

**HUDSON HIGHLAND FJORD TRAIL
SHORELINE SEGMENT
SEA LEVEL RISE WORK SESSION**

**DESIGN MEETING MINUTES
MARCH 30, 2017**

Re: Hudson Highlands Fjord Trail
Shoreline Segment
D&B No. 3750

Date: April 23, 2017 (Rev)

Location: Scenic Hudson, Poughkeepsie offices

Attendees: Amy Kacala, Scenic Hudson
Nava Tabak, Scenic Hudson
Rob DeGiorgio, D&B Engineers & Architects, P.C.
Chris Robbins, AKRF
Dave Cuff (via conference call, MTA)
Toby Ritz, (via conference call, MTA)
Lisa Vasilakos, NYSDOS
Heather Gierloff, NYSDEC
Gabriel CebadaMora, NYS Parks

Prepared by: Rob DeGiorgio



The following is a general summary of the Shoreline Segment/ Sea Level Rise Work Session held at Scenic Hudson's offices in Poughkeepsie, New York at 10:00 AM on March 30, 2017, for the above referenced project. These meeting minutes have been prepared by D&B Engineers and Architects, P.C. (D&B). Any additions, deletions or corrections to these minutes should be forwarded to Rob DeGiorgio at rdegiorgio@db-eng.com within 5 days of receipt. Otherwise, these minutes will be approved as written.

1. The meeting opened with introductions of those in attendance. D&B provided a brief overview of the entire seven segment trail master plan and the status of the Breakneck segment which is 90% designed and expected to bid for construction this summer.
2. A presentation outlining broad concepts regarding sea level rise design, coastal resiliency guidance and concept designs associated with the shoreline trail design was given.
3. The Department of State (DOS) noted their consistency review unit and resiliency group would weigh in on design ideas to provide input and that sustainable shoreline techniques and hybrid vegetation/hardscape approaches have been trending lately. DOS is funding the

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design for a segment of the Hudson Highlands Fjord Trail along the Hudson River between Little Stony Point and Breakneck Ridge.

4. The MTA has over 70 miles of tracks that are subject to flood waters and sea level rise. The MTA noted the tracks themselves are robust and while they are susceptible to flooding at current sea levels, once the water recedes and minor maintenance performed, the tracks can be returned to service.
5. Most planning and investment being conducted by the MTA for resilience focuses on a 5-year time horizon. Long-range sea level rise is not something being actively addressed due political and budgetary realities given the sheer cost involved. The MTA's focus has therefore been on near-term vulnerabilities, which is the electrical power and signaling systems, underground conduits and distribution centers that are more susceptible to damage from floods and rising waters and would have broad-reaching system implications if damaged. A large scale Positive Train Control (PTC) mandate, requiring an upgrade to the signaling infrastructure in the upper reaches to Poughkeepsie, is also a factor driving this priority.
6. The MTA noted rip-rap and natural hardening techniques such as vegetation have been used/contemplated in a few locations to reinforce tracks. In general, a design criteria of the 100-year flood elevation plus 48 inches (24 inches for SLR and 24 inches for storm surge) has been used in planning as the design flood elevation (DFE). Coordination with the MTA Track Department is needed to ensure track stabilization requirements are met/maintained.
7. With regards to a trail along this shoreline section, MTA is concerned with maintaining access along the tracks, at least 12 feet is needed for vehicle to access the tracks. In addition, safety is a concern, a positive barrier (fence) would be required to segregate the at-grade trail from the tracks. The design concepts put forth seem to accommodate both requirements. Visual impacts to riders will also be a factor in their review.
8. Top 3 MNR Issues
 - 1 ó Safety is Primary Concern ó whatever is used to separate hikers from rail must be extremely safe and very robust
 - 2 ó Trail must not infringe on MNR access; it must not impeded MNR's ability to maintain all equipment and rails and install new equipment and infrastructure
 - 3 ó Trail must be robust; it cannot become a maintenance issue for MNR and if trail maintenance is needed, keep in mind that it will take a long time to get access in order to make repairs.
9. The NYSDEC noted the proper reference for the SLR rise data is the lower Hudson data which shows a 39 inch (not 36 inch) medium-high projection in 2080. The Battery tide gauge may be a useful source for data.

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10. The NYSDEC also noted the river depth and quick drop off in elevation from shore along this section of the Hudson may preclude certain living shoreline techniques. The amount of fill required would likely be prohibitive from an environmental impact as well as cost perspective.
11. With regard to design, NYSDEC indicated that, where shoreline stabilization is required, neither geotextiles nor gabion baskets should be used. Existing vegetation should be maintained wherever possible. For rip rap application (really the only shoreline stabilization option in this reach of the Hudson River), joint plantings both above (mainly) and below MHW should be considered.
12. NYSDEC noted that construction of the trail can be done from moored barges. The suggestion was made to look to the TZB for ideas on how to build from the water including staging.
13. Bathymetric data is reportedly available for the area and the dynamics of the shore are critical in selecting a shoreline stabilization method.
14. After reviewing a variety of trail designs, the group concluded a cantilevered trail section on land-based piers may be best suited. D&B suggested such a cantilevered section can be fitted with a pre-cast concrete box along the length of trail to house MTA signaling cable. This would allow the cable to be installed above the sea level, easily accessible above grade and reduce costs for excavation, etc. The base of this structure could also serve as a protective element for sea level rise and storm surge and could be designed in a way that height is added as sea levels rise. Consider an adaptive design that will allow for components to be changed out and or added; one that lives and changes with SLR. Approximately 1,000 feet of this cantilevered trail is contemplated. The DEC noted that some rip rap will be acceptable for stabilization of the structure initially. But the rip rap should not be extended to the height of the Sea Level Rise projection. In the future, if the rip rap is needed it will likely meet issuing standards. But for the initial trail design and implementation the amount of fill on the shore should be limited to what is necessary initially.

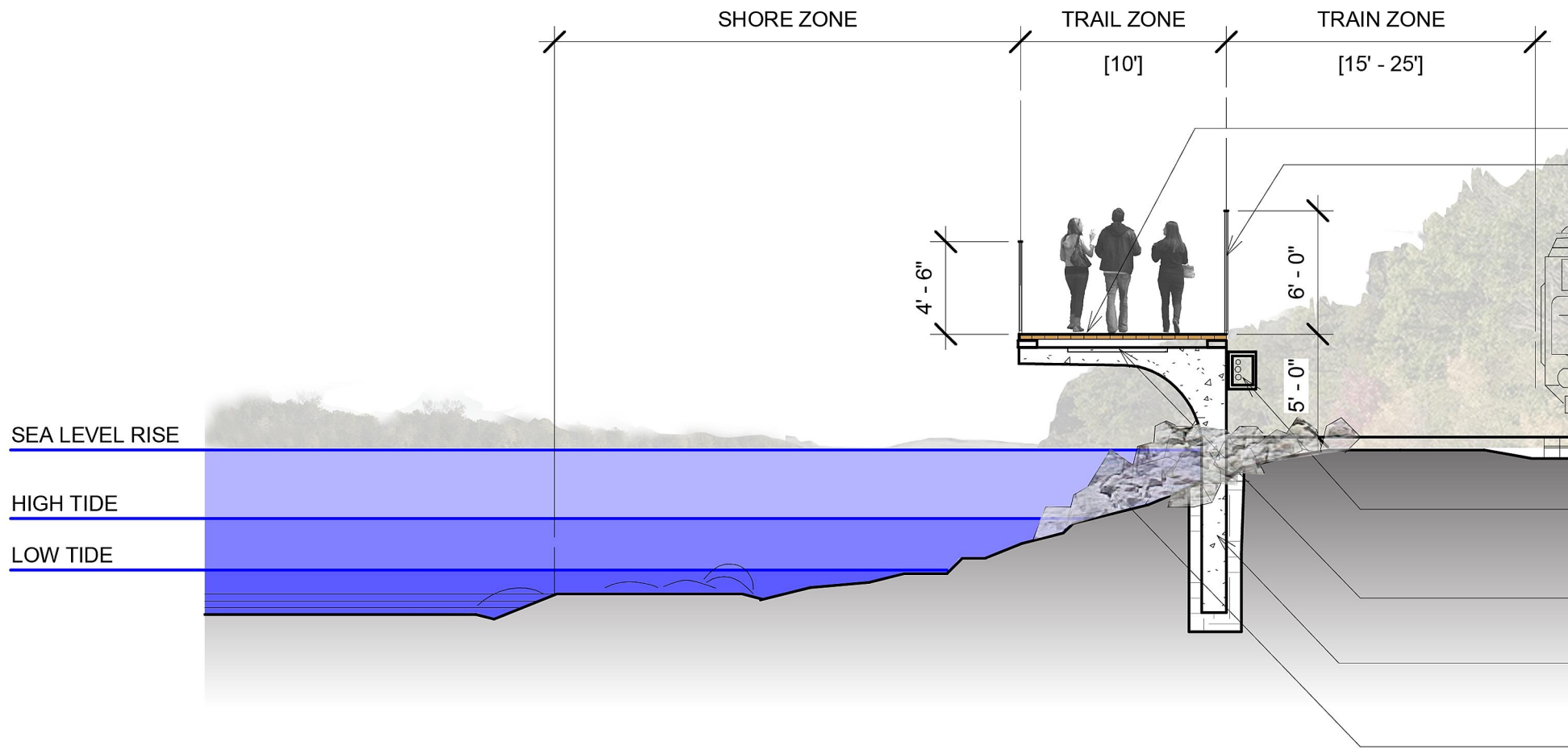
Action Items:

1. D&B to create rendering of concept plan that was contemplated in the meeting and may meet the needs of all parties. (Completed and attached herein.)
2. Detailed Engineering Feasibility Plan is underway.

Attachments:

- Concept Sketch of cantilevered trail section

SKETCH of ATTACHED



ELEVATED TRAIL - CONCEPT C (CANTILEVERED CONCRETE PILINGS)