

BIDDING INSTRUCTIONS

FOR ALL PROJECTS:

1. Use pen and ink to complete all paper Bids.
2. As a minimum, the following must be received prior to the time of Bid opening:

For a Paper Bid:

a) a copy of the Notice to Contractors, b) the completed Acknowledgement of Bid Amendments form, c) the completed Schedule of Items, d) two copies of the completed and signed Contract Offer, Agreement & Award form, e) a Bid Guaranty if required, and f) any other certifications or Bid requirements listed in the Bid Documents as due by Bid opening.

For an Electronic Bid:

a) a completed Bid using Expedite® software and submitted via the Bid Express™ web-based service, b) a Bid Guaranty (as described below) or a faxed copy of a Bid Bond if required (with original to be delivered within 72 hours), and c) any other certifications or Bid requirements listed in the Bid Documents as due by Bid opening.

3. Include prices for all required items in the Schedule of Items. (“Zero is not considered a Bid price.”)
4. Include a Bid Guaranty. Acceptable forms are:
 - a. a properly completed and signed Bid Bond on the Department’s prescribed form (or on a form that does not contain any significant variations from the Department’s form as determined by the Department) for 5% of the Bid Amount or
 - b. an Official Bank Check, Cashier’s Check, Certified Check, U.S. Postal Money Order or Negotiable Certificate of Deposit in the amount stated in the Notice to Contractors (if required).
5. If a paper Bid is to be sent, Federal Express overnight delivery is suggested as the package is delivered directly to the DOT Headquarters Building in Augusta. Other means, such as U.S. Postal Service’s Express Mail has proven not to be reliable.

IN ADDITION, FOR FEDERAL AID PROJECTS:

6. Complete the DBE Proposed Utilization form in the proper amounts, and deliver to the Contracts section by 4:30 PM on bid opening day

If you need further information regarding Bid preparation, call the DOT Contracts Section at (207)624-3410.

For complete bidding requirements, refer to Section 102 of the Maine Department of Transportation, Standard Specifications, Revision of December 2002.

NOTICE

The Maine Department of Transportation is attempting to improve the way Bid Amendments/Addendums are handled, and allow for an electronic downloading of bid packages from our website, while continuing to maintain a planholders list.

Prospective bidders, subcontractors or suppliers who wish to download a copy of the bid package and receive a courtesy notification of project specific bid amendments, must provide an email address to Diane Barnes or Mike Babb at the MDOT Contracts mailbox at: MDOT.contracts@maine.gov. Each bid package will require a separate request.

Additionally, interested parties will be responsible for reviewing and retrieving the Bid Amendments from our web site, and acknowledging receipt and incorporating those Bid Amendments in their bids using the Acknowledgement of Bid Amendment Form.

The downloading of bid packages from the MDOT website is not the same as providing an electronic bid to the Department. Electronic bids must be submitted via <http://www.BIDX.com>. For information on electronic bidding contact Larry Childs at Larry.Childs@maine.gov.

NOTICE

For security and other reasons, all Bid Packages which are mailed, shall be provided in double (one envelope inside the other) envelopes. The *Inner Envelope* shall have the following information provided on it:

Bid Enclosed - Do Not Open

PIN:

Town:

Date of Bid Opening:

Name of Contractor with mailing address and telephone number:

In Addition to the usual address information, the *Outer Envelope* should have written or typed on it:

Double Envelope: Bid Enclosed

PIN:

Town:

Date of Bid Opening:

Name of Contractor:

This should not be much of a change for those of you who use Federal Express or similar services.

Hand-carried Bids may be in one envelope as before, and should be marked with the following information:

Bid Enclosed: Do Not Open

PIN:

Town:

Name of Contractor:

STATE OF MAINE DEPARTMENT OF TRANSPORTATION
Bid Guaranty-Bid Bond Form

KNOW ALL MEN BY THESE PRESENTS THAT _____

_____, of the City/Town of _____ and State of _____

as Principal, and _____ as Surety, a

Corporation duly organized under the laws of the State of _____ and having a usual place of

Business in _____ and hereby held and firmly bound unto the Treasurer of

the State of Maine in the sum of _____ for payment which Principal and Surety bind

themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

The condition of this obligation is that the Principal has submitted to the Maine Department of

Transportation, hereafter Department, a certain bid, attached hereto and incorporated as a

part herein, to enter into a written contract for the construction of _____

_____ and if the Department shall accept said bid

and the Principal shall execute and deliver a contract in the form attached hereto (properly

completed in accordance with said bid) and shall furnish bonds for this 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 bid, then this obligation shall be null and void; otherwise it shall remain in full

force, and effect.

Signed and sealed this _____ day of _____ 20_____

WITNESS:

WITNESS

PRINCIPAL:

By _____

By: _____

By: _____

SURETY:

By _____

By: _____

Name of Local Agency: _____

NOTICE

Bidders:

Please use the attached “Request for Information” form when faxing questions and comments concerning specific Contracts that have been Advertised for Bid. Include additional numbered pages as required. Questions are to be faxed to the number listed in the Notice to Contractors. This is the only allowable mechanism for answering Project specific questions. Maine DOT will not be bound to any answers to Project specific questions received during the Bidding phase through other processes.

State of Maine
VENDOR FORM

For New Vendors & for Updates on Current Vendors

Special Instructions:

PLEASE PRINT CLEARLY

Return this form to:

*** = MUST BE COMPLETED TO PROCESS**

ONLY ONE NAME/VENDOR PER FORM

New Vendor <input type="checkbox"/>	Address Change <input type="checkbox"/>	Multi Address <input type="checkbox"/>	Name Change <input type="checkbox"/>	Contact Update <input type="checkbox"/>	ID # Change <input type="checkbox"/>
--	--	---	---	--	---

Social Security Number*
Individual or Sole Proprietor

Federal Taxpayer ID Number*
Corporation

OR

Please fill in ONE.

S

Business name in "DBA" field below.

E

Business name in "Name" field below.

This form will affect all transactions with ALL state agencies.

NEW:*

Remit to Address: Individual or Business Name.

Name*
DBA or C/O
Address*
Tel #*

OLD:

Old number:

Name
DBA or C/O
Address
Tel #

<input type="checkbox"/>	Is this the same name on your Social Security card?	Acct #	<input style="width: 100%;" type="text"/>
<input type="checkbox"/>	If not, have you told Social Security about your name change?	Provider #	<input style="width: 100%;" type="text"/>

Signature* _____

Contact Name _____

Print Name or Title _____

Accounts Receivable Contact Name _____

Date* _____ (within 3 months)

Phone # if Different or for Contact Info _____

Vendor Indicators: Enter Y (Yes) For All Categories Listed Below That Apply To This Vendor

Dealer: <input type="checkbox"/>	Manufacturer: <input type="checkbox"/>	Factory Rep: <input type="checkbox"/>
Jobber: <input type="checkbox"/>	Retailer: <input type="checkbox"/>	Commodity: <input type="checkbox"/>
Individual: <input type="checkbox"/>	Partnership: <input type="checkbox"/>	Incorporated: <input type="checkbox"/>
Minority: <input type="checkbox"/>	Small Business: <input type="checkbox"/>	In-State: <input type="checkbox"/>

Information on State Agency Submitting Vendor Form

State Agency* & SHS # _____	Contact Person Name & Title* _____	Telephone #* _____
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Send to: Maine Department of Transportation/ Contracts 16 SHS, Augusta, ME 04333-0014 Attn: Pat Brown

INSTRUCTIONS FOR COMPLETING VENDOR FORM

1. **Print Clearly**
2. **All sections marked with an * must be completed for processing**
3. **Send completed form to requesting State agency OR remit to address at bottom of form.**
4. **Do NOT send by Fax. Only originals will be accepted.**

<u>FIELDS</u>	<u>INFORMATION NEEDED FOR FIELD</u>
<i>Special Instructions</i>	<i>Instructions to Vendor from Agency requesting information.</i>
<i>Return to</i>	<i>The location of agency where the form is to be mailed back to. If none use address at bottom of form.</i>
Boxes above SSN/EIN Fields	Please check mark all that apply to the vendor. If other, please specify. If it's a new vendor only one will apply: "New Vendor"
Social Security Number	Individuals, individuals "doing business as", and individuals without a Federal Taxpayer ID #. Use if not using EIN
Federal Taxpayer ID Number*	Businesses or professionals providing services. (ID # needs to be use for REMITTANCE purposes.) Use if not using SSN
New	Current Information
Old	Old information (If another ID# had been used please put it next to "OLD")
Name	Individual's Name or Business Name. ONLY ONE name per a form.
DBA or C/O	"Doing business as" or "In Care Of"
Address	REMITTANCE ADDRESS - Street Address OR PO Box (one or the other)
Tel #	Phone Number of individual or business
Signature	Individual or authorized representative of individual or authorized representative of the business
Date	Current Date (no more than 3 months old)
Contact Name	Contact person at business
Accounts Receivable Contact Name	Contact person at business for accounts receivables.
Phone #	Phone for Act Rec Contact
Vendor Indicators	Indicate all that apply for the vendor, as needed
Agency Info	For Agency personnel submitting the form. Contact info incase of questions.

**STATE OF MAINE DEPARTMENT OF TRANSPORTATION
NOTICE TO CONTRACTORS**

The Maine Department of Transportation, Augusta, Maine 04333 is planning to advertise and construct the following project on Spruce Mountain, in the Town of Woodstock. Bids will be received from contractors at the reception desk, Maine DOT building, Child St., Augusta, Maine, until 11:00am (prevailing time) on August 22, 2007, and at that time and place publicly opened and read.

Description: STATE PROJECT, PIN 14278.00

Location: In the town of Woodstock, Oxford County, State of Maine, United States of America

Scope and Outline of Work: PIN 14278.00; installation of reinforced concrete slab, prefabricated shelter, generator, radio tower and equipment, and other incidental work.

Contractor's bid package must include a list of 3 examples of successful completion of similar turn-key projects. This list shall include names, addresses and phone numbers of the owner for who the work was performed for.

For general information regarding bidding and contracting procedures, contact Scott Bickford at (207)624-3410. Our Webpage at <http://www.state.me.us/mdot/project/design/homepg.htm> contains plan holders list, written portions of bid amendments, and bid results. For project specific information fax all questions to Project Manager Joel Kittridge at (207)624-3431. Questions received after 12:00 noon on Monday prior to bid date will not be answered. Bidders shall not contact any other departmental staff for clarification of contract provisions, and the department will not be responsible for any interputations so obtained.

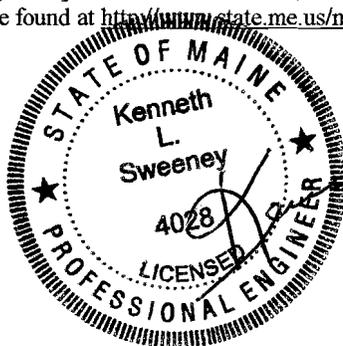
There will be a pre-bid, on-site site visit scheduled to the site on AUGUST 8, 2007 in order for contractors to tour the site and ask questions regarding the project. Contractors and their representatives are strongly urged to attend the on-site meeting to gain a clear understanding of the work and physical limitations of the site.

Specifications and bid forms may be seen at the Maine DOT building in Augusta Me. They may be purchased from the Department between the hours of 8:00 am to 4:30 pm. by cash, credit card, or check payable to Maine Department of Transportation, Attn: Mailroom, 16 State House Station, Augusta, Me. 04333-0016. They may be purchased by telephone at (207)624-3536 between the hours of 8:00 am to 4:30 pm. Bid book \$10.00 (\$13.00 by mail).

Each bid must be made upon blank forms provided by the Department and must be accompanied by a bid bond at 5% of the bid amount or an official bank check, cashier's check, certified check, certificate of deposit, or US. Postal service money order in the amount of \$12,000.00 payable to Treasurer, State of Maine as a bid guarantee. A contract performance surety bond and contract payment surety bond, each in the amount of 100% of the contract price, will be required of the successful bidder.

The Contract will be subject to all applicable Federal and State Laws. This contract is subject to compliance with the Disadvantaged Business Enterprise program requirements as set forth by the Maine Department of Transportation. All work shall be governed by "State of Maine, Department of Transportation, Standard Specifications, Revision of December 2002", price \$10 [\$13 by mail], and Standard Details, Revision of December 2002, price \$20 [\$25 by mail]. Standard Detail updates can be found at <http://www.state.me.us/mdot/project/design/homepg.htm>

Augusta, Maine
July 25, 2007



Kenneth L. Sweeney
KENNETH L. SWEENEY
DEPUTY CHIEF ENGINEER

SPECIAL PROVISION 102.7.3
ACKNOWLEDGMENT OF BID AMENDMENTS

With this form, the Bidder acknowledges its responsibility to check for all Amendments to the Bid Package. For each Project under Advertisement, Amendments are located at <http://www.maine.gov/mdot/comprehensive-list-projects/project-information.php> It is the responsibility of the Bidder to determine if there are Amendments to the Project, to download them, to incorporate them into their Bid Package, and to reference the Amendment number and the date on the form below. The Maine DOT will not post Bid Amendments any later than noon the day before Bid opening without individually notifying all the planholders.

Amendment Number	Date

The Contractor, for itself, its successors and assigns, hereby acknowledges that it has received all of the above referenced Amendments to the Bid Package.

CONTRACTOR

_____ Date

_____ Signature of authorized representative

_____ (Name and Title Printed)

SCHEDULE OF ITEMS

REVISED:

CONTRACT ID: 014278.00

PROJECT(S): 014278.00

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
SECTION 0001 PROJECT ITEMS						
0010	510.10 SPECIAL DETOUR ROADWAY WIDTH VEHICULAR & PEDESTRIAN TRAFFIC NOT SEPARATED 11 FOOT ROADWAY	LUMP	LUMP			
0020	643.97 RADIO COMMUNICATIONS TOWER - SELF-SUPPORTING - ERECTED	LUMP	LUMP			
0030	643.971 RADIO COMMUNICATIONS TOWER - FIELD INSPECTION & ACCEPTANCE	LUMP	LUMP			
0040	643.972 RADIO COMMUNICATIONS TOWER - INSPECTION & FINAL ACCEPTANCE	LUMP	LUMP			
0050	643.973 RADIO COMMUNICATIONS TOWER-INSPECTION & ACCEPTANCE TRAINING	LUMP	LUMP			
0060	643.98 EMERGENCY POWER GENERATOR SYSTEM - INSTALLED	LUMP	LUMP			
0070	643.981 EMERGENCY POWER GENERATOR -FIELD INSPECTION & ACCEPTANCE	LUMP	LUMP			
0080	643.982 EMERGENCY POWER GENERATOR - INSPECTION & ACCEPTANCE TESTING	LUMP	LUMP			

SCHEDULE OF ITEMS

REVISED:

CONTRACT ID: 014278.00

PROJECT(S): 014278.00

CONTRACTOR : _____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0090	643.983 EMERGENCY POWER GENERATOR - INSPECTION & FINAL ACCEPTANCE	LUMP	LUMP			
0100	643.99 COMMUNICATIONS EQUIPMENT SHELTER: MODULAR, PREFABRICATED, PRE-OUTFITTED	LUMP	LUMP			
0110	643.991 COMMUNICATIONS EQUIPMENT SHELTER - FIELD INSPECTION & ACCEPTANCE	LUMP	LUMP			
0120	643.992 COMMUNICATIONS EQUIPMENT SHELTER - INSPECTION & FINAL ACCEPTANCE	LUMP	LUMP			
0130	643.993 COMMUNICATIONS EQUIPMENT SHELTER - INSPECTION & ACCEPTANCE TRAINING	LUMP	LUMP			
0140	644.91 PERIMETER FENCE ACCEPTED	LUMP	LUMP			
0150	644.92 HELICOPTER LANDING ZONE, ACCEPTED	LUMP	LUMP			
0160	656.75 TEMP SOIL EROS AND WATER POLL CONTROL	LUMP	LUMP			
0170	659.10 MOBILIZATION	LUMP	LUMP			
	SECTION 0001 TOTAL					
	TOTAL BID					

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

_____ a corporation or other legal entity organized under the laws of the State of _____, with its principal place of business located at _____

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

A. The Work.

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, PIN No. **14278.00** for a **Radio Communication Tower** in the town of **Woodstock**, County of **Oxford**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. Time.

The Contractor agrees to complete all Work, except warranty work, on or before **October 17, 2007**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, Revision of December 2002 and related Special Provisions.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is _____

\$ _____ Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, Revision of December 2002, Standard Details Revision of December 2002 as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in the Federal Contract Provisions Supplement, and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications Revision of December 2002, Standard Details Revision of December 2002 as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

PIN. 14278.00 - Radio Communication Tower - in the town of Woodstock,

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, Revision of December 2002, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications Revision of December 2002 and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan by 4:30pm on the day of bid opening to the Contracts Engineer.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

Date

(Signature of Legally Authorized Representative
of the Contractor)

Witness

(Name and Title Printed)

G. Award.

Your offer is hereby accepted.
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: David A. Cole, Commissioner

Witness

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

_____ a corporation or other legal entity organized under the laws of the State of _____, with its principal place of business located at _____

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

A. The Work.

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, PIN No. **14278.00** for a **Radio Communication Tower** in the town of **Woodstock**, County of **Oxford**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. Time.

The Contractor agrees to complete all Work, except warranty work, on or before **October 17, 2007**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, Revision of December 2002 and related Special Provisions.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is _____

\$ _____ Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, Revision of December 2002, Standard Details Revision of December 2002 as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in the Federal Contract Provisions Supplement, and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications Revision of December 2002, Standard Details Revision of December 2002 as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

PIN. 14278.00 - Radio Communication Tower - in the town of Woodstock,

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, Revision of December 2002, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications Revision of December 2002 and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan by 4:30pm on the day of bid opening to the Contracts Engineer.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

Date

(Signature of Legally Authorized Representative
of the Contractor)

Witness

(Name and Title Printed)

G. Award.

Your offer is hereby accepted.
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: David A. Cole, Commissioner

Witness

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and (Name of the firm bidding the job) a corporation or other legal entity organized under the laws of the State of Maine, with its principal place of business located at (address of the firm bidding the job)

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

A. The Work.

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, PIN No. 1224.00, for the Hot Mix Asphalt Overlay in the town/city of West Eastport, County of Washington, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. Time.

The Contractor agrees to complete all Work, except warranty work, on or before November 15, 2003. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, Revision of December 2002.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is (Place bid here in alphabetical form such as One Hundred and Two dollars and 10 cents)
\$ (repeat bid here in numerical terms, such as \$102.10) Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, Revision of December 2002, Standard Details Revision of December 2002, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to Division 100 of the Standard Specifications Revision of December 2002 (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications, Revision of December 2002, Standard Details Revision of December 2002, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

PIN 1234.00 West Eastport, Hot Mix Asphalt Overlay

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, Revision of December 2002, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work on the date specified in the Engineer's "Notice to Commence Work" as stated in Section 107.2 of the Standard Specifications Revision of 2002 and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan by 4:30pm on the day of bid opening to the Contracts Engineer.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

Date
(Witness Sign Here)
Witness

(Sign Here)
(Signature of Legally Authorized Representative of the Contractor)

(Print Name Here)
(Name and Title Printed)

CONTRACTOR

G. Award.

Your offer is hereby accepted. documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: David A. Cole, Commissioner

(Witness)

BOND # _____

CONTRACT PERFORMANCE BOND
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That _____
_____ **and the State of** _____, as principal,
and _____,
a corporation duly organized under the laws of the State of _____ and having a
usual place of business _____,
as Surety, are held and firmly bound unto the Treasurer of the State of Maine in the sum
of _____ **and 00/100 Dollars (\$** _____ **)**,
to be paid said Treasurer of the State of Maine 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 designated as Contractor in
the Contract to construct Project Number _____ in the Municipality of
_____ promptly and faithfully performs the Contract, 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 State
of Maine.

Signed and sealed this _____ day of _____, 20.....

WITNESSES:

SIGNATURES:

CONTRACTOR:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY:

Signature

.....

Print Name Legibly

Print Name Legibly

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

ADDRESS

.....

.....

.....

.....

TELEPHONE.....

.....

BOND # _____

CONTRACT PAYMENT BOND
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That _____
_____ **and the State of** _____, as principal,
and _____
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 Treasurer of the State of Maine for the use
and benefit of claimants as herein below defined, in the sum of
_____ **and 00/100 Dollars (\$** _____ **)**
for the payment whereof 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 designated as Contractor in
the Contract to construct Project Number _____ in the Municipality of
_____ promptly satisfies all claims and demands incurred for all
labor and material, used or required by him in connection with the work contemplated by
said Contract, and fully reimburses the obligee for all outlay and expense which the
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 the Principal for labor, material or both, used or reasonably required for
use in the performance of the contract.

Signed and sealed this _____ day of _____, 20 .. .

WITNESS:

SIGNATURES:

CONTRACTOR:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

.....

ADDRESS

.....

.....

TELEPHONE

.....

Spruce Mountain
14278.00
7-09-07

SPECIAL PROVISION
SECTION 102
PRE-BID SITE VISIT

The DEPARTMENT will make time slots available to all prospective bidders for gaining access to the site to review the actual conditions of the work.

Times will be scheduled on August 8, 2007 , from 7:30 AM to 4:30 PM in 2 hour time slots. Bidders will be given slots on a first come, first serve basis and they will be accompanied by a Department representative. Bidders and or their representatives will be limited to three (3) people on the site visit and must remain with the Department representatives at all times. Bidders will need to submit the names of those people attending the site visit at least 2 days prior to the site visit. Arrangements for the visit can be made through Joel Kittredge by calling 207-624-8223.

The bidders may ask questions during the visit, but none of the answers provided can be interpreted to modify the Contract Documents, unless a formal response is requested in writing and a written Contract amendment is issued.

SPECIAL PROVISION

SECTION 102.3

**EXAMINATION OF DOCUMENTS, SITE AND OTHER INFORMATION
(Geotechnical Information)**

Geotechnical Information pertaining to this project has been collected and assembled. Bidders and Contractors are obligated to examine and, if necessary, obtain geotechnical information. Geotechnical Information is available at the Maine Department of Transportation office on Child Street, Augusta, Maine. Geotechnical Information will be provided to interested parties who request this information. Requests for this information should be directed to the Project Manager as outlined in the "Notice to Contractors".

The Department shall not be responsible for Bidder's and Contractor's interpretations of, or estimates or conclusions drawn from, the Geotechnical Information. Data provided may not be representative of the subsurface conditions between the boring locations.

This section does not diminish the duties imposed upon parties in Section 102 or in any other sections.

NOTICE TO CONTRACTORS - PREFERRED EMPLOYEES

Sec. 1303. Public Works; minimum wage

In the employment of laborers in the construction of public works, including state highways, by the State or by persons contracting for the construction, preference must first be given to citizens of the State who are qualified to perform the work to which the employment relates and, if they can not be obtained in sufficient numbers, then to citizens of the United States. Every contract for public works construction must contain a provision for employing citizens of this State or the United States. The hourly wage and benefit rate paid to laborers employed in the construction of public works, including state highways, may not be less than the fair minimum rate as determined in accordance with section 1308. Any contractor who knowingly and willfully violates this section is subject to a fine of not less than \$250 per employee violation. Each day that any contractor employs a laborer at less than the wage and benefit minimum stipulated in this section constitutes a separate violation of this section. [1997, c. 757, §1 (amd).]

**2007 Fair Minimum Wage Rates
Heavy & Bridge Oxford County**

<u>Occupation Title</u>	<u>Minimum Wage</u>	<u>Minimum Benefit</u>	<u>Total</u>	<u>Occupation Title</u>	<u>Minimum Wage</u>	<u>Minimum Benefit</u>	<u>Total</u>
Asphalt Raker	\$12.50	\$0.23	\$12.73	Insulation Installer	\$17.25	\$5.05	\$22.30
Backhoe Loader Operator	\$14.00	\$2.24	\$16.24	Ironworker - Reinforcing	\$20.15	\$10.00	\$30.15
Boilermaker	\$18.50	\$3.52	\$22.02	Ironworker - Structural	\$19.00	\$2.85	\$21.85
Boom Truck Operator	\$16.50	\$2.66	\$19.16	Laborers/Helper/Tender	\$12.00	\$0.36	\$12.36
Bricklayer	\$21.00	\$2.62	\$23.62	Laborer - Skilled	\$14.25	\$3.91	\$18.16
Bulldozer Operator	\$16.00	\$2.87	\$18.87	Line Erector, Power	\$18.01	\$3.88	\$21.89
Cable Splicer	\$18.50	\$3.56	\$22.06	Loader Op, Front-End	\$15.63	\$2.09	\$17.72
Carpenter	\$16.50	\$1.84	\$18.34	Mechanic - Maintenance	\$19.50	\$3.04	\$22.54
Carpenter - Rough	\$16.25	\$3.28	\$19.53	Millwright	\$19.13	\$3.64	\$22.77
Cement Mason/Finisher	\$15.00	\$0.76	\$15.76	Painter	\$25.84	\$6.68	\$32.52
Commun Equip Installer	\$21.25	\$2.60	\$23.85	Paver - Bituminous	\$14.88	\$1.27	\$16.15
Commun Trans Erectr	\$19.00	\$2.73	\$21.73	Pile Driver Operator	\$19.00	\$5.07	\$24.07
Concrete Pump Operator	\$15.40	\$9.40	\$24.80	Pipe/Stm/Sprkler Fitter	\$21.00	\$3.29	\$24.29
Crane Op =>15 Tons	\$18.54	\$4.91	\$23.45	Pipelayer	\$22.00	\$7.66	\$29.66
Crusher Plant Operator	\$14.48	\$3.27	\$17.75	Plumber (Licensed)	\$20.00	\$3.80	\$23.80
Diver	\$21.00	\$10.67	\$31.67	Pump Installer	\$15.50	\$1.48	\$16.98
Driller - Rock	\$15.00	\$2.50	\$17.50	Roller Op - Pavement	\$15.00	\$3.36	\$18.36
Electrician, Licensed	\$21.65	\$5.50	\$27.15	Sheet Metal Worker	\$15.45	\$3.18	\$18.63
Electrician Hlpr (Licensed)	\$16.25	\$3.32	\$19.57	Truck Driver - Light	\$13.25	\$0.98	\$14.23
Excavator Operator	\$17.50	\$3.40	\$20.90	Truck Driver - Medium	\$12.85	\$2.06	\$14.91
Fence Setter	\$13.00	\$1.64	\$14.64	Truck Driver, Heavy	\$13.75	\$1.63	\$15.38
Hot Top Plant Operator	\$17.33	\$6.98	\$24.31	Truck Driver, Tractor Trlr	\$12.95	\$2.10	\$15.05

The Laborer classifications include a wide range of work duties. Therefore, if any specific occupation to be employed on this project is not listed in this determination, call the Bureau of Labor Standards at the above number for further clarification.

Welders are classified in the trade to which the welding is incidental.

Apprentices - The minimum wage rate for registered apprentices are those set forth in the standards and policies of the Maine State Apprenticeship and Training Council for approved apprenticeship programs.

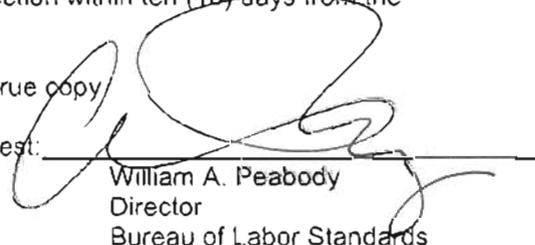
Posting of Schedule - Posting of this schedule is required in accordance with 26 MRSA §1301 et. seq., by any contractor holding a State contract for construction valued at \$50,000 or more and any subcontractors to such a contractor.

Appeal - Any person affected by the determination of these rates may appeal to the Commissioner of Labor by filing a written notice with the Commissioner stating the specific grounds of the objection within ten (10) days from the filing of these rates with the Secretary of State.

Determination No: HB-016-2007
 Filing Date: June 15, 2007
 Expiration Date: 12-31-2007

A true copy/

Attest:



William A. Peabody
 Director
 Bureau of Labor Standards

Location of Project -- Woodstock, Maine in Oxford County

**2007 Fair Minimum Wage Rates
Building 2 Oxford County
(other than 1 or 2 family homes)**

Occupation Title	Minimum	Minimum	Total	Occupation Title	Minimum	Minimum	Total
	Wage	Benefit			Wage	Benefit	
Asbestos Abatement Wrkr	\$14.13	\$1.16	\$15.29	Ironworker - Reinforcing	\$18.00	\$10.00	\$28.00
Assembler - Metal Bldg	\$12.00	\$4.92	\$16.92	Ironworker - Structural	\$17.25	\$4.01	\$21.26
Backhoe Loader Operator	\$14.00	\$2.24	\$16.24	Laborers/Helper/Tender	\$12.72	\$0.99	\$13.71
Boilermaker	\$19.75	\$4.21	\$23.96	Laborer - Skilled	\$14.79	\$1.01	\$15.80
Boom Truck Operator	\$16.50	\$2.66	\$19.16	Loader Op - Front End	\$14.75	\$2.28	\$17.03
Bricklayer	\$21.93	\$0.85	\$22.78	Mechanic - Maintenance	\$19.34	\$2.76	\$22.10
Bulldozer Operator	\$16.00	\$2.87	\$18.87	Mechanic - Refrigeration	\$20.19	\$4.48	\$24.67
Cable Splicer	\$20.25	\$3.35	\$23.60	Millwright	\$18.00	\$4.10	\$22.10
Carpenter	\$17.50	\$2.77	\$20.27	Oil/Fuel Burner Serv & Instr	\$20.00	\$6.21	\$26.21
Carpenter - Acoustical	\$13.00	\$2.15	\$15.15	Painter	\$11.56	\$1.67	\$13.23
Carpenter - Rough	\$13.80	\$3.12	\$16.92	Paperhanger	\$13.00	\$0.00	\$13.00
Cement Mason/Finisher	\$15.00	\$0.74	\$15.74	Paver - Bituminous	\$14.88	\$1.27	\$16.15
Commun Equip Installer	\$20.88	\$3.57	\$24.45	Pile Driver Operator	\$19.00	\$5.55	\$24.55
Concrete Mixing Plant Op	\$14.55	\$3.70	\$18.25	Pipe/Stm/Sprkler Fitter	\$18.00	\$4.10	\$22.10
Concrete Pump Operator	\$18.50	\$2.38	\$20.88	Pipelayer	\$20.75	\$5.45	\$26.20
Crane Operator =>15 Tons	\$19.50	\$4.70	\$24.20	Plumber (Licensed)	\$21.00	\$4.13	\$25.13
Crusher Plant Operator	\$14.48	\$3.27	\$17.75	Plumber Hlpr/Trainee (Lic)	\$15.00	\$3.01	\$18.01
Diver	\$21.00	\$0.75	\$21.75	Roller Operator - Earth	\$12.43	\$4.49	\$16.92
Driller - Well	\$13.00	\$1.94	\$14.94	Roofer	\$14.25	\$1.23	\$15.48
Dry-Wall Applicator	\$22.00	\$0.00	\$22.00	Screed Operator	\$15.50	\$3.42	\$18.92
Dry-Wall Taper & Finisher	\$18.25	\$0.63	\$18.88	Sheet Metal Worker	\$16.43	\$3.42	\$19.85
Electrician	\$20.50	\$6.54	\$27.04	Sider	\$14.00	\$0.60	\$14.60
Electrician Hlpr (Licensed)	\$14.53	\$2.14	\$16.67	Stone Mason	\$16.24	\$2.04	\$18.28
Elevator Constrctr/Installer	\$40.32	\$14.77	\$55.09	Tile Setter	\$18.50	\$3.68	\$22.18
Excavator Operator	\$15.00	\$2.36	\$17.36	Truck Driver - Light	\$13.25	\$0.98	\$14.23
Fence Setter	\$12.50	\$1.08	\$13.58	Truck Driver - Medium	\$11.38	\$0.71	\$12.09
Floor Layer	\$15.00	\$1.35	\$16.35	Truck Driver - Heavy	\$12.75	\$2.10	\$14.85
Glazier	\$15.00	\$1.87	\$16.87	Truck Driver - Tractor Trailer	\$12.95	\$2.10	\$15.05
Insulation Installer	\$15.00	\$1.98	\$16.98				

The Laborer classifications include a wide range of work duties. Therefore, if any specific occupation to be employed on this project is not listed in this determination, call the Bureau of Labor Standards at the above number for further clarification.

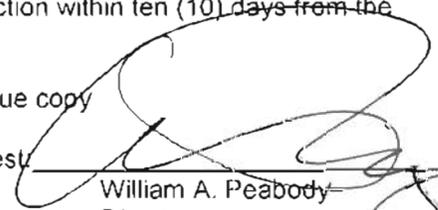
Welders are classified in the trade to which the welding is incidental.

Apprentices - The minimum wage rate for registered apprentices are those set forth in the standards and policies of the Maine State Apprenticeship and Training Council for approved apprenticeship programs.

Posting of Schedule - Posting of this schedule is required in accordance with 26 MRSA §1301 et. seq., by any contractor holding a State contract for construction valued at \$50,000 or more and any subcontractors to such a contractor.

Appeal - Any person affected by the determination of these rates may appeal to the Commissioner of Labor by filing a written notice with the Commissioner stating the specific grounds of the objection within ten (10) days from the filing of these rates with the Secretary of State.

Determination No: B2-067-2007
 Filing Date: June 15, 2007
 Expiration Date: 12-31-2007

A true copy
 Attest: 
 William A. Peabody
 Director
 Bureau of Labor Standards

Spruce Mountain
14278.00
6-26-067

SPECIAL PROVISION
SECTION 104.3.8.B.1
(State of Maine Wage Rates Apply)

104.3.8.B.1 State Wage Rate

Wages. This Project is not being constructed with federal funds and is not subject to the jurisdiction of the Davis-Bacon or other Federal Act that requires the Secretary of Labor to establish the minimum wages and benefits. The State of Maine minimum wage and benefits apply to the construction of this Radio Tower Project (PIN 14276.00). See the provisions in 26 MRSA §§ 1304 to 1313. Federal wage rates do not apply.

SPRUCE MOUNTAIN
142786.00
6-26-07

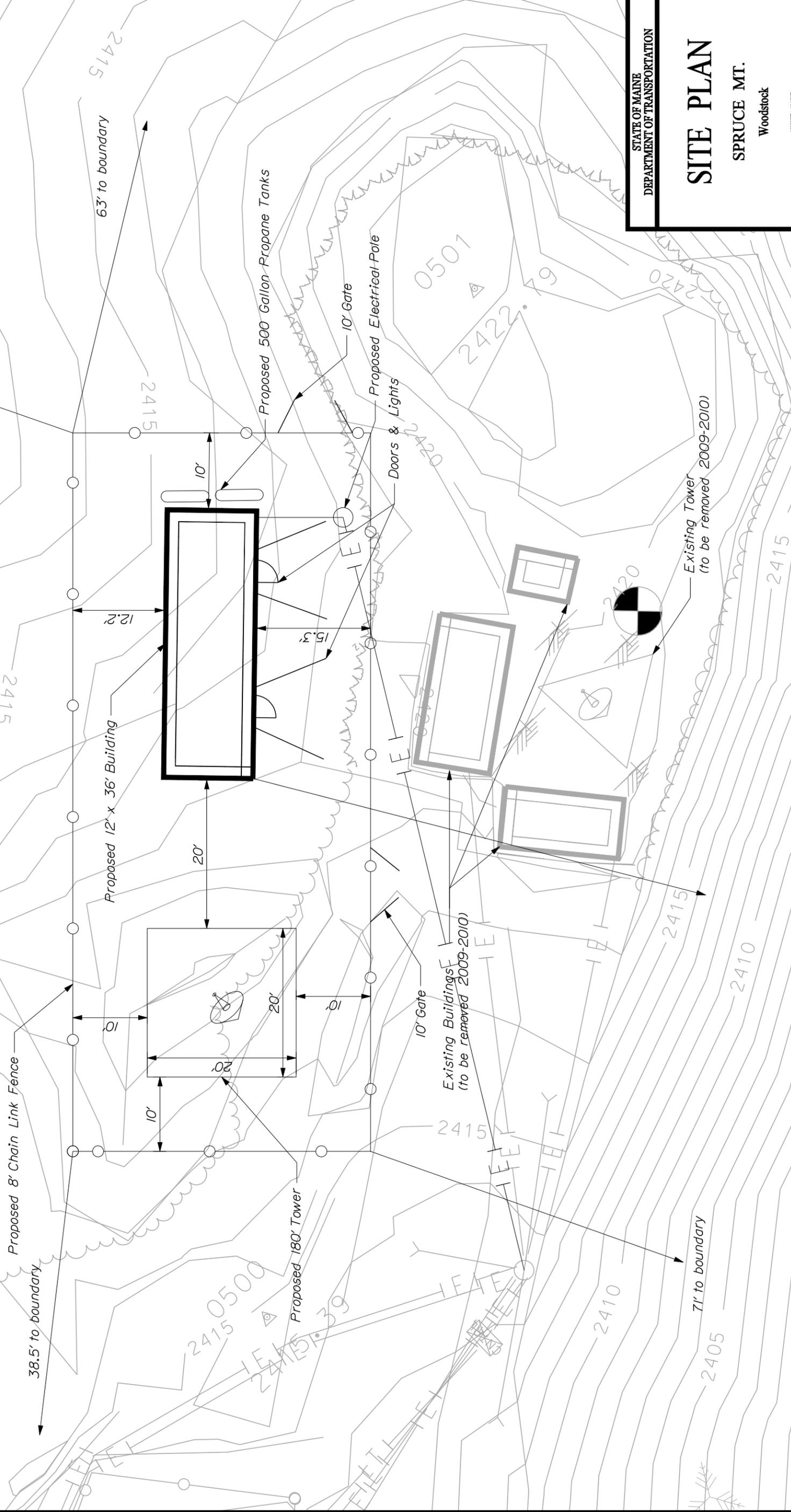
SPECIAL PROVISION
SECTION 104.2.1
(Furnishing of Right-of-Way)

Section 104.2.1, entitled, "Furnishing of Right-of-Way," of Division 100 of the Maine Department of Transportation's Standard Specifications, Revision of December 2002, is hereby deleted and replaced by the following Special Provision.

104.2.1 Furnishing of Right-of-Way The Department has yet to secure all necessary rights to real property within the Project Limits. Right-of-way information will be shown on the Contract Plans, however no project work affecting property access shall begin until the Department secures all necessary access.

State of Maine
 Office of Information Technology
 36 Anthony Ave.
 Augusta, ME 04333

Signed: _____



STATE OF MAINE
 DEPARTMENT OF TRANSPORTATION

SITE PLAN

SPRUCE MT.
 Woodstock
 AUGUSTA, MAINE

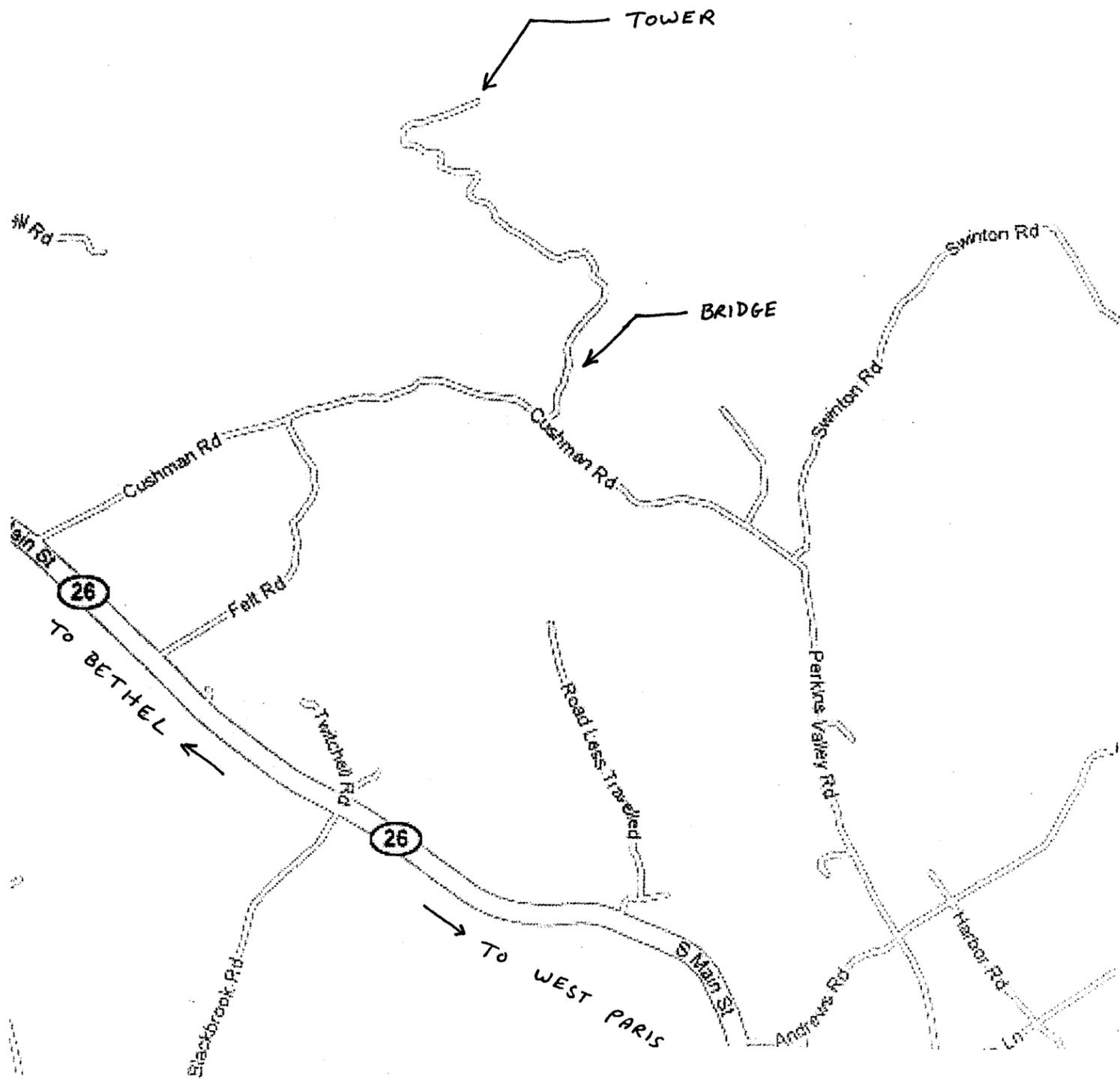
STATE	PROJECT NUMBER	SHEET	TOTAL SHEETS
MAINE	FIN 14278.00	1	1

PROJECT DESIGN ENGINEER	BY	DATE
DESIGN-DETAILED	Designer: [Signature]	12/2007
CHECKED	Checker: [Signature]	
REVISIONS		
FIELD CHANGES		

Spruce Mt. Location Map

PIN 14278.00

ENTRANCE LOCATION : $44^{\circ}23'21.59''N$, $70^{\circ}34'45.21''W$



Spruce Mountain
14278.00
6-26-07

SPECIAL PROVISION
SECTION 105
GENERAL SCOPE OF WORK

The Scope of work for the project consists of complete construction, installation, testing and commissioning of a radio tower, radio equipment/generator building, emergency and perimeter fence on Spruce Mountain as shown in the project plans and outlined in the special provisions.

**SPRUCE
MOUNTAIN
PIN 14278.00
7-9-07**

Special Provision
Section 107.1.1
Time
Contract Completion Date

With the exception of the documentation, all contractor's physical work at the site shall be completed by October 17, 2007.

The Specified Contract Completion Date is October 17, 2007.

SPECIAL PROVISION
SECTION 510
SPECIAL DETOURS

Section 510, Special Detours of the Standard Specifications is amended as follows:

510.01 Description Modify this entire subsection to read as follows:

This work shall consist of the design, construction, maintenance in good condition, and removal of temporary structures and approaches required for the satisfactory maintenance of one-way vehicular traffic.

510.03 Vehicular and Pedestrian Traffic Not Separated Modify this entire subsection to read as follows:

The existing timber bridge on the access road to Spruce Mountain is not adequate for vehicles larger than passenger vehicles. In order to pass larger vehicles by the bridge, the contractor must supply a bridge spanning the existing structure. At no point shall the temporary bridge touch or impact in any manner the existing bridge. The new structure must be designed, according to AASHTO, to handle all vehicles and equipment required to pass over the bridge. The design computations and plans for the temporary bridge shall be submitted to the Department for approval. The width of the structure shall be determined by the Contractor to handle all vehicles and equipment crossing it. Temporary abutments shall be placed a minimum of 10 feet from the back of the existing abutments. The approaches shall be built up to provide a smooth transition from the existing road to the temporary bridge. No wetlands shall be impacted as a result of the temporary bridge and approaches. Upon completion of the project, the temporary bridge and approaches shall be removed in their entirety and the road be returned to its original elevation and condition.

Any shoring of excavation on the approaches to maintain the embankment will be considered incidental to the Special Detour, as well as any maintenance of the proposed temporary retaining structures. Any modifications or alterations to the contractor's cofferdams dictated by the contractor's option of maintaining traffic will be considered incidental to the Special Detour.

510.06 Contractor's Responsibility. The following shall be added to the Standard Specification:

The access road may be closed for a maximum of eight consecutive hours in order to construct the Special Detour. Another maximum 8 hour consecutive closure may be used to remove the Special Detour.

510.09 Basis of Payment. This subsection is deleted in its entirety and replaced by the following:

The accepted Special Detour will be paid for at the contract lump sum price which price shall be full compensation for the respective items, as called for in the contract, designed, constructed, maintained completely removed and the affected areas rehabilitated and stabilized.

Payment will also be considered full compensation for all erosion control required for this temporary detour, including the development of SEWPCP, SPCC, and incidental work related to erosion control. Payment will also be considered full compensation for all traffic control devices.

Payment will be made under:

<u>Pay Item</u>		<u>Pay Unit</u>
510.10	Special Detour, ___ foot Roadway Width Vehicular and Pedestrian Traffic Not Separated	Lump Sum

**SPECIAL PROVISION
SECTION 656**

Temporary Soil Erosion and Water Pollution Control

The following is added to Section 656 regarding Project Specific Information and Requirements.

Project Specific Information and Requirements

The following information and requirements apply specifically to this Project. The temporary soil erosion and water pollution control measures associated with this work shall be addressed in the SEWPCP.

1. This project is considered **SENSITIVE** in accordance with the BMP Manual. The Contractor's SEWPCP shall comply with Section II.B., Guidelines for Sensitive Water bodies in the BMP Manual.
2. **A preconstruction field review is mandatory for this project. The preconstruction field review shall take place before commencing any work that involves soil disturbance or potential impacts on water quality. Attendees shall include the Environmental Coordinator, the preparer of the SEWPCP, the Resident, and a representative from the Department's ENV Water Resources Unit. The date and time shall be set by the Contractor in consultation with the Resident and ENV Water Resources Unit representative.**
3. Due to the project sensitivity, CONSTRUCTION SHALL BE PHASED to limit the amount of disturbed area. The Contractor's SEWPCP shall include specific provisions for phasing the work including, but not limited, to the installation of the temporary bridge and any required access road upgrades. Each section must be stabilized to the approval of the Resident and the Water Resources Unit before work can begin on any subsequent section. The contractor's SEWPCP shall include a mobilization plan for equipment and materials going to, and, returning from, the summit. The summit, access road and temporary bridge shall be restored to pre-existing conditions prior to contract termination.
4. Newly disturbed earth shall be mulched by the end of each workday. Mulch shall be maintained on a daily basis.
5. CLEARING LIMIT LINES SHALL BE MINIMIZED. Clearing shall be minimized as shown on the design plans. Areas to be cleared shall be discussed at the preconstruction field review.
6. All disturbed ditches shall be stabilized by the end of each workday. Stabilization shall be maintained on a daily basis.
7. Material placed to provide equipment/material access shall consist of clean, granular material so as to provide stable access without increasing the potential of erosion and sedimentation.

**SPECIAL PROVISION
SECTION 656**

Temporary Soil Erosion and Water Pollution Control

8. Permanent slope stabilization measures shall be applied within one week of the last soil disturbance.
9. Permanent seeding shall be done in accordance with *Standard Specification, Section 618 - Seeding* unless the Contract states otherwise.
10. Culvert inlet and outlet protection shall be installed within 48 hours of culvert installation, or prior to a storm event, whichever is sooner.
11. Temporary winter stabilization must be used between November 1 and April 1 or outside of said time period if the ground is frozen or snow covered. Temporary winter stabilization involves, at a minimum, covering all disturbed soils and seeded ground that is not Acceptable Work with an approved method. If temporary winter stabilization practices are used, spring procedures for permanent stabilization shall also be described in the SEWPCP. Use of these methods for over-winter temporary erosion control will be incidental to the contract and be paid for as part of Pay Item 656.75.
12. Erosion control blanket shall be installed in the bottoms of all ditches except where a stone lining is planned. Seed shall be applied prior to the placement of the blanket.
13. If check dams are used, they shall be constructed of stone in accordance with BMP Manual, Section 9. *Hay Bale Temporary Check Dams* **are not allowed**. Delete all reference to them in Section 9.
14. Demolition debris generated by the removal of the temporary bridge (including debris from wearing surface removal, saw cut slurry, dust, etc.) shall be contained and shall not be allowed to discharge to any resource. All demolition debris shall be disposed of in accordance with *Standard Specifications, Section 202.03 Removing Existing Superstructure, Structural Concrete, Railings, Curbs, Sidewalks and Bridges*. Containment and disposal of demolition debris shall be addressed in the Contractor's SEWPCP.

Method of measurement:

ITEM # 656.75 Soil Erosion Water Pollution Control
Plan

Basis of Payment:

As outlined and stipulated in this Special Provision, and as otherwise as authorized and approved by the Department.

ITEM # 656.75 Soil Erosion Water Pollution Control 1 LS
Plan

STANDARD DETAIL UPDATES

Standard Details and Standard Detail updates are available at:

http://www.maine.gov/mdot/contractor-consultant-information/ss_standard_details_updates.php

<u>Detail #</u>	<u>Description</u>	<u>Revision Date</u>
504(15)	Diaphragms	12/30/02
507(04)	Steel Bridge Railing	2/05/03
526(33)	Concrete Transition Barrier	8/18/03
645(06)	H-Beam Posts – Highway Signing	7/21/04
645(09)	Installation of Type II Signs	7/21/04
626(09)	Electrical Junction Box for Traffic Signals and Lighting	2/25/05
604(01)	Catch Basins	11/16/05
604(05)	Type “A” & “B” Catch Basin Tops	11/16/05
604(06)	Type “C” Catch Basin Tops	11/16/05
604(07)	Manhole Top “D”	11/16/05
604(09)	Catch Basin Type “E”	11/16/05
606(02)	Multiple Mailbox Support	11/16/05
606(07)	Reflectorized Beam Guardrail Delineator Details	11/16/05
609(06)	Vertical Bridge Curb	11/16/05
504(23)	Hand-Hold Details	12/08/05
609(03)	Curb Type 3	6/27/06
609(07)	Curb Type 1	6/27/06
535(01)	Precast Superstructure - Shear Key	10/12/06
535(02)	Precast Superstructure - Curb Key & Drip Notch	10/12/06

535(03)	Precast Superstructure - Shear Key	10/12/06
535(04)	Precast Superstructure - Shear Key	10/12/06
535(05)	Precast Superstructure - Post Tensioning	10/12/06
535(06)	Precast Superstructure - Sections	10/12/06
535(07)	Precast Superstructure - Precast Slab & Box	10/12/06
535(08)	Precast Superstructure - Sections	10/12/06
535(09)	Precast Superstructure - Sections	10/12/06
535(10)	Precast Superstructure - Sections	10/12/06
535(11)	Precast Superstructure - Sections	10/12/06
535(12)	Precast Superstructure - Sections	10/12/06
535(13)	Precast Superstructure - Sections	10/12/06
535(14)	Precast Superstructure - Stirrups	10/12/06
535(15)	Precast Superstructure - Plan	10/12/06
535(16)	Precast Superstructure - Reinforcing	10/12/06
535(17)	Precast Superstructure - Notes	10/12/06
801(01)	Drives on Sidewalk Sections	2/06/07
801(02)	Drives on Non-Sidewalk Sections	2/06/07

SUPPLEMENTAL SPECIFICATION

(Corrections, Additions, & Revisions to Standard Specifications - Revision of December 2002)

SECTION 101

CONTRACT INTERPRETATION

101.2 Definitions

Closeout Documentation Replace the sentence “A letter stating the amount..... DBE goals.” with “DBE Goal Attainment Verification Form”

Add “Environmental Information Hazardous waste assessments, dredge material test results, boring logs, geophysical studies, and other records and reports of the environmental conditions. For a related provision, see Section 104.3.14 - Interpretation and Interpolation.”

Add “Fabrication Engineer The Department’s representative responsible for Quality Assurance of pre-fabricated products that are produced off-site.”

Geotechnical Information Replace with the following: “Boring logs, soil reports, geotechnical design reports, ground penetrating radar evaluations, seismic refraction studies, and other records of subsurface conditions. For a related provision, see Section 104.3.14 - Interpretation and Interpolation.”

SECTION 102

DELIVERY OF BIDS

102.7.1 Location and Time Add the following sentence “As a minimum, the Bidder will submit a Bid Package consisting of the Notice to Contractors, the completed Acknowledgement of Bid Amendments form, the completed Schedule of Items, 2 copies of the completed Agreement, Offer, & Award form, a Bid Bond or Bid Guarantee, and any other Certifications or Bid Requirements listed in the Bid Book.”

102.11.1 Non-curable Bid Defects Replace E. with “E. The unit price and bid amount is not provided or a lump sum price is not provided or is illegible as determined by the Department.”

SECTION 103

AWARD AND CONTRACTING

103.3.1 Notice and Information Gathering Change the first paragraph to read as follows: “After Bid Opening and as a condition for Award of a Contract, the Department may require an Apparent Successful Bidder to demonstrate to the Department’s satisfaction that the Bidder is responsible and qualified to perform the Work.”

SECTION 104

GENERAL RIGHTS AND RESPONSIBILITIES

104.3.14 Interpretation and Interpolation In the first sentence, change “...and Geotechnical Information.” to “...Environmental Information, and Geotechnical Information.”

Delete the entire Section 104.5.9 and replace with the following:

104.5.9 Landscape Subcontractors The Contractor shall retain only Landscape Subcontractors that are certified by the Department's Environmental Office Landscape Unit.

SECTION 105 GENERAL SCOPE OF WORK

Delete the entire Section 105.6 and replace with the following:

105.6.1 Department Provided Services The Department will provide the Contractor with the description and coordinates of vertical and horizontal control points, set by the Department, within the Project Limits, for full construction Projects and other Projects where survey control is necessary. For Projects of 1,500 feet in length, or less: The Department will provide three points. For Projects between 1,500 and 5,000 feet in length: The Department will provide one set of two points at each end of the Project. For Projects in excess of 5,000 feet in length, the Department will provide one set of two points at each end of the Project, plus one additional set of two points for each mile of Project length. For non-full construction Projects and other Projects where survey control is not necessary, the Department will not set any control points and, therefore, will not provide description and coordinates of any control points. Upon request of the Contractor, the Department will provide the Department's survey data management software and Survey Manual to the Contractor, or its survey Subcontractor, for the exclusive use on the Department's Projects.

105.6.2 Contractor Provided Services Utilizing the survey information and points provided by the Department, described in Subsection 105.6.1, Department Provided Services, the Contractor shall provide all additional survey layout necessary to complete the Work. This may include, but not be limited to, reestablishing all points provided by the Department, establishing additional control points, running axis lines, providing layout and maintenance of all other lines, grades, or points, and survey quality control to ensure conformance with the Contract. The Contractor is also responsible for providing construction centerline, or close reference points, for all Utility Facilities relocations and adjustments as necessary to complete the Work. When the Work is to connect with existing Structures, the Contractor shall verify all dimensions before proceeding with the Work. The Contractor shall employ or retain competent engineering and/or surveying personnel to fulfill these responsibilities.

The Contractor must notify the Department of any errors or inconsistencies regarding the data and layout provided by the Department as provided by Section 104.3.3 - Duty to Notify Department If Ambiguities Discovered.

105.6.2.1 Survey Quality Control The Contractor is responsible for all construction survey quality control. Construction survey quality control is generally defined as, first, performing initial field survey layout of the Work and, second, performing an independent check of the initial layout using independent survey data to assure the accuracy of the initial layout; additional iterations of checks may be required if significant discrepancies are discovered in this process. Construction survey layout quality control also requires written documentation of

the layout process such that the process can be followed and repeated, if necessary, by an independent survey crew.

105.6.3 Survey Quality Assurance It is the Department's prerogative to perform construction survey quality assurance. Construction survey quality assurance may, or may not, be performed by the Department. Construction survey quality assurance is generally defined as an independent check of the construction survey quality control. The construction survey quality assurance process may involve physically checking the Contractor's construction survey layout using independent survey data, or may simply involve reviewing the construction survey quality control written documentation. If the Department elects to physically check the Contractor's survey layout, the Contractor's designated surveyor may be required to be present. The Department will provide a minimum notice of 48 hours to the Contractor, whenever possible, if the Contractor's designated surveyor's presence is required. Any errors discovered through the quality assurance process shall be corrected by the Contractor, at no additional cost to the Department.

105.6.4 Boundary Markers The Contractor shall preserve and protect from damage all monuments or other points that mark the boundaries of the Right-of-Way or abutting parcels that are outside the area that must be disturbed to perform the Work. The Contractor indemnifies and holds harmless the Department from all claims to reestablish the former location of all such monuments or points including claims arising from 14 MRSA § 7554-A. For a related provision, see Section 104.3.11 - Responsibility for Property of Others.

SECTION 106 QUALITY

106.4.3 Testing Change the first sentence in paragraph three from "...maintain records of all inspections and tests." to "...maintain original documentation of all inspections, tests, and calculations used to generate reports."

106.6 Acceptance Add the following to paragraph 1 of A: "This includes Sections 401 - Hot Mix Asphalt, 402 - Pavement Smoothness, and 502 - Structural Concrete - Method A - Air Content."

Add the following to the beginning of paragraph 3 of A: "For pay factors based on Quality Level Analysis, and"

106.7.1 Standard Deviation Method Add the following to F: "Note: In cases where the mean of the values is equal to either the USL or the LSL, then the PWL will be 50 regardless of the computed value of s."

Add the following to H: "Method C Hot Mix Asphalt: $PF = [55 + (\text{Quality Level} * 0.5)] * 0.01$ "

SECTION 107 TIME

107.3.1 General Add the following: "If a Holiday occurs on a Sunday, the following Monday shall be considered a Holiday. Sunday or Holiday work must be approved by the Department,

except that the Contractor may work on Martin Luther King Day, President's Day, Patriot's Day, the Friday after Thanksgiving, and Columbus Day without the Department's approval."

107.7.2 Schedule of Liquidated Damages Replace the table of Liquidated Damages as follows:

<u>From More Than</u>	<u>Up to and Including</u>	<u>Amount of Liquidated Damages per Calendar Day</u>
\$0	\$100,000	\$100
\$100,000	\$300,000	\$200
\$300,000	\$500,000	\$400
\$500,000	\$1,000,000	\$575
\$1,000,000	\$2,000,000	\$750
\$2,000,000	\$4,000,000	\$900
\$4,000,000	and more	\$1,875

SECTION 108 PAYMENT

108.4 Payment for Materials Obtained and Stored First paragraph, second sentence, delete the words "...Delivered on or near the Work site at acceptable storage places."

SECTION 109 CHANGES

109.1.1 Changes Permitted Add the following to the end of the paragraph: "There will be no adjustment to Contract Time due to an increase or decrease in quantities, compared to those estimated, except as addressed through Contract Modification(s)."

109.1.2 Substantial Changes to Major Items Add the following to the end of the paragraph: "Contract Time adjustments may be made for substantial changes to Major Items when the change affects the Critical Path, as determined by the Department"

109.4.4 Investigation / Adjustment Third sentence, delete the words "subsections (A) - (E)"

109.5.1 Definitions - Types of Delays

B. Compensable Delay Replace (1) with the following; "a weather related Uncontrollable Event of such an unusually severe nature that a Federal Emergency Disaster is declared. The Contractor will only be entitled to an Equitable Adjustment if the Project falls within the geographic boundaries prescribed under the disaster declaration."

109.7.2 Basis of Payment Replace with the following: "Equitable Adjustments will be established by mutual Agreement for compensable items listed in Section 109.7.3- Compensable Items, based upon Unit or Lump Sum Prices. If Agreement cannot be reached, the Contractor shall accept payment on a Force Account basis as provided in Section 109.7.5 - Force Account Work, as full and complete compensation for all Work relating to the Equitable Adjustment."

109.7.3 Compensable Items Replace with the following: “The Contractor is entitled to compensation for the following items, with respect to agreed upon Unit or Lump Sum Prices:

1. Labor expenses for non-salaried Workers and salaried foremen.
2. Costs for Materials.
3. A 15 % markup on the totals of Items 1 and 2 of this subsection 109.7.3 for home office overhead and profit of the Contractor, its Subcontractors and suppliers, and any lower tier Subcontractors or suppliers, with no mark-ups on mark-ups.
4. Cost for Equipment, based on Blue Book Rates or leased rates, as set forth in Section 109.7.5(C), or the Contractor’s Actual Costs if determined by the Department to be lower.
5. Costs for extended job-site overhead.
6. Time.
7. Subcontractor quoted Work, as set forth below in Section 109.7.5 (F).”

109.7.5 Force Account Work

C. Equipment

Paragraph 2, delete sentence 1 which starts; “Equipment leased....”

Paragraph 6, change sentence 2 from “The Contractor may furnish...” to read “If requested by the Department, the Contractor will produce cost data to assist the Department in the establishment of such rental rate, including all records that are relevant to the Actual Costs including rental Receipts, acquisition costs, financing documents, lease Agreements, and maintenance and operational cost records.”

Add the following paragraph; “Equipment leased by the Contractor for Force Account Work and actually used on the Project will be paid for at the actual invoice amount plus 10% markup for administrative costs.”

Add the following section;

“F. Subcontractor Quoted Work When accomplishing Force Account Work that utilizes Subcontractors, the Contractor will be allowed a maximum markup of 5% for profit and overhead on the Subcontractor’s portion of the Force Account Work.”

SECTION 110
INDEMNIFICATION, BONDING, AND INSURANCE

Delete the entire Section 110.2.3 and replace with the following:

110.2.3 Bonding for Landscape Establishment Period The Contractor shall provide a signed, valid, and enforceable Performance, Warranty, or Maintenance Bond complying with the Contract, to the Department at Final Acceptance.

The bond shall be in the full amount for all Pay Items for work pursuant to Sec 621, Landscape, payable to the “Treasurer - State of Maine,” and on the Department’s forms, on exact copies thereof, or on forms that do not contain any significant variations from the Department’s forms as solely determined by the Department.

The Contractor shall pay all premiums and take all other actions necessary to keep said bond in effect for the duration of the Landscape Establishment Period described in Special Provision 621.0036 - Establishment Period. If the Surety becomes financially insolvent, ceases to be licensed or approved to do business in the State of Maine, or stops operating in the United States, the Contractor shall file new bonds complying with this Section within 10 Days of the date the Contractor is notified or becomes aware of such change.

All Bonds shall be procured from a company organized and operating in the United States, licensed or approved to do business in the State of Maine by the State of Maine Department of Business Regulation, Bureau of Insurance, and listed on the latest Federal Department of the Treasury listing for “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies.”

By issuing a bond, the Surety agrees to be bound by all terms of the Contract, including those related to payment, time for performance, quality, warranties, and the Department’s self-help remedy provided in Section 112.1 - Default to the same extent as if all terms of the Contract are contained in the bond(s).

Regarding claims related to any obligations covered by the bond, the Surety shall provide, within 60 Days of Receipt of written notice thereof, full payment of the entire claim or written notice of all bases upon which it is denying or contesting payment. Failure of the Surety to provide such notice within the 60-day period constitutes the Surety’s waiver of any right to deny or contest payment and the Surety’s acknowledgment that the claim is valid and undisputed.

SECTION 202 REMOVING STRUCTURES AND OBSTRUCTIONS

202.02 Removing Buildings Make the following change to the last sentence in the final paragraph, change “...Code of Maine Regulations 401.” to “...Department of Environmental Protection Maine Solid Waste Management Rules, 06-096 CMR Ch. 401, Landfill Siting, Design and Operation.”

SECTION 203 EXCAVATION AND EMBANKMENT

203.01 Description Under b. Rock Excavation; add the following sentence: “The use of perchlorate is not allowed in blasting operations.”

SECTION 502
STRUCTURAL CONCRETE

502.05 Composition and Proportioning; TABLE #1; NOTE #2; third sentence; Change "...alcohol based saline sealer..." to "alcohol based silane sealer...". Add NOTE #6 to Class S Concrete.

502.0502 Quality Assurance Method A - Rejection by Resident Change the first sentence to read: "For an individual subplot with test results failing to meet the criteria in Table #1, or if the calculated pay factor for Air Content is less than 0.80....."

502.0503 Quality Assurance Method B - Rejection by Resident Change the first sentence to read: "For material represented by a verification test with test results failing to meet the criteria in Table #1, the Department will....."

502.0505 Resolution of Disputed Acceptance Test Results Combine the second and third sentence to read: "Circumstances may arise, however, where the Department may"

502.10 Forms and False work

D. Removal of Forms and False work 1., First paragraph; first, second, and third sentence; replace "forms" with "forms and false work"

502.11 Placing Concrete

G. Concrete Wearing Surface and Structural Slabs on Precast Superstructures Last paragraph; third sentence; replace "The temperature of the concrete shall not exceed 24° C [75° F] at the time of placement." with "The temperature of the concrete shall not exceed 24° C [75° F] at the time the concrete is placed in its final position."

502.15 Curing Concrete First paragraph; replace the first sentence with the following; "All concrete surfaces shall be kept wet with clean, fresh water for a curing period of at least 7 days after concrete placing, with the exception of vertical surfaces as provided for in Section 502.10 (D) - Removal of Forms and False work."

Second paragraph; delete the first two sentences.

Third paragraph; delete the entire paragraph which starts "When the ambient temperature...."

Fourth paragraph; delete "approved" to now read "...continuously wet for the entire curing period..."

Fifth paragraph; second sentence; change "...as soon as it is possible to do so without damaging the concrete surface." to "...as soon as possible."

Seventh paragraph; first sentence; change "...until the end of the curing period." to "...until the end of the curing period, except as provided for in Section 502.10(D) - Removal of Forms and False work."

502.19 Basis of Payment First paragraph, second sentence; add "pier nose armor" to the list of items included in the contract price for concrete.

SECTION 503 REINFORCING STEEL

503.06 Placing and Fastening Change the second paragraph, first sentence from: "All tack welding shall be done in accordance with Section 504, Structural Steel." to "All tack welding shall be done in accordance with AWS D1.4 Structural Welding Code - Reinforcing Steel."

SECTION 504 STRUCTURAL STEEL

504.09 Facilities for Inspection Add the follow as the last paragraph: "Failure to comply with the above requirements will be consider to be a denial to allow access to work by the Contractor. The Department will reject any work done when access for inspection is denied."

504.18 Plates for Fabricated Members Change the second paragraph, first sentence from: "...ASTM A 898/A 898 M..." to "...ASTM A 898/A 898 M or ASTM A 435/A 435 M as applicable and..."

504.31 Shop Assembly Add the following as the last sentence: "The minimum assembly length shall include bearing centerlines of at least two substructure units."

504.64 Non Destructive Testing-Ancillary Bridge Products and Support Structures Change the third paragraph, first sentence from "One hundred percent..." to "Twenty five percent..."

SECTION 535 PRECAST, PRESTRESSED CONCRETE SUPERSTRUCTURE

535.02 Materials Change "Steel Strand for Concrete Reinforcement" to "Steel Strand." Add the following to the beginning of the third paragraph; "Concrete shall be Class P conforming to the requirements in this section. 28 day compressive strength shall be as stated on the plans. Coarse aggregate...."

535.05 Inspection Facilities Add the follow as the last paragraph: "If the above requirements are not met, the Contractor shall be considered to be in violation of Standard Specification 104.2.5 – Right to Inspect Work. All work occurring during a violation of this specification will be rejected."

535.26 Lateral Post-Tensioning Replace the first paragraph; "A final tension..." with "Overstressing strands for setting losses cannot be accomplished for chuck to chuck lengths of 7.6 m [25 ft] and less. In such instances, refer to the Plans for all materials and methods. Otherwise, post-tensioning shall be in accordance with PCI standards and shall provide the anchorage force noted in the Plans. The applied jacking force shall be no less than 100% of the design jacking force."

SECTION 603
 PIPE CULVERTS AND STORM DRAINS

603.0311 Corrugated Polyethylene Pipe for Option III Replace the Minimum Mandrel Diameter Table with the following:

Nominal Size US Customary (in)	Minimum Mandrel Diameter (in)	Nominal Size Metric (mm)	Minimum Mandrel Diameter (mm)
12	11.23	300	280.73
15	14.04	375	350.91
18	16.84	450	421.09
24	22.46	600	561.45
30	28.07	750	701.81
36	33.69	900	842.18
42	39.30	1050	982.54
48	44.92	1200	1122.90

SECTION 604
 MANHOLES, INLETS, AND CATCH BASINS

604.02 Materials Add the following:

“Tops and Traps	712.07
Corrugated Metal Units	712.08
Catch Basin and Manhole Steps	712.09”

SECTION 605
 UNDERDRAINS

605.05 Underdrain Outlets Make the following change:

In the first paragraph, second sentence, delete the words “metal pipe”.

SECTION 606
 GUARDRAIL

606.02 Materials Delete the entire paragraph which reads “The sole patented supplier of multiple mailbox...” and replace with “Acceptable multiple mailbox assemblies shall be listed on the Department’s Approved Products List and shall be NCHRP 350 tested and approved.” Delete the entire paragraph which reads “Retroreflective beam guardrail delineators...” and replace with “Reflectorized sheeting for Guardrail Delineators shall meet the requirements of Section 719.01 - Reflective Sheeting. Delineators shall be fabricated from high-impact, ultraviolet and weather resistant thermoplastic.

606.09 Basis of Payment First paragraph; delete the second and third sentence in their entirety and replace with “Butterfly-type guardrail reflectorized delineators shall be mounted on all W-beam guardrail at an interval of every 10 posts [62.5 ft] on tangents sections and every 5 posts [31.25 ft] on curved sections as directed by the Resident. On divided highways, the delineators shall be yellow on the left hand side and silver/white on the right hand side. On two-way

roadways, the delineators shall be silver/white on the right hand side. All delineators shall have retroreflective sheeting applied to only the traffic facing side. Reflectorized guardrail delineators will not be paid for directly, but will be considered incidental to the guardrail items.”

SECTION 609 CURB

609.04 Bituminous Curb f., Delete the requirement “Color Natural (White)”

SECTION 615 LOAM

615.02 Materials Make the following change:

<u>Organic Content</u>	<u>Percent by Volume</u>
Humus	“5% - 10%”, as determined by Ignition Test

SECTION 618 SEEDING

618.01 Description Change the first sentence to read as follows: “This work shall consist of furnishing and applying seed” Also remove “,and cellulose fiber mulch” from 618.01(a).

618.03 Rates of Application In 618.03(a), remove the last sentence and replace with the following: “These rates shall apply to Seeding Method 2, 3, and Crown Vetch.”

In 618.03(c) “1.8 kg [4 lb]/unit.” to “1.95 kg [4 lb]/unit.”

618.09 Construction Method In 618.09(a) 1, sentence two, replace “100 mm [4 in]” with “25 mm [1 in] (Method 1 areas) and 50 mm [2 in] (Method 2 areas)”

618.15 Temporary Seeding Change the Pay Unit from Unit to Kg [lb].

SECTION 620 GEOTEXTILES

620.03 Placement Section (c)

Title: Replace “Non-woven” in title with “Erosion Control”.

First Paragraph: Replace first word “Non-woven” with “Woven monofilament”.

Second Paragraph: Replace second word “Non-woven” with “Erosion Control”.

620.07 Shipment, Storage, Protection and Repair of Fabric Section (a)

Replace the second sentence with the following: “Damaged geotextiles, as identified by the Resident, shall be repaired immediately.”

620.09 Basis of Payment

Pay Item 620.58: Replace “Non-woven” with “Erosion Control”

Pay Item 620.59: Replace “Non-woven” with “Erosion Control”

SECTION 621 LANDSCAPING

621.0036 Establishment Period In paragraph 4 and 5, change “time of Final Acceptance” to “end of the period of establishment”. In Paragraph 7, change “Final Acceptance date” to “end of the period of establishment” and change “date of Final Acceptance” to “end of the period of establishment”.

SECTION 626 HIGHWAY SIGNING

626.034 Concrete Foundations Add to the following to the end of the second paragraph: “Pre-cast and cast-in-place foundations shall be warranted against leaning and corrosion for two years after the project is completed. If the lean is greater than 2 degrees from normal or the foundation is spalling within the first two years, the Contractor shall replace the foundation at no extra cost.”

SECTION 627 PAVEMENT MARKINGS

627.10 Basis of Payment Add to the following to the end of the third paragraph: “If allowed by Special Provision, the Contractor may utilize Temporary Bi-Directional Yellow and White(As required) Delineators as temporary pavement marking lines and paid for at the contract lump sum price. Such payment will include as many applications as required and removal.”

SECTION 637 DUST CONTROL

637.06 Basis of Payment Add the following after the second sentence of the third paragraph: “Failure by the Contractor to follow Standard Specification or Special Provision - Section 637 and/or the Contractor’s own Soil Erosion and Pollution Control Plan concerning Dust Control and/or the Contractor’s own Traffic Control Plan concerning Dust Control and/or visible evidence of excessive dust problems, as determined by the Resident, will result in a reduction in payment, computed by reducing the Lump Sum Total by 5% per occurrence per day. The Department’s Resident or any other representative of the Department reserves the right to suspend the work at any time and request a meeting to discuss violations and remedies. The Department shall not be held responsible for any delay in the work due to any suspension under this item. Additional penalties may also be assessed in accordance with Special Provision 652 - Work Zone Traffic Control and Standard Specification 656 - Temporary Soil Erosion and Water Pollution Control.”

SECTION 639 ENGINEERING FACILITIES

639.04 Field Offices Change the forth to last paragraph from: “The Contractor shall provide a fully functional desktop copier...” to “...desktop copier/scanner...”

SECTION 652

MAINTENANCE OF TRAFFIC

652.2.3 Flashing Arrow Board Delete the existing 5 paragraphs and replace with the following: Flashing Arrow Panels (FAP) must be of a type that has been submitted to AASHTO's National Transportation Product Evaluation Program (NTPEP) for evaluation and placed on the Maine Department of Transportation's Approved Products List of Portable Changeable Message Signs & Flashing Arrow Panels.

FAP units shall meet requirements of the current Manual on Uniform Traffic Control Devices (MUTCD) for Type "C" panels as described in Section 6F.56 - Temporary Traffic Control Devices. An FAP shall have matrix of a minimum of 15 low-glare, sealed beam, Par 46 elements capable of either flashing or sequential displays as well as the various operating modes as described in the MUTCD, Chapter 6-F. If an FAP consisting of a bulb matrix is used, each element should be recess-mounted or equipped with an upper hood of not less than 180 degrees. The color presented by the elements shall be yellow.

FAP elements shall be capable of at least a 50 percent dimming from full brilliance. Full brilliance should be used for daytime operation and the dimmed mode shall be used for nighttime operation. FAP shall be at least 2.4 M x 1.2 M [96" x 48"] and finished in non-reflective black. The FAP shall be interpretable for a distance not less than 1.6 km [1 mile].

Operating modes shall include, flashing arrow, sequential arrow, sequential chevron, flashing double arrow, and flashing caution. In the three arrow signals, the second light from the arrow point shall not operate.

The minimum element on-time shall be 50 percent for the flashing mode, with equal intervals of 25 percent for each sequential phase. The flashing rate shall be not less than 25 nor more than 40 flashes per minute. All on-board circuitry shall be solid state.

Primary power source shall be 12 volt solar with a battery back-up to provide continuous operation when failure of the primary power source occurs, up to 30 days with fully charged batteries. Batteries must be capable of being charged from an onboard 110 volt AC power source and the unit shall be equipped with a cable for this purpose.

Controller and battery compartments shall be enclosed in lockable, weather-tight boxes. The FAP shall be mounted on a pneumatic-tired trailer or other suitable support for hauling to various locations, as directed. The minimum mounting height of an arrow panel should be 2.1 M [7 feet] from the roadway to the bottom of the panel.

The face of the trailer shall be delineated on a permanent basis by affixing retro-reflective material, known as conspicuity material, in a continuous line as seen by oncoming drivers.

A portable changeable message sign may be used to simulate an arrow panel display."

652.2.4 Other Devices Delete the last paragraph and add the following:
"652.2.5 Portable Changeable Message Sign Trailer mounted Portable Changeable Message Signs (PCMS) must be of a type that has been submitted to AASHTO's National

Transportation Product Evaluation Program (NTPEP) for evaluation and placed on the Maine Department of Transportations' Approved Products List of Portable Changeable Message Signs & Flashing Arrow Panels. The PCMS unit shall meet or exceed the current specifications of the Manual on Uniform Traffic Control Devices (MUTCD), 6F.55.

The front face of the sign should be covered with a low-glare protective material. The color of the LED elements shall be amber on a black background. The PCMS should be visible from a distance of 0.8 km [0.5 mile] day and night and have a minimum 15° viewing angle. Characters must be legible from a distance of at least 200 M [650 feet].

The message panel should have adjustable display rates (minimum of 3 seconds per phase), so that the entire message can be read at least twice at the posted speed, the off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed. Each message shall consist of either one or two phases. A phase shall consist of up to eight characters per line. The unit must be capable of displaying at least three lines of text with eight characters per line. Each character shall be 457 mm [18"] high. Each character module shall use at least a five wide and seven high pixel matrix. The text of the messages shall not scroll or travel horizontally or vertically across the face of the sign.

Units shall automatically adjust their brightness under varying light conditions to maintain legibility.

The control system shall include a display screen upon which messages can be reviewed before being displayed on the message sign. The control system shall be capable of maintaining memory when power is unavailable. Message must be changeable with either a notebook computer or an on-board keypad. The controller shall have the capability to store a minimum of 200 user-defined and 200 pre-programmed messages. Controller and battery compartments shall be enclosed in lockable, weather-tight boxes.

PCMS units shall have the capability of being made programmable by means of wireless communications. PCMS units shall also be fully capable of having an on-board radar system installed if required for a particular application.

PCMS' primary power source shall be solar with a battery back-up to provide continuous operation when failure of the primary power source occurs. Batteries must be capable of being charged from a 110 volt AC power source. The unit must also be capable of being operated solely from a 110 volt AC power source and be equipped with a cable for this purpose.

The PCMS shall be mounted on a trailer in such a way that the bottom of the message sign panel shall be a minimum of 2.1 M [7 ft] above the roadway in urban areas and 1.5 M [5 ft] above the roadway in rural areas when it is in the operating mode. PCMS trailers should be of a heavy duty type with a 51 mm [2"] ball hitch and a minimum of four leveling jacks (at each corner). The sign shall be capable of being rotated 360° relative to the trailer. The face of the trailer shall be delineated on a permanent basis by affixing retro-reflective material, known as conspicuity material, in a continuous line as seen by oncoming drivers."

652.3.3 Submittal of Traffic Control Plan In item e. change "A list of all certified flaggers..." to "A list of all the Contractor's certified flaggers..."

In the last paragraph add the following as the second sentence: “The Department will review and provide comments to the Contractor within 14 days of receipt of the TCP.”

652.3.5 Installation of Traffic Control Devices In the first paragraph, first sentence; change “Signs shall be erected...” to “Portable signs shall be erected..” In the third sentence; change “Signs must be erected so that the sign face...” to “Post-mounted signs must also be erected so that the sign face...”

652.4 Flaggers Replace the first paragraph with the following; “The Contractor shall furnish flaggers as required by the TCP or as otherwise specified by the Resident. All flaggers must have successfully completed a flagger test approved by the Department and administered by a Department-approved Flagger-Certifier who is employing that flagger. All flaggers must carry an official certification card with them while flagging that has been issued by their employer. Flaggers shall wear safety apparel meeting ANSI 107-1999 Class 2 risk exposure and clearly identify the wearer as a person, shall be visible at a minimum distance of 300 m [1000 ft], and shall wear a hardhat with retroreflectivity. For nighttime conditions, Class 3 apparel should be considered, retroreflective or flashing SLOW/STOP paddles shall be used, and except in emergency situations the flagger station shall be illuminated to assure visibility.”

Second paragraph, first sentence; change “...have sufficient distance to stop before entering the workspace.” to “...have sufficient distance to stop at the intended stopping point.” Third sentence; change “At a spot obstruction...” to “At a spot obstruction with adequate sight distance,...”

Fourth paragraph, delete and replace with “Flaggers shall be provided as a minimum, a 10 minute break, every 2 hours and a 30 minute or longer lunch period away from the work station. Flaggers may only receive 1 unpaid break per day; all other breaks must be paid. Sufficient certified flaggers shall be available onsite to provide for continuous flagging operations during break periods. Breaker flaggers will not be paid for separately, but shall be considered incidental to the appropriate pay item.”

652.8.2 Other Items Replace the last paragraph with the following: “There will be no payment made under any 652 pay items after the expiration of the adjusted total contract time.”

SECTION 653 POLYSTYRENE PLASTIC INSULATION

653.05 Placing Backfill In the second sentence; change “...shall be not less than 150 mm [6 in] loose measure.” to “...shall be not less than 250 mm [10 in] loose measure.” In the third sentence; change “...crawler type bulldozer of not more than 390 kg/m² [80 lb/ft²] ground contact pressure...” to “...crawler type bulldozer of not more than 4875 kg/m² [2000 lb/ft²] ground contact pressure...”

653.06 Compaction In the last sentence; change “...not more than 390 kg/m² [80 lb/ft²] ground contact...” to “...not more than 4875 kg/m² [2000 lb/ft²] ground contact...”

SECTION 656

TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL

656.5.1 If Pay Item 656.75 Provided Replace the second paragraph with the following: "Failure by the Contractor to follow Standard Specification or Special Provision - Section 656 and/or the Contractor's own Soil Erosion and Pollution Control Plan will result in a reduction in payment, computed by reducing the Lump Sum Total by 5% per occurrence per day. The Department's Resident or any other representative of the Department reserves the right to suspend the work at any time and request a meeting to discuss violations and remedies. The Department shall not be held responsible for any delay in the work due to any suspension under this item."

SECTION 701

STRUCTURAL CONCRETE RELATED MATERIALS

701.10 Fly Ash - Chemical Requirements Change all references from "ASTM C311" to "ASTM C114".

SECTION 703

AGGREGATES

703.05 Aggregate for Sand Leveling Change the percent passing the 9.5 mm [3/8 in] sieve from "85 - 10" to "85 - 100"

703.06 Aggregate for Base and Subbase Delete the first paragraph: "The material shall have..." and replace with "The material shall have a minimum degradation value of 15 as determined by Washington State DOT Test Method T113, Method of Test for Determination of Degradation Value (March 2002 version), except that the reported degradation value will be the result of testing a single specimen from that portion of a sample that passes the 12.5 mm [1/2 in] sieve and is retained on the 2.00 mm [No. 10] sieve, minus any reclaimed asphalt pavement used."

703.07 Aggregates for HMA Pavements Delete the fourth paragraph: "The composite blend shall have..." and replace with "The composite blend, minus any reclaimed asphalt pavement used, shall have a Micro-Deval value of 18.0 or less as determined by AASHTO T 327. In the event the material exceeds the Micro Deval limit, a Washington Degradation test shall be performed. The material shall be acceptable if it has a value of 30 or more as determined by Washington State DOT Test Method T 113, Method of Test for Determination of Degradation Value (March 2002 version) except that the reported degradation value will be the result of testing a single composite specimen from that portion of the sample that passes the 12.5mm [1/2 inch] sieve and is retained on the 2.00mm [No 10] sieve, minus any reclaimed asphalt pavement used."

703.18 Common Borrow Replace the first paragraph with the following: "Common borrow shall consist of earth, suitable for embankment construction. It shall be free from frozen material, perishable rubbish, peat, and other unsuitable material including material currently or

previously contaminated by chemical, radiological, or biological agents unless the material is from a DOT project and authorized by DEP for use.”

703.22 Underdrain Backfill Material Change the first paragraph from “...for Underdrain Type B...” to “...for Underdrain Type B and C...”

SECTION 706 NON-METALLIC PIPE

706.06 Corrugated Polyethylene Pipe for Underdrain, Option I and Option III Culvert Pipe Change the first sentence from “...300 mm diameters to 900 mm” to “...300 mm diameters to 1200 mm” Delete, in it’s entirety, the last sentence which begins “This pipe and resins...” and replace with the following; “The manufacturing plants of polyethylene pipe shall be certified by the Eastern States Consortium. Polyethylene pipe shall be accepted based on third party certification by the AASHTO’s National Transportation Product Evaluation Program.”

SECTION 709 REINFORCING STEEL AND WELDED STEEL WIRE FABIC

709.03 Steel Strand Change the second paragraph from “...shall be 12mm [½ inch] AASHTO M203M/M203 (ASTM A416/A416M)...” to “...shall be 15.24 mm [0.600 inch] diameter AASHTO M203 (ASTM A416)...”

SECTION 710 FENCE AND GUARDRAIL

710.03 Chain Link Fabric Add the following sentence: “Chain Link fabric for PVC coated shall conform to the requirements of AASHTO M181, Type IV-Class B.”

710.07 Guardrail Posts Section b. change “...AASHTO M183/M183M...” to “...AASHTO M 270M/M 270 Grade 250 (36)...”

SECTION 712 MISCELLANEOUS HIGHWAY MATERIALS

712.06 Precast Concrete Units In the first paragraph, change “...ASTM C478M...” to “...AASHTO M199...” Delete the second paragraph and replace with the following; “Approved structural fibers may be used as a replacement of 6 x 6 #10 gauge welded wire fabric when used at an approved dosage rate for the construction of manhole and catch basin units. The material used shall be one of the products listed on the Maine Department of Transportation’s Approved Product List of Structural Fiber Reinforcement.” Delete the fifth paragraph and replace with the following; “The concrete mix design shall be approved by the Department. Concrete shall contain 6% air content, plus or minus 1½% tolerance when tested according to AASHTO T152. All concrete shall develop a minimum compressive strength of 28 MPa [4000 psi] in 28 days when tested according to AASHTO T22. The absorption of a specimen, when tested according to AASHTO T280, Test Method “A”, shall not exceed nine percent of the dry mass.”

Add the following:

“712.07 Tops, and Traps These metal units shall conform to the plan dimensions and to the following specification requirements for the designated materials.

Gray iron or ductile iron castings shall conform to the requirements of AASHTO M306 unless otherwise designated.

712.08 Corrugated Metal Units The units shall conform to plan dimensions and the metal to AASHTO M36/M36M. Bituminous coating, when specified, shall conform to AASHTO M190 Type A.

712.09 Catch Basin and Manhole Steps Steps for catch basins and for manholes shall conform to ASTM C478M [ASTM C478], Section 13 for either of the following material:

- (a) Aluminum steps-ASTM B221M, [ASTM B211] Alloy 6061-T6 or 6005-T5.
- (b) Reinforced plastic steps Steel reinforcing bar with injection molded plastic coating copolymer polypropylene. Polypropylene shall conform to ASTM D 4101.

712.23 Flashing Lights Flashing Lights shall be power operated or battery operated as specified.

- (a) Power operated flashing lights shall consist of housing, adapters, lamps, sockets, reflectors, lens, hoods and other necessary equipment designed to give clearly visible signal indications within an angle of at least 45 degrees and from 3 to 90 m [10 to 300 ft] under all light and atmospheric conditions.

Two circuit flasher controllers with a two-circuit filter capable of providing alternate flashing operations at the rate of not less than 50 nor more than 60 flashes per minute shall be provided.

The lamps shall be 650 lumens, 120 volt traffic signal lamps with sockets constructed to properly focus and hold the lamp firmly in position.

The housing shall have a rotatable sun visor not less than 175 mm [7 in] in length designed to shield the lens.

Reflectors shall be of such design that light from a properly focused lamp will reflect the light rays parallel. Reflectors shall have a maximum diameter at the point of contact with the lens of approximately 200 mm [8 in].

The lens shall consist of a round one-piece convex amber material which, when mounted, shall have a visible diameter of approximately 200 mm [8 in]. They shall distribute light and not diffuse it. The distribution of the light shall be asymmetrical in a downward direction. The light distribution of the lens shall not be uniform, but shall consist of a small high intensity portion with narrow distribution for long distance throw and a larger low intensity portion with wide distribution for short distance throw. Lenses shall be marked to indicate the top and bottom of the lens.

(b) Battery operated flashing lights shall be self-illuminated by an electric lamp behind the lens. These lights shall also be externally illuminated by reflex-reflective elements built into the lens to enable it to be seen by reflex-reflection of the light from the headlights of oncoming traffic. The batteries must be entirely enclosed in a case. A locking device must secure the case. The light shall have a flash rate of not less than 50 nor more than 60 flashes per minute from minus 30 °C [minus 20 °F] to plus 65 °C [plus 150 °F]. The light shall have an on time of not less than 10 percent of the flash cycle. The light beam projected upon a surface perpendicular to the axis of the light beam shall produce a lighted rectangular projection whose minimum horizontal dimension shall be 5 degrees each side of the horizontal axis. The effective intensity shall not have an initial value greater than 15.0 candelas or drop below 4.0 candelas during the first 336 hours of continuous flashing. The illuminated lens shall appear to be uniformly bright over its entire illuminated surface when viewed from any point within an angle of 9 degrees each side of the vertical axis and 5 degrees each side of the horizontal axis. The lens shall not be less than 175 mm [7 in] in diameter including a reflex-reflector ring of 13 mm [½ in] minimum width around the periphery. The lens shall be yellow in color and have a minimum relative luminous transmittance of 0.440 with a luminance of 2854° Kelvin. The lens shall be one-piece construction. The lens material shall be plastic and meet the luminous transmission requirements of this specification. The case containing the batteries and circuitry shall be constructed of a material capable of withstanding abuse equal to or greater than 1.21 mm thick steel [No. 18 U.S. Standard Gage Steel]. The housing and the lens frame, if of metal shall be properly cleaned, degreased and pretreated to promote adhesion. It shall be given one or more coats of enamel which, when dry shall completely obscure the metal. The enamel coating shall be of such quality that when the coated case is struck a light blow with a sharp tool, the paint will not chip or crack and if scratched with a knife will not powder. The case shall be so constructed and closed as to exclude moisture that would affect the proper operation of light. The case shall have a weep hole to allow the escape of moisture from condensation. Photoelectric controls, if provided, shall keep the light operating whenever the ambient light falls below 215 lx [20 foot candles]. Each light shall be plainly marked as to the manufacturer's name and model number.

If required by the Resident, certification as to conformance to these specifications shall be furnished based on results of tests made by an independent testing laboratory. All lights are subject to random inspection and testing. All necessary random samples shall be provided to the Resident upon request without cost to the Department. All such samples shall be returned to the Contractor upon completion of the tests.

712.32 Copper Tubing Copper tubing and fittings shall conform to the requirements of ASTM B88M Type A [ASTM B88, Type K] or better.

712.33 Non-metallic Pipe, Flexible Non-metallic pipe and pipe fittings shall be acceptable flexible pipe manufactured from virgin polyethylene polymer suitable for transmitting liquids intended for human or animal consumption.

712.34 Non-metallic Pipe, Rigid Non-metallic pipe shall be Schedule 40 polyvinylchloride (PVC) that meets the requirement of ASTM D1785. Fittings shall be of the same material.

712.341 Metallic Pipe Metallic pipe shall be ANSI, Standard B36.10, Schedule 40 steel pipe conforming to the requirements of ASTM A53 Types E or S, Grade B. End plates shall be steel conforming to ASTM A36/A36M.

Both the sleeve and end plates shall be hot dip galvanized. Pipe sleeve splices shall be welded splices with full penetration weld before galvanizing.

712.35 Epoxy Resin Epoxy resin for grouting or sealing shall consist of a mineral filled thixotropic, flexible epoxy resin having a pot life of approximately one hour at 10°C [50°F]. The grout shall be an approved product suitable for cementing steel dowels into the preformed holes of curb inlets and adjacent curbing. The sealant shall be an approved product, light gray in color and suitable for coating the surface.

712.36 Bituminous Curb The asphalt cement for bituminous curb shall be of the grade required for the wearing course, or shall be Viscosity Grade AC-20 meeting the current requirements of Subsection 702.01 Asphalt Cement. The aggregate shall conform to the requirements of Subsection 703.07. The coarse aggregate portion retained on the 2.36 mm [No. 8] sieve may be either crushed rock or crushed gravel.

The mineral constituents of the bituminous mixture shall be sized and graded and combined in a composite blend that will produce a stable durable curbing with an acceptable texture.

Bituminous material for curb shall meet the requirements of Section 403 - Hot Bituminous Pavement.

712.37 Precast Concrete Slab Portland cement concrete for precast slabs shall meet the requirements of Section 502 - Structural Concrete, Class A.

The slabs shall be precast to the dimension shown on the plans and cross section and in accordance with the Standard Detail plans for Concrete Sidewalk Slab. The surface shall be finished with a float finish in accordance with Subsection 502.14(c). Lift devices of sufficient strength to hold the slab while suspended from cables shall be cast into the top or back of the slab.

712.38 Stone Slab Stone slabs shall be of granite from an acceptable source, hard, durable, predominantly gray in color, free from seams which impair the structural integrity and be of smooth splitting character. Natural color variations characteristic of the deposit will be permitted. Exposed surfaces shall be free from drill holes or indications of drill holes. The granite slabs in any one section of backslope must be all the same finish.

The granite slabs shall be scabble dressed or sawed to an approximately true plane having no projections or depressions over 13 mm [$\frac{1}{2}$ in] under a 600 mm [2 ft] straightedge or over 25 mm [1 in] under a 1200 mm [4 ft] straightedge. The arris at the intersection of the top surface and exposed front face shall be pitched so that the arris line is uniform throughout the length of the installed slabs. The sides shall be square to the exposed face unless the slabs are to be set on a radius or other special condition which requires that the joints be cut to fit, but in any case shall be so finished that when the stones are placed side by side no space more than 20 mm [$\frac{3}{4}$ in] shall show in the joint for the full exposed height.

Liftpin holes in all sides will be allowed except on the exposed face.

SECTION 717
ROADSIDE IMPROVEMENT MATERIAL

717.03 C. Method #3 - Roadside Mixture #3 Change the seed proportions to the following:

Crown Vetch	25%
Perennial Lupine	25%
Red Clover	12.5%
Annual Rye	37.5%

717.05 Mulch Binder Change the third sentence to read as follows:

“Paper fiber mulch may be used as a binder at the rate of 2.3 kg/unit [5 lb/unit].”

SECTION 720
STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND
TRAFFIC SIGNALS

720.08 U-Channel Posts Change the first sentence from “..., U-Channel posts...” to “..., Rib Back U-Channel posts...”

SECTION 722
GEOTEXTILES

722.01 Stabilization/Reinforcement Geotextile Add the following to note #3; “The strengths specified in the columns labeled”<50%” and “≥ 50%” refer to the elongation at which the geotextile material was tested. For example; if a fabric is tested at 15% elongation then it must meet or exceed the minimum strength shown in the “<50%” column. Submittals must include the percent elongation at which the material was tested.”

722.02 Drainage Geotextile Add the following to note #3; “The strengths specified in the columns labeled”<50%” and “≥ 50%” refer to the elongation at which the geotextile material was tested. For example; if a fabric is tested at 15% elongation then it must meet or exceed the minimum strength shown in the “<50%” column. Submittals must include the percent elongation at which the material was tested.”

722.01 Erosion Control Geotextile Add the following note to Elongation in the Mechanical Property Table; “The strengths specified in the columns labeled”<50%” and “≥ 50%” refer to the elongation at which the geotextile material was tested. For example; if a fabric is tested at 15% elongation then it must meet or exceed the minimum strength shown in the “<50%” column. Submittals must include the percent elongation at which the material was tested.”

Maine Department of Transportation

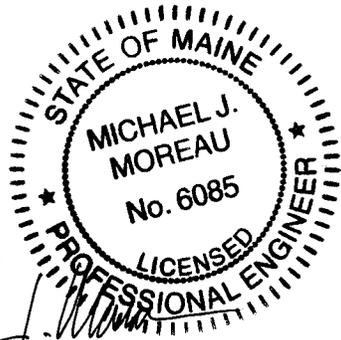
Highway Program
Geotechnical Section

GEOTECHNICAL DESIGN REPORT
for
SPRUCE MOUNTAIN RADIO TOWER REPLACEMENT
TOWN OF WOODSTOCK
OXFORD COUNTY, MAINE

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Soils Report 2007-05

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Figure 1, Site Location Map

Figure 2, Boring Location Plan

Appendix - B, Field Exploration and Test Data

Appendix - C, Laboratory Test Data

1.0 GEOTECHNICAL DESIGN SUMMARY

This report summarizes our geotechnical engineering evaluations for the Spruce Mountain Radio Tower in the Town of Woodstock, Oxford County, Maine. The design and construction recommendations below are discussed in greater detail in Section 4.0, Evaluation and Recommendations.

1.1 Foundation Support

- A mat foundation or individual leg pier pad foundations, with or without rock anchors should be considered for design
- Use an allowable contact bearing pressure of 15 tons per square foot (tsf) for foundations constructed on competent bedrock
- Use a minimum footing width of 3 feet for pier pad foundations
- Settlement will be negligible and less than ½-inch for foundations constructed on competent bedrock and will occur as the tower is built
- Assume the groundwater table at the finished grade ground surface
- Foundations constructed on shallow, sound bedrock will satisfy frost depth requirements

1.2 Rock Anchors for Lateral and Uplift Load Resistance

- Use an allowable rock/grout bond stress of 175 psi or less for anchor design
- Limit rock anchor working loads to the allowable structural capacity for an anchor tendon (60 percent of the specified minimum tensile strength of the tendon steel) or the allowable geotechnical capacity, whichever is less
- Use a minimum bond length of 10 feet and a free stressing length of 10 feet for bar tendons or 15 feet for strand tendons
- Use bar or strand anchor tendons furnished with double corrosion protection
- Provide anchor hole diameter in accordance with manufacturer's recommendations
- Use a rock engagement angle of 60 degrees
- Assume a total unit weight of 160 pounds per cubic foot (pcf) for rock within the engagement cone
- Assumed groundwater level at the ground surface
- Performance test all installed rock anchors to 1.33 times the design load

1.3 Lateral and Uplift Load Resistance Without Rock Anchors

- Neglect passive earth pressure for lateral load resistance
- Use a concrete/rock interface coefficient of friction of 0.7. The resisting interface force is 0.7 times the normal load on the base of the foundation.
- The normal load should include the buoyant unit weight of concrete for the portion below the ground surface, regular weight concrete above ground surface, and the tower dead load

- Improve concrete/bedrock interface sliding resistance by anchoring, doweling, or benching if the prepared bedrock surface is sloped steeper than 4:1 (H:V) in any direction

1.4 Site Preparation

- Clean the bedrock surface to remove all soil, and loose or fractured rock using mechanical means
- Bedrock surfaces sloping steeper than 4H:1V shall be excavated to a completely level surface or benched level surface
- Wash the bedrock surface with high pressure water jet for final preparation
- Divert surface water away from excavation and remove groundwater from excavation using sump pump
- If required, use backfill meeting the requirements of MaineDOT 703.20, Gravel Borrow compacted to 95 percent of Modified Proctor maximum dry density

1.5 Final Plan Review and Construction Monitoring

- The Radio Tower Project Team geotechnical engineer should review final plans and specifications
- A qualified geotechnical engineer or construction engineer should observe:
 - Foundation subgrade prior to placement of footing form work
 - Rock anchor installation and performance testing if rock anchors are used, and
 - Placement and compaction of backfill soils around the perimeter and/or the top of the tower foundation
- The radio tower shop drawings should be reviewed by the Maine Department of Transportation (MaineDOT) structures group to verify that loading criteria, load conditions, anchorage, performance criteria, and required factors of safety (FS) conform to current radio tower structural standards.

2.0 INTRODUCTION

MaineDOT plans to install a new 180-foot self supported radio tower at the existing radio tower facility on Spruce Mountain, Woodstock, Maine, shown on the Site Location Map on Figure 1 in Appendix A. The proposed new tower will be constructed on a new foundation(s) adjacent to the existing tower (exact location not yet known). Figure 2 in Appendix A shows the existing site features.

The new Spruce Mountain tower is planned to be a self supporting tower. We understand that the foundation design will be provided by the tower manufacturer selected by MaineDOT for this site.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The site is accessed by a very steep, narrow, and in places winding gravel road. Conventional rubber-tired construction equipment would not be able to access the site. Portable equipment pulled behind heavy duty pickup trucks or small dozers, or aerial lift equipment will be required.

The existing tower is a guyed tower approximately 100 feet high and is operated by the Department of Public Safety (DPS). There are several attendant structures immediately adjacent to the existing tower including a DPS shelter, a County shelter and generator building (see Figure 2). During preparation of this report no information was available concerning the design and construction of the existing tower, guy anchorages and support building foundations. Other than the DPS and County shelters and the generator building, the nearest existing structure to the proposed site is the Unicel and US Cellular communication tower and buildings located about 150 feet to the west.

The immediate vicinity of the proposed tower site is relatively flat and the local ground surface topography slopes down and away steeply to the east and south, and moderately to the west and north. Surficial drainage will generally follow the local topography and carry surface water away in all directions, although some rainfall will be retained in the thin surficial soils on the flatter areas of the site. Surficial geology maps of the region indicate thin drift and glacial till surficial soils and many bedrock outcrops. The area of the proposed tower is barren of soil other than small patches of wind-blown sediments anchored by grass or moss vegetation.

3.2 Subsurface Conditions

We investigated the subsurface conditions in the vicinity of the proposed tower site by drilling one boring to a depth of approximately 20.3 feet below ground surface (bgs) at the location shown on Figure 2. The test boring, designated B-WOOD-101, was drilled on 8 November 2006 by Maine Test Borings, Inc. of Brewer, Maine, using a track-mounted Mobile B-53 drill rig.

MaineDOT technician Bruce Wilder was present throughout the field program to select the boring location, determine protocols for rock sampling and log the conditions encountered. Since no overburden soils occurred at the drill site, an auger was used to create a shallow depression in the bedrock. Then the bedrock was drilled using a diamond NQ2 rock coring double-tube core barrel without casing. The core barrel produced a 3-inch diameter borehole and a 2-inch diameter rock core sample. The borehole was grouted after the exploration was completed.

In the boring, we found bedrock that is consistently comprised of slightly weathered to fresh, fine to medium-grained biotite-muscovite gneiss. Joints are very close to moderately close to a depth of 5.6 feet and moderately close to wide in the remainder of the core. The joints are 1 mm or less wide with minor silt in-filling and iron staining. The observed rock quality designations (RQD's) ranged between 42 percent in Run R-1 (0.3 to 5.3 ft bgs), and 93 to 100 percent in Runs R-2 through R-4 (5.3 to 20.3 ft bgs). Thus, the observed rock quality ranged from poor to excellent.

We did not encounter groundwater at the time the boring was conducted. However, the groundwater level will fluctuate with seasonal changes, runoff, and adjacent construction activities. For a more detailed description of the subsurface conditions, please refer to the boring log in Appendix B, Field Exploration and Test Data.

3.3 Laboratory Testing

Golder Associates, Inc., Brunswick, Maine, conducted a total of eight point load tests on selected portions of bedrock core samples from Run R-1 (0.3-5.3 ft bgs), and Run R-4 (15.3-20.3 ft. bgs) and summarized the results in their report dated 15 February 2007 (Golder Associates, 2007). The point load tests were conducted using a Roc Test Pil-7 apparatus. Point load index test data can be used to assess variations in the rock unconfined compressive strength. The Golder point load test results estimate average rock compressive strengths of 8,000 pounds per square inch (psi) and 14,600 psi in diametrical and axial point load tests on intact portions of bedrock core, respectively.

Results of laboratory testing are presented in Appendix C, Laboratory Test Data. The Golder Associates, Inc., rock test results have been excerpted from their report and have been placed in Appendix C.

4.0 EVALUATION and RECOMMENDATIONS

The tower and the foundation support requirements will be designed in accordance with the Standard TIA-222-F (Telecommunications Industry Association, June 1996, Reaffirmed March 2003). Although the design loads for a 180-foot tower are currently unknown, we understand that loads for a triangular tower of this height can be on the order of 100 to 300 kips/leg for

compression and uplift. To provide resistance against lateral, overturning and uplift loads, the tower foundation typically consists of a large mat foundation or concrete pier pads for each leg. At shallow bedrock sites, rock anchor installation may be cost effective. The final tower design loads will depend on the type and square foot area of antennas, wind and ice loading for the site, load and performance criteria, anchorage, and required factors of safety (FS).

4.1 Foundation Support

We recommend that the new tower foundation be supported directly on sound bedrock. Based on our boring exploration, we expect sound bedrock to occur either at the bedrock surface or within about one foot of the rock surface. We recommend consideration of both a mat foundation, and individual concrete pier pad foundations, with or without rock anchors as required by the design.

Typically, a concrete foundation pier pad without rock anchors for a three-legged self-supporting tower would have dimensions on the order of 10 to 15-foot square, 2 to 3 feet thick, and be founded 5 or 6 feet below the ground surface. However, the engineered foundation for this project may vary in dimensions and embedment, based on site-specific loading and performance criteria. Alternately, rock anchors could be designed to resist lateral and uplift loads for a shallower pier pad foundation beneath the entire structure, or for individual foundations for each tower leg.

4.1.1 Bearing Capacity

When correlated to the estimated rock compressive strengths determined from the point load tests, the allowable bearing pressure for foundations bearing directly on sound bedrock is typically in the range of 1/3 to 1/10 the unconfined compressive strength (Bowles, p. 278). Presumptive allowable bearing pressures for gneiss published in Fang, 1991, range between 30 and 50 tsf. We estimated theoretical bearing capacity values on the order of 500 tsf using equations and correlations found in Bowles.

However, based on our observations of the bedrock conditions and our experience at similar sites, we recommend an allowable contact bearing pressure of 15 tsf for compression loads used for design. We recommend a minimum footing width of 3 feet regardless of footing pressures for individual tower leg foundations if a large pier pad is not used. In no instance shall the maximum footing pressure exceed the allowable concrete bearing stress, regardless of the bedrock bearing capacity. To verify that the foundation bearing conditions are consistent with our findings in the boring exploration, we recommend that the exposed footing subgrade be observed and approved by an experienced engineer or geologist.

4.1.2 Settlement

We expect that foundation settlement will be negligible and less than 1/2-inch for foundations bearing on sound bedrock and with bearing pressures less than or equal to 15 tsf. Any anticipated settlement will occur rapidly as the foundation and tower are constructed.

4.1.3 Groundwater Table

We did not encounter groundwater at the time of the boring exploration. However, we noted that the upper layer of bedrock was slightly weathered and fractured as evidenced by the low RQD in core Run R-1. Consequently, we recommend that the groundwater table be assumed at the finished grade surface for design purposes.

4.1.4 Frost Depth

The design freezing index for Woodstock, Maine, is 1530 F-degree days which would indicate an average frost depth of about six feet depending on soil type and natural water content (Table 5-1, MaineDOT Bridge Design Guide, 2003). However as previously mentioned, the area of the proposed tower is for all practical purposes barren of soil. Since sound rock is not frost-susceptible, we believe that foundations may be constructed on sound bedrock. We recommend that the bedrock conditions be confirmed by an experienced engineer or geologist during construction.

4.2 Rock Anchors for Lateral and Uplift Load Resistance

We encountered competent gneiss bedrock at the site with an average unconfined compressive strength of about 11,300 psi. Consequently, permanent rock anchors incorporating ASTM A 722 150 psi thread bars or ASTM A 416 strand anchors may be used to provide uplift and lateral load resistance for the tower foundation. Bond stresses in Post-Tensioning Institute, 2004, indicate typical average ultimate rock/grout bond stresses in competent granite between 250 and 450 psi. Granite and gneiss have similar strength characteristics as found in Fang, 1991. Considering an ultimate rock/grout bond stress of 350 psi and a FS of 2, we recommend that a maximum allowable rock/grout bond stress of 175 psi should be used for design (PTI, 2004; NAVFAC, 1983).

Either bar type anchors such as Dywidag or Williams threadbar anchors or strand type anchors may be used, however bar anchors are commonly used. Based on the findings of our exploration, laboratory testing, and rock anchor design guidance from several references (NAVFAC, DM 7.3, 1983; Post-Tensioning Institute, 2004; Fang, 1991), we recommend the following criteria for rock anchor design:

- Use anchor tendons furnished with double corrosion protection
- Size the anchor tendon for a design load less than 60 percent of the specified minimum tensile strength of the tendon steel, or the allowable geotechnical capacity, whichever is less
- Use a minimum rock/grout bond length of 10 feet regardless of the design load
- Provide anchor hole diameter in accordance with manufacturer's recommendations
- Limit the allowable rock/grout bond stress to 175 psi or less
- Assume a rock engagement angle of 60 degrees
- Assume a total unit weight of 160 pcf for rock within the engagement cone
- Assume the groundwater level at the ground surface

The free stressing length will depend on the type of anchor tendon used. We recommend minimum free stressing lengths of 10 feet for bar anchors and 15 feet for strand anchors.

We recommend that all of the rock anchors installed for the tower foundation be performance tested in accordance with the procedures described by the Post-Tensioning Institute. Specifically, we recommend a maximum test load of 1.33 times the design load, provided the maximum test load does not exceed 80 percent of the anchor tendon's specified minimum tensile strength. After testing, all anchors should be locked off at a load specified by the design engineer not exceeding 70 percent of the minimum specified tensile strength of the anchor tendon.

4.3 Lateral and Uplift Load Resistance Without Rock Anchors

Lateral loads may be resisted using concrete/bedrock interface friction. We do not recommend using passive earth pressure because surficial soils are thin and loose. For base friction, we recommend using a concrete/rock interface coefficient of friction of 0.7. The resisting interface force is 0.7 times the normal load on the base of the foundation (NAVFAC, 1983). This assumes a completely level or benched level bedrock surface and cast-in-place foundations. The normal load should include the buoyant weight of the tower foundation below the ground surface, regular weight concrete above ground surface, the buoyant weight of any overlying soil below the ground surface (if the foundation is embedded below ground surface), and the dead load of the tower. A minimum factor of safety of 1.5 against overturning is recommended for design (TIA-222-F).

In accordance with TIA-222-F, uplift resistance for a pier pad foundation may be provided by the weight of the concrete pier and, if the foundation is embedded, the weight of the soil overlying the foundation enclosed within an inverted pyramid whose sides form a 30 degree angle with the vertical. The unit weight of soil overlying the foundation is required to be assumed equal to 100 pcf per TIA-222-F. Similarly, the weight of the foundation concrete is required to be assumed equal to 150 pcf for this analysis. Based on our site explorations, buoyant unit weights should be used for soil and concrete for foundations constructed below the ground surface at this site.

4.4 Site Preparation

We anticipate that shallow leveling bench excavations will be made to construct the tower foundation. The foundation subgrade should consist of sound bedrock. The bearing surface should be cleaned of all overburden soils, and loose, disturbed or visibly fractured bedrock should be removed by mechanical means. Mechanical means include expansive agents, use of hydraulic hoe rams, hydraulic splitters, or wedging and prying. We recommend final bedrock surface preparation by washing with a high pressure water jet.

The nature, slope, and degree of fracturing in the bedrock will not be evident until the foundation excavation is made. We recommend anchoring, doweling, benching or other means of improving sliding resistance if the prepared bedrock surface is steeper than 4:1 (H:V) in any direction.

Surface water should be diverted from the foundation excavation throughout the period of construction. We recommend removing any groundwater encountered at the base of the foundation excavation by using a sump pump located in a corner of the excavation outside of the foundation footprint.

If required, the contractor should use a foundation backfill soil material meeting the requirements of MaineDOT Standard Specification 703.20, Gravel Borrow. The backfill soil should be placed in 8-inch thick loose lifts and compacted to 95 percent of the Modified Proctor (ASTM D 1557) maximum dry density.

4.5 Final Plan Review and Construction Monitoring

We recommend that the Radio Tower Project Team geotechnical engineer review the final drawings and specifications to confirm that the earthwork and foundation recommendations are properly interpreted and implemented in the design and specifications. We also recommend that a qualified geotechnical engineer or construction engineer observe and evaluate the following tower foundation construction phases:

- Foundation subgrade prior to placement of footing formwork
- Rock anchor installation and performance testing, if applicable, and
- Placement and compaction of backfill soils around the perimeter and/or the top of the tower foundation

Finally, we recommend that the radio tower shop drawings be reviewed by the Maine Department of Transportation structures group to verify that loading criteria, load conditions, anchorage, performance criteria, and required FS conform to current radio tower structural standards.

5.0 CLOSURE

This report has been prepared for use by the MaineDOT Radio Tower Replacement Team, for specific application to the Spruce Mountain tower replacement. The report has been prepared in accordance with generally accepted soil and foundation engineering practices. No other intended use or warranty is expressed or implied.

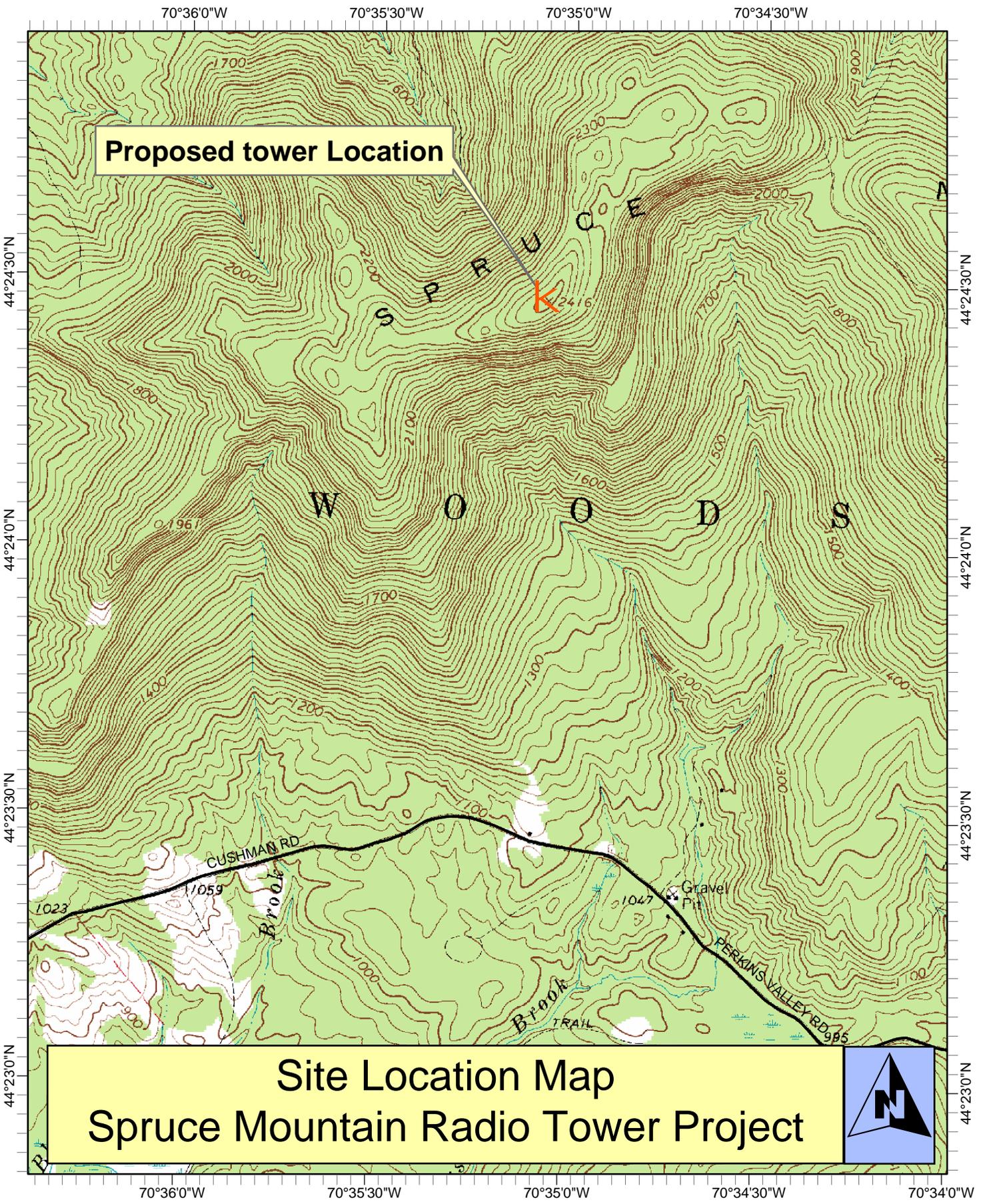
In the event that any changes in the nature, design, or location of the proposed tower are planned, this report should be reviewed by a geotechnical engineer to assess the appropriateness of the conclusions and recommendations and to modify the recommendations as appropriate to reflect the changes in design. Further, the analyses and recommendations are based in part upon limited soil explorations completed at discrete locations on the project site. If variations from the conditions encountered during the investigation appear evident during construction, it may also become necessary to re-evaluate the recommendations made in this report.

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APPENDIX - A

Figures

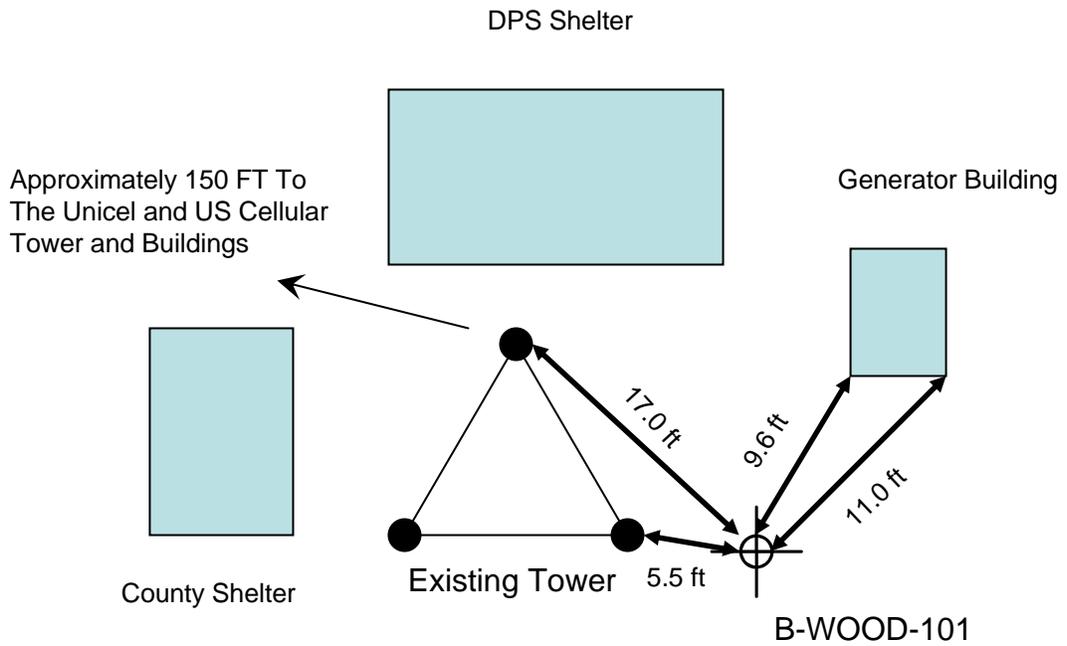


Date: 10/12/06

Road Names:
Town(s): Woodstock (Spruce Mtn)
1 inch equals 1,443 feet

Figure 1

Location: 044 24'27"N 070 35'04"W
Project ID: 14278.00
Project Manager: Joel Kittredge
Page 1 of 1



Boring Location Plan
Spruce Mountain Radio Tower Project
PIN 14278
(Not To Scale)

APPENDIX - B

Field Exploration and Test Data

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Spruce Mountain Tower	Boring No.: B-WOOD-101
	Location: Woodstock, Maine	PIN: 14278.00

Driller: Maine Test Borings, Inc.	Elevation (ft.): 2419.5	Auger ID/OD: 5" Solid Stem Auger
Operator: Jerry/Jackie	Datum: NAVD 88	Sampler: N/A
Logged By: B. Wilder	Rig Type: Mobile B-53 (Tracked)	Hammer Wt./Fall: N/A
Date Start/Finish: 11/8/06-11/8/06	Drilling Method: Wash Boring (No Casing Used)	Core Barrel: NQ-2"
Boring Location: See Boring Location Plan	Casing ID/OD: N/A	Water Level*: None Observed

Definitions: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample R = Rock Core Sample V = Insitu Vane Shear Test SSA = Solid Stem Auger	Definitions: S_u = Insitu Field Vane Shear Strength (psf) T_v = Pocket Torvane Shear Strength (psf) q_p = Unconfined Compressive Strength (ksf) $S_u(\text{lab})$ = Lab Vane Shear Strength (psf) WOH = weight of 140lb. hammer WOR = weight of rods	Definitions: WC = water content, percent LL = Liquid Limit PL = Plastic Limit PI = Plasticity Index G = Grain Size Analysis C = Consolidation Test
---	--	--

Depth (ft.)	Sample Information										Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log				
0	R1	60/51	0.3 - 5.3	RQD = 42%		SSA NQ	2419.20		Augered into Bedrock surface 0.3' bgs. Grey and white, fine to medium grained biotite-muscovite GNEISS, slightly weathered and strongly foliated (0.3 ft to 18.5 ft) to fresh and moderately foliated (18.5 ft to 20.3 ft), discontinuities and joints are rough and mostly parallel to foliation throughout the core, and are irregular to planar to undulating between 0.3 ft and 5.3 ft. Joints are 1 mm to 2 mm wide in the upper 3 ft of R1, then less than 1 mm wide in the rest of the core. Joints are spaced very close to moderately close to 5.6 ft, then spaced moderately close to wide from 5.6 to 20.3 ft, with minor silt-infilling and iron staining and occur from horizontal to about 60 degrees from horizontal. There is one near vertical fracture (approx. 80 degrees from horizontal) at 19.5 feet with vuggy precipitates of yellow and orange iron hydroxides.			
5	R2	60/60	5.3 - 10.3	RQD = 93%			2414.20		R1:Bedrock: R1:Core Times (min:sec) 0.3-1.3' (1:42) 1.3-2.3' (1:29) 2.3-3.3' (1:11) 3.3-4.3' (1:26) 4.3-5.3' (1:26) 85% Recovery	0.3		
10	R3	60/60	10.3 - 15.3	RQD = 100%			2409.20		R2:Bedrock: R2:Core Times (min:sec) 5.3-6.3' (1:20) 6.3-7.3' (1:02) 7.3-8.3' (0:54) 8.3-9.3' (1:06) 9.3-10.3' (1:00) 100% Recovery	5.3		
15	R4	60/51	15.3 - 20.3	RQD = 95%			2404.20		R3:Bedrock: R3:Core Times (min:sec) 10.3-11.3' (1:37) 11.3-12.3' (1:00) 12.3-13.3' (1:05) 13.3-14.3' (1:00) 14.3-15.3' (1:10) 100% Recovery	10.3		
20							2399.20	R4:Bedrock: R4:Core Times (min:sec) 15.3-16.3' (1:20) 16.3-17.3' (1:40) 17.3-18.3' (2:20) 18.3-19.3' (2:10) 19.3-20.3' (4:00) 85% Recovery	15.3			
20.3	Bottom of Exploration at 20.3 feet below ground surface.											

Remarks:

APPENDIX - C
Laboratory Test Data

TABLE 1
SUMMARY OF POINT LOAD INDEX TEST RESULTS

MAINE DOT RADIO TOWER SITES
ROCK CORE TESTING

PROJECT	LOCATION	BORING NUMBER	CORE RUN NUMBER	DEPTH (ft)	TEST TYPE ²	De EQUIV. CORE DIAMETER (in)	P FORCE AT FAILURE ³ (lb)	F SIZE CORRECTION (De/50)	I _s POINT LOAD STRENGTH INDEX ⁴ (psi)	ESTIMATED UCS BASED ON CORRELATION WITH POINT LOAD INDEX ⁵ (psi)	ROCK TYPE
Cadillac Mountain Radio Tower	Mount Desert Island, ME	B-1	R1	3.2-4.2	D	2.00	3288	1.01	824	18,950	biotite-hornblende GRANITE
		B-1	R1	3.2-4.2	D	1.99	3964	1.00	1008	23,180	
		B-1	R1	3.2-4.2	D	2.01	4126	1.01	1034	23,770	
		B-1	R1	3.2-4.2	A	2.23	4780	1.06	1022	23,500	
		B-1	R1	3.2-4.2	A	2.29	2326	1.08	479	11,020	
		B-1	R1	3.2-4.2	A	2.20	5063	1.06	1107	25,470	
Ossipee Hill Tower	Waterboro, ME	B-WATE-101	R3	12.9-13.8	D	1.97	2275	1.00	587	13,500	muscovite-biotite GNEISS
		B-WATE-101	R3	12.9-13.8	D	1.97	2343	1.00	605	13,910	
		B-WATE-101	R3	12.9-13.8	D	1.97	2848	1.00	735	16,900	
		B-WATE-101	R3	12.9-13.8	A	2.22	4019	1.06	865	19,900	
		B-WATE-101	R3	12.9-13.8	A	2.27	3134	1.07	655	15,070	
		B-WATE-101	R3	12.9-13.8	A	2.04	3168	1.02	777	17,880	
		B-WATE-102	R1	4.1-5.0	D	1.97	2796	1.00	722	16,600	muscovite-biotite GNEISS
		B-WATE-102	R1	4.1-5.0	D	2.01	1330	1.01	333	7,660	
		B-WATE-102	R1	4.1-5.0	A	1.97	3660	1.00	945	21,720	
B-WATE-102	R1	4.1-5.0	A	1.71	4019	0.93	1283	29,500			
Granite Hill Tower	Hallowell, ME	B-HALL-101	R3	18.9-19.9	D	2.01	3327	1.01	833	19,170	muscovite-plagioclase GRANITE
		B-HALL-101	R3	18.9-19.9	D	1.99	4460	1.00	1134	26,080	
		B-HALL-101	R3	18.9-19.9	A	2.28	5896	1.08	1223	28,140	
		B-HALL-101	R3	18.9-19.9	A	2.19	5101	1.05	1124	25,850	
		B-HALL-101	R5	29.7-30.6	D	1.99	4541	1.00	1154	26,550	muscovite-plagioclase GRANITE
		B-HALL-101	R5	29.7-30.6	D	1.97	4109	1.00	1060	24,390	
		B-HALL-101	R5	29.7-30.6	A	2.29	4716	1.08	972	22,360	
		B-HALL-101	R5	29.7-30.6	A	2.20	6059	1.06	1324	30,460	
Spruce Mountain Tower	Woodstock, ME	B-WOOD-101	R1	2.2-2.8	D	1.97	924	1.00	238	5,480	biotite-muscovite GNEISS
		B-WOOD-101	R1	2.2-2.8	D	1.97	1881	1.00	486	11,170	
		B-WOOD-101	R1	2.2-2.8	A	1.37	1244	0.83	553	12,730	
		B-WOOD-101	R1	2.2-2.8	A	2.13	2335	1.04	535	12,310	
		B-WOOD-101	R4	17.0-17.8	D	1.97	1039	1.00	268	6,170	biotite-muscovite GNEISS
		B-WOOD-101	R4	17.0-17.8	D	1.97	1569	1.00	405	9,310	
		B-WOOD-101	R4	17.0-17.8	A	1.94	3044	0.99	805	18,520	
		B-WOOD-101	R4	17.0-17.8	A	1.72	2057	0.93	650	14,940	

Notes:

- All tests were performed in accordance with ASTM D 5731
- D = Diametral / A = Axial
- Force at Failure (P) calculated from Gauge reading at failure x Ram Area of Jack (1.474 in²)
- I_s = Point Load Strength Index = (P/D²) x F
- Estimated uniaxial compressive strength (UCS) values calculated from I_s x 23 based on correlation in "Rock Slope Engineering" Hoek and Bray, 1981.
- ft = feet; in = inch; psi = pounds per square inch

Checked by: JRS
Reviewed by: MSP

APPENDIX - D

Calculations

Definition of Units:

$$\begin{aligned} \text{psf} &:= \frac{\text{lbf}}{\text{ft}^2} & \text{pcf} &:= \frac{\text{lbf}}{\text{ft}^3} & \text{Mg} &:= 1000 \cdot \text{kg} & \text{kN} &:= 1000 \cdot \text{newton} & \text{kPa} &:= \frac{\text{kN}}{\text{m}^2} & \text{tsf} &:= \text{g} \cdot \left(\frac{\text{ton}}{\text{ft}^2} \right) & \text{kip} &:= 1000 \cdot \text{lbf} \\ \text{ksf} &:= \frac{\text{kip}}{\text{ft}^2} & \text{ft} &= 0.305 \text{ m} & \text{in} &= 0.025 \text{ m} & \text{MPa} &:= 1000 \cdot \text{kPa} \end{aligned}$$

Rock Bearing Capacity,

Terzaghi Eqn., Square Footing Case:

$$q_{ult} = 1.3cN_c + qN_q + 0.4\gamma BN_\gamma$$

Bowles 5th Ed.p. 220

Assume B = 4 ft (pier pad footing) B := 4ft

Assume conservative rock values: $\phi = 40^\circ$ and $c = 500$ psi Bowles 5th Ed.p. 278

Footing Will Bear Directly on Rock $q := 0$

Assume Rock Unit Weight = 160 pcf $\gamma := 160$ pcf

Bearing Capacity Factors: Bowles 5th Ed.p. 278

$$\phi := 40\text{deg} \quad \alpha := 500\text{psi}$$

$$N_q := \tan\left(45\text{deg} + \frac{\phi}{2}\right)^6 \quad N_c := 5 \cdot \tan\left(45 \cdot \text{deg} + \frac{\phi}{2}\right)^4 \quad N_\gamma := N_q + 1$$

$$N_q = 97.3 \quad N_c = 105.7 \quad N_\gamma = 98.3$$

$q_{ult} := 1.3c \cdot N_c + q \cdot N_q + 0.4 \cdot \gamma \cdot B \cdot N_\gamma$ Assume Square Footing Values, Bowles, p.220

$$q_{ult} = 9.923 \times 10^6 \text{ psf}$$

$$q_{allow} := \frac{q_{ult}}{10} \quad q_{allow} = 496.2 \text{ tsf}$$

OK, Limit Applied Pressure to 15 tsf to Control Settlement

SECTION 1

Special Provision

Specification for a Radio Communications Self-Supporting Tower

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1. General

1.1 Introduction

This specification covers the requirements for designing, furnishing, installing and commissioning a 180' galvanized-steel, lattice-type tower structure and associated components. The tower will be used to support radio communications antennas. The tower and associated components shall be new, of current production and as specified herein.

1.2 Description of Major Work Elements

- A. Design, Furnish & Install:
 - 1. Tower Antenna Support Structure.
 - 2. Tower Reinforced Concrete Foundation.
 - 3. Cable Bridge/Ice Shield
 - 4. Install fall arrest system
- B. All site planning, preparation and development.
- C. All engineering design certification and documentation.
- D. Provide design and specifications stamped by a Maine licensed Professional Engineer of:
 - 1. Tower Design.
 - 2. Foundation Design.
- E. Other work as specified elsewhere in this document.

1.3 Qualifications

- A. General
 - 1. The Contractor shall have demonstrated experience in design, furnishing and installing communications tower(s) on a turn-key basis.
 - 2. The Contractor shall have demonstrated experience as one-source responsible for tower warranty, parts, and service.
- B. Tower
 - 1. The manufacturer shall have no less than 5 contiguous years in the fabrication of communications type towers.

2. All field-work associated with the tower shall be performed by a contractor having no less than 5 years experience in the erection of communications type poles or towers.
- C. Foundation
1. All work associated with the tower foundation shall be performed by a contractor having no less than 5 years experience in the erection of communications type poles or towers.
- D. Cable Bridge/Ice-Shield
1. The manufacturer shall have no less than 5 contiguous years in the fabrication of cable bridge/shields.

1.4 Regulatory Requirements

A. Unless specified otherwise in this section, materials and installation shall conform to the applicable requirements of:

1. Local & National Codes.
2. Maine Electrical Code.
3. Electronics Industries Association (EIA/TIA).
4. American Society for Testing & Materials (ASTM).
5. American Concrete Institute (ACI).
6. American National Standards Institute (ANSI).
7. Federal Aviation Administration (FAA).
8. American Institute of Steel Construction (AISC).
9. American Iron and Steel Institute (AISI).
10. Occupational Safety & Health Administration (OSHA).
11. National Fire Protection Association (NFPA).
12. Institute of Electrical & Electronics Engineers (IEEE).
13. Underwriters Laboratories (UL)
14. Motorola R-56 or approved equal
15. Federal Communications Commission (FCC)

1.5 Quantities & Locations

The single 180' tower shall be located as shown on the plans.

2. Products

2.1 Tower

2.1.1 General

- A. The tower and accessories shall be new and of current fabrication.
- B. All structural members and associated hardware shall be manufactured of steel and hot-dipped galvanized at the manufacturer's facility.

2.1.2 Physical & Structural

- A. Height of the tower shall be one hundred eighty feet (180').
- B. The top 60 feet shall not be tapered.
- C. The tower shall be of the self-support, lattice-type.
- D. Legs shall be of solid-rod or solid-angle-iron design. Hollow-tube designs are not acceptable.
- E. Wind and ice loading shall be per TIA 222-G, Class III, latest edition for this location with all antennas, feedlines, waveguides, and other appurtenances, as stated in this section, installed.

2.1.3 Appurtenance Design Load

- A. The tower shall be designed to support the following load.

Please Note: Design load allows for future expansion and will be different than the initial load

- B. Land Mobile Radio (LMR) Antennas
 - 1. Design shall be based on six (6) LMR antennas mounted at the top level supported by heavy-duty, 6-foot side arms, spaced at 60° azimuth intervals.
 - 2. Design shall be based on six (6) LMR antennas mounted 30 feet below the top supported by heavy-duty, 6-foot side arms, spaced at 60° azimuth intervals.
 - 3. The antenna shall be of the 620 series fiberglass-whip omni-directional antenna as manufactured by Radio Frequency Systems (RFS) or equivalent (800-437-3045 or www.rfsworld.com).
 - 4. Each antenna fed by 7/8 inch foam dielectric, coaxial feedline.

C. Microwave Antennas

1. Design load shall be based on four (4), 8-foot diameter, non-radomed, solid-parabolic microwave dish design antennas; centerline-mounted 10-feet below top level; plus two (2), 8 foot diameter, non-radomed, solid-parabolic microwave dish antennas, centerline mounted 40 feet below the top level.
2. Design load shall account for worst-case azimuth for all antennas on the tower, protected by a falling-ice shield. Each antenna fed by 2¼ inch elliptical waveguide or air-dielectric coaxial feedline.

2.1.3.1 Other Load Considerations

Cable Ladder, as necessary.

Safety Climbing System, as necessary.

Climbing bolts or pegs, as necessary.

Grounding bussbars, as necessary.

Lighting components, as necessary.

2.1.4 Antenna Support Side Arms - LMR

- A. Side arms shall be 6-foot side arms designed to support a single 620 series fiberglass-whip Omni-directional antenna as manufactured by Radio Frequency Systems (RFS) or equivalent. (800-437-3045 or www.rfswprld.com)
- B. All side arms shall be identical in size, type, fabrication and finish.
- C. All side arms shall include antenna pipe mounts.

2.1.5 Cable Ladder

The structure shall be equipped with a cable ladder for each of two (2) structure legs in the tapered portion.

A single ladder is permissible in the non-tapered portion.

The ladder design shall allow for supporting cables on both sides of the ladder.

Ladder width shall not be less than 18-inches.

2.1.6 Climbing Devices

2.1.6.1 Ladder

The structure shall be equipped with a climb ladder.

The ladder shall be equipped with a safety-cable climbing system.

The safety-cable system shall be such as to protect two (2) persons while climbing the tower.

2.1.6.2 Bolts or Pegs

The structure shall be equipped with climbing bolts or pegs on each leg.

Bolts or pegs shall not be furnished below 12-feet above ground level.

2.1.7 Ground Strap Bussbar

- A. A copper ground bussbar and associated mounting hardware shall be furnished and installed at the base of the structure to facilitate connection of the antenna feedline and waveguide ground-straps.

2.1.8 Lighting & Painting

The structure shall be lit and/or painted in accordance with FCC/FAA requirements, as necessary.

2.2 Foundation

- A. All foundation design, materials and construction practices shall be as required per State of Maine Professional Engineer stamped drawings and specifications for the tower foundation.

2.3 Cable Bridge/Ice-Shield

2.3.1 General

- A. An elevated cable bridge ice-shield shall support, and protect from falling ice, LMR antenna feed lines and microwave antenna waveguides from the equipment shelter to the tower.
- B. All structural members and associated hardware shall be manufactured of steel and hot-dipped galvanized at the manufacturer's facility.

2.3.2 Physical & Structural

- A. The bridge shall be no less than 18-inches in width.
- B. The Bridge shall span the length between the equipment shelter and the tower.
- C. All antenna feedlines and waveguides shall be supported below the ice-shield.
- D. The height of the bridge above ground shall be such to allow, to the greatest extent, for straight horizontal runs of feedlines and waveguides.
- E. The bridge shall use support posts along its length as needed to preserve its support and falling-ice protection properties.
- F. Impact Load: Capable of withstanding the impact of 20-lbs from a 180-foot height without affecting system operation.

2.4 Installation

The contractor shall organize and implement a formalized installation model to plan, prepare, install, configure, test, optimize, certify, document, and release to the State all furnished components of this Contract throughout the Contract Term. The contractor shall staff its installation team with individuals sufficiently skilled and experienced in the various functions needed to execute the duties for this contract.

The contractor will not be responsible for relocating any third-party or tenant communications or communication related equipment to any of the towers and/or shelters to be furnished under this contract.

2.5 General Site Access Information

CTA = Contractor to Assess

	SITE	ACCESS
	Spruce Mtn.	CTA - Road steep & rocky

2.6 Delivery & Storage of Materials

2.6.1 General

The contractor shall be responsible for all aspects of shipment, transportation, and delivery of materials and equipment to their final destination, as necessary. State personnel shall be excluded from performing any of these activities unless otherwise approved by the State.

The contractor shall be responsible for coordinating, unloading, inspecting, accepting and storing all material and equipment deliveries, as necessary. State personnel shall be excluded from performing any of these activities.

All claims necessary as a result of damage or loss during shipment shall be the responsibility of the contractor.

All stored materials and equipment shall remain the responsibility of the contractor until installed and accepted by the State. Acceptance is described in Section 12.

2.7 Decommissioning & Disposal

All decommissioning and disposal shall be done in accordance with Federal and State of Maine laws, regulations and policies. The State of Maine actively encourages recycling. Certain materials including metals, batteries, and fencing materials shall be disposed of in a manner that ensures they are not placed in solid waste landfills.

Tower steel will be recycled. The State may wish to reuse certain assets such as radio equipment and generators, in such cases the designated equipment shall be delivered to the State in Augusta or other specified location. The contractor shall present documentation as necessary to confirm proper disposal.

No site, system or part thereof will be decommissioned until all communications needs have been cleared from those parts of the infrastructure to be decommissioned.

2.8 Radio Communications Tower

2.8.1 Description of Major Work Elements

2.8.1.1 Performed by State

The following work will be performed by the State:

- F. Acquisitions:
 - Perform site acquisition activities, as required.
- G. Ownership:
 - Conduct property title/deed searches.
- H. Surveying
 - Perform boundary and topographical site surveys.

- I. Zoning:
 - Assist contractor with zoning approval process, as required, when deemed by the State.
- J. Permitting:
 - Assist contractor with permitting process, as required, when deemed by the State.
- K. Leases:
 - Secure site leases, as required.
- L. Environmental Impact Studies.

2.8.1.2 Performed by Contractor

2.8.1.2.1 General

Unless otherwise noted, the following work is required by the contractor:

- A. Design, Furnish & Install:
 - Towers.
 - Tower Lighting.
 - Tower Foundations.
 - Cable Bridges.
- B. Furnish & Install:
 - Tower Painting.
 - Antenna Support Side Arms.
 - Cable Ladders.
 - Safety-Cable Climb System.
 - Ground Bussbars and associated hardware.
 - Grounding of tower to the earth ground grid system
 - Grounding of cable bridge to the earth ground grid system.
 - Pipe Bollards at some sites.
 - Signage at sites with no fence.
- C. All site planning, clearing, preparation and development, as required.
 - Sediment Control see SP 656 SEWPCP

- D. All engineering design certification and documentation.
- E. Planning, Zoning & Permitting
- Prepare all site planning documents necessary for zoning and permitting, as required.
 - State to review and approve all planning documents prior to zoning and permitting.
 - Obtain all zoning approvals, as required.
 - Obtain all site permitting, as required. Fees will be borne by the State.
 - Coordinate all permitting inspections, as required.
- F. Soil Borings & Geological Tests
- Conduct all necessary tests for the design.
 - Department to review and approve statement-of-work prior to tests.
 - Provide test results to the Department.
- G. Design & Construction
- Prepare all pre-stamped drawings and specifications necessary for the designs and construction, as applicable.
 - State shall review and approve pre-stamped drawings and specifications prior to zoning, permitting and ordering.
 - Provide State of Maine PE stamped drawings and specifications to the Department.
- H. Utility Services
- All commercial utility service relocations and/or improvements necessary for the installation.
- I. Access
- All access road improvements and clearing as necessary for delivery of all materials.
 - All access road repairs after the delivery. Road shall be restored to its pre-installation condition, as approved by the Department.
- J. Premises
- To the greatest applicable and practical extent, the contractor shall restore the premises to its pre-installation condition.
 - Removing all rubbish and debris associated with site preparation, unpacking of shipping materials, and/or the installation, from the premises.

K. Other work as needed to ensure a complete installation whether or not specified or shown elsewhere in this document.

L. Decommission existing site structures consisting of

- i. The existing tower
- ii. Existing antennas
- iii. Two equipment shelters
- iv. One wooden generator shelter

The Contractor will coordinate the disposition of all items with the State of Maine Program Management Office prior to the removal or disposal of any item from the site.

2.8.1.2.2 Site Specific

SITE	TOWER TYPE	CABLE BRIDGE	PIPE BOLLARDS	OTHER WORK
Spruce Mtn	180-Foot SS	Yes		As specified

2.8.2 Installation

2.8.2.1 General

The contractor shall be responsible for:

- The installation of the tower and components.
- Providing all materials, labor and tools to ensure a complete installation whether or not specified or shown.
- Installing the tower and components in accordance with the professional engineer’s design, as applicable and as approved by the Department.
- Neat and professional workmanship.
- Coordination with other trades, as necessary.

2.8.2.2 Tower

2.8.2.2.1 General

Install all materials in accordance with State of Maine PE stamped drawings and specifications.

Contractor to provide written certification to State that tower was installed in accordance with a State of Maine PE stamped drawings and specifications.

2.8.2.2.2 Orientation

A visible and permanent weather-resistant marker shall be embedded into the foundation.

The marker shall indicate the direction of 'True North'.

The size, type, and location of the marker shall be coordinated with the State.

2.8.2.3 Foundation

Construct in accordance with State of Maine PE stamped drawings and specifications (see attached geotechnical design report).

Contractor to provide written certification to the Department that foundation was constructed in accordance with a State of Maine PE stamped drawings and specifications.

2.8.2.4 Antenna Support Side Arms

Install all materials in accordance with the State's specifications, if any, and manufacturer's instructions as approved by the Department.

2.8.2.5 Cable Bridge/Ice Shield

Install all materials in accordance with the State's specifications, if any, and manufacturer's instructions.

Except as otherwise noted, the height and placement of the cable bridge shall be such as to allow, to the greatest extent, for straight runs of feedlines and waveguides.

2.8.2.6 Climbing Devices

Climb ladder and climbing bolts or pegs shall not be installed lower than 12-feet AGL.

2.8.2.7 Signage

Size, contents and location of the signs shall be coordinated with the State.

2.8.2.8 Ground Strap Bussbar

Install all materials in accordance with the State's specifications.

2.8.2.9 Grounding

2.8.2.9.1 General

The contractor shall be responsible for providing all materials and labor for the installation of grounding, and lightning and power surge protection devices in accordance with the manufacturer's recommendations, the State's standards, or the contractor's practices.

The State has adopted Motorola's "STANDARDS & GUIDELINES FOR COMMUNICATIONS SITES" document, latest edition, to serve as its standard for the grounding of communications structures and equipment. This document is sometimes referred to as the "R56 Manual" and is available from Motorola as hard copy (part # 6881089E50-B) and in CD (part # 9880384V83).

In the event certain aspects of the recommendations, the standards, or the practices are in conflict, then the most stringent shall prevail.

2.8.2.9.2 Certification

Contractor shall provide written certification to State that grounding was performed in accordance with the State's standards, manufacturer's recommendations, and/or the contractor's practices as specified in the General section above.

2.9 Installation

2.9.1 General

- A. Prior to installation, the Contractor shall coordinate the exact site placement and/or orientation of the following items with the Owner:
1. Tower Foundation.
 2. Tower.
 3. VHF antennas as specified.
 4. 6 GHz antennas with ice shields as specified.
 5. Cable Bridge/Ice-Shield.
 6. Antenna Side Arms.

7. Ground Strap Bussbar
8. Fall arrest system

2.10 VHF Antenna Systems

2.10.1 Antennas

Installed VHF antennas shall be as specified in the accompanying “Spruce Mtn. Tower Diagram” below.

All antenna mounts and associated mounting hardware shall be manufactured of steel and hot-dipped galvanized at the manufacturer’s facility.

2.10.2 Antenna Feedlines & Accessories

2.10.2.1 Main Cable

Main antenna feedlines shall be foam-dielectric coaxial transmission cable as manufactured by the Andrew Corporation, or approved equivalent.

The diameter of the feedline shall be 7/8” minimum.

All main line connectors shall be as appropriate to the size of feedline cable being supplied.

Main feedline connectors shall be female type ‘N’, silver-plated.

Each main feedline shall be furnished with a cable entry port boot.

2.10.2.2 Transition Cables

Transition jumper cables from the main antenna feedlines to the station and antennas shall be furnished as required.

The cables shall be of the flexible type.

All transition cable connectors shall be as required.

Transition cable connectors shall be type ‘N’, silver-plated.

2.10.2.3 Interconnect Cables

Field-installed interconnect cables between stations and filtering/coupling devices shall be of the double-shielded type.

All interconnecting cable connectors shall be male type ‘N’, silver-plated.

2.11 Dish Antennas –6 GHz

2.11.1.1 Antenna & Accessories

The dish-antenna shall as specified in the accompanying “Spruce Mtn. Tower Diagram” below. At a minimum, the antenna shall have a wind survival rating of 125 MPH with 1-inch radial ice.

Each antenna shall be equipped with a non-heated radome, manufactured of fiberglass or thermoformed plastic material.

At a minimum, the radome shall have a wind survival rating of 125 MPH with 1-inch radial ice.

All antenna mounts and associated mounting hardware shall be manufactured of steel and hot-dipped galvanized at the manufacturer’s facility.

2.11.1.2 Ice Shield

All tower-mounted antennas shall be furnished with an ice shield.

The shield shall be of a lattice-mesh design.

The shield and associated mounting hardware shall be manufactured of steel and hot-dipped galvanized at the manufacturer’s facility.

Impact Load: Capable of withstanding the impact of 20-lbs from a 180-foot height without affecting system operation.

2.11.1.3 Dish Antenna Feedlines & Accessories

Main antenna feedlines shall be pressurized air-dielectric coaxial or elliptical waveguide transmission cable EW 63 as manufactured by the Andrew Corporation, or approved equivalent.

The size of the feedline shall be as required to meet the system performance requirements stated in this specification, however, the cross section size at its widest point shall not exceed 2-1/4”.

All main line connectors shall be as appropriate to the size of feedline cable being supplied.

Each main feedline shall be furnished with a cable entry port boot plus one (1) spare boot.

Transition jumper cables or flanges from the main antenna feedlines to the equipment terminals and antennas shall be furnished as required.

All transition cable connectors shall be as required.

Feedline ground straps shall be furnished in accordance with the State's installation standards and practices. Straps shall be from the same manufacturer as the main antenna feedlines.

Feedline lightning suppression devices shall be furnished in accordance with the State's installation standards and practices. All feedline mounts and associated mounting hardware shall hot-dipped galvanized or stainless steel.

2.11.1.4 Pressurization/Dehydration

An automatic, integrated dry-air pressurization and dehydration (APD) unit shall be furnished for the main antenna feedline(s).

It shall be powered from an external power source supplying a nominal 120 VAC. The unit shall not be of the regenerative desiccant type.

At a minimum, the unit shall be sized to pressurize all the furnished feedlines at each site plus two (2) additional feedlines of the same size and length. The unit shall be equipped with a pressure relief valve.

At a minimum, the unit shall be equipped with an output manifold capable of supporting all the furnished feedlines at each site plus two (2) additional feedlines. The manifold shall be capable of being expanded. Each manifold output port shall be equipped with a pressure gauge and shut-off valve.

The unit shall be equipped with alarm output capability and, at a minimum, shall alarm the following conditions: low pressure, high humidity, power fail, and excessive run-time. These conditions shall appear as separate independent outputs. The alarm output(s) shall be of the dry-contact, form-C (NO/NC) type. A local visual indicator shall indicate an alarm condition.

2.11.1.5 Ground Straps

Feedline ground straps shall be furnished in accordance with the State's installation standards and practices.

Straps shall be from the same manufacturer as the main antenna feedlines.

2.11.1.6 Lightning Protection

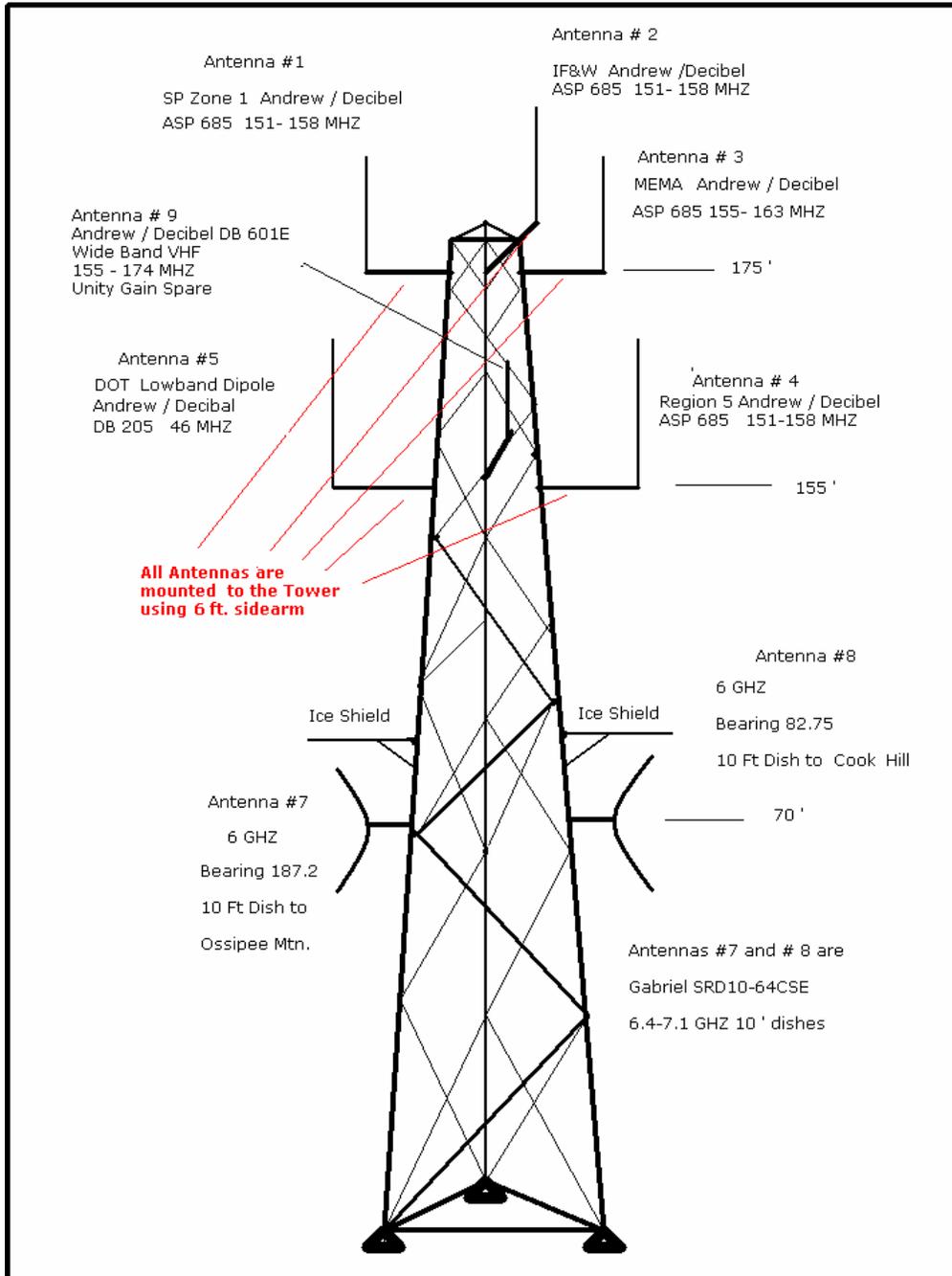
Feedline lightning suppression devices shall be furnished in accordance with the State's installation standards and practices.

2.11.1.7 Mounting Hardware

All feedline mounts and associated mounting hardware shall be hot-dipped galvanized or stainless steel.

2.11.1.8 Spruce Mountain Tower Diagram

This diagram is for installation purposes only.



2.12 Inspection & Acceptance

2.12.1 Field Inspection

- A. After installation of all the components furnished under this section, the Contractor along with the Department, at its discretion, shall perform a field inspection to verify that the installation of the components furnished under this contract has been performed and completed in accordance with the following, as applicable.
 - 1. The professional engineer's design.
 - 2. The manufacturer's instructions and recommendations.
 - 3. The contract specifications.
 - 4. The contractor's installation practices and standards as approved by the Department.
- B. The Contractor shall provide all items, instrumentation, materials, equipment, and personnel necessary to conduct the inspection.
- C. Prior to the commencement of this activity, the contractor shall deliver a preliminary field inspection plan to the Department for review and approval.
- D. At the conclusion of this activity, the contractor shall present to the Department written certification that the inspection performed was in accordance with, and that the results of the inspection were in compliance with, the approved field inspection plan.
- E. The Department's signature on the certification shall constitute acceptance by the Department of the inspection.

2.12.2 Final Acceptance

- A. General
 - 1. After acceptance of all the inspections and all the tests conducted under this section, the contractor shall present to the Department written certification that the activities were performed in accordance with, and that the results were in compliance with, the approved plans.
 - 2. This certification shall include the original signed copy of the individual inspection and test certifications previously accepted by the Department.
 - 3. Final acceptance will be deemed final when the Department's signature appears on this certification.

B. Post-Final Acceptance Documentation

1. After final system acceptance, the contractor shall deliver to the Department, in both printed and electronic form, the following documents, on a per-site basis, in one consolidated package.
 - a. Copies of all signed certifications.
 - b. Copies of all approved inspection and test plans.

2.13 Warranty

- A. The Contractor shall include a copy of the manufacturer's standard commercial warranty for all furnished tower and associated components in their response.

2.14 Training

- A. The Contractor shall conduct a single, on-site, hands-on training session for selected Department personnel.
- B. The training location and schedule shall be by mutual agreement between the Department and Contractor.
- C. The session shall be conducted after final acceptance.
- D. The contents of the session shall include familiarizing the Department with special structure attributes, recommended inspection procedures, recommended maintenance procedures, ground connections, etc.

2.15 Documentation

2.15.1 With the Contractor's Bid

- A. The Contractor's bid shall include specification sheets for the following items on this basis.
 1. Tower
 2. Accessories
 3. Manufacturer's loading data for built tower.

2.15.2 Post-Contract Award

A. General

1. Thorough documentation of all major tower components, and their respective installations, will be required from the Contractor. This documentation will be comprised of both factory-provided and field-generated documents and/or manuals.
2. Every document exchanged between Department and Contractor shall be in paper and/or electronic form, as mutually agreed. Electronic documents shall use the latest version of the application software or by a mutually agreed version. The following applications are preferred:
 - a. Text - Microsoft Word
 - b. Spreadsheets - Microsoft Excel
 - c. Databases - Microsoft Access
 - d. Scanned documents - Adobe Acrobat
 - e. Simple Diagrams & Charts - Microsoft Visio or Excel
 - f. Large Drawings – mutually agreed software program
 - g. Schedules - Microsoft Project
3. The Department shall approve the contents and organization of all field-generated documents supplied by the contractor.
4. Costs associated with documentation shall be clearly and individually identified in the pricing section of the response.

B. Factory Provided – Technical & Service Manuals

1. All factory-provided documentation shall be available on CD media.
2. All factory available manuals shall be provided for the major components installed under this contract.
3. The following sets of manuals are to be furnished prior to project closeout on a per-site basis:
 - a. Five (5) complete paper-form sets
 - b. Five (5) complete electronic-form sets

C. Field Generated - As-Built

1. All field-generated documentation shall be prepared in a format suitable for storage in loose-leaf 3-ring binders. This documentation shall also be supplied on CD media.

2. All field-generated drawings shall be prepared using a mutually agreed software program.
3. The following documentation shall be provided. Specification or catalog cut sheets for each of the major items illustrated in the documents shall be included with the submittals to the Department.
 - a. Tower & foundation – top view diagram.
 - b. Tower – side elevation view diagram with tower sections identified.
 - c. Foundation – side elevation view diagram illustrating both above and below grade portions.
 - d. A site plan illustrating the installed location of the components supplied under this contract relative to other existing major site components (e.g., shelters, fences, towers, etc.). Plan shall be to scale; and the new and existing components shall be contrasted by the use of a gray scale.
 - e. The site plan shall identify the interconnection between the tower legs or accessories to the site electrical ground grid system.
4. The following sets of field-generated documentation are to be furnished prior to project closeout:
 - a. Five (5) complete paper-form sets
 - b. Five (5) complete electronic-form sets

3. Measurement of Payment

3.1.1 4.1 Method of measurement

ITEM #	DESCRIPTION
643.97	Radio Communication Tower, Self-Supporting, Erected
643.971	Radio Communication Tower---Inspection and Acceptance, Field Inspection
643.972	Radio Communication Tower---Inspection and Acceptance, Final Acceptance
643.973	Radio Communication Tower---Inspection and Acceptance, Training

3.1.2 4.2 Basis of Payment

The accepted Radio Communication Tower items will be paid for at the contract lump sum prices which will include payment for all respective items as called for in the contract,

designed, delivered, stored, constructed, installed, tested, documented, all clearing, preparation, demolition, removal, site restoration, materials, labor, equipment, training and incidentals necessary to complete the work.

Payment will be made under:

ITEM #	DESCRIPTION	UNIT
643.97	Radio Communication Tower, Self-Supporting, Erected	LS
643.971	Radio Communication Tower---Inspection and Acceptance, Field Inspection	LS
643.972	Radio Communication Tower---Inspection and Acceptance, Final Acceptance	LS
643.973	Radio Communication Tower---Inspection and Acceptance, Training	LS

END OF DOCUMENT

SECTION 2

Special Provision

Specification for a

Communications Equipment Shelter Modular, Pre-Fabricated, Pre-Outfitted

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1. General

Introduction

This specification covers the requirements for designing, furnishing, installing and commissioning a modular, pre-fabricated, pre-outfitted telecommunications-type shelter and other associated components. The shelter and associated components shall be new, of current production, and as specified herein.

Description of Major Work Elements

- A. Design, Furnish & Install:
 - 1. Shelter (12' x 36').
 - 2. Other Shelter Components as Specified.
 - 3. Shelter Foundation (14' x 38').
- B. Furnish & Install:
 - 1. In-Shelter Emergency Power Generator System. Refer to generator specifications under Section 3.
 - 2. System will consist of the following major components:
 - a. Generator.
 - b. Fuel Sub-system.
 - c. Automatic Transfer Switch.
- C. All site planning, preparation and development.
- D. All engineering design certification and documentation.
- E. Provide design and specifications stamped by a Maine licensed Professional Engineer of:
 - 1. Shelter Foundation Design.
- F. Other work as specified elsewhere in this document.

Qualifications

- A. General
 - 1. The Contractor shall have demonstrated experience in design, furnishing, and installing communication shelters on a turn-key basis.

2. The Contractor shall have demonstrated experience in furnishing and installing generators on a turn-key basis.
 3. The Contractor shall function as one-source responsible for shelter warranty, parts and service.
- B. Shelter
1. The manufacturer shall have no less than 5 contiguous years in the fabrication of communications type shelters.
 2. All field-work associated with the shelter shall be performed by a contractor having no less than 5 years experience in the installation of pre-fabricated communications equipment shelters.
- C. Foundation
1. All work associated with the shelter foundation shall be performed by a contractor having no less than 5 years experience in the installation of pre-fabricated communications equipment shelters.
- D. Generator
1. Refer to qualifications in the generator specifications under Section 3.

Regulatory Requirements

- A. Unless specified otherwise, materials and installation shall conform to the applicable requirements of:
1. Local & National Codes.
 2. Maine Electrical Code.
 3. American Concrete Institute (ACI).
 4. American Institute of Steel Construction (AISC).
 5. American Iron and Steel Institute (AISI).
 6. American National Standards Institute (ANSI).
 7. American Society for Testing & Materials (ASTM).
 8. Electronics Industries Association (EIA/TIA).
 9. Institute of Electrical & Electronics Engineers (IEEE).
 10. National Fire Protection Association (NFPA).
 11. Occupational Safety & Health Administration (OSHA).

12. Underwriters Laboratories (UL)
13. Motorola R-56 standard or approved equal.

2. Products

Shelter

2.1.1 General

- A. The shelter shall be 12' x 36'
- B. The shelter shall be of a pre-fabricated, pre-outfitted design.
- C. The shelter and accessories shall be new and of current fabrication.
- D. The shelter will be used to house radio telecommunications equipment and an emergency power generator.
- E. Equipment and generator will be located in separate rooms isolated by a closed partition.
- F. The equipment and generator rooms shall have separate exterior doors.
- G. Unless otherwise noted, at a minimum, the shelters shall meet all of the applicable ANSI/NFPA/TIA standards for communications equipment shelters.

2.1.2 Construction

2.1.2.1 Shelter Base

Shelter base shall be fabricated of rot resistant material.

2.1.2.2 Floor

Insulation: R-Value = 27, minimum.

Weight Load: 750 lbs per square foot.

Finish: Commercial grade, electro-static discharge floor tiles.

Fire Retardant: 1-hour rated, minimum.

The floor shall accommodate equipment rack anchor bolts.

2.1.2.3 Floor Plate

A solid metal plate or panel shall protect the underside of the floor.

Thickness: 1/16 inches.

Material: aluminum.

2.1.2.4 Roof

Weight Load: 100-lbs per square foot.

Impact Load: 20-lbs from a 180-foot height.

Pitch: sloped downward from shelter centerline for drainage.

Wind Load: Wind Loading shall be per TIA-222-G, Class III.

2.1.2.5 Ceiling

Insulation: R-Value = 27, minimum.

Finish: fiberglass reinforced plastic laminate.

Interior Height: 9-feet, minimum.

Pitch: none.

Fire Retardant: 1-hour rated, minimum.

2.1.2.6 Walls

Insulation: R-Value = 11, minimum.

Wind Load: Wind Loading shall be per TIA-222-G, Class III.

Interior Finish: fiberglass reinforced plastic laminate.

Exterior Finish: natural stone aggregate.

Fire retardant: 1-hour rated, minimum.

Bullet Resistance: none.

2.1.2.7 Interior Partition

The shelter shall be partitioned, unless otherwise noted, to form the following separate rooms:

- Communications Equipment
- Generator

The partition shall not have a through-access between rooms.

Framing: 2-inch x 4-inch studding.

Finish: fiberglass reinforced plastic laminate.

Fire retardant: 1-hour rated, minimum.

Sound attenuation: sound absorption panels between studs.

2.1.2.8 Interior Electrical Service Wiring

All electrical wiring shall be in conduit and/or raceways, as required.

All conduit, raceways, and outlet or junction boxes shall be exposed and attached to the interior surfaces of the shelter.

All conduit, raceways, fittings, and hardware shall be of galvanized or stainless steel.

Service wiring raceways shall be separate and isolated and from any communications or antenna cable trays.

All service runs shall be continuous.

All wiring shall be per applicable electrical codes and owner standards.

Communications Equipment Room

2.1.3 Size

The exact size of the room shall be coordinated with the Department before ordering.

2.1.4 Interior Partition

The interior of the Communications Equipment Room shall be partitioned with a movable wire divider. The divider shall be furnished with a 36 inch wide (minimum) locking sliding gate (preferred) or door. The height shall be as close to the ceiling as practical and shall be of sufficient height to prevent access from one area to the other.

2.1.5 Electrical

2.1.5.1 Exterior

External main disconnect switch.

2.1.5.2 Interior

Interior main distribution panel.

200-amp service, 120 VAC, single-phase.

40-branch circuit capacity, equipped as needed.

2.1.5.3 Surge Protection - Service Entrance

Transient Voltage Surge Suppressor (TVSS)

Liebert Corporation Model Type SS Hybrid or equivalent.

Dry-contact, form-C (NO/NC) closure alarm.

2.1.5.4 Utility Outlets

Quad receptacles on individual breakers, labeled on both the receptacle and main distribution panel.

Rating: 15-amp.

Wall-mounted, 24-inches above finished floor.

As needed, 4-foot on-center spaced evenly on all walls.

2.1.5.5 Equipment Outlets – Equipment Rack Mounted

Quad receptacles.

Rating: 20-amp.

As needed, per equipment rack.

2.1.6 Lighting

2.1.6.1 Interior

Lighting shall be via fluorescent light fixtures.

Fixtures shall be 48-inches in length.

Fixtures shall use dual, straight tube bulbs.

Fixtures shall protect bulbs via wire guard or translucent cover.

As needed to provide a minimum of 150 foot-candles of illumination at floor level.

Interior, wall-mounted, 1-hour timed light switch.

2.1.6.2 Interior - Emergency

Integrated, solid-state design emergency light fixture for each doorway.

Self-contained in single, interior, wall-mountable housing.

Medium to heavy-duty industrial-use rated.

1-hour operation rated, minimum.

10-year operating life rated.

Dual light beams lamps.

Sealed maintenance-free rechargeable battery.

Battery viewport.

Automatic battery charger.

Low battery cutoff.

Voltmeter.

Indicators: 1) On; 2) Charging.

Test Switch, externally accessible.

Dry-contact, form-C (NO/NC) closure alarm.

2.1.6.3 Exterior

Light fixture for each exterior doorway.

Bulb: Halogen, standard screw-base, 150-watt rated, minimum.

Bulb Life: 10,000-hour rated, minimum.

Shatter/tamper resistant lens.

Remote activated by key fob or garage-door-opener type device.

Interior, wall-mounted, 1-hour timed light switch.

2.1.7 Door - Exterior

2.1.7.1 Fabrication

Door: galvanized or stainless steel, welded fabrication.

14-gauge, minimum

42-inches x 7-feet.

Polyurethane insulation.

Gasket Sealed.

Frame: hi-strength, galvanized or stainless steel.

2.1.7.2 Accessories

Lockset: stainless steel; replaceable cores; keyed alike.

External weatherproof lock box with padlock hasp, hi-strength, galvanized or stainless steel.

Interior pull handle.

Anti- prying exterior plate, hi-strength, galvanized or stainless steel.

Vandal resistant, non-removable hinge pins.

Hydraulic-damper closer with sliding passage set.

Wind check or chain.

Overdoor exterior drip awning, galvanized or stainless steel, or aluminum.

Intrusion sensor with a dry-contact, form-C (NO/NC) closure alarm.

2.1.8 Air Conditioning System

Two (2) self-contained, integrated wall mount units.

Units shall be of the high energy-efficient design.

System shall be sized to provide an interior temperature of 65 degrees F during exterior temperature of +100 degrees F, no equipment heat loads considered.

System shall be equipped with:

- Auto-restart.
- Economizer cycle.
- Pre-wired thermostat.
- Lead/lag controller.
- Dry contact, form-C (NO/NC) closure alarm.

2.1.9 Heating System

Baseboard electric heat strips.

Units shall be of the high energy-efficient design.

System shall be sized to provide an interior temperature of 70 degrees F during exterior temperature of – 30 degrees F, no equipment heat loads considered.

System shall be equipped with:

- Auto-restart.
- Pre-wired thermostat.
- On/off visual indicator.
- Dry contact, form-C (NO/NC) closure alarm.

2.1.10 Ventilation System

2.1.10.1 Design

12-inch motorized fan, minimum.

Wall-mounted controls.

Programmable/adjustable start-up cycle timer.

Programmable/adjustable run cycle timer.

Dual, parallel thermostats, manually adjustable.

2.1.10.2 Intake

Mechanically activated louver/damper.

Galvanized or stainless steel, or aluminum weather hood.

Galvanized or stainless steel, or aluminum screen to prevent insect or rodent intrusion.

Filtered.

2.1.10.3 Exhaust

Gravity-type louver/damper.

Galvanized or stainless steel, or aluminum weather hood.

Galvanized or stainless steel, or aluminum screen to prevent insect or rodent intrusion.

2.1.11 Antenna Cable Accessories

2.1.11.1 Cable Entry Panel

Size: 16-individual, 4-inch ports, minimum.

As manufactured by Polyphaser (8 PEEP-M) or equivalent and supplied by Tessco Technologies.

Furnish exterior UV-protected weather-boots for all ports. Include nine (9) spare port boots.

Furnish pre-punched, solid-copper ground bussbar for the interior and exterior sides of the entry panel.

2.1.11.2 Interior Cable Tray

Type: Ladder style, ceiling hung.

Width: 18-inches, minimum.

Length: as required to support two (2) equipment rack rows and the cable entry panel.

Equipment rack row trays shall be bridged together through the use of T-shaped sections or junctions at both ends and mid-center.

T-shaped sections or junctions shall feature U-shaped side-rails.

2.1.12 Communication Cable Accessories

2.1.12.1 Interior Cable Tray

Communications cables can share the interior antenna cable tray.

2.1.12.2 Termination Backboard

Size: 4-feet x 8-feet x 3/4 inches. Material: plywood sheet, 1-hour fire retardant rated.

Furnish backboard with 3-inch standoffs.

Painting: gray or black, fire retardant.

2.1.13 Heat/Smoke/CO Detection & Fire Suppression

2.1.13.1 Heat

The shelter shall be equipped with heat detectors, as needed, spaced for maximum coverage.

Detectors shall be equipped with a dry-contact, form-C (NO/NC) closure alarm.

Combination heat, smoke and CO detectors are not acceptable.

2.1.13.2 Smoke

The shelter shall be equipped with smoke detectors spaced for maximum coverage.

Detectors shall be of the photoelectric and ionization type.

Detectors shall be equipped with a dry-contact, form-C (NO/NC) closure alarm.

Combination heat, smoke and CO detectors are not acceptable.

2.1.13.3 Carbon Monoxide (CO)

The shelter shall be equipped with carbon monoxide detectors spaced for maximum coverage.

Detectors shall be equipped with a dry-contact, form-C (NO/NC) closure alarm.

Combination heat, smoke and CO detectors are not acceptable.

2.1.13.4 Suppression

The shelter shall be equipped with one (1) wall-mounted fire extinguishers.

Type: Class ABC all purpose dry chemical.

Size: 10 lbs.

2.1.14 Ground System

2.1.14.1 Interior Perimeter Halo

Tinned-bare solid-copper conductor no less than #2 AWG.

Furnish insulated standoffs as required.

Generator Room

2.1.15 Size

The exact size of the room shall be coordinated with the Department before ordering.

2.1.16 Electrical

2.1.16.1 Utility Outlets

Quad receptacles.

Rating 20 amp

Wall-mounted, 24-inches above finished floor.

As needed, 4-feet on-center spaced evenly on all walls.

2.1.17 Lighting

2.1.17.1 Interior

Lighting shall be via fluorescent light fixtures.

Fixtures shall be 48-inches in length.

Fixtures shall use dual straight tube bulbs.

Fixtures shall protect bulbs via wire guard or translucent cover.

Fixtures shall be furnished on both sides of the generator set.

As needed to provide a minimum of 150 foot-candles of illumination at floor level.

Interior, wall-mounted, 1-hour timed light switch.

2.1.17.2 Interior - Emergency

Integrated, solid-state design emergency light fixture for each doorway.

Self-contained in single, interior, wall-mountable housing.

Medium to heavy-duty industrial-use rated.

1-hour operation rated, minimum.

10-year operating life rated.

Dual light beams lamps.

Sealed maintenance-free rechargeable battery.

Battery viewport.

Automatic battery charger.

Low battery cutoff.

Voltmeter.

Indicators: 1) On; 2) Charging.

Test Switch, externally accessible.

Dry-contact, form-C (NO/NC) closure alarm.

2.1.17.3 Exterior

Light fixture for each exterior doorway.

Bulb: Halogen, standard screw-base, 150 watt rated, minimum.

Bulb Life: 10,000-hour rated, minimum.

Shatter/tamper resistant lens.

Remote activated by key fob or garage-door-opener type device.

Interior, wall-mounted, 1-hour timed light switch.

2.1.18 Door - Exterior

2.1.18.1 Fabrication

Door: galvanized or stainless steel, welded fabrication.

14-gauge, minimum.

42-inches x 7-feet.

Poly-urethane insulation.

Gasket sealed.

Frame: hi-strength, galvanized or stainless steel, welded.

2.1.18.2 Accessories

Lockset: stainless steel; replaceable cores; keyed alike.

Interior pull handle.

Anti-prying exterior plate, hi-strength, galvanized or stainless steel.

Vandal resistant, non-removable hinge pins.

Hydraulic-damper closer with sliding passage set.

Wind check or chain.

Overdoor exterior drip awning, galvanized or stainless steel, or aluminum.

Intrusion sensor with a dry-contact, form-C (NO/NC) closure alarm.

2.1.19 Air Conditioning System

Not required.

2.1.20 Heating System

Baseboard electric heat strips.

Units shall be of the high energy-efficient design.

System shall be sized to provide an interior temperature of 70 degrees F during exterior temperature of –30 degrees F, no equipment heat loads considered.

System shall be equipped with:

- Auto-restart.
- Pre-wired thermostat.
- On/off visual indicator.
- Dry contact, form-C (NO/NC) closure alarm.

2.1.21 Ventilation System

2.1.21.1 Design

12-inch motorized fan, minimum.

Wall-mounted controls.

Programmable/adjustable start-up cycle timer.

Programmable/adjustable run cycle timer.

Dual, parallel thermostats, manually adjustable.

2.1.21.2 Intake

Mechanically activated louver/damper.

Galvanized or stainless steel, or aluminum weather hood.

Galvanized or stainless steel, or aluminum screen to prevent insect or rodent intrusion.

Filtered.

2.1.21.3 Exhaust

Gravity-type louver/damper.

Galvanized or stainless steel, or aluminum weather hood.

Galvanized or stainless steel, or aluminum screen to prevent insect or rodent intrusion.

2.1.22 Generator Cooling

The room shall be equipped with the necessary intakes, exhausts, ducts, flanges, adapters, and associated hardware in support of a generator.

If motorized louvers and/or dampers are used they shall be equipped to be controlled by the generator.

2.1.23 Communication Cable Termination Backboard

Size: 4-feet x 8-feet x 3/4 inches.

Material: plywood sheet, 1-hour fire retardant rated.

Furnish backboard with 3-inch standoffs.

Painting: gray or black, fire retardant.

2.1.24 Heat/Smoke/CO Detection & Fire Suppression

2.1.24.1 Heat

The shelter shall be equipped with heat detectors, as needed, spaced for maximum coverage.

Detectors shall be equipped with a dry-contact, form-C (NO/NC) closure alarm.

Combination heat, smoke and CO detectors are not acceptable.

2.1.24.2 Smoke

The shelter shall be equipped with smoke detectors spaced for maximum coverage.

Detectors shall be of the photoelectric and ionization type.

Detectors shall be equipped with a dry-contact, form-C (NO/NC) closure alarm.

Combination heat, smoke and CO detectors are not acceptable.

2.1.24.3 Carbon Monoxide (CO)

The shelter shall be equipped with carbon monoxide detectors spaced for maximum coverage.

Detectors shall be equipped with a dry-contact, form-C (NO/NC) closure alarm.

Combination heat, smoke and CO detectors are not acceptable.

2.1.24.4 Suppression

The shelter shall be equipped with one (1) wall-mounted fire extinguisher.

Type: Class ABC all purpose dry chemical.

Size: 10 lbs.

2.1.24.5 Interior Perimeter Halo

Tinned-bare solid-copper conductor no less than No. 2 AWG. Furnish insulated standoffs as required.

2.1.25 Floor

- A. Insulation: R-Value = 27, minimum.
- B. Weight Load: 750-lbs per square foot.
- C. Finish
 - 1. Commercial grade, glued, inlaid vinyl covering.
 - 2. Self-sticking tiles are not acceptable.
- D. Fire Retardant: 1-hour rated, minimum.

Foundation

- A. Foundation materials shall conform to the requirements of Sate of Maine Department of Transportation Standard Specifications, Revision of December 2002. Foundation design, plans and drawings shall be stamped by a professional engineer licensed in the State of Maine.

1. Dimensions: Shall be 14' x 38'.
 2. Materials: Class A concrete.
- B. Contractor to provide written certification to Department that foundation was constructed in accordance with a State of Maine PE stamped drawings and specifications.

3. Execution

Delivery & Storage of Materials

- A. The contractor shall be responsible for all aspects of shipment and/or transportation of materials to their destination.
- B. The contractor shall be responsible for coordinating, unloading, inspecting, accepting and storing all material deliveries.
- C. All stored materials shall remain the responsibility of the contractor until final acceptance by the Department.

Installation

3.1.1 General

- A. Prior to installation, the contractor shall coordinate the exact site placement and/or orientation of the following items with the Department:
 1. Shelter Foundation.
 2. Shelter.
- B. The contractor shall be responsible for:
 1. Providing all materials, labor and tools to ensure a complete installation whether or not specified or shown.
 2. All workmanship shall conform to applicable standards and prevailing practices as approved by the Department.
 3. Delivery of all materials to the site.
 4. Restoring the site to its original pre-installation condition.

5. All access road improvements and clearing as necessary for delivery as approved by the Department.
6. All access road repairs after delivery. Road shall be restored to original pre-installation condition as approved by the Department.
7. All commercial electric utility service necessary for the installation as approved by the Department.
8. Removing all rubbish and debris associated with all aspects of the installation.
9. The installation of the shelter and components.
10. Providing all materials, labor and tools to ensure a complete installation whether or not specified or shown.
11. Installing the shelter and components in accordance with the professional engineer's design, as applicable and as approved by the department.
12. Neat and professional workmanship.
13. Coordination with other trades, as necessary.
14. Design, Furnish & Install:
 - Shelter.
 - Shelter Foundation.
 - Electrical & Lighting.
 - HVAC Systems.
15. Furnish & Install:
 - Shelter accessories.
 - Grounding materials and bonding hardware.
 - Connection of accessories to the shelter's ground system.
 - Connection of shelter to earth ground grid system.
16. All site planning, clearing, preparation and development, as required.
17. All engineering design certification and documentation.
18. Soil Borings & Geological Tests
 - Conduct all necessary tests for the design.
 - Department to review and approve statement-of-work prior to tests.

- Provide test results to the Department.

19. Design & Construction

- Prepare all pre-stamped drawings and specifications necessary for the designs and construction, as applicable.
- Department to review and approve pre-stamped drawings and specifications prior to zoning, permitting, and ordering.
- Provide State of Maine PE stamped drawings and specifications to the Department.

20. Utility Services

- All commercial utility service relocations and/or improvements necessary for the installation.

21. Access

- All access road improvements and clearing as necessary for delivery of all materials.
- All access road repairs after the delivery. Road shall be restored to its pre-installation condition.

22. Premises

- To the greatest applicable and practical extent, the contractor shall restore the premises to its pre-installation condition. See SP 656 SEWPCP
- Removing all rubbish and debris associated with site preparation, unpacking of shipping materials, and/or the installation, from the premises.

23. Other work as needed to ensure a complete installation whether or not specified or shown elsewhere in this document.

3.1.1.1 Shelter

Install all materials in accordance with State of Maine PE stamped drawings and specifications.

Contractor to provide written certification to the Department that shelter was installed in accordance with a State of Maine PE stamped drawings and specifications.

3.1.1.2 Foundation

Construct in accordance with State of Maine PE stamped drawings and specifications.

Contractor to provide written certification to the Department that foundation was constructed in accordance with a State of Maine PE stamped drawings and specifications.

3.1.1.3 Anchoring

The shelter shall be anchored to the foundation in such a manner as to withstand displacement in prevailing high wind conditions as indicated in the technical specifications.

3.1.1.4 Locations & Placement

The exact location of all shelter components and/or accessories shall be coordinated with the Project Management Office of the State's Radio Project Office and the Department before ordering.

At a minimum, where practical and available, shelters shall be placed at least 20-feet from site towers to minimize exposure to falling ice.

3.1.1.5 Electrical

3.1.1.5.1 Outlets

Mounting of ceiling outlets to communications cable trays is not acceptable.

Each half of a ceiling mounted quad outlet shall be wired to a separate circuit breaker and labeled at both the receptacle and main distribution panel.

Utility wall duplex outlets can be doubled to a single circuit breaker.

All outlets shall be labeled with its associated circuit breaker or labeled with its circuit number.

3.1.1.5.2 Lighting

All interior and exterior lighting shall be dispersed between 2 circuit breakers, at a minimum.

Interior emergency lighting shall be mounted above each entry door.

3.1.1.5.3 Interior Wiring

All wiring shall be per applicable electrical codes.

All electrical wiring shall be in conduit and/or raceways, as required.

All conduit, raceways, fittings, and hardware shall be of galvanized or stainless steel.

All conduit, raceways, and outlet or junction boxes shall be exposed and attached to the interior surfaces of the shelter.

Service wiring raceways shall be separate and isolated from any communications or antenna cable trays.

All service wiring runs shall be continuous.

3.1.1.5.4 Switchgear - Interior Service

Bypass and isolation switchgear, as needed.

Switchgear shall allow for service and testing without disrupting power to critical loads.

3.1.1.6 Alarms

All dry-contact alarms shall be terminated at a demarcation point inside the shelter.

3.1.1.7 Grounding & Surge Protection

3.1.1.7.1 General

The contractor shall be responsible for providing all materials and labor for the installation of grounding, and lightning and power surge protection devices in accordance with the manufacturer's recommendations, the Department's standards, or the contractor's practices.

The State has adopted Motorola's "STANDARDS & GUIDELINES FOR COMMUNICATIONS SITES" document, latest edition, to serve as its standard for the grounding of communications structures and equipment. This document is sometimes referred to as the "R56 Manual" and is available from Motorola as hard copy (part # 6881089E50-B) and in CD (part # 9880384V83).

In the event certain aspects of the recommendations, the standards, or the practices are in conflict, then the most stringent shall prevail.

3.1.1.7.2 Test Well

A grounding test well shall be placed at an exterior location near the cable entry panel.

Coordinate exact location with the Department..

3.1.1.7.3 Certification

Contractor shall provide written certification to the Department that grounding was performed in accordance with the State's standards, manufacturer's recommendations, or the contractor's practices as specified in the General section above.

3.1.2 Grounding

- A. General
 - 1. Connection to the site's earth ground grid system (EGGS) shall be required.
 - 2. All bonded welds shall be of the exothermal-type.
 - 3. Wire conductors size shall be no less than 2/0 AWG.
 - 4. Wire conductors shall be bare, tinned, solid copper.
- B. Shelter
 - 1. Ground the shelter to the EGGS.
 - 2. Conductors shall be weld-bonded to the closest EGGS ground rod.
 - 3. Conductors shall be weld-bonded to the tower leg.
- C. Generator
 - 1. Ground generator to the EGGS.
 - 2. Ground exterior fuel tank to the EGGS.
 - 3. Ground automatic transfer switch to the EGGS.

Inspection & Acceptance

3.1.3 Field Inspection

- A. After installation of all the components furnished under this section, the contractor along with the Department, at its discretion, shall perform a field inspection, to verify that the installation of the components furnished under this contract has been performed and completed in accordance with the following, as applicable.
 - 1. The professional engineer's design.
 - 2. The manufacturer's instructions and recommendations.
 - 3. The Department's specifications.
 - 4. The Contractor's installation practices and standards as approved by the Department.
- B. The Contractor shall provide all items, instrumentation, materials, equipment, and personnel necessary to conduct the inspection.
- C. Prior to the commencement of this activity, the contractor shall deliver a preliminary field inspection plan to the Department for review and approval.

- D. At the conclusion of this activity, the contractor shall present to the Department written certification that the inspection performed was in accordance with, and that the results of the inspection was in compliance with, the approved field inspection plan.
- E. The Department's signature on the certification shall constitute acceptance by the Department of the inspection.

3.1.4 Final Acceptance

A. General

- 1. After acceptance of all the inspections and all the tests. Conducted under this section, the contractor shall present to the Owner written certification that the activities were performed in accordance with, and that the results were in compliance with, the approved plans.
- 2. This certification shall include the original signed copy of the individual inspection and test certifications previously accepted by the Owner.
- 3. Final acceptance will be deemed final when the Owner's signature appears on this certification.

B. Post-Final Acceptance Documentation

- 1. After final system acceptance, the contractor shall deliver to the Owner, in both printed and electronic form, the following documents, on a per-site basis, in one consolidated package.
 - a. Copies of all signed certifications.
 - b. Copies of all approved inspection and test plans.

Warranty

- A. The Contractor shall include a copy of the manufacturer's standard commercial warranty for all furnished shelter and associated components in their response (excluding generator which is covered in the generator section).

Training

- A. The contractor shall conduct a single, on-site, hands-on training session for selected Department personnel.
- B. The training location and schedule shall be by mutual agreement between the Department and contractor.

- C. The session shall be conducted after final acceptance.
- D. The contents of the session shall include familiarizing the Department with special structure attributes, recommended inspection procedures, recommended maintenance procedures, ground connections, etc.
- E. Costs associated with the training defined in this section shall be clearly and individually identified in the pricing section of the response.

Documentation

3.1.5 With the Contractor's Bid

- A. The Contractor's bid shall include a catalog or specification sheet for this site as described in Section 2.1.

3.1.6 Post-Contract Award

- A. General
 - 1. Thorough documentation of all major shelter components, and their respective installations, will be required from the Contractor. This documentation will be comprised of both factory-provided and field-generated documents and/or manuals.
 - 2. Every document exchanged between Department and contractor shall be in paper and/or electronic form, as mutually agreed. Electronic documents shall use the latest version of the application software or by a mutually agreed version. The following applications are preferred:
 - a. Text - Microsoft Word
 - b. Spreadsheets - Microsoft Excel
 - c. Databases - Microsoft Access
 - d. Scanned documents - Adobe Acrobat
 - e. Simple Diagrams & Charts - Microsoft Visio or Excel
 - f. Large Drawings – mutually agreed software program
 - g. Schedules - Microsoft Project
 - 3. The Department shall approve the contents and organization of all field-generated documents supplied by the contractor.
 - 4. Costs associated with documentation shall be clearly and individually identified in the pricing section of the response.

B. Factory Provided – Technical & Service Manuals

1. All factory-provided documentation shall be available on CD media.
2. Manuals shall be provided for the following components on a per-site basis:
 - a. All available manufacture's manuals for the building and major components.
3. The following sets of manuals are to be furnished prior to project closeout on a per-site basis:
 - a. Five (5) complete paper-form sets
 - b. Five (5) complete electronic-form sets

C. Field Generated - As-Built

1. All field-generated documentation shall be prepared in a format suitable for storage in loose-leaf 3-ring binders. This documentation shall also be supplied on CD media.
2. All field-generated drawings shall be prepared using a mutually agreed software program.
3. The following documentation shall be provided on a per-site basis. Specification or catalog cut sheets for each of the major items illustrated in the documents shall be included with the submittals to the Department.
 - a. Shelter & foundation – top view diagram.
 - b. Foundation – side elevation view diagram illustrating both above and below grade portions.
 - c. Shelter – 4-sided elevation view diagram.
 - d. Shelter – interior layout w/list of materials.
 - e. A site plan illustrating the installed location of the components supplied under this contract relative to other existing major site components (e.g., towers, fences, generators, etc.). Plan shall be to scale; and the new and existing components shall be contrasted by the use of a gray scale.
 - f. The site plan shall identify the interconnection between the shelter or accessories to the site electrical ground grid system.
4. The following sets of field-generated documentation are to be furnished prior to project closeout:
 - a. Five (5) complete paper-form sets
 - b. Five (5) complete electronic-form sets

D. Costs associated with the post-contract award documentation defined in this section shall be clearly and individually identified in the pricing section of the response.

4. MEASUREMENT AND PAYMENT

4.1 Method of measurement.

Method of Measurement: The following items will be paid for by the lump sum:

ITEM #	DESCRIPTION
643.99	Communications Equipment Shelter, Modular, Pre-fabricated, Pre outfitted, Set
643.991	Communications Equipment Shelter, Inspection and Acceptance, Field Testing
643.992	Communications Equipment Shelter, Inspection and Acceptance, Final Acceptance
643.993	Communications Equipment Shelter, Inspection and Acceptance, Training

4.2 Basis of payment.

The accepted Communications Equipment Shelter items will be paid for at the contract lump sum prices which will include payment for all respective items as called for in the contract, designed, delivered, stored, placed, constructed, installed, tested, documented, all clearing, demolition, remediation, preparation, materials, labor, equipment, training and incidentals necessary to complete the work.

Payment will be made under:

ITEM #	DESCRIPTION	UNIT
643.99	Communications Equipment Shelter, Modular, Pre-fabricated, Pre outfitted, Set	LS
643.991	Communications Equipment Shelter, Inspection and Acceptance, Field Testing	LS
643.992	Communications Equipment Shelter, Inspection and Acceptance, Final Acceptance	LS
643.993	Communications Equipment Shelter, Inspection and Acceptance, Training	LS

END OF DOCUMENT

SECTION 3

Special Provision

Specification for an Emergency Power Generator System

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1. General

1.1 Introduction

This specification identifies the requirements for designing, furnishing, installing and commissioning an emergency power generator system and associated components. The generator will be used to support radio communications equipment and as specified herein. The system and associated components shall be new, and of current production.

1.2 Description of Major Work Elements

- A. Design, Furnish & Install:
 - 1. Emergency Power Generator 25KW with electric start
 - 2. Automatic Transfer Switch, sized by contractor
 - 3. Fuel Line to Existing Sub-system
- B. Fuel Line to Tank
 - 1. Connection of generator to the earth ground grid system.
 - 2. Connection of transfer switch to the earth ground grid system.
 - 3. Connection of fuel sub-system to the earth ground grid system.
- C. All site planning, preparation and development.
- D. All engineering design certification and documentation.
- E. Provide design and specifications stamped by a Maine licensed Professional Engineer of:
 - 1. Generator Mounting Design
- F. Other work as specified elsewhere in this document.

1.3 Qualifications

- A. General
 - 1. The Contractor shall have demonstrated experience in furnishing, installing, testing and fully commissioning systems on a turn-key basis.
 - 2. The Contractor shall have demonstrated experience as one-source responsible for generator warranty, parts, and service.

B. Contractor

1. The Contractor shall have been in the furnishing, installation and servicing of emergency power generator systems for no less than 5 contiguous years.
2. The Contractor shall be the generator manufacturer's authorized distributor.

C. Generator

1. The manufacturer shall have been in the manufacture of motor-driven generators for no less than 5 contiguous years.
2. All field work associated with the generator shall be performed by a contractor having no less than 5 contiguous years of experience in the installation of emergency power generators.

D. Automatic Transfer Switch

1. The manufacturer shall have been in the manufacture of automatic transfer switches for no less than 5 contiguous years.

1.4 Regulatory Compliance

The generator system shall meet or exceed all of the requirements of:

1. NFPA 110 (most recent edition).
2. Local and National Codes.
3. Underwriters Laboratory (UL).
4. Occupational Safety & Health Administration (OSHA)

1.5 Quantities & Locations

Site: Spruce Mtn.

a. Generator

- Size: 25KW
- Installation: interior as approved by the Department.

b. Transfer Switch

- a. Size: Sized by contractor with the Departments approval.
- b. Installation: Inside Equipment Shelter Generator Room As approved by the Department

c. Fuel

1. Type: Liquid Propane (LP)

Tank Capacity: Refer to chart in the installation section of this document.

2. Tank Installation: Above Ground as approved by the Department.

2. Products

2.1 Power Generator

2.1.1 General

The generator system shall be new and of current production.

The generator shall be rated for industrial/commercial use.

Generators manufactured by Onan/Cummins are preferred.

2.1.2 Output Requirements

- 120/240 VAC.
- Single-Phase.
- Three -wire.
- 60 Hertz.
- Full single-phase output @ 1.0 pf.
- Voltage regulation +/- 2% of rated voltage for constant load between no-load and full-load.
- Frequency regulation 0.5 % from steady state no-load to steady state rated-load.
- Single Step Load Pickup 100% of rated output power, less applicable derating factors, with the engine and generator at operating temperature.
- The generator shall be equipped with an integral UL listed, thermal-magnetic type rated, main output circuit breaker.

2.1.3 Engine

2.1.3.1 General

- The engine shall be of the propane internal combustion type.
- The engine shall be of the stationary type.
- The engine shall be mounted on a heavy-duty steel skid base.

- The engine shall be mounted on vibration isolators or dampers that are either integral or external to the skid base.
- The engine shall be equipped with a thermostatically-controlled engine block heater.
- Maximum rated speed: 1,800 RPM.

2.1.3.2 Starting System

- Shall be electric, 12 VDC negative ground, sourced from gel cell, maintenance free type storage batteries.
- Batteries shall be mounted to the generator unit, insulated from both the generator and the floor.
- A float/equalize battery charger shall be mounted to the generator unit.
- The charger shall be of a constant voltage/current limiting design and sized appropriately.
- At a minimum, the charger shall be equipped with the following:
 1. On/Off Switch
 2. DC Voltmeter
 3. DC Ammeter
 4. Equalizer-Charger Timer
- The equalizer timer shall provide for a minimum of 12-hours of equalization time.
- Upon termination of the equalization cycle, the charger shall automatically revert to float charging.

2.1.3.3 Lubricating Oil System

- Shall be capable of using both petroleum and synthetic motor oils.
- Shall include an oil level dipstick.
- Oil filter shall be of the replaceable type.
- System shall provide a low oil pressure visual indicator on the generator's control panel.
- Indicator shall remain active until reset by service personnel.
- Activation of the low oil pressure indicator shall trigger a dry-contact, form-C (NO/NC) alarm output.

2.1.3.4 Lubricating Level Maintaining System

- Shall be equipped with an automatic oil level maintaining system.

- The system shall include an oil supply tank.
- The tank shall be sized to supply oil for 15-days of continuous operation.
- The tank shall include a see-thru oil level gauge.
- The tank shall include a shutoff valve.
- Shall be equipped with an integral, dry-contact, form-C (NO/NC) alarm for low oil level before shutdown.
- Shall be equipped with an integral, dry-contact, form-C (NO/NC) alarm for low oil level shutdown.

2.1.3.5 Cooling System

- Shall be either air-cooled, or liquid-cooled using a fan radiator. Liquid-cooled engines are preferred.
- For liquid-cooled engines, the radiator should be mounted to the generator unit and in such a way that the fan's airflow is drawn over the engine.
- System shall provide a high temperature visual indicator on the generator's control panel.
- Indicator shall remain active until reset by service personnel.
- Activation of the high temperature indicator shall trigger a dry-contact, form-C (NO/NC) alarm output.
- The generator unit shall be equipped with the necessary ducts, flanges, adapters, and/or other hardware to allow ducting of heated air to the outside.
- The generator unit shall be equipped with the necessary controls to activate motorized ventilation louvers or dampers.

2.1.3.6 Exhaust System

- A critical muffler shall be supplied with the unit.
- The connection between the muffler and the exhaust manifold shall be of the flexible type.
- The muffler shall be equipped with a condensation trap with a manual drain valve.
- The muffler shall have thermal insulation.
- The exhaust/manifold shall be shrouded

2.1.3.7 Fuel System

- Aspirated air shall be filtered through a replaceable dry-element filter.

- The system shall include all necessary accessories for full functionality including, but not limited to fuel lines, gauges, level-sensors, valves, fittings, filters, piping, insulation, wiring, and pumps, as necessary.
- For propane fueled systems, fuel lines from storage tank shall be of sufficient size to meet the engine's vaporization requirements in ambient outside temperatures as low as -30F.

2.1.4 Engine Controls & Alarms

2.1.4.1 Control Panel

- All controls, indicators, meters and alarms specified herein shall be consolidated into a control panel capable to being installed at a remote location.
- One remote panel shall be furnished for installation within the shelter's radio room.
- One remote panel shall be furnished for installation within the shelter's generator room.

2.1.4.2 Run/Stop Switch

- A manual run/stop switch shall be provided.
- This switch shall be capable of being controlled remotely.

2.1.4.3 Gauges & Meters

- The unit shall be equipped with the following:
 1. Oil pressure gauge.
 2. Temperature gauge.
 3. Charge rate ammeter.
 4. Running time meter.
 5. Analog output-frequency meter.

2.1.4.4 Governor

- The unit shall be equipped with a governor to maintain speed regulation to within 5% from no-load to full-load output.
- The governor shall maintain frequency regulation to within +/- 0.25% of rated frequency under steady state load conditions.
- The governor shall be of the mechanical or electronic-type.

2.1.4.5 Over Crank Control

- The control unit shall provide a minimum of 3 cranking cycles of no less than 10 seconds before shutdown and activation of the over crank alarm.
- The control unit shall be equipped with the capability of manually-resetting the over crank alarm.
- The control unit shall be equipped with the capability of remotely-resetting the over crank alarm.

2.1.4.6 Automatic Shutdown

- The unit shall be equipped for automatic engine shutdown for the following conditions:
 1. Over Crank.
 2. Over Speed.
 3. Under Speed.
 4. Frequency regulation beyond design tolerances.
 5. Voltage regulation beyond design tolerances.
 6. Low Oil Pressure.
 7. High Temperature.

2.1.4.7 Fault Reset

- The unit shall be equipped with a manual reset switch to allow engine restart after any fault condition shutdown.
- The unit shall be equipped with means to activate the manual fault reset switch remotely.

2.1.4.8 Condition Indicators

- At a minimum, the following visual indicators shall be available on each control panel furnished:
 1. Generator running.
 2. Over Crank shutdown.
 3. Over Speed shutdown.
 4. Under Speed shutdown.
 5. Low oil pressure shutdown.
 6. High temperature shutdown.

7. Low fuel level.

2.1.4.9 Alarms

- A generator running condition shall activate a dry-contact, form-C (NO/NC) alarm.
- A second dry-contact, form-C (NO/NC) alarm shall be activated, at a minimum, by any one of the following alarm conditions:
 1. Over Crank shutdown.
 2. Over Speed shutdown.
 3. Under Speed shutdown.
 4. Low oil pressure shutdown.
 5. High temperature shutdown.
 6. Low fuel level.

2.1.5 Main Fuel Storage Tank

2.1.5.1 General

The tank shall be new and of current production.

2.1.5.2 Size & Type

The size of the tank shall be as per table in the Installation Section.

Tank shall be suitable for exterior, above-ground installations.

Cylindrical shaped tanks are preferred.

All fixed installation fuel tanks shall be of the horizontal type.

Tank manufacture shall be as required by local, state and/or federal codes.

Tanks shall include warning and information signs on all sides as required by codes, laws, and/or the Department.

2.1.5.3 Features & Accessories

The storage tank features and accessories are as follows:

- Shall be equipped with a lockable fuel cap.
- Shall be equipped with a tank-mounted fuel gauge.

- Fuel gauge levels shall also be monitored from an interior on-site location such as an equipment shelter.
- The tank shall be equipped with a low fuel level sensor.
- A low fuel level condition shall activate a visual indicator on the generator's control panel.
- Indicator shall remain active until reset by service personnel.
- Activation of the low level indicator shall trigger a dry-contact, form-C (NO/NC) alarm output. Contacts shall be remoted to an interior on-site location.
- The tank shall include all necessary accessories for full functionality including, but not limited to fuel lines, gauges, level sensors, valves, fittings, filters, piping, insulation, wiring, and pumps, as necessary.
- The fuel line to the engine shall be equipped with a manually-controlled, emergency fuel-shutoff valve. The valve shall comply with all applicable codes.
- For propane-fueled systems, fuel lines to the engine shall be of sufficient size to meet the engine's vaporization requirements in ambient outside temperatures as low as -30F.

2.2 Switchgear - Transfer, Bypass & Isolation

2.2.1 General

The switchgear shall be new and of current production.

The transfer switch shall be of the automatic type.

Bypass and isolation switchgear shall allow the system to be serviced and tested without disrupting power to the critical loads.

2.2.2 Size

The contractor shall size the switchgear with the Departments approval.

2.2.3 Housing

All switchgear shall be contained within a single or multiple, key-lockable, U.L. listed, indoor wall-mount, NEMA cabinet(s).

2.2.4 Features & Functions

The transfer switch shall be equipped, at a minimum, with the following:

- AC line under-voltage sensor.

- Time delay on-start.
- Time delay on-transfer.
- Time delay on-retransfer.
- Time delay on-stop.
- Exerciser Clock.
- Test Switch

2.2.5 Exerciser Clock

The exerciser clock shall be equipped, at a minimum, with the following:

- Day-of-week set.
- Time-of-day set.
- Duration-of-exercise set.

2.3 Monitoring & Control Sub-System

The system shall be equipped with a monitoring and control sub-system capable, at a minimum, of accessing the generators and transfer switches.

The sub-system shall allow for local and remote access.

The sub-system shall be microprocessor and IP-network based.

At a minimum, the sub-system shall be capable of:

- monitoring system performance and fault conditions
- display and annunciation of alarms
- controlling system functions
- real-time data collection, retention and report generation

All external IP-network based hardware such as routers, switches and workstations will be furnished by the Department.

3. Execution

3.1.1 Description of Major Work Elements

3.1.2 Performed by Contractor

3.1.2.1 General

- A. Design, Furnish & Install:
 - Emergency Power Generator.
 - Transfer Switchgear.
 - Fuel Sub-system.

- B. Furnish & Install:
 - Bypass & isolation switchgear.
 - Monitoring & Control Sub-System
 - Connection of generator to the earth ground grid system.
 - Connection of transfer switch to the earth ground grid system.
 - Connection of fuel sub-system to the earth ground grid system, if applicable.

- C. All site planning, clearing, preparation and development, as required.

- D. All engineering design certification and documentation.

- E. Planning, Zoning & Permitting
 - Prepare all site planning documents necessary for zoning and permitting, as required.
 - Department to review and approve all planning documents prior to zoning and permitting.
 - Obtain all zoning approvals, as required.
 - Obtain all site permitting, as required. Fees will be borne by the State.
 - Coordinate all permitting inspections, as required.

- F. Soil Borings & Geological Tests
 - Conduct all necessary tests for the design.
 - Department to review and approve statement-of-work prior to tests.
 - Provide test results to the Department.

G. Design & Construction

- Prepare all pre-stamped drawings and specifications necessary for the designs and construction, as applicable.
- Department to review and approve pre-stamped drawings and specifications prior to zoning, permitting and ordering.
- Provide State of Maine PE stamped drawings and specifications to Department. Obtain all site permitting, as required. Fees will be borne by the State.

H. Utility Services

- Coordinate commercial utility service relocations and/or improvements necessary for the installation.

I. Access

- All access road improvements and clearing as necessary for delivery of all materials.
- All access road repairs after the delivery. Road shall be restored to its pre-installation condition. Refer to SP 656 SEWPCP for more information.

J. Premises

- To the greatest applicable and practical extent, the contractor shall restore the premises to its pre-installation condition.
- Removing all rubbish and debris associated with site preparation, unpacking of shipping materials, and/or the installation, from the premises.

- K. Other work as needed to ensure a complete installation whether or not specified or shown elsewhere in this document.

3.1.2.2 Site Specific

The generator size shown on the table is the minimum requirement. Contractor shall adjust size as dictated by the electrical power requirements at the site.

3.2 Delivery & Storage of Materials

- A. The contractor shall be responsible for coordinating, unloading, inspecting, accepting and storing all material deliveries.

- B. All claims necessary as a result of damage or loss during shipment shall be the responsibility of the Contractor.
- C. All stored materials shall remain the responsibility of the contractor until final acceptance by the Department. Final acceptance is described later in this document.

3.3 Installation

3.3.1.1 General

The contractor shall be responsible for:

- The installation, wiring, testing and commissioning of the system.
- Providing all materials, labor and tools to ensure a complete installation whether or not specified or shown.
- Installing the system components in accordance with the professional engineer's design, as applicable and as approved by the Department.
- Neat and professional workmanship.
- Coordination with other trades, as necessary.

3.3.1.2 Generator

All generators shall be installed inside the new site equipment shelters furnished by the contractor.

Prior to installation, the contractor shall coordinate the exact placement of the generator and accessories with the Project Management Office of the State's Radio Project Office.

3.3.1.3 Switchgear

Prior to installation, the contractor shall coordinate the exact placement of the switchgear and accessories with the Project Management Office of the State's Radio Project Office.

All switchgear shall be installed inside the site equipment shelters in the same room as the generator.

3.3.1.4 Monitoring & Control Sub-System

Install and optimized in one (1) Department furnished workstation.

3.3.1.5 Alarms

All Form C (NO/NC) dry contact alarms shall be terminated at a demarcation point inside the shelter.

3.3.1.6 Fuel Tank

AG = Above Ground SBC = Sized by Contractor

SITE	Genset	Genset Install	Xfer Switch	Switch Install	Fuel	Fuel Tank	Tank Install
Spruce Mtn.	25 KW continuous	In new shelter	SBC	In new shelter	LP	2 ea500 Gal (1000 Gal Total)	AG

All fuel tanks furnished by the contractor shall be installed in an above ground exterior location.

At fixed-tank sites, the contractor shall be responsible for the tank’s foundation design and construction, as necessary.

Prior to installation, the contractor shall coordinate the exact site placement of the fuel tank and accessories with the Project Management Office of the State’s Radio Project Office.

The installation of the tank and construction of foundation shall be in accordance with local, state and/or federal codes, as applicable.

The foundation shall be of a pad and/or pier design.

The foundation shall be made of reinforced concrete.

The top of the foundation shall be elevated above grade.

The foundation design shall securely anchor an empty tank in wind load per TIA/EIA 222, Class III latest edition for this location.

Control, sensor and/or alarm wiring, as applicable, to/from generator shall be run inside rigid, weatherproof conduit.

Fuel lines to/from generator shall be insulated.

3.3.1.7 Engine Exhaust

Prior to installation, the contractor shall coordinate the exact placement of the exhaust with the Project Management Office of the State’s Radio Project Office.

The exterior exhaust pipe (EEP) shall penetrate an exterior wall. Roof penetrations are prohibited.

The EEP shall be oriented vertically.

The EEP shall clear the roof overhang by a minimum of 1-foot in all applicable directions.

The EEP shall extend a minimum of 2-feet above the roof line.

The EEP shall be furnished with a rain cap.

3.3.1.8 Grounding & Surge Protection

3.3.1.8.1 General

The contractor shall be responsible for providing all materials and labor for the installation of grounding, and lightning and power surge protection devices in accordance with the manufacturer's recommendations, the Department's standards, or the contractor's practices.

The State has adopted Motorola's "STANDARDS & GUIDELINES FOR COMMUNICATIONS SITES" document, latest edition, to serve as its standard for the grounding of communications structures and equipment. This document is sometimes referred to as the "R56 Manual" and is available from Motorola as hard copy (part # 6881089E50-B) and in CD (part # 9880384V83).

In the event certain aspects of the recommendations, the standards, or the practices are in conflict, then the most stringent shall prevail.

Unless otherwise noted, the contractor shall assume the existence of a transient voltage surge suppression (TVSS) device at the main electrical service entrance at all sites.

3.3.1.8.2 Certification

Contractor shall provide written certification to Department that grounding was performed in accordance with the State's standards, manufacturer's recommendations, or the contractor's practices as specified in the General section above.

- A. The Contractor shall be fully responsible for the installation, wiring, testing and commissioning of the system.
- B. The Contractor is responsible for providing all materials, labor and tools to ensure a complete installation.
- C. Prior to installation, the Contractor shall coordinate the exact site placement of the following items with the Department:
 1. Generator.
 2. Fuel line from existing propane tank to equipment shelter.

3. Automatic Transfer Switch. The switch shall be installed inside of the equipment shelter.
- D. The Contractor shall be responsible for:
 1. Removing all rubbish and debris associated with all aspects of the installation.
 2. All commercial electric utility improvements necessary for the installation
 3. All engineering design certification and documentation.

3.3.2 Foundation Pad – Generator & Fuel Tank

- A. Generator foundation shall be reinforced concrete, attached directly to the floor.
- B. Fuel lines to/from generator shall:
 1. Be installed in a protective device approved by the Department.
 2. Exterior fuel line above grade shall be insulated.

3.4 Inspection, Testing & Acceptance

3.4.1 Field Inspection

- A. After installation of all the components furnished under this section, the contractor along with the Department shall perform a field inspection, on a per-site basis, to verify that the installation of the components furnished under this contract has been performed and completed in accordance with the Department's specifications; the contractor's installation practices and standards; and that workmanship has been performed in a neat and professional manner.
- B. The Contractor shall provide all items, instrumentation, materials, equipment, and personnel necessary to conduct the inspection.
- C. Prior to the commencement of this activity, the contractor shall deliver a preliminary field inspection plan to the Department for review and approval.
- D. At the conclusion of this activity, the contractor shall present to the Department written certification that the inspection performed was in accordance with, and that the results of the inspection was in compliance with, the approved field inspection plan.
- E. The Department's signature on the certification shall constitute the Department's acceptance.

3.4.2 Testing

- A. After installation of all the components furnished under this section, the Contractor along with the Department shall perform the test(s) described herein, on a per-site basis, to demonstrate that the emergency power generator system has been properly configured and optimized, and that it is operating fully and correctly.

- B. The Contractor shall provide all items, instrumentation, materials, equipment, and personnel necessary to conduct the test(s).
- C. This test(s) shall be performed after the inspection defined earlier in this section has been accepted.
- D. Prior to the commencement of this activity, the Contractor shall deliver a preliminary test plan to the Department for review and approval.
- E. At the conclusion of this activity, the Contractor shall present to the Department written certification that the test(s) performed were in accordance with, and that the results of the test(s) were in compliance with, the approved test plan.
- F. The Department's signature on the certification shall constitute the Department's acceptance.
- G. Costs associated with the test(s) defined in this section shall be clearly and individually identified in the pricing section of the response.

3.4.3 Final Acceptance

- A. General
 - 1. After acceptance of all the inspections and all the tests conducted under this section, the Contractor shall present to the Department written certification that the activities were performed in accordance with, and that the results were in compliance with, the approved plans.
 - 2. This certification shall include the original copy of the individual inspection and test certifications previously accepted by the Department.
 - 3. Final acceptance will be deemed final when the Department's signature appears on this certification.
- B. Post-Final Acceptance Documentation
 - 1. After final system acceptance, the contractor shall deliver to the Department, in both printed and electronic form, the following documents, on a per-site basis, in one consolidated package.
 - a. Copies of all signed certifications.
 - b. Copies of all approved inspection and test plans.

3.5 Warranty

- A. System
 - 1. The entire system, less genset batteries, shall be warranted to be free from defects in material and workmanship for a period of two (2) years after final acceptance.
 - 2. The warranty shall include all costs for labor and materials, inclusive of travel.

3. Costs associated with the warranty defined in this section shall be clearly and individually identified in the pricing section of the response.

B. Batteries

1. The batteries shall have a 10-year pro-rata warranty.

3.6 Preventive Maintenance

- A. Preventive maintenance shall be performed on the system during the warranty period.
- B. The preventive maintenance shall adhere to the manufacturers suggested schedule and, at a minimum, include all maintenance required by the manufacturer to prevent the warranty from being voided.

3.7 Training

- A. The Contractor shall conduct a single, on-site, hands-on training session for selected Department personnel.
- B. The training location and schedule shall be by mutual agreement between the Department and Contractor.
- C. The session shall be conducted after final acceptance.
- D. The contents of the session shall include demonstrations on the location, proper operation, and visual checks of all mechanical and electrical elements of the system.

3.8 Documentation

3.8.1 With the Contractor's Bid

- A. The Contractor's bid shall include a catalog or specification sheet for the following items:
 1. Generator
 2. Automatic Transfer Switch

3.8.2 Post-Contract Award

- A. General
 1. Thorough documentation of all generator, transfer switch, gauges and switches, and any auxiliary components, and their respective installations, will be required from the Contractor. This documentation will be comprised of both factory-provided and field-generated documents and/or manuals.

2. Every document exchanged between Department and Contractor shall be in paper and electronic form, as appropriate. Electronic documents shall use the latest version of the application software or by a mutually agreed version. The following applications are preferred:
 - a. Text - Microsoft Word
 - b. Spreadsheets - Microsoft Excel
 - c. Databases - Microsoft Access
 - d. Scanned documents - Adobe Acrobat
 - e. Simple Diagrams & Charts - Microsoft Visio or Excel
 - f. Large Drawings – mutually agreed software program
 - g. Schedules - Microsoft Project
 3. The Department shall approve the contents and organization of all field-generated documents supplied by the Contractor.
- B. Factory Provided – Technical & Service Manuals
1. All factory-provided documentation shall be available on CD media.
 2. Manuals shall be provided for the following categories of equipment on a per-site basis:
 - a. Generator
 - b. Automatic Transfer Switch
 3. The following sets of manuals are to be furnished prior to project closeout on a per-site basis:
 - a. Five (5) complete paper-form sets
 - b. Five (5) complete electronic-form sets
- C. Field Generated - As-Builts
1. All **field-generated documentation** shall be prepared in a format suitable for storage in loose-leaf 3-ring binders. This documentation shall also be supplied on CD media.
 2. All field-generated drawings shall be prepared using a mutually agreed software program.
 3. The following documentation shall be provided. Specification or catalog cut sheets for each of the major items illustrated in the diagrams shall be included with the submittals to the Department.
 - a. Interconnection power wiring schematic diagram(s).
 - b. Interconnection control wiring schematic diagrams(s).
 - c. Alarm wiring schematic diagram(s).
 - d. Interconnection ground wiring schematic diagram(s).

- e. Wiring between generator, transfer switch and electrical distribution panel(s).
 - f. A simple floor plan illustrating the installed location of the equipment supplied under this contract relative to other existing major components (e.g., doors, HVAC units, electrical distribution panels, etc.). Plan shall be approximately to scale; and the new and existing components shall be contrasted by the use of a gray scale.
 - g. A detailed inventory of each major equipment component installed. This shall include model and serial numbers
4. The following sets of field-generated documentation is to be furnished prior to project closeout on this site:
- a. Five (5) complete paper-form sets
 - b. Five (5) complete electronic-form sets

4. MEASUREMENT AND PAYMENT

4.1 Method of Measurement:

ITEM #	DESCRIPTION
643.98	Emergency Power Generator, Installed
643.981	Emergency Power Generator----Inspection and Acceptance, Field Inspection
643.982	Emergency Power Generator----Inspection and Acceptance, Testing
643.983	Emergency Power Generator----Inspection and Acceptance, Final Acceptance

4.2 Basis of Payment

The accepted Communications Equipment Shelter items will be paid for at the contract lump sum prices which will include payment for all respective items as called for in the contract, designed, delivered, stored, placed, constructed, installed, tested, documented, all clearing, demolition, remediation, preparation, materials, labor, equipment, training and incidentals necessary to complete the work.

Payment will be made under:

ITEM #	DESCRIPTION	UNIT
643.98	Emergency Power Generator, Installed	LS
643.981	Emergency Power Generator----Inspection and Acceptance, Field Inspection	LS
643.982	Emergency Power Generator----Inspection and Acceptance, Testing	LS
643.983	Emergency Power Generator----Inspection and Acceptance, Final Acceptance	LS

END OF DOCUMENT

SECTION 4

Special Provision

**Specification for a
Communications Site Perimeter Fence
And
Helicopter Landing Zone**

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Perimeter Fence System

6.1.1 Fence

6.1.1.1 General

The fence and associated components shall be new and of current fabrication. Used, re-rolled and/or re-galvanized materials are not acceptable.

The fence and associated components shall be industrial or commercial-grade rated.

Unless otherwise noted, all components and associated hardware shall be fabricated of steel and hot-dipped galvanized at the manufacturer's facility.

6.1.1.2 Physical & Structural

The fence shall be of the chain-link type.

The height of the fence shall be eight (8)-feet excluding the security barrier.

6.1.1.3 Posts

Post height: as required.

Post insertion: below frost line if loose soil or anchored if ledge.

Post-type: tubular, high-strength (Schedule 40).

6.1.1.4 Chain-link Fabric

Weave: 2-inch diamond-mesh pattern.

Wire Size: 9 AWG, minimum.

Top and bottom selvage edges shall be twisted and barbed.

6.1.2 Gate

6.1.2.1 Physical

Swing-type, twin-leaf.

Leaf Width: 5-feet

Fabric: same as fence.

Gate-leaf frame members shall be welded together.

6.1.2.2 Hinges

Hinges shall use vandal resistant, non-removable hinge pins.

Hinges shall allow for 180-degree swing for each gate-leaf from closed to open position.

6.1.2.3 Latch

Latch shall be of a horizontal-bar design. Drop-rod or plunger-bar type designs are not acceptable.

Latch shall be of a vandal-resistant design.

Latch shall permit operation from either side of gate.

Padlock hasp shall be an integral part of latch.

6.1.2.4 Keeper

Device to secure gate-leaf in the full-open position.

One (1) keeper per gate-leaf.

Auto-engage.

Manual release.

Devices of an in-ground, drop-rod or plunger-bar type design are not acceptable.

6.1.3 Security Barrier

6.1.3.1 General

The fence system shall include a top-mounted security barrier made of barbed-wire and razor-tape.

The security barrier wire and tape shall be fabricated of galvanized or stainless steel.

6.1.3.2 Barbed-Wire

Barrier shall be comprised of 3-lines of barbed-wire.

The length of the barrier shall span the perimeter of the fence including the gate.

Barbed-wires shall be supported by 45-degree top-mounted extension arms tilted outward.

Each barbed-wire shall be fabricated of two (2) individual wire strands, at a minimum.

Barb clusters shall be of a 4-point design and spaced evenly on 3-inch centers.

6.1.4 Helicopter Landing Zone

24 foot by 24 foot gravel pad, minimum 6 inches in depth when compacted, with weed barrier will be installed.

45 foot radius from the center of gravel pad will be cleared of all obstacles.

6.1.5 Signage

Information, notice, and/or warning signs shall be furnished for each side of the fence perimeter.

At a minimum, signs shall meet the following:

- Industry Standards
- Municipal or Local Codes
- Specific requirements of the State

6.1.6 Perimeter Fence System

6.1.6.1 Description of Major Work Elements

6.1.6.1.1 Performed by State

The following work will be performed by the State at each site identified herein:

- A. Acquisitions:
 - Perform site acquisition activities, as required.
- B. Ownership:
 - Conduct property title/deed searches.
- C. Surveying
 - Perform boundary and topographical site surveys.

- D. Zoning:
 - Assist contractor with zoning approval process, as required, when deemed by the State.
- E. Permitting:
 - Assist contractor with permitting process, as required, when deemed by the State.
- F. Leases:
 - Secure site leases, as required.
- G. Environmental Impact Studies.

6.1.6.1.2 Performed by Contractor

6.1.6.1.2.1 General

- A. Furnish & Install:
 - Fence.
 - Gate.
 - Security Barrier.
 - Grounding of fence system to the earth ground grid system.
 - Gravel layer within fence perimeter.
 - Signage.
- B. All site planning, clearing, preparation and development, as required.
- C. All engineering design certification and documentation.
- F. Design & Construction
 - Prepare all pre-stamped drawings and specifications necessary for the designs and construction, as applicable.
 - State to review and approve pre-stamped drawings and specifications prior to zoning, permitting and ordering.
 - Provide State of Maine PE stamped drawings and specifications to State.
- G. Utility Services
 - All commercial utility service relocations and/or improvements necessary for the installation.

H. Access

- All access road improvements and clearing as necessary for delivery of all materials.
- All access road repairs after the delivery. Road shall be restored to its pre-installation condition.

I. Premises

- To the greatest applicable and practical extent, the contractor shall restore the premises to its pre-installation condition.
- Removing all rubbish and debris associated with site preparation, unpacking of shipping materials, and/or the installation, from the premises.

J. Other work as needed to ensure a complete installation whether or not specified or shown elsewhere in this document.

6.1.6.1.2.2 Site Specific

Contractors shall assume that 400 linear feet will be required to encircle the tower, shelter and fuel tank.

SITE	PERIMETER	GRAVEL LAYER
Spruce Mtn	Encircle tower, shelter & fuel tank	No

6.1.6.2 Installation

6.1.6.2.1 General

The contractor shall be responsible for:

- The installation of the fence system and components.
- The installation of the gravel layer.
- Providing all materials, labor and tools to ensure a complete installation whether or not specified or shown.
- Installing the fence and components in accordance with the manufacturer's instructions and recommendations.

- Installing the fence and gravel components in accordance with the State's specifications, practices and standards.
- Installing the fence and gravel components in accordance with the professional engineer's design, as applicable.
- Installing the fence and gravel components in accordance with local, state and/or federal codes, as applicable.
- Neat and professional workmanship.
- Coordination with other trades, as necessary.

6.1.6.2.2 Fence

Install all materials in accordance with the manufacturer's drawings, specifications, instructions and recommendations.

Fence posts shall be ground-anchored in concrete.

Fence posts shall be weather-tight capped.

Contractor to provide written certification to State that fence was installed in accordance with the manufacturer's drawings, specifications, instructions and recommendations.

6.1.6.2.3 Gate

Install all materials in accordance with the manufacturer's drawings, specifications, instructions and recommendations.

6.1.6.2.4 Security Barrier

Install all materials in accordance with the manufacturer's drawings, specifications, instructions and recommendations.

Coil razor-tape around barbed wire.

6.1.6.2.5 Buffer Zone

At a minimum, where practical and available, a 10-foot buffer zone between the fence and the tower/shelter shall be maintained.

6.1.6.2.6 Gravel Layer

In accordance with gravel-laying practices typical of the conditions at each site.

Gravel layer shall be preceded with a weed barrier layer.

6.1.6.2.7 Helicopter Landing Zone

24 foot by 24 foot gravel pad will be compacted and include a weed barrier.

Gravel will have a grade of 0.5 to 2 percent to allow for drainage.

No obstacles taller than 8 inches will be allowed in the safety zone (45 foot radius from center of landing zone).

Approach and departure must be clear to meet a departure of 6 to 1.

6.1.6.2.8 Signage

Size, contents and location of the signs shall be coordinated with the State.

6.1.6.2.9 Grounding

6.1.6.2.9.1 General

The fence grounding shall be integrated into the site ground system.

The contractor shall be responsible for providing all materials and labor for the installation of grounding, and lightning and power surge protection devices in accordance with the manufacturer's recommendations, the State's standards, or the contractor's practices.

The State has adopted Motorola's "STANDARDS & GUIDELINES FOR COMMUNICATIONS SITES" document, latest edition, to serve as its standard for the grounding of communications structures and equipment. This document is sometimes referred to as the "R56 Manual" and is available from Motorola as hard copy (part # 6881089E50-B) and in CD (part # 9880384V83).

In the event certain aspects of the recommendations, the standards, or the practices are in conflict, then the most stringent shall prevail.

6.1.6.2.9.2 Certification

Contractor shall provide written certification to State that grounding was performed in accordance with the State's standards, manufacturer's recommendations, or the contractor's practices as specified in the General section above.

6.1.6.3 Field Inspection

- A. After installation of all the components furnished under this section, the contractor along with the Department, at its discretion, shall perform a field inspection, to verify

that the installation of the components furnished under this contract has been performed and completed in accordance with the following, as applicable.

1. The manufacturer's instructions and recommendations.
 2. The Department's specifications including testing and certifying the site's earth ground grid system meets R-56 requirements.
 3. The Contractor's installation practices and standards as approved by the Department.
- B. The Contractor shall provide all items, instrumentation, materials, equipment, and personnel necessary to conduct the inspection.
- C. Prior to the commencement of this activity, the contractor shall deliver a preliminary field inspection plan to the Department for review and approval.
- D. At the conclusion of this activity, the contractor shall present to the Department written certification that the inspection performed was in accordance with, and that the results of the inspection was in compliance with, the approved field inspection plan.
- E. At the discretion of the State, the Maine Forest Service may inspect for compliance the Helicopter Landing Zone.
- F. The Department's signature on the certification shall constitute acceptance by the Department of the inspection.

6.1.6.4 Final Acceptance

- A. General
1. After acceptance of all the inspections and all the tests. Conducted under this section, the contractor shall present to the Owner written certification that the activities were performed in accordance with, and that the results were in compliance with, the approved plans.
 2. This certification shall include the original signed copy of the individual inspection and test certifications previously accepted by the Owner.
 3. Final acceptance will be deemed final when the Owner's signature appears on this certification.

6.1.6.5 Measurement of Payment

6.1.6.5.1 Method of Measurement:

The following items will be paid for by the lump sum

ITEM #	DESCRIPTION
644.91	Perimeter Fence Accepted
644.92	Helicopter Landing Zone Accepted

6.1.6.5.2 Basis of Payment:

The accepted radio communications site Perimeter Fence and Helicopter Landing Zone Installed items will be paid for at the contract lump sum prices which will include payment for all respective items called for in the contract designed, delivered, stored, placed, constructed, installed, tested, inspected, accepted, documented, all clearing demolition, remediation, site work, materials, labor, equipment and incidentals required to complete

ITEM #	DESCRIPTION	UNIT
644.91	Perimeter Fence Accepted	LS
644.92	Helicopter Landing Zone Accepted	LS

END OF DOCUMENT

SECTION 5

Special Provision

Specification for a
Radio Communications Site
Earth Ground and Lightning Protection System

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Spruce Mountain
PIN14278.00
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6.1. Grounding & Lightning Protection

This document describes the standards of grounding for communications facilities for the State of Maine. This Standard is to be used, in conjunction with engineering judgment, for the design, modification, retrofit, installation and maintenance of communications site ground systems associated with this project.

The ground system shall consider site-specific information such as cost, site location, relative lightning risk, soil conditions, existing communications facilities, adjacent communication facilities and other pertinent information to design the optimum ground system for each site.

6.1.1 General

All metallic objects in the communications facility which enclose electrical conductors, or that are likely to have electrical currents flow in them, shall be grounded.

These objects include, but are not limited to the following: towers, transmission lines, conduits, raceways, structural and architectural steel components, shelters, generators, fuel-storage systems, fences, solar arrays and equipment cabinets and racks.

Grounding shall be adequate for personnel safety, fire hazard reduction, protection of the equipment and protection of the equipment's electronic performance from circuit faults, electrostatic discharge and lightning. All electrical and electronic equipment within the building shall be grounded.

The internal building ground system shall be a single point ground system with a single point connecting to the external ground system. This is to assure electrical isolation from fault currents and for electrical noise reduction.

The interior building ground system and exterior site ground system shall be integrated into a common, single-point ground system.

6.1.2 References

6.1.2.1 State Standards

The State has adopted Motorola's "STANDARDS & GUIDELINES FOR COMMUNICATIONS SITES" document, latest edition, to serve as its standard for the grounding of communications structures and equipment. This document is sometimes referred to as the "R56 Manual" and is available from Motorola as hard copy (part # 6881089E50-B) and in CD (part # 9880384V83).

In the event that certain grounding practices, methods or standards are in conflict with the standards adopted by the State, then the most stringent shall prevail.

6.1.2.2 Other Government and Industrial Standards

The following is a list of government and industrial grounding standards listed in the order of governing precedence:

- National Fire Protection Association (NFPA) 780 Lightning Protection Code
- National Electrical Code NFPA 70
- Institute of Electrical and Electronics Engineers Emerald Book - Powering and Grounding Sensitive Electronics Equipment

Practices, methods and/or standards contained in these documents can be used to compliment or supplement the standards adopted by the State.

6.1.3 Undesirable Methods and Materials

6.1.3.1 Ufer Grounds

Ufer or concrete-encased grounding systems are prohibited for use in MSCommNet, especially as part of the tower or building foundation, for use on new construction of communications facilities.

6.1.3.2 Aluminum

Aluminum conductors are forbidden for use on new construction of communications facilities.

6.1.3.3 Chemical Grounds

Methods of acquiring lower ground resistance by adding ionized salts (soil doping) and other chemicals are unacceptable for new construction of communications facilities. The only acceptable method of lowering the ground resistance is addition of ground rods and ground radials.

6.1.4 External Grounding Design and Installation

6.1.4.1 Grounding

An earth electrode subsystem shall be installed for each communications facility. For each site, the earth electrode subsystem shall consist of a buried external site ground system of a bare copper conductor connected to ground rods as required to obtain the overall grounding resistance goals.

6.1.4.2 Ground Resistance

The integrated, common, single-point ground system shall be designed to achieve a ground resistance of 5-ohms or less.

6.1.4.3 Grounding for Building, Architectural, and Structural Steel

All building, architectural, and structural steel shall be electrically grounded and connected into a single electrically-conductive unit. Acceptable grounding connection methods include clamps, bolting, exothermic welds and welding.

The building structural steel system shall be connected to the grounded conductor of the incoming AC supply system at the service entrance, and to the main cold-water piping and sewer systems, if the building is provided with water or sewer service and continuous metallic piping is used.

6.1.4.4 Site Ground System

Each facility shall be provided with an interconnected buried ground system for all structures. These structures include but are not limited to the following: building, sheds, towers, fuel tanks, generators, generator supports, fences and other structures.

This ground system shall be connected to the building's (or any other structure's) structural steel system and to any electrical and metallic piping systems that cross it. Connection shall occur at the nearest point to the intersection between the ground system and the item being connected.

The system shall be continuously connected into one electrical system. The ground shall be buried at a minimum distance of 24 inches from the foundation, and shall be buried at a minimum depth of 30 inches or below the frost line, which ever is greater. In hard rock locations, the 30 inches deep grounding wire installation requirement is waived.

6.1.4.5 Ground Test Well

A buried ground test well shall be furnished and placed at an exterior site location near the cable entry panel of the shelter.

The test well will be used for:

- Periodic soil resistivity and ground system resistance checks.
- Connection node for future expansion of the ground system.

The well shall:

- rise no less than two (2) inches and no more than four (4) inches above grade.
- be no less than six (6) inches in width.
- be protected inside a weatherproof non-corrosive metal or plastic-type conduit or pipe.
- be capped with a screw-type top.

- be furnished with a weatherproof identification sign.
- be placed at a location coordinated with the State.

6.1.4.6 Grounding for Lightning Protection

Lightning rods (air terminals) shall be connected to the tower.

6.1.4.7 Tower Grounding

The antenna tower shall be connected to the site ground system. The preferred attachment method for grounding conductors to the tower is by an exothermic weld attached near the base of each tower leg.

All grounding cables and wires attached to the tower, transmission lines, ice bridges and other exterior appurtenances shall be installed leading in a constantly descending manner with no sharp bends or loops. This tower ground shall be connected to the site ground system.

6.1.4.8 Guy Wire Grounding

A ground rod shall be installed at each guy anchor. This guy wire ground shall be connected to the site ground. A single ground cable shall be clamped to each guy wire above the anchor plate. This cable shall be installed in a constantly descending direction with no sharp bends or loops.

6.1.4.9 Fence Grounding

A ground rod shall be installed at intervals for each 25 linear feet of fence and at all corners and gates. This ground rod shall be installed from the closest fence post to the site ground. The fence shall be electrically connected so that it forms a single electrical unit.

Exothermic welds shall be used to connect each fence post to its associated ground rod and to the site ground system. All gates shall be connected to grounded components using exothermic welds and stranded copper wire.

All exothermic welds on fence posts shall be treated with cold galvanizing spray.

6.1.4.10 Grounding for AC Service

The commercial AC service and any generators shall connect the AC grounds and neutrals to the site ground. This connection to the site ground shall be adjacent to the master ground buss-bar.

All AC power metal equipment parts, such as enclosures, raceways or conduits, and equipment grounding conductors, and all earth grounding electrodes shall be connected into a continuous electrically conductive system.

6.1.4.11 Grounding for Telephone Services

The commercial telephone service ground shall be connected to the site ground. This connection to the site ground system shall be adjacent to the ground bar.

All telephone equipment's metal parts, such as enclosures, raceways or conduits, and equipment grounding conductors, and all earth grounding electrodes shall be connected into a continuous electrically conductive system.

6.1.4.12 Transmission Lines

The outer conductor of all coaxial transmission lines and waveguides shall be bonded to the tower at:

- its highest practical point on the tower
- midpoints along the length of the transmission lines and waveguides in accordance with the State's standards.
- the lowest point on the tower
- to the ground bar at the point of entrance to the building.

A common ground point consisting of a copper grounding bar shall be provided to ground the transmission lines at the entrance to the building. This ground bar shall be bonded to the nearest external ground point on the site ground system with two 6" copper straps. These straps shall be connected to the internal building ground bar.

This can be achieved by use of internal and an external ground bar connected with copper straps or a commercially available transmission line entrance assembly.

6.1.4.13 Other Grounding

All other metallic items at each communications site shall be grounded. These include but are not limited to the following items: metal hatches and doors, metal downspouts, roofing and siding, all metal fuel-storage tanks, telephones, electrical and other utility equipment, generators and supports, solar photovoltaic panel supporting structures, and exterior and interior cable trays and ice shields.

6.1.5 Internal Building Grounding

6.1.5.1 Ground Bar

A connection to the site ground system shall enter the building at a single point and terminate at a master ground bar. At a minimum, the ground bar shall be pre-drilled, be 18-inches in width, be 8-inches in height, and be .25-inches in thickness.

This ground bar shall be installed adjacent to the AC ground system, and shall consist of a single copper bar with attachment points for internal building grounding. The copper bar shall be connected to the external ground system by exothermic welds, brazing, or welding.

All internal equipment shall be connected to this master ground bar. This includes the telephone system, the electrical system, and RF systems connected via the internal ground bus.

6.1.5.2 Internal Building Ground Halo

An internal building ground halo system shall be installed to allow low impedance ground connections to individual pieces of equipment.

The internal building halo system may be constructed of 3/4" or 1" copper pipe bus network or of green insulated #2/0 AWG stranded copper wire.

This system shall be isolated from building steel and other electrical conductors such as metallic water pipes, conduits or structural steel.

The internal building ground halo shall be connected to the site ground system at a single point at the master ground bar.

6.1.5.3 Connection to Equipment

All stand-alone equipment shall be connected to the internal building ground bus. Care shall be taken to minimize the length of the connection to the internal building ground bus.

6.1.5.4 Connection to Electronic Equipment Racks

All electronic equipment racks, console cabinets, and transmitter cabinets shall be connected to the internal building ground bus using #2/0 AWG stranded copper wire.

6.1.5.5 Transmission Lines

The outer conductor of all coaxial transmission lines and waveguides shall be bonded to the tower at the lowest point on the tower and to the ground bar at the point of entrance to the building.

A common ground point consisting of a copper grounding bar shall be provided to ground the transmission lines at the entrance to the building. This ground bar shall be bonded to the nearest external ground point on the site ground system with two 6" copper straps.

6.1.5.6 Roof Mounted Antennas

The steel structure used to support roof-mounted antennas shall be connected to the nearest point on the site ground system.

Each building roof-mounted antenna shall be individually grounded to the master ground buss bar.

6.1.6 Grounding Components

6.1.6.1 Ground Rods

All ground rods shall be made of copper or copperclad steel and shall be a minimum of 5/8 inch in diameter and 10 feet in length.

In soils where there is difficulty driving ground rods, 3/4 inch diameter ground rod shall be used.

Sections of ground rods may be coupled together using exothermic welds or threaded connectors.

Connection from the ground rod to the site ground system conductor shall employ an exothermic weld.

Ground rods shall be driven using the proper tool to prevent deformation of the rod.

The top of each ground rod shall be driven to the depth of the site ground system.

Ground rods shall be driven to a minimum depth of 10 feet below the site ground system conductor.

In soil conditions where it is practical, ground rods shall be driven to 20 feet below the site ground system conductor.

In low conductivity soils, ground rods shall be driven as deep as practical to provide a satisfactory ground resistance.

Ground rods shall be located a minimum of 30 inches from foundation walls, concrete tower piers or concrete footings. Ground rods shall be approximately equally spaced along the site ground system.

At sites located on solid rock, or where the subsurface layer is solid rock, where ground rods cannot be installed using conventional methods, a star-shaped ground made up of #2/0 AWG bare copper conductor shall be installed in place of a ground rod.

The number and length of individual conductors in this ground system shall be configured to obtain the grounding resistance goal.

The ground system shall be buried as deeply as practical for the soil conditions.

6.1.6.2 Ground Wire, Cable Strap and Pipe

Wire for buried ground conductors surrounding buildings (main ground wire) and other structures shall be #2/0 AWG at a minimum according to NFPA 780 Lightning Protection Code, 1992 Edition Table 3-5.

All other grounding wire and connection wire shall consist of bare or green insulated #2/0 AWG or #6/0 AWG copper conductors (bonding ground wire).

In general, solid wire is to be used in locations where there is no movement between the connections, and stranded wire is to be used where movement is expected.

For low impedance signal grounds, copper strap and copper pipe is preferred. An internal copper pipe ground bus is acceptable.

6.1.6.3 Lightning Rods

Lightning rods (air terminals) shall consist of solid copper rod with a minimum diameter of 5/8 inches and a minimum length of 18 inches.

The lightning rod shall extend above all tower mounted systems such as tower lights, antennas and tower mounted preamps, which require protection.

The "area of protection" is defined by a 30° cone which extends downward from the top of the lightning rod.

All antennas, buildings and other structures within the communications site shall be protected from lightning according to NFPA 780 Lightning Protection Code, 1992 Edition. Lightning rods shall extend a minimum of 18 inches above device to be protected.

All lightning rods shall be connected to the steel supporting tower or connected to #2/0 AWG wire and connected to the site ground system.

6.1.6.4 Ground Connectors

Exothermic welds shall be used for all ground connections exposed to the elements. In places where exothermic welds are not possible, brazing, silver solder and bolted clamps are acceptable under authorization from the State of Maine.

Ground connections shall be according to tower manufacturers' guidelines.

All clamps, connectors, bolts, washers, nuts, and other hardware used in the grounding system shall be copper or bronze, except that nuts, bolts, and washers may be stainless steel.

Dissimilar metal mechanical connections shall be made with components specifically designed to reduce the likelihood of galvanic corrosion.

Dissimilar metal connections are permissible only when connecting the ground system to other systems and appropriate methods to alleviate galvanic corrosion have been made.

6.1.6.5 Underground Ground Connectors

All buried ground connections shall use exothermic welding techniques except where it presents a specific hazard such as connections to fuel tanks.

All underground metallic structures such as tanks, water lines, sewer lines, and armored cable shall be connected to the grounding system with bare copper cable with a minimum size of #2/0 AWG.

Appropriate measures shall be taken to prevent corrosion.

6.1.6.6 Rack Mounted Equipment

All electronic equipment racks shall be provided with a single copper bar, with attachment points for grounding electronic equipment.

All equipment shall have a low-impedance connection to the rack ground bar.

The rack shall be connected to the rack ground bar, and the rack ground bar shall be connected to the internal building ground system or ground bus.

6.1.6.7 Fuel Tanks and Generators

All fuel tanks and generators shall be grounded in accordance with the State's standards.

6.1.6.8 Dissimilar Metals

All ground systems shall consist of copper components.

No aluminum shall be used within any grounding system.

Connection to racks and other systems where the connection is to a dissimilar metal shall be made with components specifically designed to reduce the likelihood of galvanic corrosion.

All screws and hardware used on racks and other electronic connections shall be constructed from similar metals or from stainless steel.

Where interconnection between copper ground system components or buswork and aluminum equipment cabinets or frames is unavoidable, such connections shall be made by using prepared bimetallic strips or by a tinplate to the copper surface where it contacts aluminum.

All dissimilar metal grounding connections (aluminum-tin, copper-zinc galvanizing) in exterior locations shall be painted with waterproof sealing compound (Perma-tex or equal) for at least 2 inches on each side of the dissimilar metal connection.

6.1.7 Surge Protection

This Section describes the standards for transient voltage surge suppression (TVSS) equipment for the proposed new System.

These standards are to be used in conjunction with engineering judgment for the design, modification, retrofit, installation and maintenance of communications AC power systems, RF equipment, microwave equipment, and other equipment associated with the new System.

The system designers shall consider site-specific information such as cost, site location, relative lightning risk, and power distribution facilities at existing State and local government site communications facilities to be shared by State, adjacent communication facilities and other pertinent information to design the optimum AC Power Surge Protection system for each site.

6.1.7.1 Overview

All electronic equipment within the new System shall be protected with transient voltage surge suppression (TVSS) systems. This is to assure that there are no equipment faults due to power line fluctuations or lighting events.

Contractor shall also provide TVSS systems for all transmission lines, waveguides and data and telephone lines, or any other electrical conductors that extend off of the premises (such as tower lighting) of the communications facility. These systems shall, to the extent possible, be located at the point of entry into the equipment area or equipment shelter.

Contractor shall design an appropriate TSSV system for each application. Documentation shall be provided to demonstrate that the proposed system provides adequate TVSS protection for each application.

6.1.7.2 References

6.1.7.2.1 State Standards

The State has adopted Motorola's "STANDARDS & GUIDELINES FOR COMMUNICATIONS SITES" document, latest edition, to serve as its standard for the grounding of communications structures and equipment. This document is sometimes referred to as the "R56 Manual" and is available from Motorola as hard copy (part # 6881089E50-B) and in CD (part # 9880384V83).

In the event that certain grounding practices, methods or standards are in conflict with the standards adopted by the State, then the most stringent shall prevail.

6.1.7.2.2 Other Government and Industrial Standards

The following is a list of government and industrial grounding standards listed in the order of governing precedence:

- National Electrical Code
- Institute of Electrical and Electronics Engineers Emerald Book - Powering and Grounding Sensitive Electronics Equipment
- IEEE/ANSI C62.41-199, C62.45-1992, c62.1 and C62.11
- Underwriters Laboratories UL 1449, UL 1283, UL 489 and UL198

Practices, methods and/or standards contained in these documents can be used to compliment or supplement the standards adopted by the State.

6.1.7.3 Undesirable Methods and Materials

6.1.7.3.1 Aluminum

Aluminum conductors are forbidden for use on new construction of communications facilities.

6.1.7.3.2 Sacrificial Components

To the extent that is possible TVSS systems shall not rely on components that cease to function after a single TVSS event. In systems that use this type of technology the system shall have adequate front panel notification that the failed component requires replacement.

Systems with sacrificial components shall be designed to withstand multiple TVSS events equivalent to 10 years of typical service without component replacement.

6.1.7.4 TVSS Equipment Location

To the extent possible, all TVSS equipments shall be located as close as possible to the AC mains entrance or the building entrance of telephone or data lines after demark point. TVSS equipment on transmission lines and waveguides shall be incorporated into the transmission line or waveguide entry port ground bus panel.

6.1.7.5 Physical Conditions

6.1.7.5.1 Environmental Conditions

Equipment shall function properly under the following environmental conditions:

- Temperature: -10°C to +50°C

- Storage: -40°C to +65°C
- Humidity: 5% to 95% non-condensing
- Altitude: up to 15,000 ft. (4,267 meters).

6.1.7.6 Operating Requirements

6.1.7.6.1 Maximum Continuous Operating Voltage

The TVSS system shall be able to provide continuous operation of electrical service when voltage conditions vary within $\pm 15\%$ of normal line voltage.

6.1.7.6.2 Operating Frequency

The operating frequency shall be $60\text{Hz} \pm 5\%$.

6.1.7.6.3 Protection Modes

Protection shall be provided for all electrical configuration modes, Line-to-Line, Line-to Neutral, Line-to-Ground and Neutral-to-Ground protection as appropriate for WYE or Delta line configurations.

For telco and transmission line TVSS devices, these devices shall be in-line and shall prevent any equipment-damaging TVSS event from entering the building.

6.1.7.6.4 Transmission Line and Waveguide TVSS

These devices shall be an inline device that presents a VSWR of no more than 1.1:1 to the RF circuit and an insertion loss of no more than 0.05 dB.

The devices shall be sufficient to protect all downstream equipment from any TVSS event. In cases where a tower top amplifier is used the system shall provide adequate protection for this amplifier and associated equipment.

If there are any TVSS devices that are tower-mounted they shall provide remote control, alarm and test functions to the main facility.

6.1.7.6.5 Tower Lighting Protection

All tower lighting circuits shall have TVSS devices to protect the building equipment from any TVSS event that can enter in the tower lighting circuits.

These devices shall be located within 2 feet of the tower lighting entry point or wall penetration.

All tower lighting cables shall be run in dedicated conduits to the entry/exit point. They shall not be bundled with other cabling.

6.1.7.7 Field Inspection

- A. After installation of all the components furnished under this section, the contractor along with the Department, at its discretion, shall perform a field inspection, to verify that the installation of the components furnished under this contract has been performed and completed in accordance with the following, as applicable.
 - 1. The professional engineer's design.
 - 2. The manufacturer's instructions and recommendations.
 - 3. The Department's specifications including testing and certifying the site's earth ground grid system meets R-56 requirements.
 - 4. The Contractor's installation practices and standards as approved by the Department.
- B. The Contractor shall provide all items, instrumentation, materials, equipment, and personnel necessary to conduct the inspection.
- C. Prior to the commencement of this activity, the contractor shall deliver a preliminary field inspection plan to the Department for review and approval.
- D. At the conclusion of this activity, the contractor shall present to the Department written certification that the inspection performed was in accordance with, and that the results of the inspection was in compliance with, the approved field inspection plan.
- E. The Department's signature on the certification shall constitute acceptance by the Department of the inspection.

6.1.7.8 Final Acceptance

- A. General
 - 1. After acceptance of all the inspections and all the tests. Conducted under this section, the contractor shall present to the Owner written certification that the activities were performed in accordance with, and that the results were in compliance with, the approved plans.
 - 2. This certification shall include the original signed copy of the individual inspection and test certifications previously accepted by the Owner.
 - 3. Final acceptance will be deemed final when the Owner's signature appears on this certification.

6.1.7.9 Measurement of Payment

6.1.7.9.1 Method of Measurement:

The following items will be paid for by the lump sum

ITEM #	DESCRIPTION
644.91	Radio Comm. Site Earth Ground and Lightning Protection System, Installed
644.92	Radio Comm. Site Earth Ground and Lightning Protection System, Field Inspected
644.93	Radio Comm. Site Earth Ground and Lightning Protection System, Final Acceptance

6.1.7.9.2 Basis of Payment:

The accepted radio communications site earth ground and lightning protection system item will be paid for at the contract lump sum prices which will include payment for all respective items called for in the contract designed, delivered, stored, placed, constructed, installed, tested, inspected, accepted, documented, all clearing demolition, remediation, site work, materials, labor, equipment and incidentals required to complete

ITEM #	DESCRIPTION	UNIT
644.91	Radio Comm. Site Earth Ground and Lightning Protection System, Installed	LS
644.92	Radio Comm. Site Earth Ground and Lightning Protection System, Field Inspected	LS
644.93	Radio Comm. Site Earth Ground and Lightning Protection System, Final Acceptance	LS

END OF SECTION