

## **Appendix 3.2-D**

### **Pine Swamp Trestle Memorandum**



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**Memorandum**

To: File

Date: March 9, 2012

Project No.: 10111

From: Mark Louro  
Lisa Standley

Re: South Coast Rail  
Pine Swamp Trestle

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The Secretary's Certificate on the DEIR stated that "The FEIR should ... evaluate the feasibility of constructing a trestle through Pine Swamp". The current design for the Stoughton Alternative includes an at-grade track structure through the Pine Swamp, utilizing the existing embankment to carry the proposed track. This memorandum compares the current at-grade design through the Pine Swamp with a trestle option similar to the structure proposed for the Hockomock Swamp. As documented below, a trestle could be constructed through Pine Swamp but is not practicable based on cost, particularly when considered in the context of impacts to biological resources.

### **Pine Swamp**

Pine Swamp is a 275-acre wetland system located in western Raynham and consisting of several properties that are owned by the Town of Raynham Conservation Commission. The Stoughton Line crosses the swamp in a one-mile segment from King Phillip Street to East Britannia Street (Figure 1). This area consists of forested and marsh wetlands known as Pine Swamp, an area that is located within estimated habitat of rare wetlands species, and which supports an Atlantic white cedar swamp community. Atlantic white cedar swamps do not support



unique wildlife species, although some wetland species are more likely to occur in these coniferous wetlands than in red maple swamps. Ambystomid salamanders, four-toed salamanders, wood frogs, spring peepers, and spotted turtles are characteristic reptiles and amphibians (although none of these are restricted to Atlantic white cedar wetlands). In the 2001 wildlife surveys, VHB found four-toed salamanders and spotted turtles in Pine Swamp. Some bird species (red-shouldered hawk, barred owl, brown creeper, golden-crowned kinglet, northern and Louisiana waterthrush) are also characteristic of Atlantic white cedar swamps. There are no small mammals restricted to these wetlands, although red squirrels inhabit coniferous wetlands as well as uplands.

Pine Swamp is currently fragmented by the former railroad bed, which acts as a barrier to aquatic organisms except at the two culverts. The swamp is also fragmented by the Taunton Municipal Light Corporation's overhead powerline which is maintained as a cleared utility corridor.

In November 2011, the UMass Extension Center for Agriculture published two sets of town maps based on CAPS<sup>1</sup>. In conjunction with DEP, UMass produced Important Wildlife Habitat maps. In cooperation with MassDOT and the Federal Highway Administration (FHWA), UMass produced IEI maps showing the 50 percent of the landscape with the highest IEI values and color-coded by habitat type (forests, shrublands, freshwater wetlands and aquatic habitats). These maps show the existing conditions and are useful in visualizing the existing important biodiversity areas. In addition, these maps are useful in identifying areas where biodiversity mitigation may be of the most value. The DEP map, "Habitat of Potential Regional or Statewide Importance", shows important wildlife habitat ONLY on the west side of the ROW in Pine Swamp, indicating that there is not a compelling wildlife habitat connectivity across the ROW.

Pine Swamp is a small (relative to the Hockomock) wetland ecosystem that is not recognized as an ACEC or Important Bird Area. It does not have extensive vernal pool complexes adjacent to the existing elevated embankment or track bed, and does not support state-listed salamanders or turtles. The only state-listed species present is a butterfly (Hessel's hairstreak). The area immediately adjacent to the existing embankment is a power line where invasive species (*Phragmites*) have become established.

### **At-Grade Option**

The existing embankment through the Pine Swamp extends 5,300 feet from King Philip Street to East Britannia Street. The top of the embankment varies from elevation 67 at King Philip Street, the northern limit, to elevation 58 at East Britannia Street, the southern limit. The At-Grade Option for the Pine Swamp section of the Stoughton Alternative, as presented in the DEIS/DEIR, was developed to minimize wetland impacts, particularly through the 3,300-foot section where the existing embankment is narrowest (the "limited width area").

The cross section currently proposed under the South Coast Rail Project for the limited width area utilizes layers of geogrid reinforcing to stabilize the 1:1 embankment and minimize wetland impacts. The proposed cross section (Figure 1) consists of the ballast layer running level one foot beyond the end of the tie where the slope breaks and slopes 2:1 to the bottom of the subballast layer at which point the side slope steepens to 1:1 by introducing a mechanically stabilized reinforced earth (MSRE) treatment using geogrid reinforcing between six-inch layers of compacted gravel fill. This solution offers a cost effective slope retention system that reduces the overall footprint of the proposed track bed structure by minimizing the embankment width to approximately 24 feet. This MSRE cross section does not include a three foot level walkway within the 3,300-foot limited width area as is proposed elsewhere. Also the MSRE treatment enables the proposed top of rail profile to remain one to three feet above the existing embankment, minimizing any visual barrier effect to wildlife.

The At-Grade Option would cost approximately \$5 Million, and would result in filling approximately 15,600 square feet of wetland (Figures 3 and 4). Wildlife passage would be provided by reconstructing the two existing stream crossings with extended culverts (which provide a shelf or bank on either side of the waterway to allow a passage for non-aquatic wildlife), and by adding at least four wildlife underpasses. These wildlife underpasses will maintain travel passages for species that may be unable to cross the tracks (salamanders, frogs, turtles, small mammals) as well as

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<sup>1</sup> <http://www.masscaps.org>

enhance travel passages for small mammals that may be deterred from crossing an active rail line. Drift fences will be installed that will facilitate wildlife passage by directing movement to these underpasses.

### **Trestle Option**

As required by the Secretary's Certificate, we have developed a trestle structure similar to the structure proposed for the Hockomock Swamp. It consists of two distinct cross sections – a 1,000-foot transition at each end and a central trestle structure, which is approximately 3,300 feet long. The transition (Figure 5) includes a cast-in-place (CIP) retained fill section that vertically transitions from the standard at-grade track cross section to the trestle at a grade of one percent. The retained fill section has an overall width of 28 to 30 feet. The cast-in-place retaining walls maintain a vertical barrier along each side of the track to minimize wetland impacts as the track profile rises up to the level of the trestle. The trestle (Figure 6) consists of a prestressed concrete superstructure. The overall width of the superstructure is 21 feet and is supported on pile caps that are spaced every 30 feet. The bottom of the superstructure is approximately three feet above the existing track bed to allow for inspection and maintenance, which translates to the top of rail profile rising up above the existing embankment as much as 9.5 feet. This solution reduces wetland impacts to only those locations where the pier caps and transition retaining walls extend into the bordering vegetated wetlands.

The design evaluated for Pine Swamp is the same as the trestle design for the Hockomock Swamp, because we assume that the same conditions exist in both locations. The railroad was built on fill placed over a swamp. Geotechnical borings from the Hockomock Swamp show a deep subsurface layer of peat over sand, silt and clay. Deep pilings are necessary to support the Cooper E-80 loadings required for the railroad. VHB and the geotechnical engineers at Jacobs have evaluated the data and conclude that the proposed pile-supported trestle is the most cost-effective structure in the Hockomock Swamp. It would therefore be the most cost-effective structure that meets the project loading requirements in Pine Swamp.

The superstructure types considered consisted of common steel and concrete structures, and prefabricated concrete arch units. Steel deck beam and through girders and prestressed concrete box beams and Northeast Extreme (NEXT) beams were evaluated for cost, ease of construction and maintenance. Consideration was also given to maximizing span lengths to minimize the number of piers to be constructed. Prestressed concrete boxes were found to be the most cost effective, offered a range of workable span lengths, and require the least amount of maintenance. Steel structures offer longer span lengths, but they are more costly, require more maintenance, and the advantage of longer span lengths is counter balanced by limited access to the trestle site. The concrete arch option is more costly than the prestressed beams, and physical limitations with the arch design require the trestle to be constructed at an excessively higher elevation than the other alternatives resulting in more impacts associated with constructing longer approaches. Based on the prestressed box beam type, the Trestle Option would cost approximately \$50 Million, which includes engineering and construction costs. Other alternatives may be considered beyond the common bridge types, however it is not anticipated that any savings would be significant enough to make the trestle a viable option. This option would result in filling approximately 3,800 square feet of wetland (Figures 7 and 8).

Wildlife passage would be provided by the existing culverts (which do not have a shelf or bank on either side of the waterway to allow a passage for non-aquatic wildlife), and in the space under the trestle.

## **Taunton Municipal Power & Light Impacts**

The Taunton Municipal Light Corporation (TMLC) currently uses the existing rail embankment for maintenance access of their overhead wires. A meeting was held with TMLC on February 16, 2012 (notes attached) to discuss the proposed track through the Pine Swamp and access requirements. TMLC annually inspects their wires and poles using the embankment for truck access for access. Once the track has been constructed they will be required to use a high-rail vehicle to perform this function. A separate access road is not required and will not be constructed. With the At-Grade Option, the track will be less than three feet above the existing profile and the proposed embankment will allow access to each pole by foot and from a high-rail vehicle. TMLC may also relocate the line to Route 138 as another option.

## **Practicability**

While each of the construction options offer a benefit to the project they appear to be on opposite ends of the spectrum regarding impacts and costs. The At-Grade MSRE solution provides a reasonable cost effective solution that retains and stabilizes the existing railroad track bed at a cost of less than \$5 million and 15,600 square feet in wetland impacts, while maintaining wildlife passage. The At-Grade solution allows larger wildlife to cross over the tracks and provides wildlife passage for smaller animals through two enhanced culverts (reconstructed to meet Stream Crossing Standards, with upland shelves) and four additional between-the-ties wildlife passages. The Trestle Option has reduced impacts to wetlands (3,800 square feet) but at a cost of \$50 million.

It is useful to compare Pine Swamp with the Hockomock Swamp to establish the justification for the extraordinary expense of an elevated trestle structure, at more than ten times the cost of at-grade rail. The South Coast Rail Project includes a 1.8-mile trestle through the Hockomock Swamp. The decision to elevate the track in the Hockomock Swamp was based on discussions with the Natural Heritage and Endangered Species Program staff during the prior MEPA process, and was an important mitigation commitment made in the 2002 FEIR and upheld by MassDOT in the current design for impacts on state-listed rare species.

The Hockomock Swamp is part of the Hockomock Swamp Area of Critical Environmental Concern (ACEC), which includes approximately 16,950 acres in Bridgewater, Easton, Norton, Raynham, Taunton, and West Bridgewater. In addition to its protection as an ACEC, portions of the swamp are also owned by MassWildlife as the Hockomock Swamp Wildlife Management Area, and it is designated as an Important Bird Area by the Massachusetts Audubon Society. The swamp is also designated as a Biomap Core Area by the NHESP, and is known to contain populations of several state-listed species.

A trestle was selected for the Hockomock Swamp section of the Stoughton Alternative, from Foundry Street to the Raynham Greyhound Park, to mitigate impacts of the South Coast Rail project on wetlands, rare species, vernal pools, and biological diversity. The Hockomock Swamp is a unique and highly valuable ecosystem, as indicated by its status as an Area of Critical Environmental Concern, Wildlife Management Area, Important Bird Area, and Biomap Core Habitat. The trestle, although it will increase project costs substantially, will allow vernal pool amphibians, state-listed rare salamanders and turtles, and other small vertebrates, to pass freely across the existing embankment through the swamp. Modifications to the embankment will allow passage of larger vertebrates.

While the Pine Swamp has conservation and biodiversity value, it is not a wildlife habitat for rare amphibians, a wildlife corridor, an ACEC or an IBA. The DEP Important Wildlife Habitat maps

show that there is important wildlife habitat currently only on the west side of the ROW. Pine Swamp therefore does not have the extraordinary wildlife habitat value on both sides of the ROW that justifies the additional \$45 million expenditure necessary to construct a trestle. The proposed MSRE stabilized track bed through the Pine Swamp along with other proposed mitigation including modifications to existing culverts and additional wildlife crossings provide a reasonable cost-effective solution to reduce the barrier effect resulting from replacing the former tracks that is in keeping with the biological diversity and overall value of the Pine Swamp.

### **Summary**

Because Pine Swamp does not provide extraordinary biodiversity values, a trestle would not provide significant biodiversity or rare species benefits. The cost increase (ten times the cost of the At-Grade Alternative) is not warranted and the trestle is not practicable based on cost. Proposed wildlife crossing structures would mitigate for the effects of reconstructing the At-Grade Option, and the proposed MSRE treatment would minimize wetland impacts.

### **Attachments**

- Figure 1 – Pine Swamp Crossing
- Figure 2 – MSRE Cross-Section
- Figure 3 – MSRE, Northern Approach
- Figure 4 – MSRE, Southern Approach
- Figure 5 – Trestle Cross-Section, Transition
- Figure 6 – Trestle Cross-Section
- Figure 7 – Trestle Option, Northern Approach
- Figure 8 – Trestle Option, Southern Approach

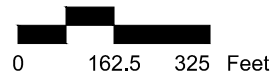
TMLC Meeting Notes



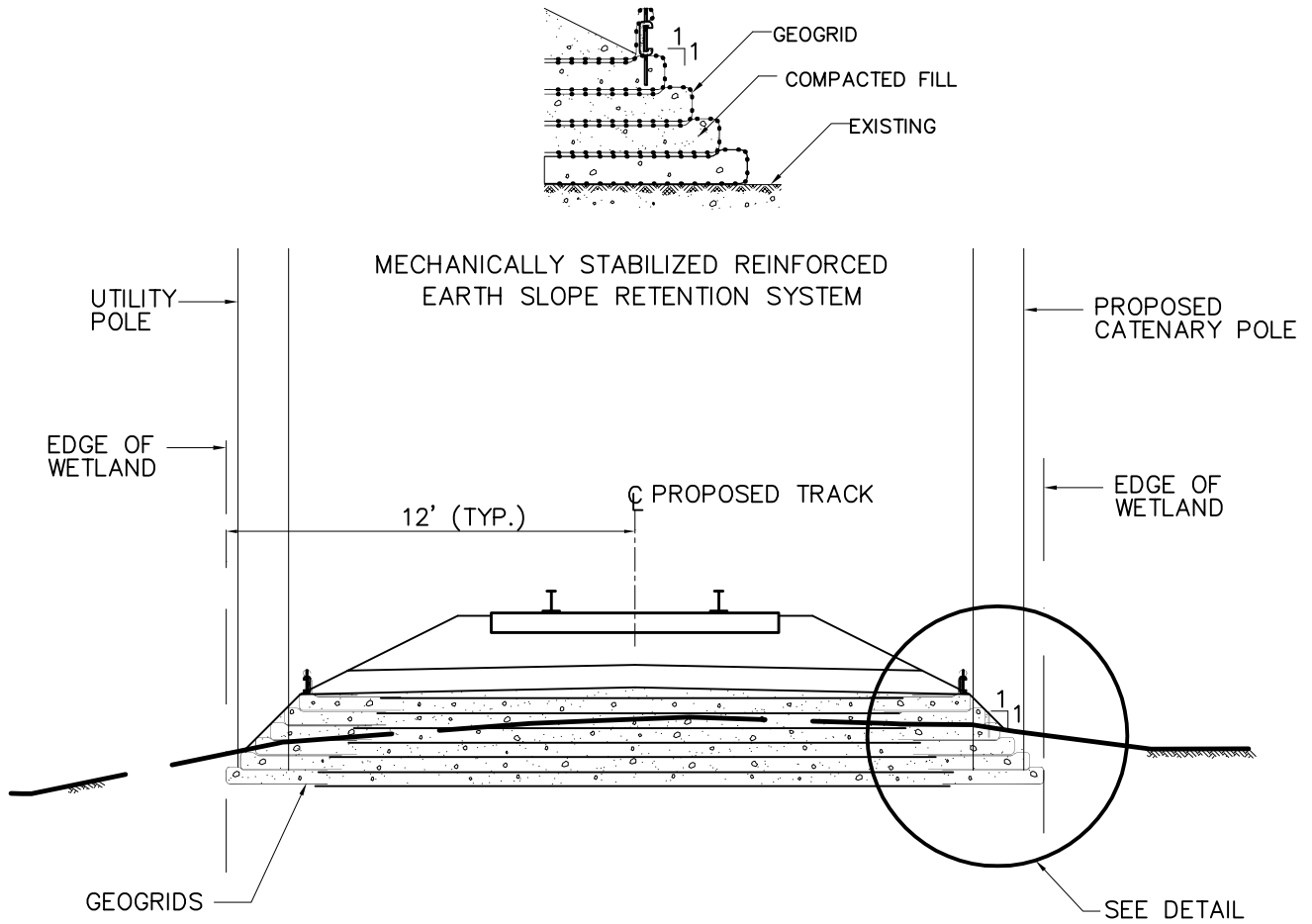
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Figure 1  
Pine Swamp Crossing



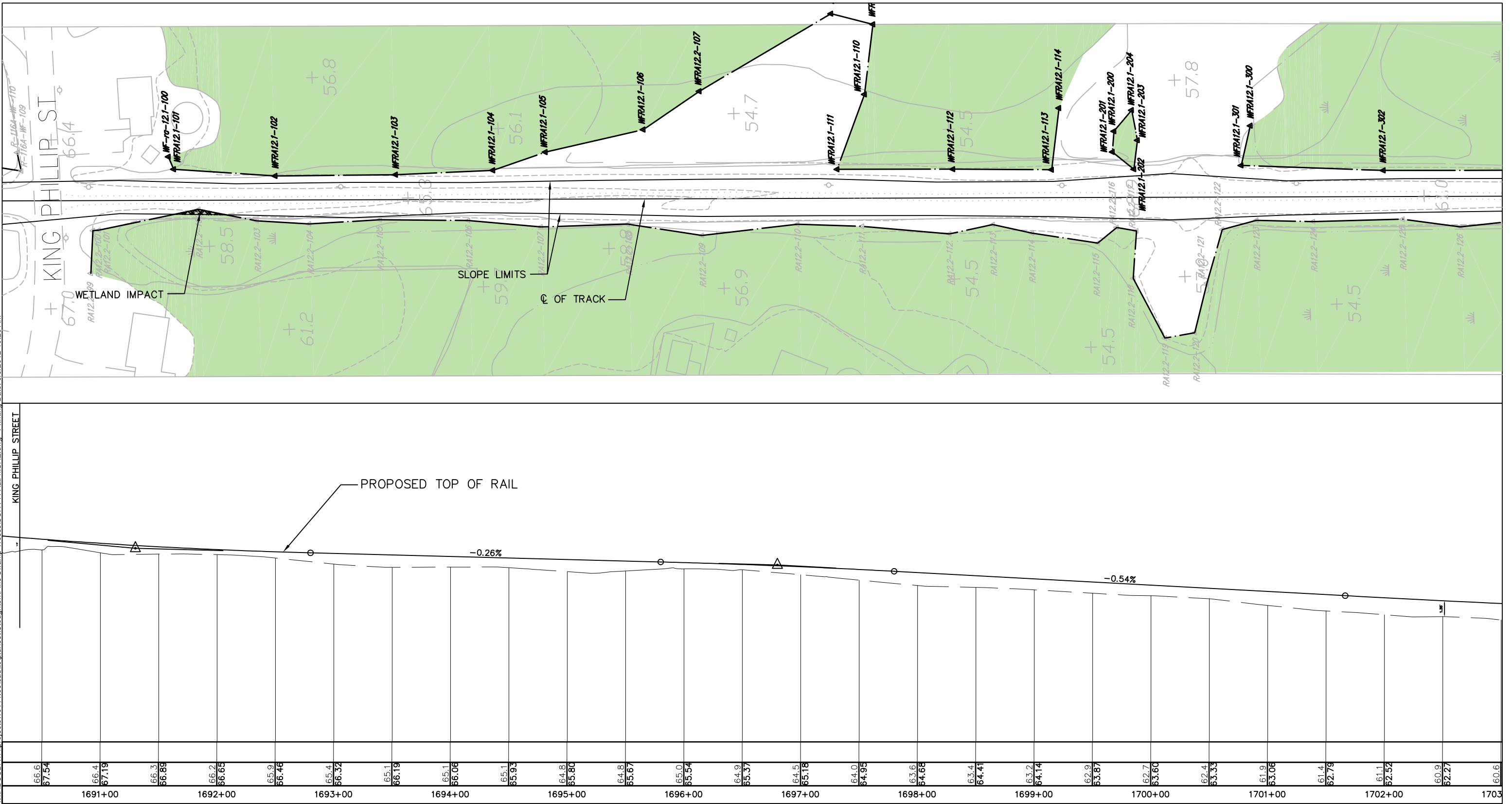




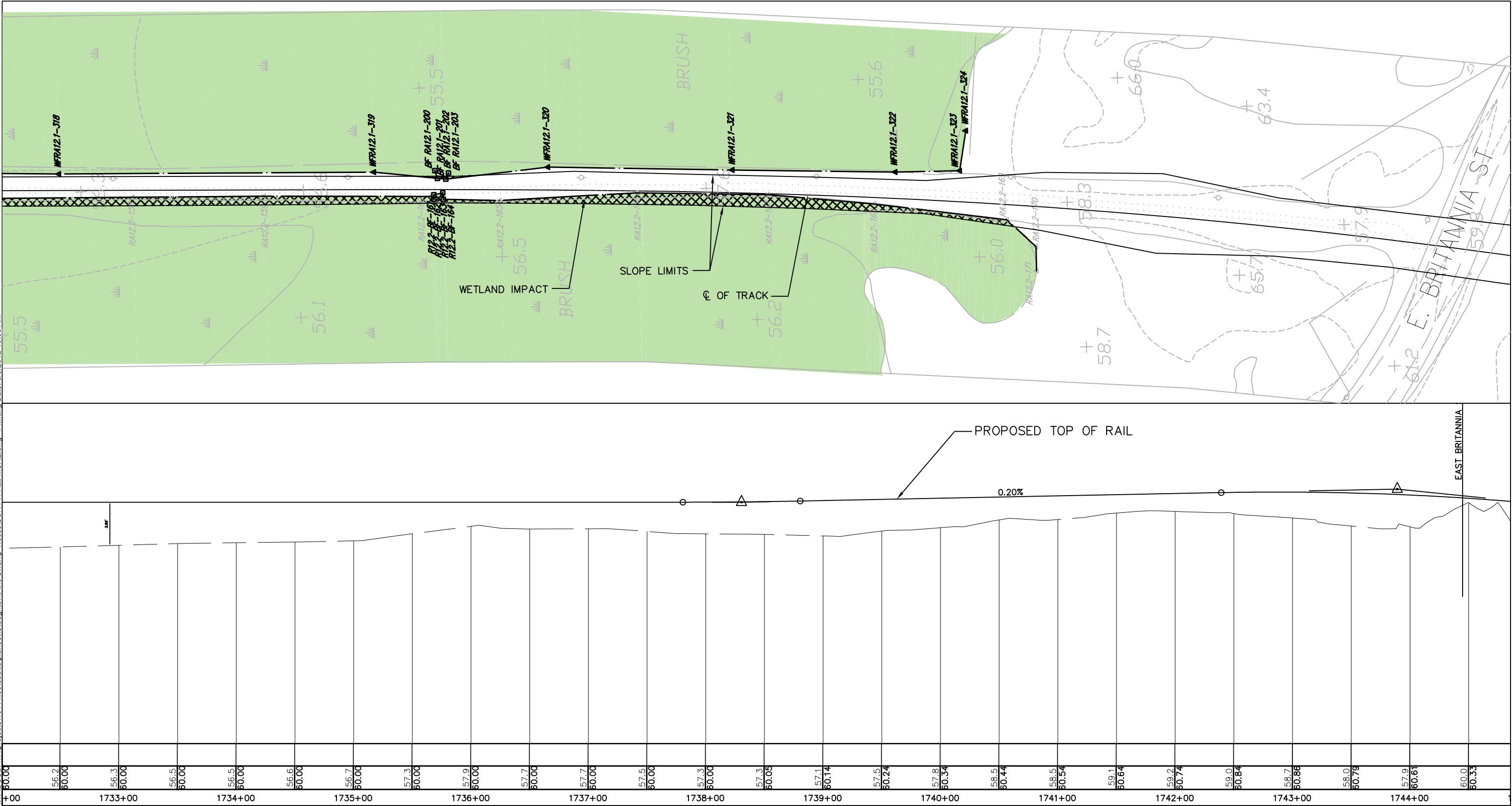
**Figure 2**  
**MSRE Cross Section**  
**Not to Scale**

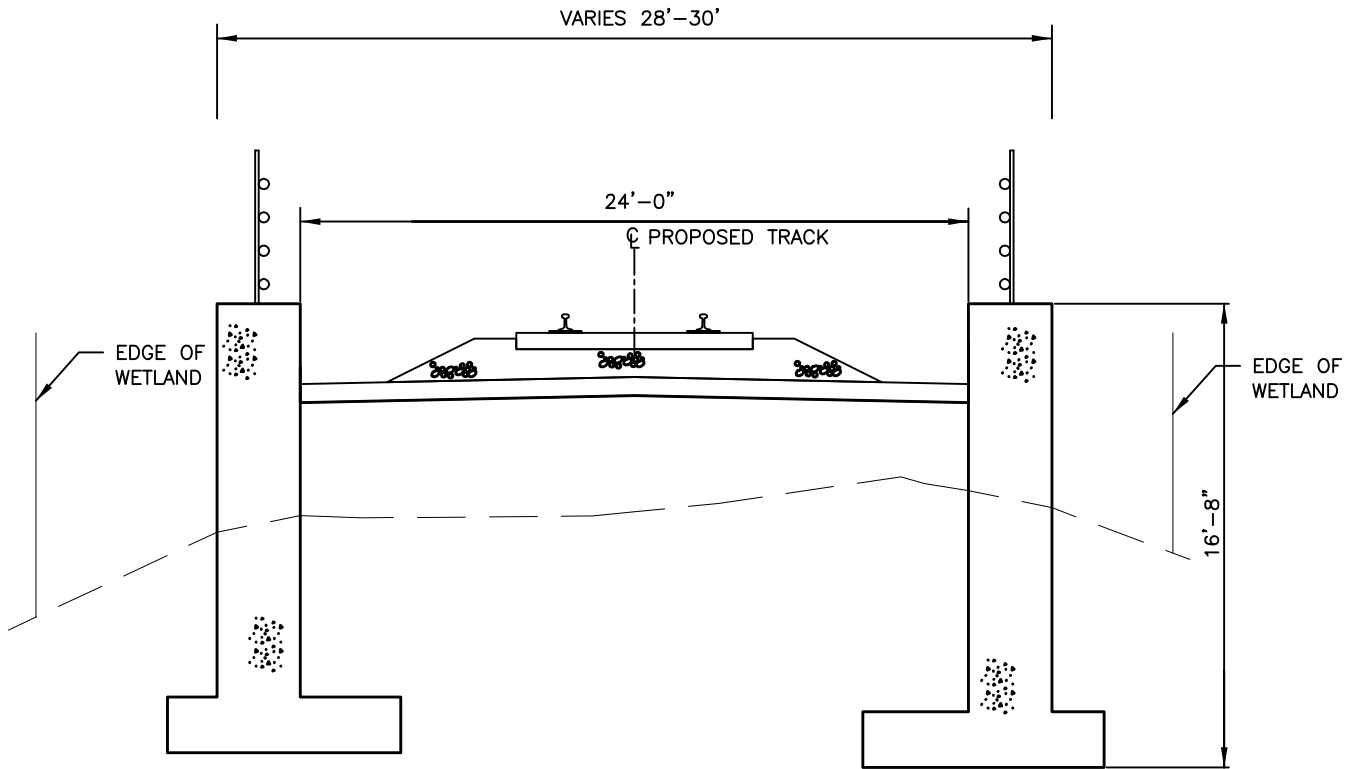


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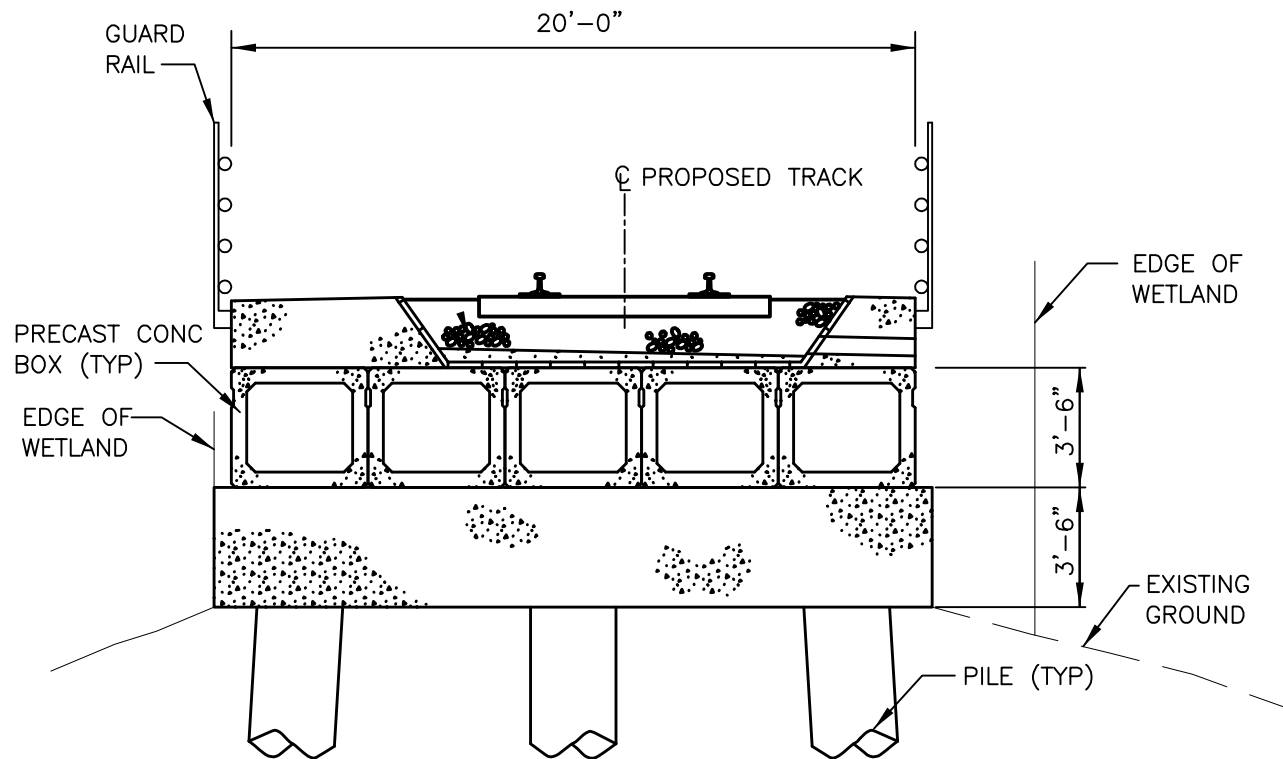
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**Figure 5**  
**Transition Cross Section**  
**Not to Scale**





**Figure 6**  
**Trestle Cross Section**  
**Not to Scale**

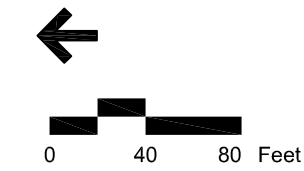
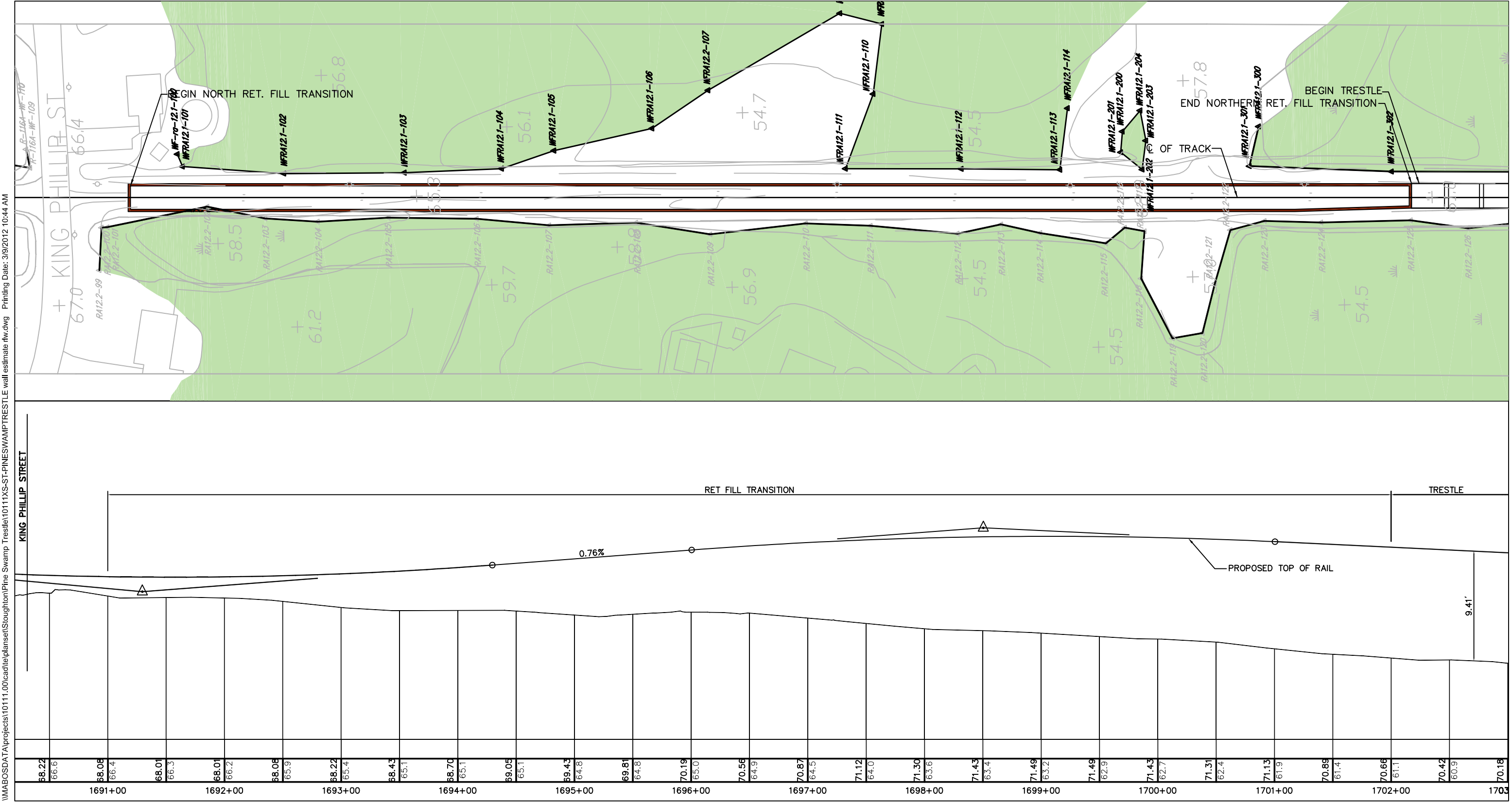


Figure 7  
Pine Swamp Trestle  
Northern Transition  
1"=80'

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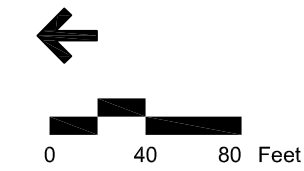
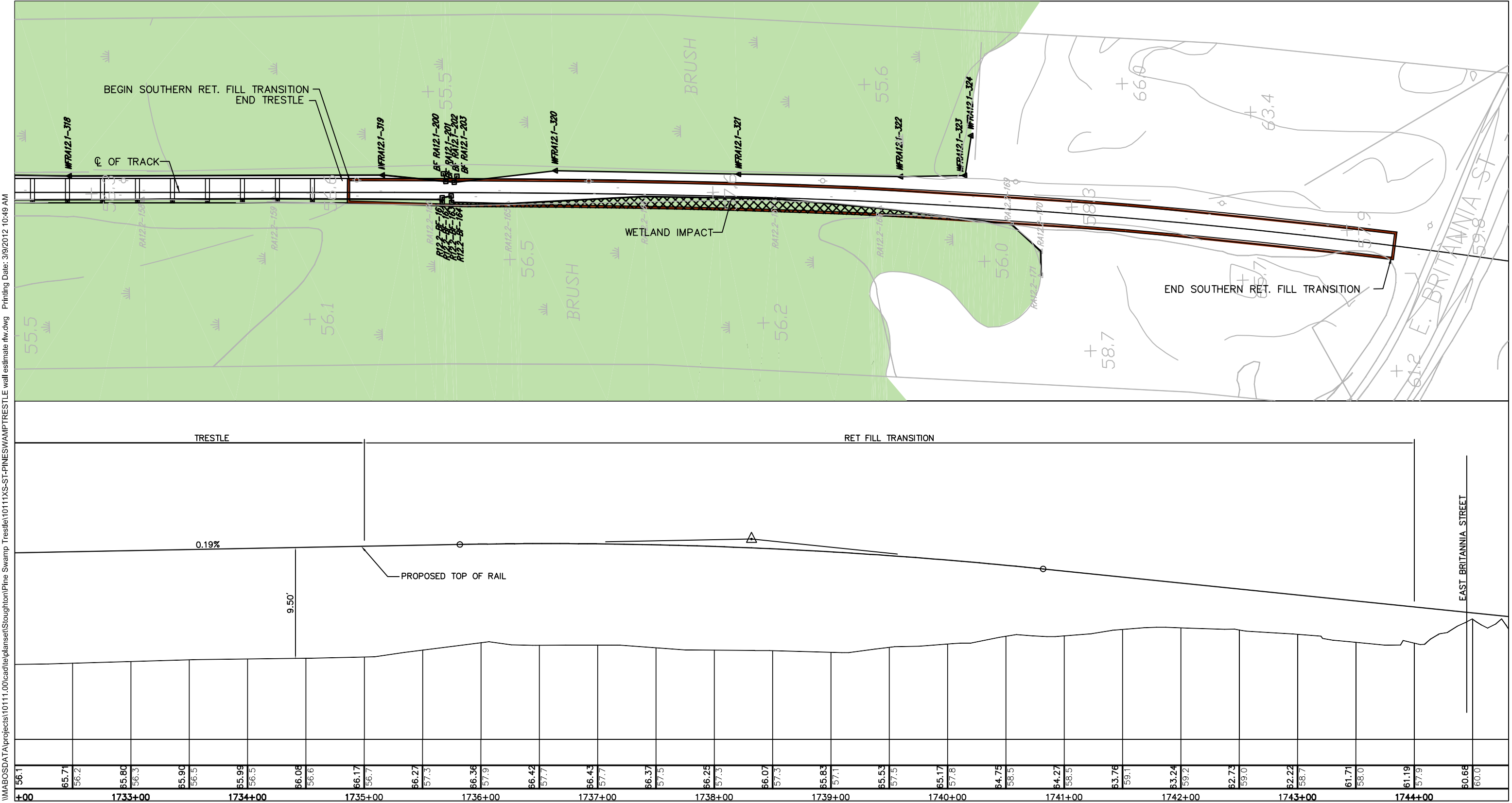


Figure 8  
Pine Swamp Trestle  
Southern Transition  
1"=80'





## Meeting Notes

Attendees: Craig Foley, TMLP  
Mike Horrigan, TMLP  
Mark Louro, VHB

Date/Time: February 16, 2012  
4:00 PM

Project No.: 10111.00

Place: TMLP  
55 Weir Street  
Taunton, MA

Re: South Coast Rail  
TMLP coordination meeting  
Pine Swamp

Notes taken by: M. Louro

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The purpose of the meeting was to review the track alignment and typical section proposed through the Pine Swamp and discuss Taunton Municipal Light Plant maintenance needs. The discussion included the following.

- The track horizontal alignment will follow the existing railroad berm that runs through Pine Swamp between King Philip Street and East Britannia Street in Taunton, MA. The rail profile will be one to two feet above the existing berm profile.
- Once the track is in place TMLP will have to access their line from a high rail vehicle(s). If MBTA owns the vehicle then TMLP will have to coordinate each time access
- TMLP recently installed new poles, insulators and wire within this area so they do not expect to have to replace equipment for several years.
- TMLP inspects this line once annually.
- TMLP is concerned about not having unlimited access to this line once trains start running, especially in the event of an emergency. All inspections or work will have to be scheduled with MBTA and flaggers will be required. Much of the work that TMLP performs will be limited to off peak, night, or weekend work, which will be more costly. TMLP will be limited by the train schedule.
- A cost benefit analysis should be done to compare the cost of relocating the line to Route 138 with the cost of a high rail vehicle, flagging, training and increased labor costs to perform maintenance work at night and on weekends.
- The high rail vehicles will have to be able to auger poles, provide access to the wire and poles and haul materials.
- The existing pole line may have to be reset to provide 15 feet horizontal clearance from the proposed track and the catenary.
- The bare wire may have to be replaced by unsulated cable.
- TMLP is not sure if they have an easement agreement that defines access limitations and maintenance responsibilities related to this line.
- TMLP facilities are within the existing railroad right-of-way from Pine Swamp to the Easton Town Line/Raynham Park. The line in Raynham and Easton should be evaluated to see if relocations are warranted beyond Pine Swamp.
-