring loaded rubber cam holders.
 - 1. Product: B-223 by Bobrick.
- M. Item 14B - Hook Strip: Surface mounted; stainless steel, Type 304, 24" L.
 - 1. Product: B-232 by Bobrick.
- N. Item 18B - Folding Shower/Dressing Seat: Surface mounted; welded tubular seat frame, structural support members, hinges and mechanical fasteners of Type 304 stainless steel, supports concentrated force of 360 pounds applied at any point in any direction. Phenolic or polymeric composite one-piece seat or seat slats, white color.
 - 1. Product: B-5191 by Bobrick.
- O. Item 20A - Wall-Mounted Soap Dish (for showers): Heavy duty, seamless stainless steel, recessed, without grab bar, satin finish; with concealed mechanical fastening suitable for substrate.
 - 1. Product: B-4380 by Bobrick.
- P. Item 21A - Shower Curtain Rod, Curtain and Hooks: Stainless steel tube, 1-1/4 inch outside diameter, 0.05 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for concealed mounting. All joint continuous welded and ground smooth. Provide flanges and rod ceiling support hangers for wall mounting.
 - 1. Product: B-6047 by Bobrick.
 - 2. Shower Curtain and Hooks: White curtain, 42 x 72 inches, or length as required; hemmed edges; stainless steel grommets; pierced through top hem on 6 inch centers. Chrome-plated or stainless steel spring wire hooks designed for snap closure. B-204 by Bobrick.
- R. Item 22A - Diaper Changing Station: Surface mounted; ASTM F2255; Polypropylene cabinet and bed; 35" W x 22" H x 4" D when closed; folding horizontal style; supports concentrated force of 200 pounds applied at any point in any direction. Color to be selected by Architect from manufacturer's full range.
 - 1. Product: KB200-00 by Koala Kare - Bobrick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work. Check opening scheduled to receive recessed units for correct dimensions and preparation that would affect installation of accessories.
- B. Verify exact location of accessories for installation. Check for conditions that would affect placement, quality and execution of work.
- C. Verify that field measurements are as indicated on drawings. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.
- D. See Section 06 10 54 - Wood Blocking and Curbing, for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings. Do not begin installation of accessories until openings and surfaces are acceptable and adequate blocking has been provided

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings.
- D. Secure all items to concealed blocking or anchor plates installed in walls. All anchors shall be fully concealed.
 - 1. Stationary grab bar mounting devices and supports within walls shall support a concentrated force of 250 pounds applied at any point in any direction 4" from the face of the wall.
 - 2. Shower seat mounting devices and supports within walls shall support a concentrated force of 400 pounds applied at any point in any direction 12" from the face of the wall.
 - 3. Diaper changing cabinet mounting devices and supports within walls shall support a concentrated force of 200 pounds applied at any point in any direction 11" from the face of the wall.
- E. All accessories installed in wet shower areas shall have fastener penetrations sealed with silicone sealant.
- F. Install shower curtains and rods to allow bottom of curtain to hang between 1" and 3" above floor or shower base.
- G. Adjust accessories for proper operation. After completion of installation, clean and polish all exposed surfaces. Deliver keys and instruction sheet to Owner. All keys shall be clearly labeled.
- H. Paper towel and soap dispensers shall be installed at all sinks outside of restrooms, whether indicated or not on the Drawings.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

**SECTION 10 44 00
FIRE PROTECTION SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers, fire blankets, fire extinguisher and fire blanket cabinets, and accessories.
- B. See Code Analysis Key Plan and Floor Plan Drawings for fire extinguisher locations.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking and shims.
- B. Section 09 21 16 - Gypsum Board Assemblies: Roughed-in metal stud wall openings.

1.03 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- B. UL - Fire Protection Equipment Directory; current edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit fire blanket, fire extinguisher and cabinets, operational features, color, finish, and anchorage details.
- C. Shop Drawings: Indicate cabinet physical dimensions and rough-in measurements for recessed cabinets. Verify that cabinets are sized to accommodate the type and capacity of extinguishers specified.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: J.L. Industries.
- B. Acceptable Manufacturers:
 - 1. Larsen's Manufacturing Co
 - 2. Pyro-Chem
 - 3. Amerex Corp.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent. Provide extinguishers labeled by UL for the purpose specified and indicated.
- B. Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
 - 1. Class: 3A:40BC.
 - 2. Size: 5 pound.
 - 3. Finish: Baked polyester powder coat, color as selected.
- C. FE-36 Type Fire Extinguishers: Stainless steel tank, with pressure gage.
 - 1. Class: B:C
 - 2. Size: 5 pound
 - 3. Finish: Baked polyester powder coat, color as selected.

- D. Wet Chemical Type: Type K, stainless steel tank, with pressure gage.
 - 1. Class 2A:1B:1C:K.
 - 2. Size: 5 gallons
 - 3. Location: Kitchens.

2.03 FIRE EXTINGUISHER CABINETS

- A. Basis of Design: Ambassador Series 1017 by JL Industries.
- B. Metals: Formed primed steel sheet; 0.036 inch thick base metal; weld, fill and grind components smooth.
- C. Cabinet Configuration: Semi-recessed and recessed type.
 - 1. Sized to accommodate accessories.
 - 2. Trim: Returned to wall surface, with 4" projection.
- D. Door: Hollow core, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon catch.
- E. Door Glazing: Full, 1/4 inch thick acrylic.
- F. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- G. Finish for Cabinet Trim and Door (interior & exterior): Baked enamel, color as selected. Interior: White.
- H. Provide ADAC option for cabinets located in fire-rated wall construction.

2.04 FIRE BLANKETS AND CABINETS

- A. Fire Blanket: Fire retardant treated wool; red, 62 by 84 inches.
- B. Fire Blanket Cabinet: Surface mounted, horizontal drop cabinet.
 - 1. Basis of Design: Model 9613S21 by JL Industries.

2.05 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated. Provide wall brackets for all extinguishers not indicated to be in a cabinet. Brackets shall be as recommended by the fire extinguisher manufacturer for weight and size of the extinguisher to be hung. Finish shall match the extinguishers. Provide spring-type metal straps to secure the extinguisher on hook.
- B. Cabinet Signage: Plastic, 3-D tent type; 5 inches x 6 inches.
 - 1. Basis of Design: 24S by JL Industries Inc.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located. Verify fire extinguisher monitoring device wiring is in place for installation of the device adjacent to the extinguisher, within the cabinet for cabinet mounted extinguishers.

3.02 INSTALLATION

- A. Refer to the Drawings for locations of fire blankets with cabinets, fire extinguishers with (designated F.E.C.) and wall mounted fire extinguishers without cabinets (designated F.E.). Locations shown on the Drawings are approximate. Verify all locations and mounting heights with the Architect prior to roughing-in of cabinets or mounting brackets. In general, fire extinguishers shall be installed no higher than 4'-6" AFF to top of unit.
- B. Install in accordance with manufacturer's instructions.
- C. Install cabinets plumb and level in wall openings, no higher than 4'-6" to top of cabinet.
- D. Secure rigidly in place.

- E. Place extinguishers in cabinets and on wall brackets as indicated.
- F. Position cabinet signage at each extinguisher location. Verify placement in field with architect.
- G. All fire extinguishers shall be fully charged and inspected within one (1) month prior to date of Substantial Completion.

3.03 SCHEDULE

- A. In addition to locations indicated on the Drawings for fire extinguishers in cabinets and mounted on walls, fire extinguishers shall be provided in the following locations:
 - 1. One wall mounted fire extinguisher in all elevator machine rooms.
 - 2. One wall mounted fire extinguisher in all boiler rooms.
 - 3. One wall mounted Type K fire extinguisher near all commercial kitchen cooking lines.
 - 4. One cabinet mounted fire extinguisher FE-36, Type 5BC in all Computer labs and classrooms.
 - 5. One wall mounted fire extinguisher FE-36, Type 5BC in all tel/data rooms and closets.

END OF SECTION

SECTION 10 51 00
LOCKERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Standard type and welded type metal locker units with hinged doors.
- B. Phenolic lockers units with hinged doors.
- C. Locker benches.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete base construction for lockers.
- B. Section 06 20 00 - Finish Carpentry and Architectural Millwork: Locker surrounding construction.
- C. Section 06 10 54 - Wood Blocking and Curbing: Wood base construction for lockers.
- D. Section 09 21 16 - Gypsum Board Assemblies: Locker surrounding construction.

1.03 REFERENCE STANDARDS

- A. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013; 2015.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published product data on locker construction, sizes, finishes and accessories. Submit sample warranty.
- C. Shop Drawings: Indicate locker plan layout including locations of accessible lockers, locker elevations, installation details, sections and all relevant details including numbering plan. Indicate gages and finishes of all materials.
- D. Samples:
 - 1. Upon request, submit a full size locker sample to evaluate construction.
 - 2. Submit manufacturer's color chips for phenolic and metal lockers in all available colors for selection.
 - 3. Submit confirmation samples 3 x 6 inches in size, of each color selected on metal and phenolic panel.

1.05 QUALITY ASSURANCE

- A. All lockers shall be installed by the locker manufacturer's authorized representative. Lockers and accessories shall be obtained through one source from a single manufacturer for metal lockers and one manufacturer for phenolic lockers.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect locker finish and adjacent surfaces from damage.
- B. Lockers shall not be delivered to the Project until spaces to receive them are clean, dry and ready for the locker installation.

1.07 WARRANTY

- A. See Section 01 78 10 - Warranties.
- B. Provide the welded athletic locker manufacturer's standard lifetime product warranty against all defects in materials and workmanship, structural failure, and faulty operation of latches and

other door hardware for the full life of the building. Damage from deliberate destruction and vandalism is excluded.

- C. Provide the phenolic locker manufacturer's standard 10 year warranty against all defects in materials and workmanship, structural failure, and faulty operation of latches and other door hardware. Damage from deliberate destruction and vandalism is excluded.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Quiet Lockers (knocked-down):
 - 1. Republic Storage Systems Co.; Product: Quiet Lockers.
 - 2. Lyon Workspace Products; Product: Quiet-Plus Lockers.
 - 3. Penco Products, Inc.; Product: Guardian Medallion Lockers.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Welded Athletic Lockers:
 - 1. Lyon Workspace Products; Product: Expanded Metal All-Welded Lockers
 - 2. DeBourgh Manufacturing Co.; Product: Athletic Lockers.
 - 3. Penco Products, Inc; Product: Angle Iron-Welded Lockers.
 - 4. Republic Storage Systems Co; Product: Angle Iron Lockers.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Phenolic Lockers:
 - 1. ASI Storage Solutions; Product: Traditional Plus Phenolic Locker.
 - 2. Columbia Lockers; Product:
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOCKER APPLICATIONS

- A. Corridor / Pathway Lockers, other lockers indicated in the Drawings but not specifically noted:
 - 1. Type: Phenolic.
 - 2. Unit Configuration: Single tier, 2-tier and 4-tier as indicated on the Drawings
 - 3. Mounting: Recessed, see Drawings.
 - 4. Unit Size: 18" W x 18" D x 72" H.
 - 5. Unit Quantity: As indicated on the Drawings.
 - 6. Accessible Unit Quantity: 5% of total lockers as required by AADAG.
 - 7. Base: Field fabricated, wood base. Flooring to extend under base. See the Drawings.
 - 8. Locks: Hasps for padlocks by Owner.
- B. Athletic and Team Lockers:
 - 1. Type: Athletic welded metal.
 - 2. Unit Configuration: Single tier and 2-tier.
 - 3. Mounting: Surface.
 - 4. Unit Size: 12" W x 18" D x 72" H
 - 5. Unit Quantity: As indicated on the Drawings.
 - 6. Accessible Unit Quantity: 5% of total lockers as required by AADAG.
 - 7. Base: Field fabricated concrete bases.
 - 8. Locks: Hasps for padlocks by Owner.
- C. Coaches Lockers:
 - 1. Type: Quiet knocked-down metal.
 - 2. Unit Configuration: 2-tier.
 - 3. Mounting: Surface.
 - 4. Unit Size: 12" W x 18" D x 72" H.
 - 5. Unit Quantity: As indicated on the Drawings.
 - 6. Accessible Unit Quantity: 5% of total lockers as required by AADAG.
 - 7. Base: Field fabricated concrete bases.

8. Locks: Hasps for padlocks by Owner.
- D. Classroom / Lab Lockers:
 1. Type: Quiet knocked-down metal.
 2. Unit Configuration: 2-tier and 3-tier, as indicated on the Drawings.
 3. Mounting: Surface.
 4. Unit Sizes: 12" W x 18" D x 72" H and 24"W x 15" D x 72" H, as indicated on the Drawings.
 5. Unit Quantity: As indicated on the Drawings.
 6. Accessible Unit Quantity: 5% of total lockers as required by AADAG.
 7. Base: Field fabricated wood base. Flooring to extend under base. See the Drawings.
 8. Locks: Hasps for padlocks by Owner.

2.03 PHENOLIC LOCKERS – MATERIALS

- A. Phenolic Lockers: Factory assembled, made of phenolic core panels with mortise and tenon joints and stainless steel mechanical joint fasteners; fully finished inside and out; each locker capable of standing alone.
 1. Doors: ½ inch minimum thickness; full overlay, covering full width and height of locker body; square edges.
 2. Locker Body: Tops, bottom and shelves ½ inch minimum; sides and backs 3/8 inch minimum.
 3. End Panels, Filler Panels, Sloped Tops: ½ inch minimum. Where locker ends or sides are exposed, finish the same as fronts or provide extra panels to match fronts. Filler panels shall be securely attached to lockers.
 4. Panel Core Exposed at Edges: Machine polished, without chips or tool marks; square edge unless otherwise indicated.
 5. Phenolic Core Panels: Nonporous phenolic resin and paper core formed under high pressure, with natural colored finished edges, integral melamine surface, matte finish, and uniform surface appearance; glued laminated panels not acceptable.
 - a. Surface Burning Characteristics, ASTM E84: Flame Spread Index of 75 or less; Smoke Developed Index of 450 or less.
 6. Ventilation: By holes drilled in tops, bottoms, and intermediate shelves, and by open space between the back of door and locker body.
 7. Hinges: Stainless steel, satin finish; minimum of 90 degree opening; either full length piano hinge or exposed barrel 5-knuckle hinge attached to back of door and inside of body with tamperproof screws.
 8. Coat Hooks: Stainless steel attached with tamperproof screws.
 9. Number Plates: Manufacturer's standard, minimum 4 digit, permanently attached with adhesive.
 10. Locks: Hasps for padlocks by Owner.
 11. Door Colors: Multiple colors shall be selected by the Architect from the manufacturer's full range.
 12. Body Color: Manufacturer's standard white or light color.
 13. Fasteners for Accessories and Locking Mechanisms: Tamperproof type.

2.04 QUIET METAL LOCKERS - MATERIALS

- A. Standard Lockers Sheet Steel: ASTM A653 SS Grade 33/230, with G60/Z180 coating, stretcher leveled; metal edges finished smooth without burrs; baked enamel finished inside and out.
 1. Body and Shelf: 24 gage, 0.024 inch.
 2. Door Outer Face: 16 gage.
 3. Door Frame: 16 gage, 0.060 inch.
 4. Hinges: 14 gage, 0.075 inch.
 5. Latching: Recessed, zinc alloy die-cast case and handle, chrome plated handle operates latch bar and opens door. Moveable latch bar shall be shielded with 3 latching points on doors taller than 42 inches. Shorter doors shall have 2 latching points. Provide rubber silencers. Stainless steel recessed cup for operating handle and lock.

6. Locks: Hasps for padlocks by Owner.
7. Trim: 18 gage.
8. Fillers: Less than 3" wide: 18 gage; 3" to 8" wide: 16 gage; No filler shall be wider than 8". Fillers shall be firmly attached to lockers.
9. End Panels: 16 gage, concealed fasteners, shaped to locker end including sloped top and back-to-back lockers where ends or sides are exposed. All end panels shall be one piece.
10. Number Plates: Provide manufacturer's standard shaped aluminum plates. Form numbers a minimum of 3/8 inch high of block font style, in contrasting color. Attach plates with 2 rivets.
11. Locker Colors: Multiple colors as selected by Architect; allow for contrasting colors for locker bodies and doors.
12. Construction: Lockers shall be bolted together.

2.05 WELDED METAL LOCKERS - MATERIALS

- A. Welded Athletic Locker Sheet Steel: Sheet Steel: ASTM A1008, cold rolled commercial steel (CS) Type B, suitable for exposed applications.
 1. Tops, Bottoms, Tier Dividers and Shelves: 16 gage.
 2. Back: 18 gage.
 3. Sides and Intermediate Partitions: 13 gage bond sheared panels with 1" x 1" x 1/8" steel angles, all securely welded in place at intervals not to exceed 6".
 4. Doors:
 - a. Single and 2 Tier Doors: 13 gage, sheared expanded metal for 73% ventilation, with 1" x 1" x 1/8" perimeter angle. An additional 14 gage steel handle panel shall be welded to the center span of the door. All horizontal mesh edges shall be concealed with additional steel formations welded to the door.
 - b. 3 Tier Doors: 13 gage, one-piece, with 3/4" diamond punched perforations for 37% ventilation.
 - c. 4 to 9 Tier Doors: 14 gage, 3/4" flanged edges, diamond perforated for ventilation and pre-punched for padlock latch with stainless steel hasp for securing locker door in closed position.
 5. Hinges:
 - a. Single, 2 and 3 Tier Doors: Hinge on right side with 3" five knuckle 14-gage fast pin heavy-duty butt hinges. Hinges shall be welded to both doors and locker frame.
 - b. Single Tier Doors: Three hinges per door.
 - c. 2 and 3 Tier Doors: Two hinges per door.
 - d. 4 to 9 T Doors: Hinge on right side by one piece 3/16" minimum diameter hinge pin securely welded to door, and bearing in two solid brass bushed 16-gauge knife hinges secured to locker body by no less than four (4) rivets.
 6. Latching: Single-point latching, unbreakable stationary 11-gauge latch welded securely to locker frame, extending no more than 1-1/4" into the locker opening and penetrating a flush-mounted, recessed, stainless steel cup. Latch and cup assembly shall be capable of accepting either padlock or built-in lock.
 7. Locks: Padlocks.
 8. Fillers: Less than 3" wide: 16 gage; 3" to 8" wide: 13 gage; No filler shall be wider than 8".
 9. End Panels: 16 gage, concealed fasteners, shaped to locker end including sloped top and back-to-back lockers as applicable. All end panels shall be one piece and shall cover locker side panels.
 10. Number Plates: Provide oval shaped brass plates. Form numbers 5/8 inch high of block font style with ADA designation, in contrasting color.
 11. Locker Colors: Multiple colors as selected by Architect; allow for contrasting colors for locker bodies and doors.
 12. Construction: Lockers shall be welded at seams and joints and all exposed welds sanded smooth. NO BOLTS, SCREWS, OR RIVETS SHALL BE USED IN ASSEMBLY OF MAIN LOCKER UNITS.

2.06 METAL LOCKER MATERIALS - GENERAL

- A. Accessories For Each Single, Double and Triple Tier Locker: Two single prong wall hooks and one double prong hook.
 - 1. All single tier lockers shall have one hat shelf.
 - 2. Hooks for standard lockers shall be cadmium steel plated with ball ends and attached with 2 bolts.
 - 3. Hooks for welded athletic lockers shall be forged steel with ball ends and zinc plating.
- B. Fasteners: Zinc or nickel plated steel, slot-less type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.
- C. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
 - 2. Provide toothed-steel or expansion sleeves for drilled-in-place anchors.
- D. Metal Finishing: Clean, degrease, and neutralize metal; prime and finish with one coat of baked enamel complying with NAAMM Finishes Manual for Architectural and Metal Products. All surfaces except aluminum, stainless steel and chrome shall be painted.

2.07 ACCESSIBLE LOCKERS

- A. Accessible (ADA) Lockers:
 - 1. Single tier or the lower portion of double tier locker. Provide interior shelves at 10" and 47" above finish floor level, in addition to standard locker hooks.
 - 2. Three-point latching with recessed ADA compliant lever handle.
 - 3. Do NOT install international accessibility signage on face of locker.
 - 4. Identify all accessible lockers in the locker and lock combination sequence spreadsheet.
 - 5. Five (5) percent of the total count of each type of locker shall be accessible lockers. Locations, if not indicated on the Drawings, shall be located on the shop drawings by the Architect.

2.08 BENCHES

- A. Standard Benches: Stationary type, laminated maple hardwood tops, 1-1/4" finished thickness with rounded corners.
 - 1. Finish: Smooth with manufacturer's standard two or three coat clear finish on top and edge surfaces, with a minimum one coat finish on the bottom surface.
 - 2. Standard Bench Sizes: 9-1/2 inches wide by 17-1/2 inches overall high, lengths in full foot increments as indicated on the Drawings.
 - 3. ADA-compliant Bench Sizes: 22 to 24 inches wide by 17-1/2 inches overall high by 48" long. Benches located against walls shall not have backs.
 - 4. Pedestal Type: One-piece cast iron including 6" minimum diameter flanges on both ends with countersunk bolt holes. Painted finish to match lockers. Provide a minimum of two pedestals for benches up to 8 feet long. Provide 3 pedestals for benches up to 10 feet long. For ADA-compliant benches provide 4 pedestals.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.
- B. Verify bases and embedded anchors are properly sized.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on prepared base.

- D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.
- E. Bolt adjoining locker units together to provide rigid installation.
- F. Install end panels, filler panels, and sloped tops.
- G. Install accessories.
- H. Replace components that do not operate smoothly.

3.03 CLEANING AND ADJUSTMENT

- A. Clean locker interiors and exterior surfaces.
- B. Remove all extraneous hardware and fasteners.
- C. Adjust doors and latches to operate easily without binding. Verify that all locks are operating properly.
- D. Touch up marred finishes, or replace locker units that cannot be restored to the satisfaction of the Architect.
- E. Upon completion of the locker installation, provide an electronic Excel spreadsheet on CD rom and two hard copies of the locker numbering and lock combination sequences for the Owner's use.

END OF SECTION

SECTION 10 75 00
FLAGPOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum Flagpoles - see plans for locations and quantities.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete base and foundation construction.

1.03 REFERENCE STANDARDS

- A. AASHTO M 36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains; American Association of State Highway and Transportation Officials; 2003.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.
- C. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pole, accessories, and configurations.
- C. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design flagpole foundation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed the State in which the Project is located.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- B. Protect flagpole and accessories from damage or moisture.
- C. Flagpoles shall be constructed and shipped to site in one piece wherever possible. If more than one piece is necessary, provide precision joints with self-aligning internal sleeves for weather tight joints.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flagpoles:
 - 1. (Basis of Design) Monarch IRC 30C61 by American Flagpole.
 - 2. Concord Industries, Inc.
 - 3. Pole-Tech Co., Inc.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FLAGPOLES

- A. Flagpoles: Aluminum.
 - 1. Design: Cone tapered.
 - 2. Mounting: Ground mounted type.
 - 3. Outside Butt Diameter: 6 inches.
 - 4. Outside Tip Diameter: 3-1/2 inches.
 - 5. Nominal Wall Thickness: 0.156 inches.

6. Nominal Height: 30 ft; measured from nominal ground elevation.
 7. Halyard: Interior type.
- B. Performance Requirements:
1. Flagpole With Flag Flying: Resistant without permanent deformation to 105 miles/hr wind velocity; non-resonant, safety design factor of 2.5.
 2. Flagpole Without Flag: Resistant without permanent deformation to 170 miles/hr wind velocity; non-resonant, safety design factor of 2.5.
 3. Flag size: 6' x 10' maximum.

2.03 POLE MATERIALS

- A. Aluminum: ASTM B221 (ASTM B 221M), 6063 alloy, T6 temper.

2.04 ACCESSORIES

- A. Finial Ball: Copper, 6 inch diameter.
- B. Truck Assembly: Stainless steel; revolving, stainless steel ball bearings, non-fouling.
- C. Cleat Box: Stainless steel, with built-in hinge and hasp assembly, attached to pole with tamper proof screws inside box.
- D. Halyard: 5/16 inch diameter polypropylene, braided, white.

2.05 MOUNTING COMPONENTS

- A. Foundation Tube Sleeve: AASHTO M 36M, corrugated 16 gage steel, galvanized, depth of as required by engineering.

2.06 FINISHING

- A. Metal Surfaces in Contact With Concrete: Asphaltic paint.
- B. Aluminum: Factory finished, baked enamel, white color.
- C. Stainless Steel: No. 4 satin finish.

3 EXECUTION

3.01 EXAMINATION

- A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.

3.02 PREPARATION

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.03 INSTALLATION

- A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.
- B. Electrically ground flagpole installation.
- C. Fill foundation tube sleeve with concrete specified in Section 03 30 00.
- D. Install foundation plate and centering wedges for flagpoles base set in concrete base and fasten.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/2 inch.

3.05 ADJUSTING

- A. Adjust operating devices so that halyard and flag functions smoothly and travels for its full length..

END OF SECTION

SECTION 11 40 00
FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 Sections, apply to this Section.

1.02 SCOPE

- A. Attention is directed to the detailed Item Specifications, which provide for minimum acceptable products. Item Specifications paragraphs may indicate materials or components that exceed the manufacturer's standards and are required for this project.
- B. Cooperate and coordinate with others engaged on the project in order that work will progress on schedule.
- C. Work to be performed under this Section is shown on Foodservice Equipment Drawings.
- D. Install materials furnished under this Section, other than materials that are expressly noted for installation under other Sections. Installation work shall be performed by workmen compatible with those existent on the project site. Equipment shall be of the latest design; new and unused, unless indicated otherwise in the Item Specifications, complete with all standard parts for normal operations and including such accessories or materials as may be required to comply with these Specifications.
- E. This Specification is to further describe and supplement the applicable Drawings. What is called for by either the Drawings and/or these Specifications shall be furnished and installed as part of this work. Any questions relative to discrepancies or omissions shall be submitted to the Architect.
- F. Provide neatly punched openings or cutouts required to permit passage of plumbing and electrical services by related trades and to accommodate mounted switches and receptacles in the equipment.
- G. Work in this Section shall include but shall not be limited to the following:
 - 1. Catalog items of equipment.
 - 2. Fabricated equipment other than catalog items.
 - 3. Plumbing trim consisting of mechanical system components required for standard operation of equipment items such as faucets and waste outlets. Vacuum breakers shall be furnished for equipment where water is introduced less than 2 in. above flood level.
 - 4. Electrical equipment forming an integral part of equipment items such as electric motors, heating elements, controls, switches, starters, temperature regulators and internal wiring to a control panel or switch, if mounted on the equipment.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Finished floor and walls, structural supports for all ceiling supported equipment, acoustical ceilings and related building.
- B. Connecting piping, waste lines, traps and vent piping, complete with shut-off valves to all the equipment, and the rough-in for sanitary waste, domestic water, floor drains and plumbing fixtures except those provided under this Section, and related mechanical work.
- C. Exhaust ventilating systems complete with blowers, ductwork, hangers, access panels, and insulation between the exhaust collars and the exhaust blowers.
- D. External wiring; the mounting and wiring of motor starters, solenoid valves, switches and receptacles not integral with the equipment; mounting and wiring of walk-in refrigerated room ceiling mount light fixtures; wiring of walk-in refrigerated room interior evaporator coils; connecting conduit, and external connections to equipment to the building electrical distribution system.

1.04 SUBMITTALS

- A. Submit Shop Drawings for approval in accordance with the General Conditions.
- B. Stub-in drawings shall indicate the layout of equipment and dimensioned locations of all services to the equipment.
 - 1. Hand drawn scale: 1/2 in. = 1 ft., 0 in.
 - 2. CAD drawn scale: 1/4 in. = 1 ft., 0 in.
 - 3. Stubbed services shall include electrical, hot and cold water, floor drains or floor sinks, solid wastes and exhaust collar connections. Point of connection services shall include steam supply, condensate return, gas connection and indirect waste connections. Service dimensions shall include height measured from finish floor.
 - 4. Electrical and plumbing services shall be indicated and coordinated on the same drawing.
 - 5. Call-outs for each stub point indicated at the point, or clearly keyed to a schedule on the same drawing.
 - 6. Special conditions plan shall include all floor recesses, curbs and special wall construction indicated and dimensioned
- C. Fabrication drawings shall be furnished for non-catalog items, showing plans, elevations and full construction details with gauges, components, fasteners, erection and connections. Drawings shall be to the minimum scale of 3/4 in. = 1 ft., 0 in.
- D. Standard items of equipment, not built-in or part of other assemblies shall be submitted for approval in the form of bound catalog cuts. Each cut shall include a clearly marked item number, a listing of all optional accessories and finishes, and connection data.
- F. Mechanical refrigeration system submittal shall include the firm name and address of the installation contractor and name of the qualified installer.

- G. Energy Star - Specified Energy Star rated equipment and appliances shall serve as the standard for all types of equipment and appliances whenever possible. Kitchen Equipment Contractor shall clearly indicate that items are Energy Star rated both on the submittal cover sheet and manufacturer cut sheets.
- H. Failure to comply with approved shop drawings shall be cause for rejection of an improperly built assembly.

1.05 SAMPLES

- A. If the bidder's proposed equipment fabricator is unknown to the Consultant's office, immediately after award of contract, submit the following samples for selection and approval:
 - 1. Section of table showing edge, bullnose, framing, fasteners, gusset, leg, and foot, all assembled.
 - 2. Drawer assembly (will be returned for use on this project).
- B. Work delivered to the job shall match approved samples.

1.06 GUARANTEES AND WARRANTIES

- A. New equipment furnished for this facility shall be guaranteed for a period of not less than one calendar year beginning on the date of final acceptance of the work of this Section. In the case of a manufacturer whose standard warranty exceeds this period the longer period shall apply. Self-contained refrigeration units for reach-in refrigerators, freezers, ice cream chests and ice machines shall carry a five-year replacement warranty for the sealed unit. The guarantee shall protect against defective material, design and workmanship.
- B. In addition to the guarantee called for under the General Conditions, this Contractor shall further agree that in the event of failure of any system or item of equipment or improper functioning of specified work during the guarantee period, he shall have "on call" competent service personnel available to make the necessary repairs or replacements of specified work promptly at no cost to the Owner. In the event that replacement of an entire item is required, the Owner shall have the option of full use of the defective equipment until a replacement has been delivered and completely installed.
- C. Furnish manufacturer's warranties for each item of standard equipment and a warranty on fabricated equipment. Submit guarantees and warranties to the Architect in accordance with conditions found in "Demonstration and Operating Instructions" paragraphs, contained in Part 3, this Section.

1.07 REGULATORY AGENCIES

- A. Work shall be in accordance with the governing health, building and safety, and fire protection codes and regulations.
- B. Standards of the National Sanitation Foundation (NSF) shall serve as guidelines for the work of this Section.
- C. Electric equipment and accessories shall conform to the standards of the National Electric Manufacturers Association (NEMA), Underwriters Laboratories, Inc. (UL) or Electrical Testing Station (ETS).

- D. Steam generating equipment and accessories shall conform to the standards of the American Society of Mechanical Engineers (ASME).
- E. Gas fired equipment and accessories shall conform to the standards of the American Gas Association (AGA) and the American National Standards Institute (ANSI) Z83.11.
- F. Energy Star - Specified Energy Star rated equipment and appliances shall serve as the standard for all types of equipment and appliances whenever possible.

1.08 EQUALITY OF MATERIALS AND EQUIPMENT

- A. The base bid shall contain no substitutions to these drawings or specifications. Bidders may offer substitute equipment in a separate proposal, indicating the proposed model and sum to be added or deducted if the alternate item is accepted by the Owner. Each line item shall include delivery, installation and taxes. Decisions to accept or reject a piece of equipment shall be made by the Owner, and all decisions shall be final.

PART 2 - PRODUCTS

2.01 MATERIALS AND FINISHES

A. General

- 1. Metals shall be free from defects impairing strength, durability or appearance, made of new materials with structural properties to withstand strains and stresses to which normally subject.
- 2. Stock materials, patterns, products and methods of fabrication shall be approved provided that they conform to the requirements specified under Item Specifications.

B. Stainless Steel

- 1. Stainless steel shall be non-magnetic corrosion resistant chromium-nickel steel, Type 302 or 304 (18-8 Alloy), polished to a Number 4 finish where exposed, unless otherwise noted. Minimum gauges shall be as specified under Item Specifications.

C. Galvanized (Galvannealed) Steel

- 1. Galvannealed steel shall be commercial quality with tight coat of zinc galvanizing metal applied to a soft steel sheet, subsequently passed through a 1200 degree F. oven, resulting in a spangle free paintable surface. Minimum gauges shall be as specified under Item Specifications.

D. Plastic Laminate Materials

- 1. The laminate facing shall be GP-50, .050 in. thick, general purpose, high pressure, decorative plastic laminate that meets or exceeds the requirements of NEMA Publication LD3-1985, and NSF Standard 35. The plastic laminate exposed surfaces shall be provided in accordance with the specified manufacturer, finish and color. Balancing sheet shall be backing grade GP-28 in matching color at semi-exposed and BK-20 unfinished where hidden.
- 2. Plastic laminate covered surfaces shall be factory fabricated with 3/4 in. thick core having plastic laminate facing on both faces and all edges, laminated with waterproof

- glue under pressure in accordance with the plastic laminate manufacturer's specifications.
3. The core shall be medium density phenolic resin particleboard conforming to ANSI A208.1, Type 2-M-2, 45 pound per cubic foot density minimum.
 4. Provide veneer core plywood or solid hardwood edge banding for doors and vertical dividers or panels where hardware is attached to casework.
 5. Hinges shall be articulated, spring loaded type equal to Grass CST65-170-F or Stanley, with quantity adequate to support the door without deformation. Do not provide handles on plastic laminate clad doors.

2.02 CONSTRUCTION

A. General

1. Flat metal work items of equipment, such as tables, sinks, or counter tops, and other non-catalog items described under Item Specifications, shall be manufactured by a food service equipment fabricator who has the plant, personnel and engineering facilities to properly design, detail and manufacture high quality food service equipment.
2. The equipment fabricator shall be subject to the approval of the Architect, Owner and Consultant. Refer to Paragraph 1.05, Samples.
3. Fabricated foodservice equipment shall be manufactured by one manufacturer, of uniform design, material and finish.
4. Equipment shall conform to the applicable requirements of current Federal, State, and Local Codes and Regulations.

B. Welding

1. The words "weld", "welded" or "welding" as used in this Section of the Specification shall mean that metal joints shall be continuously welded and the exposed parts ground smooth and polished to match adjoining surfaces. Welding electrodes shall match the material being welded.
2. Where spot welding is specified, the welds shall be a maximum spacing of 3 in. on center.
3. Where tack welding is specified, the pieces welded shall have 1/2 in. minimum lengths of welding material at 4 in. on center maximum spacing.

C. Grinding, Polishing and Finishing

1. Exposed welding joints shall be ground flush with the adjoining material and neatly finished to harmonize therewith. Wherever material has been depressed or sunken by a welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surfaces and, if necessary, again welded and ground to eliminate low spots. Ground surfaces shall be polished or buffed to a degree consistent with good workmanship. Coves shall be ground and polished to match adjoining material.

2. Care shall be exercised in grinding operations to avoid excessive heating of metal and discoloration. Abrasives, wheels, and belts used in grinding stainless steel shall be iron free and shall have not been used on carbon steel. The texture of the final polishing operation shall be uniform and smooth. Grain direction shall be uniform, uni-directional for a total length of material. Cross grains and random polishing are not acceptable.
3. The general finish of equipment shall be consistent throughout the job. Brake ends shall be free of open texture or orange peel appearance, and where brake work mars the uniform finish of the material, the marks shall be removed by grinding and polishing, and finishing. Sheared edges shall be free of burrs, projections or fins to eliminate all danger of laceration. Mitered or bullnosed corners shall be neatly finished with the underedge of the material neatly ground to a uniform condition and in no case will overlapping material be acceptable. The equipment surfaces, where exposed, shall be finished to a grained Number 4 (satin) finish unless otherwise specified. An exposed surface shall include an inside surface, which is exposed to view when a swinging or sliding door is opened. Underside of shelves need not be satin finish unless otherwise specified.
4. Excessive distortion caused by welding shall be cause for rejection for that item of equipment.

2.03 BUY-OUT COMPONENTS

- A. CASTERS: 5 in. diameter polyurethane tired, swivel, plate or stem mount to suit application, 300 pound capacity, brakes only if specified, NSF approved; Component Hardware C-21-3050 (plate/no brake), C21-3051 (plate/brake) C23-3350 (stem/no brake) or C23-3351 (stem/brake), or equal.
- B. COUNTER LEGS: Stainless steel, 6 in. to 7-3/4 in. height adjustment; Component Hardware A72-0811, or A77-5048, or equal.
- C. DOOR AND DRAWER PULLS: Stainless steel, full grip type with beveled edge, NSF approved for stud mounting in device, in horizontal attitude to meet NSF requirements; Component Hardware P63-1012, or equal.
- D. DOOR HINGES: Stainless steel, lift off type, swedged knuckle for minimum clearance, nylon bearings; Component Hardware M75-1002.
- E. DRAWER PANS: Molded plastic or fiberglass, 20 in. by 20 in. by 5 in. deep, NSF approved; Component Hardware S80-2020, or equal.
- F. DRAWER SLIDES: Stainless steel, NSF approved, full extension, 200 pound capacity with stainless steel ball bearing wheels; Component Hardware S-52 series, or equal.
- G. FAUCET SETS, DECK MOUNTED: Chrome plated cast bronze with 1/2 in. IPS eccentric flanged female inlets on 8 in. centers, removable cartridges, lever handles, and aerator tip on swivel nozzle or swivel gooseneck to suit the application; T&S Brass B-0221 or B-0321, or equal by Component Hardware, Chicago, or Fisher.
- H. FAUCET SETS, POTWASHING SINK: Chrome plated cast bronze with removable cartridges, 3/4 in. passages, eccentric flanged female inlets on 8 in. centers with LL street EL inlets with locknuts, four prong handles, 12 in. swing spout; T&S Brass B-290.

- I. FAUCET SETS, SPLASH MOUNTED: Chrome plated cast bronze with 1/2 in. IPS eccentric flanged female inlets on 8 in. centers, removable cartridges, lever handles, and aerator tip on 12 in. swing spout; T&S Brass, B-0231 or equal by Component Hardware, Chicago, or Fisher. Provide each with a mounting kit.
- J. GUSSETS: Stainless steel, stepped side, fully closed, NSF approved, mild steel interior reinforcement, wide flange for welding to framing, set screw anchor for leg; Component Hardware A20-0206C, or equal.
- K. LEG AND BULLET FOOT ASSEMBLIES: Stainless steel tubing, 16 gauge, number 4 finish, adjustable bullet foot with minimum of 3 in. vertical travel, 2,000 pound capacity, top designed for mounting in gusset, length to suit application; Component Hardware A46-6272-C, or equal.
- L. LEG AND FLANGED FOOT ASSEMBLIES: Stainless steel tubing, 16 gauge, number 4 finish, adjustable bullet foot with 3-1/2 in. diameter flange and two holes for securing to floor, minimum of 3 in. vertical travel, 2,000 pound capacity, top designed for mounting in gusset, length to suit application; Component Hardware A46-4272-C, or equal.
- M. NUTS: Zinc plated "Pal Nuts" with integral cap and lockwasher; Component Hardware Q-34-1024 or equal.
- N. SEALANT: Silicone type sealant for sealing equipment to walls or filling crevices between components, TRANSLUCENT, NSF approved; Component Hardware M90-1010, or Dow Corning 732-RTV.
- O. SOUND DEADENING BASINS: Component Hardware Q75-1366
- P. SOUND DEADENING TOPS AND SHELVES: Component Hardware Q85-5225 "Tacky Tape" installed between all channel or angle reinforced tops, drainboards or undershelves.
- Q. WASTE OUTLETS, CRUMB CUP: Stainless steel body, removable crumb cup stopper, gasket, coupling nut and sealing washer, 1-1/2 in. IPS, and optional 4 in. long nickel plated brass tailpiece with gasket; Component Hardware E38-1010, or equal.
- R. WASTE OUTLETS, LEVER OPERATED: Cast stainless steel rotary type with 1-1/2 in. NPS and 2 in. NPS threads, and removable beehive crumb-cup; Component Hardware DSS-8000.
- S. WELD STUDS: Copper flashed steel with 10-24 threads, length to suit; Component Hardware Q-36, or equal.
- T. GFCI RECEPTACLES: Pass & Seymour 2095-W, 115 volt, 20 amp GFCI Duplex Receptacle or equal.

2.04 FABRICATED COMPONENTS

- A. Box Type Cabinet Construction
 - 1. Sheet metal cabinet bases of box type construction shall be fabricated without general interior framing. Structural strength shall be achieved by the gauge of the metal and the formed angle and channel edges and corners. Vertical sections shall be closed. Cabinet base shall be fabricated of 18 gauge minimum of material specified at Item Specifications. Mount on counter legs or base as specified.

2. Intermediate shelf shall be fabricated of 16 gauge stainless steel with rear and sides turned up 1-1/2 in. tight to the cabinet sides. The front edge of shelf shall be turned down 1-1/2 in. and in 1/2 in. at 45 degrees and shelf spot welded in place. Reinforce underside with longitudinal 14 gauge channel on the centerline.
3. Bottom shelf shall be fabricated of 16 gauge stainless steel similar to the intermediate shelf except that the front edge shall be formed into a full width 1-1/2 in. by 4 in. welded in boxed channel. Rear edge shall be fitted with a full width channel. Underside shall be reinforced.

B. Counters and Drainboards

1. Counters, table tops and drainboards shall be 14 gauge stainless steel, of NSF construction, with edges per Item Specifications. Metal tops shall be made of the largest pieces available and shall appear as one piece with all field and shop joints reinforced and welded, ground and polished. Short pieces of metal will not be acceptable. Counter bends shall be not less than 1/8 in. radius. Wherever a fixture has a waste or drain outlet, the surface shall pitch toward the outlet.
2. Counters, table tops and drainboards shall be reinforced with channel or angle frame as specified in the Item Specifications. Framing shall be secured to the underside with sound deadening material sandwiched between the surfaces, weld studs, and nuts.
3. Wherever bolts or screws are welded to the underside of trim or tops, neatly finish the reverse side of the weld uniform with the adjoining surface of the trim or top. Depressions at these points will not be acceptable. Raise dimples and depressions by peening, or heating and shrinking, and grind and polish to present a flat surface.

C. Crossrails

1. Crossrails shall be not less than 1-1/4 in. outside diameter 16 gauge stainless steel tubing welded, ground and polished to a Number 4 finish. Crossrails shall be welded to legs at a height of 10 in. above finished floor, and shall extend from left to right between front legs, unless otherwise specified, and from front to back between all legs.

D. Drawer Assembly

1. Drawer assemblies shall consist of a removable drawer pan set in a removable 16 gauge stainless steel channel shaped drawer support frame with gusset plate reinforced corners.
2. Support frame shall have double pan front cover consisting of boxed 18 gauge stainless steel outer shell with welded corners, flush mounted recessed stainless steel pull, 20 gauge stainless steel back shell tack welded to outer shell with fiberglass sound deadening between. Drawer shall be provided with rubber bumpers to quiet closing. Support drawer frame on full extension drawer slides.
3. Drawer shall be suspended from table in a three-sided, 16 gauge stainless steel enclosure with flanged-in bottom edges, banded lower front, flanged-out front side and top edges. All sharp corners shall be broken and any exposed exterior threads of slide mounting bolts shall be provided with solid metal acorn nuts.

4. Component Hardware S91-0020 with thermoplastic pan is considered as equivalent to the above specified construction.

E. Edges

1. Marine: Bumped up 1/2 in. at 45 degrees and turned down 1-1/2 in. and in 1/2 in. at 45 degrees; corners welded and square.
2. Raised roll: Coved up and rolled 180 degrees on a 1-1/2 in. diameter with 3 in. height; corners welded and rounded or coved.
3. Rolled: Rolled 180 degrees on a 1-1/2 in. diameter; corners welded and bullnosed.
4. Short (6 in.) splash on counters and tables: Coved up 6 in., turned back to wall or equipment 1 in. and down 1/2 in.; ends welded closed. Secure tight to face of wall with clips unless specified otherwise and seal joint.
5. Tall (10 in.) splash on preparation sinks, dishtables, counter, and tables: Coved up 8-1/2 in., turned back to wall or equipment 1-1/2 in. at 45 degrees and down 1/2 in.; ends welded closed. Secure 3 in. off face of wall with brackets unless specified otherwise.
6. Turn down: Turn down 2 in. and in 1/2 in. at 45 degrees; corners welded and square.

F. Framing of Tops, Drainboards, Undershelves

1. Channel: Reinforce with 1 in. by 4 in. by 1 in. 14 gauge galvannnealed steel channels; stainless steel if exposed to view. Channels shall run front-to-back at all legs and longitudinally on the centerline. Cross and longitudinal members shall be welded into a single assembly at intersections and sharp corners shall be broken. Framing shall be secured to underside of tops with pairs of weld studs. Framing shall be installed maintaining NSF required clearance to adjacent vertical surfaces and edges of top. The following specified angle framing is considered superior to channel framing and may be used in its place.
2. Angle: 1-1/2 in. by 1-1/2 in. by 1/8 in. perimeter angle frame with crossmembers not over 30 in. on center. Framing shall be secured to top with weld studs, 18 in. on center maximum with three minimum studs on any single face of a table. Perimeter angle frame that is exposed to normal view, shall be stainless steel. Crossmembers and framing not unexposed to normal view shall be iron. Corners of angle frame shall be mitered, or notched and brake formed to form a closed corner. Corner gusset plates used for mounting of leg gussets shall be 1/8 in. thick and sealed to underside of the top. Iron framework joints shall be ground smooth, and shall be painted with a minimum of two coats of aluminum lacquer after degreasing. Framing shall be installed maintaining NSF required clearance to adjacent vertical surfaces and edges of top. Channel framing shall not be considered equal to specified angle framing.
3. Sound deaden all horizontal framed surfaces with material sandwiched between the framing and the bottom of the surface.

G. Hinged Doors

1. Hinged doors shall be double pan type stainless steel construction with 18 gauge exterior and 20 gauge interior, welded corners, and 1/2 in. fiberglass insulation for sound deadening. Each door shall be provided with a stainless steel recessed handle,

and an adjustable tension door catch equal to Component Hardware M22-2430. Doors shall close against the bottom shelf and flush with body of equipment.

2. Louvered hinged doors for ventilation shall be fabricated of the same components and provided with a full perimeter 3 in. wide channel reinforcing frame on the interior face. Remaining face shall be die punched with drip-proof louvers fully utilizing the remaining flat metal or a stainless steel flattened expanded metal grille per Item Specifications.

H. Sinks and Sink Inserts

1. Unless otherwise specified, sinks including sink inserts built into tops of fixtures, shall be made of 14 gauge stainless steel with all vertical and horizontal corners rounded to a radius of approximately 3/4 in. with the intersections meeting in a spherical section. Sinks shall be integrally welded to fixture tops.
2. Sinks with two or more compartments shall have full height, 1 in. thick double wall partitions consisting of two pieces of stainless steel back-to-back so fabricated that each compartment will be a deep bowl with coved corners. Partitions shall be welded in place to the bottom, front and back of the sink with smooth rounded coved corners. Top edges of the partitions shall be continuously welded. The front of the sinks shall consist of a stainless steel smooth, flush apron, same gauge as the sinks. Bottom and rear of partitions shall be closed. Sink dimensions contained in Item Specifications are inside dimensions.
3. Sinks shall be provided with integral 14 gauge stainless steel drainboards when specified. Drainboards and sink basins shall be pitched toward waste outlets and shall be self draining. The underside of all sink basins shall sound deadened. Sink units shall be provided with an integral splash at walls. Provide the necessary holes for the mounting of faucet sets.

I. Sliding Doors

1. Sliding doors shall be double pan type stainless steel construction with 18 gauge exterior and 20 gauge interior, welded corners, and 1/2 in. fiberglass insulation for sound deadening. Each door shall be provided with a stainless steel recessed handle. Provide sliding doors with nylon roller bearing sheaves and overhead track components equal to Component Hardware B58-5523 and 5513 sheaves, B57 track, B62-1093 nylon door guides and B60-1086 door stops.

J. Undershelves

1. Undershelf in an open type table shall be 16 gauge stainless steel unless otherwise noted. Edges shall be turned down 1-1/2 in. and in 1/2 in. at 45 degrees with corners notched out to fit legs to which shelf shall be welded from underside. Line up all edges of shelf with centerline of legs. Reinforce underside with longitudinal 14 gauge channel on the centerline.

K. Wall Brackets

1. Dish tables, sinks and counters with sinks shall be securely anchored 3 in. off the face of the wall unless specified otherwise. Brackets shall be "Z" shaped and fabricated of 3 in. wide, 14 gauge stainless steel. Brackets shall be secured in a vertical attitude to the rear of equipment backsplash with weld studs, and to the wall with appropriate fasteners.

2. Counters that are specified tight-to-wall shall be secured in a hidden manner with steel clips, and the wall/fixture joint shall be sealed.

L. Wall Shelves

1. Wall shelves shall be fabricated of 16 gauge stainless steel, size per Item Specifications, with back and ends raised 1-1/2 in., front edges of ends angled back, all corners broken, and front turned down 1-1/2 in., and in 1/2 in. at 45 degrees. Shelf corners shall be welded, ground and polished. Mount shelf 1 in. off face of wall with suitable fasteners on 14 gauge stainless steel flag brackets, 48 in. on center maximum. Flag brackets shall have a web angle of 30 degrees, measured from horizontal.

2.05 ELECTRICAL EQUIPMENT AND WIRING

- A. Under this Section, items of equipment having mounted electrical motors, electrical heating units, lighting fixtures, controllers, control stations, switches, receptacles and the like shall be internally wired as specified herein, terminating at a junction box mounted on the equipment and left ready for connection to the building electrical distribution system by the Electrical Contractor. Extra ceiling mount light fixtures for refrigerated rooms shall be delivered to Electrical Contractor for field installation and wiring. Connections to evaporator coils mounted inside refrigerated rooms shall be wired by the Electrical Contractor.
- B. Provide openings or cutouts required to accommodate the switches and receptacles in the specified work, and the wiring in conduit from terminal blocks in junction boxes.
- C. Electrically operated equipment and fabricator wiring shall conform to the requirements of Underwriter's Laboratories, Inc. Motors over one horsepower shall be equipped with overload protection.
- D. Furnish wiring diagrams for equipment as requested by the Architect or Contractor.

2.06 ITEM SPECIFICATIONS

Item 1

MOP SINK

No work in this Section. Units provided by Plumbing Contractor.

Item 2

MOP RACK WITH UTILITY SHELF

Make - Advance Tabco K-245 or equal

Size - 24" x 8" x 7-1/2" high

Description - Unit shall be all standard construction of welded 18 gauge stainless steel type 430 polished satin finish, back and sides turned up 1-1/2", mounted on two die formed wall brackets and furnished with two mop hangers and three rag hooks.

Item 3

Spare number

Item 4

DETERGENT STORAGE CABINET

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 36" x 18" x 72" high

Construction - 16 gauge stainless steel top with edges turned down, 18 gauge stainless steel cabinet body, fixed bottom shelf, three adjustable intermediate shelves, and 63" high double pan hinged doors at front. Mount on 6" high stainless steel adjustable legs.

Accessories - Provide unit with two (2) three point "T" handles, one locking and barrel bolts mounted to inside top and bottom of door. Provide slotted "L" bracket a top rear for securing to wall.

Item 5

STACKED CLOTHES WASHER AND DRYER

Make - UniMac UTEE5ASP173TW01 or equal

Size - 27" x 27-3/4" x 78-3/16" high

Power - 30 amps circuit - 120/208/60/1 - cord and plug; 20 amps circuit - 120/60/1 - cord & plug

Exhaust - 4" diameter dryer vent

Water factor - Less than 3.7 gallons/ft3/cycle

Certification - Unit shall be Energy Star compliant and CEE qualified.

Description - Washer shall be all standard construction with white exterior, see-thru door with heavy duty stainless steel hinge, 3.42 cubic foot front loading basket, detergent dispensers, front panel control, three wash/rinse temperatures, and five selectable wash cycles. Dryer shall be all standard construction with white exterior, see-thru door with heavy duty stainless steel hinge, lint filter, and interior light.

Item 6

Spare number

Item 7

DRY STORAGE SHELVING

Quantity - 24

Make - Metro Super Adjustable Super Erecta or equal by Eagle or Nexel

Size - (14) 48" x 21", (7) 42" x 21", (3) 36" x 21" all 74-5/8" high; five tier with bottom shelf up 14" clear above floor

Description - Unit shall be all standard construction with Super Adjustable Chrome plated wire shelves and tubular steel uprights with capped tops, adjustable feet, and 1" shelf height adjustment capability with Corner Release System. Each unit shall include four legs.

Item 8

UTILITY CARTS

Quantity - 4

Make - Lakeside 544

Size - 38-5/8" x 22-3/8" x 37-1/8" high

Description - Cart shall be all standard NSF construction, stainless steel throughout, with top, bottom, and intermediate shelves supported by an angle frame, and mounted on two 8" fixed and two 5" swivel casters. Capacity of cart to be 650 pounds.

Item 9

DUNNAGE RACKS

Quantity - 3

Make - New Age 2009

Size - 48" x 24" x 12" high

Description - Dunnage platforms shall be all standard construction with 1-1/2" x 1-3/4" x .070" thick wall extruded Type 6063-T5 aluminum tubing with four horizontal tubes and four legs welded together, and each unit capable of supporting 2,500 pounds.

Item 9A

MOBILE DUNNAGE RACKS

Quantity - 2

Make - New Age 1212-SW*C166

Size - 48" x 24"

Description - Dunnage platforms shall be all standard construction with 1-1/2" x 1-3/4" x .070" thick wall extruded Type 6063-T5 aluminum tubing with four horizontal tubes and plate mounted casters with unit capable of supporting 1200 pounds.

Accessories - Provide with 1208 handles. All casters to swivel.

Item 10

STAFF LOCKERS

No work in this Section. Units provided by General Contractor.

Quantity - 8

Item 11

WALL PHONE

No work in this Section. Units provided by General Contractor.

Item 12

WALK-IN COOLER

Make - American Panel, Bally, or Thermo-Kool

Size - 12'-0" x 13'-2" x 7'-10" high minimum inside dimensions; 7'-8" high after finished floor is installed by the General Contractor

Power - 1.3 KW - 120/60/1 to light fixtures and door defrost heater strip

Installation - The walk-in refrigerated room shall be installed in a 7" deep ID recess (below finished floor).

Recess depth allows 1" for use of leveling sand; 4" for the insulated floor panels; 2" for finished floor and setting bed that shall be carried in from the adjacent room and level to same. The finished floor and setting bed shall be furnished and installed by the General Contractor, and shall have coved joints at all walls, turned up a minimum of 4" inside and out. The unit shall be set level on a bed of clean, dry mason's sand. Shims are not acceptable for leveling material.

Construction - All standard construction per the manufacturer, modified to meet the specific following points:

- Walls to be 4" thick with CFC free urethane foam insulation, UL Class 1 rated and Factory Mutual listed meeting FM Approvals Standard 4880.
- Cam type locking devices
- 34" x 76" minimum door clearance
- Polished hardware (hinges and latch to match)
- Three hinges on doors (to include one Kason 1248 spring assist hinge per door)
- Leveraged pull handle (mechanical advantage type, Kason 1236 or equal)
- Quarter turn inside safety release lever handle mechanism (not screw type)
- Prewired door sections with heater wires and light fixtures and switches
- Kason 1806 LED light fixtures or Kason 1808 LED light fixtures
- Dial type thermometers at doors
- Model 200 (with dry contacts) or Modularm 75LC 200 (with dry contacts) temperature and HACCP monitoring system at doors
- NSF construction throughout with exception of buried floor panels
- Interior and exterior faces of doors and exposed exterior walls shall be provided with aluminum diamond tread plate protective material to a height of 48" above finished floor. Hold diamond plating up 6" from the finish floor to accommodate the coved base.

Minimum materials - Interior and exterior wall surfaces shall be clad with .038" pebble finished aluminum.

The ceiling shall be finished in white polyester over 24 gauge galvanized steel. Interior floor shall be 14 gauge galvanized steel.

Accessories - Freezer shall be provided with an electrically heated pressure relief port. Each door shall be provided with a heated vision panel, 14-1/2" x 23", constructed of three panels of tempered unbreakable glass, electrically heated, with sealed air spaces between. Provide matching trim strips

and closure panels to adjoining surfaces, fabricated per details, made of largest pieces available to minimize number of joints, and installed in accordance with NSF Brochure 770202, Installation Manual for Walk-in Refrigerators and Freezers. Provide fifteen total extra Kason 1806 LED OR Kason 1808 LED light fixtures for mounting in the rooms and deliver to Electrical Contractor for field installation.

Guarantee - The walk-in refrigerated room panels shall be guaranteed for a period of ten (10) years from the date of approved installation for defects in materials and workmanship when subjected to normal use and service; remainder of rooms for one year.

Item 13

WALK-IN FREEZER

Make - American Panel, Bally, or Thermo-Kool

Size - 12'-11-1/2" x 13'-2" x 7'-10" high minimum inside dimensions; 7'-8" high after finished floor is installed by the General Contractor

Power - 1.5 KW - 120/60/1 to light fixtures and door defrost heater strip

Installation, Construction, Materials and Accessories - See Item 12

Guarantee - See Item 12

Item 14

REMOTE REFRIGERATION SYSTEMS

Quantity - 2

Make - Bally, Keeprite, or Trenton or equal by Heatcraft

Scope - Furnish and install complete refrigeration systems for the walk-in refrigerated rooms in accordance with the plans. The systems shall include condensing units, evaporator coils, piping, all specified accessories, and those components required to provide complete and satisfactory systems in accordance with accepted refrigeration practice.

Important: The installation work shall be performed by a fully qualified refrigeration contractor employing a certified mechanic fully trained in the installation of commercial refrigeration systems. Submittal shall list the installing company and the qualified system installer.

Piping - Furnish and install the interconnecting piping between the condensing units and their respective unit coolers. Piping shall be installed in a neat and workmanlike manner with adjustable hangers spaced at no more than ten foot intervals on horizontal runs; six foot intervals, vertical runs.

Line sizes shall be in accordance with ASHRAE standards and best refrigeration practice to assure proper feed to evaporator, avoid excessive pressure drop, and prevent excessive amounts of lubricating oil from being trapped in any part of the system. Line sizing shall be such that it will protect the compressor from loss of lubrication at all times, prevent liquid refrigerant from entering the compressor during operating or idle time, and maintain a clean and dry system.

Refrigeration piping shall be Type L, ACR grade, hard drawn seamless copper tubing, wrought type copper fittings, and silver soldered joints. Precharged lines are not acceptable.

Furnish and install sleeves for refrigerant and evaporator drain piping wherever piping passes through a wall or ceiling. Sleeves shall be non-conductive gray plastic tubing, with interior dimension sized at least 1/4" larger than piping, and shall be neatly packed with brine putty after installation.

Furnish and install condensate drain piping from the unit cooler to an open drain. Piping shall consist of not less than 7/8" Type L copper tubing, supported 36" on center maximum, in such a way that there will be 1" clearance between the wall and the tubing. Provide a union or slip fitting at the connection to the evaporator drain pan to allow easy disassembly for service and cleaning. Drain piping shall be pitched 4" to the foot and carried through the wall of the refrigerated area. It shall be

trapped to prevent entry of warm air and insects to the refrigerated rooms and discharged to a floor drain with the code required air gap. The exposed drain piping shall be spray painted.

Provide an electric drainline heater tape in the freezer, with a length equal to five wraps per foot of length of the drainline located within the freezer compartment. Wrap and secure in accordance with manufacturer's recommendations.

Provide chrome plated escutcheon plates at all exposed points where piping penetrates the wall or ceilings.

Insulation - Suction lines for refrigerated rooms having a temperature above freezing shall be covered with 3/4" wall thickness closed cell HT Armaflex insulation with ultra violet radiation protection.

Suction lines for refrigerated rooms having a temperature below freezing shall be covered with 1" wall thickness closed cell HT Armaflex insulation with ultra violet radiation protection.

The insulation shall be applied to these lines in accordance with manufacturer's recommendations, and as they are being installed so that insulation will not be split. All joints shall be completely sealed with overlapping, cemented material to prevent the formation of frost on the lines.

Controls - Each evaporator shall be provided with a Smart-Vap II electronic control as manufactured by National Refrigeration. The time clock and heater contactor shall be removed from the condensing unit. No control wiring will be required from evaporator to the condensing unit.

Refrigerant Testing - The entire system shall be pressure and leak tested at no less than 100 PSIG, cleaned and dehydrated by maintaining a vacuum of 500 microns or lower for a period of five hours. The required operating charge of refrigerant and oil, if necessary, shall be added and the entire system tested for performance. Each system shall be clearly marked as to the type refrigerant required.

Guarantee - The equipment shall be guaranteed to maintain the specified temperatures. All mechanical refrigeration equipment shall be mechanically guaranteed for a period of one year after date of acceptance by the Owner. The emergency service shall be provided free of charge, whenever necessary on a 24 hour, seven day-per-week basis during the guarantee period.

Any leaks that occur during the first year of operation after acceptance by the Owner, shall be repaired and the necessary refrigerant added at no expense to the Owner.

The year's service shall be provided by the installing company, and under no circumstances will the service policy be sublet to another refrigeration contractor. The name of the installer/service agency for the guarantee period shall be located at a prominent place on the condensing units.

The condensing units shall be provided with an additional four year parts warranty to commence upon the completion of the aforementioned guarantee, bringing the total parts warranty to five years.

Condensing Units - The condensing units shall consist of an EC energy saving motor with variable speed controller, compressor, refrigerant condenser, liquid receiver, compressor service valves, and a dual high-low pressure control. The units shall be as manufactured by National Refrigeration.

The condensing units shall be outdoor type, wall mountable, and quiet type with an approximate 53 to 61 decibel rating at 100 percent fan speed. The compressor shall be serviceable semi-hermetic or scroll type per schedule, and fitted with gold coated aluminum fin condenser, suction service valve, discharge service valve, compressor contactor, high and low pressure controls, receiver with fusible plug, liquid shut-off valve and charging port, mounted non-fused disconnect switch, waterproof

electrical control box, discharge line vibration eliminator, weather resistant enameled galvanized steel cabinet, access guard, liquid line assembly, suction line filter and vibration eliminator, crankcase heater, and 1-1/2" high raised steel base.

Mount on roof per architectural drawings with structural supports, roof penetrations and weatherproofing provided by the General Contractor. Mount with clearance above roof deck per Manufacturers recommendation.

Evaporator Coils - Each evaporator shall be provided with a Smart-Vap II electronic control, as manufactured by National Refrigeration, thermostatic expansion valve, and solenoid valve. The time clock and heater contactor shall be removed from the condensing unit. No control wiring will be required from evaporator to the condensing unit.

The freezer shall be provided with an automatic electric defrost system consisting of one evaporator coil as indicated in the schedule. Evaporator shall be low profile type six fins per inch complete with variable speed EC energy saving fan motors with controller. Coil shall be NSF and UL Listed.

The cooler shall be provided with one evaporator coil as indicated in the schedule. Evaporator shall be low profile type six fins per inch complete with EC energy saving fan motors. Coil shall be NSF and UL Listed.

Furnish and install 1/4" minimum diameter stainless steel threaded mounting rods for the hanging of the evaporator coils, with stainless steel washers and nuts on the interior ends, and reinforcing angle at the exterior top of the room. Plated steel running thread is not acceptable.

Refrigeration Equipment Schedule

Cooler	Room Temp: +35°F	TD:	10°F		
Condensing unit	Amps	Ref	BTU/hour	Evap Temp	Cond Temp
BQHA010E6-HT3A	5.9 - 208/3	404a	10,652	+26.5°F	+95°F
Evaporator coil	BTU/hour	CFM	Fan amps	Defrost amps	Defrost type
BLP211MA-S1B-ECM	10,571	1,910	2.0 - 120/1	NA	Timed ambient

Freezer	Room Temp: -10°F	TD:	10°F		
Condensing unit	Amps	Ref	BTU/hour	Evap Temp	Cond Temp
BQZA035L6-HT3A	14.4 - 208/3	404a	13,019	+26.5°F	+95°F
Evaporator coil	BTU/hour	CFM	Fan amps	Defrost amps	Defrost type
BLP314LE-S2B-ECM	13,044	2,860	1.8 - 208/1	11.9 - 208/1	Timed ambient

Item 15

MOBILE SHELVING UNITS

Quantity - 24

Make - MetroMax Q

Size - (7) 48" x 21" and (17) 36" x 21", all 69" high on casters; four tier

Description - Shelving unit shall be all standard construction and shall consist of four shelves with removable injection molded polypropylene mats with antimicrobial product protection, supported on epoxy coated steel shelf frames and similar uprights with capped tops, and mounted on 5" diameter polyurethane tired swivel casters with donut bumpers.

Accessories - Provide with polymer posts in lieu of standard.

Item 16

PREP COUNTER WITH SINKS

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 10'-0" x 30" x 36" high to work surface plus 10" high splash at rear and left; two 18" x 20" x 10" deep integral sink basins
Construction - 14 gauge stainless steel top, basins and splash over angle frame, six legs with gussets and adjustable feet, partial undershelf, two crossrails, tall splash at rear and left end, and marine front and end, secured 3" off face of wall.
Accessories - Drawer assembly, splash mounted faucet set and two 2" lever waste outlets.

Item 17

WALL SHELF

Quantity - 2

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 7'-0" x 10" mounted 1" off face of wall up 54" above finished floor

Item 18

WASTE BARRELS

No work in this Section. Units provided by Owner.

Quantity - 4

Item 19

HAND SINKS

Quantity - 5

Make - Advance 7-PS-70-CM*C166 or equal by Krowne

Description - Units shall be all standard stainless steel construction with mounting bracket. Mount on wall with rim at 36" above floor

Accessories - Provide with a splash mounted faucet set with wrist handles (Item 19A), 3" flat strainer type (non-basket, non-lever) open type waste, chrome plated tailpiece, "P" trap and clean-out cap.
Provided end splashes welded to each side.

Item 19A

FAUCETS

Quantity - 5

Make - T&S Brass B-0330-04 modified or Fisher 1953 modified

Description - Units shall be all standard construction with mixing body, 8" center inlets, and wrist blade handles. Modified unit shall be provided with 119X gooseneck with B-0199-02-F10 aerator tip in lieu of the standard.

Item 20

WASTE BINS

No work in this Section. Units provided by Owner.

Quantity - 5

Item 21

MOBILE PAN RACKS

Quantity - 4

Make - New Age 1331*C166

Size - 20-1/2" x 26" x 69" high

Capacity - Twenty 18" x 26" pans on 3" centers

Description - Rack shall be fabricated of welded extruded aluminum 1" x 1" x .070" tubular uprights and framing, and 1-1/4" x 1-5/8" x .100" angle pan slides with corners chamfered and deburred. Gussets of 1-1/2" x 1-1/2" x 5/8" angle aluminum shall be welded to the bottom inside angles where horizontal bracing meets vertical uprights. Mount on platform type, 5" polyurethane tired swivel casters.

Item 22
Spare number

Item 23
Spare number

Item 24
MOBILE MIXER STAND
Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal
Size - 30" x 30" x 32" high
Construction - 14 gauge stainless steel top over channel frame, edges formed in turn down, mounted on four legs with gussets, undershelf, and 5" diameter casters, two with brakes.

Item 25
TWENTY-QUART MIXER
Make - Hobart HL-200*C166 or equal by Globe
Power - 8 amps - 1/2HP - 120/60/1 - cord and plug
Description - Mixer frame and body shall be fabricated of welded heavy gauge steel finished in Hybrid Powder coat finish, and provided with a stainless steel splash guard at the column, stainless steel bowl guard with electrical interlock, single point bowl installation with swing-out bowl support, manual bowl lift and an attachment hub with No. 12 taper. Transmission shall be gear driven constant mesh heat treated and hardened gears on similar shafts be mounted in ball bearings with recirculating oil and grease to all gears and shafts. Mixing action shall be planetary and shall have speeds of 59 (stir), 107, 198, 365, agitator RPM speeds as selected by an external dial. Speeds to be selectable on-the-fly and include a soft start and stir speed while lifting the bowl into place and controlled with a 15 minute timer with automatic time recall
Accessories - Provide mixer with a 20 quart stainless steel bowl, one flat "B" beater and one "D" wire loop whip with stainless steel wires.

Item 26
MOBILE SLICER STAND
Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal
Size - 30" x 30" x 32" high
Construction - 14 gauge stainless steel top over channel frame, edges formed in turn down, mounted on four legs with gussets, undershelf, and 5" diameter casters, two with brakes.

Item 27
AUTOMATIC SLICER
Make - Hobart HS9 or equal by Bizerba
Power - 5 amps - 1/2 HP - 120/60/1 - cord and plug
Description - Slicer shall be all standard construction, automatic type with anodized cast aluminum housing and base, removable 13" diameter 304L stainless steel knife with removable ring guard cover, totally enclosed, permanently lubricated PSC knife motor, with poly-v belt drive, zero knife exposure, linear automatic carriage drive system with speeds of 28, 38, 48 and 58 strokes per minute, manual assist mode, and provided with thermoplastic coated steel feed grip, glass bead finished gauge plate and knife cover, tilting carriage, water protected push-button switches, top mounted and removable knife sharpener with two borazon stones, adjustable gauge plate from "0" to 1", lift lever system and rubber feet. Unit to be provided with mechanical and electrical interlocks to include home position start, close gauge plate to stop, carriage will not tilt away or remove if gauge plate is not closed, locked gauge plate when carriage is removed, no-volt release, and 30 second automatic shut-off without carriage motion. Slicer shall be NSF 8 compliant.
Accessories - Provide unit with knife removal tool

Item 28

SIXTY-QUART MIXER

Make - Hobart HL-600*C166 or equal by Globe

Power - 2.7 HP - 10.0 amps - 208/60/3

Description - Mixer frame and body shall be fabricated of welded heavy gauge steel finished in gray baked enamel, and provided with a stainless steel splash guard at the column, stainless steel bowl guard with electrical interlock, single point bowl installation with swing-out bowl support, motor driven power bowl lift and an attachment hub with No. 12 taper. Mixer shall be driven by a switched reluctance, ball bearing motor, ventilated within the mixer body. Motor starter shall be magnetic type with thermal overload protection mounted within the mixer. Transmission shall be poly-V belt driven and geared down with constant mesh heat treated and hardened gears on similar shafts be mounted in ball bearings with recirculating oil and grease to all gears and shafts. Mixing action shall be planetary and shall have speeds of 36 (stir), 67, 120, 200, and 353 RPM as selected by an external lever. Speeds to be selectable on-the-fly and include a soft start and stir speed while lifting the bowl into place and controlled with a 50 minute timer with automatic time recall

Accessories - Provide mixer with a self-centering polished aluminum, four wheel 60 quart bowl truck, sixty quart stainless steel bowl, flat beater, dough hook, and a whip with stainless steel wires.

Item 29

BAKER'S TABLE WITH OVERSHELF

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 60" x 30" x 36" high plus 1-1/2" x 6" high splash at rear and ends; approximately 60" x 10" overshelf mounted at 54" above floor

Construction - 14 gauge stainless steel top over angle frame with front edge formed in turndown, rear and ends formed in short splash with stainless steel finished panels on all three exterior faces, and mounted on four legs with gussets, adjustable feet and three crossrails open at front for ingredient bins. Provide unit with a full length overshelf, constructed same as a wall shelf, and mounted on four 1" diameter stainless steel tubular uprights secured thru the top of the splash to welded concealed brackets.

Item 30

INGREDIENT BINS

Quantity - 3

Make - Rubbermaid 3600

Size - 13-1/8" x 29-1/4" x 28" high

Capacity - 2.75 cubic feet, 21 gallons

Description - Bin shall be all standard construction with structural foam body, mounted on 3" diameter casters and provided with polycarbonate hinged/slide off lid.

Item 31

PREP COUNTER WITH SINKS

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 9'-0" x 30" x 36" high to work surface plus 10" high splash at rear and left; two 18" x 20" x 10" deep integral sink basins

Construction - 14 gauge stainless steel top, basins and splash over angle frame, six legs with gussets and adjustable feet, partial undershelf, two crossrails, tall splash at rear and left end, finished exterior end splash, and front and end formed in turndown, secured 3" off face of wall.

Accessories - Drawer assembly, splash mounted faucet set and two 2" lever waste outlets.

Item 32

MICROWAVE OVEN

Make - Amana RFS12TS

Size - 21-3/4" x 20" x 14-3/4" high

Power - 16 amp - 120/60/1 - cord and plug (NEMA 5-20)

Description - Microwave oven shall be all standard construction with 1200 watt nominal cooking power, oven stirrer fan, stainless steel interior and exterior, full length stainless steel piano door hinge, slotted choke door seal, see through door window with interior light, ceramic cooking shelf, ten station programmable touch control timer, 100 programmable settings, five power level options, end of cycle signal and three year warranty.

Item 33

FORTY-GALLON BRAISING PAN

Make - Groen BPP-40G

Size - 35-3/4" x 28-1/4" x 10" deep inside pan dimensions

Power - 5 amps - 120/60/1

Rating - 1/2" gas inlet at 144,000 BTU/Hour

Description - Unit shall be all standard stainless steel construction, with tubular support frame, adjustable feet, flanged feet at rear, electric motorized crank tilt mechanism with manual override and three position control switch, torsion bar counterbalanced hinged cover with vent, and a 40 gallon pan. The cooking surface shall be constructed with 5/8" thick stainless steel and bonded clad plate with integral heat transfer fins, and a multi-tube gas burner. Pan shall be polished to a 100 emery grit finish and provided with electronic ignition, 7° off level cooking capable, power on switch and indicator light, heat on indicating light, thermostatically controlled and provided with a high limit cut-off.

Accessories - Provide unit with a faucet mounting bracket with a double pantry water fill faucet and aerator tip, BPC pan carrier.

Item 34

FLOOR PAN AND GRATE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 20" x 36" x 4" deep inside dimensions; 23" x 39" overall

Construction - Pan shall be fabricated of 14 gauge stainless steel, all welded construction, pitched to a 4" ID drain fitting with stainless steel removable, perforated basket and perforated dome strainer. Long sides shall be fitted with integral grate support ledges. Provide a model CGF molded fiberglass grate (Chemgrate) with 1" x 4" pattern, 3/4" clear slots and ends finished in accordance with manufacturer's instructions. Grate shall be cut in a manner that closed pockets will not be formed where they rest on the pan ledges.

Item 35

FORTY-GALLON TILT KETTLE

Make - Groen DHT/1-40

Power - 5 amps - 120/60/1

Rating - 1/2" gas inlet at 100,000 BTU/hour

Description - Unit shall be all standard construction self-contained, gas heated, stainless steel steam jacketed kettle with integral bar type reinforcing ring and butterfly shaped pouring lip, supported on a stainless steel console containing a worm gear tilt mechanism for the kettle trunnion with front-mounted controls, trunnion mounted thermostat, gas heated steam source charged with chemically pure water, low-water cut-off and indicator, safety valve, pressure gauge, water sight glass, gas regulator, electronic ignition, and heating light. Kettle shall be UL listed, AGA Design Certified, NSF listed and ASME code constructed and National Board registered for operating up to 50 PSI maximum working pressure. Unit to be mounted on 6" high adjustable stainless steel legs.

Accessories - Provide unit with swing spout double mixing faucet with aerator tip and bracket, 2" tangent drawoff with 1/4" perforated strainer, Model 51 counterbalanced hinged cover, a kettle brush kit and Tri-basket inserts.

Item 36

FLOOR PAN AND GRATE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 20" x 36" x 4" deep inside dimensions; 23" x 39" overall

Construction - Pan shall be fabricated of 14 gauge stainless steel, all welded construction, pitched to a 4" ID drain fitting with stainless steel removable, perforated basket and perforated dome strainer. Long sides shall be fitted with integral grate support ledges. Provide a model CGF molded fiberglass grate (Chemgrate) with 1" x 4" pattern, 3/4" clear slots and ends finished in accordance with manufacturer's instructions. Grate shall be cut in a manner that closed pockets will not be formed where they rest on the pan ledges.

Item 37

FOUR-BURNER RANGE WITH OVEN

Make - Garland GFE24-4L*C166

Size - 23-5/8" x 34-1/2" x 36" high to work surface, 45-3/8" high overall

Power - 0.1 amps - 120/60/1 - cord and plug (electronic spark ignition)

Rating - 3/4" inlet at 136,000 BTU/Hour

Description - Range shall be all standard construction with four 26,000 BTU/hour open burners with flame failure protection and electronic spark pilot ignition, level cast iron removable grates, stainless steel exterior, thermostatically controlled oven with rack and porcelain interior, 9-3/8" high stainless steel back guard, and provided with pressure regulator.

Accessories - Finished stainless steel back panel. Mount unit on 5" diameter heavy duty swivel casters, two with brakes and provide assembly with a 36" long x 3/4" line size Dormont 1675 KIT2S plastic covered hose assembly with full port gas ball valve, two Supr-Swivels, brass disconnect, 90° street elbow and restraining cable. Mount the nipple on the rear of the range, and the hose assembly with disconnect device connected to the building supply line.

Item 38

DOUBLE COMBINATION OVEN

Make - Blodgett BCX-14G Double or equal

Size - 42-1/4" x 40" x 75" high

Power - (2) 20 amps circuit - 120/60/1 - cord and plugs

Rating - (2) 3/4" gas inlet at 115,000 BTU per hour

Description - Combination steamer/ovens shall be all standard construction with stainless steel exterior and interior, aluminized steel bottom and rear panels, dual pane tempered glass panel in right hand hinged doors, easily replaced door gaskets, self draining condensate door trough, five stainless steel wire racks per deck, water pressure regulators, integrated retractable hose and spray assembly, and mounted on 6" high casters. Each deck shall have a four function selector switch, solid state rotary dial thermostat with 150° to 500° F range, automatic shut down with audible buzzer requiring manual shut-off, electronic ignition, steam on demand generator and stacking kit. Provide unit with factory authorized start-up service and one year warranty.

Accessories - Provide single source water manifold and water pressure regulator.

Item 39

WATER FILTER

Make - 3M ScaleGard HT SF165 Modified

Description - Unit shall be all standard construction designed for wall mounting behind the *(make)* steamer and consisting of a mounting bracket, quarter-turn cartridge release mechanism, manifold with integral pressure gauge, integral quarter turn shut-off valve, outlet check valve, filter cartridge

with internal prefilter membrane and external scale feeder cartridge. Provide with HF95-CL chloramine reduction filter cartridge in lieu of standard HF65 cartridge.
Accessories - Provide four spare HF95-CL filter cartridges and four spare HF8-S cartridges.

Item 40

DOUBLE CONVECTION OVEN

Quantity - 2

Make - Blodgett DFG-200-ES Double*^C166 or equal by Montague or Lang

Size - 38-1/4" x 42-7/8" to include fan motor x 70-5/8" high

Power - (2) (8 amps) 1/3 HP - 120/60/1 - cords and plugs

Rating - 3/4" gas inlet at 100,000 BTU/Hour

Certification - Unit shall be Energy Star compliant

Description - Units shall be all standard construction with stainless steel front, sides and top, porcelain enameled steel interior with 29" x 28-1/4" x 20" high inside dimensions, 1" thick mineral fiber sheet insulation on top, back and sides, dual pane thermal glass windows in coupled doors, removable rack supports capable of holding eleven racks and five chrome plated steel wire racks, electronic ignition with fail-safe controls, solid state digital controls with separate temperature and time settings, timer with buzzer, cook and hold and fan pulse modes, manual gas service cut-off switch, removable dual tube burners, pressure regulators, two speed blowers with thermal overload protection and door interlock, and interior lighting with two 50 watt commercial bake oven lamps. Provide standard three year parts and labor warranty on the total oven and additional five year warranty on the door assembly exclusive of glass, parts only.

Accessories - Provide a stainless steel draft diverter. Mount on heavy duty swivel casters. Manifold the two ovens for a single gas connection. Provide assembly with a 36" long x 3/4" line size Dormont 1675 KIT2S plastic covered hose assembly with full port gas ball valve, two Supr-Swivels, brass disconnect, 90° street elbow and restraining cable. Mount the nipple on the rear of the oven, and the hose assembly with disconnect device connected to the building supply line.

Item 41

EXHAUST VENTILATOR

Make - AquaMatic AM-ND-2

Size (Left) - 12'-0" plus 12" utility cabinet x 60" plus 12" extended rear standoff x 30" high plus 4" high collars, mounted up 6'-8" above finished floor; flat bottom

Size (Right) - 11'-3" x 60" plus 12" extended rear standoff x 30" high plus 4" high collars, mounted up 6'-8" above finished floor; flat bottom

Exhaust (Left) - 3,780 CFM exhaust through a 36" x 10" collar at 1.107" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Exhaust (Right) - 3,375 CFM exhaust through a 32" x 10" collar at 1.029" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Power - 0.8 KW - 120/60/1 to lights; Power to lights from Item 42.

Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edges with integral front baffle, double wall insulated fronts, and NSF Listed. Units shall have grease collection troughs, storage containers, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator.

Accessories - Provide unit with eight UL Listed light fixtures with LED bulbs, factory prewired and left ready for final connection by the Electrical Contractor. Provide closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on three sides. Provide one filter removal tool and balance dampers.

Item 42

VENTILATOR CONTROL

Make - CaptiveAire DCV

Power - 20 amps circuit - 120/60/1 to logic controller

Scope - Furnish and install complete exhaust control system for the exhaust canopy in accordance with the plans and Manufacturers shop drawings. The system shall include programmable logic controller (PLC), variable frequency drive (VFD), stainless steel control enclosure, exhaust duct temperature sensors, room temperature sensor, LCD screen interface with cable, all specified accessories, and those components required to provide complete and satisfactory systems in accordance with accepted HVAC practice. System shall control Item 41. Mount LCD screen control in UDS riser. Mount system processor in the cabinet mounted on the left end of exhaust ventilator 41.

Important: The installation work shall be performed by a fully qualified contractor employing a certified mechanic fully trained in the installation of the DCV hood system. Submittal shall list the installing company and the qualified system installer. Provide wiring diagrams and guidance to related trades to achieve correct operation of the system.

Item 43

FIRE SUPPRESSION SYSTEM

Make - Ansul R-102

Design - Protection for hood number 41. Provide an automatic liquid fire suppressant system sized to meet all local codes, UL 300 and NFPA Codes. System shall provide surface protection for cooking equipment, hood and the exhaust duct work, if required. Tanks shall be mounted in the hood manufacturer provided utility cabinet and piping shall run hidden wherever possible. All pipes and fittings used to convey the chemical shall be scale free steel, 40 weight. Exposed piping located within the ventilator shall be stainless steel or chrome and limited to vertical drops only. Horizontal piping shall be run over the ventilator's top. Nozzles shall be swivel type with metal caps. Detection shall be fusible links rated per codes, and system shall rely on no outside source of power. The system shall be provided with a control box with indicator to indicate system status. Control head shall also include integral micro switch offering "normally open" and "normally closed" terminals for use by the Electrical Contractor for the shut-down of equipment and the sounding of alarms, etc. Suppressant tanks shall be stainless steel. Gas valve shall be provided as part of Item 44. Provide and install a remote pull station per codes, complete with cables, conduit and pulleys. Coordinate installation of remote pull station with General Contractor to provide a recessed junction box mounted for installing the pull box with cable conduit concealed within walls. Provide system with class-K extinguisher as required.

Workmanship - Exposed stainless steel fittings and piping shall be assembled with special care to avoid marring or damaging the surfaces. Any pieces showing marks shall be removed and replaced with new materials. **Chrome sleeves are not acceptable.**

Test - Perform a puff test on the completed system and obtain the written approval of the local Fire Inspector.

Accessories - Provide metal caps on the nozzles.

Item 44

UTILITY DISTRIBUTION SYSTEM

Make - AquaMatic AM-UDI

Size - 24'-3" x 12" x 6'-8" high

Power - 50 amps circuit - 120/208/60/3

Rating - 2" gas manifold at 810 MBTU/Hour (1,175 MBTU/Hour capacity)

Description - Utility distribution system shall be all standard construction of 300 series stainless steel with primary service riser, secondary riser and a horizontal raceway with separate compartments for plumbing and electrical services. Plumbing compartment shall include a gas manifold with a pre-plumbed 2" electric gas valve, service drops with shut-off valves, Dormont quick disconnect hoses and hot and cold flexible water connectors. Electrical compartment shall include bus bar with

individually sized breakers along raceway. Primary riser shall include breaker panel with main shunt trip breaker, emergency kill switch with status lights, two GFI convenience outlet, and gas delay reset. Mount Item 45, utility faucet, on plumbing riser per plan at 18" above floor
Accessories - Provide 36" long minimum Dormont swivel type quick disconnect gas hoses and restraining cables for Items 37, 38, and 80; standard gas hoses for Items 33 and 35.

Item 45

UTILITY FAUCET

Make - T&S Brass 2301*C166 or equal by Fisher or Encore

Description - Unit shall be all standard construction with right hand mounted lever and top mounted vacuum breaker.

Item 46

Spare number

Item 47

COOK'S TABLE WITH SINK AND OVERSHELF

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 8'-0" x 30" x 36" high; overshelf 69" long with shelf at 54" above floor; 20" deep shelf; 18" x 20" x 10" deep integral sink basin

Construction - 14 gauge stainless steel top and sink basin over angle frame, edges formed in turndown, six legs with gussets, adjustable feet, flanged feet at the corners for securing to floor, two crossrails and partial undershelf. Overshelf shall be 16 gauge stainless steel, with edges formed in turndown, channel reinforced, and welded to two extended rear table legs with support webs. Extended legs shall be supported in integrally welded inverted gussets with sleeved joints for rigidity.

Accessories - Drawer assembly, deck mounted faucet set and a 2" lever waste outlet. Provide two rigid stainless steel brackets for mounting of electric outlets in setback positions complete with work boxes, GFI receptacles and stainless steel cover plates. Mount one of the outlets below the overshelf and pre-wire thru upright to junction box mounted below the table.

Item 48

CAN OPENER

Make - Edlund S-11*C166

Description - Opener shall be all standard construction with cast stainless steel body, base and blade. Install on table per plan.

Item 49

Spare number

Item 50

WORK TABLE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 8'-0" x 30" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown, and mounted on six legs with gussets, adjustable feet, partial undershelf, and two crossrails.

Accessories - Drawer assembly and two rigid stainless steel brackets for mounting of electric outlets in set back positions below the top complete with a work boxes, GFI outlets and stainless steel cover plates.

Item 51

FOOD PROCESSOR

Make - Robot Coupe R301U Series D

Power - 9 amps - 120/60/1 - cord and plug

Description - Combination food cutter shall be all standard construction with 1-1/2 HP direct drive fan cooled capacitor start motor with brake, magnetic interlocks, stainless steel cutter bowl with handle and see-thru lid, continuous feed top unit with attached large feed pusher and two standard discs.

Item 52

WORK TABLES

Quantity - 2

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 72" x 30" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown, and mounted on four legs with gussets, adjustable feet and full undershelf.

Accessories - Drawer assembly and two rigid stainless steel brackets for mounting of electric outlets in set back positions below the top complete with a work boxes, GFI outlets and stainless steel cover plates.

Item 53

CEILING MOUNTED UTENSIL RACK

Quantity - 2

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 5'-0" x 24" mounted up 6'-6" and 7'-6" above floor

Construction - Rack shall be fabricated of 1/4" x 2" stainless steel bar stock throughout, fully welded construction, consisting of a two bar upper rail with full radiused ends, a single lower rail, reinforcing straps, and suspended from the overhead structure on four hangers. Provide unit with forty Component Hardware J77-4401 stainless steel double pot hooks.

Item 54

MOBILE WORK TABLES

Quantity - 3

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 60" x 30" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown and mounted on four legs with gussets, 5" diameter swivel casters, two with brakes, and full undershelf.

Accessories - Drawer assembly.

Item 55

MOBILE WORK TABLE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 48" x 30" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown and mounted on four legs with gussets, 5" diameter swivel casters, two with brakes, and full undershelf.

Accessories - Drawer assembly.

Item 56

PASS-THRU REFRIGERATOR

Make - Traulsen AHT 2-32 NPUT or equal by Victory or True

Power - 8.6 amps - 5/8 HP - 120/60/1 - cord and plug

Capacity - 48.3 cubic feet

Doors - Half height, standard hinging

Certification - Unit shall be Energy Star compliant

Description - Refrigerator shall be all standard construction with stainless steel exterior and louver rails, anodized aluminum interior and aluminized steel top and bottom. Unit shall include automatic interior lighting, hot gas condensate evaporator, self-closing cam lift door hinges with 120° stay open feature, plasticized fin coil, stainless steel breaker strips. Mount on 6" high stainless steel adjustable legs. Moistureproof Intel-a-traul controls for the expansion valve operated refrigeration system shall be provided and factory pre-set for a 34° to 38° temperature range, built-in data storage, alarms, automatic defrost and system sensors, and automatic door jamb heaters. Refrigerant shall be R-134a. Install with controls facing kitchen side.

Accessories - Provide unit with optional five year compressor warranty, welded corners of exterior door pans, #1 stainless steel angle type pan slides spaced 3" on center in the top half behind both doors.

Item 57

MOBILE HOT FOOD HOLDING CABINETS

Quantity - 3

Make - Food Warming Equipment MTU-12D or equal by Cres Core

Size - 29-3/4" x 30-1/4" x 69" high

Power - 13.75 amps - 1.65 KW - 120/60/1 - cord and plug

Description - Cabinet shall be all standard construction with stainless steel interior and exterior, stainless steel base frame with tubular perimeter and 10 gauge stainless steel reinforcing plates at corners, high density fiberglass insulation on all sides, flush mounted Dutch doors with high temperature gaskets mounted on the cabinet, edge mounted heavy duty hinges and latches, twelve pair of removable universal chrome plated and epoxy coated rod type pan slides capable of supporting 18" x 26" or 12" x 20" pans on 4-1/2" centers, mounted thermometer, recessed controls, thermostatically controlled system with separate heat and humidity controls, air distribution blower and removable stainless steel reservoir, and 10' cord set and cord storage loop. Mount on 5" diameter plate mounted polyurethane tired casters; two swivel, two rigid. Provide with two year warranty. Unit shall be Energy Star compliant.

Accessories - Provide unit with Dutch doors, perimeter vinyl bumper and push/pull handles.

Item 58

REACH-IN REFRIGERATOR

Make - Traulsen AHT 232 NUT-HHS or equal by Victory or True

Power - 8.2 amps - 5/8 HP - 120/60/1 - cord and plug

Capacity - 46.0 cubic feet

Doors - Half height, Left/Left

Description - Refrigerator shall be all standard construction with stainless steel exterior front and ends and louver rails, anodized aluminum interior and aluminized steel top, back and bottom. Unit shall include automatic interior lighting, hot gas condensate evaporator, self-closing cam lift door hinges with 120° stay open feature, plasticized fin coil, stainless steel breaker strips. Mount on 6" high stainless steel adjustable legs. Moistureproof Intel-a-traul controls for the expansion valve operated refrigeration system shall be provided and factory pre-set for a 34° to 38° temperature range, built-in data storage, alarms, automatic defrost and system sensors, and automatic door jamb heaters. Refrigerant shall be R-134a. Unit shall be Energy Star compliant.

Accessories - Provide unit with optional five year compressor warranty, welded corners of exterior door pans, two adjustable chrome plated steel wire shelves in the bottom half and eighteen pair of #1 stainless steel angle type pan slides spaced 3" on center in the top half.

Item 59

DELI SERVING COUNTER

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 11'-6" x 33" plus 12" deep trayslide x 36" high; 33-1/2" high to top of trayslide; angled top and trayslide end per plan; mitered trayslide corner per plan

Power - 20 amps - 120/60/1 to each of two body mounted GFI outlets

20 amps - 120/60/1 to body mounted NEMA L15-20R outlet at Item 65 end
Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Provide flanged openings for the refrigerated pans with all edges flanged down 1" and corners filled and welded. Provide set pins and support brackets at front of top for supporting cutting boards.

Mount on six 2" square 16 gauge stainless steel tubular legs with Component Hardware A15-0851 adjustable feet. Reinforce between all front and end legs with 2" square stainless steel tubing welded in place 6-1/4" clear above floor. Provide similar reinforcement between rear legs.

Trayslide shall be fabricated of 14 gauge stainless steel with front and ends turned down and corners welded. Rear shall be turned up under the counter front edge Mount on Component Hardware J19-4966 brackets bolted through the front panels to reinforced area..

Front and right end of counter shall be provided with plastic laminate clad panels. Plastic laminate manufacturer shall be as selected by the Architect. Plastic laminate color shall be as selected by the Architect from Wilsonart's full range of colors. Panels shall be mounted with a minimum of joints. All joints to be hairline type. Joint between a front and end panel shall appear on the end panel face. Panels shall be secured to counter legs and crossrails with welded stainless steel clips and stainless steel wood screws. Do NOT secure THROUGH the legs or crossrails. Provide a continuous 14 gauge support-protector strip at the lower edge of all finish panels, extending 1/16" past front face.

Apron shall be provided per elevations, fabricated of 18 gauge stainless steel. Apron shall include a formed reinforced bottom edge and shall be set in 1" from leg face.

Accessories - Provide two 48" x 8" x 1/2" thick polyethylene cutting boards.

Item 60

MECHANICAL COLD PANS

Quantity - 2

Make - Atlas RM-3 or equal by Hatco or Wells

Size - 45-3/4" x 26-1/2" with 39-3/8" x 19-7/8" x 9" deep pan

Power - 6.3 amps - 1/4 HP - 120/60/1 - cord and plug

Description - Mechanically refrigerated cold pan shall be all standard construction with 3" recessed stainless steel pan and mounting frame, full perimeter sealing gasket, 1" insulation on all sides, 1-1/2" insulation on bottom, all contained in 22 gauge galvanized steel wrapper, drain outlet, and self-contained thermostatically controlled refrigeration system with perimeter side and bottom refrigerant tubing mounted on an integral angle frame with removable closure panels.

Accessories - Provide 5YW optional five year warranty on the compressor, WFB stainless steel perforated false bottom and Stainless steel adaptor bars.

Item 61

CONVERTIBLE SNEEZE GUARDS

Quantity - 2

Make - Versa-Gard VG2

Size - 4'-5" long x 15" top glass x 18" high

Description - Convertible for self service or full service, breath guard with top shelf shall be all standard construction with 1" outside diameter solid CNC machined supports, hardware and brackets. Top shelf shall be 3/8" clear tempered glass, 1/4" glass front panels and two 1/4" glass panels mounted on the ends. All glass shall have beveled and polished exposed edges. All hardware shall be brushed stainless steel finish. Unit shall be built in accordance with NSF/ANSI 2 - 2010.

Item 62

DROP CORD

Make -World Cords (860/763-2100) Model 88-DC-2003-A4 with inline IL-A-20125 GFCI or equal

Power - 20 amps - 120/60/1

Description - Cord shall be all standard construction with female connector body, cord, strain relief, and stainless steel ceiling plate. Provide with inline GFCI protection with integrated test and reset buttons, and automatic reset. Cords shall be adjusted to hang to 78" above floor. Plastic wire ties are not acceptable for this work.

Item 63

Spare number

Item 64

CUTTING BOARDS

Quantity - 2

Specified as accessory to Item 59

Item 65

REFRIGERATED GRAB-N-GO DISPLAY CASES

Quantity - 2

Make - Structural Concepts Oasis CO34R or equal by RPI

Size - 36-1/4" x 32-5/8" x 46-7/8" high

Power - 7.0 amps - 120/60/1 - cord and plug

Description - Display case shall be all standard construction with premium laminate exterior and stainless steel interior. Architect to select color. Provide unit with a self-contained EnergyWise refrigeration system capable of maintaining and average product temperature of 40° or less. Provide a metal shelf and a cord and plug.

Accessories - Provide unit with a one year parts and labor, five year compressor warranty, and a solid security cover that is removable and locking.

Item 66

HOT ENTRÉE SERVING COUNTER

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 9'-9" (at front edge) x 33" plus 12" deep trayslide x 36" high; 33-1/2" high to top of trayslide; top and trayslide shape per plan; mitered trayslide corner per plan

Power - 4.0 KW - 208/60/1 to disconnect for four hot food wells

20 amps - 120/60/1 to each of two body mounted GFI outlets at Items 70

20 amps - 120/60/1 to apron mounted GFI outlet

Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Provide raw openings for the heated wells.

Mount on eight 2" square 16 gauge stainless steel tubular legs with Component Hardware A15-0851 adjustable feet. Reinforce between all front and end legs with 2" square stainless steel tubing welded in place 6-1/4" clear above floor.

Undershelves shall be fabricated of 16 gauge stainless steel with reinforcing and sound deadening as specified for open base table undershelves. Front face shall be turned down 1-1/2" and in 1/2" at 45°. Rear and ends shall be turned up 1-1/2" and corners welded. Weld to legs at a point 10" above floor. Shelf shall be mounted on the inside face of legs, not cut-out at each leg. Leave 2" clearance between the shelf edge and the counter front and end panels for passing of services by Related Trades.

Trayslide shall be fabricated of 14 gauge stainless steel with front and ends turned down and corners welded. Rear shall be turned up under the counter front edge Mount on Component Hardware J19-4966 brackets bolted through the front panels to reinforced area..

Front and left end of counter shall be provided with plastic laminate clad panels. Plastic laminate manufacturer shall be as selected by the Architect. Plastic laminate color shall be as selected by the Architect from Wilsonart's full range of colors. Panels shall be mounted with a minimum of joints. All joints to be hairline type. Joint between a front and end panel shall appear on the end panel face. Panels shall be secured to counter legs and crossrails with welded stainless steel clips and stainless steel wood screws. Do NOT secure THROUGH the legs or crossrails. Provide a continuous 14 gauge support-protector strip at the lower edge of all finish panels, extending 1/16" past front face.

Apron shall be provided per elevations, fabricated of 18 gauge stainless steel, and shall be used for the mounting of switches, outlets, and controls. Apron shall include a formed reinforced bottom edge and shall be set in 1" from leg face.

Item 67

HOT FOOD WELLS

Quantity - 4

Make - Piper CCF-D-A-I-L-20-10*C166 or equal by APW/Wyott or Wells

Power - 1.0 KW - 208/60/1 each

Description - Hot food wells to be all standard construction, top mount type with one-piece, coved corner stainless steel interior, galvanized steel outer wrap, insulated on five sides, lead wires encased in Fabricator provided flexible armored conduit, drain outlet, infinite heat switch controls with off position, and mounting hardware. Wells shall be Fabricator wired to a single point with disconnect switch in accordance with UL Requirements.

Accessories - Mount in a group of four and provide a quarter turn ball type shut-off valve and Fabricator installed 3/4" copper manifold connecting the wells, complete with cleanout, left ready for extending to the floor drain by the Plumbing Contractor.

Item 68

PROTECTOR CASE

Make - Versa-Gard VG6S

Size - 72" x 19" x 18-3/16" high

Description - Protector case shall be all standard construction with three front and two rear brushed finish stainless steel uprights with surface mount flanges supporting a slanted tempered glass front panel, tempered glass top shelf and end panels. All glass shall have beveled and polished exposed edges. Unit shall be built in accordance with NSF/ANSI 2 - 2010.

Item 69

FILL FAUCET

Make - T&S Brass B-0208 or equal by Fisher or Encore

Description - Unit shall be all standard construction with a B-199-02F-12 aerator tip.

Item 70

SOUP WELLS

Quantity - 2

Make - Wells SS-10TDUCI-120

Power - 825 watts each - 120/60/1 - cord and plug

Description - Wells shall be all standard construction, fully insulated, built-in circular type with Wellslok and sealing gasket, one-piece, coved corner stainless steel interior, galvanized steel element outer wrap, and provided with a cord and plug, drain outlet, thermostatic controls with off position, power "on" indicator light, and mounting hardware. Mount the controls in counter apron. Manifold pairs of

wells into a single 3/4" copper drain line fitted with quarter turn ball type drain valve, clean-out, and leave ready for connection by Plumber.
Accessories - Provide with inserts and hinged lids.

Item 71
Spare number

Item 72
Spare number

Item 73

PIZZA SERVING COUNTER

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 15'-6" x 33" plus 12" deep trayslide x 36" high; 33-1/2" high to top of trayslide; angled top and trayslide end per plan; mitered trayslide corner per plan

Power - 20 amps - 120/60/1 to body mounted GFI outlet at Item 74

20 amps - 120/60/1 to each of three apron mounted GFI outlets

20 amps - 120/60/1 to body mounted NEMA L15-20R outlet at Item 65 end

Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Provide raw opening for the heated surface.

Mount on eight 2" square 16 gauge stainless steel tubular legs with Component Hardware A15-0851 adjustable feet. Reinforce between all front and end legs with 2" square stainless steel tubing welded in place 6-1/4" clear above floor.

Undershelves shall be fabricated of 16 gauge stainless steel with reinforcing and sound deadening as specified for open base table undershelves. Front face shall be turned down 1-1/2" and in 1/2" at 45°. Rear and ends shall be turned up 1-1/2" and corners welded. Weld to legs at a point 10" above floor. Shelf shall be mounted on the inside face of legs, not cut-out at each leg. Leave 2" clearance between the shelf edge and the counter front and end panels for passing of services by Related Trades.

Trayslide shall be fabricated of 14 gauge stainless steel with front and ends turned down and corners welded. Rear shall be turned up under the counter front edge Mount on Component Hardware J19-4966 brackets bolted through the front panels to reinforced area..

Front and left end of counter shall be provided with plastic laminate clad panels. Plastic laminate manufacturer shall be as selected by the Architect. Plastic laminate color shall be as selected by the Architect from Wilsonart's full range of colors. Panels shall be mounted with a minimum of joints. All joints to be hairline type. Joint between a front and end panel shall appear on the end panel face. Panels shall be secured to counter legs and crossrails with welded stainless steel clips and stainless steel wood screws. Do NOT secure THROUGH the legs or crossrails. Provide a continuous 14 gauge support-protector strip at the lower edge of all finish panels, extending 1/16" past front face.

Apron shall be provided per elevations, fabricated of 18 gauge stainless steel, and shall be used for the mounting of switches, outlets, and controls. Apron shall include a formed reinforced bottom edge and shall be set in 1" from leg face.

Item 74

HEATED DISPLAY SURFACE

Make - Hatco GRSB-72-I

Size - 72" x 19-1/2" plus perimeter flange

Power - 1,440 watts - 120/60/1 - cord and plug

Description - Hardcoat aluminum top plate clad with blanket foil element, thermostatic controls with 80° to 200°F. range, bottom insulation and flanged edge for drop-in installation, and mounted controls.

Accessories - Provide with flush mount control box with lighted power switch for mounting in counter apron.

Item 75

CONVERTIBLE SNEEZE GUARD WITH HEAT LAMP

Make - Versa-Gard VG2 / Hatco GRNH-72

Size - 6'-9" long x 15" top glass x 18" high

Power - 1.725 KW - 208/60/1 (heat lamp)

Description - Convertible for self service or full service, breath guard with top shelf shall be all standard construction with 1" outside diameter solid CNC machined supports, hardware and brackets. Top shelf shall be 3/8" clear tempered glass, 1/4" glass front panels and two 1/4" glass panels mounted on the ends. All glass shall have beveled and polished exposed edges. All hardware shall be brushed stainless steel finish. Unit shall be built in accordance with NSF/ANSI 2 - 2010.

Accessories - Provide with a mounted Hatco GRNH-72 heat lamp with RMB-7G remote control for mounting in counter apron.

Item 76

HEATED SANDWICH SLIDES

Quantity - 2

Make - Hatco GRSDS-24D

Size - 24" x 24" x 29" high

Power - 11.3 amps - 1.35 KW - 120/60/1 - cord and plug

Description - Unit shall be all standard construction with two heated slanted shelves with Hardkote finish, constructed of stainless steel and extruded aluminum with tempered glass end panels, incandescent lights, twelve divider rods, and thermostatic controls.

Item 77

Spare number

Item 78

Spare number

Item 79

SALAD BAR COUNTER

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 8'-0" x 44" x 34" high; Shape per plan

Power - 20 amps - 120/60/1 to each of two body mounted GFI outlets

Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2". Provide a flanged opening for the refrigerated pan with all edges flanged down 1" and corners filled and welded.

Mount on six 2" square 16 gauge stainless steel tubular legs with Component Hardware A15-0851 adjustable feet. Reinforce between legs with 2" square stainless steel tubing welded in place 6-1/4" clear above floor.

Counter shall be provided with plastic laminate clad panels on all sides. Panels shall be curved at ends to align with shape of top. Plastic laminate manufacturer shall be as selected by the Architect. Plastic laminate color shall be as selected by the Architect from Wilsonart's full range of colors. Panels shall be mounted with a minimum of joints. All joints to be hairline type. Joint between a front and end panel shall appear on the end panel face. Panels shall be secured to counter legs and crossrails with welded stainless steel clips and stainless steel wood screws. Do NOT secure

THROUGH the legs or crossrails. Provide a continuous 14 gauge support-protector strip at the lower edge of all finish panels, extending 1/16" past front face. Provide a 42" opening in kitchen side with a pair of hinged doors with stainless steel louvers for access to cold pan controls and outlets below counter.

Item 80

MECHANICAL COLD PAN

Make - Atlas RM-4 or equal by Hatco or Wells

Size - 59-1/2" x 26-1/2" with 53-1/8" x 19-7/8" x 9" deep pan

Power - 7.4 amps (1/3 HP) - 120/60/1 - cord and plug

Description - Mechanically refrigerated cold pan shall be all standard construction with 3" recessed stainless steel pan and mounting frame, full perimeter sealing gasket, 1" insulation on all sides, 1-1/2" insulation on bottom, all contained in 22 gauge galvanized steel wrapper, drain outlet, and self-contained thermostatically controlled refrigeration system with perimeter side and bottom refrigerant tubing mounted on an integral angle frame with removable closure panels.

Accessories - Provide 5YW optional five year warranty on the compressor, WFB stainless steel perforated false bottom and Stainless steel adaptor bars.

Item 81

SNEEZE GUARD

Make - Vers-Gard VG Custom

Size - 7'-8" x 3'-8" x 13-1/2" high

Description - Breath guard shall be all standard construction with four 1" diameter brushed stainless steel uprights with surface mount flanges supporting a tempered glass top shelf with fully radiused corners. All glass shall have beveled and polished exposed edges.

Item 82

REFRIGERATED GRAB-N-GO DISPLAY CASES

Quantity - 2

Make - Structural Concepts Oasis CO47R, or equal by RPI

Size - 47-1/4 in. by 33 in. by 79-5/8 in. high

Power - 10.23 amps - 208/60/1 - cord and plug (NEMA 6-20P)

Description - Display case shall be all standard construction with premium laminate exterior and stainless steel interior. Architect to select laminate. Provide unit with a self-contained EnergyWise refrigeration system capable of maintaining and average product temperature of 40 degrees or less. Mount on casters.

Accessories - Provide unit with a one year parts and labor, five year compressor warranty, and retractable night curtain.

Item 83

MOBILE CASHIER STAND

Quantity - 2

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 30" x 30" x 36" high main section with 42" x 12" trayslide on left side set at 33-1/2" above floor

Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Mount on four 2" square legs with crossrails on three sides, footrest set in 8", undershelf and plastic laminate clad panels on three sides and a solid mounted trayslide all of similar construction to the serving counter. Mount trayslide on fold down brackets. Provide 5" diameter swivel casters; two with brakes.

Accessories - Provide unit with a Component Hardware S95-1000 locking cashier drawer.

Item 84

MOBILE CASHIER STANDS

Quantity - 2

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 30" x 30" x 36" high main section with 42" x 12" trayslide on right side set at 33-1/2" above floor
Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Mount on four 2" square legs with crossrails on three sides, footrest set in 8", undershelf and plastic laminate clad panels on three sides and a solid mounted trayslide all of similar construction to the serving counter. Mount trayslide on fold down brackets. Provide 5" diameter swivel casters; two with brakes.

Accessories - Provide unit with a Component Hardware S95-1000 locking cashier drawer.

Item 85

CASHIER TERMINALS

Quantity - 4

No work in this Section. Units provided by Owner.

Item 86

MOBILE CONDIMENT COUNTERS

Quantity - 2

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 48" x 27" x 34" high

Construction - 14 gauge stainless steel top over angle frame with all edges turned down 2" and corners welded. Mount on four 2" square legs with undershelf and plastic laminate clad panels on four sides all of similar construction to the serving counter. Rear face shall be provided with a pair of hinged doors in a 36" wide opening. Provide 5" diameter swivel casters; two with brakes.

Item 87

SNACK RACKS

Quantity - 4

No work in this Section. Units provided by Owner's Vendor.

Item 88

THREE-COMPARTMENT SINK

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 10'-0" x 30" x 34" high plus 10" high splash at wall; 3" high raised open roll on three sides; three 21" x 27" x 12" deep integral sink basins

Construction - 14 gauge stainless steel drainboards, basins and splash, stainless steel channel reinforced, mounted on eight legs with gussets, adjustable feet, seven lengths of crossrail, and secured 3" off face of wall.

Accessories - Two splash mounted pot sink faucet sets, three 2" lever waste outlets.

Item 89

SOILED WARE TABLE WITH SINK

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 8'-3" x 27" plus pass-thru, plus 6'-10" x 27" return to warewasher x 34" high plus 10" high splash at walls; 3" high raised open roll on working faces; 48" x 50" pass thru with 35" sill height; 30" x 18" x 8" deep integral sink

Construction - 14 gauge stainless steel top, basin and splash, channel frame, eight legs with gussets, adjustable feet, and seven crossrails. Secure 3" off wall. Turn end down into dishwasher and

secure with stainless steel machine screws. Top of splash shall be fitted with integral flat spot for mounting of the pre-rinse fixture. Top shall pass through the wall and be an integral part of the pass window. Pass-thru ledge shall extend through the wall and be secured to the frame. Provide a 16 gauge stainless steel telescoping window frame at the opening with front edges turned out 2" and returned 1/2". Rear edges to be turned out 2-1/2" flat to wall. Integral scrapping sink shall be provided with a 12" sloped side with disposer water inlet mounted, and a 2" x 1/4" bar stock rack guide attached to the reinforced splash with stainless steel through bolts.

Item 90

WALL SHELF

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 60" x 10" mounted 1" off face of wall up 54" above finished floor

Item 91

ROLL-DOWN SHUTTER

Make - Raynor DuraShutter Select/surface mount

Size - Opening approximately 48" wide x 50" high; verify

Description - Assembly shall be all standard construction and shall consist of a self-coiling rolling counter shutter, all anodized aluminum construction with interlocking extruded slats, extruded aluminum bottom bar with rubber astragal, designed for surface type mounting with extruded guides with wool pile inserts, and complete with recessed inside lifting handles and thumb-turn locks, and complete covers.

Installation - Install with tracks located 1" clear above table surface to permit proper cleaning.

Item 92

DISPOSER

Make - Salvajor 200-SA-ARSS-LD*C166

Power - (6.6 amps) 2 HP - 208/60/3

Description - Unit shall have an 8" diameter precision ground nickel-chrome carbide shredder, 58-60 Rockwell "C" hardness with a hardened carbide rotor, 52-58 Rockwell "C" driven by a water cooled electric motor with an air seal, automatic reversing feature, and built-in thermal overload protection. Housing shall be of an aluminum alloy with a polished exterior finish and an adjustable leg support. All bearings shall be permanently lubricated type. Feed throat to be 6-1/2" diameter.

Accessories - Provide 6-1/2" sink mount assembly with short top housing, equipped with water inlet nozzle for mounting in the sink, grinding chamber inlet, removable rubber scrapping ring, vacuum breaker, flow control, electric solenoid valve, and a wall mounted ARSS-LD start/stop switch with auto reverse and line disconnect in a stainless steel NEMA 4 enclosure.

Item 93

HOSE REEL ASSEMBLY

Make - T&S Brass B-1457-7102-01C or equal by Fisher or Reel Craft

Size - 12 foot hose, 3/8" ID

Description - Unit shall be all standard construction with stainless steel open type reel, adjustable bumper, blue hose, B-0107-C low flow spray valve, heat resistant spray valve handle, chrome risers, two wall brackets, continuous pressure vacuum breaker, 36" flexible water hose, control valve, and deck type base faucet, designed for wall mounting per plan up 7'-0" measured at the inlet.

Installation - The hose reel bracket for wall mounted units shall be rotated 90° downward and installed such that it allows the hose to hang straight down and parallel to the wall. Refer to T&S Brass instructions manual page four figure one for further details.

Item 94

WAREWASHER WITH 70 DEGREE RISE BOOSTER HEATER

Make - Champion 44 DR (left to right) or equal by Hobart

Size - 44" x 25" x 58-1/2" high to top of hood; 65-1/2" high over controls

Power -131 Amps - 208/60/3

Conveyor speed - 5.8 feet per minute; 208 racks per hour

Water consumption - 0.54 gallon per rack

Description - Dishwasher shall be all standard stainless steel construction throughout, single tank machine having hood with integral tank, mounted on a frame with adjustable feet and removable closure panels on the front and ends. Vertical clearance shall be 20-3/4" to accept standard sheet pans. Hood to have 26" wide access door with door guides, double hook safety catch, and insulated handle. All interior surfaces to be stainless steel including easily removable scrap basket, two-piece scrap screens and one-piece cast stainless steel upper and lower spray assemblies. Stainless steel pump shall be self draining type with cast stainless steel impeller and designed to be non-clogging with standard NEMA frame, drip-proof pump motor and with grease packed ball bearing shaft. Provide a pre-wired top mounted control panel having an approved magnetic motor starter with overload heaters and low voltage protection for each motor, energy saver pump shut-down, on-off switches for motors and tank heat with indicator lights, and 120 volt control circuit. Tank heater shall consist of a 15.0 KW element in the wash tank with thermostatic control and low-water cut-off. Furnish standard temperature thermometers for tank and final rinse line, vacuum breaker and air gap, fill valve, door operated drain valve, splash curtains, door safety switch, automatic tank fill, common hot water connection and final rinse saver.

Accessories - Provide machine with built-in 22 KW electric hot water booster, dual rinse pump with spray manifold, 24" clearance through machine, two end cowls with 7" high stacks and locking dampers, table limit switch, 24" cantilever sideloader, and standard assortment of three plastic dish racks; two peg, one flat.

Item 95

EXHAUST DUCTS

Quantity - 2

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 4" x 16" with length as necessary to reach 3" above finished ceiling

Construction - 18 gauge stainless steel welded exhaust ducts, sized to suit the vent stacks. Ducts shall be provided with a one-piece perimeter angle collar at the ceiling, installed "leg up".

Item 96

CLEAN WARE TABLE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 84" x 27" x 34" high plus 10" splash at rear; 3" high raised roll at front and end

Construction - 14 gauge stainless steel top and splash over channel frame with raised roll front and end, tall splash at rear, turned down into dishwasher and secured with stainless steel machine screws, and mounted on four legs with gussets, adjustable feet and undershelf. Secure table 3" off face of wall.

Item 97

MOBILE UTENSIL RACKS

Quantity - 3

Make - MetroMax Q

Size - (1) 42" x 24" and (2) 36" x 24", all 69" high on casters; four tier

Description - Shelving unit shall be all standard construction and shall consist of four shelves with removable injection molded polypropylene mats with antimicrobial product protection, supported on epoxy coated steel shelf frames and similar uprights with capped tops, and mounted on 5" diameter polyurethane tired swivel casters with donut bumpers.

Accessories - Provide with polymer posts in lieu of standard.

Item 98 thru Item 115
Spare numbers

Item 116

WALK-IN COOLER

Make - American Panel, Bally, or Thermo-Kool

Size - 7'-8-1/2" x 13'-2-1/2" x 7'-10" high minimum inside dimensions; 7'-8" high after finished floor is installed by the General Contractor

Power - 1.3 KW - 120/60/1 to light fixtures and door defrost heater strip

Installation, Construction, Materials and Accessories - See Item 117

Guarantee - See Item 117

Item 117

WALK-IN FREEZER

Make - American Panel, Bally, or Thermo-Kool

Size - 7'-8-1/2" x 13'-2-1/2" x 7'-10" high minimum inside dimensions; 7'-8" high after finished floor is installed by the General Contractor

Power - 1.5 KW - 120/60/1 to light fixtures and door defrost heater strip

Installation - The walk-in refrigerated room shall be installed in a 7" deep ID recess (below finished floor).

Recess depth allows 1" for use of leveling sand; 4" for the insulated floor panels; 2" for finished floor and setting bed that shall be carried in from the adjacent room and level to same. The finished floor and setting bed shall be furnished and installed by the General Contractor, and shall have coved joints at all walls, turned up a minimum of 4" inside and out. The unit shall be set level on a bed of clean, dry mason's sand. Shims are not acceptable for leveling material.

Construction - All standard construction per the manufacturer, modified to meet the specific following points:

- Walls to be 4" thick with CFC free urethane foam insulation, UL Class 1 rated and Factory Mutual listed meeting FM Approvals Standard 4880.
- Cam type locking devices
- 34" x 76" minimum door clearance
- Polished hardware (hinges and latch to match)
- Three hinges on doors (to include one Kason 1248 spring assist hinge per door)
- Leveraged pull handle (mechanical advantage type, Kason 1236 or equal)
- Quarter turn inside safety release lever handle mechanism (not screw type)
- Prewired door sections with heater wires and light fixtures and switches
- Kason 1806 LED light fixtures or Kason 1808 LED light fixtures
- Dial type thermometers at doors
- Model 200 (with dry contacts) or Modularm 75LC 200 (with dry contacts) temperature and HACCP monitoring system at doors
- NSF construction throughout with exception of buried floor panels
- Interior and exterior faces of doors and exposed exterior walls shall be provided with aluminum diamond tread plate protective material to a height of 48" above finished floor. Hold diamond plating up 6" from the finish floor to accommodate the coved base.

Minimum materials - Interior and exterior wall surfaces shall be clad with .038" pebble finished aluminum.

The ceiling shall be finished in white polyester over 24 gauge galvanized steel. Interior floor shall be 14 gauge galvanized steel.

Accessories - Freezer shall be provided with an electrically heated pressure relief port. Each door shall be provided with a heated vision panel, 14-1/2" x 23", constructed of three panels of tempered unbreakable glass, electrically heated, with sealed air spaces between. Provide matching trim strips and closure panels to adjoining surfaces, fabricated per details, made of largest pieces available to minimize number of joints, and installed in accordance with NSF Brochure 770202, Installation Manual for Walk-in Refrigerators and Freezers. Provide six total extra Kason 1806 LED OR Kason

1808 LED light fixtures for mounting in the rooms and deliver to Electrical Contractor for field installation.

Guarantee - The walk-in refrigerated room panels shall be guaranteed for a period of ten (10) years from the date of approved installation for defects in materials and workmanship when subjected to normal use and service; remainder of rooms for one year.

Item 118

REMOTE REFRIGERATION SYSTEMS

Quantity - 2

Make - Bally, Keeprite, or Trenton or equal by Heatcraft

Scope, Piping, Insulation, Controls, Refrigerant Testing, Guarantee, Condensing Units details, and Evaporator Coils details, same as Item 14.

Refrigeration Equipment Schedule

Cooler	Room Temp: +35°F	TD:	10°F		
Condensing unit	Amps	Ref	BTU/hour	Evap Temp	Cond Temp
BQHA008E6-HT3A	7.8 - 208/1	404a	7,867	+26.5°F	+95°F
Evaporator coil	BTU/hour	CFM	Fan amps	Defrostats	Defrost type
BLP209MA-S1B-ECM	7,813	2,020	2.0 - 120/1	NA	Timed ambient

Freezer	Room Temp: -10°F	TD:	10°F		
Condensing unit	Amps	Ref	BTU/hour	Evap Temp	Cond Temp
BQZA025L6-HT3A	11.3 - 208/3	404a	9,976	+26.5°F	+95°F
Evaporator coil	BTU/hour	CFM	Fan amps	Defrost amps	Defrost type
BLP21LE-S2B-ECM	9,988	1,800	1.2 - 208/1	8.2 - 208/1	Timed ambient

Item 119

MOBILE SHELVING UNITS

Quantity - 18

Make - MetroMax Q

Size - 36" x 21", all 69" high on casters; four tier

Description - Shelving unit shall be all standard construction and shall consist of four shelves with removable injection molded polypropylene mats with antimicrobial product protection, supported on epoxy coated steel shelf frames and similar uprights with capped tops, and mounted on 5" diameter polyurethane tired swivel casters with donut bumpers.

Accessories - Provide with polymer posts in lieu of standard.

Item 120

Spare number

Item 121

UTILITY CARTS

Quantity - 2

Make - Lakeside 521 or equal by Kelmax or Channel

Size - 32-5/8" x 19-3/8" x 34-1/2"

Description - Cart shall be all standard NSF construction, stainless steel throughout, with top and bottom shelves supported by an angle frame, and mounted on two 8" fixed and two 5" swivel casters.

Capacity of cart to be 650 pounds.

Item 122

DRY STORAGE SHELVING

Quantity - 19

Make - Metro Super Adjustable Super Erecta or equal by Nexel

Size - (12) 48" x 21", (6) 42" x 21", (1) 36" x 21" all 74-5/8" high; five tier with bottom shelf up 14" clear above floor

Description - Unit shall be all standard construction with Super Adjustable Chrome plated wire shelves and tubular steel uprights with capped tops, adjustable feet, and 1" shelf height adjustment capability with Corner Release System. Each unit shall include four legs.

Item 123

PREP COUNTER WITH SINKS

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 9'-0" x 30" x 36" high to work surface plus 10" high splash at rear and right; two 18" x 20" x 10" deep integral sink basins

Construction - 14 gauge stainless steel top, basins and splash over angle frame, six legs with gussets and adjustable feet, partial undershelf, two crossrails, tall splash at rear and right end, finished exterior end splash, and front and end formed in turndown, secured 3" off face of wall.

Accessories - Drawer assembly, splash mounted faucet set and two 2" lever waste outlets.

Item 124

WALL SHELF

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 66" x 10" mounted 1" off face of wall up 54" above finished floor

Item 125

Spare number

Item 126

ACCESSIBLE HAND SINK

Make - Advance 7-PS-25 modified*C166 or equal by Krowne

Size - 20" x 24" x 13" high overall, 14" x 16" x 5" deep sink bowl

Description - Unit shall be all standard stainless steel construction with wall mounting bracket. Mount on wall with rim at 34" above floor. Modify faucet holes to be two holes spaced 8" apart on center.

Delete standard faucet.

Accessories - Deck mounted soap dispenser, 3" flat strainer type (non-basket, non-lever) open type waste, chrome plated tailpiece, "P" trap and clean-out cap.

Item 126A

FAUCET

Make - T&S Brass B-0322-04 modified or equal by Fisher or Encore

Description - Unit shall be all standard construction with deck mounted mixing body, 8" center inlets, and wrist blade handles. Modified unit shall be provided with B-0199-02F-12 aerator tip in lieu of the standard.

Item 127

TRASH BARREL

No work in this Section. Units provided by Owner.

Item 128

MOBILE WORK TABLES

Quantity - 3

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 60" x 30" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown and mounted on four legs with gussets, 5" diameter swivel casters, two with brakes, and full undershelf.
Accessories - Drawer assembly.

Item 129

EXHAUST VENTILATOR

Make - AquaMatic AM-ND-2

Size - 15'-0" plus 12" utility cabinet x 66" x 30" high plus 4" high collars, mounted up 6'-8" above finished floor; flat bottom

Exhaust - 3,375 CFM exhaust through two 16" x 10" collar at 0.585" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Power - 0.5 KW - 120/60/1 to lights; Power for lights from Item 130.

Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edges with integral front baffle, double wall insulated fronts, and NSF Listed. Units shall have grease collection troughs, storage containers, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator.

Accessories - Provide unit with five UL Listed light fixtures with LED bulbs, factory prewired and left ready for final connection by the Electrical Contractor. Provide closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on three sides. Provide one filter removal tool and balance dampers.

Item 130

VENTILATOR CONTROL SYSTEM

Make - CaptiveAire DCV

Power - 20 amps circuit - 120/60/1 to logic controller

Scope - Furnish and install complete exhaust control system for the exhaust canopy in accordance with the plans and Manufacturers shop drawings. The system shall include programmable logic controller (PLC), variable frequency drive (VFD), stainless steel control enclosure, exhaust duct temperature sensors, room temperature sensor, LCD screen interface with cable, all specified accessories, and those components required to provide complete and satisfactory systems in accordance with accepted HVAC practice. System shall control Item 129. Mount LCD screen control, recessed and flush to wall per plan 60" above floor. Mount system housing in the cabinet mounted on the right end of exhaust ventilator 129.

Important: The installation work shall be performed by a fully qualified contractor employing a certified mechanic fully trained in the installation of the DCV hood system. Submittal shall list the installing company and the qualified system installer. Provide wiring diagrams and guidance to related trades to achieve correct operation of the system.

Item 130A

VENTILATOR CONTROL INTERFACE

Specified as part of Item 130

Item 131

DECK OVEN WITH FOUR DECKS

Make - Doyon 2T or equal by Gemini

Size - 54-1/2" x 46-1/2" x 76-1/2" high; four 37-1/2" x 30" x 8" high baking chambers

Power - 72 amps - 33.2 KW - 208/60/3

Description - Oven assembly shall be all standard construction with electronically controlled decks with manual steam injection with individual systems, stone decks, stainless steel exterior, and mounted on a stainless steel stand with casters and an oven top cover.

Item 132

DOUBLE CONVECTION OVEN

Make - Blodgett DFG-200-ES Double* C166 or equal by Montague or Lang

Size - 38-1/4" x 42-7/8" to include fan motor x 70-5/8" high

Power - (2) (8 amps) 1/3 HP - 120/60/1 - cords and plugs

Rating - 3/4" gas inlet at 100,000 BTU/Hour

Certification - Unit shall be Energy Star compliant

Description - Units shall be all standard construction with stainless steel front, sides and top, porcelain enameled steel interior with 29" x 28-1/4" x 20" high inside dimensions, 1" thick mineral fiber sheet insulation on top, back and sides, dual pane thermal glass windows in coupled doors, removable rack supports capable of holding eleven racks and five chrome plated steel wire racks, electronic ignition with fail-safe controls, solid state digital controls with separate temperature and time settings, timer with buzzer, cook and hold and fan pulse modes, manual gas service cut-off switch, removable dual tube burners, pressure regulators, two speed blowers with thermal overload protection and door interlock, and interior lighting with two 50 watt commercial bake oven lamps. Provide standard three year parts and labor warranty on the total oven and additional five year warranty on the door assembly exclusive of glass, parts only.

Accessories - Provide a stainless steel draft diverter. Mount on heavy duty swivel casters. Manifold the two ovens for a single gas connection. Provide assembly with a 48" long x 3/4" line size Dormont 1675 KIT2S plastic covered hose assembly with full port gas ball valve, two Supr-Swivels, brass disconnect, 90° street elbow and restraining cable. Mount the nipple on the rear of the oven, and the hose assembly with disconnect device connected to the building supply line.

Item 133

FOUR-BURNER RANGE WITH OVEN

Make - Garland GFE24-4L* C166

Size - 23-5/8" x 34-1/2" x 36" high to work surface, 45-3/8" high overall

Power - 0.1 amps - 120/60/1 - cord and plug (electronic spark ignition)

Rating - 3/4" inlet at 136,000 BTU/Hour

Description - Range shall be all standard construction with four 26,000 BTU/hour open burners with flame failure protection and electronic spark pilot ignition, level cast iron removable grates, stainless steel exterior, thermostatically controlled oven with rack and porcelain interior, 9-3/8" high stainless steel back guard, and provided with pressure regulator.

Accessories - Finished stainless steel back panel. Mount unit on 5" diameter heavy duty swivel casters, two with brakes and provide assembly with a 36" long x 3/4" line size Dormont 1675 KIT2S plastic covered hose assembly with full port gas ball valve, two Supr-Swivels, brass disconnect, 90° street elbow and restraining cable. Mount the nipple on the rear of the range, and the hose assembly with disconnect device connected to the building supply line.

Item 134

FORTY-QUART KETTLE WITH DRAIN STAND

Make - Groen TDHC-40* C166

Power - 1 amp - 120/60/1

Rating - 1/2" gas inlet at 52,000 BTU/Hour

Description - Kettle shall be all standard construction, self-contained gas fired type, stainless steel throughout, ASME inspected, stamped and registered with the National Board for operation up to a maximum working pressure of 50 psi, design certified by AGA, and NSF Listed. Unit shall be thermostatically controlled, capable of producing temperatures from 150 to 298° F., filled with chemically pure water, and provided with low-water cut-off, safety valve, pressure gauge, on-off switch, spark ignition, gas regulator and water sight glass. Unit shall be fitted with a crank tilt mechanism and the burner shall turn off when the kettle is tilted.

Accessories - Provide unit with a faucet mounting bracket with a double pantry water fill faucet and aerator tip, basket insert, and lift off cover, kettle brush kit, and a TS/9S-3 drain cart stand.

Item 135

EXHAUST VENTILATOR

Make - AquaMatic AM-ND-2

Size (Left) - 8'-6" x 60" x 30" high plus 4" high collars, mounted up 6'-8" above finished floor; flat bottom

Size (Right) - 8'-6" plus 12" utility cabinet x 60" x 30" high plus 4" high collars, mounted up 6'-8" above finished floor; flat bottom

Exhaust (Left) - 2,550 CFM exhaust through a 22" x 10" collar at 0.887" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Exhaust (Right) - 1,912 CFM exhaust through an 18" x 10" collar at 0.621" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Power - 0.6 KW - 120/60/1 to lights; remote switch from item 143.

Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edges with integral front baffle, double wall insulated fronts, and NSF Listed. Units shall have grease collection troughs, storage containers, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator.

Accessories - Provide unit with six UL Listed light fixtures with LED bulbs, factory prewired and left ready for final connection by the Electrical Contractor. Provide closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on three sides. Provide one filter removal tool and balance dampers.

Item 136

FIRE SUPPRESSION SYSTEMS

Quantity - 2

Make - Ansul R-102

Protection for hoods: 129 and 135

Design - Provide an automatic liquid fire suppressant system sized to meet all local codes, UL 300 and NFPA Codes. System shall provide surface protection for cooking equipment, hood and the exhaust duct work, if required. Tanks shall be mounted in the hood manufacturer provided utility cabinet and piping shall run hidden wherever possible. All pipes and fittings used to convey the chemical shall be scale free steel, 40 weight. Exposed piping located within the ventilator shall be stainless steel or chrome and limited to vertical drops only. Horizontal piping shall be run over the ventilator's top. Nozzles shall be swivel type with metal caps. Detection shall be fusible links rated per codes, and system shall rely on no outside source of power. The system shall be provided with a control box with indicator to indicate system status. Control head shall also include integral micro switch offering "normally open" and "normally closed" terminals for use by the Electrical Contractor for the shut-down of equipment and the sounding of alarms, etc. Suppressant tanks shall be stainless steel. Provide a properly sized mechanically operated gas shut-off valve (up to 3" diameter) for mounting by the Plumber at a point in the gas supply that will shut off fuel to all gas fired equipment. Provide and install a remote pull station per codes, complete with cables, conduit and pulleys. Coordinate installation of remote pull station with General Contractor to provide a recessed junction box mounted for installing the pull box with cable conduit concealed within walls. Provide system with class-K extinguisher as required.

Workmanship - Exposed stainless steel fittings and piping shall be assembled with special care to avoid marring or damaging the surfaces. Any pieces showing marks shall be removed and replaced with new materials. **Chrome sleeves are not acceptable.**

Test - Perform a puff test on the completed system and obtain the written approval of the local Fire Inspector.

Accessories - Provide metal caps on the nozzles.

Item 137

UTILITY DISTRIBUTION SYSTEM

Make - AquaMatic AM-UDW

Size - 18'-0" x 12" x 6'-8" high

Power - 50 amps circuit - 120/208/60/3

Rating - 2" gas manifold at 600 MBTU/Hour (1,450 MBTU/Hour capacity)

Description - Utility distribution system shall be all standard construction of 300 series stainless steel with primary service riser, secondary riser and a horizontal raceway with separate compartments for plumbing and electrical services. Plumbing compartment shall include a gas manifold with a pre-plumbed 2" electric gas valve, service drops with shut-off valves, and Dormont quick disconnect hoses. Electrical compartment shall include bus bar with individually sized breakers along raceway. Primary riser shall include breaker panel with main shunt trip breaker, emergency kill switch with status lights, two GFI convenience outlet, and gas delay reset.

Accessories - Provide 48" long minimum Dormont swivel type quick disconnect gas hoses and restraining cables.

Item 138

GRIDDLE RANGE WITH CABINET BASE

Make - Montague 36-8

Size - 36" x 37-1/4" x 36" high to work surface

Rating - 1" rear inlet at 60,000 BTU/Hour

Description - Range shall be all standard construction with precision ground steel fry top 36" x 28" x 3/4" thick with 4" high welded splash on rear and sides, heated by four thermostatically controlled cast iron burners rated at 15,000 BTU/hour, constant burning pilot burners, removable spillover tray with tall receiver, and stainless steel cabinet base with open front and bottom and intermediate shelf. Front panel shall be stainless steel; ends and rear enameled steel.

Accessories - Provide with stainless steel ends, manifold caps and covers, cabinet shelves and sides, and mount on casters.

Item 139

TWO-BURNER, HOT TOP RANGE WITH CABINET BASE

Make - Montague 36-11E

Size - 36" x 37-1/4" x 36" high to work surface

Rating - 1" rear inlet at 100,000 BTU/Hour

Description - Range shall be all standard construction with a 40,000 BTU/hour solid hot plate, two cast iron sections, each containing two individually controlled 30,000 BTU/hour star burners, constant burning pilot burners, removable spillover tray, and stainless steel cabinet base with open front and bottom and intermediate shelf. Front panel shall be stainless steel; ends and rear enameled steel.

Accessories - Provide with stainless steel ends, manifold caps and covers, cabinet shelves and sides, and mount on casters.

Item 140

FOUR-BURNER RANGE WITH OVEN

Make - 136-5A

Make - Montague 136-5A

Size - 36" x 36-5/8" x 36" high to work surface

Rating - 1" rear inlet at 160,000 BTU/Hour

Description - Range shall be all standard construction with two cast iron sections, each containing four individually controlled star burners rated at 30,000 BTU per hour, constant burning pilot burners, removable spillover tray and insulated, porcelain enameled oven, 26" x 28" x 15" high, complete with throttling thermostatic control, automatic ignition and 100% safety pilot, weight counterbalanced door mounted in self lubricating bearings, two rack positions, and one nickel plated oven rack. Front panel shall be stainless steel; ends and rear enameled steel.

Accessories - Provide with stainless steel ends, manifold caps and covers, and mount on casters.

Item 141

UPRIGHT BROILER WITH OVEN BASE

Make - Montague 136W36

Size - 36" x 36-3/4" x 71-1/2" high plus deflector

Rating - 3/4" rear gas inlet at 124,000 BTU/Hour

Description - Infrared broiler shall be all standard construction with two independently controlled cast iron burners and ceramic radiants, standing pilot lights, aluminized steel interior, chrome plated 27" x 27" grid on counterbalanced assembly with 2" to 5" clearance and ball bearing movement, removable full width grease deflector pitched to exterior mounted drawer and top mounted warming oven with tilt back door. Mount on a porcelain enamelled oven, 26" x 28" x 15" high, complete with throttling thermostatic control, automatic ignition and 100% safety pilot, weight counterbalanced door mounted in self lubricating bearings, two rack positions, and one nickel plated oven rack. Front shall be stainless steel; ends and rear enamelled steel. Mount on 6" high adjustable stainless steel legs.

Accessories - Provide rear gas connection.

Item 142

FRYER ASSEMBLY WITH DUMP STATION, HEAT LAMP AND OIL FILTRATION SYSTEM

Make - Pitco 2SSH55-SSTC-Dual/BNB*C166

Size - 47" x 34-3/8" x 34" high to rim

Power - 7 amps - 120/60/1 - cord and plug

1.7 amps - 120/60/1 - cord and plug

6.3 amps - 120/60/1 - cord and plug

Rating - 1" gas inlet at 160,000 BTU/Hour

Description - Fryers and BNB shall be factory assembled into a single unit of all standard construction and shall be complete with stainless steel body, splash, top and fryer pots, blower free atmospheric burner system, self cleaning thermostatically controlled burners and solid state fail-safe thermostats. Mount BNB unit on the right hand end and mount the assembly on heavy duty casters.

Accessories - Provide assembly with a 36" long x 1" line size Dormont 16100 KIT2S plastic covered hose assembly with full port gas ball valve, two Supr-Swivels, brass disconnect, 90° street elbow and restraining cable. Mount the nipple on the rear of the unit, and the hose assembly with disconnect device connected to the building supply line. Provide assembly with four twin sized baskets, drainline cleanout rod, two nickel plated draining nipples and 100 filter bags. BNB unit shall be provided with drainer type top, drain outlet and food warmer.

Item 143

VENTILATOR CONTROL SYSTEM

Make - CaptiveAire DCV

Power - 20 amps circuit - 120/60/1 to logic controller

Scope - Furnish and install complete exhaust control system for the exhaust canopy in accordance with the plans and Manufacturers shop drawings. The system shall include programmable logic controller (PLC), variable frequency drive (VFD), stainless steel control enclosure, exhaust duct temperature sensors, room temperature sensor, LCD screen interface with cable, all specified accessories, and those components required to provide complete and satisfactory systems in accordance with accepted HVAC practice. System shall control Item 135. Mount LCD screen control in UDS riser. Mount system processor in the cabinet mounted on the right end of exhaust ventilator 135.

Important: The installation work shall be performed by a fully qualified contractor employing a certified mechanic fully trained in the installation of the DCV hood system. Submittal shall list the installing company and the qualified system installer. Provide wiring diagrams and guidance to related trades to achieve correct operation of the system.

Item 144

Spare number

Item 145
Spare number

Item 146
CHEF'S COUNTER ASSEMBLY WITH OVERSHELF

Make - Randell Custom, Allstate, Carbone, or South Jersey Metal

Size - 19'-0" x 54" plus 72" x 54" extension x 34" high to top of pick-up side cabinet, 36" high to prep side; full length x 23" deep double overshef with shelves mounted at 56" and 70" above floor; 10" x 14" x 10" deep integral sink basin

Power - 150 amps circuit - 120/208/1 supply to mounted breaker panel. Panel to be mounted in an accessible location. Panel to be provided with circuit breakers and main disconnect breaker, pre-wired by the Fabricator in accordance with local, national and UL Codes to all counter assembly mounted receptacles and equipment connections.

Description - Pick-up side shall be all standard construction with 14 gauge stainless steel top and 2-5/8" nosing, bottom and partial intermediate shelves and body to be 22 gauge stainless steel with marine edge at front, integrally welded channel bracing, control panel located on the left side behind hinged access door. Provide opening in shelf below breaker panel for electrical connection from below. Mount on 6" high stainless steel with adjustable bullet feet. Legs mounted to full length channel frame assembly integrally welded to bottom of body assembly. Provide cut-outs in top to accommodate soup wells (Item 146A), and front apron at wells for mounting switches and controls. Provide two interior cabinet mounted GFCI receptacles for the soup wells, pre-wired back to the main breaker panel. Provide cut-outs in top for Item dipper well (Item 146G) and flanged opening in top for the ice cream freezer with all edges flanged down 1" and corners filled and welded. Provide a louvered panel in exterior cabinet end for air flow to drop-in ice cream freezer (Item 146H).

Prep top refrigerator (Item 146B) shall be all standard construction with 14 gauge stainless steel top and raised coldwall pan, 18 gauge stainless steel front, coved stainless steel interior rear and bottom, and vacuum formed thermoplastic interior ends, jam and door liner, a pair of refrigerated drawers with each drawer capable of accommodating two 12" x 20" pans, a pair of refrigerated drawers with each drawer capable of accommodating one 12" x 20" pan, one door section with baked enamel wire shelf, and magnetic door and drawer gaskets. Top openings shall be complete with anti-freezing pan assist capable of holding twenty-one 1/6 size pans and hinged slide back removable covers. Unit shall be insulated with foamed in place polyurethane and provided with self-contained air-cooled refrigeration systems with expansion valve, thermostatic controls and hot gas condensate evaporator, forced air coil and independent pan control, and interior thermometer. Mount refrigeration compartment at right end and pre-wire back to the main breaker panel.

Work top refrigerator (Item 146E) shall be all standard construction with 14 gauge stainless steel top, 18 gauge stainless steel front, coved stainless steel interior rear and bottom, and vacuum formed thermoplastic interior ends and jam, a pair of refrigerated drawers with each drawer capable of accommodating two 12" x 20" pans, a pair of refrigerated drawers with each drawer capable of accommodating one 12" x 20" pan, and magnetic drawer gaskets. Units shall be insulated with foamed in place polyurethane and provided with self-contained air-cooled refrigeration systems with expansion valve, thermostatic controls and hot gas condensate evaporator, forced air coil, and interior thermometer. Mount refrigeration compartment at right end and pre-wire back to the main breaker panel.

Prep top refrigerator (Item 146F) shall be all standard construction with 14 gauge stainless steel top and raised coldwall pan, 18 gauge stainless steel front, coved stainless steel interior rear and bottom, and vacuum formed thermoplastic interior ends and jam, two pairs of refrigerated drawers with each drawer capable of accommodating two 12" x 20" pans, and magnetic drawer gaskets. Top openings shall be complete with anti-freezing pan assist capable of holding twelve 1/6 size pans and hinged slide back removable cover. Unit shall be insulated with foamed in place polyurethane and provided with self-contained air-cooled refrigeration systems with expansion valve, thermostatic controls and

hot gas condensate evaporator, forced air coil and independent pan control, and interior thermometer. Mount refrigeration compartment at left end and pre-wire back to the main breaker panel.

Sink section shall be all standard construction with 16 gauge stainless steel top and basin, 22 gauge body with bottom shelf, apron at sink. Legs to be 6" high stainless steel with adjustable bullet foot mounted to full length channel frame assembly which is integrally welded to bottom of body assembly. Provide 6" high stainless steel splash at sides and rear of basin with front edges of ends angled back.

Hot well section shall be all standard construction with 14 gauge top, four individually and thermostatically controlled electrically heated wells, controls for 1100 watt elements mounted on front of 8" deep removable stainless steel plate shelf. Connections to heating elements to be located outside of heated zone to avoid wiring deterioration. Individual wells wired to common junction box and with apron mounted disconnect switch, and pre-wired back to main breaker panel. Provide unit with 6" high adjustable legs.

Overshelf shall be all standard 16 gauge construction, channel reinforced, edges formed in turndown, made to accept heat lamp assemblies below top shelf, and five 120/60/1 GFCI receptacles complete with rigid stainless steel mounting brackets in set back position. Each outlet shall be provided with box, proper outlet and stainless steel cover plate. All shall be pre wired and mounted by the fabricator. Leg assembly to consist of fourteen square tubular stainless steel uprights and mounted to countertop and raised rails, and provided with chase at one end for mounting remote heat lamp controls.

Accessories - Deck mounted faucet set with wrist blade handles, and 2" lever waste outlet. Provide overshelf with (2) Hatco GRA-60D heat lamps with remote infinite controls. Provide refrigerators with optional five year compressor warranty, and Richlite cutting boards. Provide raised rail sections with adapter bars and full complement of stainless steel 1/6 size pans. Provide hot well section with a single pantry faucet and a Richlite cutting board. Wells shall be provided with drain outlets factory manifolded with 1" diameter line and a gate valve left ready for extending to the floor drain by the Plumbing Contractor.

Item 146A
SOUP WELLS
Quantity - 2

Make - Wells SS-10TDUCI-120, or equal by Alto-Shaam, or Piper
Power - 825 watts each - 120/60/1 - cord and plug

Description - Wells shall be all standard construction, fully insulated, built-in circular type with Wellslok and sealing gasket, one-piece, coved corner stainless steel interior, galvanized steel element outer wrap, and provided with a cord and plug, drain outlet, thermostatic controls with off position, power "on" indicator light, and mounting hardware. Mount the controls per details. Manifold pairs of wells into a single 3/4" copper drain line fitted with quarter turn ball type drain valve, clean-out, and leave ready for connection by Plumber.

Accessories - Provide with inserts and hinged lids.

Item 146B
RAISED RAIL PREP REFRIGERATOR
Specified as part of Item 146.

Item 146C
HOT FOOD TABLE
Specified as part of Item 146.

Item 146D
WORK SINK
Specified as part of Item 146.

Item 146E
REFRIGERATED BASE
Specified as part of Item 146.

Item 146F
RAISED RAIL PREP REFRIGERATOR
Specified as part of Item 146.

Item 146G
DROP-IN ICE CREAM FREEZER
Make - Delfield N225, or equal by Randell or Masterbuilt
Size - 27-7/8" x 16-9/16" x 26-3/4" high with 22-1/8" x 11-3/4" x 13-3/4" deep interior
Power - 5.3 amps - 1/5 HP - 120/60/1 - cord and plug
Description - Drop-in freezer shall be all standard construction with 18 gauge stainless steel top, 1-3/16" flanged edge on all sides, die raised opening, and insulated, folding, lift off cover. Interior shall be 22 gauge stainless steel, wrapped on sides with refrigeration lines and insulated on sides and bottom with polyurethane foam. Refrigeration system shall be self-contained, air cooled, with adjustable thermostat, all mounted on an attached frame. Install in hole provided in counter top.
Accessories - Provide optional five year compressor warranty.

Item 146H
DIPPER WELL
Make - T&S Brass B-2282-01 or equal
Description - Dipper well shall be all standard construction with stainless steel bowl and interior overflow cup, faucet, and drain fitting.

Item 146I
HEAT LAMPS
Quantity - 2
Specified as part of Item 146.

Item 146J
P.O.S. PRINTERS
Quantity - 3
No work in this Section. Item to be provided and installed by Owner.

Item 147
REACH-IN REFRIGERATORS
Quantity - 2
Make - Traulsen AHT 132 WUT-HHS*C166 or equal by Victory or True
Power - 7 amps - 1/3 HP - 120/60/1 - cord and plug
Capacity - 24.2 cubic feet
Doors - Half height, one unit hinged on the left, one unit hinged on right
Certification - Unit shall be Energy Star compliant
Description - Refrigerator shall be all standard construction with stainless steel exterior front and ends and louver rails, anodized aluminum interior and aluminized steel top, back and bottom. Unit shall include automatic interior lighting, hot gas condensate evaporator, self-closing cam lift door hinges with 120° stay open feature, plasticized fin coil, stainless steel breaker strips. Mount on 6" high stainless steel adjustable legs. Moistureproof Intel-a-traul controls for the expansion valve operated

refrigeration system shall be provided and factory pre-set for a 34° to 38° temperature range, built-in data storage, alarms, automatic defrost and system sensors, and automatic door jamb heaters.

Refrigerant shall be R-134a. Unit shall be Energy Star compliant.

Accessories - Provide unit with optional five year compressor warranty, welded corners of exterior door pans, #1 stainless steel angle type pan slides spaced 3" on center in the top half.

Item 148

MOBILE SHELVING

Quantity - 8

Make - MetroMax Q*C166 or equal by Eagle

Size - (3) 54" x 24", (1) 42" x 24", and (4) 36" x 24", all 69" high on casters; four tier

Description - Shelving unit shall be all standard construction and shall consist of four shelves with removable injection molded polypropylene mats with antimicrobial product protection, supported on epoxy coated steel shelf frames and similar uprights with capped tops, and mounted on 5" diameter polyurethane tired swivel casters with donut bumpers.

Accessories - Provide with polymer posts in lieu of standard.

Item 149

STORAGE SHELVING

Quantity - 7

Make - Metro Super Adjustable Super Erecta or equal by Nexel

Size - (2) 48" x 21", (2) 42" x 21", and (3) 36" x 21", all 74-5/8" high; five tier with bottom shelf up 14" clear above floor

Description - Unit shall be all standard construction with Super Adjustable Chrome plated wire shelves and tubular steel uprights with capped tops, adjustable feet, and 1" shelf height adjustment capability with Corner Release System. Each unit shall include four legs.

Item 150

HAND SINKS

Quantity - 6

Make - Advance 7-PS-70-CM*C166 or equal by Krowne

Description - Units shall be all standard stainless steel construction with mounting bracket. Mount on wall with rim at 36" above floor

Accessories - Provide with a splash mounted faucet set with wrist handles (Item 150A), 3" flat strainer type (non-basket, non-lever) open type waste, chrome plated tailpiece, "P" trap and clean-out cap. Provided end splashes welded to each side.

Item 150A

FAUCETS

Quantity - 6

Make - T&S Brass B-0330-04 modified or Fisher 1953 modified

Description - Units shall be all standard construction with mixing body, 8" center inlets, and wrist blade handles. Modified unit shall be provided with 119X gooseneck with B-0199-02-F10 aerator tip in lieu of the standard.

Item 151

WASTE BINS

No work in this Section. Units provided by Owner.

Quantity - 7

Item 152

ACCESSIBLE PREP STATION WITH SINK

Make - Fabricate per General Construction this Section by Allstate, Carbone, or Custom Metals of Massachusetts

Size - 8'-0" x 30" x 34" high plus 6" rear splash, 14" x 16" x 6-1/2" deep integral sink basin; offset drain to rear left.

Construction - 14 gauge stainless steel top over angle frame with rear formed in short splash, front and ends formed in turndown, and mounted on six legs with gussets, five crossrails and adjustable feet with 3" adjustability. Provide basin with a lift out, 16 gauge stainless steel cover with all edges flanged down 1" and corners rounded, provided with two neatly punched thumb holes, and designed to rest on 1/4" rod stock supports welded across the basin corners at proper height to provide a flush surface.

Accessories - Crumb cup waste outlet, T&S Brass B-0323-04 faucet, or equal by Fisher or Encore, with 6" wrist blade handles.

Item 153

WALL SHELF

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 8'-0" x 10" mounted 1" off face of wall up 54" above finished floor

Item 154

FIVE-QUART MIXERS

Quantity - 4

Make - Hobart N-50*C166 or equal by Globe or Varimixer

Power - 2.9 amps - 1/6 HP - 120/60/1 - cord and plug

Description - Mixer shall be all standard construction with gray enamelled exterior, sleeve bearing ventilated drip-proof motor, three speed transmission with agitator speeds of 139, 285 and 591 RPM interlocked to on-off switch, and a manual bowl lift.

Accessories - Provide unit with a stainless steel bowl, wire whip with stainless steel wires and a flat beater.

Item 155

SIXTY-QUART MIXER

Make - Hobart HL-600*C166 or equal by Globe

Power - 10 amps - 2.7 HP - 208/60/3

Description - Mixer frame and body shall be fabricated of welded heavy gauge steel finished in gray baked enamel, and provided with a stainless steel splash guard at the column, stainless steel bowl guard with electrical interlock, single point bowl installation with swing-out bowl support, motor driven power bowl lift and an attachment hub with No. 12 taper. Mixer shall be driven by a switched reluctance, ball bearing motor, ventilated within the mixer body. Motor starter shall be magnetic type with thermal overload protection mounted within the mixer. Transmission shall be poly-V belt driven and geared down with constant mesh heat treated and hardened gears on similar shafts be mounted in ball bearings with recirculating oil and grease to all gears and shafts. Mixing action shall be planetary and shall have speeds of 36 (stir), 67, 120, 200, and 353 RPM as selected by an external lever. Speeds to be selectable on-the-fly and include a soft start and stir speed while lifting the bowl into place and controlled with a 50 minute timer with automatic time recall

Accessories - Provide mixer with a 60 quart stainless steel bowl, flat beater, dough hook, and a whip with stainless steel wires. Provide the following optional accessories: self-centering polished aluminum four wheel 60 quart bowl truck, 40 quart stainless steel bowl and adapter, 40 quart beater, whip and dough hook, vegetable slicer with adjustable slicer plate, plate holder and 3/16" shredder plate, and grater plate.

Item 156

FILL FAUCET

Make - T&S Brass B-0610

Description - Faucet assembly shall be all standard construction with 8" centers, 1/2" IPS inlets, built-in check valves, vacuum breaker connection for hose, all chrome plated, and provided with a 60" long polished stainless steel hose with hook nozzle, self-closing valve and retaining ring.

Item 157

MOBILE MIXER STANDS

Quantity - 3

Make - Fabricate per General Construction this Section by Allstate, Carbone, or Custom Metals of Massachusetts

Size - 30" x 30" x 32" high

Construction - 14 gauge stainless steel top over channel frame, edges formed in turn down, mounted on four legs with gussets, undershelf, and 5" diameter casters, two with brakes.

Item 158

TWENTY-QUART MIXERS

Quantity - 3

Make - Hobart HL-200*C166 or equal by Globe

Power - 8 amps - 1/2HP - 120/60/1 - cord and plug

Description - Mixer frame and body shall be fabricated of welded heavy gauge steel finished in Hybrid Powder coat finish, and provided with a stainless steel splash guard at the column, stainless steel bowl guard with electrical interlock, single point bowl installation with swing-out bowl support, manual bowl lift and an attachment hub with No. 12 taper. Transmission shall be gear driven constant mesh heat treated and hardened gears on similar shafts be mounted in ball bearings with recirculating oil and grease to all gears and shafts. Mixing action shall be planetary and shall have speeds of 59 (stir), 107, 198, 365, agitator RPM speeds as selected by an external dial. Speeds to be selectable on-the-fly and include a soft start and stir speed while lifting the bowl into place and controlled with a 15 minute timer with automatic time recall

Accessories - Provide mixer with a 20 quart stainless steel bowl, one flat "B" beater and one "D" wire loop whip with stainless steel wires.

Item 159

STAINLESS STEEL COLUMN ENCLOSURES

Quantity - 3

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - (2) approximately 10" x 10", (1) approximately 12" x 12", all extending from top of floor covered base (approximately 6" above finished floor) to 14'-0" above floor

Construction - Enclosure shall be fabricated of 16 gauge stainless steel outer and infitting channels. Secure with concealed fasteners.

Item 160

PROOFER CABINET

Make - Food Warming Equipment PHU-12*C166

Size - 32-3/4" x 33-1/4" x 69" high

Power - 13.75 amps - 120/60/1 - cord and plug

Description - Cabinet shall be all standard construction with stainless steel interior and exterior, stainless steel base frame with tubular perimeter and 10 gauge stainless steel reinforcing plates at corners, high density fiberglass insulation on all sides, flush mounted door with high temperature gasket mounted on the cabinet, edge mounted heavy duty hinges and latch, twelve pair of removable universal chrome plated and epoxy coated rod type pan slides capable of supporting 18" x 26" or 12" x 20" pans on 4-1/2" centers, exterior reading thermometer, recessed controls, thermostatically controlled system with separate heat and humidity controls, air distribution blower and removable

stainless steel reservoir, and 10' cord set and cord storage loop. Mount on 5" diameter plate mounted polyurethane tired casters; two swivel, two rigid. Provide with two year warranty. Accessories - Lexan door, perimeter vinyl bumper and push/pull handles.

Item 161

DOUGH DIVIDER / ROUNDER

Make - Doyon DFS030 or equal

Size - 23" x 20" x 54" high

Power - 8 amps - 120/60/1, cord and plug

Capacity - 30 pieces

Description - Unit shall be all standard construction per manufacturer's specifications with an enamel coated heavy gauge steel body, stainless steel cutting knives, manual motor start with built-in thermal overload protection and a grease bath for rounder mechanism. Tilting head unit for easy cleaning.

Item 162

SCALE WITH MOBILE STAND

Make - Hobart HBR301-1 on stand or equal

Capacity - 300 pounds

Description - Scale shall be all standard construction with stainless steel 16" x 20" platter, tilt and rotatable digital display, automatic shut-off, low battery indicator, check weighing, batch weighing, over and under weighing, toggle between pounds and kilograms, tare indicator, one touch and reset tare, zero key, stable weight indicator, net/gross weighing, automatic zero tracking, AC/DC adapter, battery power supply, leveling leg set, and leveling indicator.

Accessories - Provide with HBR-301 mobile stand.

Item 163

MAPLE TOP TABLES

Quantity - 6

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 60" x 36" x 36" high

Construction - Bally Block Versatable 1-3/4" thick hard maple table top with penetrating oil finish, mounted on four legs with gussets, adjustable feet, three lengths of crossrail and 1" x 4" x 1" x 14 gauge stainless steel channels welded to the gussets. Break sharp corners of channels. Top shall be secured through slotted holes in the channels to permit expansion and contraction in the top.

Item 164

INGREDIENT BINS

Quantity - 12

Make - Rubbermaid 3600 or equal

Size - 13-1/8" x 29-1/4" x 28" high

Capacity - 2.75 cubic feet, 21 gallons

Description - Bin shall be all standard construction with structural foam body, mounted on 3" diameter casters and provided with polycarbonate hinged/slide off lid.

Item 165

DROP CORDS

Quantity - 17

Make - World Cords (860/763-2100) Model 88-DC-2003-A4 with inline IL-A-20125 GFCI or equal

Power - 20 amps - 120/60/1

Description - Cord shall be all standard construction with female connector body, cord, strain relief, and stainless steel ceiling plate. Provide with inline GFCI protection with integrated test and reset buttons, and automatic reset. Cords shall be adjusted to hang to 78" above floor. Plastic wire ties are not acceptable for this work.

Item 166

MOBILE PAN RACKS

Quantity - 5

Make - New Age 1331*C166

Size - 20-1/2" x 26" x 69" high

Capacity - Twenty 18" x 26" pans on 3" centers

Description - Rack shall be fabricated of welded extruded aluminum 1" x 1" x .070" tubular uprights and framing, and 1-1/4" x 1-5/8" x .100" angle pan slides with corners chamfered and deburred. Gussets of 1-1/2" x 1-1/2" x 5/8" angle aluminum shall be welded to the bottom inside angles where horizontal bracing meets vertical uprights. Mount on platform type, 5" polyurethane tired swivel casters.

Item 167

MOBILE DEMONSTRATION COUNTER WITH MIRROR

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 60" x 30" x 36" high to table top; mirror to mount 84" above floor measured on centerline

Construction - 14 gauge stainless steel top over angle frame with all edges formed in turndown, mounted on a stainless steel cabinet base of box type construction with bottom and intermediate shelves and mounted on 5" diameter swivel casters, two with brakes. Front shall be provided with two double pan stainless steel doors. Mirror shall consist of 1/4" plate glass with mirror backing mounted in an 18 gauge stainless steel pan with stainless steel angle perimeter retainer trim. Mirror shall be supported on a full width stainless steel shaft of rod stock on its horizontal centerline with appropriate clamps to the frame and passing through the uprights. Both sides shall be fitted with a flag type adjustment bracket with slotted hole permitting adjustment from 30° from horizontal to 60° from horizontal as a minimum, and stainless steel 3/8"-16 securing bolts passing through the leg and fitted with washers and stainless steel wing nuts. Uprights shall be 1-5/8" stainless steel tubing with welded capped tops, drilled holes to receive the mounting shaft and securing bolts. Uprights shall pass through tight swedged openings in the top and secured to cabinet interior intermediate shelf with concealed fasteners to provide necessary rigidity. Ends of the support shaft shall be fitted with washers and pins to secure the mirror in the uprights.

Item 168

MOBILE WORK TABLE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 60" x 30" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown and mounted on four legs with gussets, 5" diameter swivel casters, two with brakes, and full undershelf.

Accessories - Drawer assembly.

Item 169

CLOTHES WASHER

Make - UniMac UFNE5BJP113TW01 or equal

Size - 27" x 27-3/4" x 40-1/2" high

Power - 20 amps circuit - 120/60/1 - cord and plug

Water factor - 3.7 gallons/ft3/cycle

Certification - Unit shall be Energy Star compliant and CEE qualified.

Description - Washer shall be all standard front loading construction with white exterior, see-thru door with heavy duty stainless steel hinge, 3.42 cubic foot front loading stainless steel basket, detergent dispensers, electronic controls, three wash/rinse temperatures, and five selectable wash cycles.

Item 170

CLOTHES DRYER

Make - UniMac UDEE5BGS173CW01 or equal

Size - 27" x 28" x 40-1/2" high

Power - 30 amps circuit - 120/208/60/1 - cord and plug

Description - Dryer shall be all standard front loading construction with white exterior, 7 cubic foot capacity, galvanized drum, electronic controls, lint filter, and interior light.

Item 171

MOP SINK

No work in this Section. Units provided by Plumbing Contractor.

Item 172

MOP RACK WITH UTILITY SHELF

Make - Advance Tabco K-245 or equal

Size - 24" x 8" x 7-1/2" high

Description - Unit shall be all standard construction of welded 18 gauge stainless steel type 430 polished satin finish, back and sides turned up 1-1/2", mounted on two die formed wall brackets and furnished with two mop hangers and three rag hooks.

Item 173

DETERGENT CABINET

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 36" x 18" x 72" high

Construction - 16 gauge stainless steel top with edges turned down, 18 gauge stainless steel cabinet body, fixed bottom shelf, three adjustable intermediate shelves, and 63" high double pan hinged doors at front. Mount on 6" high stainless steel adjustable legs.

Accessories - Provide unit with two (2) three point "T" handles, one locking and barrel bolts mounted to inside top and bottom of door. Provide slotted "L" bracket a top rear for securing to wall.

Item 174

ICE MAKER WITH BIN

Make - Scotsman CO530SA-1/B530S

Size - 30" x 34" x 74" high on bin

Power - 15.2 amps - 120/60/1

Capacity - 525 pounds of cubes per day at 70/50°

Description - Ice cuber shall be all standard construction with an air cooled condenser, automatic controls, front air intake and filter, R-404A refrigerant, self-cleaning and sanitizing system, digital display diagnostic, system information and programmable ice production, vertical freezing plate with medium sized cubes, bin level thermostat, and housed in a stainless steel cabinet. Bin shall have 370 pound capacity with hinged lift-up door, polyethylene bin interior, and stainless steel exterior wrap. Mount on stainless steel adjustable legs. Provide unit with standard 3 year parts and labor warranty on total machine, 5 year parts and labor warranty on the evaporator and 5 year parts warranty on the compressor. Ice maker shall be Energy Star compliant.

Item 175

WATER FILTER

Make - 3M ICE140-S*C166

Size - 5-1/4" x 5" x 15" verify clearance below to remove cartridge

Description - Unit shall be all standard construction and consist of a head assembly with integral mounting bracket, quarter-turn cartridge release mechanism, "valve-in-head" automatic shut-off upon removal of cartridge, pressure gauge, and filter cartridge with internal pre-filter membrane designed for ice makers. Cartridge shall be capable of removal to .2 micron or larger particles, remove

chlorine and off tastes and odors, inhibit scale build-up, service flow rate of up to 3.34 gallons per minute, and meet requirements of NSF Standards 42 and 53 and be so listed.

Accessories - Provide three spare filter cartridges

Item 176

FLOOR PAN AND GRATE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 30" x 15" x 4" deep inside dimensions; 33" x 18" overall

Construction - Pan shall be fabricated of 14 gauge stainless steel, all welded construction, pitched to a 4" ID drain fitting with stainless steel removable, perforated basket and perforated dome strainer. Long sides shall be fitted with integral grate support ledges. Provide a model CGF molded fiberglass grate (Chemgrate) with 1" x 4" pattern, 3/4" clear slots and ends finished in accordance with manufacturer's instructions. Grate shall be cut in a manner that closed pockets will not be formed where they rest on the pan ledges.

Item 177

MOBILE SLICER STAND

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 30" x 30" x 32" high

Construction - 14 gauge stainless steel top over channel frame, edges formed in turn down, mounted on four legs with gussets, undershelf, and 5" diameter casters, two with brakes.

Item 178

SLICER

Make - Hobart HS8 or equal by Bizerba

Power - 5.6 amps - 1/2 HP - 120/60/1 - cord and plug

Description - Slicer shall be all standard construction, manual type with anodized cast aluminum housing and base, 13" diameter stainless steel knife with permanent ring guards, totally enclosed, permanently lubricated ball bearing motor, 430 RPM blade with Poly-V belt drive, capable of 7-1/2" diameter product and provided with thermoplastic coated steel feed grip, cast aluminum gauge plate with ribbed stainless steel face, water protected double pole toggle type switch with push rod, neon indicator light, top mounted and removable knife sharpener with two Borazon stones, adjustable gauge plate from "0" to 1", and rubber feet. Unit to be provided with mechanical and electrical interlocks to include home position start, locked gauge plate when carriage is removed, and no-volt release.

Accessories - Provide unit with automatic shut-off to stop unit if not used for thirty seconds.

Item 179

WORK TABLES

Quantity - 8

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 84" x 30" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turn down and mounted on six legs with gussets, adjustable feet, partial undershelf, and two crossrails.

Item 180

Spare number

Item 181

THREE-COMPARTMENT SINK

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 12'-0" x 30" x 34" high plus 10" high splash at wall; 3" high raised open roll on three sides; three 21" x 27" x 12" deep integral sink basins

Construction - 14 gauge stainless steel drainboards, basins and splash, stainless steel channel reinforced, mounted on eight legs with gussets, adjustable feet, seven lengths of crossrail, and secured 3" off face of wall.

Accessories - Two splash mounted pot sink faucet sets, three 2" lever waste outlets.

Item 182

WALL SHELF

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 66" x 10" mounted 1" off face of wall up 54" above finished floor

Item 183

Spare number

Item 184

SOILED WARE LANDING TABLE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 9'-3" x 27" plus a 18" x 27" return to dishwasher and a 57" x 36" dish drop extension, plus 10" high splash at walls and end; 3" high raised open roll on working faces; 18" x 18" x 8" deep integral sink; 8" deep raised plate landing shelf.

Construction - 14 gauge stainless steel top, sink basin and splash, channel frame, ten legs with gussets, flanged feet and seven crossrails. Secure 3" off walls. Turn end down into dishwasher and secure with stainless steel machine screws. Top of splash shall be fitted with integral flat spot for mounting of the pre-rinse fixture. Integral scrapping sink shall be provided with a 2" x 1/4" bar stock rack guide attached to the reinforced splash with stainless steel through bolts. Sink shall be provided with two 16 gauge perforated stainless steel scrapping baskets, 6" deep, on 1/2" high angle legs set back to clear the basin cove, and integral tubular handles flush with counter tops. Provide finished exterior splash at end. Prepare top of end splash to receive rack sorting shelf uprights.

Accessories - Provide unit with a 2" free flow waste outlet Component Hardware D36-2080

Item 185

RACK SORTING SHELF

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 7'-3" x 24" mounted up 18" clear above counter top

Description - Shelf shall be fabricated of 14 gauge stainless steel and mounted 18" clear above dish table with four stainless steel tubular uprights, two mounted through the table and two mounted thru the splash on one end per plan to brackets below the counter top and secured to the wall on opposite end using suitable fasteners. Provide drain hole located over dish table, no down spouts. Mount to Item 184.

Item 186

HOSE REEL ASSEMBLY

Make - T&S Brass B-1457-7102-01C or equal by Fisher or Reel Craft

Size - 12 foot hose, 3/8" ID

Description - Unit shall be all standard construction with stainless steel open type reel, adjustable bumper, blue hose, B-0107-C low flow spray valve, heat resistant spray valve handle, chrome risers,

two wall brackets, continuous pressure vacuum breaker, 36" flexible water hose, control valve, and deck type base faucet, designed for wall mounting per plan up 7'-6" measured at the inlet.
Installation - The hose reel bracket for wall mounted units shall be rotated 90° downward and installed such that it allows the hose to hang straight down and parallel to the wall. Refer to T&S Brass instructions manual page four figure one for further details.

Item 187

WAREWASHER

Make - Champion 44 DR*C166 or equal by Hobart

Size - 44" x 25" x 58-1/2" high to top of hood; 65-1/2" high over controls

Power -131 Amps - 208/60/3

Conveyor speed - 5.8 feet per minute; 208 racks per hour

Water consumption - 0.54 gallon per rack

Description - Dishwasher shall be all standard stainless steel construction throughout, single tank machine having hood with integral tank, mounted on a frame with adjustable feet and removable closure panels on the front and ends. Vertical clearance shall be 20-3/4" to accept standard sheet pans. Hood to have 26" wide access door with door guides, double hook safety catch, and insulated handle. All interior surfaces to be stainless steel including easily removable scrap basket, two-piece scrap screens and one-piece cast stainless steel upper and lower spray assemblies. Stainless steel pump shall be self draining type with cast stainless steel impeller and designed to be non-clogging with standard NEMA frame, drip-proof pump motor and with grease packed ball bearing shaft. Provide a pre-wired top mounted control panel having an approved magnetic motor starter with overload heaters and low voltage protection for each motor, energy saver pump shut-down, on-off switches for motors and tank heat with indicator lights, and 120 volt control circuit. Tank heater shall consist of a 15.0 KW element in the wash tank with thermostatic control and low-water cut-off. Furnish standard temperature thermometers for tank and final rinse line, vacuum breaker and air gap, fill valve, door operated drain valve, splash curtains, door safety switch, automatic tank fill, common hot water connection and final rinse saver.

Accessories - Provide machine with built-in 22 KW electric hot water booster, dual rinse pump with spray manifold, 24" clearance through machine, two end cowls with 7" high stacks and locking dampers, and standard assortment of three plastic dish racks; two peg, one flat.

Item 188

EXHAUST DUCTS

Quantity - 2

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 4" x 16" with length as necessary to reach 3" above finished ceiling

Construction - 18 gauge stainless steel welded exhaust ducts, sized to suit the vent stacks. Ducts shall be provided with a one-piece perimeter angle collar at the ceiling, installed "leg up".

Item 189

CLEAN WARE TABLE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 66" x 27" x 34" high plus 10" splash at rear; 3" high raised roll at front and end

Construction - 14 gauge stainless steel top and splash over channel frame with raised roll front and end, tall splash at rear, turned down into dishwasher and secured with stainless steel machine screws, and mounted on four legs with gussets, adjustable feet and undershelf. Secure table 3" off face of wall.

Item 190

BUSSING CARTS

Quantity - 2

Make - Lakeside 522

Size - 32-5/8" x 19-3/8" x 34-1/2" high overall with 18" x 27" shelves

Description - Cart shall be all standard NSF construction, stainless steel throughout, with top, intermediate, and bottom shelves supported by an angle frame, and mounted on two 8" fixed and two 5" swivel casters. Capacity of cart to be 650 pounds.

Item 191

Spare number

Item 192

Spare number

Item 193

MILLWORK COUNTER

No work in this Section. Item to be provided and installed by General Contractor.

Item 194

REACH-IN REFRIGERATOR

Make - Traulsen AHT 132 WUT-HHS*C166 or equal by Victory or True

Power - 7 amps - 1/3 HP - 120/60/1 - cord and plug

Capacity - 24.2 cubic feet

Doors - Half height, hinged on the Left

Certification - Unit shall be Energy Star compliant

Description - Refrigerator shall be all standard construction with stainless steel exterior front and ends and louver rails, anodized aluminum interior and aluminized steel top, back and bottom. Unit shall include automatic interior lighting, hot gas condensate evaporator, self-closing cam lift door hinges with 120° stay open feature, plasticized fin coil, stainless steel breaker strips. Mount on 6" high stainless steel adjustable legs. Moistureproof Intel-a-traul controls for the expansion valve operated refrigeration system shall be provided and factory pre-set for a 34° to 38° temperature range, built-in data storage, alarms, automatic defrost and system sensors, and automatic door jamb heaters. Refrigerant shall be R-134a. Unit shall be Energy Star compliant.

Accessories - Provide unit with optional five year compressor warranty, welded corners of exterior door pans, #1 stainless steel angle type pan slides spaced 3" on center in the top half.

Item 195

REACH-IN FREEZER

Make - Traulsen ALT 1-32 WUT-FHS*C166 or equal by Victory or True

Power - 9.4 amps - 1/2 HP - 120/60/1 - cord and plug

Capacity - 24.2 cubic feet

Doors - Full height, hinged on the Left

Certification - Unit shall be Energy Star compliant

Description - Freezer shall be all standard construction with stainless steel exterior front and ends and louver rails, anodized aluminum interior and aluminized steel top, back and bottom. Unit shall include automatic interior lighting, hot gas condensate evaporator, self-closing cam lift door hinges with 120° stay open feature, plasticized fin coil, stainless steel breaker strips. Mount on 6" high stainless steel adjustable legs. Moistureproof Intel-a-traul controls for the expansion valve operated refrigeration system shall be provided and factory pre-set for a zero to -6° temperature range, built-in data storage, alarms, automatic defrost and system sensors, and automatic door jamb heaters. Refrigerant shall be R-404a.

Accessories - Provide unit with optional five year compressor warranty, welded corners of exterior door pans.

Item 196

COMBINATION DISPLAY CASE

Make - Structural Concepts H5C4850LR*C166 or equal by RPI

Size - 50" x 42" x 51" high overall

Power - 10.72 amps - 120/60/1 - NEMA L5-15P cord and plug

Description - Display case shall be all standard construction with white scratch resistant display deck, left side refrigerated, right side non-refrigerated, top and shelf mounted fluorescent lights with shields, three tiers of adjustable cantilevered clear glass shelves with plastic channel edges, tempered lift-up front glass, mirrored interior ends, rear sliding doors, plastic laminate clad exterior in color as selected by Architect from non-standard selection, digital thermometer, self-contained refrigeration system with adjustable control, condensate evaporator and coil capable of maintaining 38° to 40° average case temperature.

Accessories - Provide unit with mirrored ends, reflective doors and cord set.

Item 197

WORK COUNTER WITH SINK

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 7'-0" x 30" x 36" high plus 6" high splash at rear and left; 15" x 18" x 10" deep integral sink

Construction - 14 gauge stainless steel top, basin and splash over angle frame and mounted on a stainless steel cabinet base of box type construction with bottom shelf, partial intermediate shelf, section of glass rack rails in base with rear rack stops, hinged doors at front except at rack slides, and mounted on 6" high adjustable legs. Provide neatly punched hole in undershelf for passage of drainline. Front and right end of top shall be formed in a turndown; rear and left in a short splash. Secure to wall and seal.

Accessories - Deck mount faucet set and 2" lever waste outlet.

Item 198

WALL SHELF

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 42" x 10" mounted 1" off face of wall up 54" above finished floor

Item 199

CONVEYOR TOASTER

Make - Hatco TQ-400*C166

Size - 17-3/4" x 14-1/2" x 13-3/4" high

Power - 10.7 amps - 208/60/1 - cord and plug NEMA 6-15P

Description - Toaster shall be all standard construction with stainless steel exterior, variable speed control, manual advance knob, automatic thermostat, one or two side selector switch, and heated stainless steel delivery tray.

Item 200

COFFEE BREWER

Make - Curtis D1000GT or equal

Size - 18" x 16-1/2" x 25-1/4" high

Power - 23 amps - 208/60/1

Description - Brewer shall be all standard construction per manufacturers specification.

Accessories - Provide with 3M Filtration Brew-120 water filter with three four spare filter cartridges.

Provide with four ThermoPro TLXA 2.2 liter airpot dispensers.

Item 201

Spare number

Item 202
Spare number

Item 203
Spare number

Item 204
Spare number

Item 205
CLOTHES WASHER
Make - UniMac UFNE5BJP113TW01 or equal
Size - 27" x 27-3/4" x 40-1/2" high
Power - 20 amps circuit - 120/60/1 - cord and plug
Water factor - 3.7 gallons/ft3/cycle
Certification - Unit shall be Energy Star compliant and CEE qualified.
Description - Washer shall be all standard front loading construction with white exterior, see-thru door with heavy duty stainless steel hinge, 3.42 cubic foot front loading stainless steel basket, detergent dispensers, electronic controls, three wash/rinse temperatures, and five selectable wash cycles.

Item 206
CLOTHES DRYER
Make - UniMac UDEE5BGS173CW01 or equal
Size - 27" x 28" x 40-1/2" high
Power - 30 amps circuit - 120/208/60/1 - cord and plug
Description - Dryer shall be all standard front loading construction with white exterior, 7 cubic foot capacity, galvanized drum, electronic controls, lint filter, and interior light.

Item 207
MILLWORK CABINET
No work in this Section. Item to be provided and installed by General Contractor.

Item 208
REACH-IN FREEZER
No work in this Section. Item to be provided and installed by Owner.

Item 209
REACH-IN REFRIGERATORS
Quantity - 2
No work in this Section. Item to be provided and installed by Owner.

Item 210
MILLWORK STORAGE CABINETS
Quantity - 4
No work in this Section. Item to be provided and installed by General Contractor.

Item 211
MILLWORK COUNTER AND WALL CABINETS
Quantity - 4
No work in this Section. Item to be provided and installed by General Contractor.

Item 212

RESIDENTIAL STYLE GAS RANGE WITH OVEN

Quantity - 2

Make - General Electric JGS750SEFSS or equal

Power - 15 amps - 120/60/1 - cord and plug

Rating - 1/2" gas inlet at 63,100 BTU/Hour

Description - Range shall be all standard construction per the manufacturers specification with five burner top, edge-to-edge heavy cast grates, self-clean 5.6 cubic foot convection oven, front mounted controls, and stainless steel exterior finish.

Item 213

RESIDENTIAL STYLE ELECTRIC RANGE WITH OVEN

Quantity - 3

Make - General Electric JS750SFSS or equal

Power - 40 amps circuit - 120/208/1

Description - Range shall be all standard construction per the manufacturers specification with five heating element top, self-clean convection oven, front mounted controls, and stainless steel exterior finish.

Accessories - Provide one unit with JXS77BB body side kit at the wheelchair accessible station.

Item 214

EXHAUST VENTILATORS

Quantity - 2

Make - AquaMatic AM-ND-2

Size - 3'-6" x 36" x 24" high plus 4" high collar, mounted up 6'-8" above finished floor; flat bottom

Exhaust - 752 CFM exhaust through an 8" x 8" collar at 0.434" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Power - 0.1 KW - 120/60/1 to lights

Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edges with integral front baffle, double wall insulated fronts, and NSF Listed. Unit shall have grease collection trough, storage container, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator.

Accessories - Provide unit with one UL Listed light fixture with LED bulb, factory prewired and left ready for final connection by the Electrical Contractor. Provide closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on three sides. Provide with balance damper and one total filter removal tool.

Item 215

DROP-IN SINK WITH FAUCET

Quantity - 6

Make - Elkay LSR2722 / T&S Brass B-2730

Size - 27" x 22" flange with 24" x 16" x 8" deep basin

Description - Basin shall be all standard 18 gauge stainless steel with sound deadening on underside and 3-1/2" diameter drain opening.

Accessories - Provide with mounting clips, crumb cup waste outlet, four hole faucet configuration, and T&S Brass g deck mount faucet with side spray.

Item 216

Spare number

Item 217

UNDERCOUNTER WAREWASHERS

Quantity - 2

Make - Hobart LXeH or equal by Champion

Power - 30.5 amps - 120/208/60/1- cord and plug (NEMA 14-50P)

Certification - Unit shall be Energy Star compliant

Description - Dishwasher shall be all standard stainless steel construction with 17" high load capacity, twin upper and lower wash/rinse arms, 38 GPM pump, integral 4.9 KW hot water booster, top mounted microcomputer controls, 109 second cycle complete with pumped rinse, 1.8 KW tank heat, two racks, pumped drain, door interlock switch, automatic fill and digital thermometer and cord and plug kit.

Accessories - Provide unit with cord and plug kit.

Item 218

MILLWORK COUNTER AND WALL CABINETS

No work in this Section. Item to be provided and installed by General Contractor.

Item 219

MILLWORK ISLAND DEMONSTRATION COUNTER

No work in this Section. Item to be provided and installed by General Contractor.

Item 220

DROP-IN RESIDENTIAL STYLE ELECTRIC RANGE TOP

Make - General Electric JP5030SJSS or equal

Size - 29-7/8" x 21-1/2" cooktop

Power - 30.4 amps - 208/60/1

Description - Range top shall be all standard construction per the manufacturers specification with four-element glass top, digital touch controls, timer, control lock capability, and stainless steel trim,

Item 221

EXHAUST VENTILATOR

Make - AquaMatic AM-ND-2

Size - 4'-6" x 7'-0" x 24" high plus 4" high collars, consisting of two 4'-6" long canopies joined back-to-back, mounted up 6'-8" above finished floor; flat bottom

Exhaust - 2,042 total CFM exhaust through (2) 9" x 10" collars at 0.491" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Power - 0.4 KW - 120/60/1 to lights

Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edges with integral front baffle, double wall insulated fronts, and NSF Listed. Units shall have grease collection troughs, storage containers, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator.

Accessories - Provide unit with four UL Listed light fixture with LED bulb, factory prewired and left ready for final connection by the Electrical Contractor. Provide closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on four sides. Provide with balance dampers.

Item 222

RESIDENTIAL STYLE ELECTRIC WALL OVEN

Make - General Electric JK5000SFSS or equal

Power - 20 amps circuit - 120/208/1

Description - Oven shall be all standard construction per the manufacturers specification with convection operation, three heating elements, self-clean capability, self-clean oven racks, glass touch controls, halogen interior lighting, 4.3 cubic foot capacity, and stainless steel exterior trim.

Item 223

MILLWORK COUNTER

No work in this Section. Item to be provided and installed by General Contractor.

Item 224

EXHAUST VENTILATORS

Quantity - 2

Make - AquaMatic AM-ND-2

Size - 4'-6" x 4'-0" x 24" high plus 4" high collar, mounted up 6'-8" above finished floor; flat bottom

Exhaust - 1,238 total CFM exhaust through an 11" x 10" collar at 0.645" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Power - 0.2 KW - 120/60/1 to lights

Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edges with integral front baffle, double wall insulated fronts, and NSF Listed. Unit shall have grease collection trough, storage container, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator.

Accessories - Provide unit with two UL Listed light fixture with LED bulb, factory prewired and left ready for final connection by the Electrical Contractor. Provide with finished back panel and closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on four sides. Provide with balance damper.

Item 225A

FIRE SUPPRESSION SYSTEM

Make - Ansul R-102

Protection for hoods: 214 and 221

Design - Provide an automatic liquid fire suppressant system sized to meet all local codes, UL 300 and NFPA Codes. System shall provide surface protection for cooking equipment, hood and the exhaust duct work, if required. Tanks shall be mounted on wall per plan, 88" high to bottom and within a 16-1/2" x 23-1/2" x 7-1/2" high stainless steel cabinet and piping shall run hidden wherever possible. All pipes and fittings used to convey the chemical shall be scale free steel, 40 weight. Exposed piping located within the ventilator shall be stainless steel or chrome and limited to vertical drops only. Horizontal piping shall be run over the ventilator's top. Nozzles shall be swivel type with metal caps. Detection shall be fusible links rated per codes, and system shall rely on no outside source of power. The system shall be provided with a control box with indicator to indicate system status. Control head shall also include integral micro switch offering "normally open" and "normally closed" terminals for use by the Electrical Contractor for the shut-down of equipment and the sounding of alarms, etc. Suppressant tanks shall be stainless steel. Provide a properly sized mechanically operated gas shut-off valve (up to 3" diameter) for mounting by the Plumber at a point in the gas supply that will shut off fuel to all gas fired equipment. Provide and install a remote pull station per codes, complete with cables, conduit and pulleys. Coordinate installation of remote pull station with General Contractor to provide a recessed junction box mounted for installing the pull box with cable conduit concealed within walls. Provide system with class-K extinguisher as required.

Workmanship - Exposed stainless steel fittings and piping shall be assembled with special care to avoid marring or damaging the surfaces. Any pieces showing marks shall be removed and replaced with new materials. Chrome sleeves are not acceptable.

Test - Perform a puff test on the completed system and obtain the written approval of the local Fire Inspector.

Accessories - Provide metal caps on the nozzles.

Item 225B

FIRE SUPPRESSION SYSTEM

Make - Ansul R-102

Protection for hoods: 214 and 224

Design - Provide an automatic liquid fire suppressant system sized to meet all local codes, UL 300 and NFPA Codes. System shall provide surface protection for cooking equipment, hood and the exhaust duct work, if required. Tanks shall be mounted on wall per plan, 8" high to bottom and piping shall run hidden wherever possible. All pipes and fittings used to convey the chemical shall be scale free steel, 40 weight. Exposed piping located within the ventilator shall be stainless steel and limited to vertical drops only. Horizontal piping shall be run over the ventilator's top. Detection shall be fusible links rated per codes, and system shall rely on no outside source of power. The system shall be provided with a control box with indicator to indicate system status. Control head shall also include integral micro switch offering "normally open" and "normally closed" terminals for use by the Electrical Contractor for the shut-down of equipment and the sounding of alarms, etc. Suppressant tanks shall be stainless steel. Provide and install a remote pull station per codes, complete with cables, conduit and pulleys. Coordinate installation of remote pull station with General Contractor to provide a recessed junction box mounted for installing the pull box with cable conduit concealed within walls. Coordinate installation of remote pull station with General Contractor to provide a flush mounted pull box with cable conduit concealed within walls. Provide system with class-K extinguisher as required.

Workmanship - Exposed stainless steel fittings piping shall be assembled with special care to avoid marring or damaging the surfaces. Any pieces showing marks shall be removed and replaced with new materials. Chrome sleeves are not acceptable.

Test - Perform a puff test on the completed system and obtain the written approval of the local Fire Inspector.

Accessories - Provide swivel type nozzles with metal caps.

Item 225C

FIRE SUPPRESSION SYSTEM

Make - Ansul R-102

Protection for hood: 224

Design, Workmanship, Test, and Accessories - Same as Item 225B

Item 226

Spare number

Item 227

Spare number

Item 228

Spare number

Item 229

Spare number

Item 230

Spare number

Item 231

MOP SINK CABINET

Make - Advance Tabco 9-OPC-84 or equal by Eagle

Size - 25" x 22-5/8" x 84" high, 12" deep basin

Description - Cabinet assembly shall be all standard heavy gauge type 304 stainless steel construction with satin finish, tile edge at rear of sink, vented cabinet walls, hinged door, utility shelf, two mop holders, and central drain with stainless steel strainer.

Accessories - Provide unit with K-240 faucet with K-244 hose and bracket, TA-46 door lock, and K-94-CAB 18-gauge stainless steel upgrade.

Item 232

STACKED WASHER/DRYER

Make - UniMac UTEE5ASP173TW01 or equal

Size - 27" x 27-3/4" x 78-3/16" high

Power - 30 amps circuit - 120/208/60/1 - cord and plug; 20 amps circuit - 120/60/1 - cord & plug

Exhaust - 4" diameter dryer vent

Water factor - Less than 3.7 gallons/ft3/cycle

Certification - Unit shall be Energy Star compliant and CEE qualified.

Description - Washer shall be all standard construction with white exterior, see-thru door with heavy duty stainless steel hinge, 3.42 cubic foot front loading basket, detergent dispensers, front panel control, three wash/rinse temperatures, and five selectable wash cycles. Dryer shall be all standard construction with white exterior, see-thru door with heavy duty stainless steel hinge, lint filter, and interior light.

Item 233

STORAGE SHELF

Make - Metro Super Adjustable Super Erecta or equal by Eagle or Nexel

Size - 48" x 24" x 74-5/8" high; five tier with bottom shelf up 14" clear above floor

Description - Unit shall be all standard construction with Super Adjustable Chrome plated wire shelves and tubular steel uprights with capped tops, adjustable feet, and 1" shelf height adjustment capability with Corner Release System. Each unit shall include four legs.

Item 234

REACH-IN FREEZER

Make - Traulsen ALT 1-32 WUT*C166 or equal by Victory or True

Power - 9.4 amps - 1/2 HP - 120/60/1 - cord and plug

Capacity - 24.2 cubic feet

Door - Full height, hinged on right

Description - Freezer shall be all standard construction with stainless steel exterior front and ends and louver rails, anodized aluminum interior and aluminized steel top, back and bottom. Unit shall include automatic interior lighting, hot gas condensate evaporator, self-closing cam lift door hinges with 120° stay open feature, plasticized fin coil, stainless steel breaker strips. Mount on 6" high stainless steel adjustable legs. Moistureproof Intel-a-traul controls for the expansion valve operated refrigeration system shall be provided and factory pre-set for a zero to -6° temperature range, built-in data storage, alarms, automatic defrost and system sensors, and automatic door jamb heaters. Refrigerant shall be R-404a.

Accessories - Provide unit with optional five year compressor warranty, and welded corners of exterior door pans.

Item 235

REACH-IN REFRIGERATOR

Make - Traulsen AHT 1-32 WUT*C166 or equal by Victory or True

Power - 7 amps - 1/3 HP - 120/60/1 - cord and plug

Capacity - 24.2 cubic feet

Doors - Full height, hinged on right

Certification - Unit shall be Energy Star compliant

Description - Refrigerator shall be all standard construction with stainless steel exterior front and ends and louver rails, anodized aluminum interior and aluminized steel top, back and bottom. Unit shall include automatic interior lighting, hot gas condensate evaporator, self-closing cam lift door hinges with 120° stay open feature, plasticized fin coil, stainless steel breaker strips. Mount on 6" high stainless steel adjustable legs. Moistureproof Intel-a-traul controls for the expansion valve operated refrigeration system shall be provided and factory pre-set for a 34° to 38° temperature range, built-in data storage, alarms, automatic defrost and system sensors, and automatic door jamb heaters. Refrigerant shall be R-134a. Unit shall be Energy Star compliant.

Accessories - Provide unit with optional five year compressor warranty, welded corners of exterior door pans.

Item 236

HAND SINK

Make - Advance 7-PS-70-CM*C166 or equal by Krowne

Description - Unit shall be all standard stainless steel construction with mounting bracket. Mount on wall with rim at 36" above floor

Accessories - Provide with a splash mounted faucet set with wrist handles (Item 236A), 3" flat strainer type (non-basket, non-lever) open type waste, chrome plated tailpiece, "P" trap and clean-out cap. Provided end splashes welded to each side.

Item 236A

FAUCET

Make - T&S Brass B-0330-04 modified or Fisher 1953 modified

Description - Units shall be all standard construction with mixing body, 8" center inlets, and wrist blade handles. Modified unit shall be provided with 119X gooseneck with B-0199-02-F10 aerator tip in lieu of the standard.

Item 237

WASTE BIN

No work in this Section. Unit to be provided by Owner.

Item 238

WORK COUNTER WITH SINK

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 72" x 30" x 36" high to work surface plus 6" high splash at rear; 18" x 20" x 10" deep integral sink basin

Construction - 14 gauge stainless steel top, basins and splash over angle frame, six legs with gussets and adjustable feet, partial undershelf, short rear splash, and front and ends formed in turndown, secured 3" off face of wall.

Accessories - Drawer assembly, deck mounted faucet set and a 2" lever waste outlet.

Item 239

WALL SHELVES

Quantity - 3

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 60" x 10" mounted 1" off face of wall up 54" above finished floor

Item 240

EXHAUST VENTILATOR

Make - AquaMatic AM-ND-2

Size - 4'-6" plus 12" utility cabinet at left end x 4'-6" x 24" high plus 4" high collar, mounted up 6'-8" above finished floor; flat bottom

Exhaust - 968 total CFM exhaust through a 10" x 9" collar at 0.449" static pressure. Blower and ductwork provided and installed by Ventilation Contractor.

Power - 0.2 KW - 120/60/1 to lights

Description - Ventilator shall be of all standard construction, built of not less than 18 gauge 304 stainless steel throughout with welded joints and seams in accordance with NFPA-96, with reinforced front bottom edges with integral front baffle, double wall insulated fronts, and NSF Listed. Unit shall have grease collection trough, storage container, and hanger brackets. Provide with 430 stainless steel Captrate Grease-Stop Solo Filter UL classified S-baffle extractors that shall remove at least 75% of grease particles five microns in size, and 90% of grease particles seven microns in size and larger, with a corresponding pressure drop not to exceed 1.0 inches of water gauge. Provide all materials necessary for the hanging of the ventilator.

Accessories - Provide unit with two UL Listed light fixture with LED bulb, factory prewired and left ready for final connection by the Electrical Contractor. Provide with finished back panel and closure trim per detail to a point 3" above finished ceiling to close to adjacent surfaces on four sides.

Item 241

FIRE SUPPRESSION SYSTEM

Make - Ansul R-102

Design - Provide an automatic liquid fire suppressant system sized to meet all local codes, UL 300 and NFPA Codes. System shall provide surface protection for cooking equipment, hood and the exhaust duct work, if required. Tanks shall be mounted in the hood manufacturer provided utility cabinet and piping shall run hidden wherever possible. All pipes and fittings used to convey the chemical shall be scale free steel, 40 weight. Exposed piping located within the ventilator shall be stainless steel or chrome and limited to vertical drops only. Horizontal piping shall be run over the ventilator's top. Nozzles shall be swivel type with metal caps. Detection shall be fusible links rated per codes, and system shall rely on no outside source of power. The system shall be provided with a control box with indicator to indicate system status. Control head shall also include integral micro switch offering "normally open" and "normally closed" terminals for use by the Electrical Contractor for the shut-down of equipment and the sounding of alarms, etc. Suppressant tanks shall be stainless steel. Provide a properly sized mechanically operated gas shut-off valve (up to 3" diameter) for mounting by the Plumber at a point in the gas supply that will shut off fuel to all gas fired equipment. Provide and install a remote pull station per codes, complete with cables, conduit and pulleys. Coordinate installation of remote pull station with General Contractor to provide a recessed junction box mounted for installing the pull box with cable conduit concealed within walls. Provide system with class-K extinguisher as required.

Workmanship - Exposed stainless steel fittings and piping shall be assembled with special care to avoid marring or damaging the surfaces. Any pieces showing marks shall be removed and replaced with new materials. Chrome sleeves are not acceptable.

Test - Perform a puff test on the completed system and obtain the written approval of the local Fire Inspector.

Accessories - Provide metal caps on the nozzles.

Item 242

SIX-BURNER RANGE WITH OVEN

Make - Garland GFE36-6R*C166 or equal by Montague

Size - 35-1/2" x 34-1/2" x 36" high to work surface, 45-3/8" high overall

Power - 0.1 amps - 120/60/1 - cord and plug (electronic spark ignition)

Rating - 3/4" inlet at 194,000 BTU/Hour

Description - Range shall be all standard construction with six 26,000 BTU/hour open burners with flame failure protection and electronic spark pilot ignition, level cast iron removable grates, stainless steel exterior, thermostatically controlled oven with rack and porcelain interior, 9-3/8" high stainless steel back guard, and provided with pressure regulator.

Accessories - Finished stainless steel back panel. Mount unit on 5" diameter heavy duty swivel casters, two with brakes and provide assembly with a 36" long x 3/4" line size Dormont 1675 KIT2S plastic

covered hose assembly with full port gas ball valve, two Supr-Swivels, brass disconnect, 90° street elbow and restraining cable. Mount the nipple on the rear of the range, and the hose assembly with disconnect device connected to the building supply line.

Item 243

WORK COUNTER

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 72" x 30" x 36" high plus 6" splash at wall

Construction - 14 gauge stainless steel top over angle frame with three edges formed in turndown and rear formed in short splash, mounted on four legs with gussets, adjustable feet and full undershelf.

Accessories - Drawer assembly.

Item 244

MOBILE WORK TABLE

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 48" x 27" x 36" high

Construction - 14 gauge stainless steel top over angle frame with edges formed in turndown and mounted on four legs with gussets, 5" diameter swivel casters, two with brakes, and full undershelf.

Item 245

UNDERCOUNTER WAREWASHER

Make - Hobart LXeH or equal by Champion

Power - 30.5 amps - 120/208/60/1- cord and plug (NEMA 14-50P)

Certification - Unit shall be Energy Star compliant

Description - Dishwasher shall be all standard stainless steel construction with 17" high load capacity, twin upper and lower wash/rinse arms, 38 GPM pump, integral 4.9 KW hot water booster, top mounted microcomputer controls, 109 second cycle complete with pumped rinse, 1.8 KW tank heat, two racks, pumped drain, door interlock switch, automatic fill and digital thermometer and cord and plug kit. Mount in place and secure with stainless steel angles to the underside of the counter.

Accessories - Provide unit with cord and plug kit.

Item 246

THREE-COMPARTMENT SINK

Make - Fabricate per General Construction this Section by Carbone, Custom Metals of Massachusetts, or South Jersey Metal

Size - 9'-0" x 27" x 34" high plus 10" high splash at rear; 3" high raised open roll on three sides; three 18" x 27" x 12" deep integral sink basins

Construction - 14 gauge stainless steel drainboards, basins and splash, stainless steel channel reinforced, mounted on four legs with gussets, adjustable feet, three lengths of crossrail, and secured 3" off face of wall. Prepare underside of tight end for undercounter warewasher.

Accessories - Two splash mounted pot sink faucet sets, three 2" lever waste outlets.

Item 247

COUNTER

No work in this Section. Item to be provided and installed by General Contractor.

Item 248

WASTE BARREL

No work in this Section. Item to be provided by Owner.

Item 249

Spare number

Item 250
Spare number

Item 251
RANGE HOOD WITH FIRE SUPPRESSION

Make - Greenheck GRRS-30-T-E-0-N

Size - 30" x 19-1/3" x 10-1/2" high; bottom mounted 24" (minimum) to 36" (maximum) above range top below

Power - 15 amps - 120/60/1

Exhaust - 550 CFM exhaust through a 7" diameter collar at 0.45" static pressure. Blower, and ductwork provided and installed by Ventilation Contractor.

Description - Ventilator shall be of all standard construction, stainless steel exterior, built in accordance with NFPA-101, UL300A approved, with wall mount bracket, integral baffle filter, internal fire suppression system, fusible link detection, Amerex 660 wet chemical agent, discharge nozzles with caps, audible alarm, front mount fan speed knob, light switch, fan switch, LED status light, and suppressant pressure gauge.

Accessories - Provide unit with electrical disconnect box, and remote manual pull station kit. Coordinate installation of remote pull station with General Contractor to provide a flush mounted pull box with cable conduit concealed within walls.

Test - Perform a puff test on the completed system and obtain the written approval of the local Fire Inspector.

PART 3 - EXECUTION

3.01 SANITATION REQUIREMENTS

- A. Equipment specified herein shall be fabricated to conform to the "Food Service Equipment Standards" of the National Sanitation Foundation prepared by the Committee on Food Service Standards, and published by the National Sanitation Foundation, Ann Arbor, Michigan. Any differences of opinion on sanitation shall be referred to the State Department of Health for a ruling.
- B. Equipment shall be installed in accordance with the manufacturer's instructions and the best practices of the food service industry, with careful attention to eliminating all cracks, crevices and concealed spaces in wet areas that would be difficult to clean or keep free of vermin and soil.

3.02 EXAMINATION AND ACCEPTANCE

- A. Determine whether the General Contractor will furnish and provide temporary power and light, openings and storage space to permit scheduled delivery of equipment. Verify water pressure and provide necessary reducing valves.
- B. Examine space in which specified work is to be installed to assure that conditions are satisfactory for the installation of specified work. Report in writing to the Architect, any deficiency in the work of other contractors affecting specified work. Commencement of specified work shall be construed as acceptance of space conditions.
- C. Obtain and verify all measurements and conditions on the job, and assume responsibility in respect to same.
- D. Inspect flooring and raised concrete bases, wall finishes, painting, ceiling installation and all related work for readiness to commence installation of foodservice equipment. Verify the existence of required mechanical and electrical rough-ins.

3.03 CLEANING UP

- A. Debris and surplus materials resulting from installation work shall be removed promptly as work progresses, to a location indicated by the General Contractor.
- B. Following completion, and before final acceptance by the Owner, clean finished surfaces in accordance with the manufacturer's instructions, and leave specified work free of imperfections.

3.04 DEMONSTRATION AND OPERATING INSTRUCTIONS

- A. Before final acceptance, and by appointment with the Owner and his representatives, completely demonstrate with power, the correct operation of each new item of operating equipment.
- B. Prior to the demonstration, turn on all mechanical and electrical foodservice equipment. Test for leaks, poor connections, and inadequate or faulty performance and correct if necessary. Adjust for proper operation. Thermostatically controlled equipment and equipment with automatic features shall be operated for a sufficient length of time with proper testing equipment to prove controls are functioning as intended. Recalibrate thermostats if necessary.

- C. Provide Architect or Consultant with a loose leaf bound manual of operating data and maintenance instructions containing complete description, wiring diagrams, operating data, maintenance requirements and other information pertaining to the proper operation and upkeep of the various items of electrical or mechanical equipment. Include names, addresses and telephone numbers of authorized service agencies for all items. Arrange all material in alphabetical order by Manufacturer. Book shall be turned over to Owner after review and approval.
- D. Submit guarantees and warranties to the Architect in the above specified manual with all warranty cards completed and becoming effective at the time the equipment was satisfactorily demonstrated.

3.05 PROTECTION OF WORK

- A. Protect specified work from damage during transportation to the project site, storage at the site, during installation, and after completion until acceptance by the Owner.
- B. Protect adjacent work under other contracts during installation until completion of specified work. After completion, the contractor for other work shall be responsible for the protection of his work until acceptance by the Owner.
- C. Damaged work as determined by the Architect, shall be repaired or replaced as determined by and to the satisfaction of the Architect.

END OF SECTION

SECTION 11 53 00
LABORATORY EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Laboratory equipment.
- B. Welding Booths.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing
- B. Division 23 - Mechanical: Exhaust connections for welding booths.

1.03 QUALITY ASSURANCE

- A. Air balancing and blower adjustments to provide proper operation and design air flow for welding booths per SEFA 1 test procedures shall be part of the Work of this Section. The subcontractor shall employ the services of the mechanical subcontractor's balancing agent, or another approved balancing agent. Prior to any balancing activities, the proposed balancing agent shall be submitted to the Architect. Submit copies of the air balancing report to the Architect.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Convene at least two weeks before starting work of this Section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide equipment dimensions and construction, equipment capacities, physical dimensions, utility and service requirements and locations, point loads.
- C. Shop Drawings: Indicate equipment locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances and clearances required.
- D. Manufacturer's Installation Instructions: Indicate special installation requirements.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the types of products specified in this section, with minimum (5) five years of documented experience.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Except where more stringent warranty requirements are provided, all equipment furnished under this Section shall be guaranteed for a minimum of one year, parts, and labor from date of Substantial Completion against defective materials, design and workmanship.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Installation Accessories: Provide all rough-in frames, anchors, supports, accessories and closure trim required for complete installation.

2.02 WELDING BOOTHS

- A. Welding Booth: Panel steel is stitch welded to the frame and bracing steel at normal intervals and top rear corners are fitted with cross gussets for added structural integrity. Each panel has Qty-1 vertical cross brace and engineered to support overhead ducting.

1. Basis of Design: WB-1000 Series by Avani Environmental Intl., Inc.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.
2. Size: 72 inches x 72 inches x 90 inches.
3. Booth Panel Steel: 12 Gauge, minimum.
4. Booth Frame and Cross Brace Steel: Frame: 2" Square Tube; 11-Gauge.
5. Welding Curtain Support: Bar assembly with brackets for hanging a 1-piece, vinyl Avani XA Series welding curtain
6. Fume Arm Bracket Stanchion: All 11-gauge, 24" long 2" square tube steel with 10" L x 6.5" W steel plate welded to the tube steel for a fume arm bracket; stanchion can mount left, right, or center.
7. Adjustable Feet: Legs to have adjustable feet for leveling the booth from 1" to 3"
8. Rear Fixed Shelf; 72" L x 20" D; 12 gauge steel with 1.5-inch square tube under framing with 3 cross supports.
9. Finish: Booth to be industrial powder coated. Color as selected by architect from manufacturer's full range.
10. Accessories:
 - a. Steel Fume Arm: Avani Hanging Fume Arm Model 1620:
 - b. Welding Fume Arm Bracket; Avani Bracket Model: BR-006.
 - c. Welding Positioner Stand with C-Clamp; Avani WPS-SA290.
 - d. Welding Booth Curtain: Avani XA-66 and XA-86.
11. Metal Ducting: Clamp-together duct for branch system required for weld smoke ventilation. Fabricate duct for connecting the branch system to the collector and the collector to the fan where required for weld smoke ventilation.

2.03 MEDICAL HEADWALL EQUIPMENT

- A. Simulated Medical Headwall Units: Vertical, wall mounted, medical simulation headwall unit, complete with standard accessories package including: oxygen and air flow meters, humidifiers, nasal cannulas, vacuum regulator, suction collection canister and ring holder. Provide all required mounting brackets.
 1. Note: Panels are for simulation purposes only. Do **NOT** include manufacturer's standard compressor unit.
 2. Color: Selected by Architect from manufacturer full range.
 3. Size: 39-3/8" H x 19-1/2" W x 4-3/4" D.
 4. Basis of Design: Private Wall Mounted Vertical Flatwall #HW030801 by DiaMedical USA.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough-in frames, anchors and supports are accurately placed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor equipment securely in place.
- C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- D. Touch-up minor damaged surfaces caused during installation. Replace damaged components as directed by Architect.

3.03 CLOSEOUT ACTIVITIES

- A. Demonstrate equipment operation.

END OF SECTION

SECTION 11 66 23
GYMNASIUM EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Motorized basketball backboards, goals, and support framing.
- B. Motorized gym dividing curtains.
- C. Volleyball floor sleeves for net posts.
- D. Wall mounted protection pads.
- E. Installation of Owner furnished scoreboards.
- F. Accurate layout coordination of equipment and floor anchors/sleeves with gymnasium flooring marking.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Secondary structural members supporting gymnasium equipment.
- B. Section 09 64 29 - Wood Strip and Plank Flooring: Gymnasium flooring.
- C. Division 26 - Electrical: Equipment wiring.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM F2440 – Standard Specification for Interior Wall Padding, 2011.
- C. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2010 w/Errata.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 101 - Life Safety Code; 2009.
- F. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Large Components: Ensure that large components can be moved into final position without damage to other construction.
- B. Electrically Operated Equipment: Coordinate location and electrical characteristics of service connection.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, accessories, electrical characteristics and connection locations, fire rating certifications, manufacturer's installation instructions.
 - 1. Provide operating manuals.
- C. Shop Drawings: For custom fabricated equipment indicate, in large scale detail, construction methods; method of attachment or installation; type and gage of metal, hardware, and fittings; plan front elevation; elevations and dimensions; minimum one cross section; utility requirements as to types, sizes, and locations.
 - 1. Provide wiring diagrams for all electrical equipment.
 - 2. Erection Drawings: Detailed dimensional requirements for proper location of equipment.
- D. Samples:
 - a. Submit samples of wall pad coverings in manufacturer's full range of colors.

- b. Submit samples of vinyl curtain in manufacturer's full range of colors.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified with minimum five years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.
- B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.
- C. Store products in accordance with manufacturer's instructions; protect from extremes of weather, temperature, moisture, and other damage.
- D. Coordinate equipment placement with installation of gymnasium flooring.

1.08 WARRANTY

- A. See Section 01 78 00 - Warranties, for additional warranty requirements.
- B. Basketball backstop assemblies shall be warranted for 10 years against defects in materials and workmanship. Backboards with direct goal attachment shall be provided with a life-time warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Porter Athletic Equipment Company.
- B. Acceptable Manufacturers, subject for product review:
 - 1. JayPro Sports
 - 2. Performance Sports Systems
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GYMNASIUM EQUIPMENT - GENERAL REQUIREMENTS

- A. See Drawings for sizes and locations.
- B. Comply with applicable layout requirements of the National Federation of State High School Associations (NFHS) sports rules.
- C. Provide mounting plates, brackets, and anchors of sufficient size and strength to securely attach equipment to building structure; comply with requirements of construction documents.
- D. Hardware: Heavy duty steel hardware, as recommended by manufacturer.
- E. Electrical Wiring and Components: Comply with NFPA 70; provide UL-listed equipment.
- F. Structural Steel Fabrications: Welded in accordance with AWS D1.1, using certified welders.

2.03 DIVIDER CURTAINS

- A. Gymnasium Divider Curtains: Ceiling suspended, motorized, roll-up type.
 - 1. Curtain Lower Section: 8'-0" high, minimum 22 oz/sq. yd. vinyl coated polyester, flame retardant meeting standards of UL-214 and NFPA-701.
 - 2. Curtain Upper Section: 9 oz./sq.yd. vinyl coated mesh, flame resistant, with an approximate 45% to 50% open area. Solid vinyl fabric shall be provided at hoist line locations.
 - 3. Colors: As selected by Architect from manufacturer's full range of standard colors

4. Fabrication: Fully padded pocket at bottom to conceal a continuous 3-1/2" bottom batten, driven with 5" wide polyester webbing. Curtain shall maintain a smooth wrinkle-free surface when rolled and stores within a 24" high overhead space.
5. Operators: Heavy duty 3/4 hp, 115 v, reversible motors with thermal overload protection, as recommended by curtain manufacturer.
6. Controls: Remote control operator that shall also operate backstops. Provide local recessed wall switch for each curtain in addition to remote control with locking cover. See Electrical Drawings.

2.04 BASKETBALL EQUIPMENT

- A. Ceiling-Suspended Backstop Assemblies: Capable of mounting both rectangular and fan-shaped backboards. Provide additional bridging and supports as recommended by the manufacturer.
 1. Framing: Center strut; forward folding framing.
 2. Steel Tube Assemblies: 6-5/8" O.D.
 3. Folding Control System: Electric worm gear hoist; folds backstop with 115 volt actuator; integral limit switches provide automatic shut-off in both positions; provide safety catch with automatic reset. Hoist shall lock and hold the backstop in any position in the event of power failure. The hoist motor shall be pre-wired and complete with a twist lock plug and receptacle.
 - a. Controls: Hoist motor control by hand held transmitter capable of controlling up to nine hoists. Provide (4) four transmitters. Height adapter shall be by hand held transmitter. Control units shall also operate dividing curtains.
 - b. Cable: 1/4" diameter 7000# aircraft cable.
 - c. Safety Lock: At all backstops located above bleachers, to prevent free-fall in the event of cable, pulley, supporting fitting or winch failure, remaining fully operational during storage, raising and lowering of backstops. System shall be rated for 1000 lbs.
 4. Finish on Metal Components: Factory 2 coat painted finish, color selected from manufacturer's full color range.
- B. Backboards: Tempered glass, rectangular shaped.
 1. Markings: White border and target lines.
 2. Frame: Brushed aluminum edge, steel mounting.
 3. Dimensions: 48 inches high by 72 inches wide (official).
 4. Thickness: 1/2 inches.
 5. Markings: Painted.
 6. Provide safety padding for backboard edges meeting all athletic association requirements.
 7. Pad Color: As selected from manufacturer's standard selection.
- C. Goals: Steel rim, mounted to backboard, with attached nylon anti-whip net; complete with mounting hardware.
 1. Net Attachment Device: Tube-tie.
 2. Breakaway mechanism.
 3. Finish: Powder coat orange.

2.05 FLOOR-MOUNTED EQUIPMENT

- A. Floor Sleeves for Posts: Metal sleeve, with latch cover, cast into concrete subfloor to hold poles for nets and goals; installed flush with finish floor surface.
 1. Latch Cover: Brass, round;; tamper resistant lock with key.
 2. Sleeve: Aluminum.
 3. Round Pole Diameter: Confirm with the Owner.
 4. Depth of Sleeve: 9 inches from floor surface to bottom, including latch cover.
 5. Sleeve assemblies in "floating" gym floors shall be installed to allow movement with the floor system.

2.06 WALL PADDING

- A. Wall Padding: Polyethylene foam, phthalate-free, low VOC, bonded to backing board, wrapped in covering; each panel fabricated in one piece. ASTM F2440 compliant.
 - 1. Surface Burning Characteristics, ASTM E84: Class C minimum, tested as a complete panel. (sprinkled assembly).
 - 2. Covering: Vinyl-coated polyester fabric, mildew and rot resistant; stapled to back of board.
 - a. Color: As selected from manufacturer's standard range. Two colors to be selected.
 - b. Texture: Embossed leather-look.
 - c. Fabric Weight: 15 oz/sq yd.
 - 4. Foam Thickness: 2.25 inches.
 - 7. Backing Board: OSB.
 - 8. Panel Dimensions: 24 inches wide by 72 or 84 inches long as indicated, including nailing margins. See Drawings for custom sizes and locations.
 - a. Field modify panels and fabricate back-wrapped openings as required to suit job conditions.
 - b. Specially Shaped Padding: Same construction as standard padding; custom fabricate to fit irregularly shaped members, wall corners, columns, pilasters, and protrusions in gymnasium as indicated.
 - 9. Mounting: Permanent; using screws.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.
- B. Inspect areas and conditions before installation. Notify Architect in writing of unsatisfactory or detrimental conditions. Do not proceed until conditions have been corrected. Commencing installation constitutes acceptance of work site conditions.
- C. Verify that electrical services are correctly located and of the proper characteristics.
- D. Verify the mounting surfaces are ready to receive scoreboards and that supports, anchors and blocking are capable of supporting scoreboard weight.

3.02 INSTALLATION

- A. Remove and re-install floor inserts to match new flooring elevation. Carefully coordinate locations of all inserts and anchors built into floors.
- B. Basketball backstop supports and dividing curtains where attached to roof joist, shall only be attached to panel points as required by the Project's structural engineer.
- C. Install equipment rigid, straight, plumb, and level.
- D. Secure all equipment with manufacturer's recommended anchoring devices.
- E. Install wall padding securely, with edges tight to wall and without wrinkles in fabric covering.
- F. Separate dissimilar metals to prevent electrolytic corrosion.

3.03 ADJUSTING, CLEANING AND PROTECTION

- A. Verify proper placement of equipment.
- B. Verify proper placement of equipment anchors and sleeves. Use actual movable equipment to be anchored if available.
- C. Remove masking or protective covering from finished surfaces.
- D. Clean equipment in accordance with manufacturer's recommendations.
- E. Protect installed products until Substantial Completion. Replace damaged products before Substantial Completion.

3.04 OWNER TRAINING

- A. Instruct the Owner's representatives in the proper operation and maintenance of the athletic equipment. Operating instructions and maintenance manuals shall be available at this training session.

END OF SECTION

SECTION 12 24 00
WINDOW SHADE SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manually-operated window sun-screen shades, black-out shades and accessories.
- B. Motorized window sun-screen shades and accessories for restaurant.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking for attachment of headrail brackets.

1.03 REFERENCE STANDARDS

- A. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog data, product descriptions, installation instructions, detail sheets, and specifications for each type system specified.
- C. Samples for Selection: Manufacturer's color chart or sample set.
- D. Shop Drawings: Prepared specifically for this Project; show dimensions and interface with other products.
 - 1. Room schedule including field-verified dimensions of each opening to receive window shade systems.
 - 2. Indicate system series, operator, fabric selection, and mounting type.
- E. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than ten years of experience.
- B. Window sun-screen shade installer shall have not less than five years installing the products of this Section and shall be approved by manufacturer.

1.06 MOCK-UP

- A. Mock-Up: Provide full size mock-up of window shade complete with selected shade fabric including sample of seam when applicable to demonstrate installation and workmanship. Adjust mock-up as required to achieve Architect's acceptance. Accepted mock-ups may become part of the final installation.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original cartons. Individually package and mark shades with room number and opening number.
- B. Inspect the materials upon delivery to assure that specified products have been received.
- C. Store and handle shades to prevent damage to fabrics, finishes, and operators prior to installation.

1.07 WARRANTY

- A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.
- B. All window sun-screen shades shall be furnished with the manufacturer's standard five year warranty for date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Mecho/5 by MechoShade Systems, Inc.
- B. Acceptable Manufacturers:
 - 1. FlexShade Systems by Draper Shade and Screen Co.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Provide all window shade systems from a single manufacturer.

2.02 ROLLER SHADES

- A. Manual Roller Shades:
 - 1. Light-Block Fabric: Flame-retardant polyester with acrylic coating, PVC free, fade resistant, meeting NFPA 701. Color to be selected from manufacturer's full range.
 - a. Product:
 - 1) Equinox Blackout 0100 Series.
 - 2) Phifer SheerWeave 7500 Blackout fabric.
 - 2. Sun-Screen Fabric: Flame-retardant polyester yarn with coating, meeting NFPA 701, anti-microbial per ASTM G21.
 - a. Assume shade fabric shall be 10% open, to be confirmed by review of actual shade fabric samples to be submitted in a range of % open for review.
 - b. Colors: Selected by the Architect from the manufacturer's standard color range.
 - c. Products:
 - 1) Thermo-Veil Basket Weave 2100 Series, Greenguard.
 - 2) Phifer SheerWeave 2100.
 - 3. Manual Operators: Bead chain operate rollers with bi-directional spring clutches. Chains shall be nickel-plated steel or stainless steel.
 - 4. Rollers: Heavy-duty steel with springs, size as required to eliminate sag and ensure smooth operability. Single and side-by-side, dual rollers. Offset with outside roller over and inside roller under.
 - 5. Headbox: Standard assembly consisting of fascia, back/top cover and ceiling/wall mounting end caps, side, and sill channels.
 - a. Headbox Installation Types:
 - 1) At exterior windows: Within the wall opening.
 - 2) At interior H.M. frames: At face of wall.
 - 6. Brackets and Accessories: Zinc plated steel of size and type recommended by the manufacturer for each proposed installation.
 - 7. Finish for Metal Components and Hardware: White.
 - 8. Light-Block Shades: Provide side and sill channels. Application may require painted wood trim around opening.

2.03 SCHEDULE

- A. Type 1: Manual Sun Shades
 - 1. Window Type Locations: W1, W2, W3, W3b, W4, W4b, W5, W5b, W6
 - 2. Storefront Type Locations: S7, S8, S8a, S9, S10a, S10b, S11.
- B. Type 2: Manual Light-Bloc Shades
 - 1. Location: H.M. borrowed lite at Room B103 Video Production
- C. Type 3: Manual Dual Light-Bloc & Sun Shades
 - 1. Location: Exterior openings at Room C124 Physics.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Contractor shall examine mounting surfaces and installation conditions, field measure for blinds, verify that the site is free of conditions that would interfere with blind installation and

operation, and shall begin installation only when any unsatisfactory conditions have been rectified.

3.02 INSTALLATION

- A. In general, each individual window opening shall be furnished with its own shade. Where multiple windows are combined within single openings, shades may be provided in multiple units as recommended by the manufacturer, subject to the prior approval of the Architect. Shades shall extend the full height and width of windows to minimize light penetration.
- B. Window shades shall be installed in strict accordance with the manufacturer's printed instructions and shall fit openings in accordance with manufacturer's standards. All shades shall be secured to window openings, not directly to window units, and shall be clear of all window hardware. The Contractor shall assume all responsibility for field dimensions and mounting surfaces.
- C. The location of all operators shall be reviewed with the Architect prior to rough-in.
- D. All shades shall be adjusted for proper operation.
- E. Clean soiled shades and exposed components as recommended by the manufacturer. Replace shades that cannot be cleaned to 'like new' condition.

3.03 TRAINING AND CLOSEOUT ACTIVITIES

- A. Demonstrate operation and maintenance of window shade system to Owner's personnel.
- B. Protect installed products from subsequent construction operations.

END OF SECTION

SECTION 12 34 00
PLASTIC LAMINATE CASEWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Plastic Laminate Casework.
- B. Laboratory fume hoods.
- C. Sinks and Fixtures: All plumbing fixtures, including sinks, faucets, tail pieces, nipples, etc., except as specified herein, shall be provide as a part of the Work of Division 22 - Plumbing. Casework coordination with plumbing fixtures shall be provided as part of the Work of this Section. Factory and field casework cut-outs required for the installation of all plumbing fixtures shall be part of the Work of this Section.
- D. Electrical Service Fixtures: Electrical service fixtures specified herein shall be furnished as part of the Work of this Section and installed as part of the Work of Division 26 - Electrical. All other electrical service fixtures in casework shall be furnished and installed as part of the Work of Division 26 - Electrical. Factory and field casework cut-outs required for the installation of all electrical service fixtures shall be part of the Work of this Section.

1.02 RELATED SECTIONS

- A. Section 06 10 54 - Wood Blocking and Curbing.
- B. Section 06 20 00 - Finish Carpentry.
- C. Section 09 21 16 - Gypsum Board Assemblies.
- D. Section 09 65 00 - Resilient Flooring: Resilient base installation on casework.
- E. Section 12 36 00 - Countertops: All countertops for millwork and casework, including Laboratory countertops.
- F. Division 22 - Plumbing
- G. Division 23 - HVAC: Fume Hoods.
- H. Division 26 - Electrical

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions on all products specified herein.
 - 1. Fume Hoods: Submit test reports for each type of fume hood, verifying conformance to test requirements. Submit name of the proposed balancing agent for hoods. Submit copies of the hood air balancing reports. Submit description of equipment operation and required adjusting and testing.
- B. Shop Drawings: Submit shop drawings indicating floor plan casework layout and elevations at not less than 1/4" scale. Show materials, dimensions, equipment and appliance cut-out locations, all plumbing, electrical, ventilating and other service connections. Submit shop drawings at not less than 1/2" scale, indicating details of construction of all casework components and all locations required for back-up blocking provided by other Sections.
 - 1. Special care shall be taken to ensure proper interface between any casework requiring coordination with work specified in Section 11 53 00 - Laboratory Equipment, Division 22 - Plumbing, Division 23 - HVAC and Division 26 - Electrical. Thoroughly review all Drawings in order to determine locations of plumbing fixtures, appliances, electrical fixtures, plenum requirements, and other miscellaneous items and indicate same on the shop drawings.
 - 2. Field Measurements: Verify all building dimensions relative to equipment to be furnished and installed by taking actual field measurements at the job site prior to casework fabrication.
- C. Samples:

1. Upon request of Architect, submit a full size cabinet sample showing all aspects of typical construction.
 2. Submit samples of fixtures and hardware.
 3. Submit samples of fixtures, hardware and plastic laminates. A minimum of seventy (70) plastic laminate colors and patterns shall be available as standard selections.
 4. Submit samples of exposed finishes for fume hoods for selection.
- D. Project Close-out: Submit operating instructions, maintenance manuals, parts lists for each piece of equipment. Provide name, address and telephone number of the manufacturer's representative and service company for each piece of equipment, so that service or spare parts can be readily obtained.

1.04 QUALITY ASSURANCE

- A. Casework products shall comply with applicable standards of the AWI Architectural Woodwork Quality Standards, for custom millwork.
- B. Casework installation contractor shall be approved by the manufacturer and shall provide adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and also are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- C. Comply with applicable electrical, mechanical and plumbing, accessibility and other codes and regulations of all Federal, State and Local authorities having jurisdiction.
- D. Fume Hood Manufacturer: Company specializing in manufacturing the types of products specified in this Section, with minimum fifteen years of documented experience.
- E. Custom/Independent Millwork Shops:
 1. Fabricator Qualifications: Company specializing in fabricating the products specified in this Section with minimum five years of documented experience.
 - a. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 - b. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 2. Quality Certification: Provide AWI Quality Certification Program (QCP) inspection report and quality certification of completed work.
 - a. Arrange and pay for inspections required for certification.
 - b. Replace, repair, or rework all work for which certification is refused.

1.05 DELIVERY, STORAGE AND PROTECTION

- A. Protect all casework during transit, delivery, storage and handling to prevent damage, soiling and deterioration. Store under cover in ventilated building not exposed to extreme temperature and humidity changes. Do not store or install casework in building until concrete, masonry, and plaster work is dry.
- B. Do not deliver casework until painting, wet work, grinding, and similar operations, which could be performed before installation of cabinets have been completed in installation areas. Store casework in installation areas or, if that is impracticable, in areas with ambient conditions meeting the same requirements.
- C. On the protective crating, or on a concealed but accessible surface of each item of the Work of this Section, plainly mark an identifying code or tag to aid in rapid and efficient location of each item's specific installation point within the building.

1.06 JOB CONDITIONS

- A. Manufacturer shall advise Contractor of temperature and humidity requirements for casework installation areas. Do not install casework until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
- B. Maintain temperature and humidity in installation areas as required to maintain moisture content of installed cabinet work within a tolerance range of the optimum moisture content

acceptable to the casework manufacturer, from date of installation through remainder of construction period.

1.07 WARRANTY

- A. The manufacturer shall warranty that casework and other products furnished shall be free from defects in material and workmanship when properly installed and under normal use for a period of two (2) years from the date of Substantial Completion. Upon notification of any such defects within said warranty period, the manufacturer shall promptly make all necessary repairs and replacements at no cost or expense to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Basis of Design: Advantage 1000 Series by Stevens Industries, Inc.
 - 1. Application(s): General Use, and where no other millwork is indicated.
- B. Basis of Design: 4120 Laminate Series by Stevens Industries Inc.
 - 1. Application(s): Science Classrooms and Laboratories and as otherwise indicated per the Drawings.
- C. Acceptable manufacturers:
 - 1. Laminate Casework by Kewaunee.
 - 2. Sheldon Laboratory Systems.
 - 3. Wood-Metal Industries.
 - 4. LSI Corp.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Custom/Independent Millwork Shops
 - 1. The intent of the specified Basis of Design and listed Acceptable Manufacturer's above is to set a standard of quality and performance criteria pertaining to the scope of work included within this Section. It is not the intent of this Section to prohibit the scope of work included here-in to be manufactured and installed by Custom/Independent Millwork Shops (commonly referred to as "Local Millworkers") capable of meeting or providing those requirements.
 - 2. See Quality Assurance requirements specified in this Section.

2.02 MATERIALS

- A. High Pressure Decorative Laminate (HPDL): NEMA LD 3, indicated "P Lam" on the Drawings. See Finish Legend for manufacturers and colors. All panels shall be faced both sides for balanced construction. Provide types for applications as follows:
 - 1. Vertical Surfaces: VGS, 0.028 inch nominal thickness.
 - a. Applications: Exposed vertical surfaces, exposed interior surfaces, both sides of cabinet doors.
 - 2. Laminate Backer: BKL; 0.020 inch nominal thickness; undecorated plastic laminate.
 - a. Applications: Semi-concealed cabinet interiors, concealed faces for balanced construction.
- B. Substrate Panels: Particle Board (PB); ANSI A208.1; Class M2, 45 pcf minimum density; no urea formaldehyde-added (NAUF), composed of wood fibers pressure bonded with adhesive to suit application; sanded faces; thicknesses as required.
 - 1. High stress areas such as drawer bodies shall use ANSI A208.1 medium density fiberboard; 48 pcf density.
- C. Melamine: Thermo-fused; NEMA LD 3; particle board core as specified above; surfaced both faces; for concealed surfaces. Color as selected from manufacturer's standard solid colors
- D. Edge Banding: ABS or PVC, smooth finish, flat with eased edges; width to match component thickness and length required; applied with hot melt adhesive. Color shall be as selected from the manufacturer's full range.
 - 1. Applications:

- a. Door and drawer front edges, shelves, end panels: 3 mm (0.12") thickness.
- b. Semi-exposed cabinet body edges and drawer boxes: 1 mm (0.04") thickness.
2. Products:
 - a. Accent Edge by Dolken Woodtape.
 - b. Edge Banding by Charter Industries.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 CABINETS

- A. Base Cabinets: Fully enclosed at the bottom for all cabinet types.
 1. Cabinets at perimeter fin tube radiate heat locations shall be cut for installation of toe space grilles and free air flow out back of cabinet base.
- B. Base and Tall Cabinet Tops and Bottoms and Vertical Members: 3/4" thickness.
- C. Wall Cabinet Tops and Bottoms: 1" thickness.
- D. Cabinet Frame Rails: 3/4" x 3-3/4".
- E. Toe Kicks: 3/4" x 3-3/4" integral to cabinet inset from cabinet front and back edge.
- F. Adjustable Shelves: Less than 36" long: 3/4" thickness; 36" and longer: 1" thickness.
 1. Semi-concealed shelves: Melamine with plastic banding.
 2. Exposed shelves: Substrate panel with high-pressure plastic laminate both faces with plastic banding.
- G. Doors Panels: 3/4" thickness.
- H. Drawers: Full box design with a separate front panel; 3/4" thickness with 1/4" bottom panel.
- I. Cabinet components shall be joined by hardwood dowels or mechanical fasteners.
- J. Backs: Pre-finished MDF; 1/4" thickness; secured to back cross rail, cabinet bottom and dadoed into cabinet sides. Backs shall be recessed 3/4" to permit accurate scribing to the wall.
- K. Wall Cabinet Filler Panels for electrical devices shall include top closures.
- L. Finished End Panels: 3/4" thickness; finished both sides.
- M. Upper Cabinet Valance Panels: (if indicated on the Drawings) 3/4" thickness; extend from cabinet top to finish ceiling.
- N. Drying Racks: 30" wide x 36" tall unless indicated otherwise. Plastic laminate faced water resistant MDF panel, finish to match adjacent cabinets; finish edges with 3mm plastic edge banding all sides. Provide plastic or metal pegs.

2.04 HARDWARE

- A. Hinges: Wrap around, five-knuckle pin, heavy-duty institutional type with rounded ends, 2-3/4" high by .095 thick. Fasteners concealed when door is closed. Two hinges at doors under 44" high; three hinges at doors over 44" high.
 1. Finish: Brushed dull chrome.
- B. Pulls: 4" wire pull design; satin anodized aluminum finish.
 1. One pull at drawers under 27" wide; two pulls at drawers 27" and wider.
- C. Catches: Heavy duty spring loaded, double action, nylon roller catches, at all doors. Tall doors shall have a top and bottom catch
- D. Locks: Heavy-duty, cylinder type with removable and interchangeable six disc tumblers; die cast body with dead bolt engagement tang; keyed and master keyed as specified.
 1. General Use Millwork: Provide locks for 25% of drawers and cabinets. Architect to specify locations during the shop drawing process.
 2. Science Classrooms and Laboratories:
 - a. Chemistry Laboratories: All drawers and doors shall receive locks.
 - b. Other Science Classrooms and Laboratories: 50% of all drawers and cabinets. Architect to specify locations during the shop drawing process.

- E. Drawer Slides: Extension slides bottom and side mounted; epoxy coated steel; ball bearing with nylon rollers; 100 lb load rating.
- F. Shelf Supports: Injection molded clear polycarbonate with integral molded lock tab; 5mm double pin engagement to bored hole in cabinet; 200 lb per clip load rating; 4 point shelf supports; shelves over 27" shall have 5 point support

2.05 LABORATORY FIXTURES

- A. Water Faucets:
 - 1. Manufacturers:
 - a. Water Saver Faucet Co.
 - b. Chicago Faucets.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Water Saver VR411VB, mixing faucet, deck-mounted, vandal-resistant, hot and cold water faucet, stainless steel, gooseneck riser, 6" rigid vacuum breaker with cover and vandal resistant screws, round serrated hose end, provide wrist blade handles with colored index discs. ADA complaint. Provide (1) aspirator with each faucet.
 - 3. Chicago Faucets Model 930-VR317CP-VR, hot and cold water deck mounted combination lab fitting with GNBVB rigid gooseneck spout with integral vacuum breaker, round serrated hose end, 317 color indexed wrist blade handles. ADA compliant. Provide (1) aspirator with each faucet.
- B. Gas Turrets (Gas Cocks):
 - 1. Manufacturers:
 - a. Water Saver Faucet Co.
 - b. Chicago Faucets.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Water Saver VR4200-132SWSA, 180 degree straight double ball valve assembly, deck-mounted, vandal-resistant, round serrated hose end. ADA compliant.
 - 3. Chicago Faucets Model 981-VR909CAGCP, deck-mounted single ball valve turret with integral check, threaded connections, polished chrome finish, vandal-resistant, round serrated hose end. ADA compliant.
- C. General Specifications: All fixtures shall be cast from red brass (85-5-5-5) except for fixtures using brass forgings. Fixtures shall have four arm type handles, except as otherwise specified, with snap-in color coded, tamper-proof index buttons for permanent identification of service.
 - 1. On compression type fixtures, all seats shall be made of high grade silicon bronze material and be of replaceable type. Stems shall be made of rod brass and be of double acme thread construction. Stem packing is to be of heavy pre-molded Teflon type backed by heavy brass support washer.
- D. Fume Hood: Constant volume, double bypass, "thin wall" bench type, Class B.
 - 1. Size: 30" deep x 70" high above work surface x 72" wide, nominal.
 - 2. Enclosure: Painted steel exterior, with interior lining of light colored high-density calcium silicate sheet material.
 - 3. Work Surface: Provided as part of casework and countertops: Epoxy resin with two lab sinks, two lab faucets, and one gas cock (ground hose key cock). See drawings.
 - 4. Sash: Single vertical sliding sash; welded steel frame, with laminated safety glazing, counterbalanced, smooth operation.
 - 5. Light: Interior vapor sealed lighting with lamps; minimum of 80 foot-candles; controlled from the front apron.
 - 6. Duct Connection: 10 inch round stainless steel. Blower is provided by Mechanical Contractor, see Drawings.
 - 7. Blower control and receptacle: Switch and a duplex receptacle at front apron.
 - 8. Provide one duplex outlet and one data port inside fume hood.
 - 9. Adjacent to the fume hood, provide camera connections including USB and composite video. Include recessed wall box and face plate.

10. Ceiling enclosure panels and cabinet base part of casework.
 11. Note: At each fume hood provide one Document Camera and associated wiring/connections
 12. Basis of Design: Eliminator Series 100 (EH-111-72) by Air Master Systems.
 13. Acceptable Manufacturers:
 - a. Labconco
 - b. SafeAire
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Document Camera:
1. Provide and mount camera inside each fume hood.
 2. Adjacent to the fume hood, provide camera connections including USB and composite video. Include recessed wall box and face plate.
 3. Product: Video Flex Fume Hood 5400 Document Camera by Ken-a-vision.
 - a. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 LOOSE STUDENT TABLES

- A. Loose Student Lab Tables:
1. Size: 18" W x 72" L x 36" H, unless otherwise indicated on the Drawings.
 2. Top: Laboratory epoxy, color gray, unless otherwise indicated. See Section 12 36 00.
 3. Aprons: 1" x 4-1/2"; Hard White Maple, 4-sides.
 4. Legs: 3" x 3" minimum; Hardwood White Maple with adjustable legs and leveling glides and double diagonal steel corner brackets. No exposed fasteners. Provide maple leg brace rails at sides and front of tables.
- B. Loose Adjustable Height Student Lab Tables:
1. Size: 18" W x 72" L x 30" to 36" H, unless otherwise indicated on the Drawings.
 2. Top: Laboratory epoxy, color gray, unless otherwise indicated. See Section 12 36 00.
 3. Aprons: 1" x 4-1/2"; Hard White Maple, 4-sides.
 4. Legs: 3" x 3" minimum; Hardwood White Maple with adjustable leveling glides and double diagonal steel corner brackets. No exposed fasteners. Provide maple leg brace rails at sides and front of tables.

2.07 COMPONENT UNIT DESCRIPTION

- A. The following is a description of the items to be furnished and installed. Refer to the floor plans and casework drawings for additional information. See casework elevations for required base cabinet heights, widths and special cabinet depths.
- B. Architectural Drawing Designation and Description:
- 1) Base Double Cabinets: 2 doors, 1 adjustable shelf, 2 drawers
 - a) BD343024 = 34" High, 30" Wide, 24" Deep
 - b) BD343624 = 24" High, 36" Wide, 24" Deep
 - c) BD344224 = 34" High, 42" Wide, 24" Deep
 - d) BD363024 = 34" High, 30" Wide, 24" Deep
 - e) BD363324 = 36" High, 33" Wide, 24" Deep
 - f) BD363624 = 36" high, 36" wide, 24" Deep
 - g) BD363924 = 36" High, 39" wide, 24" Deep
 - h) BD423018 = 42" High, 30" Wide, 18" Deep
 - i) BD423024 = 42" High, 30" Wide, 24" Deep
 - j) BD423030 = 42" High, 30" Wide, 30" Deep
 - k) BD423624 = 42" High, 36" Wide, 24" Deep
 - l) BD423630 = 42" High 36" Wide, 30" Deep
 - 2) Base Single Cabinet: 1 door; 1 adjustable shelf, 1 drawer.

- a) BS341524= 34" High, 15" Wide, 24" Deep
- b) BS351825= 34" High, 18" Wide, 24" Deep
- c) BS342424= 34" High, 24" Wide, 24" Deep
- d) BS361524= 36" High, 15" Wide, 24" Deep
- 3) Base Open Cabinet: No doors, 1 fixed full depth shelf
 - a) BO343624= 34" High, 36" Wide, 24" Deep
 - b) BO363624= 36" High, 36" Wide, 24" Deep
- 4) Base Cabinet Doors: Doors only with adjustable shelves
 - a) BC363624= 36" High, 36" Wide, 24" Deep
- 5) Drawer Base Cabinet: 4 equal drawers
 - a) DB341224=34" High, 12" Wide, 24" Deep
 - b) DB341824= 34" High, 18" Wide, 24" Deep
 - c) DB342124= 34" High, 21" Wide, 24" Deep
 - d) DB361824= 36" High, 18" Wide, 24" Deep
 - e) DB361524= 36" High, 15" Wide, 24" Deep
 - f) DB421824= 42" High, 18" Wide, 24" Deep
 - g) DB422134= 42" High, 21" Wide, 24" Deep
- 6) Drawer File Cabinet: 2 equal drawers
 - a) DF341824= 34" High, 18" Wide, 24" Deep
 - b) DF361824= 36" High, 18" Wide, 24" Deep
- 7) Sink Base Cabinet: 2 doors, 1 fixed panel
 - a) SB343624= 34" High, 36" Wide, 24" Deep
 - b) SB363024= 36" High, 30" Wide, 24" Deep
 - c) SB363624= 36" High, 36" Wide, 24" Deep
 - d) SB423024= 42" High, 30" Wide, 24" Deep
 - e) SB423030= 42" High, 30" Wide, 30" Deep
- 8) Sink Apron: 5.25" h x 1" thick apron, 1 removable panel to conceal piping
 - a) SA3424= 34" High, Width shown on interior elevations, 24"Deep
 - b) SA3430= 34" High, Width shown on interior elevations, 30"Deep
 - c) SA3436= 34" High, Width shown on interior elevations, 36"Deep
 - d) SA3624= 36" High, Width shown on interior elevations, 24" Deep
- 9) Open Cabinet
 - a) OC343624= 34" High, 36" Wide, 24" Deep
 - b) OC363624= 36" High, 36" Wide, 24" Deep
- 10) Wall Double Cabinet: 2 doors, 2 adjustable shelves
 - a) WD183612= 18" High, 36" wide, 12" Deep
 - b) WD302712= 30" High, 27" Wide, 12" Deep
 - c) WD303012= 30" High, 30" Wide, 12" Deep
 - d) WD303312= 30" High, 33" Wide, 12" Deep
 - e) WD303612=30" High, 36" Wide, 12" Deep
 - f) WD304212= 30" High, 42" wide, 12" Deep
 - g) WD304812= 30" High, 48" wide, 12" Deep
- 11) Wall Single cabinet: 1 Door, 2 adjustable shelves
 - a) WS301812= 30" High, 18" wide, 12" Deep
- 12) Wall Open Double, 1 fixed shelf, no doors
 - a) WO303012= 30" High, 30" Wide, 12" Deep
 - b) WO303612= 30" High, 36" Wide, 12" Deep
- 13) Wall Open Single, 1 fixed shelf, no doors

- a) WU301812= 30" High, 18" Wide, 12" Deep
- b) WU302112= 30" High, 21" Wide, 12" Deep
- 14) Wall Double Glass Cabinet, 2 glass doors, 1 adjustable shelf
 - a) WDG303012= 30" High 30" Wide, 12" deep
 - b) WDG303612= 30" High 36" Wide, 12" deep
 - c) WDG304212= 30" High 42" Wide, 12" deep
- 15) Wall Single Glass Cabinet, 1 glass door, 1 adjustable shelf
 - a) WSG301812= 30" High, 18" Wide, 12" Deep
- 16) Wall Cabinet Corner, 1 door, 1 adjustable shelf
 - a) WCC3412= 30" high, 12" Deep
- 17) Tall Cabinet: 2 doors, 5 adjustable shelves
 - a) TC722424= 72" High, 24" Wide, 24" Deep
 - b) TC723618= 72" High, 36" Wide, 18" Deep
 - c) TC723624= 72" High, 36" Wide, 24" Deep
 - d) TC724224= 72" High, 42" Wide, 24" Deep
 - e) TC724824= 72" High, 48" Wide, 24" Deep
 - f) TC726024= 72" High, 60" Wide, 24" Deep
 - g) TC842424= 84" High, 24" Wide, 24" Deep
 - h) TC843024= 84" High, 30" Wide, 24" Deep
 - i) TC843624= 84" High, 36" Wide, 24" Deep
- 18) Tall Single: 1 door, 5 adjustable shelves
 - a) TS721824= 72" High, 18" Wide, 24" Deep
- 19) Tall Open: No door, 3 fixed shelves
 - a) TO723624= 72" High 36" Wide, 24" Deep
- 20) Mail slots
 - a) FSM5616760= 76" High, 56 1/8" Wide, 16 7/8" Deep
- 21) Drawers: 2 drawers under counter
 - a) UCD4224: Two drawers 6" high 42" wide, 24" deep
 - b) UCD5424: Three drawers 6" high 54" wide, 24" deep

OTHER:

- a) Instructor's Lab Station:
30"d, 34"h, 96"w, (1) 30"w, 24"d, 32.5"h, 2 door, 1 shelf cab ;(1) AR Apron;
30"w, 24" d, 33.5"h, 6 drawer cabinet; finished side & back panels; (1) set rods, sockets,
double gas cock; panel for electrical controls and receptacles. Refer to 12-36-00.
- b) Cabinet Valances: Panels for complete closure from cabinet top to finish ceiling, matching
cabinet body material and finish, with concealed fasteners.
- c) Filler Panels & Scribes: Flush with adjacent cabinet face, as required for a complete, neat
installation. Use of surface mounted moldings is not acceptable.
- d) LEG - Leg assembly: 2-1/2" x 2-1/2" wood, with hold down angle.
- e) Drying Racks (DR) 36" High, 36" Wide, 1" Thick, Plastic or Metal Pegs

PART 3 - EXECUTION

3.01 COORDINATION

- A. Coordinate Work of this Section with related Work of other Sections as necessary to obtain
proper installation of all items.
- B. Verify site dimensions of cabinet locations in building prior to fabrication.

- C. Examine space in which specified Work is to be installed to assure that conditions are satisfactory for the installation of specified Work. Report in writing to the Architect, any deficiency in the work of other contractors affecting specified Work. Commencement of Work shall be construed as acceptance of space conditions.
- D. Verify location and sizes of utility rough-in associated with work of this Section.
- E. Casework shall be conditioned to the space humidity and temperature conditions prior to installation

3.02 INSTALLATION

- A. Attach wall mounted cabinets to support blocking following industry standards and best practices. Ensure that proper fastener type is utilized for support structure material.
- B. Use concealed joint fasteners to align and secure adjoining cabinet units.
- C. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- D. Secure cabinets to floor using appropriate angles and anchorages. Base toe kick board shall be scribed to uneven floor surfaces.
- E. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- F. Install without distortion so that doors and drawers will fit openings properly and be accurately aligned.
- G. Cut and fit work around pipes, ducts, etc. All shims under cabinets at floors shall be continuous for proper support of cabinets, and shall be water-resistant.
- H. Install all items complete and adjust all moving parts to operate properly. Leave surfaces clean and free from defects at time of final acceptance.
- I. Cabinets set off from a wall surface shall have extended finished ends, and top and bottom closure panels to the wall surface.

3.03 CLEAN-UP, PROTECTION AND INSTRUCTION

- A. Protect specified Work from damage until acceptance by the Owner.
- B. Damaged Work as determined by the Architect, shall be repaired, or replaced as determined, by, and to the satisfaction of, the Architect.

END OF SECTION

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for manufactured casework specified in Section 12 34 00 – Plastic Laminate Casework. Countertops for architectural millwork and wall-hung countertops are part of the scope of Section 06 20 00 – Finish Carpentry and Architectural Millwork.
- B. Molded laboratory countertops, sinks, reagent shelves, window sills.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking.
- B. Section 06 20 00 - Finish Carpentry & Architectural Casework: Countertops for millwork, wall-hung countertops, end panels, cleats, support brackets and grommets.
- C. Section 12 34 00 - Plastic Laminate Casework.
- D. Division 22 - Plumbing: Sinks.

1.03 REFERENCE STANDARDS

- A. ANSI A161.2 - Performance Standards for Fabricated High Pressure Decorative Laminate Countertops.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use.
- D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. AWI/AWMAC/WI - Architectural Woodwork Standards; 2014.
- G. ISSFA-2 - Classification and Standards for Solid Surfacing Material; 2007.
- H. NEMA LD 3 - High-Pressure Decorative Laminates.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets for surfacing, substrate and other products; include manufacturer's maintenance instructions and recommendations.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other Sections.
- D. Verification Samples: Submit 4 inches square minimum size samples representing actual products and colors selected.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Same fabricator as for Section 06 20 00 – Finish Carpentry & Architectural Casework.
- B. Installer Qualifications: Fabricator.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS).
- B. Plastic Laminate Countertops: High pressure decorative laminate sheet (HPDL) bonded to substrate with backer sheet for balanced construction.
 - 1. Laminate Face Sheet: NEMA LD3 Grade HGS, 0.048 inch; nominal 1/16 inch thickness.
 - a. Surface Burning Characteristics, ASTM E84: Flame spread 25, max. Smoke developed 450, max.
 - b. Manufacturers and Colors: See Finish Legend.
 - 2. Laminate Backer Sheet: Grade BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.
 - 3. Plastic Exposed Edge Treatment: Molded plastic (PVC or ABS) edge, 3 mm thickness, 1-5/16 inch wide or as required to completely cover edge of finished panel.
 - a. Color: As selected by Architect from the manufacturer's full line.
 - b. Products:
 - 1) ABS Greenline by Dollken Woodtape.
 - 2) Edge Banding by Charter Industries.
 - 3) Substitutions: See Section 01 60 00 - Product Requirements.
 - 4. Wood Exposed Edge Treatment: Hardwood as specified and finished in Section 06 20 00. See Drawings for nosing shape.
 - 5. Back and End Splashes: Same material, same construction as countertop.
 - 6. Counter Substrate: See Accessories below.
- C. Solid Surface Countertops – Type SS: Solid surfacing sheet ISSFA-2 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness. Solid surfacing sheet supported by continuous substrate.
 - 1. Flat Sheet Thickness: 1/2 inch.
 - 2. Surface Burning Characteristics, ASTM E84: Flame spread 25, max. Smoke developed 450, max.
 - 3. Exposed Edge Treatment: Built up to 1-1/2 inch thick; eased edge.
 - 4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high and as indicated on the Drawings.
 - 5. Substrate: See Accessories.
 - 6. Manufacturers and Colors: See Finish Legend.

2.02 LABORATORY COUNTERTOP ASSEMBLIES

- A. Laboratory Countertops – Type EP-1: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components and highly resistant to chemical attack.
 - 1. Flat Surface Thickness: 1 inch, nominal.
 - 2. Chemical Resistance: Provide products that resist the following chemicals with not more than Slight Effect when tested in the same manner as specified in NEMA LD 3:
 - 3. Flammability, ASTM D635: Self-extinguishing.
 - 4. NSF approved for food contact.
 - 5. Surface Finish: Smooth, non-glare.
 - 6. Color: Black.
 - 7. Exposed Edge Shape: 3/16 inch radius bullnose corner.

8. Drip Edge: Drip groove 1/8 inch wide and deep, located 1/2 inch back from edge on underside of all exposed edges.
 9. Back and End Splashes: Same material, same thickness; separate for field attachment.
- B. Manufacturers:
1. Durcon, Inc.
 2. Prime Industries, Inc.
 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Molded Laboratory Sinks:
1. Sinks: Same material, same color; lipped design to inset into counter top surface; bottom sloped to outlet; molded outlets; drain outlet located in back corner, accessible sinks shall outlet at rear corner.
 - a. Sides and Ends: 1/2 inch minimum thickness.
 - b. Bottoms: 5/8 inch minimum thickness.
 - c. Interior Corners: 1 inch minimum radius.
 - d. Clamping collars for 1-1/2 or 2 inch diameter waste pipe, for sealed but not permanent connection.
 - e. Where required for size of the sink, steel channel supports front to back on each side, fastened to underside of top to support twice full sink weight. All accessible sinks shall be supported by alternate means.
 - f. Sinks shall be provided complete with epoxy resin sink outlets, stoppers and tailpieces.
 2. Sink Models and Sizes:
 - a. Student and Demo Benches: Model: D05. 14" L x 10" W x 6" D
 - b. Accessible Sinks: Model: LADA5. 14" L x 10" W x 5" D
 - c. Prep Sinks: Model: D05. 14" L x 10" W x 6" D
 - d. Fume Hood Sinks: Model: L1. 9" L x 6" W x 6" D
- D. Laboratory Reagent Shelves: Same material as laboratory countertops, with molded raised edges.
- E. Laboratory Window Sills: Same material and thickness as laboratory countertops.

2.03 WELDING BENCH COUNTERTOPS

- A. Countertops: Two layers 3/4 inch thickness APA, A-BX plywood, glued and screwed together to form a smooth, rigid counter.

2.04 ACCESSORY MATERIALS

- A. Counter Substrate: Particle board; ANSI A208.1 Class M2; no urea formaldehyde-added.
1. Application: Counters with no sinks.
 2. Density; 38.7 pcf min.
 3. Modulus of Elasticity: 290,100 psi minimum.
 4. Panel Thickness for Plastic Laminate Facing: 1-1/8 inches.
 5. Panel Thickness for Solid Surfacing: 3/4 inches minimum.
- B. Counter Substrate: Medium density fiberboard; ANSI A208.2; Grade 130; no urea formaldehyde-added; water resistant.
1. Application: Counters with sinks.
 2. Density: 45 pcf min.
 3. Modulus of Elasticity: 405,000 psi minimum.
 4. Panel Thickness for Plastic Laminate Facing: 3/4 inches with built-up edges.
 5. Panel Thickness for Solid Surfacing: 3/4 inches minimum.
 6. Product: Medex by SierraPine.
- C. Adhesives: Silicone adhesive as recommended by manufacturer of materials being joined.
- D. Joint Sealant: Mildew-resistant silicone sealant, clear.

- E. Wiring Grommets: Plastic, 2" outside diameter; colors selected from manufacturer's full color range.
 - 1. Product: Series TG by Doug Mockett Co., Inc.

2.04 FABRICATION

- A. Fabricate in accordance with standards governing fabrication quality that are specified in herein. Field conditions shall be carefully measured prior to fabrication of countertops.
- B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using self-leveling metal splines to draw sections together.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- C. Provide back and end splashes wherever counter edge abuts vertical surface unless otherwise indicated. Fabricate splashes 4 inches high, unless otherwise indicated. Splashes shall be fabricated loose, unless indicated to be integral with the counter surface.
- D. Plastic Laminate Countertops:
 - 1. Fabricate up to 10 feet long without joints. Fabricate up to 5 feet wide without joints.
 - 2. All edges shall be tooled smooth and square.
 - 3. Provide backer surfacing on non-exposed substrate surfaces for balanced construction.
 - 4. Where materials meet at edges and corners, joints shall butt and overlapping members shall be filed off smooth, forming a slightly eased joint.
 - 5. All joints shall be shop-prepared. No joint shall be located within 12 inches of a sink or 3 inches of a corner.
- E. Solid Surfacing Countertops:
 - 1. Fabricate tops up to 12 feet inches long in one piece.
 - 2. Join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
 - 3. Provide separate square edge side splashes.
 - 4. Located seams at least 3 inches from corners.
- F. Laboratory Epoxy Resin Countertops:
 - 1. Fabricate tops up to 8 feet long in one piece.
 - 2. Join pieces with epoxy sealant in accordance with manufacturer's recommendations and instructions.
 - 3. Provide separate square edge side splashes.
 - 4. Located seams at least 3 inches from corners.
- G. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on the Drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

- C. Acclimate countertop materials to temperature and relative humidity of the installation site for at least 24 hours.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners and with contact surfaces set in waterproof glue. Verify that cabinet top surfaces are level. Shim where required.
- B. Counter cleats shall be installed at walls where indicated and where required for counter support. See Section 06 20 00 - Finish Carpentry & Architectural Millwork. At countertops with no sinks, if counter cantilevers more than 3 inches beyond cabinet support, install 3/4" plywood over cabinet tops extending to full countertop cantilever. Use moisture resistant MDF at counters with sinks.
- C. Solid Surface Countertops:
 - 1. Secure countertops to cabinets with silicone sealant. Do not use water based adhesives.
 - 2. Provide a 1/32 inch expansion for 8 foot length of counter.
 - 3. Sealant joints shall be 1/8 inch minimum in width.
 - 4. Seam and finish joints as recommended by the manufacturer.
- D. Plastic Laminate Countertops:
 - 1. Attach countertops using screws with minimum penetration into substrate board of 5/8 inch.
 - 2. Finish butt seams with matching sealant, as recommended by manufacturer.
- E. Epoxy Resin Countertops:
 - 1. Dry check all work surfaces for level and flat installation and even joints. Check lengths of all pieces and for any damage.
 - 2. Attach countertop section using compatible epoxy adhesive to supporting cabinet.
 - 3. Construct seams as recommended by the manufacturer with epoxy adhesive. Do not sand seams or scratches. Install splashes, curb sections, sink bowls and outlets with epoxy adhesive as recommended. Provide temporary support during installation for under-mount sink bowls. Take care not to scratch surfaces.
- F. Loose plastic laminate and solid surface countertop back and side splashes shall be set in a continuous bead of silicone sealant at the countertop and at the wall.
 - 1. Provide a neat continuous bead of silicone at the joint between top of splash and vertical wall surface.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

- A. Clean countertop surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Any scratched or defaced materials shall be completely replaced at no additional cost to the Owner.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 48 13
ENTRANCE FLOOR MATS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet mats.
- B. Substrate patching and leveling.

1.02 RELATED SECTIONS

- A. Section 01 40 00 - Quality Requirements: Concrete substrate moisture testing.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture testing and substrate preparation.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for all mat materials.
- C. Shop Drawings: Submit seaming diagram for roll goods; indicated dimensions.
- D. Samples: Submit samples 4 x 4 inches minimum in size, illustrating pattern, color and finish of all mats.
- E. Certification and Field Reports: Prior to installation of mats submit written certification from the manufacturer that condition of sub-floor is acceptable for installation.
- F. Maintenance Materials:
 - 1. See Section 01 60 00 - Product Requirements, and Section 01 78 00 - Project Close-out, for additional provisions.
 - 2. Extra Mat tile material: 5% of each type and color installed.
 - 3. Materials shall be in provided in unbroken packaging when job is complete. Notify the Architect in writing of the quantity and location of materials furnished. These materials may not be used by the Contractor for corrective work during the warranty period.
- G. Maintenance Data: Include cleaning instructions, stain removal procedures.

1.04 FIELD CONDITIONS

- A. See Section 01 00 00 - General Requirements, for minimum indoor air quality improvement requirements.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a relative humidity of between 40 - 67 % and temperature between 65 degrees F to 80 degrees F, to achieve temperature stability. After installed product has cured, thereafter maintain conditions above 55 degrees F.

1.05 WARRANTY

- A. See Section 01 78 01 - Warranties, for additional warranty requirements.
- B. Provide manufacturer's product warranty against manufacturing defects and faulty workmanship for a period of three years from the date of Substantial Completion, unless otherwise indicated.

PART 2 PRODUCTS

2.01 MATS

- A. Carpet Mat Type MAT-1: Polyamide yarns and cut pile.
 - 1. Application: Entry vestibules.
 - 2. Critical Radiant Flux, ASTM E648 or NFPA 253: Minimum of 0.22 watts/sq cm.

3. Surface Flammability Ignition, ASTM D2859: Pass ("pill test").
 4. Roll Width: 6'-7".
 5. Backing: vinyl or latex primary and secondary backing.
 6. Color: See Finish Legend.
 7. Basis of Design: Coral Duo by Forbo.
 8. Acceptable Manufacturers:
 - a. Mats Inc.
 - b. Substitutions: See 01 60 00 - Product Requirements.
- B. Carpet Mat Type MAT- 2: Textured loop pattern; solution dyed Avalar RE nylon; Green Label certified.
1. Application: Secondary level.
 2. Critical Radiant Flux, ASTM E648 or NFPA 253: Minimum of 0.22 watts/sq cm.
 3. Surface Flammability Ignition, ASTM D2859: Pass ("pill test").
 4. Yarn Weight: 30 oz/sq. yd.
 5. Tile Size: 24" x 24"
 6. Backing: Nexterra.
 7. Warranty: Lifetime commercial limited.
 8. Color and Lay-Pattern: See Finish Legend.
 9. Basis of Design: Access by Bolyu.
 10. Acceptable Manufacturers:
 - a. Beyond the Door by Patcraft.
 - b. Trek by Mannington.
 - b. Substitutions: See 01 60 00 - Product Requirements.

2.02 ACCESSORIES

- A. Patching Compounds and Self-Leveling Underlayment: See Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Resilient Base and Flooring Transitions: See Section 09 65 00 - Resilient Flooring. Colors as selected.
- C. Adhesives: As recommended by the flooring manufacturer; first quality, water resistant, non-toxic, non-staining, compatible with materials being adhered; low VOC; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable. Adhesives and cements shall comply with flammability requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Acceptance by Carpet Mat Subcontractors: The carpet mat installer shall inspect the condition of substrates prior to commencement of work and shall notify the Architect immediately of any conditions that could adversely affect the carpet mat installation. Commencement of work without such notification shall be taken as acceptance of adequacy of the substrates and carpet mat installation environment.
- B. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive carpet mat. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesives to sub-floor surfaces.

3.02 CONCRETE SLAB PREPARATION AND MOISTURE TESTING

- A. See Section 09 05 61 - Common Work Results for Flooring Preparation.
- B. Concrete slab shall be properly finished, cured in compliance with the surfacing manufacturer's specifications. Curing compounds, hardeners, and sealers shall not be allowed on the concrete slab.
- C. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered

acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions. Do not begin installation until all unsatisfactory substrate conditions have been corrected and the work of other trades, including painting, has been completed. Comply with the carpet manufacturer's written installation instructions for preparing substrates and carpet installation.
- B. Install carpet tile mat and roll products in accordance with manufacturer's instructions and CRI Carpet Installation Standard. Apply surface sealer if recommended by carpet manufacturer.
- C. Install carpet mat roll goods in accordance with accepted seaming diagram. Install carpet mat titles in accordance with required lay pattern.
- D. Coordinate the installation of mats with thresholds and transition strips furnished and installed by other trades.
- E. Mats shall completely cover (wall-to-wall) areas so scheduled.
- F. Mat manufacturer's release-bond adhesive shall be applied with a notched towel as recommended by the manufacturer.
- G. Installation area shall remain free of all traffic for a minimum of 24 hours and from wheeled traffic for a minimum of 72 hours, or as otherwise recommended by the flooring manufacturer.

3.04 PROTECTION

- A. Provide protection for all mats until Substantial Completion.

END OF SECTION

SECTION 12 61 00
FIXED AUDIENCE SEATING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fixed upholstered theater chairs with self-rising seat mechanisms.
- B. Support standards.
- C. Chair accessories.

1.02 RELATED REQUIREMENTS

- A. Division 26 - Electrical

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A879/A879M - Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface; 2012.
- D. ASTM D3597 - Standard Specification for Woven Upholstery Fabrics--Plain, Tufted, or Flocked; 2002 (Reapproved 2009).
- E. ASTM E1352 - Standard Test Methods for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies; 2008a.
- F. ASTM E1537 - Standard Test Method for Fire Testing of Upholstered Furniture; 2013.
- G. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009.
- H. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- I. NFPA 261 - Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes; National Fire Protection Association; 2013.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets, acoustical test data, wiring diagrams, and cut sheets for products specified.
- C. Shop Drawings: Based upon actual site measurements, including fabrication and installation details, chair layouts and dimensions and seat numbering scheme.
 - 1. Field Measurements: Verify seating layout by field measurements and record field dimensions on shop drawings.
- D. Selection Samples: Manufacturer's color charts and swatches for fabric upholstery, indicating full range of materials, colors, and patterns available.
- E. Verification Samples: Full-size fabricated sample of each type of chair specified, including all accessories and one end panel, illustrating mechanical and functional features and workmanship to be expected in the finished Work; approved sample may be incorporated into the Work. Sample need not incorporate specific finish details for this installation.
- F. Maintenance Materials:
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Seats: Quantity equal to 1 percent of total installed, but not less than one of each type and width of seat, furnished from same production run as that installed.
 - 3. Extra Fabric: Quantity sufficient for reupholstering 5 percent of installed seating.

4. The Seating Contractor shall furnish to the Owner spares and repair parts for seat maintenance. All items shall be packaged with protective covering for storage, and shall be identified with labels clearly describing contents. Deliver extra materials to the project site and store where directed by the Owner. A copy of the receipt for extra materials signed by the Owner's agent shall be submitted to the Architect.
 5. Any special or unique tools required for seat maintenance or repair.
 6. Any parts (for example springs) which the Contractor's prior experience with this style of seat has shown that larger numbers of spares are advisable, or any special parts that would not be feasible to produce in the future in small quantities shall be brought to the Architect's and Owner's attention and a proposal for supplying these parts shall be submitted.
- G. Project Close-out:
1. Submit bound copies of maintenance manuals describing procedures for cleaning and servicing of seating. Manuals shall include replacement parts list and replacement procedures.
 2. Submit full size record drawings. These are to be fully revised by the start-up and installation personnel to reflect the actual finished installation.
 3. Submit numbered seating plan for ticketing use.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer certified in writing by the seating manufacturer to be qualified for installation of specified seating.
- B. Manufacturing One Source: The Seating Contractor shall work in accordance with the best trade and manufacturing standards, fabricating all items in accordance with the Architect's directions, and site verified information. To assure a high and satisfactory quality, the Seating Contractor shall make, under his control, all parts composing the complete chair such as castings, steel parts, wood and plastic. He shall also maintain thorough testing and inspection procedures to assure a uniform high quality of all raw materials used as well as the finished product.
1. All items of work included in this Section shall be furnished and installed under a single sub-contract, and by a single sub-contractor, so that there will be no division of responsibility for the proper operation of the equipment after installation.
- C. Fire Retardance of Upholstered Seating: Self-extinguishing when mock-up is exposed to smoldering cigarettes in accordance with ASTM E1352 or NFPA 261.
- D. Fire Retardance of Fixed Theater Seating: Maximum instantaneous net peak rate of heat release of 250 kW or less, and total energy released during first 5 minutes of 40 mJ or less, when tested in accordance with ASTM E1537.
- E. Fire Resistive Ratings: Chairs shall have been tested and certified as complying with BIFMA Voluntary Upholstered Furniture Flammability Standard F-1, sponsored by the Business and Institutional Furniture Manufacturer's Association.
1. All fabrics shall be Class A fire rated in accordance with ASTM E84 Tunnel Test.
 2. Molded plastics shall have a burn rate of 1" per minute when tested in accordance with ASTM D635.
- F. The term "seating contractor" as used in this Section refers to that contractor or sub-contractor directly responsible for supply and installation of audience seating; reference to other contractors shall in no way modify the responsibility of the General Contractor to provide a coordinated, complete and functioning installation of all work required by the Construction Documents.
- G. Codes and Regulations: Seating shall be installed in conformance with applicable building and safety codes, including, but not limited to NFPA 101 Life Safety Code and International Building Code, edition as indicated on the Code Analysis and Key Plan Drawing. Mounting details shall comply with the minimum clear width from back of seat-to-seat pan in the upward folded position.

- H. Accessibility Requirements: All seating specifically made for disabled individuals, including armless seating and wheelchair seating areas shall be identified by a symbol of accessibility as required by the Americans with Disabilities Act Design Guidelines.
 - 1. One percent of the total seating capacity shall have a flip-up arm rest on the aisle side. Each such seat shall be identified by a symbol of accessibility marker. Locate this seating where indicated on the Construction Documents.
- I. Seat Quantities: The manufacturer shall maximize the quantity of the seating based on row lengths, row configurations and minimum seat widths shown on the Drawings.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver seats to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store seating units in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.
- C. Protect seating units from physical damage and abuse by other trades. Replace damaged units.

1.07 MOCK-UP

- A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.

1.08 PRE-INSTALLATION MEETING

- A. Prior to commencing the seating installation, the Contractor, seating subcontractor, Architect and Owner's representative shall meet at the site to review the installation.
- B. Coordination with Electrical Work: Coordinate installation of wiring to ensure that floor-mounted junction boxes are completely beneath seats and free of aisle spaces.

1.09 WARRANTY

- A. Provide a signed, joint manufacturer's and installer's warranty against defective materials, manufacture, workmanship and installation for a period of five years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Quattro Classic by Hussey Seating Company.
- B. Acceptable manufacturers and products:
 - 1. American Seating Inc. model which meets specifications below.
 - 2. Irwin Seating Co. model which meets specifications below.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Provide all theater seating by one manufacturer.
- D. General Seating Description:
 - 1. Mounting: Chairs on sloped floor shall be floor mounted. Chairs on tiers shall be riser mounted except for rear row that shall be floor mounted.
 - 2. Chairs: Padded, upholstered backs with plastic outer panels, full spring-cushioned padded seats and tubular steel standards, full compensating hinges completely enclosed within steel seat foundation, and automatic rising seat to a uniform position without need of adjustment at any time.
 - 3. Chairs shall be installed as indicated on the drawings. Overall dimensions of chair shall be modified to meet applicable code requirements by adjustment of back pitch and hinge stop in unoccupied position to provide a maximum envelope of not more than 19" of total depth.

2.02 MATERIALS

- A. Sheet Steel: ASTM A879/A879M, Commercial Steel (CS) or Drawing Steel (DS) electrogalvanized sheet, 04Z (12G) coating class on both surfaces; chemically treated for baked enamel finish.

- B. Steel Plates, Bars, and Tubes: ASTM A36/A36M.
- C. Hardwood Plywood: HPVA HP-1; face veneers for exposed surfaces Grade A birch, hard maple, walnut, or as standard with manufacturer, with no visible defects; concealed surface veneers of sound grade hardwood.
- D. Laminated Plastic: NEMA LD 3, Type 1, Grade GP 50, nominal thickness 0.050 in; colors and patterns as selected from manufacturer's standards.
- E. Plastic: Injection molded, one-piece, high-impact, linear polyethylene with UV inhibitors.
- F. Polypropylene Sheet: Molded high density plastic with minimum tensile strength of 3300 psi, integral color pigments, and textured, scuff-resistant surface finish.
- G. Polyurethane Foam: Density not less than 1.8 lb/cu ft, fire retardant, non-hardening and non-oxidizing, with high resistance to alkalis, oils, moisture, and mildew, conforming to standards of the Authority Having Jurisdiction.
- H. Upholstery Fabric: Tilt 466356 by Maharam. Color selected from manufacturer's standard range.
 - 1. 56% Cotton, 35% Polyester, 9% Rayon. PFOA-Free Stain Resistant
 - 2. Backing: Crypton Acrylic
 - 3. Weight: 12 oz/ly (372 gr/lm)
 - 4. Abrasion: 90,000 double rubs
 - 5. Lightfastness: 40+ Hours
 - 6. Class B Flame Rating
- I. Concrete Anchors: For mounting standards to concrete substrates shall be stainless steel, size and type by Seating Contractor.
- J. Hardware: All assembly hardware shall be rust-resistant black plated.

2.03 UPHOLSTERED CHAIRS

- A. Fixed seating system designed to permit radial installation using common middle support standards in each row and aisle standards aligned as indicated on drawings. Width of seats generally not less than 22 inches, however seats may be reduced to 20 inches to adjust specific row dimensions for alignment of end standards, whether aisles are of constant or configuring widths.
- B. Backs: Fixed type; two-panel construction with fabric covering over padding and protective back panel, with installed height not less than 33 inches above finished floor.
 - 1. Structural Support: Molded hardwood plywood, not less than 5 ply and 3/8 in thick.
 - 2. Padding: Polyurethane foam not less than 1 in thick bonded to structural support.
 - 3. Covering: Fabric bonded to padding and fastened by upholstery technique that facilitates replacement.
 - 4. Rear Panel: One-piece injection molded high-impact plastic, with scuff-resistant textured surface, no less than 27 inches in height.
 - 5. Back Assembly: The upholstered inner panel shall be inserted into the rear shield and secured with hidden mechanical fasteners. The finished back shall be attached to the standard with steel wings of cold rolled steel. The design of the wings shall allow for the proper pitch of the back.
- C. Seats: Hinged type, constructed to permit reupholstering.
 - 1. Upholstery Pad: The upholstered seat topper shall consist of a 5/8" thick formed ply form base with contoured molded polyurethane foam padding and fabric upholstered cover. Seat padding shall be properly contoured to support the body without causing discomfort. The upholstered seat cover shall exhibit a high degree of tailoring and will be affixed to the base with upholstery staples.
 - 2. Seat Mechanism: Seat lifting mechanism shall use lubricated lifting springs to provide whisper quiet fail-safe operation. The seat structure shall rotate on a 3/4" [19mm] spanner

- bar to assure shaft alignment and eliminate binding due to irregular floor conditions. Seats shall be certified to withstand 350,000 lifting cycles and a 600lb static load without failure.
3. Standard Bottom Cover: Seat shell/bottom shall be constructed of polypropylene plastic to provide a durable yet aesthetic design. The cover shall protect the mechanical parts of the lifting hinge and upholstered seat topper. The shell / bottom shape shall compliment the overall design of the chair.
 - D. Hinges: Seat hinges shall be fully contained within the seat pan and fitted with a pair of independent, permanently lubricated bearings. Each of the independent seat hinges shall be fitted with double acting; self-centering, pre-loaded coiled seat return springs. Seat hinge and spring installation shall be designed not to require periodic adjustment or lubrication.
 - E. Arm Rests: Locate at aisles and between chairs; mount to support standard with concealed fasteners; exposed surfaces of solid hardwood lumber with smoothed edges. Stained.
 - F. Aisle Arm Rests for Disabled: Armrest hinged to end standards for easy patron access; swing up style in quantity as required by ADA. Each accessible chair shall include universal accessibility symbol for clear identification.

2.04 STANDARDS

- A. Support Standards: Cast aluminum or cast iron with welded mounting points for backs, seats, and arm rests, and welded floor anchor plates.
 1. Designed to fit level or floor inclines to maintain proper seat height. Footpad shall measure a minimum of 6" long by 2-1/2" wide. Standards shall contain anchor points for holding chair back, seat cushion and armrest in accurate and secure position.

2.05 ACCESSORIES

- A. Seat and Aisle Numbers: Aluminum plates, tamper-resistant, mechanically fastened to front edge of folding seats and row numbers securely fastened to aisle arm rests; anodized aluminum finish, with letters and numbers countersunk and filled with black paint. Marking shall follow the approved seat numbering plan.
- B. Aisle Lights: Manufacturer's standard UL-approved concealed lamp assemblies, low voltage type, UL listed, 24 volt AC, mounted beneath aisle arm rest; wiring route concealed to floor connection and completely pre-wired in chair standards with steel conduit connector at wiring extending beyond the standard. Lamps shall be accessible for replacement and heat generated by lamp shall not be sufficient to be uncomfortable if accidentally touched.
 1. Light locations: Assume every other row, alternating sides of aisles. High mount, under seat arm.
 2. Voltage transformer(s) shall be provided at 277 primary voltage, in a NEMA i enclosure and encapsulated to reduce noise, and shall be furnished to the electrical contractor for installation.
 3. All electrical components shall be UL approved and complete with lamps. The Seating Contractor shall provide details necessary for hook-up by the electrical contractor. Approximately 38 aisle lights are required.

2.06 FINISHES

- A. Ferrous Metals: Manufacturer's standard polyester epoxy powder coating; 1.5 mil minimum thickness, applied over conversion coating appropriate to base metal.
 1. Color and Gloss: As selected from manufacturer's standard choices.
- B. Hardwood: Manufacturer's clear low-gloss finish of sufficient film depth to afford adequate protection in use.
- C. Hardwood Plywood: Manufacturer's standard clear low-gloss finish.
- D. Plastic: Embossed plastic, color as selected by the Architect.

2.07 FABRICATION

- A. Slotted holes shall be provided for truing up equipment requiring accurate adjustment and alignment. Provide all holes in steel as required for attaching blocking, skirting, and other miscellaneous items.

- B. Machining and Finishing: All operating parts of all equipment shall be suitably machined and finished. Tolerances, fits, finished, etc., where not specified herein or indicated on the Drawings, shall conform with good trade practices, and the operational intent of the equipment.
- C. Welds shall be performed by skilled, certified welders for arc welding.

2.08 TESTING

- A. Seat Structural Testing:
 - 1. Shall support an evenly distributed 450-pound load without failure or residual deflection.
 - 2. Shall withstand 350,000 operating cycles without added lubrication, spring fatigue, adjustment or measurable bearing wear.
 - 3. Shall withstand, without failure, not less than 100,000 impacts of a 40-lb. sand bag dropped equally from heights of 4", 6", 8" and 10".
- B. Back Structural Testing:
 - 1. Shall withstand an evenly distributed front or rear load of 600 lbs.
 - 2. Shall withstand, without failure, 40,000 alternating swinging impact cycles by each of two opposing 40 lb. sand bags. Sand bags shall be moved horizontally and equally through various distances (6", 8", 10" and 12") at 35 c.p.m.
- C. Armrest Structural Testing Without Failure:
 - 1. 200 lb static load applied perpendicularly to and vertically down the arm.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of fixed theater seating. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. All equipment shall be installed under the supervision of a factory-trained foreman. All work shall be performed by mechanics skilled in their trade, and shall be in accordance with final shop and installation drawings.
- C. The Seating Contractor shall work in accordance with the best trade practices, fabricating and installing all items in accordance with manufacturer's recommendations and Architect's directions, and shall consult with trades doing adjoining work in order to provide an installation of first class quality.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions for installation.
- B. Anchor support standards securely to substrate with at least two anchoring devices recommended by manufacturer.
 - 1. Place standards in each row laterally so the standards at the aisle will be in alignment. Vary width of seats and backs as required to optimize sightlines, and comply with the ADA Standards for Accessible Design requirements for row and aisle widths.
 - 2. In curved rows, install standards to form smooth radius, without breaks or angled chords
 - 3. Attach components to standards with sufficient flexibility to compensate for convergence of seats toward the center.
- C. Do not cut or drill structural components without prior approval of the Architect. All seating components shall be accurately installed true to plumb, line and level. Installation shall be complete with all members, materials, all bolts, nuts, washers, clips, fittings, supports, and other items as required for proper installation to substrates.
- D. Concrete Floor Mounting: Chairs shall be securely attached at each standard by means of two anchoring devices of size and type required to produce chairs free from rock or instability under conditions of actual use. Anchors shall be set to a minimum depth of 1-1/4".

3.03 ADJUSTING AND ACCEPTANCE

- A. Adjust seat mechanisms to ensure that seats in each row are aligned when unoccupied.

- B. Repair minor abrasions and imperfections in painted finishes with a coating that matches factory-applied finish; replace units that cannot be repaired to unblemished appearance.
- C. Replace upholstery fabric damaged or soiled during installation.
- D. Clean chairs using the manufacturer's recommended procedure.
- E. Final Inspection: Upon completing installation and adjustment for suitable operation of all work specified under this Section, the Contractor shall notify the Architect, who will schedule an inspection. At the time of this inspection, the Seating Contractor shall furnish sufficient workmen to operate all equipment and to perform such adjustments and test as may be required by the Architect.
 - 1. Should any components not be satisfactory to the Architect, such equipment shall be repaired or replaced with suitable equipment, and the inspection shall be rescheduled with complete testing repeated, until final acceptance. At the time of these inspections, no other work shall be scheduled in the auditorium or stage areas; all temporary bracing, scaffolding, etc, shall be removed to permit full operation of and access to all equipment.

END OF SECTION

SECTION 12 66 13
TELESCOPING BLEACHERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Telescoping bleachers, fixed
- B. Electric motor operators, controls, and internal wiring.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 – Cold Formed Metal Framing
- B. Division 26 - Electrical: 208/230 volt three phase power source behind each group of bleachers and final electrical connections.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2014.
- C. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2013a.
- D. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics; 2010.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- F. NFPA 102 - Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures; National Fire Protection Association; 2011.
- G. PS 1 - Structural Plywood; 2009.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010 w/Errata.
- I. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; American Welding Society; 2008 w/Errata.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage handling and requirements.
 - 3. Installation methods.
- C. Shop Drawings: Complete layout with dimensions, seat heights, row spacing and rise, aisle widths and locations, points of connection to substrate, assembly dimensions, and material types and finishes.
 - 1. Provide drawings customized to this project.
 - 2. Include Professional Engineer certification. Submit certification that all bleachers are fully engineered, independently tested and in compliance with all applicable codes and standards, signed and sealed by a professional structural engineer registered in the State in which the Project is constructed.
 - 3. Graphics Layout Drawings: Indicate pattern of contrasting seat colors.
- D. Selection Samples: For each material for which color selection is required, submit samples, 2 by 2 inches in size, illustrating colors and finishes available.
- E. Verification Samples: For each custom colored finish, submit samples of actual finish or product, for verification of color selection.

- F. Operation and Maintenance Data: Manufacturer's operation and maintenance instructions, including annual inspection and maintenance and bi-annual inspection by a Professional Engineer or manufacturer factory service personnel.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.
- B. Installer Qualifications: Company experienced in bleacher installations and certified by the bleacher manufacturer.
- C. Welder Qualifications: Certified by AWS for the process employed.
- D. Bleacher seating and aisle layout, guardrail and handrail requirements and layout, dimensional configurations, and other pertinent features shall be in accordance with the most stringent requirements of:
 - 1. Applicable Building Code, edition as indicated on the Drawings;
 - 2. NFPA 101 - Life Safety Code, edition as indicated on the Drawings;
 - 3. NFPA 102 - Standard for Grandstands, Folding and Telescopic Seating, Tents and Membrane Structures, most current edition;
 - 4. Americans with Disabilities Act Design Guidelines;
 - 5. All other applicable codes and standards.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store, in original packaging, under cover and elevated above grade.

1.07 WARRANTY

- A. See Section 01 78 00 - Project Close-out, and Section 01 78 10 - Warranties, for additional warranty requirements.
- B. Provide the manufacturer's warranty that materials and manufacturing shall be free of defects for a period of five (5) years from the date of Substantial Completion. Replace parts that fail under normal use at no extra charge to Owner.
- C. Provide the installer's warranty that the installation shall be free of defects for a period of two (2) years from the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Maxam Series Wall Attached Telescoping Bleachers by Hussey Seating Co.
- B. Acceptable Manufacturer's:
 - 1. Interkal LLC.
 - 2. Irwin Telescopic Seating Company.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 TELESCOPING BLEACHERS

- A. Telescoping Bleachers: Factory assembled tiered benches that retract horizontally into depth approximately the same as a single row depth, with fixed seats mounted on leading edge of platforms.
 - 1. Each row shall consist of seat boards, riser boards, walking surfaces and lower steel risers, preventing items from falling through to the floor.
 - 2. Provide a design certified by a licensed Professional Engineer licensed in the State in which the Project is located.

3. Design to comply with applicable requirements of NFPA 102 and requirements of code authorities having jurisdiction; where conflicts between requirements occur, comply with whichever is more stringent.
 4. Design with solid fascia (riser) or seat fronts that conceal interior mechanisms when fully retracted, fitting tightly enough to prevent climbing up face; at front row provide key locked, hinged fascia (skirt) to cover gap between seat riser/fascia and floor.
 6. Wheelchair Spaces: See flex-row, 2.05A for spaces in compliance with ADA Standards.
 7. Cutouts: Fit units to irregular wall surfaces, columns, pilasters, roof drain leaders, and other obstructions; take field measurements prior to fabrication.
 8. Operation: Manual at Practice Gymnasium F122, Motor Operated at Main Gymnasium F102.
 9. Fixed Portions: At Main Gymnasium F102, portions of the bleachers shall remain fixed, as shown on the Drawings.
 - a. Special Attention: See section 2.02-D below. By submitting a qualified bid the bidder acknowledges that they understand, am capable and complied with the requirements specified here-in.
- B. Structural Performance: Engineer, fabricate and install telescopic gym seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections. Apply each load to produce maximum stress in each respective component of each seat unit. Design loads shall comply with NFPA 102, most current edition. In general:
1. Bleacher Design Loads: Design to withstand the following loading conditions:
 - a. Live Load on Structural Supports: 100 psf, minimum, of gross horizontal projection.
 - b. Live Load on Seats and Walking Surfaces: 120 pounds per linear foot.
 - c. Lateral Sway Stress on Structural Supports: 24 pounds per linear foot of seat plank.
 - d. Perpendicular Sway Stress on Structural Supports: 10 pounds per linear foot of seat plank.
 2. Handrailing and Guardrailing Design Loads: See handrail and guardrail paragraph.
 3. Design criteria for member sizes and connections shall conform to:
 - a. AISC Manual of Steel Construction.
 - b. AISI Specification for Design of Cold Formed Steel Structural Members.
 - c. AA Specification for Aluminum Structures.
 - d. NFOPA Nation Design Guide for Wood Construction.
- C. Dimensions:
1. See Drawings for overall dimensions.
- D. Connections / Supports:
1. See Drawings for mounting locations.
 2. Note that the upper portion of bleachers in the Main Gymnasium F102 are fixed units anchored to structural end points as indicated in the Drawings. The Bleacher Design Engineer of Record shall provide custom vertical and horizontal structural members as a portion of the bleacher assembly, as required, to accommodate support of bleachers above spanning between anchor support points. Coordinate all structures and load reactions with the cold formed metal framing engineer, under Section 05 40 00, to ensure supporting structural walls are adequate to resist and support loads required. Bleacher contractor shall be responsible for design and installation of bearing support brackets, fasteners and miscellaneous accessories as necessary for a complete installation meeting the engineering design requirements.
- E. Structural Supports: Steel; manufacturer's standard wheeled carriages supporting each tier separately, with moving parts permanently lubricated and metal parts cushioned to prevent metal-to-metal contact during operation.
1. Vertical Columns: High tensile steel tube sized as required by the bleacher manufacturer for the required loads.
 2. Sway Bracing: High tensile steel members through bolted to columns.

3. Design so that each row carriage so that it will individually support the design loads and is self supporting when fully assembled without dependence on platform panels or boards, seats, or fascia.
 4. Welding: In accordance with AWS D1.1/D1.1M and AWS D1.3/D1.3M.
 5. Bolting: Use lock-washers or locknuts, vibration resistant, of materials and size standard with manufacturer.
 6. Wheels: Minimum 5 inch diameter by 1-1/4inch wide, with non-marring rubber tires; ball, roller, or oil-impregnated metal bearings; minimum of 3 wheels at each floor support.
 7. Finish: Steel risers, nose beads, diagonal bracing, and other selected steel members shall be G-90 galvanized. All steel members shall be finished with manufacturer's standard enamel or powder coating.
 8. Row Locking: Automatically mechanically lock each carriage to adjacent carriages when fully extended.
 9. Lower Track: Continuous Positive Interglide System interlocks each adjacent CPI unit using an integral, continuous, anti-drift feature and through-bolted guide at front to prevent separation and misalignment. CPI units at end sections of powered banks and manual sections shall contain a Low Profile Posi-Lock LX to lock each row in open position and allow unlocking automatically. Provide adjustable stops to allow field adjustment of row spacing's.
- F. Motor Operation: Manufacturer's standard drive mechanism, using motor adequately sized for the purpose.
1. Provide UL listed electrical components and wiring.
 2. Controls: Start, Stop, Forward, and Reverse in a single control unit.
 3. Control Station: Removable plug-in low-voltage pendant station, with first-row plug-in location. Operation shall assure full visual control of the seating bank.
 4. Limit Switches: Automatically stop operation when unit has reached fully open or fully closed position.
 5. Provide all wiring internal to and within each bleacher group, from the power source junction box located where indicated; ensure that wiring is not energized except during operation.
 6. Electrical Characteristics: 208/230V, 5 wire, 3-phase, 60 Hz.
 7. Amperage shall be as determined by the bleacher manufacturer depending on the quantity of power units required.
 8. Provide access to motor from front side of bleachers; a hinged front skirt or hinged section at least 30 inches wide is acceptable.
- G Manual Operation: Manufacturer's standard and necessary mechanisms for manual operation.

2.03 SEAT AND PLATFORM COMPONENTS

- A. Seat module depth: 10 inches. Seat Modules: 18" long assembled, high density, 100% recyclable HDPE (high density polyethylene) modules in monochromatic colors providing, dual textured scuff resistant 10" wide seat surface with 1/2" minimum interlock on seat and face. Unit structural tested to 600 lbs occupant load.
1. Ergonomically contoured forward "waterfall" edge for enhanced spectator comfort and minimization of sensitive pressure point area, regardless of leg positioning
 2. Fore & Aft contoured seat surface for uniform support and minimize high pressure points under the buttocks.
 3. Seat height ranges from deck to t/o seat range from 16-1/8" to 18-1/8"
 4. 21-1/2" min clear foot space area, regardless of leg positioning.
 5. Integrally molded end caps at aisle end locations for clean finished appearance.
 6. Integrally molded recess pockets to accept seat number and row letters.
 7. Integrally molded rear closure panel at back of seat to allow for "continuous clean sweep" of debris at deck level and minimized visibility of structural ribbing.

8. Seat Attachment: Each plastic seat module shall be securely anchored by a 12 ga steel clamp bracket that provides a steel-to-steel, through bolted attachment to the front nose beam of the bleacher. Attachment eliminates fore / aft movement of the seat module on the nose beam.
 9. Seat and Row Numbers: Provide recessed pockets and number plates. Numbering sequence shall be confirmed with the Architect.
 10. Provide first tier modular recoverable flex-rows.
- B. Platform, Tread, and Step Structure: Plywood continuously supported on front and rear with side joints tongue-and-grooved. Decking shall be through bolted to steel supports with locking hardware. Self-tapping fasteners or friction fit deck attachment is not acceptable.
1. Plywood: PS 1, 5-ply southern pine or polyethylene-overlaid Douglas fir or southern pine, Grade A-C.
 2. Plywood Thickness: 5/8 inch, minimum.
 3. Front (Nose), Rear, and Intermediate Supports: Steel channel or tube, hot-dipped galvanized.
 4. Provide end caps of same material and finish on each exposed end.
 5. Finish: High gloss clear urethane, both sides, unless polyethylene finished.
 6. Nosings: Formed steel, minimum, G60/Z275 hot-dipped galvanized.
 7. At aisles provide permanently attached intermediate steps of same construction and finish.
 8. At bottom of aisles provide detachable step in front of first riser.
 9. Riser Boards; 3/4 inch thickness AC grade plywood with a polyethylene overlay; continuously supported along edges, or one-piece formed galvanized painted steel riser boards.

2.04 HANDRAILS AND RAILINGS

- A. Provide the following railings:
1. Aisle Handrails: Single post folding railing segment mounted in center of aisle at every other row beginning at row 2.
 2. End of Row Guardrails: Self-storing, at open ends of sections beginning at row 2.
 3. Height: 42 inches above adjacent platform or tread.
 4. Removable Railings: Provide steel post sockets attached to platform supports.
- B. Design handrails and railings to withstand the following loads:
1. Concentrated Load on Handrails: 200 pounds in any direction.
 2. Concentrated Load on Guardrails: 200 pounds in any direction along top rail.
 3. Live Load on Handrails: 50 pounds per linear foot, applied in any direction.
 4. Live Load on Guardrails:
 - a. Horizontal: 50 pounds per linear foot, applied at the guardrail height.
 - b. Vertical: 100 pounds per linear foot, applied vertically to top of guardrail.
- C. Railing Construction: Round steel tube, with formed elbows at corners and caps at ends of straight runs.
1. Steel: 1-1/2 inch minimum outside diameter, with 11 gage, 0.12 inch minimum wall thickness; textured powder coat epoxy finish.
 2. Finish: Selected by Architect from manufacturer's full range of standard colors.

2.05 ACCESSORIES

- A. Flex-Row: Provide first row modular recoverable seating units to be utilized by persons in wheelchairs and able-bodied persons. Each Flex-Row unit shall have an unlock handle for easy deployment if wheelchair or team seating access is needed. Unlock handle shall lock the bleacher seats into position when fully opened.
1. Provide a black full-surround steel skirting with no more than 3/4" floor clearance for safety and improved aesthetics.
 2. Provide a black injection molded end cap for the nose beam for safety and improved aesthetics.

3. Provide a mechanical positive lock when the Flex-Row system is in the open and used position.
 4. Flex-Row modular units are designed to achieve multi-use front row seating to accommodate team seating, ADA requirements and facility specific requirements. Flex-Row units are available in modular units from 2 to 7 seats wide as well as full section widths.
- B. Fillers and Closures:
1. Sides of Extended Units: Vinyl curtains.
 2. Vinyl Curtains: 18 ounce vinyl with grommets; color as selected from manufacturer's standard palette.
- C. Motion Monitor: Warning horn rated at 150 dB, shall operate continuously during movement of any section of bleachers.
- D. Fasteners: Provide hardware and fasteners in accordance with manufacturer's recommendations.
- E. Anchorage: As indicated on drawings; provide hardware in accordance with manufacturer's recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are consistent with those on the shop drawings.
- B. Verify that electrical rough-ins have been installed and are accessible.
- C. Do not begin installation until substrates have been properly prepared and area has been cleared of obstructions.
- D. If substrate preparation is the responsibility of another installer, notify Contractor of unsatisfactory preparation before proceeding.
- E. Prior to commencement of work, the bleacher engineer of record shall visit the site and inspect bearing structures are ready to receive custom bleacher support framing as indicated per the approved shop submittals. If supporting substrates are not in accordance with the approved coordinated engineered submittals the bleacher engineer shall notify the Contractor of unsatisfactory preparation before proceeding. Commencement of the installation of bleachers without such notification shall be considered acceptance of the adequacy of the substrates as being suitable for the intended application.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Do not field cut or alter seats, fascia, or structural members without approval.
- C. Provide manufacturer's field representative to inspect completed installation.

3.04 ADJUSTING

- A. Lubricate, test, and adjust each moving assembly to ensure proper operation in compliance with manufacturer's recommendations.

3.05 CLEANING

- A. Clean exposed and semi-exposed assembly surfaces.
- B. Touch up finishes on damaged or soiled areas.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstration and Training: Provide manufacturer's field representative to demonstrate to and train Owner's operating personnel in proper operation of equipment.
 - 1. Location: On site using installed equipment.
 - 2. Time: As agreed between Owner and Contractor.

3.07 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 129300

**SITE FURNISHINGS
(Trade Bid Required)**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Drawings, General Conditions of the Contract and Supplementary General Conditions apply to the work specified in this section.
- B. Section 1-B – School Bid Depository Conditions and Regulations

1.02 SCOPE

- A. The work of this section consists of all site improvements and related items as indicated on the drawings and/or as specified herein and includes, but is not limited to, the following:
 - 1. Site signage
 - 2. Vehicular guardrails
 - 3. Pedestrian guardrails
 - 4. Trash receptacles
 - 5. Benches
 - 6. Metal bollards
 - 7. Manual Lift bollards
 - 8. Bicycle Racks
 - 9. Tube Slide
 - 10. Vault Box (Pole Vault)
 - 11. Goal Post
 - 12. Tennis Nets
 - 13. Bases and Plates

1.03 RELATED WORK UNDER OTHER SECTIONS

- A. The following items of related work are specified and included in other sections of the specifications:
 - 1. Earthwork - Section 31200
 - 2. Asphalt Paving - Section 321216
 - 3. Unit Paving - Section 321400
 - 4. Landscape Work - Section 329300
 - 5. Cast-in-Place Concrete - Section 03300

1.04 SUBMITTALS

- A. General: Comply with the requirements of General Requirements Section – SUBMITTALS.
- B. Provide submittals for the following:
 - 1. Site signage
 - 2. Pedestrian guardrails

3. Trash receptacles
4. Benches
5. Metal bollards
6. Manual Lift bollards
7. Bicycle Rack
9. Tube Slide
10. Vault Box
11. Goal Post
12. Tennis Nets
13. Bases and Plates

1.05 SHOP DRAWINGS

- A. The contractor shall submit copies of all required shop drawings as indicated in the contract General Conditions, including fabrication details and layout and dimensioning for the approval of the Engineer. Shop drawings shall be submitted for the following:

1. Vehicular guardrail
2. Pedestrian guardrails
3. Metal bollards
4. Manual Lift bollards
5. Bicycle Racks
6. Tube Slide
7. Vault Box
8. Goal Post
9. Tennis Nets

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Trade Bids for work under this Section shall be for the complete work of this Section and shall be filed under the provisions and requirements specified under Division 01 – General Requirements.
1. Special attention is directed to Section 1-B – School Bid Depository Conditions and Regulations and all Sections within Division 01 – General requirements which are hereby made a part of this Section of the Specifications.

PART 2 - PRODUCTS

2.01 BASIC MATERIALS

- A. Concrete Supports: Comply with requirements of Section 033000 – CAST IN PLACE CONCRETE.
- B. Metal Fasteners: Comply with requirements of Section 055000 – METAL FABRICATION.
- C. Painted Surfaces: Comply with requirements of Section 099100 – PAINTING.

2.02 SITE SIGNAGE

- A. Provide handicapped parking signs as shown on drawings in accordance with the provisions of the Maine Human Rights Act, Title 5, M.R.S.A. 4551, utilizing the international symbol of accessibility.
- B. Provide other miscellaneous signage as shown on drawings.
- C. Traffic Signage shall conform to the standards of the Manual of Uniform Traffic Control Devices (MUTCD) Latest edition

2.03 VEHICULAR GUARDRAILS

- A. Two Bar Steel Bridge Railing
 - 1. Rail material shall be in accordance with the Standard Specification for Highways and Bridges" revision of November 2014, Maine Department of Transportation (abbreviated as MDOT "Standard Specifications") Section 507.05 Steel Bridge Railing.
 - 2. Guardrail to be installed on galvanized steel posts as indicated in the MDOT Standard Detail 507(17) "Steel Approach Railing" with rail installed 30-inches above pavement grade with a rail spacing of 10-inches as shown in detail 507(17). Posts to be set 6'-2" on center.
 - 3. Guard rail end treatment shall be installed as shown on MDOT Standard Detail 507(26) Barrier Mounted Steel Bridge Railing, rail end treatment.
 - 4. Provide posts, rail anchor plates, bolts, fasteners and rail bar splice joints as required for a complete installation.
 - 5. Provide a shop drawing that includes materials, fabrication details, layout and dimensioning for a complete installation.

2.04 PEDESTRIAN GUARDRAILS

- A. "Imperial B" by Master Halco (1-800-229-5615) or equal. Height of guardrail shall be a minimum of 48" above finish grade.

2.05 TRASH RECEPTACLES

- A. Austin receptacle, side opening, no lock, silver color by Landscape Forms, Inc., Kalamazoo, MI 49001, 800-521-2546. Trash receptacle shall be to the dimensions and size as stated in the manufacturer's data.

2.06 BENCHES

- A. Plexus, 4-seat, backless, no arms, silver color, embedded by Landscape Forms, Inc., Kalamazoo, MI 49001, 800-521-2546. Bench shall be to the dimensions and size as stated in the manufacturer's data.

2.07 METAL BOLLARDS

- A. Cal Pipe Security Bollard, Fixed bollard, Type 316 Stainless Steel, 6" bollards, SSF06040, 36" Height, polished #4 finished, installed as shown on Drawings.

2.08 MANUAL LIFT BOLLARDS

- A. Cal Pipe Security Bollards, Manually operated retractable bollard, Type 316 Stainless Steel, 6" Diameter, LBMR06040, 36" Height, polished #4 finish or approved equal.

2.09 BICYCLE RACKS

- A. Provide Bike Hitch racks manufactured by DERO BIKE RACK CO, 504 Malcolm Avenue SE, Minneapolis, MN 55414, 1-888-337-6729. Fax: 612-331-2731. Website: www.dero.com
- B. 304 grade stainless steel finish, #4 satin polish, spectra shield finish.

2.10 TUBE SLIDE

- A. Tube Slide manufactured by Playworld, 570-522-9800, playworld.com, including deck assembly and all components required for proper installation.
- B. 6' in length

2.11 VAULT BOX (POLE VAULT)

- A. Gill Athletics, (800-637-3090), www.gillathletics.com, – 502 (Aluminum Vault Box)

2.12 GOAL POST

- A. Gill Athletics Aluminum Football Goal (800-637-3090), www.gillathletics.com – F391
- B. 6'-0" Gooseneck, 23'-4" Distance between Uprights, 30' Upright height
- C. Color: White

2.13 TENNIS NETS

- A. Douglas Sports, Item TN 36T

2.14 BASES AND PLATES

- A. MacGregor Magnetic Super Base – including all materials, plates, ground anchors and covers for proper installation
- B. MacGregor Home Plate – including all materials, ground anchors and fixtures for proper installation
- C. MacGregor Pitcher's Rubber (Plate) – per detail, including all materials, ground anchors and fixtures for proper installation

PART 3 - EXECUTION

3.01 SITE SIGNAGE

- A. Install as shown on drawings, erected plumb and true to the lines and elevations required.

3.02 VEHICULAR GUARDRAILS

- A. Install in concrete wall as shown on drawings.
- B. Guardrail to be installed on galvanized steel posts as indicated in the MDOT Standard Detail 507(17) "Steel Approach Railing" with rail installed 30-inches above pavement grade with a rail spacing of 10-inches as shown in detail 507(12). Posts to be set 6'-2" on center.
- C. Guard rail end treatment shall be installed as shown on MDOT Standard Detail 507(26) Barrier Mounted Steel Bridge Railing, rail end treatment.
- D. Provide posts, rail anchor plates, bolts, fasteners and rail bar splice joints as required for a complete installation.
- E. Provide a shop drawing that includes materials, fabrication details, layout and dimensioning for a complete installation.
- F. Submit shop drawings for approval prior to fabrication. Shop drawings shall be prepared only after retaining walls are constructed and field measured.

3.03 PEDESTRIAN GUARDRAILS

- A. Install in concrete wall as shown on drawings. Submit shop drawings for approval prior to fabrication. Shop drawings shall be prepared only after retaining walls are constructed and field measured.

3.04 TRASH RECEPTACLES/BENCHES

- A. Installation in locations shown on drawings.

3.05 METAL BOLLARDS/MANUAL LIFT BOLLARDS

- A. Install per drawings in concrete footing.

3.06 BICYCLE RACKS

- A. Install in accordance with manufacturer's instructions. In-ground mount, embedded into concrete.
- B. Provide a shop drawing that includes product data, finish, fabrication details, layout and dimensioning for a complete installation.

3.07 TUBE SLIDE

- A. Install in accordance with manufacturers specifications.
- B. Provide a shop drawing that includes product data, finish, fabrication details, layout and dimensioning for a complete installation

3.08 VAULT BOX

- A. Install per manufacture's specifications

- B. Provide a shop drawing that includes product data, fabrication details, layout and dimensioning for a complete installation.

3.09 GOAL POST

- A. Ground sleeve installation per manufacturer's specifications.
- B. Provide shop drawing that includes product data, finish, fabrication details, layout and dimensioning for a complete installation.

3.10 TENNIS NETS

- A. Install per manufacturer's specifications and provided details.
- B. Provide submittal that includes product data, layout and dimensioning for a complete installation.

3.11 BASES AND PLATES

- A. Install per manufacturer's specifications
- B. Provide submittal that includes product data, layout and dimensioning for a complete installation.

END OF SECTION

ATTACHMENT A

Football Goal Post Specifications



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ALUMINUM FOOTBALL GOALS SPECIFICATIONS

Gill Athletics football goal posts are available in a variety of configurations. All aluminum goals are constructed of 6 5/8" diameter aluminum offset poles and crossbars with 4" diameter aluminum uprights. The durable powder coat finish is available in either white or yellow.

Each goal is designed for easy leveling of the crossbar and uprights. Goals with 8ft offsets allow a soccer goal to fit underneath the crossbar.

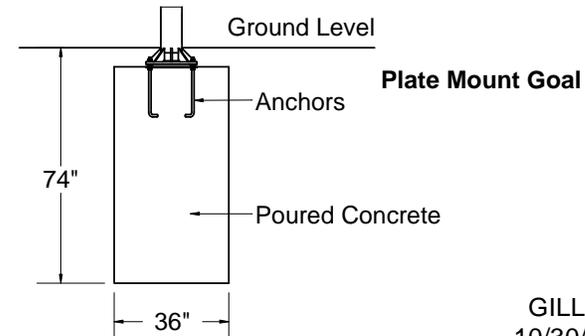
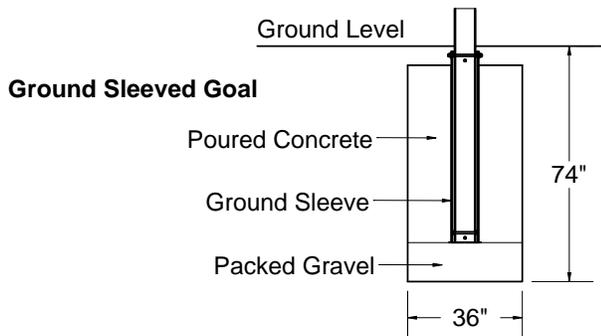
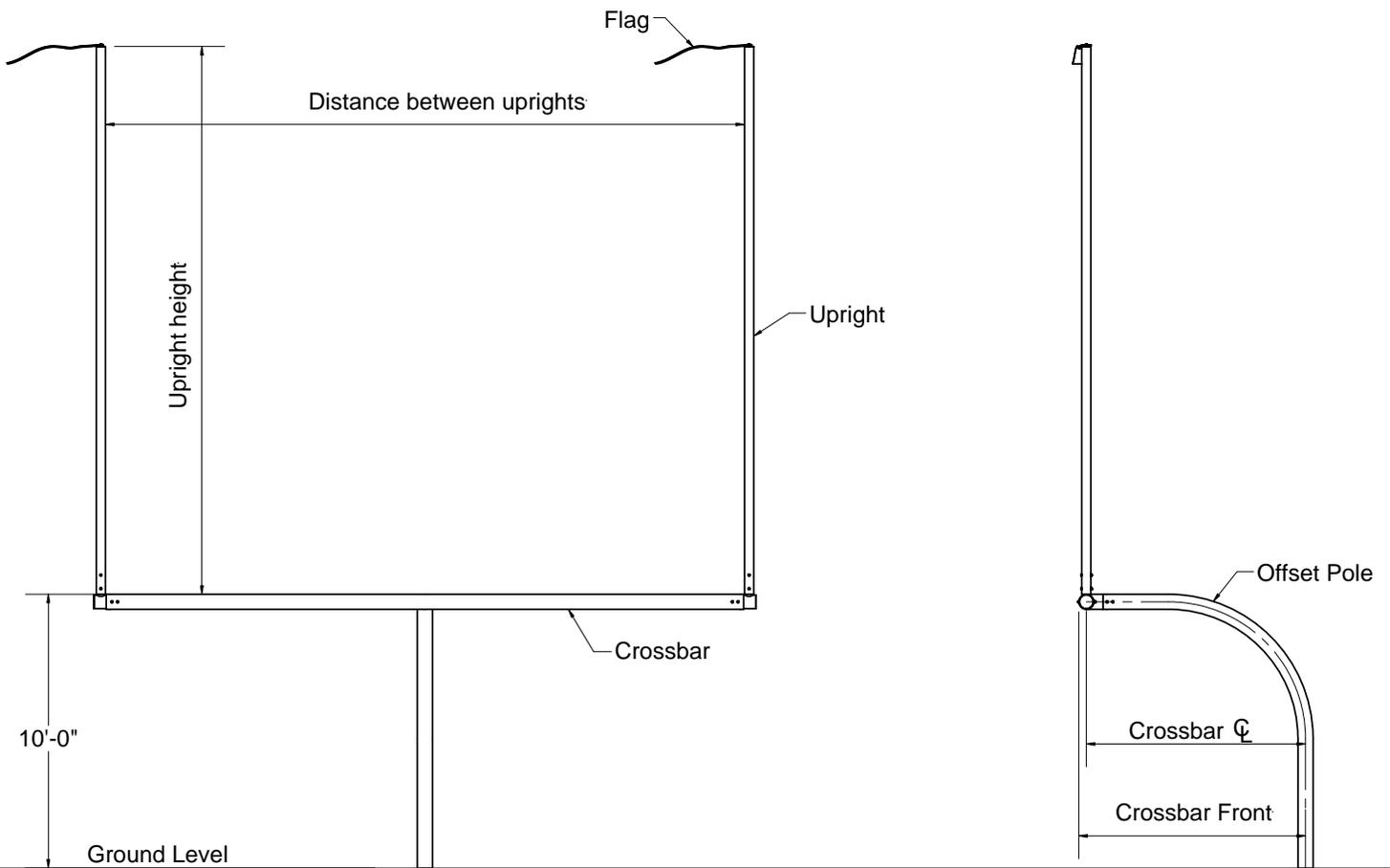
Football goals are sold in pairs. Ground sleeves and plate mounting kits are sold separately.

Offset Pole: 6" Sch 40 Aluminum Pipe (6.625" OD) 6063-T5

Crossbar: 6" Sch 40 Aluminum Pipe (6.625" OD) 6061-T6

Upright: 4"OD x 1/8" wall Aluminum Tube, 6061-T6511

Note: Local soil conditions will determine actual size of concrete foundations.





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ALUMINUM FOOTBALL GOALS SPECIFICATIONS

Aluminum Football Goal Specification Table

Part #	Installation Type	Offset Pole		Distance between uprights	Upright height
		Crossbar \bar{C}	Crossbar Front		
F300	Ground Sleeve	6'-6"	6'-9 3/8"	23'-4"	20'
F305	Ground Sleeve	8'-0"	8'-3 3/8"	23'-4"	20'
F307	Ground Sleeve	6'-6"	6'-9 3/8"	23'-4"	30'
F308	Ground Sleeve	8'-0"	8'-3 3/8"	23'-4"	30'
F310	Ground Sleeve	6'-6"	6'-9 3/8"	18'-6"	20'
F315	Ground Sleeve	8'-0"	8'-3 3/8"	18'-6"	20'
F320	Ground Sleeve	6'-6"	6'-9 3/8"	18'-6"	30'
F325	Ground Sleeve	8'-0"	8'-3 3/8"	18'-6"	30'
F340*	Ground Sleeve	6'-6"	6'-9 3/8"	18'-6" to 23'-4"	20'
F342*	Ground Sleeve	6'-6"	6'-9 3/8"	18'-6" to 23'-4"	30'
F345*	Ground Sleeve	8'-0"	8'-3 3/8"	18'-6" to 23'-4"	20'
F347*	Ground Sleeve	8'-0"	8'-3 3/8"	18'-6" to 23'-4"	30'
F361	Plate Mount	6'-6"	6'-9 3/8"	23'-4"	30'
F362	Plate Mount	8'-0"	8'-3 3/8"	23'-4"	20'
F363	Plate Mount	8'-0"	8'-3 3/8"	23'-4"	30'
F366	Plate Mount	8'-0"	8'-3 3/8"	18'-6"	20'
F367	Plate Mount	8'-0"	8'-3 3/8"	18'-6"	30'
F390	Ground Sleeve	6'-0"	6'-3 3/8"	23'-4"	20'
F391	Ground Sleeve	6'-0"	6'-3 3/8"	23'-4"	30'
F392	Ground Sleeve	6'-0"	6'-3 3/8"	18'-6"	20'
F393	Ground Sleeve	6'-0"	6'-3 3/8"	18'-6"	30'

* These goals feature special crossbars and joints that allow the uprights to be spaced at 18'-6" or 23'-4".

These expandable crossbars include a safety catch so the upright will not rotate while adjusting.

F30005 - Goal Post Ground Sleeve (sold individually)

F35550 - Plate Mounting Kit (sold individually)

F304 - Access Frame Kit (sold individually)

F302 - Football Goal Post Pads (sold in pairs)

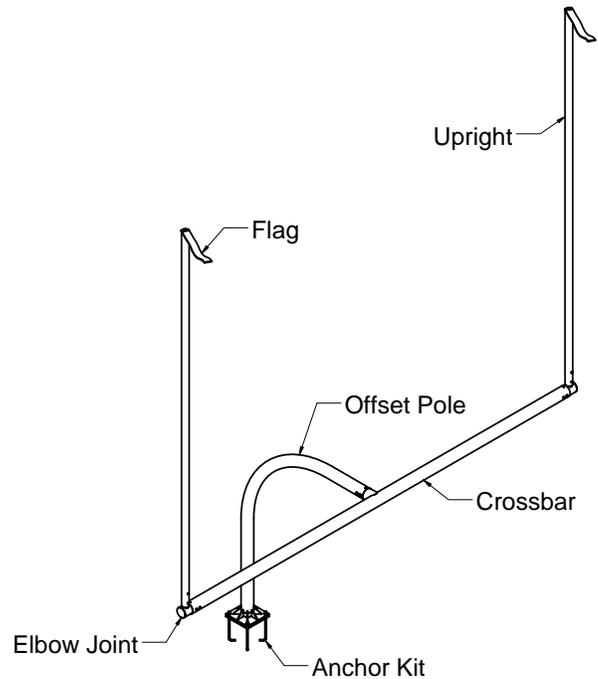
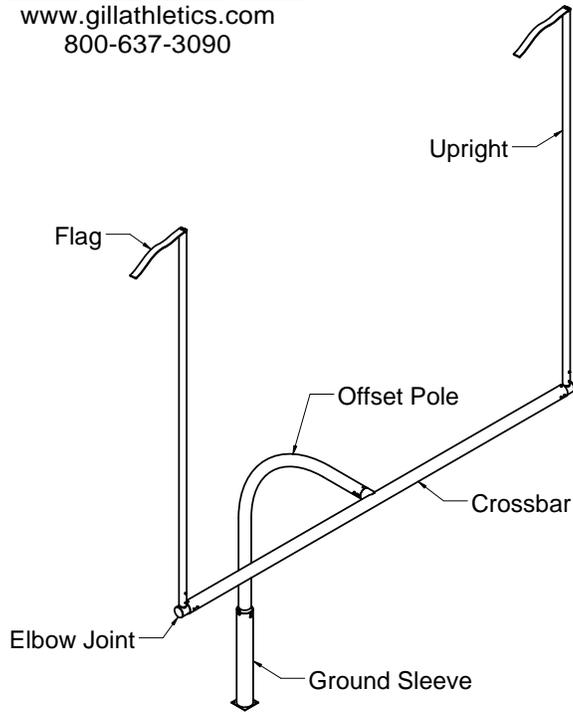
ATTACHMENT B

Football Goal Post Ground Sleeve Specifications



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ALUMINUM FOOTBALL GOALS INSTRUCTIONS



WARNING

Football goals are shipped unassembled.

Read all instructions thoroughly before attempting to assemble this equipment.

Assembly of this equipment must be done by physically capable adults only. All installations should be conducted by experienced contractors and in accord with all applicable codes, laws and regulations. Suggested instructions herein are illustrative only and should be adapted to suit local requirements. Gill Athletics is not responsible for the manner in which this product is installed.

WARNING

Read all warnings thoroughly before using this equipment. Failure to comply with the following instructions and warnings may result in serious injuries and/or property damage.

- DO NOT allow any individuals to climb onto these goal posts.
- Keep organic material away from the base of the posts. Grass, litter, etc. could cause corrosion and/or deterioration.
- Regularly check the entire structure for signs of corrosion and repaint with an exterior grade, rust-resistant enamel.
- Check structure before each use for loose or missing hardware, and repair before use.

The owner of this equipment is responsible to ensure that all individuals follow these safety and operating instructions to avoid injuries or property damage. Proper use and supervision of this equipment is essential to help reduce the possibility of accidents or injuries.

These football goal posts are provided with a factory-applied powder-coated finish. Great care must be taken during the installation of these goal posts to protect the finish from damage. An aerosol can of touch-up paint is provided with each pair of football goal posts. Check entire goal post for scratches that may have occurred during shipping or installation. Use the touch-up paint to repaint these scratches.

THIS WARNING IS GIVEN IN COMPLIANCE
WITH CALIFORNIA'S PROPOSITION 65:
WARNING
This product contains chemicals known to the
State of California to cause cancer, birth defects
or other reproductive harm.



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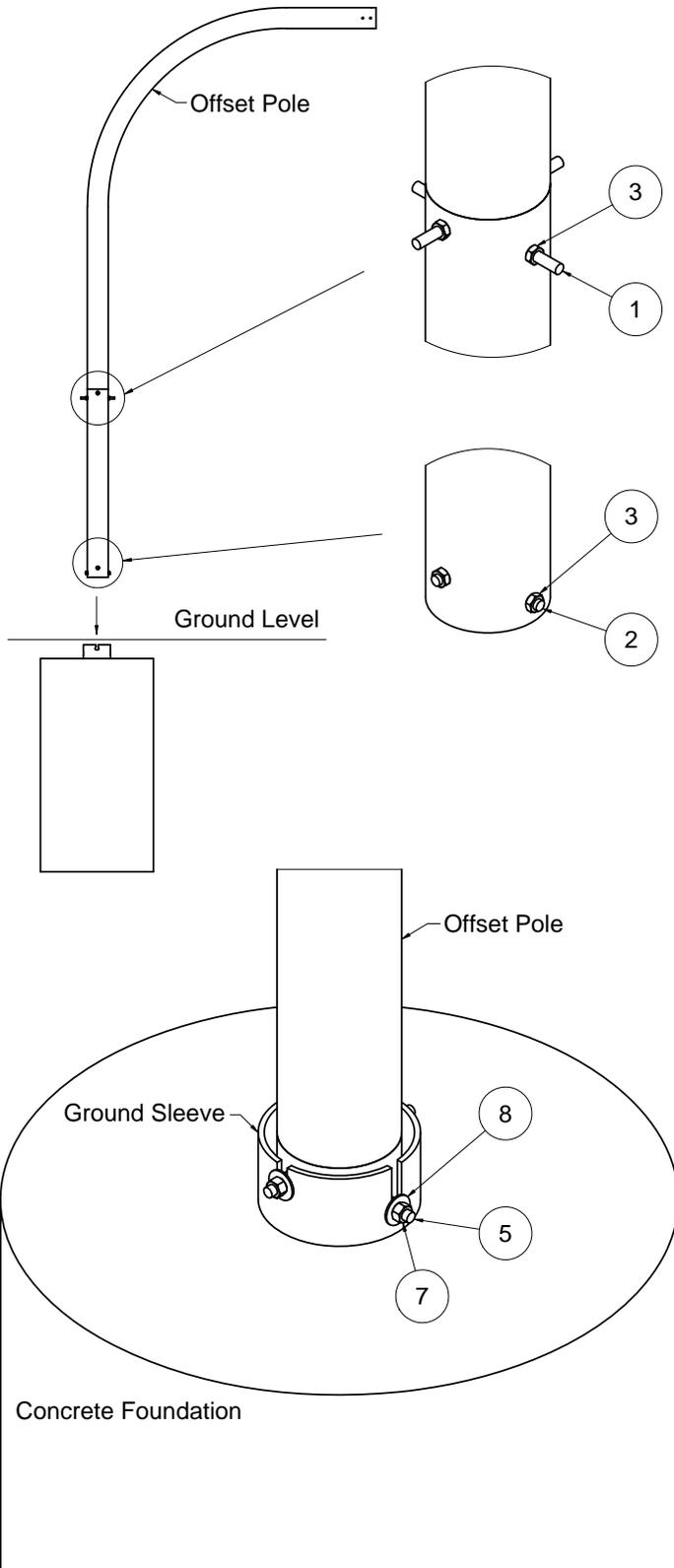
ALUMINUM FOOTBALL GOAL INSTRUCTIONS GROUND SLEEVED OFFSET POLE INSTALLATION

	PART #	DESCRIPTION	QTY.
1	F30012	Pole Clamping Pin, 5/8" x 10 3/4"	2
2	F30011	Pole Centering Pin, 5/8" x 7 7/8"	2
3	M2292	5/8"-11 Jam Nut, Zinc Plated	8
4	M1237	5/8"-11 Hex Nut, Zinc Plated	4
5	M2835	5/8" Flat Washer, 1.75OD	4

Install the 5/8" x 7 7/8" threaded centering rods (F30011) through the two lower pairs of holes in the offset pole. Secure the rods with 5/8"-11 jam nuts (M2292), leaving an equal amount of rod protruding from all four holes. These rods will keep the bottom of the offset pole from shifting in the ground sleeve during final adjustment. Install the 5/8" x 10 3/4" threaded leveling rods (F30012) in the same fashion through the upper holes in the offset pole, securing with 5/8"-11 jam nuts (M2292).

After the concrete foundation has fully cured, set the offset pole into the ground sleeve, inserting the leveling rods into the appropriate set of notches in the top of the sleeve. Install the washers (M2835) and 5/8"-11 hex nuts (M1237) onto the leveling rods to the out side of the ground sleeve. Visually check the offset pole within the ground sleeve and hand tighten the four nuts.

Using a 4' level, check to see if the offset pole is plumb. If it is, tighten the nuts around the ground sleeve securely at this time. If adjustment is required, loosen the appropriate outer nuts a small amount (a turn at a time) and tighten the opposing outer nuts until snug, then recheck. Continue this adjustment process until the offset pole is plumb. Securely tighten the four outer nuts.

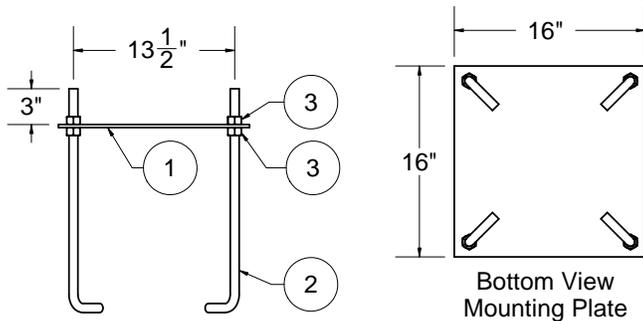




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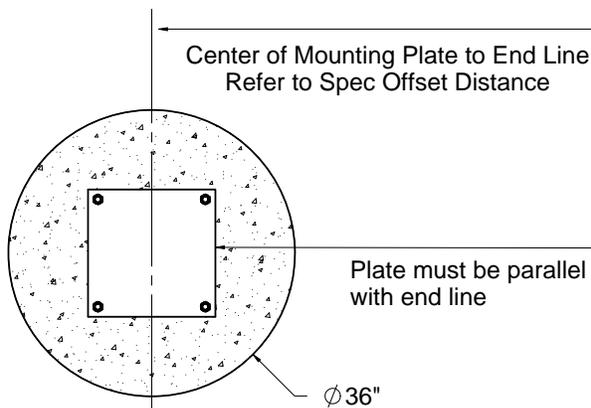
ALUMINUM FOOTBALL GOAL INSTRUCTIONS MOUNTING PLATE INSTALLATION

	PART #	DESCRIPTION	QTY.
1	M2880	Mounting Plate, Anchor Pattern	1
2	M2765	3/4" SS Anchor Bolt, 18" L-Hook	4
3	M2776	3/4"-10 SS Hex Nut	12



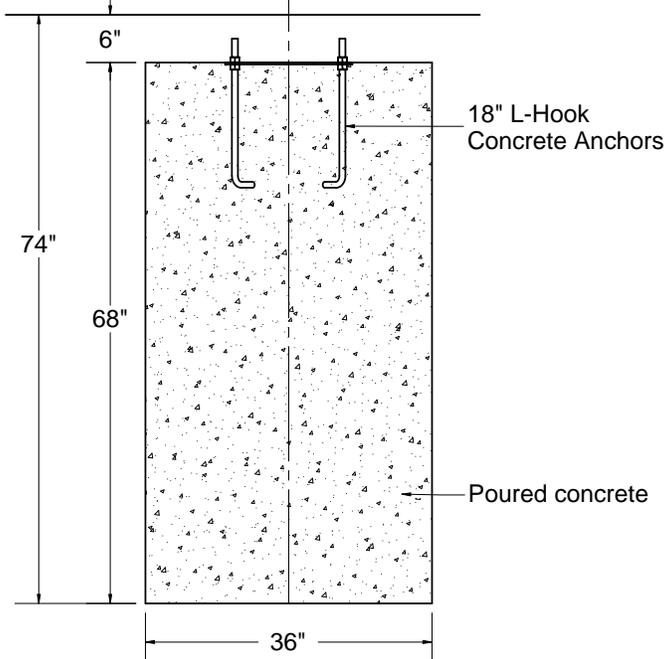
Bottom View
Mounting Plate

End Line



Ø 36"

Ground Level



Read all instructions before installing.

Local soil conditions will determine the actual size of concrete foundations. The following instructions are recommendations only, and should be considered minimums.

Locate the position of the goal post according to plans and specs. Excavate a hole which is at least 36" across and 74" deep. Set a form for a concrete foundation. A 36" diameter cardboard tube or corrugated metal pipe is recommended. The top of the form should be 6" below finished grade (for artificial infill turf fields, use top of infill material as finished grade elevation). Locate the formwork so that the mounting plate and anchors will be centered within the form.

Assemble the mounting plate and anchors as shown. Set the height and position of the anchor to the plate by clamping the plate between two nuts.

Using grade stakes and lumber, secure the mounting plate and anchors in position so that it is centered within the form and the top of the plate is even with the top of the forms, 6" below ground level. Orient the plate so that it is parallel with the goal line. Using grade stakes and lumber, secure the mounting plate and anchors in position so that it is centered within the form and the top of the plate is even with the top of the forms, 6" below ground level. Final adjustment of the goal post depends on precise installation of the mounting plate and anchors (a slight error at ground level translates to a much larger error at the top of the uprights).

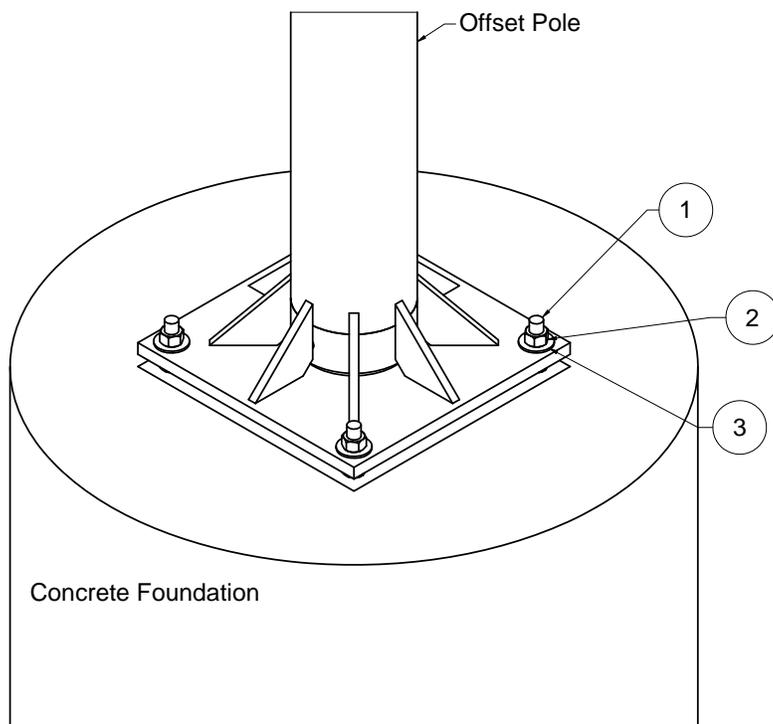
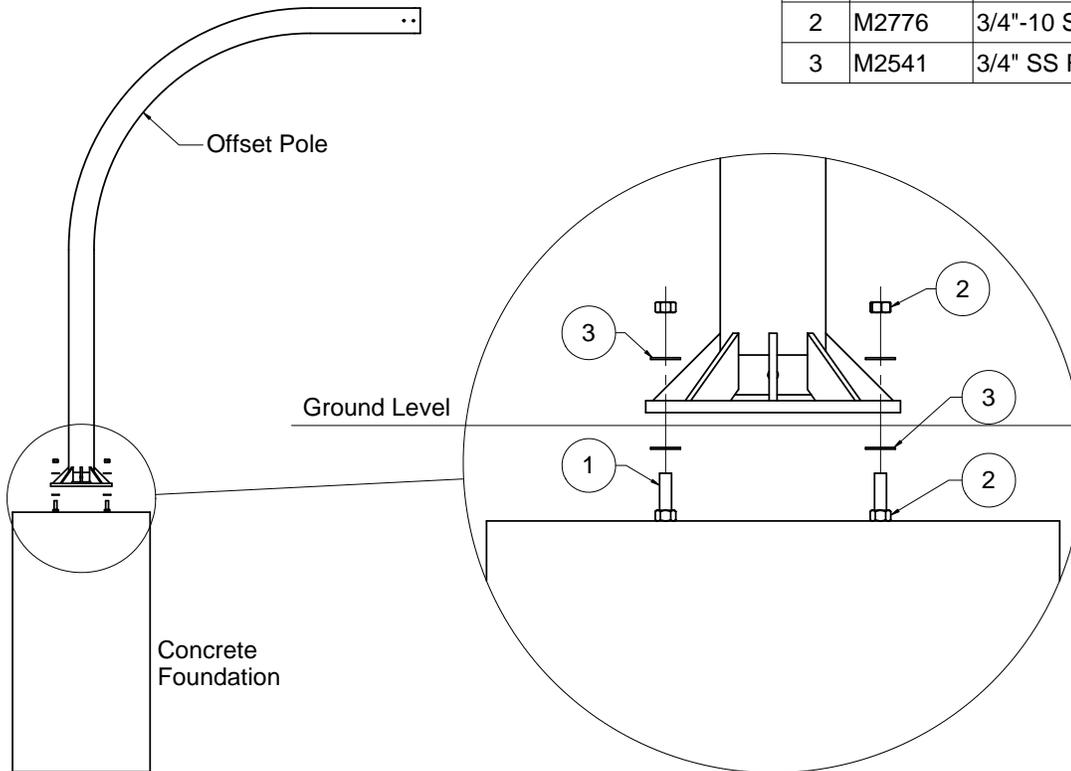
Pour concrete to the top of the form being careful not to move the mounting plate. Vibrate the concrete to insure there are no voids in the foundation. Take care not to get any concrete on the threads of the anchors above the mounting plate. The concrete must be allowed to fully cure before mounting the offset pole to the anchors.



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ALUMINUM FOOTBALL GOAL INSTRUCTIONS PLATE MOUNT OFFSET POLE INSTALLATION

	PART #	DESCRIPTION	QTY.
1	M2765	3/4" SS Anchor Bolt, 18" L-Hook	4
2	M2776	3/4"-10 SS Hex Nut	12
3	M2541	3/4" SS Flat Washer	8



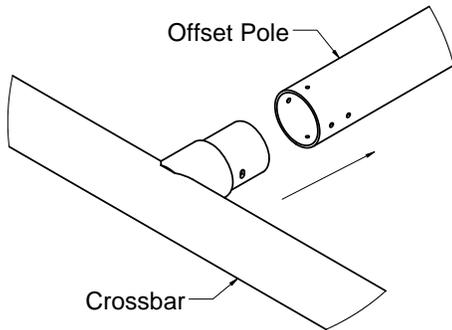
After the concrete foundation has fully cured, bolt the offset pole to the foundations using 3/4"-10 SS hex nuts (M2776) and washers (M2541) as shown.

Using a 4' level, check to see if the offset pole is plumb. If it is, tighten all the nuts securely at this time. If adjustment is required, loosen the appropriate top nuts a small amount (a turn at a time) and tighten the bottom nuts up against the bottom of the offset pole plate. Recheck the offset pole for plumb. Continue this adjustment process until the offset pole is plumb. Securely tighten all nuts.

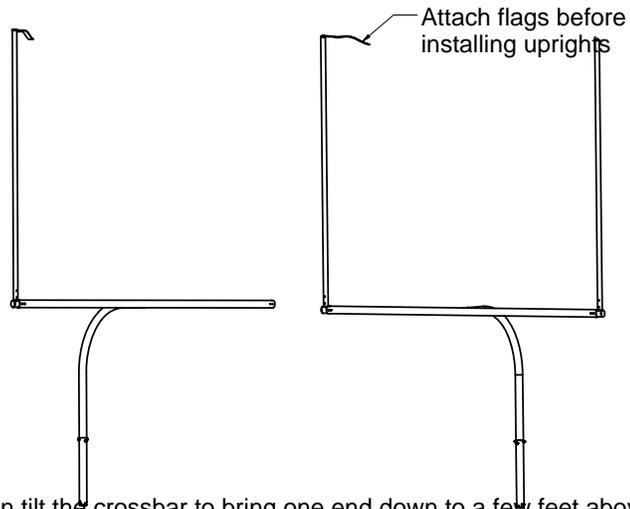


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ALUMINUM FOOTBALL GOALS CROSSBAR INSTALLATION

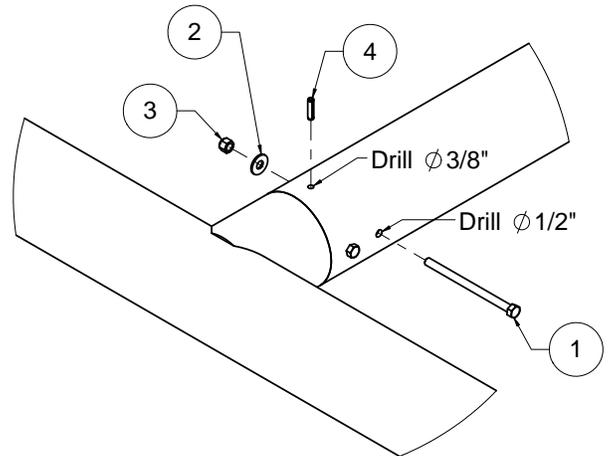
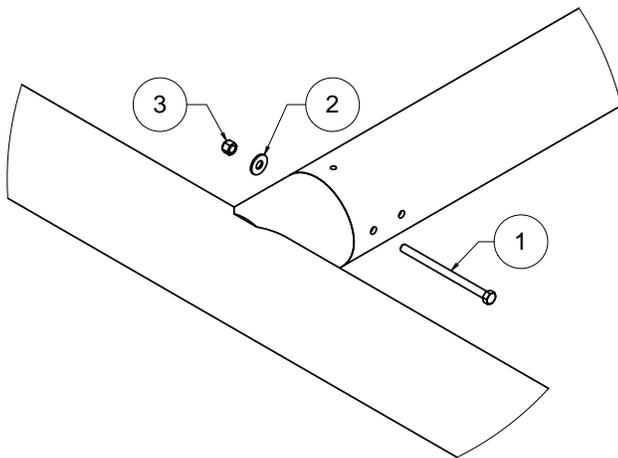


Insert the crossbar joint completely into the offset pole.



With caution tilt the crossbar to bring one end down to a few feet above ground level. Install elbow joint and upright (details on separate page). Lower the other side of the crossbar and install the other elbow joint and upright.

Use extreme caution while performing these steps. Do not stand under the crossbar and watch the crossbar insert to make sure the joint is not slipping out.



After the uprights are installed rotate the crossbar back to level, using a 4' level at the center of the crossbar and bolt through with 1/2"-13 x 7 1/2" hex bolt (M2784), washer (M1268), and nylock hex nut (M2232).

Using the second hole in the offset pole as a guide drill a $\phi 1/2''$ hole through the crossbar insert (both sides) and through bolt.

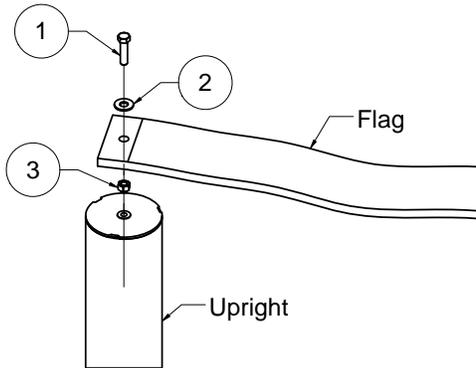
Using the $\phi 3/8''$ holes on the top and bottom of the offset pole as guides, drill $\phi 3/8''$ holes into the crossbar insert. Install 3/8" x 1 1/2" spring pins (M25073).

	PART #	DESCRIPTION	QTY.
1	M2784	1/2"-13 x 7 1/2" Hex Bolt, Gr 5	6
2	M1268	1/2" Flat Washer	10
3	M2232	1/2"-13 Nylock Hex Nut	6
4	M25073	3/8" x 1.5" Spring Pin, Zinc Plated	6



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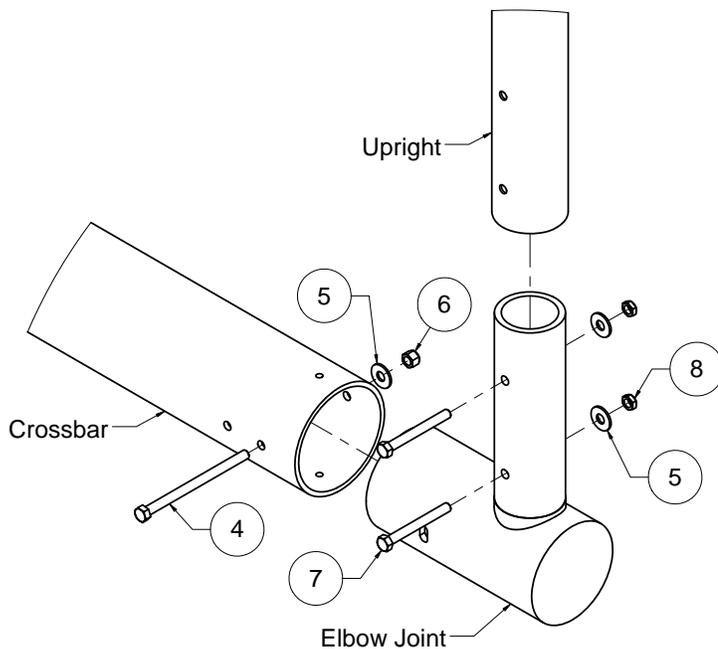
ALUMINUM FOOTBALL GOALS UPRIGHT INSTALLATION



Attach the flags to the top of the uprights before installing the uprights.

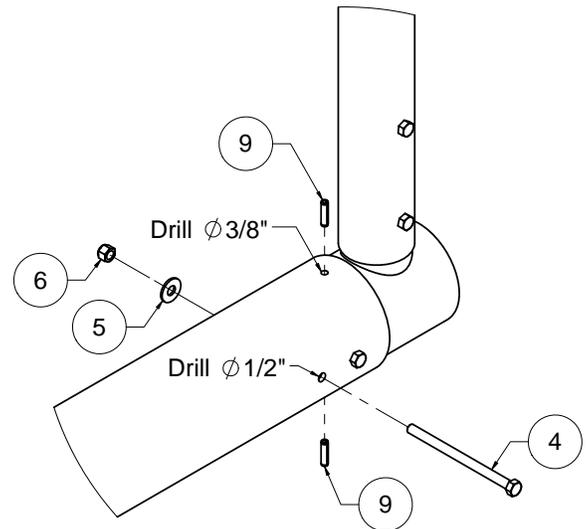
Insert the 3/8"-16 x 1 1/2" hex bolt (M2284) through the 3/8" flat washer (M2271) and the grommet in the flag. Thread the 3/8"-16 hex nut (M1236) onto the bolt, capturing the flag and washer. Thread the bolt into the hole on top of the upright. Tighten the nut down against the top of the upright. Make sure that the flag can spin freely.

	PART #	DESCRIPTION	QTY.
1	M2284	3/8"-16 x 1 1/2" Hex Bolt	2
2	M2271	3/8" Flat Washer	2
3	M1236	3/8"-16 Hex Nut	2
4	M2784	1/2"-13 x 7 1/2" Hex Bolt, Gr 5	6
5	M1268	1/2" Flat Washer	10
6	M2232	1/2"-13 Nylock Hex Nut	6
7	M2270	1/2"-13 x 4 1/2" Hex Bolt Gr 5	4
8	M1293	1/2"-13 Thin Nylock Hex Nut	4
9	M25073	3/8" x 1.5" Spring Pin, Zinc Plated	6



Insert the elbow joint into the crossbar and secure it with 1/2"-13 x 7 1/2" hex bolt (M2784), 1/2" washer (M1268), and nylock hex nut (M2232).

Slide the upright onto the elbow joint and secure it with 1/2"-13 x 4 1/2" hex bolts (M2270), 1/2" washers (M1268), and thin nylock hex nuts (M1293).



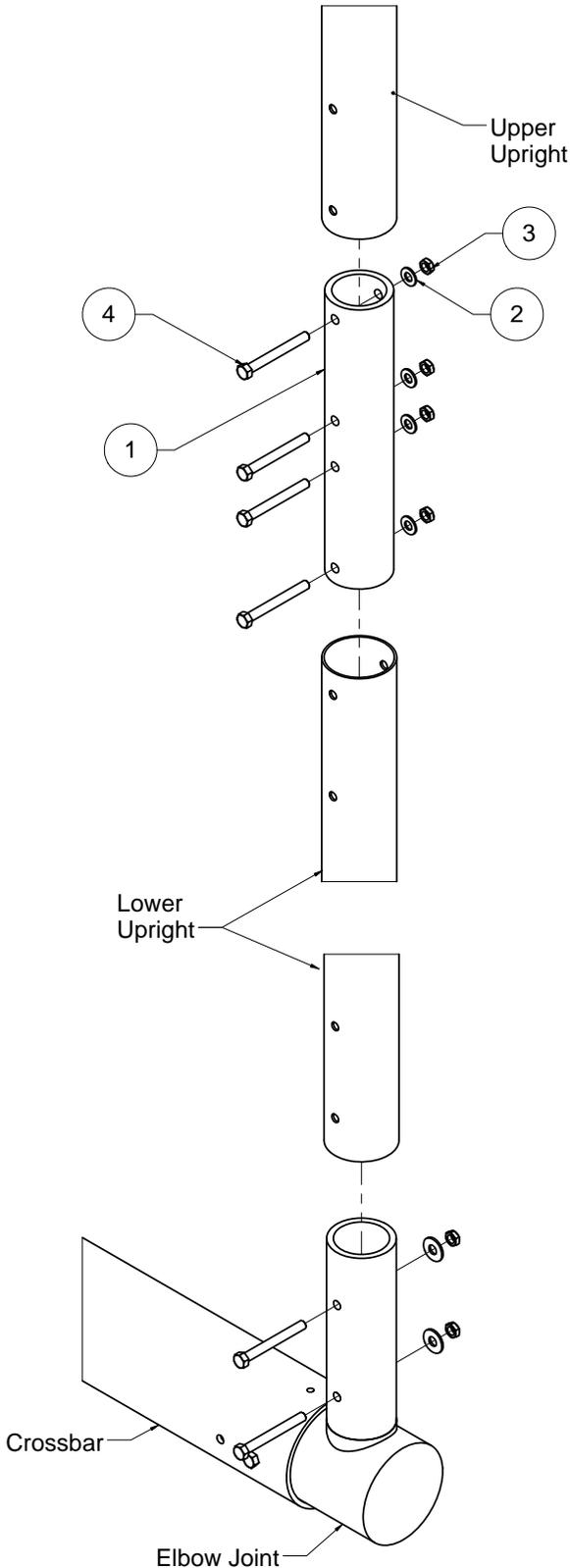
After the crossbar is leveled, loosen the bolt securing the elbow joint in the crossbar. Use a 4' level and rotate the upright till it is plumb. Re-tighten the bolt.

Using the holes in the crossbar as guides drill holes into the elbow joint as shown. Install ϕ 3/8" x 1 1/2" spring pins (M25073) into the holes on the top and bottom of the crossbar. Through bolt the holes on the front and back of the crossbar using ϕ 1/2" hardware.



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ALUMINUM FOOTBALL GOALS UPRIGHT INSTALLATION



	PART #	DESCRIPTION	QTY.
1	F30036	Upright Splice Tube	1
2	HDWE050050E0	1/2" Flatwasher	4
3	M1293	1/2"-13 Thin Nylock Hex Nut	4
4	M2270	1/2"-13 x 4 1/2" Hex Bolt Gr 5	4

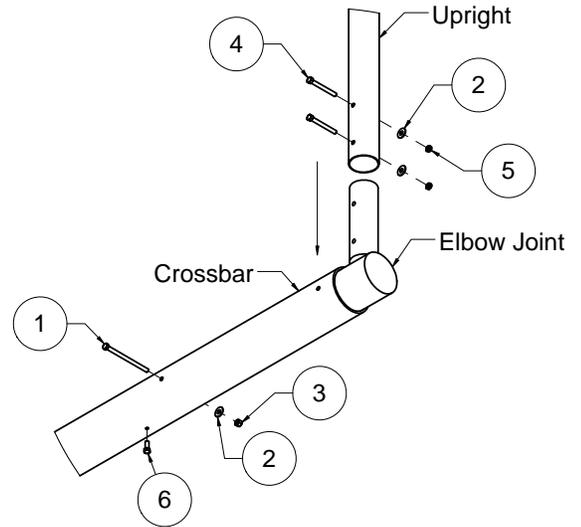
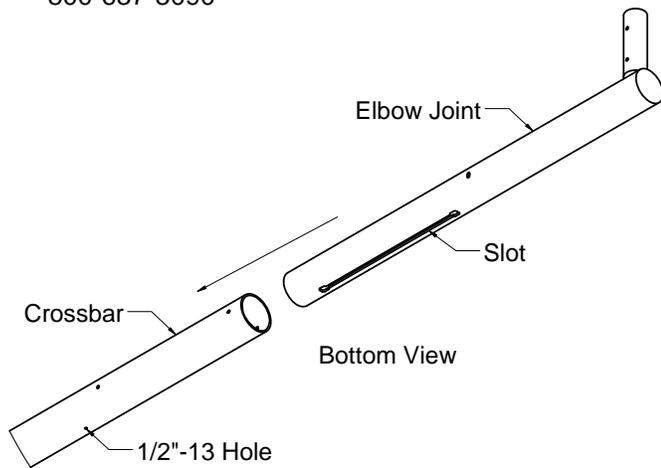
Splice the two upright pieces using one Upright Splice Tube (F30036) for each side on the ground. Fasten the upper and the lower upright tubes with four 1/2"-13 x 4 1/2" Hex Bolts (M2270), four 1/2" Flatwashers (HDWE050050E0) and four 1/2"-13 Thin Nylock Hex Nuts (M1293). Tighten the Nuts to each bolt securely.

Slide the assembled, spliced upright onto the Elbow Joint and secure in place using 1/2"-13 Hardware (see page 7).



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ALUMINUM FOOTBALL GOAL EXPANDABLE ELBOW JOINT INSTALLATION



The expandable goals utilize a special crossbar and elbow joints. When installing the crossbar make sure that the 1/2"-13 threaded hole is facing down. This hole must line up with the slot on the bottom of the elbow joint.

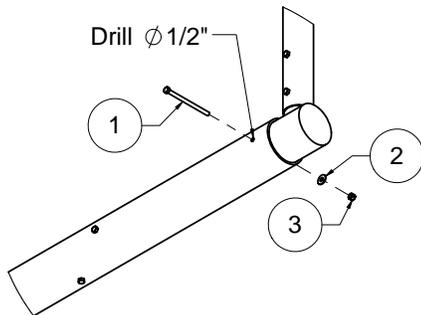
Install the flags on top of the uprights as shown on the Upright Installation page.

Insert the elbow joint into the crossbar.

Secure the elbow joint with 1/2"-13 x 7 1/2" hex bolt (M2784), 1/2" washer (M1268), and nylock hex nut (M2232). Thread 1/2"-13 x 1 1/4" bolt (M2234) into the hole on the bottom of the crossbar.

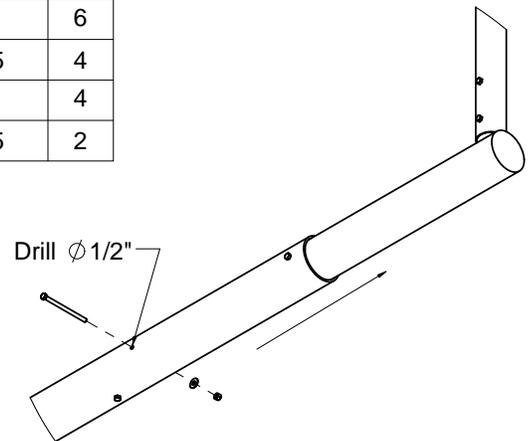
Slide the upright onto the elbow joint and secure it with 1/2"-13 x 4 1/2" hex bolts (M2270), 1/2" washers (M1268), and thin nylock hex nuts (M1293).

	PART #	DESCRIPTION	QTY.
1	M2784	1/2"-13 x 7 1/2" Hex Bolt, Gr 5	6
2	M1268	1/2" Flat Washer	10
3	M2232	1/2"-13 Nylock Hex Nut	6
4	M2270	1/2"-13 x 4 1/2" Hex Bolt Gr 5	4
5	M1293	1/2"-13 Thin Nylock Hex Nut	4
6	M2234	1/2"-13 x 1 1/4" Hex Bolt, Gr5	2



After the crossbar is leveled, loosen the bolt securing the elbow joint in the crossbar. Use a 4' level and rotate the upright till it is plumb. Re-tighten the bolt.

Using the hole in the crossbar as a guide, drill a ϕ 1/2" hole through the elbow joint insert (both sides) and bolt in place.



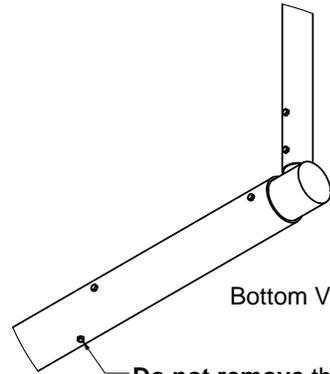
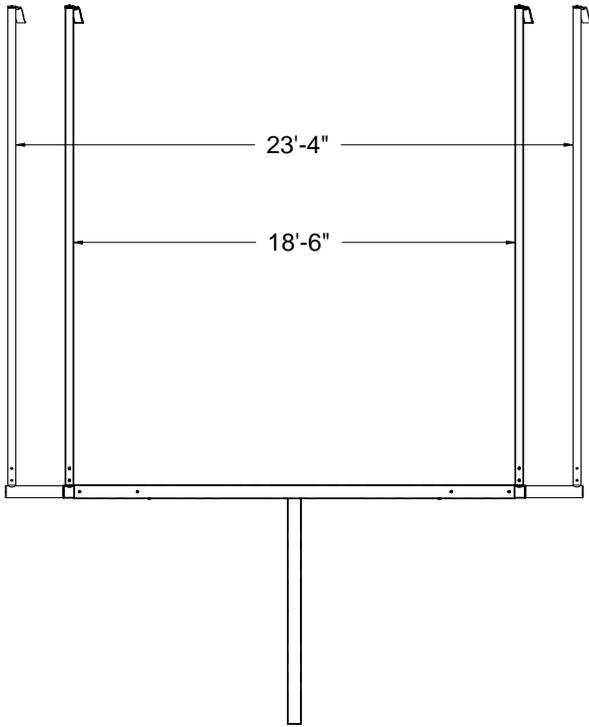
Remove both bolts securing the elbow joint, and slide it out to the extended position. Bolt the elbow joint in position using the hole closest to the end. Use a 4' level and rotate the upright till it is plumb and tighten the bolt.

Using the hole in the crossbar as a guide, drill a ϕ 1/2" hole through the elbow joint insert (both sides) and bolt in place.



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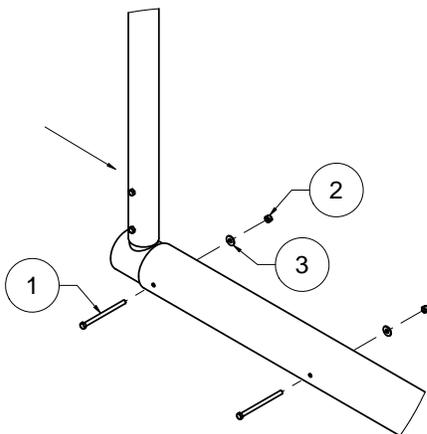
ALUMINUM FOOTBALL GOAL EXPANDABLE GOAL OPERATION



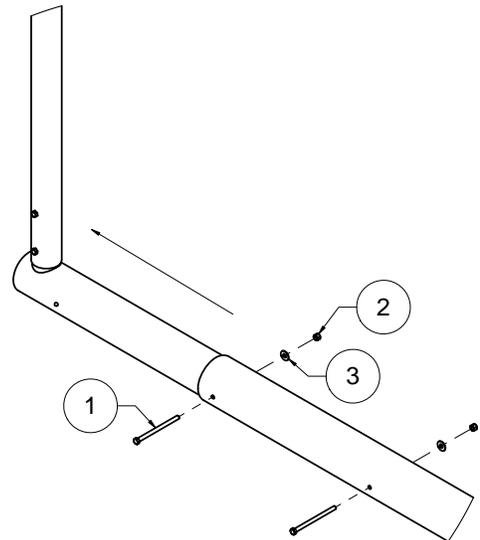
Bottom View

Do not remove the bolt from the bottom of the crossbar. This bolt prevents the crossbar from rotating during adjustments and helps align the holes in the crossbar and elbow joint at each position.

	PART #	DESCRIPTION
1	M2784	1/2"-13 x 7 1/2" Hex Bolt, Gr 5
2	M2232	1/2"-13 Nylock Hex Nut
3	M1268	1/2" Washer



To change the goal to the 18'-6" width, remove the bolts from the crossbar and carefully slide the elbow joint in until the holes in the crossbar line up with the holes in the elbow joint. Re-install the bolts.



To change the goal to the 23'-4" width, remove the bolts from the crossbar and carefully slide the elbow joint out until the holes in the crossbar line up with the holes in the elbow joint. Re-install the bolts.

ATTACHMENT C

Vault Box Specifications

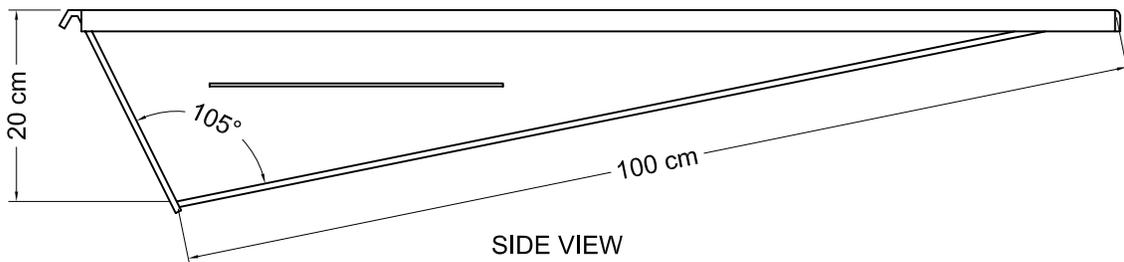
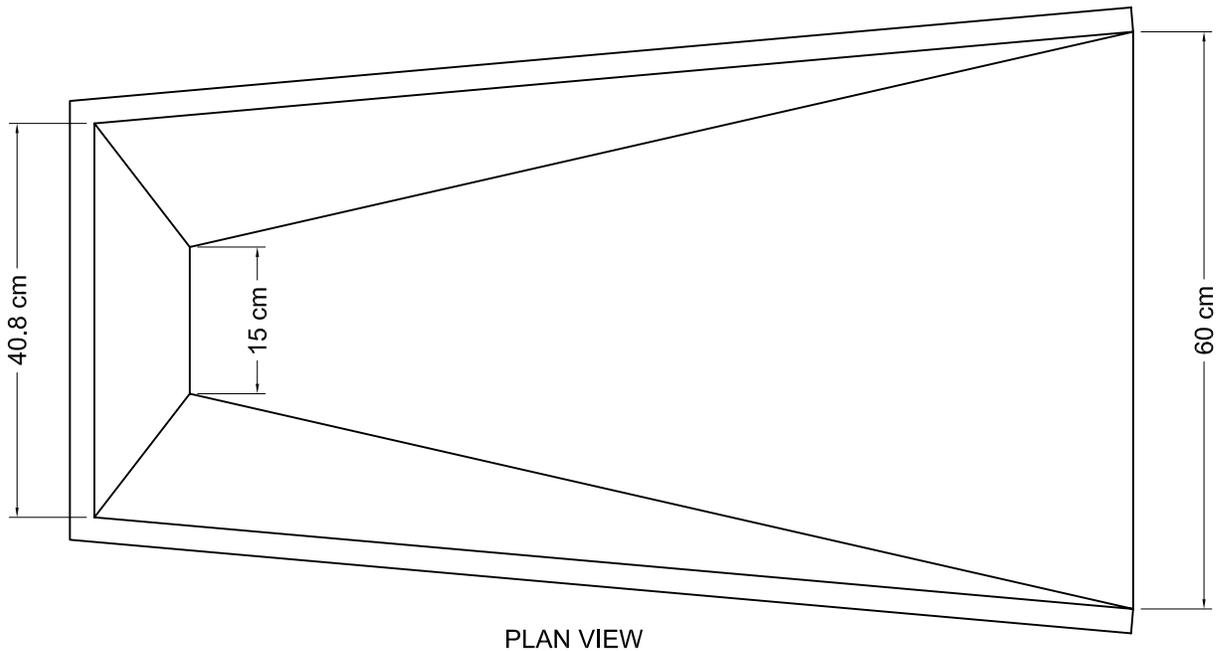


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502 - ALUMINUM VAULT BOX SPECIFICATIONS

SPECIFICATIONS

The 502 Aluminum Vault Box is fabricated from 6061 structural aluminum tempered to a T6 condition. The sides of the box are cut and folded from 1/8" [3.2mm] thick sheet. The box bottom and backstop plates are formed from 1/4" [6.4mm] plate welded to the sides along the outside edges. Outer edges of the box are folded down to eliminate sharp edges. Two outer side wings secure the box position when placed in concrete.

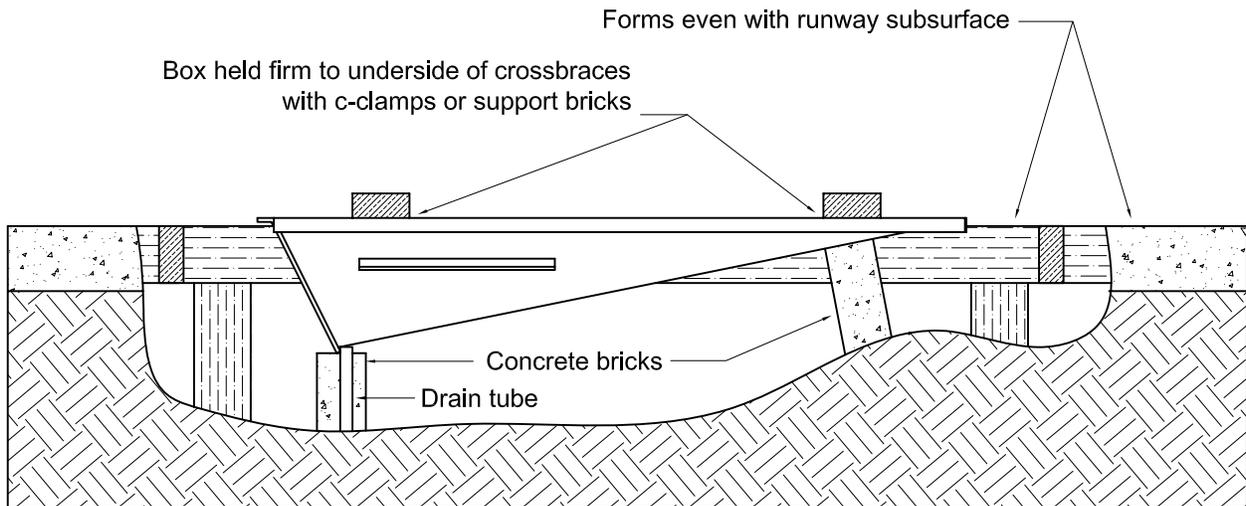
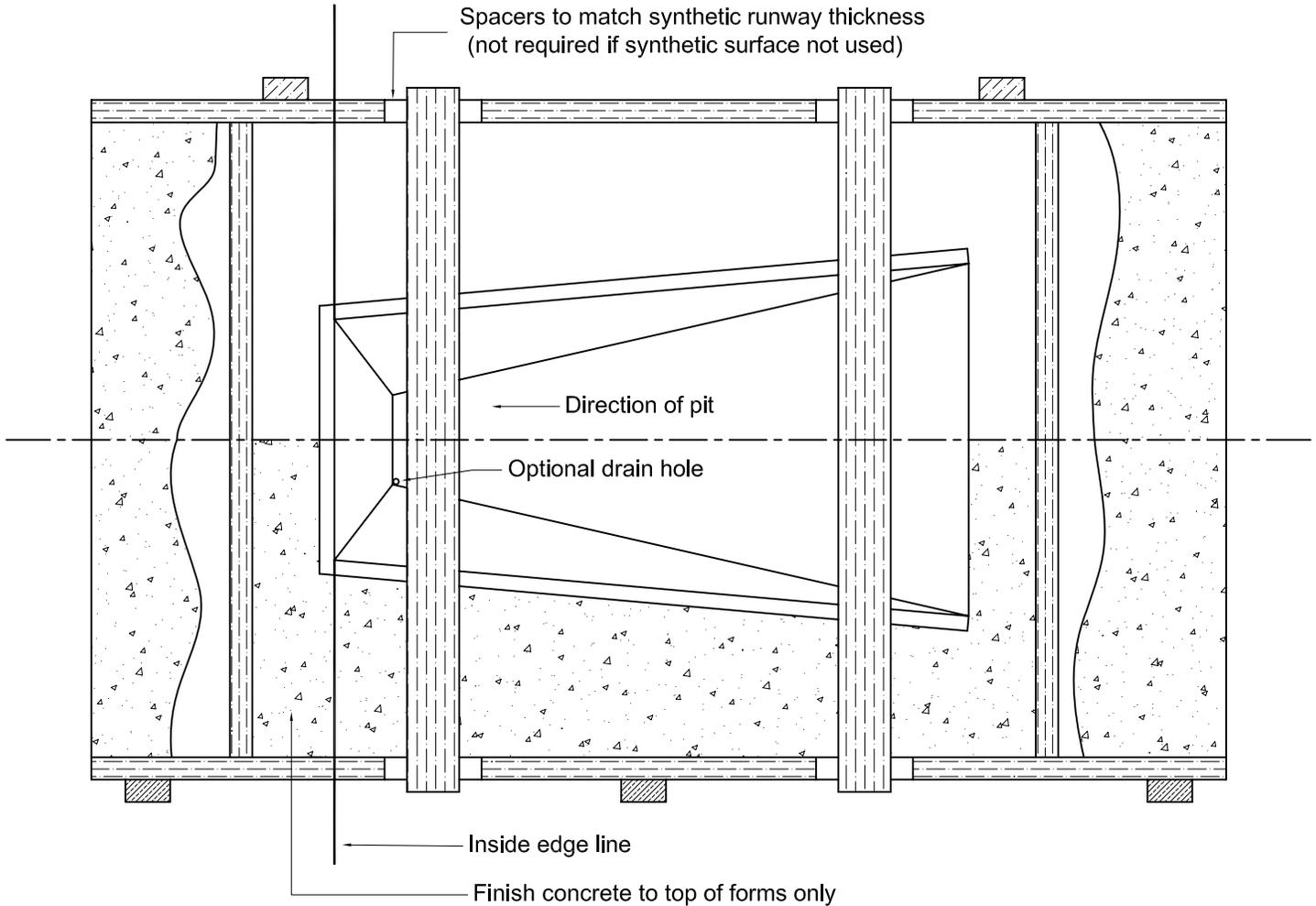




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500 SERIES VAULT BOXES 500, 502, & 504 INSTALLATION INSTRUCTIONS

INSTALLATION OF BOX IN NEW OR EXISTING RUNWAY



NOTICE: All installations should be conducted by experienced contractors and in accord with all applicable codes, laws and regulations. Suggested instructions herein are illustrative only and should be adapted to suit local requirements. Gill Athletics is not responsible for the manner in which these products are installed.

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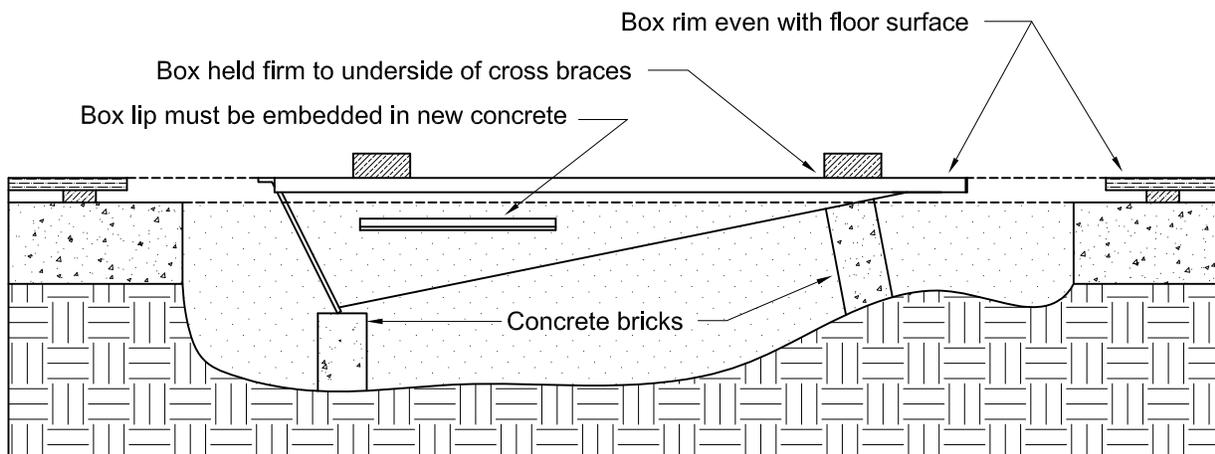
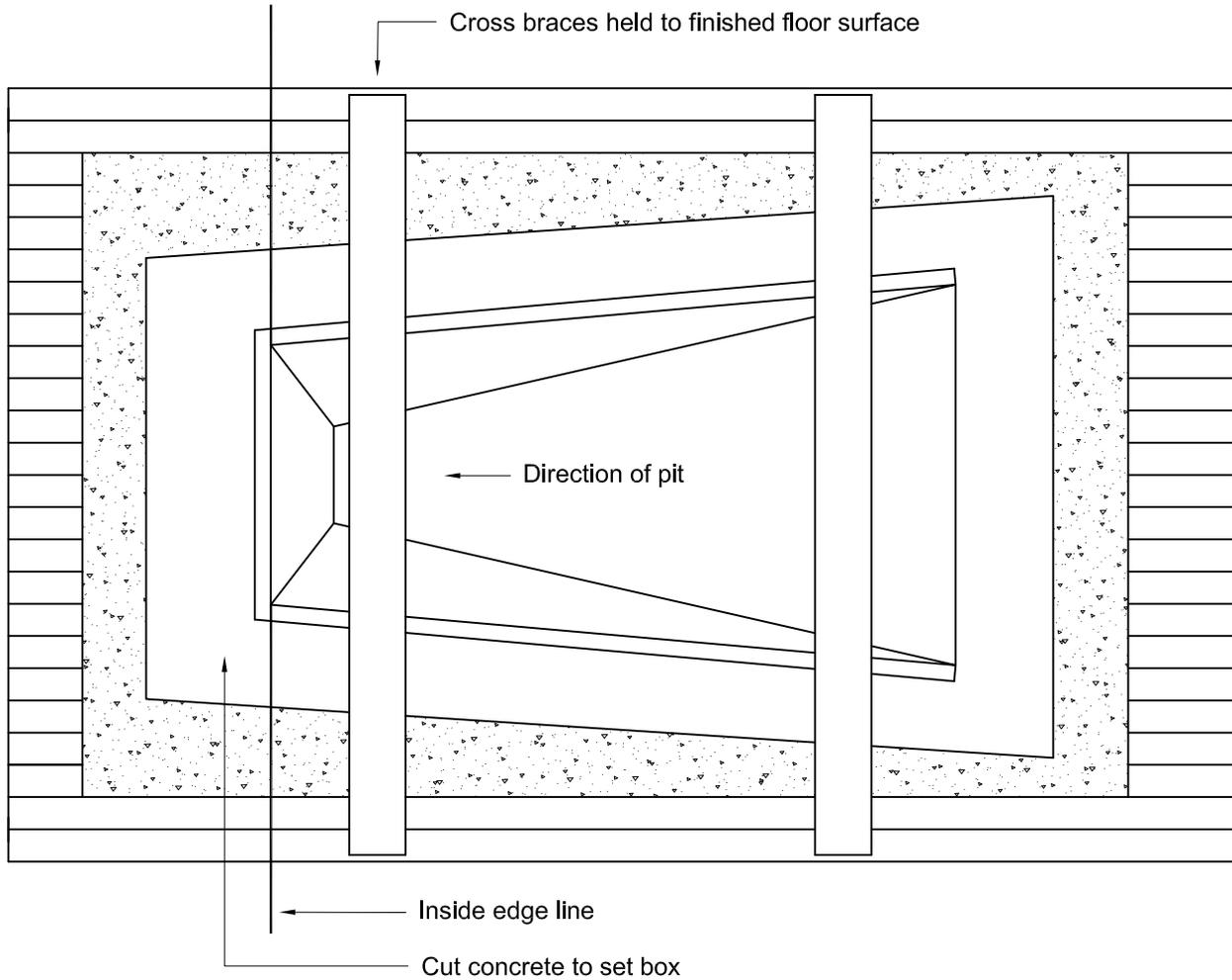
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500 SERIES VAULT BOXES 500, 502, & 504 INSTALLATION INSTRUCTIONS

INSTALLATION OF BOX IN GYM FLOOR



NOTICE: All installations should be conducted by experienced contractors and in accord with all applicable codes, laws and regulations. Suggested instructions herein are illustrative only and should be adapted to suit local requirements. Gill Athletics is not responsible for the manner in which these products are installed.

THIS WARNING IS GIVEN IN COMPLIANCE WITH CALIFORNIA'S PROPOSITION 65:

WARNING

This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

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SECTION 13 12 50
GRANDSTAND SEATING SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grandstand Seating System
 - 1. AISC certified steel fabrication
 - 2. Steel Understructure Designed with an L/200 Serviceability Criteria
 - 3. Powder coated structural steel finish
 - 4. Fully Closed Aluminum Welded Deck System
 - 5. Enhanced slip and stain resistant deck finish
 - 6. Powder coated aluminum risers
 - 7. Modular press box coordination and connections.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 – Cast in Place Concrete
- B. Division 31 – Earthwork
- C. Division 32 – Site Construction
- D. Division 26 - Electrical: Equipment wiring.
- E. Section 13 12 60 – Press Box

1.03 REFERENCE STANDARDS

- A. AISC Steel Manual Thirteenth Edition
- B. ASTM E985
- C. AWS D1.2.
- D. ACI 318-05.
- E. Aluminum Association Design Manual 2010
- F. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2012.
- G. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- I. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- J. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2012.
- K. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2012e1.
- L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- M. SSPC-SP; Society for Protective Coatings; 1982 (Ed. 2004).
- N. ASTM A36 - Standard Specification for Carbon Structural Steel; 2008.
- O. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate all foundation systems between manufacturer and Structural Engineer. Current drawings shown have been coordinated with the Basis of Design manufacturer. Foundations are shown on bid document drawings, in order to establish an equal bidding opportunity for all participants. Foundations changes may be required with some manufacturers. Additional Costs (if any) for foundation changes required by the manufacturer must be included within the bid.
- B. Coordinate with all Structural Design Loads for the project. See Structural Drawings. Guardrail loads shall comply with current building codes and requirements (State of Maine).

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, accessories, electrical characteristics and connection locations.
- C. Shop Drawings: Complete detailed drawings prepared, signed and sealed by a Registered Professional Engineer (P.E.) licensed in the State of Maine. Include: For custom fabricated systems indicate, in large scale detail, construction methods; method of attachment or installation; type and gage of metal, hardware, and fittings; plan front elevation; sections, section details, seat details, seat materials, elevations and dimensions; utility requirements as to types, sizes, and locations. Seating plan indicating aisles, walkways, seating sections and exits and showing exit calculations using appropriate tables and requirements of the Maine State Building Code. Footings and foundation sizes and types and relationships to finish grade in compliance with construction documents. Exposed portions of foundations, pier height and top elevations shall be subject to customer approval.
- D. Engineering calculations signed and sealed by a Registered Professional Engineer (P.E.) licensed in the State of Maine.
- E. Certifications:
 - 1. Submit seismic analysis certification sealed and signed by a registered professional structural engineer in the State in which the Project is located, that all equipment stands, frames, and supports comply with applicable codes.
 - 2. AISC Certification: All structural steel shall be fabricated in an American Institute of Steel Construction (AISC) certified plant that is certified "STD" at the time of the bid. The manufacturer shall be listed on AISC's website as a certified fabricator.
- F. Samples: Submit samples representative of materials and finished products as may be requested by the Architect.
- G. Product Certificate: Prepare written statement on manufacturer's letterhead certifying that product complies with requirements in the Construction Documents.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified with minimum five years of experience.
- C. Installation: Installation shall be performed by factory trained and certified representatives of the grandstand manufacturer. Installer shall have completed at least three installations of similar size.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.

- B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.

1.08 WARRANTY

- A. See Section 01 78 00 - Warranties, for additional warranty requirements.
- B. Product shall be guaranteed for (5) years on the structure and (3) years on the finishes together with labor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Dant Clayton Corporation
- B. Acceptable Manufacturers, subject for product review:
 - 1. Substitutions: See Section 01 60 00 - Product Requirements.

2.01 PRODUCT COMPONENTS

- A. See Drawings for design intent.
- B. Fully Closed Welded Deck System
 - 1. The decking system has two components. The first component is a one-piece welded deck panel constructed by welding multiple aluminum extensions together in the factory utilizing a fully automated, computer controlled, multi-head welding machine. The welding machine will weld all extrusions together in a single pass with 0.040" diameter 4043 welded wire using Orlicon Gas to insure uniform shape, dimension and appearance. The decking system is fixed with a 1% slope to the front to enhance water drainage. There is a gap of 1" at the rear of the front walkway to allow for water to pass to drainage beneath. The decking system is anchored with concealed clips on the underside and seat brackets bolted to the supporting steel in the front. The decking extrusions are 1 3/4" vertically with a .078" wall thickness and are interlocked horizontally prior to welding using a tongue and groove connection.
 - 2. The second component is a one-piece aluminum riser extension that has a male-female connection at the top with the welded deck panel and a shingled overlap connection at the bottom with the welded deck panel. The riser is finished with a clear anodized coating.
 - 3. The decking system will run from raker beam to raker beam. There will be a 1/2" gap at joint of the welded deck panels to allow for expansion and contraction of the aluminum due to temperature variations.
 - 4. The joint of the welded deck panel is covered with a 4" wide aluminum extrusion joint cover.
 - 5. Riser height per row and tread depth per row is indicated on design drawings.
 - 6. The ends of decking system will be finished with a one-piece aluminum angle end cap.
- C. Seating
 - 1. Bench
 - a. Seat Brackets shall bolt directly to the steel understructure. Supporting seat brackets in the aluminum channels of the deck will not be permitted.
 - b. Seats shall be 6063-T6 extruded aluminum with a fluted surface and a minimum of 4 vertical legs. The exact size of seatboard is 2" x 10" x .080" wall thickened at the joints and weighing 1.9 lbs. per foot with 1" radius comfort curve front edge.
 - c. Mounting brackets: 3/16" thick A36 steel plate, plasma cut, bent and galvanized
 - D. Understructure shall consist of an open span I-Beam understructure.
 - 1. Longitudinal bays may include angle cross bracing provided that it does not interfere with building entrances or vomitories.
 - 2. All beams and columns may be made of either wide flange or tube shapes.
 - 3. All steel shall be sized to support the most conservative of the loads in the table above, and the loads in the local building code. If sizes are shown in the drawing, they shall not be reduced for any reason.

- D. Guard Railing

1. Vertical guardrail structural supports shall be 2.8" X 2.0" X .1888" aluminum rectangular tube. Guardrails shall have structural support on each leg of fencing at all 90 degree turns. Tension bars are not acceptable.
 2. Guardrail horizontal and vertical framing members will be 1 5/8" O.D. anodized aluminum pipe.
 3. Chain link fence shall be 2" mesh, 6 gauge black vinyl-coated fabric.
- E. Ramps
1. Ramps shall be configured as shown on drawings.
 2. Ramps shall have a maximum slope of 1:12, and shall have the same guard railing as the rest of the grandstand.
 3. Ramps shall have a minimum post spacing of 3 ft and a maximum post spacing of 9 ft.
 4. Material finishes shall match those on the grandstand.
- F. Stairs
1. Stairs shall consist of L3x3x1/4" legs with a sloping steel channel supporting the treads. Each tread shall be supported by a clip angle bolted to the sloping channel. Minimum vertical leg spacing is 3 ft. Maximum spacing is 9 ft.
 2. Guardrail on the stairs shall match the guardrail on the stand.
 3. Material finishes shall match those on the grandstand.
- G. Hand & Grab Rails
1. Hand and Grab Rails shall be located in all areas required by building code.
 2. Hand and Grab Rails shall be 1-15/16" O.D. extruded aluminum pipe.
 3. Two-Line mid-aisle handrails shall be located in all interior aisles. All mid-aisle rails shall feature internal fittings for both lines of rail. External fittings are not permitted.
- H. Closure
1. Vertical closure shall be provided at the following locations and shall enclose the area from the walking surface to 4" above grade:
 - a. Front of grandstand
 - b. Egress stairs and associated platforms at front walkway
 - c. Egress ramps and associated platforms
 2. Vertical closure material shall be corrugated 6063-T6 extruded aluminum riser boards and shall be provided in a color powder coated finish.

2.02 MATERIALS

A. Structural Steel

1. All detailing, fabrication, and erection shall be completed in accordance with the AISC Steel Construction Manual 13th Edition. All fabrication shall be completed in an AISC certified facility as described in Para. 1.8 A.
2. Structural Steel shall be ASTM A572 multi-certified grade 50. Miscellaneous steel shall be ASTM A36.
3. Bolts & Nuts: All bolts 5/8" diameter and larger shall meet ASTM A325. All bolts 1/2" and smaller shall meet ASTM A307.
4. All welds shall conform to ANSI/AWS D1.1. Electrodes shall be E70xx

B. Aluminum

1. All footboards & seatboards shall consist of 6063-T6 aluminum alloy with minimum yield strength of 25 ksi.
2. All straight grab & hand rails shall consist of 6061-T6 aluminum alloy with minimum yield strength of 35 ksi.
3. All bent grab & hand rails shall consist of 6061-T4 aluminum alloy with minimum yield strength of 21 ksi.

2.03 FINISHES

A. Structural Steel

1. All structural steel shall have a factory applied powder coat finish.
 - a. All ferrous metal components shall be blast cleaned to an SSPC-6 commercial blast clean.
 - b. Powder for coating shall be a polyester-based thermal setting resin.

- c. Powder coat system shall meet or exceed the following test requirements:
 - i. Direct Impact Resistance: ASTM D 2794-93, up to 160 in.-lbs.
 - ii. Flexibility: ASTM D 522-93, Method B, equal to or less than a 1/4 inch mandrel.
 - iii. Pencil Hardness: ASTM D 3363-93a, HB-2H
 - iv. Crosshatch Adhesion: ASTM D 3359-97, Method B, 5B
 - v. Salt Spray Resistance: ASTM B 117, plus 1,000 hours
 - vi. Humidity Resistance: ASTM D 2247, plus 1,000 hours
 - d. The coating process shall eliminate all potential for outgassing.
2. All structural steel fasteners shall be galvanized.
- B. Aluminum**
1. All aluminum footboards shall have an enhanced stain resistant and slip resistant finish at all locations intended for use as a walking surface.
 - a. This finish shall be produced by the bleacher manufacturer in addition to the mill extrusion process and shall be uniform in appearance.
 - b. This surface finish shall prevent oxidation staining. Oxidation staining prior to warranty expiration shall be grounds for product replacement at the manufacturer's expense.
 - c. This surface finish shall exhibit enhanced slip resistance beyond the mill extrusion process, resulting in an improved coefficient of friction under wet conditions in all directions of travel.
 - d. Untreated mill finish aluminum with raised extruded "flutes" or "ribs" does not meet this requirement.
 2. All seat boards shall have a clear anodized finish.
 3. All Riser boards shall have a color powder coat finish.
 4. All hand and Grab Rails shall be clear anodized

PART 3 EXECUTION

3.01 EXAMINATION

- A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.
- B. Inspect areas and conditions before installation. Notify Architect in writing of unsatisfactory or detrimental conditions. Do not proceed until conditions have been corrected. Commencing installation constitutes acceptance of work site conditions.
- C. Verify that electrical services are correctly located and of the proper characteristics.
- D. Examine all existing conditions with installer present for compliance with requirements for installation tolerances and other conditions affecting performance of the work.
- E. Prepare written report, endorsed by installer, listing conditions detrimental to performance of the work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install grandstand and all components according to manufacturer's written instruction and the approved shop drawings.
- B. Install equipment rigid, straight, plumb, and level.
- C. Secure all equipment with manufacturer's recommended anchoring devices.
- D. Install all components securely, with fasteners tight
- E. Separate dissimilar metals to prevent electrolytic corrosion.

3.03 ADJUSTING, CLEANING AND PROTECTIONI

- A. Verify proper placement of equipment.
- B. Use cleaning solutions and methods that do not damage the finishes or the adjacent surfaces
- C. Remove all metal burrs, sharp edges or other cutting, unsafe conditions.

- D. Touch up finishes as recommended by manufacturer to the satisfaction of the architect

END OF SECTION

SECTION 13 12 60
PRESSBOX

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prefabricated Modular Press Box
- B. Electrical / Utility Room

1.02 RELATED REQUIREMENTS

- A. Division 26 - Electrical: Equipment wiring.
- B. Section 13 12 50 – Grandstand Seating System

1.03 REFERENCE STANDARDS

- A. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. AWPA U1 - Use Category System: User Specification for Treated Wood; 2013.
- C. PS 1 - Structural Plywood, 2009.
- D. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology; 2010.
- E. SPIB - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2002 and supplements
- F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate systems with the Grandstand Seating Systems. Current drawings shown have been coordinated with the Basis of Design manufacturer.
- B. Coordinate with all Structural Design Loads for the project. See Structural Drawings. Guardrail loads shall comply with current building codes and requirements (State of Maine).
- C. All material and workmanship shall be in accordance with the applicable state building code/ IBC current edition and NFPA
- D. All electric components shall be UL listed.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data showing configuration, sizes, materials, finishes, hardware, accessories, electrical characteristics and connection locations, and manufacturer's installation instructions.
- C. Shop Drawings: Complete detailed drawings coordinated with the Grandstand Seating Systems and submitted at the same time. Framing Drawing prepared, signed and sealed by a Registered Professional Engineer (P.E.) licensed in the State of Maine. Submit all drawings necessary to convey the design intent, including: Plan view and wall section showing complete detail of layout, connection and trim detail.
- D. Engineering calculations signed and sealed by a Registered Professional Engineer (P.E.) licensed in the State of Maine.
- E. Certifications:
 - 1. Submit seismic analysis certification sealed and signed by a registered professional structural engineer in the State in which the Project is located, that all equipment stands, frames, and supports comply with applicable codes.

2. AISC Certification: All structural steel shall be fabricated in an American Institute of Steel Construction (AISC) certified plant that is certified "STD" at the time of the bid. The manufacturer shall be listed on AISC's website as a certified fabricator.
- F. Samples: Submit samples representative of materials and finished products as may be requested by the Architect.
- G. Product Certificate: Prepare written statement on manufacturer's letterhead certifying that product complies with requirements in the Construction Documents.
- H. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified with minimum five years of experience.
- C. Installation: Installation shall be performed by factory trained and certified representatives of the grandstand manufacturer. Installer shall have completed at least three installations of similar size.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's original packaging with factory original labels attached.
- B. Store products indoors and elevated above floor; prevent warping, twisting, or sagging.

1.08 WARRANTY

- A. See Section 01 78 00 - Warranties, for additional warranty requirements.
- B. Product shall be guaranteed for (1) year against defective material or workmanship

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Dant Clayton Corporation
- B. Acceptable Manufacturers, subject for product review:
 1. Substitutions: See Section 01 60 00 - Product Requirements.

2.01 PRODUCT COMPONENTS

- A. See Drawings for design intent and sizes of structures. Provide one Press Box and One Electrical / Utility Room.
- B. FLOOR CONSTRUCTION
 1. Bottom Board: 1/2" CCX foundation grade treated plywood. Industrial grade asphalt-based pint. Continuous aluminum vents on 8' centers
 2. Insulation: 6" R-19 fiberglass batts, with vapor barrier.
 3. Joists: 2" x 6" #2 SYP, on 16" centers, longitudinal framing.
 4. Decking: 3/4" Sturdifloor, underlayment grade, tongue and groove fir plywood.
 - a. Covering: 1/8" Armstrong Excelon vinyl composition tile
 - b. Molding: 4" Thermoplastic rubber base molding by Roppe.
- C. WALL CONSTRUCTION
 1. Studs: 2" x 4", #2 or better SPF, on 16" centers, BOCA framing
 2. Bottom Plate: 2" x 4" #2 or better SPF
 3. Top Plates: (2) 2" x 4" #2 or better SPF.
 4. Headers: As span and design load requires
 5. Ceiling Height: 8'-2" x 8'-0", front to back.
 6. Covering: 5/8" vinyl-faced gypsum panels, Class A, F.S.R.

7. Insulation: 3-1/2" R-13 fiberglass batts with vapor barrier.
 8. Sheathing: 1/2" CDX plywood.
 9. Siding: Metal Sales "U-Panel" .026 gauge ribbed steel panels w/ Kynar 500 finish
- D. ROOF CONSTRUCTION
1. Joists: 2" x 8", #2 SYP, 16" O.C. spacing
 2. Overhang: 15-1/2" over front wall; 6" over rear wall. .019 Steel fascia with perforated vinyl soffit panels
 3. Ceiling: 5/8" type-x fire-rated gypsum board, taped and bedded with spray textured finish, Class A F.S.R
 4. Insulation: 6" R-19 fiberglass batts with vapor barrier
 5. Decking: 3/4" tongue & groove oriented strand board
 6. Covering: 060 polyester reinforced skid and spike resistant PVC membrane, fully adhered.
- E. CAMERA DECK
1. Ladder (Aluminum): Alaco #370 70 degree ships ladder
 2. Hatch: Bilco Model #NB-50 2'-6" x 4'-6" aluminum roof hatch. Provide with Railing Surround System complying with OSHA requirements
 3. Railing Mounts: 1/2" galvanized threaded bolts & nuts through roof fascia on 48" centers along perimeter edge of roof. Railing mounts cannot be placed on the roof surface
- F. WINDOWS:
1. THV #7000 series "paragon" or Equivalent, double horizontal slider windows w/ extruded vinyl frames, AAMA LC-25 structural rating, w/ 3/4" insulated low-e, argon filled tempered glass and removable insect screens.
 2. Interior Windows to be 1/4" tempered safety glass fixed pan with stained jambs and casing
- G. DOORS:
1. 36"x80" 18 ga. insulated hollow metal door with 16 ga. steel wrap around frames, hydraulic closer, 10"x10" window, vinyl weather-stripping, aluminum threshold and keyed lever handled locksets
- H. ELETRICIAL:
1. See Electrical Drawings
 2. Electrical distribution load c with main disconnect – 120/208V. three phase, 100 amp capacity
 3. Receptacles: Pass & Seymour 125 volt/15 amp duplex, spec-grade, along the rear wall. Wiremold 5400 Series two-piece multi-channel, dual voltage, non-metallic surface raceway along front wall below scorer's counter, outlets on 48" centers
 4. Lighting: Lithonia M232PC1S 4-ft. 2-tube fluorescent strips with low-glare parabolic diffusers
 5. Circuits: All branch circuit wiring is minimum #12 THHN encased in EMT thinwall conduit or MC Cable
 6. (3) Berko #BKOC2543 3'-0" Electric baseboard heater w/ integrated thermostat
- I. SCORERS COUNTER
1. 20" deep x 1 1/2" Clear Anodized finish aluminum countertop with rounded front nose. Mounted on brackets spaced a minimum of 32".

PART 3 EXECUTION

3.01 EXAMINATION

- A. Take field measurements to ensure proper fitting of work. If taking field measurements before fabrication will delay work, allow for adjustments within recommended tolerances.
- B. Inspect areas and conditions before installation. Notify Architect in writing of unsatisfactory or detrimental conditions. Do not proceed until conditions have been corrected. Commencing installation constitutes acceptance of work site conditions.
- C. Verify that electrical services are correctly located and of the proper characteristics.

3.02 INSTALLATION

- A. Install pressbox and all components according to manufacturer's written instruction and the approved shop drawings.
- B. Install equipment rigid, straight, plumb, and level.
- D. Install wall components securely, with fasteners tight
- E. Separate dissimilar metals to prevent electrolytic corrosion.
- F. Coordinate with Electrical Installers to connect all wiring and components.

3.03 ADJUSTING, CLEANING AND PROTECTION

- A. Coordinate with Electrical Installers Test all electrical devices and verify all items are working properly
- B. Adjust all doors and hardware to ensure proper function.
- C. Remove all packaging and construction debris.
- D. Clean all surfaces according to manufacturer's recommendations
- E. Remove all metal burrs, sharp edges or other cutting, unsafe conditions.
- F. Touch up finishes as recommended by manufacturer to the satisfaction of the architect

END OF SECTION

SECTION 13 34 12
GREENHOUSE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single source factory fabricated and installed galvanized steel clear-span pre-engineered greenhouse structure with framework, glazing and flashings.
- B. Automatic roof and wall sash, screens, interior ventilating fans, anchorages, programmable climate controller, sealants, attachments and other equipment as required for a complete, watertight installation. Include operable vents as indicated on drawing
- C. Gas unit heater system.
- D. Automatic shading system.
- E. Grow lights, type as recommended by greenhouse contractor, assume a quantity of 20.
- F. Ventilation system
- G. Note: Plant benches shall be provided by Owner's bidding of furnishings and equipment.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete foundation.
- B. Section 07 90 05 - Joint Sealants.
- C. Sections 26 – Electrical
- D. Various other Trades as shown on the drawings.

1.03 REFERENCE STANDARDS

- A. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009 (part of AAMA 501).
- B. ANSI Z 97.1 - Safety Glazing Materials Used in Buildings -Safety Performance Specifications and Methods of Test, 2010
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- D. CPSC - 16CFR 1202 - Architectural Glazing Standards and Related Material.
- E. FGNA - Glazing Manual.
- F. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association.
- G. NFPA 70 - National Electric Code, 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the installation of greenhouse with size, location and installation of foundations and service utilities. Coordinate with mechanical and electrical trades for installation of all systems specific to greenhouse by qualified and licensed contractors.
- B. Pre-installation Meeting: Conduct a pre-installation meeting at least 3 weeks prior to the start of the work of this Section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's specification, standard details and installation requirements for each product, including test reports, materials, finishes, electrical requirements.
- C. Shop Drawings: Submit shop drawings to include manufacturers' product specifications, test results showing compliance with performance criteria described below. Indicate pertinent

dimensioning, general construction, component connections and locations, anchorage methods, locations and installation details. Drawings to include: Floor/ Post Plan, Post Feet Details, Roof Framing Plan, Roof Glazing Plan, Sidewall Elevations, Gable Elevations, Aluminum Truss, Foundation Outline & Greenhouse Structural Loads, Equipment Plan & Section with Electrical Loads, Bench Layout & Irrigation Plan, Plant Lighting Plan including Light rack Plan & Details, Double Vent Ridge Section, Typical Sidewall Section, Roof to Gable Section, Misc. Closure Details (greenhouse to head house/building)

1. Submit stamped and signed drawings and structural calculations prepared in accordance with the building code by a licensed professional structural engineer qualified in the design of self-supporting sloped glazed systems and licensed in Maine.
 2. Report of field testing for water leakage.
- D. Operation and Maintenance Data: Manufacturer's operation and maintenance instructions and record drawings. See Section 01 78 00 - Project Close-Out.

1.06 QUALITY ASSURANCE

- A. Greenhouse manufacturer shall assume undivided responsibility for all components, including structural design, engineering, fabrication, finishing, preparation at the job site, erection and glazing of the greenhouse system weatherproof integrity of the system in place, heating, ventilating, shading and controlling systems.
- B. Manufacturer Qualifications: Company specializing in manufacturing and installation of greenhouses, with not less than fifteen years of documented, successful experience.
- C. Designer Qualifications: Design and engineer greenhouse system under direct supervision of a professional structural engineer experienced in design of work of the type specified in this Section and licensed in Maine.
- D. Installation Qualifications: Installers shall be permanent full-time employees of the greenhouse manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fabricated units and component parts to the jobsite completely identified with labels corresponding to the erection drawings. Protect surfaces from damage during shipping. Inspect materials for damage upon delivery to the jobsite. Replace damaged items.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide greenhouse manufacturer's written warranty that materials, greenhouse equipment and systems, design, manufacturing and erection shall be free of defects and remain free of leaks for two (2) years after the date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Thermal Movement: Provide for such expansion and contraction of component materials as will be caused by the ambient surface temperature range without buckling, stress on glazing, failure of seals, undue stress on structural elements, reduction of performance or other detrimental effects.
- B. Structural Performance:
 1. See Structural Drawings for snow, wind and seismic loads applicable to this Project.
 2. Design assembly to safely carry all dead, snow, wind, thermal and building movement loads, as well as any additional service and construction loads. Include a concentrated load of 150lb applied to any framing member at a location that will produce the most severe stress or deflection.
 3. The deflection of a framing member in a direction parallel to the plane of glazing, when carrying its full dead load, shall not exceed an amount which will reduce the panel bite below 75% of the design dimension and the member shall have a 1/8-in. minimum

clearance between itself and the edge of the fixed panel, or component immediately adjacent, nor shall it impair the function of or damage any joint seals.

4. Deflection of members shall not exceed L/120 for clear spans under 20 feet and L/240 for clear spans greater than 20 feet.
5. Rigid frame design: The greenhouse framing will exert no horizontal reactions or thrust under vertical gravity type loads, (dead, snow, live). Only unbalanced live loads such as wind, seismic, etc., acting upon the greenhouse will produce horizontal reactions applied to the supporting structure.
6. Suitable expansion joints shall be provided in all longitudinal members to take care of the longitudinal expansion in the aluminum. No longitudinal members shall exceed 21'-0". All members shall be so joined as to require each joint to handle the expansion in the individual member and to prevent an accumulation of expansion in several members in one direction.

2.02 MANUFACTURER

- A. Basis of Design: GlassHouse by Rough Brothers.
- B. Other Acceptable Manufacturers:
 1. Wisconsin Solar Design
 2. Janco Greenhouses Inc
 3. Rimol Greenhouse Systems Inc
3. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 GREENHOUSE COMPONENTS

- A. Greenhouse Overall Size: As indicated on the Drawings.
- B. Greenhouse Structure: May be Aluminum or Galvanized Steel
 1. Aluminum Structure: All primary framing shall be 6005 or 6061-T6 and 6063-T6 alloys. All aluminum flashing shall be 3003-H14 alloy.
 2. Galvanized Coating: Zinc-chromate coat, conversion coat and clear polymer top coat process.
- C. Columns: 4" x 4" galvanized steel or Aluminum; 10' 3-3/4" foot spacing spanning the full width of the structure, complete with base plates for anchorage to foundation.
 1. Anchors, fasteners and hardware shall be corrosion resistant, as recommended by the manufacturer.
- D. Roof Trusses: Bolt-together design, galvanized steel or aluminum members at 12 foot spacing. Chords shall be 2" min square and web members shall be 1-1/2" square.
- E. Purlins: 1-1/2" min square galvanized steel or Aluminum, spaced to provide six per roof bay.
- F. Gutters: Extruded aluminum 7 1/2" wide x 2 3/4" deep, with extruded drip gutter and internal downspout connections shall be provided at roof edges and as recommended by the manufacturer and agreed upon by the architect. Members shall have a flange to receive glazing bars and shall be provided with weep holes to carry condensation collected from the underside of the roof to the drip gutter. Gutter to include safety foot treads as a safety factor.
- G. Gable End Framing: 2" min square galvanized steel or Aluminum. Glass gables with fixed gables from sill to gable rafter shall be constructed in a similar manner to the roof and sides using extruded aluminum shapes. All gable glass shall be lapped 3/8" similar to roof glazing.
- H. Gable End Rafter: Specially extruded gable and corner trim shall be provided to receive roof glazing bar, vertical side and gable glazing and glazing bars. The gable and corner trim shall be neatly mitered and spliced at the ridge and at the eave or gutter to provide a smooth detail at this point. These shall be securely fastened to the structural members, forming the gable end.
- I. Internal Bracing: Galvanized steel or Aluminum knee bracing, X-bracing and W-bracing, as required by engineered design.

- J. Structural connections shall be made with galvanized steel bolts. All bolts 1/4" diameter up to 1/2" diameter shall be A307. All bolts 1/2" diameter or larger shall be Grade 5.
- K. Ridge: An extruded aluminum or galvanized steel ridge shall be furnished and placed at the peak of the structure. Ridge shall be provided with continuous socket hinge to receive ridge vents or fixed roof glazing.
- L. Wall and Vent Sills: Extruded aluminum sills shall be provided where required. Sills shall be capable of receiving side vents or fixed glazing. Sill corners shall be shop welded.
- M. Glazing Bars: Extruded aluminum glazing bars shall be placed and spaced on 24-3/4" centers to properly receive glass 24" wide. A chamber shall be provided on both the top and bottom of this bar for fastening purposes. Condensation gutters to conduct primary condensation to a suitable disposal point shall be provided. Glazing bars shall extend in one piece from the ridge to the eave or gutter. In order to prevent secondary condensation on the underside of the roof bars from collecting at purlin points, roof bars shall cross purlins with the entire underside of the bar raised to a minimum of 3/8" above the top flange of the purlin. This will allow the condensation to pass to a suitable collection point at the side of the enclosure. Rafter straps for fastening roof bars to purlins in the above manner shall be of extruded aluminum.
- N. Kneewall/Curb Sill Flashing: Aluminum sill flashing shall be placed on the outside of the perimeter kneewall or curb. Sill flashing shall be placed under the glazing sill member and to the outside of the greenhouse columns, covering the top of the exposed kneewall or curb including any insulation and/or face veneer, if present. Aluminum sill flashing shall extend no less than 2" down the vertical face of the kneewall or curb. Sill flashing at curb, kneewalls, or connection to adjacent structures shall be a minimum 1/16" thick. All sill corner flashing shall be shop welded. All sill flashing and end flashing conditions at door openings shall be shop welded closures matching the profile of the sill flashing. All sill flashing to be laid end to end with a .032 x4" long splice cap matching the profile of the sill flashing. Splice cap to be set in sealant and held in place with pop-rivets. Lapped sill flashing at joints is not acceptable.
- O. Roof Vents: Automatic 26" ridge vents with a continuous socket hinge shall be furnished and arranged to open out. Vents, when assembled and installed, shall be continuous from one end to the other. Ridge vents shall be made up of a top rail, bottom rail, and mullions of extruded aluminum. They will then be bolted together in accordance with the manufacturer's instruction. All vents shall have provision made at the hinge point to prevent creeping of the vents.
- P. Gable Vents: Automatic 26" sidewall vents with a continuous socket hinge shall be furnished and arranged to open out. Vents, when assembled and installed, shall be continuous from one end to the other. Side vent shall be made up of a top rail, bottom rail and mullions of extruded aluminum. They will then be bolted together in accordance with manufacturer's instructions. All vents shall have provision made at the hinge point to prevent creeping of the vents
- Q. Vent Operators: All vents shall be operated with aluminum rack arms with zinc pinions. Provide 14gage 1.315" diameter galvanized drive shaft with aluminum couplings. Aluminum shaft hangers with DELRIN bushings shall be provided to support roof and side vent drive shaft. Rack & pinion arms with aluminum rack, zinc pinion gear and extruded aluminum housing assembly to keep rack and pinions in proper mesh and alignment shall be provided. Racks attach to bottom rail of vents with aluminum clips and stainless steel cotter pins. No less than two sets of rack and pinion arms shall be provided for each bay per run of vents.
- R. Glazing: All glass shall be B or Greenhouse quality, 1/4" double strength, clear annealed glass. All Standard rectangle sized glass to be 1/4" clear tempered glass. All odd sized or sloped cut glass to be 1/4" double strength, clear annealed glass or 1/4" clear acrylic. All roof glazing to be laminated glass consisting of (2) 1/8" clear annealed glass pieces with .030" PVB inner layer. Nominal thickness to be 1/4". All glass shall be laid with 3/8" lapped joints and held in place with aluminum bar caps to cover the glazing, and prevent the glass from slipping. Aluminum extruded bar caps shall be applied to the bar covering the entire length of each lite of glass and made to conform to the laps in the glass and provide a uniform 3/8" lap. These caps shall be fabricated from extruded aluminum, so fabricated to exert a uniform, but not excessive pressure, along the entire length of the glass lite. Each cap shall be held with a minimum of two

½" x #10 stainless steel hex head self-tapping screws. Screws which hold bar caps shall be spaced not over 15 inches apart, nor shall any screw be placed closer than 1-1/2" from the end of the caps. At each truss top chord and end rafters, scaffold screws, 1" x #12 round head stainless steel screws shall be used to hold the caps in place, yet provide sufficient shank protruding above the caps for support of scaffolding.

2.04 ACCESSORIES

- A. Doors, Frames and Hardware: Aluminum storefront. See Section 08 43 13 - Aluminum Storefronts, for frames, doors and hardware.
- B. Glazing Accessories: Attachment hardware shall be aluminum extrusions.
- C. Glass Glazing Panels: Flat roof glass to be 1/4" clear laminated, wall glass to be ¼" clear tempered, panels furnished in continuous section for slopes of roof and sidewalls. Full panel widths shall be used wherever possible.
 - 1. Panel Size: 48" wide by length required for no cross seams.
- D. Insect Screens: Aluminum wire 18 x 16 fine mesh screening in 3/4" x 3/8" aluminum screen framing. Provide at all vent locations. Install gasketed closure to vent operating linkage.
- E. Gaskets: Manufacturer's standard as required for each application.
- F. Sealant: Manufacturer's standard.

2.05 EQUIPMENT

- A. Heating Unit(s): Gas (propane) commercial high-efficiency condensing unit heater with finished cabinet; separate combustion gas and horizontal vent pipe kit. Provide hanging kit. Heating unit quantity, BTU capacity and locations shall be as engineered by the contractor to provide proper operation for this greenhouse configuration.
 - 1. Warranty: Limited 10-year heat exchanger and 5-year electrical and mechanical component warranty.
 - 2. Products:
 - a. Sterling Manufacturing Company.
 - b. Reznor UEAS by Thomas & Betts, sized as required to maintain proper temperatures.
 - c. Modine HD power exhaust sealed combustion direct vent natural gas unit heater with low voltage thermostat and solid state ignition.
 - d. Substitutions: See Section 01 60 00 - Product Requirements
 - 3. Gas Fired Unit heater to provide 100% of the Greenhouse System Heating Load. Engineering and Design for the heating system shall meet uniform mechanical code. All drawings shall be blue lined drawings on standard D size, Stamped by mechanical engineer.
- B. Exhaust Fans: Exhaust fans shall be heavy-duty construction, consisting of a cast aluminum propeller having three (3) or more blades, and a formed fiberglass housing and exhaust cone, both having a smooth, gel coat exterior surface. High efficiency, totally enclosed air over (TEAO) motors shall drive fans with heavy duty pulleys and aramid fiber v-belts. Fans are to use a spring-loaded, automotive style v-belt tensioner. Fans shall be protected against rust and corrosion with stainless steel hardware, sealed bearings, and aluminum struts. Fans used in this specification shall be performance certified by an independent testing facility such as BESS Labs (University of Illinois) and shall list the appropriate test number on the fan. Motorized, airfoil style shutters with aluminum blades shall be provided as part of each exhaust fan. Shutter motor kits to include drive motor, crank arm, pull chain, return spring and hardware. Fans shall be two speed.
- C. Horizontal Air Flow Fan(s): Variable speed HAF fan, with OSHA approved basket enclosure, corrosion resistant finish, quiet operation; UL certified. Fan quantity, size and locations as required for greenhouse volume and length for proper operation. Provide mounting brackets. Assembled unit to include totally enclosed fan cooled motor (115V, 1/15 H.P., 1500 RPM), 1200 CFM min rating.

- D. Controller: Computerized greenhouse environmental controller for heating, cooling, humidity, shading and lighting control, complete with all required software, relays, contacts, sensors including, indoor and outdoor temperature, humidity, light, wind, rain and back-up temperature.
1. System shall be fully programmed to operate all greenhouse heating and ventilation systems and shall control full and incremental opening of ridge and side wall vents. System shall control shade/heat retention curtain system.
 2. System shall include an alarm dialer for automatic notification when room temperature falls below prescribed setting.
 3. System shall be fully programmed, set up with IP address, thoroughly tested and adjusted for proper operation prior to Owner training sessions. An Owner training session shall be provided, date and time at the convenience of the Owner. Any resulting programming modifications for the intended Owner use shall be provided and made at that time. A follow-up training session shall be held after Owner has had the opportunity to use the facility for a few weeks. Date and time at the convenience of the Owner.
 4. Warranty: Extended two year warranty that product is free from defects in materials and workmanship and shall be repaired or replaced at no cost to the Owner.
 5. Product:
 - a. iGrow Series 100 by Link4Corp.
 - b. Growmaster Procom System by Microgrow, Temecula, CA
 - c. Substitutions: See Section 01 60 00 - Product Requirements
- E. Shading System: Motorized, interior, one-zone shade/heat retention curtain system with shades between each roof truss with edge seals. Leading edge shall be supported by aluminum tubing. Operating system shall use a positive drive rack and pinion system (push/pull) and shall include a heavy-duty steel drive rack with steel drive shaft. Drive motor shall be located in approximate center of the zone.
1. Shade/Energy curtain leading edge shall be supported by aluminum tubing with stainless steel cables running from one gable end to the other. Fabric sits on top of lines to open and close. Billow retention lines shall be located above the fabric to prevent damage to the fabric from roof vent air flow.
 - a. When fully open, curtains store in a tightly folded or rolled configuration with minimum shading.
 - b. System to include extruded aluminum seal angles at each truss location designed to accept rubber seals for use in photoperiod (black-out) systems and adjustable clips to secure support and anti-billowing lines to the seal angle while maintaining straight lines down the length of the greenhouse
 2. Fabric: Shade/Heat retention fabric to be Phormitex 55B Polyester & Aluminum or similar.
 3. Motor: Noiseless transmission and 2-pole asynchronous condenser motor; instantaneous reversing capability; built-in limit switch system and internal overload protection.
 - a. Warranted against oxidation or corrosion failure due to typical greenhouse conditions of high humidity, ultraviolet and chemical fumigant exposure.
 - b. Sized appropriately for the weight and length of each shade curtain assembly.
 4. Other system components: drive cables, slide wires, clips, pulleys, sealing strips, etc. shall be selected to be compatible with the shade fabric.
- F. Motorized Roof Sash: Aluminum vents, glazed with plastic glazing panels; including gear motor, roller bearing pipe hangers, galvanized pipe, arm and rod linkage, open and close limit switches, screens, greenhouse controller connection and other components as required for a complete operating system.
1. Sash Size: Minimum 2'-0" high x greenhouse modular width; extending full length of greenhouse.
 2. Gear Motors: NEMA MG 1; high-starting-torque, reversible, continuous-duty, Class A insulated, electric motors with thermal-overload protection; sized to open and operate roof sash without exceeding nameplate ratings or considering service factor.
 - a. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - b. Enclosure: Open drip proof, unless otherwise indicated.

- c. Motors: Single phase, 110v, 60 Hz., 1/10hp.
 - d. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop roof sash at open and closed positions.
 - e. Emergency Release Mechanism: Quick disconnect-release of electric-motor drive system, permitting manual operation in the event of operating failure.
- G. Motorized Sidewall Vent Windows:
1. Aluminum awning vent windows glazed with plastic glazing panels, with motorized sash, with screens, gear motor, roller bearing pipe hangers, galvanized pipe, arm and rod linkage, open and close limit switches, thermostat and other components as required for a complete operating system interfacing with the greenhouse controls system.
 - a. Sash Size: Minimum 2'-0" high x greenhouse modular width; extending full length of greenhouse.
 - b. Vent operators: 110 volt
- H. Misting System:
1. System to include strainer, couplings, solenoid valves, nozzles, pvc pipe, drain valve, 24 hr. and 12 minute timers and transformer.
- I. Grow Lights:
1. Provide thirty (20) lights, distributed evenly. High Pressure Sodium fixtures shall have the following characteristics
 2. Fixture: Complete extruded aluminum enclosure housing the ballast, capacitor and igniter. The two aluminum pieces for the sides of the fixture body shall have vents helping to prolong the life expectancy of the internal components. Assembly and parts shall be UL/CSA approved. 60 Hz ballast designed to withstand greenhouse operating conditions
 3. Reflector: Shall be made of one piece of 99% aluminum, polished and anodized, sealed with a silicon (silicium) finish. The type of reflector to be used shall be according to the calculation provided.
 4. Bulb: 400w High Pressure Sodium bulb CSA/UL approved, initial output and life expectancy will be provided according the manufactures specifications.
 5. Mounting Hardware: The use of a fixed position steel track with standard mounting bracket hardware shall be provided.
- J. Plant Hanging System:
1. Provide standard plant hanging system throughout greenhouse, as recommended by the manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Verify that field measurements are consistent with those on the shop drawings. Examine foundations and other field conditions to determine that they are properly prepared, sized and ready to receive the greenhouse work.
- B. Verify all supporting and adjacent construction has been constructed to within + ½" of theoretical.
- C. Notify Contractor of unsatisfactory field conditions before proceeding.

3.02 INSTALLATION

- A. Contact between steel, aluminum and other metals shall receive a protective coating to prevent of electrolytic action and corrosion.
- B. Install greenhouse frame, glass and accessory items in accordance with the manufacturer's printed instructions matching profiles, sizes and spacing indicated on accepted shop drawings.
- C. Anchor work securely to supporting greenhouse structure, but allow for differential and thermal movement. Allow for differential movement between greenhouse structure and main building.

- D. Erect system plumb and true and in proper alignment and relation to established lines and grades.
- E. Handle glazing in accordance with industry standard recommendations Use rubber spacers to maintain separation of panels and adjacent metal framework.
- F. Locate weep holes in sill to positively drain condensation to exterior of greenhouse at each rafter connection.
- G. Sealant Installation: Install sealants in accordance with sealant manufacturers' instructions. Do not perform sealant work when the metal temperature is below that recommended by the sealant manufacturer. Before application, remove mortar dirt, dust moisture and other foreign matter from surfaces sealant will contact. Apply sealant in a tooled and uniform manner to completely fill joint. Remove excess sealant to leave uniform smooth edge.
- H. Separate dissimilar metals to prevent electrolytic corrosion.

3.03 TOLERANCES

- A. Maximum Variation from Plumb, Level or Line: 1/8 inch per 10 feet or 3/8 inch total in overall dimension.
- B. Alignment of Two Adjoining Members Abutting in Plane: Within 1/16 inch.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and inspection.
- B. Field test installed greenhouse for water leakage in accordance with AAMA 501.2.
- C. Make all necessary repairs following testing and retest.

3.05 SYSTEM STARTUP

- A. Provide manufacturer's field representative to perform systems startup.
- B. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.

3.06 ADJUSTING AND CLEANING

- A. Lubricate, test, and adjust each moving assembly to ensure proper operation in compliance with manufacturer's recommendations.
 - 1. Remove temporary greenhouse coverings, labels, part number markings, sealant smears, and construction dirt from all components. Clean installed products, aluminum and glass surfaces in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from Project site and legally dispose of debris.

3.07 CLOSEOUT ACTIVITIES

- A. Demonstration and Training: Provide manufacturer's field representative to demonstrate to and train Owner's operating personnel in proper operation of all on-site equipment at a date and time agreeable to the Owner. All operations and maintenance documents shall have been submitted and accepted prior to scheduling of the demonstration and training. Provide a second training session between 2 weeks and one month after commencement of use by the Owner for follow-up training and any adjustments in controller programming.

3.08 PROTECTION

- A. Protect installed products until Substantial Completion. Touch-up, repair or replace damaged products.

END OF SECTION

SECTION 14 20 10
PASSENGER ELEVATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Complete elevator systems.
- B. Elevator maintenance.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Includes elevator machine foundation.
- B. Section 04 20 00 - Unit Masonry: Masonry hoistway enclosure; building-in and grouting hoistway door frames.
- C. Section 05 12 00 - Structural Steel: Includes hoistway framing.
- D. Section 05 50 00 - Metal Fabrications: Includes pit ladder, sill supports, divider beams, and overhead hoist beams.
- E. Section 10 44 00 - Fire Protection Specialties: Fire extinguisher in elevator machine room.
- F. Division 21 - Fire Suppression: Sprinkler heads in hoistway.
- G. Division 22 - Plumbing: Pit drain.
- H. Division 23 - HVAC: Ventilation and temperature control.
- I. Division 26 - Electrical: Equipment power and wiring; pit lighting.
- J. Division 28 - Electronic Safety and Security: Fire Alarm System

1.03 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings; American Institute of Steel Construction, Inc.; 2010.
- B. ASME A17.1 - Safety Code for Elevators and Escalators; The American Society of Mechanical Engineers; 2013.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2013.
- E. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- F. UL (ECMD) - Electrical Construction Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a meeting one week prior to starting work.
 - 1. Review schedule of installation, installation procedures and conditions, and coordination with related work.
- B. Construction Use of Elevator: Not permitted.
- C. ADA Accessibilities Guidelines with State amendments.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate the following information:
 - 1. Locations of Machine Room Equipment: Driving machines, controllers, governors and other components.
 - 2. Hoistway Components: Car, counterweight, sheaves, machine, beams, guide rails, buffers, ropes, and other components.

3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
 4. Individual weight of principal components; load reaction at points of support.
 5. Loads on hoisting beams.
 6. Clearances and over-travel of car.
 7. Location and sizes of access doors, doors, and frames.
 8. Expected heat dissipation of elevator equipment in machine room.
 9. Applicable seismic design data; certified by a licensed Professional Structural Engineer.
 10. Electrical characteristics and connection requirements.
 11. Show arrangement of equipment in machine room so rotating elements, sheaves, and other equipment can be removed for repairs or replaced without disturbing other components. Arrange equipment for clear passage through access door.
- C. Product Data: Provide data on the following items:
1. Signal and operating fixtures, operating panels, indicators.
 2. Cab design, dimensions, layout, and components.
 3. Cab and hoistway door and frame details.
 4. Electrical characteristics and connection requirements.
- D. Maintenance Contract.
- E. Maintenance Data: Include:
1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
 2. Technical information for servicing operating equipment.
 3. Legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment and changes made in the Work. List symbols corresponding to identity or markings on machine room and hoistway apparatus.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with applicable code and as supplemented in this section.
- B. Designer Qualifications: Design guide rails, brackets, anchors, and machine anchors under direct supervision of a Professional Structural Engineer experienced in design of work of this type and licensed in the State in which the Project is located.
- C. Perform structural steel design, fabrication, and installation in accordance with AISC 360, Specification for Structural Steel Buildings. Perform seismic design in accordance with applicable code.
- D. Fabricate and install door and frame assemblies in accordance with NFPA 80.
- E. Perform electrical work in accordance with NFPA 70.
- F. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.
- G. Installer Qualifications: Company specializing in performing the work of this section and approved by elevator equipment manufacturer.
- H. Products Requiring Fire Resistance Rating: Listed and classified by UL.
- I. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 WARRANTY

- A. See Section 01 78 10 - Warranties, for additional warranty requirements.
- B. Provide one year manufacturer warranty for elevator operating equipment and devices starting at date of Substantial Completion of the Project.

- C. Provide emergency 24 hour call back service with services performed at all hours, Monday through Friday for this maintenance period, unless both elevators are out of service, in which case weekend service shall be provided.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer (Basis of Design): AMEE 35HLS; front entrance, 2-stage hydraulic elevator by Thyssenkrupp.
- B. Acceptable Manufacturers:
 - 1. Otis Elevator Co.
 - 2. Schindler Elevator Corp.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- C. All components to be manufactured by same entity, unless otherwise indicated.

2.02 ELEVATORS

- A. Elevator 1 & 2: Passenger, holeless hydraulic type with cylinder in hoistway.
 - 1. Operation and Controls: Two-stop automatic.
 - 2. Car Enclosure: Manufacturer's standard pre-engineered car enclosure including ventilation, lighting, ceiling finish, wall finish, access doors, top of car inspection door, entrance door, trim, accessories.
 - a. Car Wall Finish: Manufacturer's standard high pressure plastic laminate vertical panels complying NEMA LD3, 0.05 inch thickness, color and texture as selected by the Architect from the manufacturer's full range.
 - b. Car Ceiling: Fluorescent light fixtures and ceiling panels of white translucent plastic complying with flammability requirements.
 - c. Car Flooring: Shall be provided as a part of the Work of Section 09 65 00. - Resilient Flooring.
 - d. Front Panel and Car Door: AISI Type 302/304 stainless steel with No. 4 satin finish. Car door frame shall be fabricated integrally with the front wall of the car.
 - e. Car Handrails: Flat tubular satin stainless steel handrails on back and both side walls.
 - f. Protective Pads: One set for each elevator, of full height, heavy cotton duck, padded and quilted, removable with brass grommets and permanent car hooks.
 - g. Elevator certificate holder, matching car front panel finish.
 - 3. Hoistway Doors and Frames: Stainless steel.
 - 4. Hoistway and Cab Entrance Frame Opening Size: 3'-6" x 7'-0".
 - 5. Door Type: Single leaf.
 - 6. Door Operation: Side opening.
 - 7. Rated Net Capacity: 3,500 lbs.
 - 8. Rated Speed: 80 ft/min.
 - 9. Travel Distance: As indicated on drawings.
 - 10. Number of Stops: 2.
 - 11. Number of Openings: 2 Front.
 - 12. Pit ladder, primed steel, in conformance to OSHA standards and ASME A17 requirements.
 - 13. Hydraulic Motor and Pump Location: Adjacent to hoistway, see Drawings.

2.03 CONTROLS

- A. Elevator Controls: Provide landing buttons and hall lanterns.
- B. Door Controls:
 - 1. Program door control to open doors automatically when car arrives at floor.
 - 2. Render "Door Close" button inoperative when car is standing at dispatching terminal with doors open.

3. If doors are prevented from closing for approximately ten seconds because of an obstruction, automatically disconnect door reopening devices, close doors more slowly until obstruction is cleared. Sound buzzer.
 4. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equip with object proximity detector device.
- C. Landing Buttons: Stainless steel type, one for originating UP and one for originating DOWN calls, one button only at terminating landings; marked with arrows.
- D. Landing Position Indicators: Illuminating white (LED).
- E. Interconnect elevator control system with building fire alarm systems.
- F. Hall buttons shall be key operated at each floor.
- G. Provide "Firefighter's Operation" in accordance with applicable code. Designated Landing: Main Floor.
- H. Telephone: Car telephone with vandal resistant auto dial and visual signal that call has been answered, braille / raised lettering, ADA compliant, complete with identification and instructions for use. Locate in return panel adjacent to car door, finish to be satin stainless steel. Connection from the elevator machine room to the building telephone system shall be provided by others.
- I. Signage: Comply with all applicable codes and ADA Architectural Guidelines. Provide raised markings, for all controls, hall buttons and signals. Hall button signage shall include directional graphics. Provide door jamb markings, numbers and braille. Provide capacity sign engraved into front inside of each car. Provide "In case of fire.." engraved signage adjacent to hall buttons including pictorial of person descending stairs during a fire. All signage shall be on contrasting background.

2.04 EMERGENCY POWER

- A. Elevator 1:
1. Emergency Power Supply: Building emergency power; provide for emergency power characteristics and phase rotation same as for normal power. Provide transfer switches and auxiliary contacts in accordance with Division 26. Install connections to power feeders.
 2. Provide operational control circuitry for adapting the change from normal to emergency power. Elevator to function under emergency power same as for normal power operation.
- B. Elevator 2:
1. Emergency Power Supply: Self-contained battery power.
 2. Upon transfer to emergency power, advance elevator to the Main Floor landing, stop car, open doors, disable operating circuits, and hold in standby condition.

2.05 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Electrical Characteristics:
1. 25 hp.
 2. 460 volts, three phase, 60 Hz.
 3. Refer to Section 26 27 17 for additional requirements.

2.06 MACHINE ROOM FITTINGS

- A. Wall-Mounted Frames: Glazed with clear plastic; sized as required. Provide one for master electric and hydraulic schematic and one for lubrication chart. Install charts.
1. Provide frame for original copy of the elevator licensing certificate.
- B. Fire Extinguisher: See Section 10 44 00 - Fire Protection Specialties.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that hoistway, pit, and machine room are ready for work of this section.
- C. Verify hoistway shaft and openings are of correct size and within tolerance.
- D. Verify location and size of machine foundation and position of machine foundation bolts.
- E. Verify that electrical power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install system components. Connect equipment to building utilities.
- B. Provide conduit, boxes, wiring, and accessories.
- C. Install hydraulic piping between cylinder and pump unit.
- D. Mount machines, motors, and pumps on vibration and acoustic isolators, on bed plate and concrete pad. Place on structural supports and bearing plates. Securely fasten to building supports. Prevent lateral displacement.
- E. Accommodate equipment in space indicated.
- F. Install guide rails using threaded bolts with metal shims and lock washers under nuts. Compensate for expansion and contraction movement of guide rails.
- G. Accurately machine and align guide rails. Form smooth joints with machined splice plates.
- H. Bolt brackets to inserts placed in concrete form work that will perform to four times the rated pull-out load.
- I. Field Welds: Chip and clean away oxidation and residue, wire brush; spot prime with two coats.
- J. Coordinate installation of hoistway wall construction.
- K. Install hoistway door sills, frames, and headers in hoistway walls. Grout sills in place. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.
- L. Fill hoistway door frames solid with grout in accordance with Section 04 20 00.
- M. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.
- N. Machine Room Components: Clean and degrease; prime one coat, finish with one coat of enamel.
- O. Adjust equipment for smooth and quiet operation.

3.03 ERECTION TOLERANCES

- A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1.
- B. Cab Movement on Aligned Guide Rails: Smooth movement, with no objectionable lateral or oscillating movement or vibration.

3.04 FIELD QUALITY CONTROL

- A. Testing and inspection by regulatory agencies will be performed at their discretion.
 - 1. Schedule tests with agencies and notify Owner and Architect.
 - 2. Obtain permits required to perform tests.
 - 3. Document regulatory agency tests and inspections in accordance with the requirements of Section 01 40 00.
 - 4. Perform tests required by regulatory agencies.
 - 5. Furnish test and approval certificates issued by Authorities Having Jurisdiction.
- B. Perform operational tests in the presence of Owner and Architect.

- C. Instruction and Demonstration: Instruct Owner's personnel in proper use and operation of the elevators. Review emergency provisions, including emergency access and procedures for an operating failure or other building emergency. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions. Review the 12-month maintenance program provided as part of the scope of this Work.

3.05 ADJUSTING

- A. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- B. Adjust automatic floor leveling feature at each floor to achieve 1/4 inch from flush.

3.06 CLEANING

- A. Remove protective coverings from finished surfaces.
- B. Clean surfaces and components ready for inspection.

3.07 PROTECTION

- A. Do not permit construction traffic within cab after cleaning.
- B. Protect installed products until project completion.
- C. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

3.08 MAINTENANCE

- A. See Section 01 78 00 - Project Close-out, for additional requirements.
- B. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the elevator manufacturer or original installer. Notify Owner prior to all maintenance and provide follow-up documentation to the Owner after each visit.
- C. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of Owner.
- D. Provide service and maintenance of elevator system and components for one year from Date of Substantial Completion of the Project.
- E. Examine system components monthly. Clean, adjust, and lubricate equipment. Provide a maintenance visit at the end of the twelve month period.
- F. Maintenance shall be in accordance with recommendations and requirements of ASME A17.1.
- G. Include systematic examination, adjustment, and lubrication of elevator equipment. Maintain hydraulic fluid levels. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment. Replace wire ropes when necessary to maintain the required factor of safety.
- H. Perform work without removing cars during peak traffic periods.
- I. Provide emergency call back service during working hours for this maintenance period.

END OF SECTION