Revised drawings/plans notes: 12/10/19

Jami & Jay,

I am submitting a revised set of plans/drawings as discussed. I have done an extensive amount of research and have come up with some carefully thought out revisions which I feel will meet all requirements as we have discussed over time. I will outline my thoughts briefly in the numbered points below:

I am also resubmitting a clarified appendix c, as I realized that perhaps I did not state the use of material for beneficial use clearly enough and I also adjusted the volume approximation (from 7 to 8 yards^3) to match my further refined approximation.

Finally, the local permit pending NRPA completion & final review that I was asked to refile by the board a few weeks ago, is being withdrawn and will be updated to match the NRPA permit and resubmitted to the town in future for consideration.

Thanks,

-j

1.) The regrading/resurfacing of the existing boat ramp portion of the project is closely adhering to the existing topography whenever possible to reduce any potential cut or fill in the submerged/submersible zone and decrease any resulting environmental impacts.

2.) The ramp profile is approximately 15% grade and consistent with the existing topography. As a ramp designed for and used by small trailered fishing boats, in doing so, it is less likely to affect any hydraulics of the river to minimize any potential scouring or sedimentation. In addition, this slope is enough to allow the boat to be launched/retrieved without the vehicle being in the water which aids in preserving water quality/environment impact while still maintaining a safe angle for vehicle traction. As well, the area under the trailer tongue should be above the waterline so the operator does not have to stand in the water to operate/access the boat trailer or winch during launch or retrieval. The proposed resurface material provides a far more consistent texture from MLW to HAT than the existing mixed material and will also aid greatly in vehicle traction which has been a problem in the past.

3.) The ‘facility sizing’ is a common means of managing or controlling the water based usage in a launch site. To put in layman’s terms, the real-world physical limits (parking, access road, etc.) all govern and limit the use. In general, the parking area and number of launch lanes should provide no more capacity than the desired level for the type of use, user experience, and user safety. As has been discussed before, the site has finite parking at current time and there are no plans for expanding that in the future thereby limiting concurrent use naturally. The existing access road is also conducive to small trailered fishing craft only behind a standard tow vehicle, exceptionally large or heavy vehicles or multi-axle trailers carrying large boats would not be able to realistically operate at this launch site and should not be of concern.

4.) Optimal alignment of a launch ramp in the river is from perpendicular to the bank line, to an allowance of up to 30 degrees rotation downstream to best fit the river flow line at the specific site. My existing ramp is approximately perpendicular to the shoreline in accordance with this principal and any regrading/resurfacing would continue to maintain this.

5.) As you are aware, I had originally reviewed several ‘seasonal solutions’ for the ramp resurfacing, then pivoted to a permanent solution at the concern of IF&W in their review with Army Corps due to concerns with intertidal mud and supratidal dirt substrates being a mess through seasonal insertion/removal of the seasonal. We then proceeded with investigating a more permanent solution (precast planks with sub base preparation).

I believe that we are now at a hybrid approach which brings the best of both worlds. I have adjusted the proposal to have the same subbase preparation as this is considered (by the town CEO and others) to be a non-conforming maintenance activity (repair/regrade/stabilization) of existing use. Further, the town shoreland zoning authorizes explicitly the filling and earth moving of <10 cubic yards by planning board permit.

The existing ramp resurfacing will use materials chosen carefully sized & screened and prepared/washed to prevent the erosion and other potential concerns of IF&W, DEP, while also being large enough to withstand or minimize any likely movement/lateral scour (and therefore repairs) based on water velocity/energy and typical freeze patterns observed at the site.

The river as has been previously noted is considered ‘protected/ low energy’ with velocity less than 1 m/sec as confirmed by numerous observations over the years.

As an engineer, I have spent many hours studying and factoring the vast arrays of data produced by Army, US Dept of Interior, and many others. Specifically, “Bank Stabilization Design Guidelines https://www.usbr.gov/tsc/techreferences/mands/mands-pdfs/A-BankStab-final6-25-2015.pdf” there is a great section “4.4 Computing Erosive Force and Assessing

Material and Methods Suitability" which aims to simplify things and ultimately provides the following table as a guide:

Table 4–2. Permissible Shear and Velocity Resistance Values for Selected Lining Materials (Fischenich 2001)[1]

Boundary Category	Bank Material Type	Permissible Shear Stress (lb/sq ft)	Permissible Velocity (ft/sec)	Citation(s) ([2])
Soils	Fine colloidal sand	0.02 - 0.03	1.5	A
	Sandy loam (noncolloidal)	0.03 - 0.04	1.75	A
	Alluvial silt (noncolloidal)	0.045 - 0.05	2	A
	Silty loam (noncolloidal)	0.045 - 0.05	1.75 – 2.25	A
	Firm loam	0.075	2.5	A
	Fine gravels	0.075	2.5	A
	Stiff clay	0.26	3 – 4.5	A, F
	Alluvial silt (colloidal)	0.26	3.75	A
	Graded loam to cobbles	0.38	3.75	A
	Graded silts to cobbles	0.43	4	A
	Shales and hardpan	0.67	6	A
Gravel/Cobble	1-in.	0.33	2.5 – 5	A
	2-in.	0.67	3 – 6	A
	6-in.	2.0	4 – 7.5	A
	12-in.	4.0	5.5 – 12	A
Vegetation	Class A turf	3.7	6 – 8	E, N
	Class B turf	2.1	4 – 7	E, N
	Class C turf	1.0	3.5	E, N
	Long native grasses	1.2 – 1.7	4 – 6	G, H, L, N
	Short native and bunch grass	0.7 - 0.95	3 – 4	G, H, L, N
	Reed plantings	0.1-0.6	N/A	E, N
	Hardwood tree plantings	0.41-2.5	N/A	E, N
Temporary Degradable RECPs	Jute net	0.45	1 – 2.5	E, H, M
	Straw with net	1.5 – 1.65	1 – 3	E, H, M
	Coconut fiber with net	2.25	3 – 4	E, M
	Fiberglass roving	2.00	2.5 – 7	E, H, M
Non-Degradable RECPs	Unvegetated	3.00	5 – 7	E, G, M
	Partially established	4.0-6.0	7.5 – 15	E, G, M
	Fully vegetated	8.00	8 – 21	F, L, M

(table 4-2 continued)

Bank Stabilization Design Guidelines

Boundary Category	Bank Material Type	Permissible Shear Stress (lb/sq ft)	Permissible Velocity (ft/sec)	Citation(s) ([2])
Riprap	6 – in. d50	2.5	5 – 10	H
	9 – in. d50	3.8	7 – 11	H
	12 – in. d50	5.1	10 – 13	H
	18 – in. d50	7.6	12 – 16	H
	24 – in. d50	10.1	14 – 18	E
Soil Bioengineering	Wattles	0.2 – 1.0	3	C, I, J, N
	Reed fascine	0.6-1.25	5	E
	Coir roll	3 – 5	8	E, M, N
	Vegetated coir mat	4 – 8	9.5	E, M, N
	Live brush mattress (initial)	0.4 – 4.1	4	B, E, I
	Live brush mattress (grown)	3.90-8.2	12	B, C, E, I, N
	Brush layering (initial/grown)	0.4 – 6.25	12	E, I, N
	Live fascine	1.25-3.10	6 – 8	C, E, I, J
	Live willow stakes	2.10-3.10	3 – 10	E, N, O
Hard Surfacing	Gabions	10	14 – 19	D
	Concrete	12.5	>18	H

[1] Ranges of values generally reflect multiple sources of data or different testing conditions.

[2] Citations:

A. Chang, H.H. (1988).
B. Florineth. (1982)
C. Gerstgraser, C. (1998)
D. Goff, K. (1999).
E. Gray, D.H., and Sotir, R.B. (1996)
F. Julien, P.Y. (1995).
G. Kouwen, N.; Li, R.M.; and Simons, D.B., (1980)
H. Norman, J. N. (1975)
I. Schiechtl, H.M. and R. Stern. (1996).
J. Schoklitsch, A. (1937)
K. Sprague, C.J. (1999).
L. Temple, D.M. (1980).
M. TXDOT (1999)
N. Data from Author (2001)
O. USACE (1997).

[illegible]

As can be seen in the table above, 6" stone(gravel) is rated for 4-7.5 ft/sec velocity, 2" stone (smaller than proposed, but 3" is not explicitly listed) (gravel) is rated at 3-6 ft/sec.

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Given the low energy (1 m/sec = 3 ft/sec) observed nature at this location, the slightly larger stone (3”) should be more than adequate (2” meets, 3” should exceed design criteria) especially when interlocked/compacted with the larger angular stone as a base and minimize likelihood of any scour and therefore need for continued repairs. It should be noted that the entire bed shall be as close to flush with the existing topography as feasible to further minimize both potential hydrological and visual impacts.

Furthermore, regarding the potential for ‘ice scour’, over the years I have directly observed at this location that the ice does not so much laterally scour in the river with flow of river. Due to the rising/falling tides, the flexural strength of brackish ice is relatively low, and it is constantly being broken up. The embankment quickly acquires a protective layer of ice as a result, this helps to reduce the net scour effect of a mass of ice traveling down river at or near the velocity of the water. This kinetic energy of any potential resulting impact is essentially absorbed/consumed in some combination of the protective ice and any other armament that may be in place. In this case, the larger stone sub-base being proposed to assist in absorbing this energy. Historical evidence from the site suggests that necessary repair from ice scour will be minimal if any and likely not an issue.

The major problems I have had at the location has been to ice jacking (vertical lifting of the piles near shoreline by the freezing of ice and uplift as tide comes in.) Ice jacking is often overcome through the process of driving piles deeper to increase their tractive frictional forces on surrounding earthen material, but since these were seasonal/temporary posts, that solution was not applicable. To be clear, the only ‘damage’ to date sustained has been from ice jacking of posts. Please note: No “crushing” of any docks/pier has occurred at this site (as you normally see on a lake shore during expansion and shifting of ice on lake) which only further supports the analysis, conclusion, and proposed solution. Will address specific dock related changes section below.

I am very confident that the properly prepared 6-8” angular stone subbase placed on fabric underlayment material, topped with a skim of 3-4” angular interlocking material (all properly washed and rid of fines smaller than the nominal specified size) would create the proper and safe boat ramp surface that I desire while at the same time alleviating the concerns through careful analysis of impact to the resource. All material from the portion of ramp area displaced during the resurfacing will be used for beneficial purpose per DEP regulations in upland area away from resource and the estimated volume necessary (estimated ~8 yards^3 but not to exceed the town limit of 10 yards^3 in any circumstance) fits within the regulation limits as has been discussed.

This final resulting surface, in the future should such a need arise, could also be used either as a base for a temporary solution similar to those as we had evaluated in the beginning of the NRPA process (the subbase preparation would alleviate the concerns about placement of seasonal structures raised then) or it could even be used as a subbase for a permanent solution once the town clarifies any potential inconsistency in the ordinances as needed. I strongly feel that this is a 'metered' solution, sized appropriately for use and conditions, that meets or exceeds all specified requirements at the State, Town, and Federal level as well as the needs of the folks potentially using the ramp and balances the protection of the resource through minimization and careful thought.

Obviously, any potential future work would also be conditional upon any state/federal/town level permitting as necessary.

I recently observed in an issued permit issued by the State of Maine in 2017 which contained a conditional item based on a commitment of periodic, documented, evaluation of onsite conditions, excerpted here for your review:

"C. monitor for erosion issues biweekly, and take one picture biweekly, of the trailer lane for damage from trailered boats and wheeled vehicles throughout the 2017 boating season (from the launch repair date to October 31, 2017); and D. install 10-foot or 12-foot wide pre-cast concrete boat ramp planks on the trailer lane of the ramp should launching create erosion and damage to the lake bottom during the monitor timeframe. If no damage is observed from trailered boats or wheeled vehicles along the trailer lane, the Applicants are not proposing to install the pre-cast concrete boat ramp planks."

I therefore propose that we condition this permit (if this is indeed a concern of DEP/ARMY) in a similar fashion. I will commit to photographic monitoring on a biweekly basis for a full season of use to ensure that the engineering lives up to its expectations and does not put the resource in danger. Should there be evidence of an impending problem with erosion through use, then I will then move to either addressing via a seasonal or permanent solution at that time. This allows us to conclude the permitting process that we are all invested in, while also ensuring the proper and ongoing protection of resource.

Please let me know if there are any concerns/clarifications/questions as i have tried to summarize a great deal of detailed information in a short explanation.

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Now, for the dock related portion of the discussion of changes.

I have made the following changes to the design of the dock system:

1.) I removed the two proposed permanent 12”-16” piles & proposed protective rip rap at the HAT line and moved them above HAT line at top of embankment. This further minimizes the direct impact by approx. 18 ft^2 to coastal wetland and eliminates the concern at the town level for a new permanent structure at/below the HAT line should that concern be ultimately proven to be true. The 4 supporting upland piles have been placed at the top of the embankment, and now have a low (~1’ tall) “deck’ surface that is 4’x5’ connecting the piles along with cross bracing. The deck allows users to step up from ground and onto raised ramp and provides necessary clearance from ramp to embankment surface necessary to provide clearance as tide & float lowers. The gantry design of the front/waterward two piles is still relevant in new location as it is used to assist in lifting & removing ramp. This design change should provide sufficient anchorage for the 40’ aluminum (seasonal) ramp, connected to the float system that is in the water at all times while eliminating the local concern of a new permanent structure at or below HAT.

2.) The float system (seasonal) has been reviewed and altered to further minimize the potential indirect impacts and adhere to minimal size for the use. The existing landing float has been changed from 5’x16’ and is now proposed to be 5’x7’ (~44% reduction in size). I believe that with a reconfiguration of floats, this will support weight of ramp and persons walking across it. The main float components will also be reconfigured so that total size (not inclusive of previously mentioned landing float) will be reduced from 8’x32’ to 8’x24’. A reduction of 25%. ADA and other construction standards that i have reviewed for guidance indicate that a (main) float should be no less than 8’ wide for stability/safety reasons, and I believe that the 24’ length should allow for maximum concurrent common use by a reasonable number (2-3) of people as is likely expected based upon capacity planning and ultimately governed by available facilities (e.g. parking, etc.).

3.) I have also made clearer in diagram the two granite blocks & chains (seasonal) that are used as anchors on the float system.

4.) I have increased the length of the aluminum ramp (seasonal) by 5' to account for the movement of the piles to top of banking above HAT.

Notable Reference material:

1.) http://watercraft.ohiodnr.gov/Portals/watercraft/PDFs/FacilityStandards.pdf

2.) https://www.usbr.gov/tsc/techreferences/mands/mands-pdfs/A-BankStab-final6-25-2015.pdf

3.) https://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-1612.pdf