JUNE 2024 DRAFT

MOUNTAIN DIVISION RAIL CORRIDOR

Interim Trail Feasibility Study - Standish to Fryeburg

WIN# 026858.00

SUBMITTED TO:
MAINE DEPARTMENT OF TRANSPORTATION

SUBMITTED BY:
HNTB CORPORATION

HNTB

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Part 1: Introduction & Summary

1.1 Purpose and Summary

The purpose of this report is to summarize the evaluation of the feasibility, impacts, costs, and possible phasing associated with construction of an interim shared-use trail within the inactive Mountain Division corridor between Standish and Fryeburg. This study expands on previous feasibility studies that evaluated different uses of the rail corridor, including restoring train service as well as options for the constructing a shared-use trail on the rail bed or adjacent to the rail bed.

This report focuses on technical aspects of the proposed trail construction such as the typical section (trail width, shoulder width, and side slopes); trail horizontal and vertical alignment; at-grade crossings where the trail crosses roadways; and examination of the condition of the existing bridge structures. Also included in the report is an analysis of trail alternatives through Portland Water District's (PWD) property located at the Standish end of the corridor where the trail will be required to deviate from the existing rail corridor. Lastly, the report evaluates possible sequences of construction of the trail which will allow the trail to be broken into smaller segments and built under separate construction contracts for funding purposes. The report provides recommendations as to the order that the trail segments get constructed, the lengths of each respective segment, and a breakdown of costs associated with constructing each segment.

1.2 Project Location and Background

The project study area is located along the Mountain Division Corridor between Standish and Fryeburg shown in Figure 1. The 31-mile corridor begins in Standish and continues north through the Towns of Baldwin, Hiram, Brownfield, and Fryeburg. The southern end of the project begins at Route 35 in Standish located near Johnson Field which is a town owned facility. The proposed trail in this area would connect to an existing segment of the Mountain Division Trail which continues further south into Gorham and Windham. The north end of the project ends at Route 113 in Fryeburg. There is existing parking and trail head access to another segment of the Mountain Division Trail that continues north into Fryeburg and ends just before the New Hampshire border.

Past studies were conducted on this corridor in 2007 and 2022. The 2007 study titled "Mountain Division Rail Study: Report on Potential Uses and Implementation Costs" evaluated the feasibility of restoring the Mountain Division Rail Corridor to allow for freight or passenger rail. The report focused exclusively on rail operations and evaluated the condition of the rail corridor, the costs associated with repairs and upgrades to the rail corridor, as well as the potential users of the rail corridor, which included both freight and passenger rail services. The study area included the entire rail corridor from Portland, Maine to North Conway, New Hampshire. The report concluded that seasonal freight rail could be feasible but is highly dependent on aggregate operators and passenger rail was not deemed feasible at the time of the study. The 2022 study titled "Mountain Division Feasibility Study: Potential Uses and Economic Benefits" evaluated potential uses of the Mountain Division Rail Corridor. This study revisited the potential rail uses from the 2007 study, but also evaluated two trail options. One option was a rail with an adjacent trail, where the existing railroad tracks would be rehabilitated, and a shared-use path would be constructed adjacent to the rail. The

second option was to construct a shared-use trail on the existing rail bed. With the second option, if rail service was ever to be restored in the future, the trail would need to be removed or relocated. Based on the 2022 study, the Mountain Division Rail Use Advisory Council (RUAC) recommended the second “interim trail” option.

For the purposes of this study, reference to a proposed trail is assumed to mean “interim trail”.

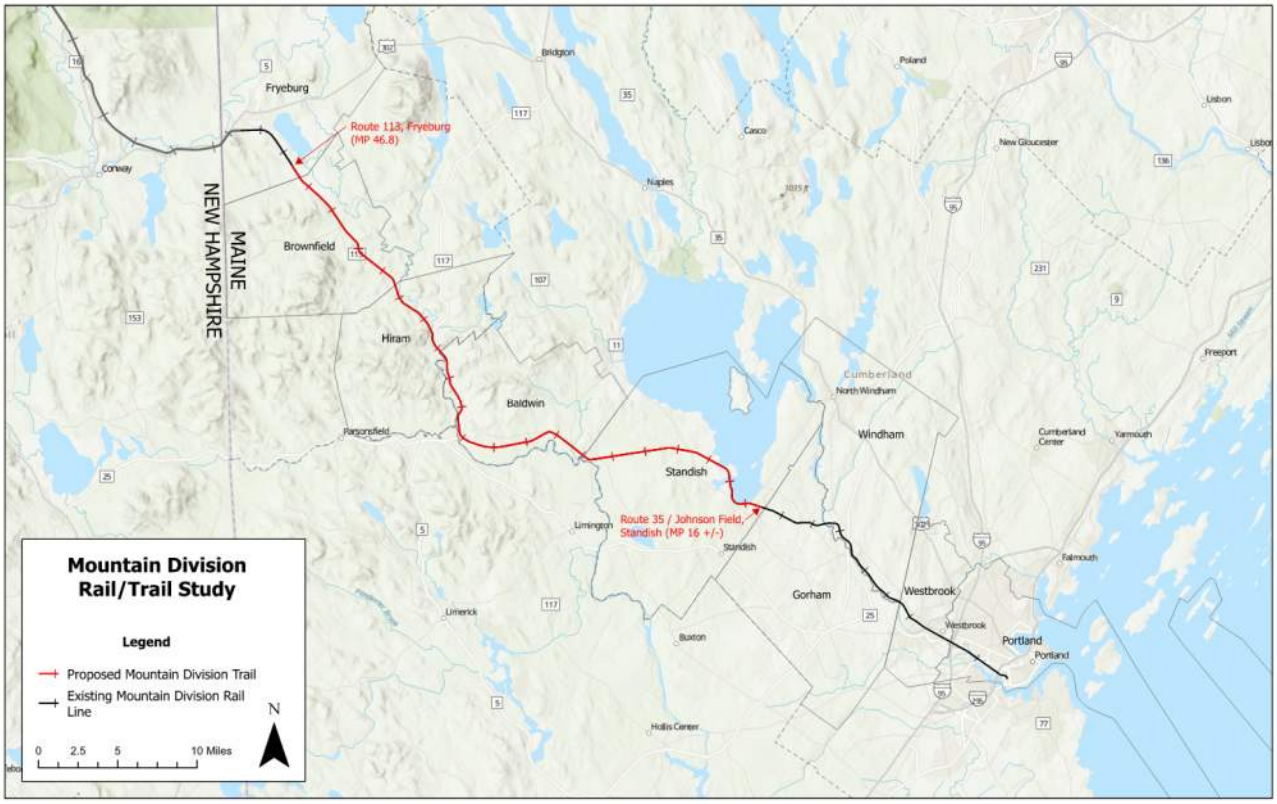

Figure 1: Project Location Overview

Part 2: Technical Aspects of Trail Design

2.1 Trail Typical Section

The trail is proposed to be constructed on the existing rail bed (except for the trail segment through PWD's property in Standish). Since the railroad ties are in poor condition and would need to be replaced if train operation resumed, the ties and rails will be removed, except on bridge structures where the ties in poor condition will be replaced to accommodate timber bridge decking. The ballast will remain in place and will provide a solid base for the trail. To avoid undercutting the existing material and to improve drainage along the edge of the trail, the top of the trail will be constructed approximately six inches above the existing ballast elevation. Aggregate subbase gravel will be placed over the ballast to achieve the increased height. The trail surface will be paved with 2" of pavement, which was approved by the RUAC over the use of stone dust for a surface treatment.

The proposed trail will be 10' wide with 2' grassed shoulders on each side which meets shared-use path standards in the AASHTO Guide for the Development of Bicycle Facilities. The shared-use path standards specify the trail width to be 10'-14' and the shoulder widths being 2'-5' with 3'-5 being desired. The existing rail corridor has 8' wide ties, and a few extra feet of ballast on each side before the ground slopes away from the track. Based on the width of the existing rail corridor, it would be challenging and costly to accommodate a wider trail, in addition, a 10' wide trail was included in RUAC's recommendation.

The proposed trail will be crowned at the centerline and slope away at a 1.5% cross slope which is in the 1%-2% range in the AASHTO Guide for the Development of Bicycle Facilities and meets ADA standards. During design, cross slopes will be reviewed to determine if a single slope across the full trail width is more appropriate based on topography and drainage. Shoulder slopes will be 6:1 or flatter with the existing side slopes generally being 3:1 or flatter. Within areas of tall embankments and bridge approaches, the side slopes will be 2:1 to minimize slope impacts. Within these areas, chain link fence or cedar rail fence will be installed within the shoulder to protect users from high embankments and steep slopes. Figure 2 details what general typical sections within the Mountain Division Corridor may look like. Typical sections of trail segments through the Portland Water District area will be discussed in Section 3.2: PWD Alignment Alternatives.

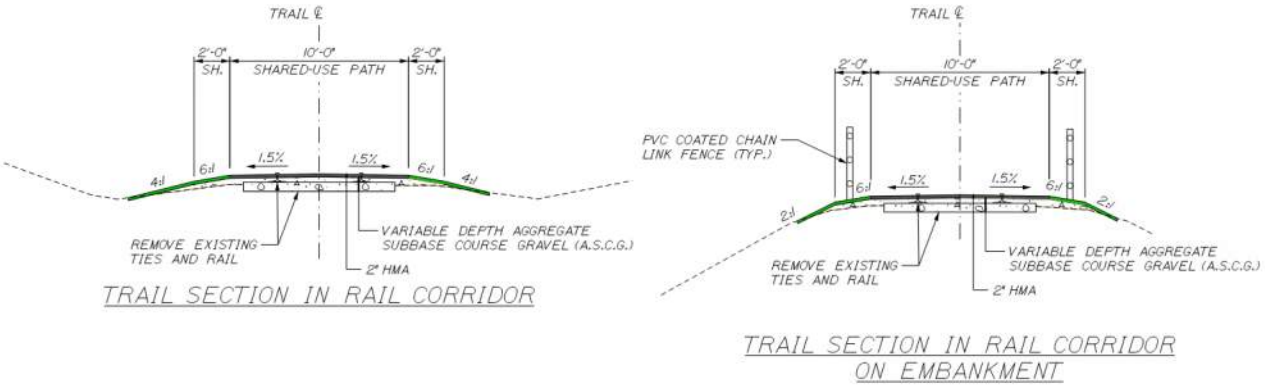

Figure 2: Trail typical sections within rail corridor

2.2 Trail Alignment and Profile

The horizontal alignment of the proposed trail will follow the existing rail alignment through the entire corridor, except for the trail segment through PWD's property in Standish mentioned previously. Since the corridor was constructed to meet minimum criteria for trains, the alignment will exceed criteria for bicycles and pedestrians. At several roadway crossings, the trail alignment may deviate slightly from the rail alignment to create a more perpendicular crossing for trail users and will need to be evaluated more closely in design.

The proposed profile will generally follow the profile of the existing rail corridor. The existing grades along the corridor are very flat due to the operating conditions for trains. The steepest grade within the project study area is approximately 1.6% per the 2007 Mountain Division Rail Study. This is much flatter than the maximum grade of 5.0% allowed by the AASHTO Guide for the Development of Bicycle Facilities and ADA standards. As described above in Section 2.1, the top of the trail should be constructed approximately six inches above the existing ballast to allow for better drainage and cross slope development. There are some areas identified during a May 2024 site visit where it may be beneficial to lower the profile below the existing grade to reduce rehabilitation costs to some bridge structures. Specific structures where this may be beneficial are the Quaker Brook crossing located at mile post 26.04 and Pierce's Brook crossing located at mile post 38.67. Options to lower the profiles in these locations should be evaluated further in design and conceptual costs do not consider lowering of the profile at these sections.

2.3 At Grade Roadway Crossings

The proposed shared-use path alignment will cross a total of 25 roadways at-grade. Each location was evaluated for sight distance and potential crossing treatments in accordance with MaineDOT's guidance on crosswalks. The sight distance evaluation was performed utilizing aerial imagery and there were no significant deficiencies noted. However, five locations will require some minor tree clearing for visibility. We recommend a more in-depth evaluation of sight distance during design when ground survey is available. Photos of some of the at-grade crossing locations can be found in Appendix A.

Out of the 25 at-grade crossings, three (3) are in high-speed areas (45 MPH or greater). The three high speed at grade crossings are located at Route 114 (Richville Rd) in Standish, Route 5/113 (Pequawket Trail) in Hiram, and Route 5/113 (Portland St.) in Fryeburg. Per MaineDOT's guidance on crosswalks, crosswalks at roads with 45 mph or greater speeds aren't allowed unless they are located at fully actuated signals. MaineDOT published a report called "Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Intersections" in which MaineDOT expressed interest in the use Pedestrian Hybrid Beacons (PHBs). PHBs are designed for pedestrians crossing high volume, wide streets (Greater than 9000 AADT and three or more lanes) or crossing streets where speed limits are 40 mph or greater. A PHB is a fully actuated signal that stays dark unless activated by a pedestrian, at which time it acts as a traffic signal to stop vehicular traffic, allowing pedestrians to safely cross. Figure 3 shows an example of a HAWK signal which is a proprietary version of a PHB:

Figure 3: Pedestrian Hybrid Beacon Example

Of the remaining 22 crossings, the character of these streets varies from gravel camp/residential roads to busier paved state routes. There are a total of five (5) crossings on state routes that are not considered high speed (25 mph to 40 mph). For the purposes of this report, rectangular rapid flashing beacons (RRFBs) are assumed at each of these crossings, see Figure 4 for an example RRFB. Although, not necessarily required at these locations, they do provide additional pedestrian visibility at these crossings where traffic volumes are higher, however additional considerations should be given in design with respect to community safety needs and mobility.

Figure 4: Rectangular Rapid Flashing Beacon Example

The remaining 17 crossings are at residential streets and range in speeds from 15 mph to 35 mph. Due to the lower volume and speeds of traffic, pedestrian warning signs with crosswalks are recommended.

2.4 Structures

There are a total of 13 numbered railroad bridge structures with spans of nine (9) feet and longer and 15 granite box culvert structures with individual spans of six (6) feet and shorter (some boxes are multi-cell with a total width exceeding six (6) feet). To maintain affordability of the project, minimal structural repairs are proposed as part of the rail to trail conversion. The repairs include:

- replacement of structurally deficient railroad ties,
- conversion of the open tie decks to closed decks with timber bridge rail, and
- the repair of substructures that are exhibiting stability loss or undermining.

Maintenance repairs such as blast cleaning and painting steel superstructures, patching spalling concrete, or widespread stone mortar repairs are not proposed currently to reduce the cost of the rail to trail conversion.

The 13 numbered railroad bridges on the corridor have been inspected by MaineDOT as part of the routine inspection. As this railroad corridor is not in service, the bridges are inspected on a five-year cycle with the most recent inspection being completed in 2021. The bridge structures are assigned a National Bridge Inventory (NBI) rating for several specific areas:

- deck (timber ties),
- superstructure (steel/timber stringers),
- substructure (concrete/stone masonry concrete abutments),
- channel (geometrics of the river channel), and
- culvert (structural culvert condition, only applicable to culverts of sufficient span to qualify as bridge structures).

Rating values are on a scale from 1 (“imminent” failure) to 9 (excellent condition). The structural components on the Mountain Division corridor have ratings from 6 (satisfactory) to 3 (serious). For reference, the Federal Highway Administration considers any structure that has at least one component with a rating of 4 or lower to be Structurally Deficient and repairs are recommended for highway bridges.

A desktop review of the bridge inspection reports, and site visit were performed for each structure to evaluate current repair needs. During the site visits, only a few minutes were spent per structure with the focus on abutment global and local instability, e.g protruding stones, non-planar faces of stone masonry, etc. A detailed inspection of each structure, including the box culverts, should be performed during the design phase(s) to determine other repair needs, such as undermining and scour, and loose/unstable stone masonry.

For future maintenance access, all bridges along the Mountain Division corridor are proposed to be capable of supporting Maine DOT State Legal Vehicles 6-8, encompassing legally loaded triaxle

(75,900 pound GVW), dual axle dump trucks (59,000 pound GVW), and 2-axle trucks (37,400 pound GVW). The existing railroad stringers were designed for Cooper E-40 or higher loads, which exceed highway design loads. Decks should be designed using a 1.30 live load factor consistent with MaineDOT Load Rating guidance for roadways with low truck traffic (ADTT) and is representative of an operating level of safety rather than an inventory level of safety. All proposed timber deck components should use galvanized fasteners and readily available pressure treated southern pine lumber.

Due to the changing usage of the structures from railroad bridges to pedestrian bridges and the consequent drop in live load demands relative to the original design loads, the steel superstructures are overdesigned for the future proposed loadings. Lower condition rated superstructures (4 or 5) that exhibit rust losses are likely structurally sufficient for pedestrian loadings, therefore steel superstructure capacity was not assessed as part of the current study. Timber tie capacity was assessed as part of this study and due to the needs of maintenance vehicles, selective replacement of timber ties is recommended such that the timber deck rating is restored to a minimum condition rating of 6 prior to adding a pedestrian deck. Costs assume that decks with a condition rating of 5 have 35% tie replacement and decks with a condition rating of 4 have 75% tie replacement. Substructures with a condition rating of 4 that have stable geometry and tight joints but have a reduced rating due to moderate to heavy mortar loss are not being recommended for repair and therefore not included in the cost estimate. However, inspections of those substructures during the design phase(s) are recommended to identify if the mortar loss, at that time, has led to new structural instability and to determine what maintenance repair(s) should be performed. Substructures with condition ratings of 3 or 4 that exhibit signs of current instability are recommended for repair or replacement and therefore are included in the cost estimate.

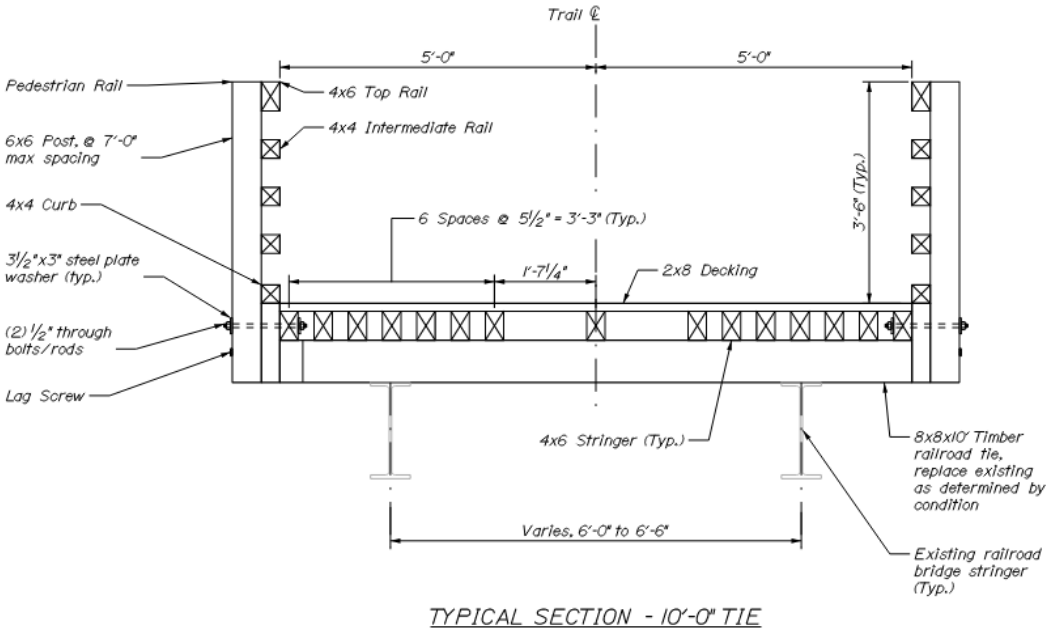

Figure 5a: Proposed Bridge Typical Section 10'-0' Tie

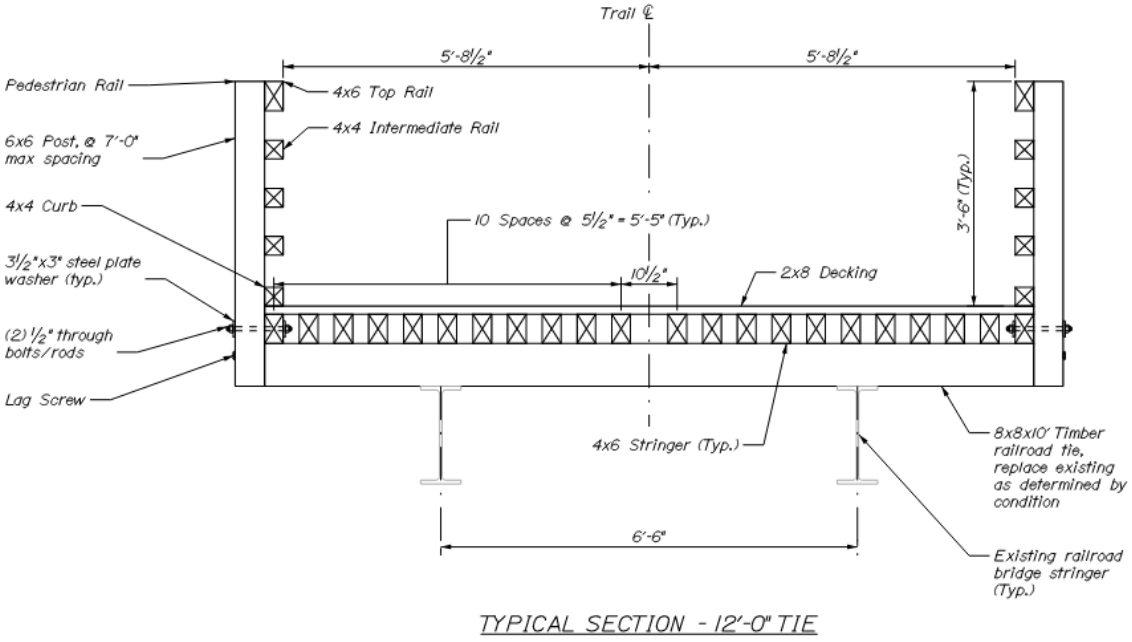

Figure 5b: Proposed Bridge Typical Section 12'-0" Tie

A summary of recommended repairs for the 13 numbered railroad bridges follows:

MP26.04 – Quaker Brook (Bridge #7673): This bridge has a 33.5' span steel stringer superstructure with 10' wide ties supported by 30' tall stone masonry abutments. Both abutments show signs of failure at the breastwall/wingwall interface and wall stabilization with soil anchors, galvanized steel channels, and local mortar replacement is recommended. The timber deck has a condition rating of 4, 75% tie replacement is assumed. Bearings have not been inspected due to vegetation around the bearing, but bearing replacement is recommended as part of this bridge rehabilitation.

Figure 6: Quaker Brook Bridge – Separation Between Wingwall and Breastwall

MP29.30 – Pidgeon Brook (Bridge #7674): This 12' span granite arch bridge appears stable, no signs of sagging or movement. Therefore, no repairs are anticipated as part of this project. Mortar is not visible in arch joints; however, it's likely this structure was constructed as dry-laid stone without mortar.

Figure 7: Pigeon Brook Bridge – Stone Arch Culvert Barrel

MP29.70 – Red Brook (Bridge #7675) & MP 30.39 – No Name Brook (Bridge #7676): These bridges each have 10' span steel stringer superstructures with 8' or 10' wide ties supported by 6' tall stone masonry abutments. Due to the low cost of replacing a short span, substandard tie width of the existing structures, and heavy mortar loss of the existing substructures, full replacement of both structures is recommended. Repair of large voids in the abutments requires cofferdams, and the combined cost of cofferdams and abutment mortar repairs is likely more expensive than bridge replacement. The recommended bridge replacements would have 30' span steel girder superstructures with timber decks supported by cross-laminated timber abutments founded on grade. Existing abutments would remain in-place as slope protection.

Figure 8: Red Brook Bridge – Stone Abutment with Timber Seat and Steel Stringers Arch Culvert Barrel

Figure 9: No Name Brook Bridge – Stone Abutment with Timber Seat and Steel Stringers Arch Culvert Barrel

MP32.90 – Dug Hill Brook (Bridge #7686): This structure is a 16' diameter steel multi-plate culvert. The culvert has significant section loss along the invert and signs of undermining at the outlet. The recommended repair is to temporarily bypass flow in the culvert to replace undermined material and the installation of a concrete culvert invert lining.

Figure 10: Dug Hill Brook Bridge – Steel Multiplate Culvert with Rust Losses Along Culvert Invert

MP33.97 – Break Neck Brook (Bridge #7678): This crossing is a 12.5' span granite arch bridge. The bridge appears stable, no signs of sagging or movement, and no repairs are recommended. Mortar generally appears intact with widespread efflorescence.

Figure 11: Break Neck Brook Bridge – Stone Arch Culvert Headwall

MP36.32 – Saco River (Bridge #7679): This bridge has a 183’ span steel truss superstructure supported by 16’ tall mortared stone abutments with concrete caps. The concrete caps are heavily spalled and the joints between stones appear tight and even. No substructure repairs are recommended. The timber deck has a condition rating 4, 75% tie replacement is assumed.

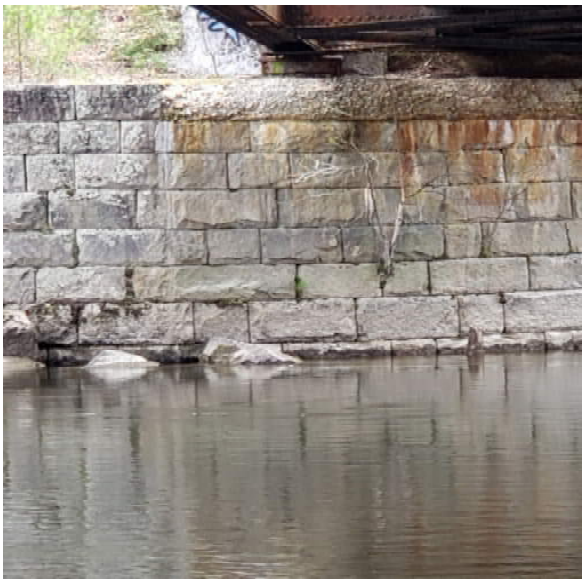

Figure 12: Saco River Bridge – Stone Abutment with Concrete Abutment Seat

MP37.01 – Cattle Pass (Bridge #7685): This bridge has a 9’ span timber superstructure with 12’ wide ties supported by 6’ tall stacked stone abutments. Timber abutment seats, backwalls, and bearings have rot and replacement is recommended. The timber deck has a condition rating of 4, 75% tie replacement is assumed.

Figure 13: Cattle Pass Bridge – Stone Abutment with Timber Stringers and Ties

MP37.45 – Red Mill Brook (Bridge #7680): This bridge has a 15.5’ span steel stringer superstructure with 10’ wide ties supported by 10’ tall mortared stone and concrete encased stone abutments with timber abutment seats. Timber abutment seats, backwalls, and bearings have rot and replacement is recommended. The abutment undermining recommended repairs are grout bags. While concrete shows extensive cracks/spalls and mortar loss of the stone masonry, deferring these repairs is acceptable. The timber deck has a condition rating of 4, 75% tie replacement is assumed.

Figure 14: Red Mill Brook Bridge – Concrete Faced Stone Wingwall with Spalling and Undermining Ties

MP38.67 – Pierce’s Brook (Bridge #7681): This bridge has a 15’ span steel stringer superstructure with 10’ wide ties supported by 15’ tall stacked stone abutments with no visible mortar with timber bridge seats. The abutment breastwalls exhibit signs of instability: the abutments are leaning generally inward; stone courses are uneven and individual stones protrude from the course of stones. Additionally, a timber punch previously installed to stabilize the abutments is displaying signs of rot and section loss. The installation of soil anchors with galvanized steel walers is recommended to provide widespread stone stabilization of the abutments. Timber abutment seats, backwalls, and bearings have rot and replacement is recommended. The timber deck has a condition rating of 5, 35% timber tie replacement is assumed.

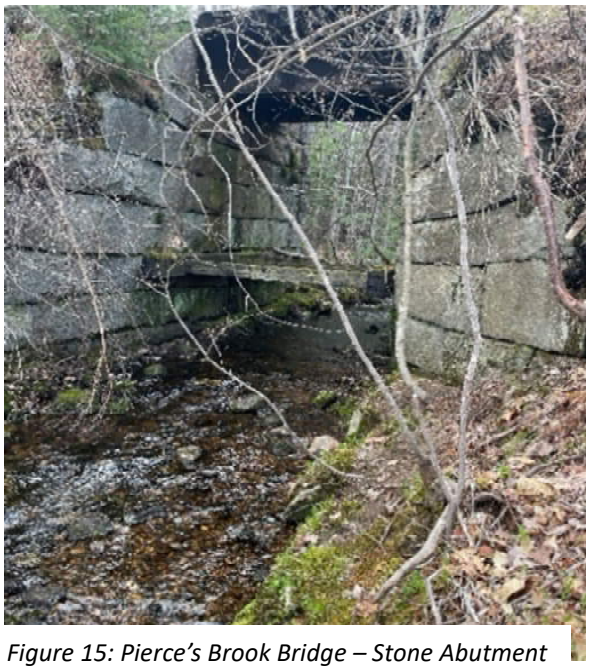

Figure 15: Pierce’s Brook Bridge – Stone Abutment with Timber Strut Supports

MP41.06 – Ten Mile Brook (Bridge #7682): This bridge has a 45' span steel stringer superstructure supported by 35' tall mortared stone abutments. The abutment breastwalls appear straight and stable with some mortar loss; therefore, no substructure repairs are recommended. There is evidence of past instability of the structure. The southwest retaining wall has two soil anchors installed to support visibly shifted stones and the southeast in-line wall shows stone separation that has been filled with large mortar repairs. Replacement of the existing bearings is recommended. The timber deck has a condition rating of 5, 35% tie replacement is assumed.

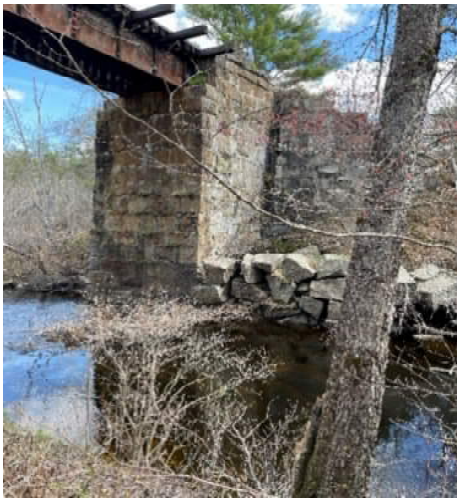

Figure 16: Ten Mile Brook Bridge – Stone Abutment with Return Wingwalls and In-Line Wingwalls

MP43.76 – Shepard's Brook (Bridge #7683): This bridge has a 56' span steel through-girder superstructure with 12' wide ties supported by 10' tall stacked stone abutments. The abutment breastwalls appear straight despite mortar loss., No substructure repairs are recommended as part of this project. The existing timber bearings are showing signs of rot; replacement with steel-reinforced elastomeric bearings is recommended. The timber deck has a condition rating of 4 and the timber ties have char/section loss resulting from a fire. Complete replacement of the timber ties is assumed.

Figure 17: Shepard's Brook Bridge – Stone Abutment and Bottom of Steel Through Girder Superstructure

MP46.27 – Little Saco River (Bridge #7684): This 28' span steel stringer bridge with 10' wide ties supported by 6' tall stacked stone abutments with scattered mortar loss. Abutment breastwalls appear straight, therefore no substructure repairs are recommended as part of this project. The timber deck has a condition rating of 5, 35% tie replacement is assumed.

Figure 18: Little Saco River Bridge – Stone Masonry Abutment and Steel Girder Superstructure

Of the 15 minor span structures, repairs are recommended only when necessitated by condition and where there is current evidence of failure. A thorough inspection of the 15 culvert structures is recommended during the design phase(s) to identify areas of undermining that will lead to future structural collapse. In areas where undermining is visible, shoring the undermined channels with grout bags to arrest the undermining is a cost-effective repair compared to reconstructing culverts.

Initial construction of the stone box culverts appears to be dry-laid granite masonry with mortar installed later to seal the joints. This assessment is based on the shallowness of the mortar seen in joints (where it is still present), the large number of joints that have complete mortar loss, and the general stability of these box culverts. Furthermore, when wet laid stone structures lose mortar the stones lose support and shift resulting in relatively large gaps in the structure that were not observed on this corridor.

The existing stone box structures are likely historic and may be Section 106 eligible resources. Therefore, protecting and repairing the existing stone boxes is preferrable to replacing with a larger modern culvert structure as well as minimizing environmental impacts.

Following are approximate locations and descriptions of the minor stream crossing structures:

- MP20.92 – Rich Millpond: A 3' diameter corrugated metal pipe with crushing at the ends and tears in the top of the culvert. Recommendation is to replace it with a new 3' diameter equalizer pipe.

- MP22.99 – Unidentified Crossing: Two (2) corrugated metal pipes, one 4' diameter and one 3' diameter, with washouts in the overburden soils and corrosion holes near the ends of the pipes. Replacing the pipes in kind is recommended.

- MP24.89 – Tucker Brook: A twin 4’ x 6’ dry laid stone box culvert in good condition. No repairs are proposed at this location.

- MP25.36 – Unidentified Crossing: A 2.5’ x 4’ dry laid stone box culvert in good condition. No repairs are proposed at this location.

- MP27.18 – Unidentified Crossing: A 3’ x 3’ dry laid stone box culvert in good condition. No repairs are proposed at this location.

- MP27.86 – Unidentified Crossing: Size and condition of this stone box culvert is unknown as it was not investigated.

- MP28.84 – Unidentified Crossing: A 6’ x 5’ dry laid stone box culvert in good condition. No repair is proposed at this location.

- MP32.19 – Unidentified Crossing: A structure was not field located at this location, but a stream is identified on the map.

- MP33.04 – Unidentified Crossing: Size and condition of this stone box culvert is unknown as it was not investigated.

- MP33.50 – Unidentified Crossing: A 4’ X 6’ dry laid stone box culvert in good condition. No repair is proposed at this location.

- MP35.41 – Ingall’s Pond: The 4’ X 5’ dry laid stone box culvert is in good condition under the railroad. A culvert extension to a stepped down culvert downstream of the tracks for the outlet of Ingall’s Pond into the Saco River. The condition of the extension was not investigated. No repairs are proposed at this location.

- MP39.90 – Rattlesnake Pond: A 6’ span ballasted bridge/culvert appears to be mortared granite walls with an unknown superstructure (timber or steel), and granite edge slabs. The walls appear straight, and mortar is generally intact. No repairs are recommended at this location.

- MP42.43 – Burnt Meadow Brook Tributary: A 5 ’x 6’ dry laid stone box culvert in good condition. No repairs are proposed at this location.

- MP42.95 – Burnt Meadow Brook: Twin 6’ x 10’ mortared stone box culverts with mortar loss in the bottom half of the box. The downstream down station wingwall has uneven courses of stones indicative of settlement. As the wingwall and culvert do not appear unstable, no repairs are recommended at this location.

- MP45.35 – Little Saco Tributary: The downstream end of this 2’ x 4’ stone box culvert is undermined and collapsed. Reconstructing the downstream end to correct the undermining and resetting the collapsed granite walls and the granite slab top is recommended instead of replacement due to the potential historic nature of the structure. Reconstruction will require temporary diversion of the flow with sandbag cofferdams and bypass pumping.

- MP46.16 – Unidentified Crossing: The downstream end of this 3’ x 5’ stone box culvert is undermined and collapsed. Reconstructing the downstream end to correct the undermining and reset the collapsed granite walls and the granite slab top is recommended instead of replacement due to the potential historic nature of the structure. Reconstruction will require temporary diversion of the flow with sandbag cofferdams and bypass pumping.

- MP46.71 – Unidentified Crossing: The upstream end of this 4’ x 5’ stone box culvert is undermined and collapsed and was previously reset by MaineDOT Maintenance. Reconstructing the upstream end to correct the undermining and reset the granite walls and the granite slab top is recommended instead of replacement due to the potential historic nature of the structure. Reconstruction will require temporary diversion of the flow with sandbag cofferdams and bypass pumping.

Part 3: Portland Water District Alternatives Analysis

3.1 Portland Water District (PWD) Site Description

Approximately 2.0 Miles of the Mountain Division Corridor follows the southern tip of Sebago Lake on PWD's property in Standish. Due to the proximity of the rail corridor to the public drinking water supply, PDW and MaineDOT entered into an agreement in the early 2000's prohibiting any recreational activity along this portion of the corridor. Based on discussions with representatives from PWD, they are interested in working with the Department to find a location on their property for the trail that would allow connectivity to the rest of the corridor. Figure 19 shows the PWD study area with the PWD owned parcels shaded in gray and the no build areas hatched in red.

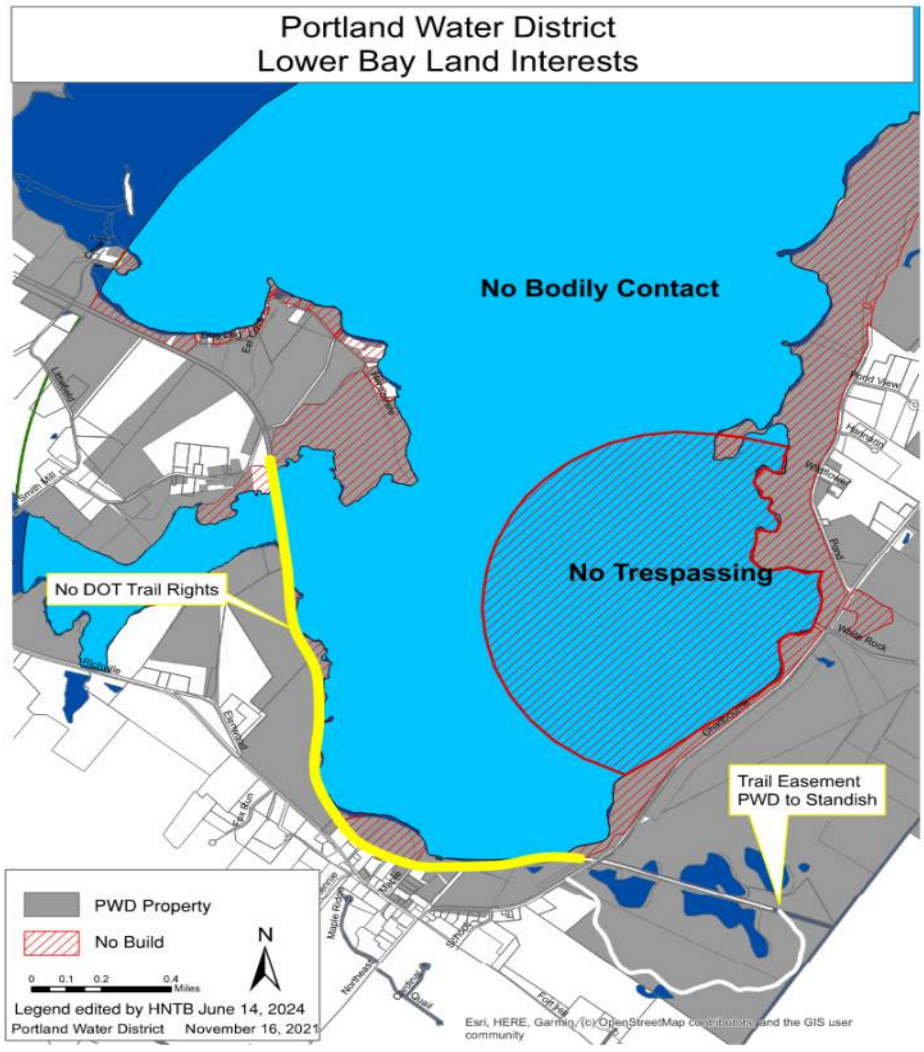

Figure 19: PWD Study Area

3.2 PWD Alignment Alternatives

Since utilization of the existing railroad corridor for a shared-use path through the PWD study area is prohibited, three different alignment alternatives were evaluated as shown in Figure 20. Alternative 1 generally follows existing roadways but utilizes PWD property as much as possible to provide a separation between the trail and the roadway. Alternative 2 utilizes PWD property that is completely off road in the woods and provides the most direct route back to the Mountain Division Rail Corridor with a new water crossing. Alternative 3 is similar to Alternative 1, but the trail would be directly adjacent to the roadway for the entire length. The objectives for evaluating each alternative were:

- to provide a connection from the existing trail entrance near Johnson Field at Chadbourne Rd. (Rte. 35) to the Mountain Division Corridor northwest of the PWD no build area
- utilize PWD property and/or public right of way
- avoid all the designated no build areas within the PWD study area adjacent to Sebago Lake.

Figure 20: Three possible alignments on PWD property

Detailed conceptual plans pertaining to each alternative can be found in Appendix B, a description of each alternative is detailed below:

Alternatives 1, 2 and 3 at Chadbourne Rd. (Route 35):

Figure 21: Alternative 1, 2, & 3 Along Chadbourne Rd.

Trail alignments for Alternatives 1, 2, and 3 begin at the entrance to the Mountain Division Trail near Johnson Field in Standish. Users will cross Chadbourne Rd. (Rte. 35), a 40 mph road, where Rectangular Rapid Flashing Beacons (RRFBs) are recommended to increase the visibility of the crossing. The alignment continues west along Chadbourne Rd. for approximately 2000 feet then Alternatives 1 and 2 diverts from the roadway and crosses Northeast Road Extension that leads to the Public Boat Launch. An assumed typical section within this segment of trail is shown in the figure below. The existing roadway shoulder varies in width and in some locations accommodates on street parking. A narrower roadway shoulder may allow this section of trail to be constructed without chasing side slopes, however input from the municipality and possibly the public is recommended to determine a reasonable shoulder width for the expected uses. Since this segment of trail is adjacent to Chadbourne Road for all three alternatives, consideration should be given to overhead and underground utilities as well as closed drainage that is assumed to be needed with this typical section.

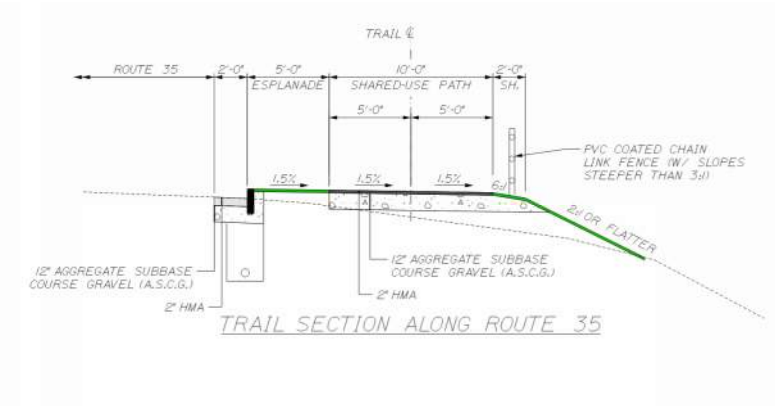

Figure 22: Typical Section Along Chadbourne Rd. (Rte. 35)

Alternatives 1 & 2 Through PWD Property:

Figure 23: Alternative 1 and 2 Alignment Thru PWD Property and Railroad Corridor

The alignments for Alternatives 1 and 2 continue north from the crossing of the Northeast Road Extension through the woods on PWD property, crossing Maple Street. There is a stream between Northeast Road Extension and Maple Street that the trail is proposing to cross with a timber bridge. Beyond Maple Street, the trail veers north towards Sebago Lake and matches into the Mountain Division Railroad corridor. The trail alignment for Alternatives 1 and 2 follows the railroad corridor northwest for approximately 1200'. This segment of trail will require a chain link fence providing separation from trail users and Sebago Lake.

Alternative 1 Thru PWD Property near Elenwood Road:

Figure 24: Alternative 1 Thru PWD Property meets Alternative 3 on Route 114 near Elenwood Road.

The Alternative 1 alignment turns west away from the railroad corridor and winds uphill through a wooded area towards Richville Road (Route 114). There are some stone walls within this wooded portion of the trail which should be surveyed during design to determine if they have historical significance and should be avoided. Alternatives 1 and 3 share the same alignment (shown in blue), running parallel along Route 114 to the west of the Sticky River crossing. The typical section of the trail will increase to 12' in the areas where the trail is adjacent to Route 114 with guardrail as shown in Figure 25.

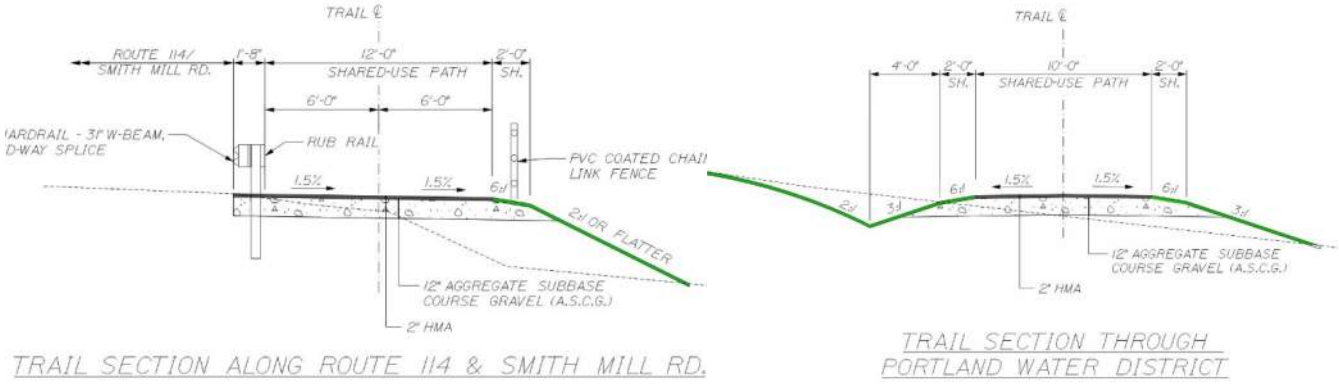

Figure 25: Typical Sections Through PWD and Richville Rd.

Alternatives 1 & 3 Along Route 114 and Sticky River Crossing to Smith Mill Road:

Figure 26: Alternative 1 & 3 Along Route 114 Between Elenwood Rd. and Sticky River

This section of Route 114 has a posted speed limit of 55 mph. Route 114 crosses the Sticky River with a single corrugated metal pipe that is approximately 48" in diameter. A combination of pipe extension and potential retaining walls along the water and pipe outlet will need to be evaluated during design. In addition, impacts to the three parcels to the east of Sticky River are anticipated as a result of constructing the trail and side slopes, essentially widening the existing roadway to accommodate the trail. Due to the high speeds along Route 114, the trail and traffic are recommended to be separated by a barrier. North of the Sticky River, Alternative 1 and alternative 3 separate, with Alternative 1 turning off from Route 114, continuing through the woods within PWD property.

Between the Sticky River and Smith Mill Road, Alternatives 1 and 3 cross a stream with surrounding wetlands. Alternative 1 is proposed to cross the stream with a timber bridge while Alternative 3 will likely require a culvert extension of the structure under Route 114. Both alignments then turn north, paralleling Smith Mill Road. Alternative 3 follows a similar route as Alternative 1 but continues directly adjacent to Route 114 and Smith Mill Road.

Alternatives 1 & 3 Along Smith Mill Road:

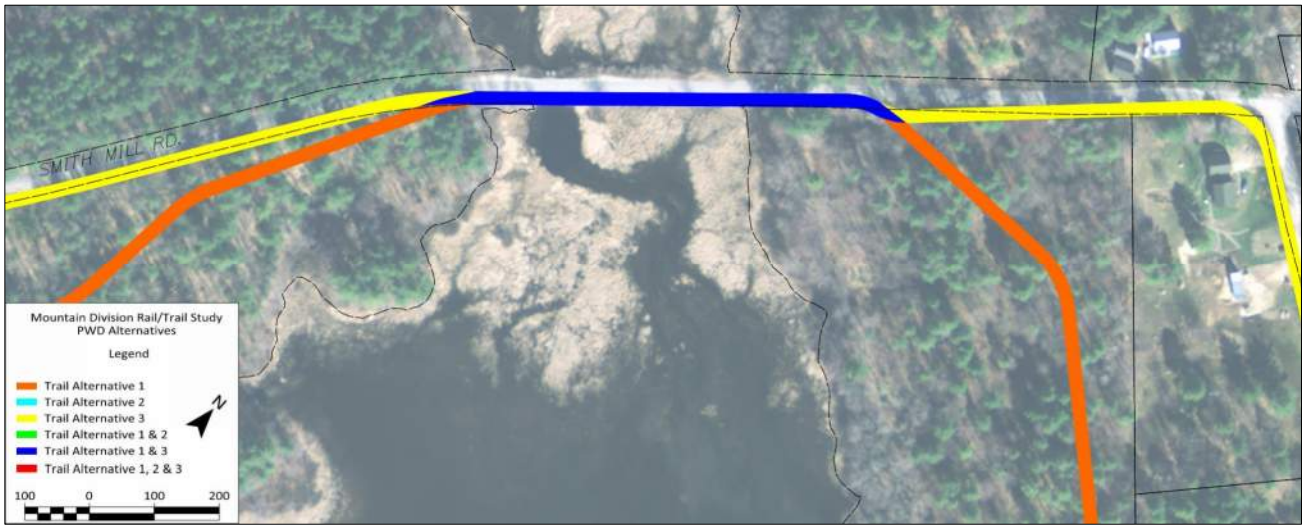

Figure 27: Alternative 1 & 3 Along Smith Mill Road

Alternatives 1 and 3 continue northeast up Smith Mill Road with Alternative 1 utilizing PWD property to provide a separate off road trail experience and Alternative 3 directly adjacent to Smith Mill Road. Approximately 1700' north of the intersection between Route 114 and Smith Mill Road, the two alternatives converge to cross another stream. The existing stream crossing consists of twin approximately 48" diameter reinforced concrete pipes. The trail will utilize the same typical section as the Sticky River crossing along Route 114. Evaluation of culvert extensions and retaining walls will need to occur during the design phase with ground survey.

North of the crossing, Alternative 3 continues adjacent to Smith Mill Road for approximately 0.8 miles before entering the Mountain Division Rail corridor. Due to the anticipated narrow existing right of way, Alternative 3 will likely require property acquisition along Smith Mill Road to construct the trail. Alternative 1 utilizes PWD property adjacent to Smith Mill Road to provide an off-road trail for the length of Smith Mill Road before entering the Mountain Division Rail Corridor.

Alternative 2 New Water Crossing:

Figure 28: Alternative 2 New Water Crossing

Alternative 2 diverges from Alternative 1 at the segment of trail where chain link fence was noted for separation from Sebago Lake and continues to parallel the existing Mountain Division Rail corridor at an approximate offset between 275' and 325'. North of where Alternatives 1 and 2 diverge, Alternative 2 crosses at least two small streams that will require the installation of new culverts.

As Alternative 2 approaches the location where the Sticky River outlets into Sebago Lake, the alignment curves around a hill to the west and then crosses the water body with a new causeway and structure mimicking the existing that carries the rail. For the purposes of estimating costs for this option, the bridge is assumed to be a 70' long steel stringer superstructure supported by timber slab on grade abutments (founded on the causeway fill). The toe of slope of the causeway will match the existing +/-25' opening of the vertical concrete-faced abutments of the existing Sticky River railroad structure. To the north of the water crossing, the alignment crosses Smith Mill Rd. and enters the Mountain Division Rail Corridor.

3.3 Alternatives Analysis and Recommendation

Each of the three alternatives have been evaluated based on criteria including:

- total length of trail
- anticipated environmental impacts
- right of way
- utility impacts
- cost

An alternatives matrix with the evaluation criteria is included below in Figure 29:

Mountain Division Trail: Portland Water District Alternatives Evaluation				
Evaluation Criteria		Alternative 1	Alternative 2	Alternative 3
Design	Length	3.49 MI	2.58 MI	3.79 MI
	% Length Along Roadways	32%	16%	100%
Cost	Total Cost	$3,280,000	$3,510,000	$4,200,000
	Cost per Mile	$938,667	$1,362,706	$1,108,800
Environmental	Stream Impacts	100 LF	106 LF	84 LF
	Number of Stream Crossings	5	3	4
	Sebago Lake Impacts	0 SF	18,105 SF	0 SF
	Freshwater Wetland Impacts	28,561 SF	2,192 SF	29,928 SF
Civil Factors	Traffic Impacts During Construction	Shoulder closure for 0.4 miles along Route 35, Shoulder work along Elenwood, Route 114 and Smith Mill Road	Shoulder closure for 0.4 miles along Route 35	Shoulder closure within entire length, potential for other impacts to traffic due to work next to roadway
	Impacts to PWD No Water Contact Area	No	Impact on north side of new water crossing, additional coordination with PWD required	No
	Road Crossings	6	4	7
	ROW Impacts (Does not include PWD)	Elenwood Rd. (Approximately 1 Parcel) Route 114. (Approximately 3 Parcels)	None	Route 114 (Approximately 16 Parcels) Smith Mill Road (Approximately 4 parcels)
	Utility Impacts	Potentially 5 utility poles (Route 35)	Potentially 5 utility poles (Route 35)	Potentially 9 utility poles (Route 35) Potentially 9 utility poles (Route 114) Potentially 17 utility poles (Smith Mill Rd.)
Final Recommendations		Recommended Alternative		

Color Code Legend:	Less Desirable	More Desirable

Figure 29: Alternatives matrix of Portland Water District trail alternatives

As described above, each alternative would bring a unique trail experience to the user when compared with each other. By nature of the Mountain Division Corridor, the overall trail experience through this corridor (outside of the PWD site) is off road through the woods and the goal of a trail through the PWD site is to mimic that experience as much as feasible. With Alternative 3, 100% of the trail would be constructed adjacent to the roadway, with a significant portion constructed along Route 114 which has a 55 mph design speed, making this the least desirable option as far as user experience of the three alternatives. In addition, this alternative is the most expensive of the three. This alternative would also likely require right of way acquisitions along Route 114 and Smith Mill Road to build a 10’ wide trail with a grassed esplanade and drainage ditches on the back side of the trail in some locations as well as drainage easements. For the above reasons Alternative 3 is dismissed as a viable alternative.

Alternative 2 is the shortest of the three alternatives by providing a more direct route from Johnson Field to the rail corridor. This option provides the best opportunity to keep the majority of trail in the woods. This alternative requires a significant new water crossing over Sebago Lake where the Sticky River outlets into the lake. To minimize costs of a structure, a combination causeway with a bridge is proposed. A new water crossing of this magnitude will likely require a significant alternatives analysis resulting in no other viable options for the environmental agencies to issue the appropriate environmental permits. Additionally, this alternative has not been fully vetted by PWD. Additional coordination would be necessary to determine if PWD would allow this alternative, since a portion of the trail would pass through what has been identified by PWD as a restricted area for recreational use. Due to these obstacles, Alternative 2 is not recommended as the preferred alternative. However, additional coordination with PWD and the environmental permitting agencies should be considered before completely dismissing this alternative since it has many advantages over the other two.

Alternative 1, with its blend of off road and on road trail experience, is the recommended alternative for the trail within the PWD study area. Alternative 1 is the least expensive alternative of the three. In addition, the trail is mostly off road, being constructed along the roadway when necessary to cross the Sticky River along Route 114 and crossing an unnamed stream along Smith Mill Road. There will likely need to be some right of way coordination to construct the trail along Route 114 just south of the Sticky River. This alternative is best suited to meet the needs of the project while balancing safety and environmental impacts and should be advanced as the preferred alternative. Aside from the right of way impacts, this alternative is the most feasible and has the fewest impacts of the three alternatives evaluated.

Part 4: Mountain Division Trail Phasing

4.1 Project Segments

Constructing the full 31-mile trail under one construction contract is likely not feasible for funding purposes alone, therefore the project should be separated into smaller segments to be constructed under separate contracts. Since each segment will need a logical begin and end point with public access and the segments will likely be constructed at different times by different contractors as funding becomes available, each segment of trail is presumed to have independent utility and would be permitted individually through the environmental agencies. However, this presumption should be vetted with the appropriate agencies prior to the start of preliminary design.

With the full trail project being separated into several segments, potential trail head locations for public access have been evaluated. Due to the rural nature of the project, there are a limited number of locations of potential trail heads and access points along the corridor. The 2022 feasibility study identified four potential trail head locations that provided a starting point for this study. Based on the potential trail head locations identified, the 31–mile trail has been divided into six segments with varying lengths from approximately 3.5 miles to 6.5 miles, as shown in Figure 30. A description and graphic of the proposed segments in order from north to south follows, and a map showing each segment as well as trail head locations can be found in Appendix C.

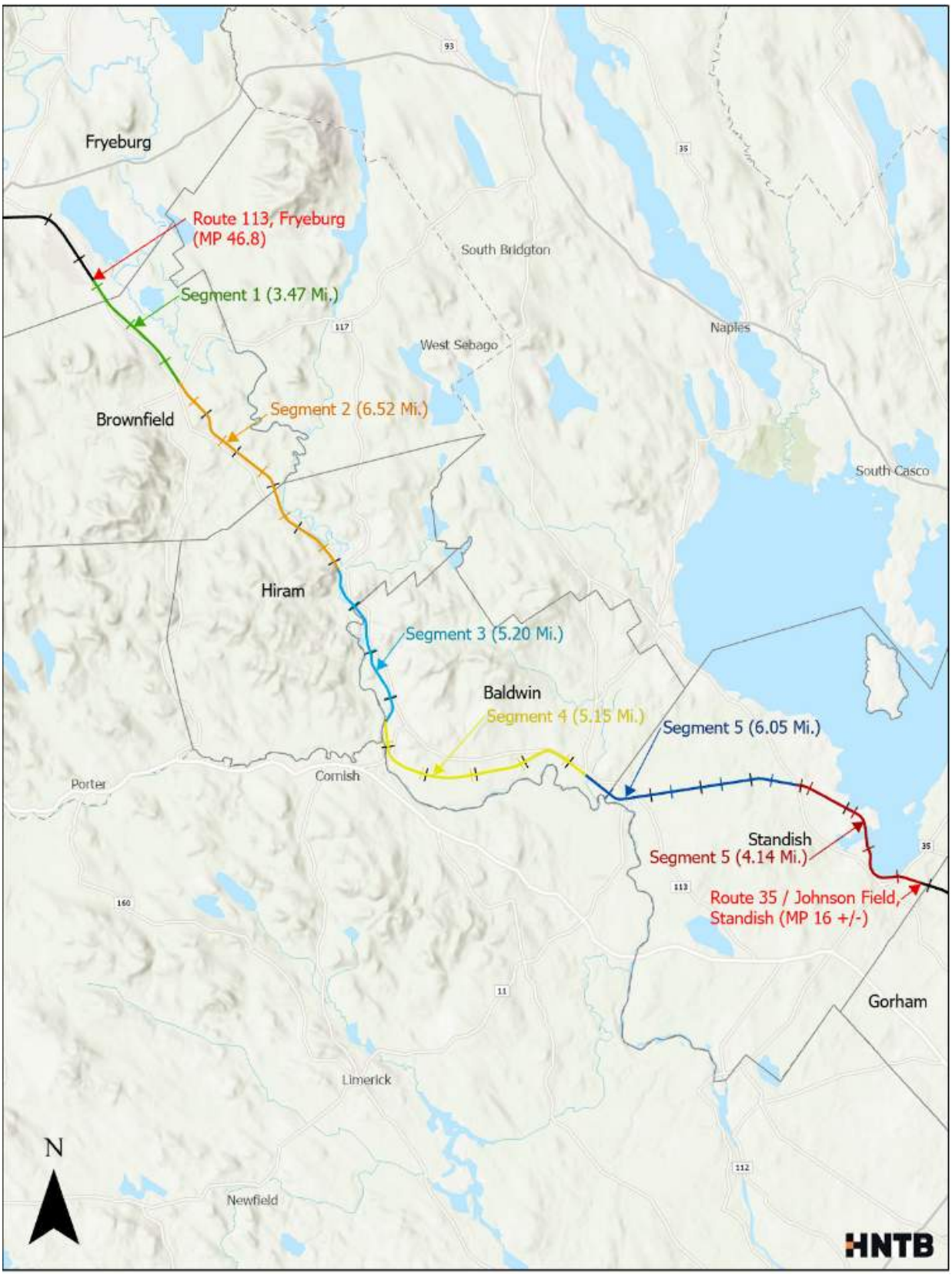

Figure 30: Trails Segments

Segment 1 begins at the terminus of the existing Mountain Division Trail in Fryeburg where there is currently public access and parking off Portland Street (Route 113). Segment 1 extends south for 3.5 miles where it intersects Denmark Road (Route 160) in Brownfield. The intersection with Route 160 is in a fairly residential area of Brownfield with a few local roads intersecting Route 160 and several residences abutting the area. The 2022 Feasibility Study identified the nearby Dillon's convenience store along Pequawket Trail (Route 5/113) as a potential trail head location. The convenience store is located approximately 1/4 mile from the trail and would require pedestrians to cross Route 113 which is a 45 mph roadway and walk to the trail without any sidewalks or other pedestrian accommodations. The Town of Brownfield may choose to explore an option to acquire property rights to construct parking near the trail crossing Denmark Road (Route 160) to avoid a high-speed crossing. In the absence of a formal trail head, there are a few local roads (Misty Lane and Depot Street) and Route 160 itself where trail users may choose to park as informal trail access.

Segment 2 begins at Denmark Road (Route 160) and extends south for 6.5 miles. This section would end in Hiram at a proposed trail head located along Mountain View Avenue Segment 2 is the longest proposed segment, and contains the most bridge structures, however because of the ruralness of this section there doesn't appear to be any opportunities to provide a trail head at a location to shorten the segment. The proposed trail head location along Mountain View Avenue allows a small parking area to be constructed within public right of way and is located within a small residential area.

Segment 3 begins at the Mountain View Avenue trail head and extends south for 5.2 miles. The section would end at a proposed trail head along Route 5/117 in West Baldwin. This trail head is identified in the 2022 report as the former Cornish Station and can accommodate parking within the State's right of way.

Segment 4 begins at the Route 5/117 trail head and extends south 5.2 miles. The section would end at a proposed trail head along Route 113 near the Whistle Stop General Store in Baldwin. This location identified in the 2022 Feasibility Study is also the location of an informal trail head for snowmobile and ATV users. This location would be able to accommodate a large amount of parking, however based on tax information from the Town of Baldwin, it is owned by a private owner. The property owners would need to enter an agreement with the Town of Baldwin or the agency responsible for the trail maintenance for it to be used formally as a trail head location.

Segment 5 begins at the Whistle Stop trail head location and extends south for 6.1 miles. The end of this section would be located where the trail crosses Richville Road (Route 114) in Standish. The Route 114 trail head is located at a track siding and can be constructed entirely within the State's right of way. In addition to the Route 114 trail head, this section crosses Route 11 and Route 113 in the Steep Falls Village area of Standish. This area is residential with a sidewalk along Route 11, providing informal trail access to people that live in the area.

Segment 6 is the final segment of the trail and includes the PWD study area evaluated in Part 3 of this report. This segment begins at the Route 114 trail head and extends south/east 4.1 miles where it ends at Johnson Field along Chadbourne Rd. (Route 35) in Standish. There is an existing

parking area at Johnson Field as well as access to an existing segment of the Mountain Division Trail that extends further southeast into Gorham and Windham.

4.2 Construction Sequencing and Prioritization

With the six segments described above identified, prioritizing the order to construct the segments is the next step. As part of this evaluation, four different criteria were reviewed. The first being connectivity to the existing trail network. A trail that builds off the existing trails will provide more benefit to users initially than a fragmented system with gaps. The second criteria was providing immediate benefit to trail users. Constructing portions of the trail that are easily accessible to the public and provide connectivity to local destinations will create more demand for trail use than a section of trail that is constructed in a more remote location and fewer access points. The third criteria was complexity of design and construction. Complex designs that require right of way coordination and environmental permitting will take longer to design and ultimately to enter the construction phase. Likewise, if there is a lot of bridge work with challenging access to the site, constructing that segment of the trail will take longer. If a simpler portion of the trail is prioritized, construction can begin more quickly and allow more time for development and completion of the complex sections. The last criteria were costs. Sections of trail that can be constructed with lower costs will likely get funded for construction sooner and the more expensive sections may have to wait longer for funds to become available. Figure 31 shows a breakdown of construction costs for the trail (paved surface and stone dust surface), bridge, culvert replacement, and pedestrian crossings for each segment and Figure 32 shows the programmatic costs broken down by segment.

Mountain Division Trail Construction Costs by Segment

Segment	Length (Mi.)	Trail Cost ($) Paved	Trail Cost ($) Stone Dust	Mile Post	Bridge	Bridge Cost ($)	Stream Crossing	Stream Crossing Cost ($)	Pedestrian Crossing	Pedestrian Crossing Cost ($)
1	3.47	$2,600,000	$1,800,000	46.83					HAWK Signal @ Rte. 113	$150,000
				46.71			4'X5' Granite Box	$260,000		
				46.27	Little Saco River	$60,000				
				46.16			3'X5' Granite Box	$250,000		
				45.35			2'X4' Granite Box	$230,000		
				43.76	Shepard's Brook	$190,000				
Segment 1 Total Cost: (Paved)= $3,740,000 (Stone Dust) = $2,940,000										
2	6.52	$4,900,000	$3,300,000	43.35					RRFB @ Rte. 160	$20,000
				42.95			Twin 6' X 10' Granite Boxes			
				42.43			5'X6' Granite Box			
				41.06	Ten Mile Brook	$130,000				
				39.90			Rattlesnake Pond			
				39.00					HAWK Signal @ Rte. 113	$150,000
				38.67	Pierce's Brook	$580,000				
				37.45	Red Mill Brook	$110,000				
				37.01	Cattle Pass	$60,000				
Proposed Trail Head @ Mountain View Ave.				36.84	$53,000				N/A	
Segment 2 Total Cost: (Paved)= $6,003,000 Stone Dust = $4,403,000										
3	5.20	$3,800,000	$2,600,000	36.32	Saco River	$390,000				
				35.41			4'X5' Granite Box			
				33.97	Break Neck Brook					
				33.50			4'X6' Granite Box			
				33.04			Unidentified			
				32.90	Dug Hill Brook	$290,000				
				32.19+/-			Unidentified			
Proposed Trail Head @ Route 5/117				31.64	$98,000				RRFB @ Rte. 5/117	$20,000
Segment 3 Total Cost: (Paved)= $4,598,000 (Stone Dust) = $3,398,000										
4	5.15	$3,800,000	$2,600,000	30.39	No Name	$150,000				
				29.70	Red Brook	$150,000				
				29.30	Pigeon Brook	-				
				28.84		-	6'x5' Granite Box			
				27.86+/-			Unidentified			
				27.18		-	3'X3' Granite Box			
Proposed Trail Head @ Whistle Stop				26.49	$162,000				N/A	
Segment 4 Total Cost: (Paved)= $4,262,000 (Stone Dust) = $3,062,000										
5	6.05	$4,300,000	$2,900,000	26.04	Quaker Brook	$640,000				
				25.36			2.5'X4' Granite Box			
				24.89			Twin 6'X4' Granite Boxes			
				24.73					RRFB @ Route 11	$20,000
				24.58					RRFB @ Rte. 113	$20,000
				22.99+/-			Twin Pipe Culvert	$40,000		
				20.92+/-			Rich Millpond CMP	$20,000		
Proposed Trail Head @ Route 114				20.42	$69,000				HAWK Signal @ Rte. 114	$150,000
Segment 5 Total Cost: (Paved)= $5,259,000 (Stone Dust) = $3,859,000										
6	[1] 4.14	$6,300,000	$5,900,000	N/A					RRFB @ Rte. 35	$20,000
Segment 6 Total Cost: (Paved)= $6,320,000 (Stone Dust) = $5,920,000										

Figure 31: Mountain Division Trail construction costs broken down by Segment

Mountain Division Trail Programmatic Costs by Segment - Paved							
	Segment 1	**Segment 2**	**Segment 3**	**Segment 4**	**Segment 5**	**Segment 6**	**Total**
Construction Costs	$3,740,000.00	$6,003,000.00	$4,598,000.00	$4,262,000.00	$5,259,000.00	$6,320,000.00	$ 30,182,000.00
Design (10% of construction)	$ 374,000.00	$ 600,300.00	$ 459,800.00	$ 426,200.00	$ 525,900.00	$ 632,000.00	$ 3,018,200.00
Construction Engineering (10% of construction)	$ 374,000.00	$ 60,030.00	$ 45,980.00	$ 42,620.00	$ 52,590.00	$ 63,200.00	$ 301,820.00
Right of Way	$ -	$ -	$ -	$ 5,000.00	$ -	$ 20,000.00	$ -
Environmental							
					Total Programmatic Costs		**$33,502,020.00**

Mountain Division Trail Programmatic Costs by Segment - Stone Dust							
	Segment 1	**Segment 2**	**Segment 3**	**Segment 4**	**Segment 5**	**Segment 6**	**Total**
Construction Costs	$2,940,000.00	$4,403,000.00	$3,398,000.00	$3,062,000.00	$3,859,000.00	$5,920,000.00	$ 23,582,000.00
Design (10% of construction)	$ 294,000.00	$ 440,300.00	$ 339,800.00	$ 306,200.00	$ 385,900.00	$ 592,000.00	$ 2,358,200.00
Construction Engineering (10% of construction)	$ 294,000.00	$ 44,030.00	$ 33,980.00	$ 30,620.00	$ 38,590.00	$ 59,200.00	$ 235,820.00
Right of Way	$ -	$ -	$ -	$ 5,000.00	$ -	$ 20,000.00	$ -
Environmental							
					Total Programmatic Costs		**$26,176,020.00**

Figure 32: Mountain Division Trail programmatic costs broken down by Segment

4.3 Construction Sequencing Recommendation

Based on the criteria above, construction of the Mountain Division Trail is recommended to begin at the north end in Fryeburg (Segment 1). We recommend prioritizing Segment 1 since:

- it is an expansion of the existing trail facility in Fryeburg
- is the least expensive segment
- it provides connectivity to residential areas in East Brownfield

Although Segment 6 in Standish would be an expansion of the existing trail on the south end of the corridor, this section is the most complex and expensive of the six segments. Since segment 6 includes the portion of the trail evaluated under the PWD alternatives section, there is a substantial amount of coordination required with PWD, other utility companies along the proposed route, environmental agencies, and right of way. These factors would slow the progression of design and delay the opening of any new sections of trail if this section were to be prioritized. The higher costs of constructing Segment 6 are due to the proposed trail within the PWD study area not having the benefit of utilizing existing railroad infrastructure. The area will need to be cleared of trees, gravel subbase constructed, and new drainage installed.

Segments 2, 3, 4, and 5 are all similar in terms of trail length construction, costs, and complexity. Segment 2 is slightly more complex in that it contains the most bridge structures within the corridor. Segments 2, 3, and 4 also don't provide a lot of access for construction and are within remote areas. Segment 5 would likely provide the most immediate benefit to trail users with the segment beginning at Route 114 in Standish on one end and ending at the Whistle Stop along Route

113 in Baldwin at the other. The middle portion of this segment also passes through Steep Falls Village which is the most residential area along the 31-mile corridor.

While Segment 1 is recommended to be constructed first, design efforts related to Segment 6 should begin shortly after with construction potentially beginning upon completion of Segment 1. This would allow the additional time to complete coordination related to the complexities of the PWD site while also quickly expanding the north end of the trail from Fryeburg. Should funding become available, the Mountain Division Corridor would ideally be expanded from the north and the south ends, meeting somewhere in the middle. This sequencing would prioritize expansion of the existing trail facilities while considering the complexity and costs associated with expanding the trail from the south. In addition, this would allow sections of the trail serving Steep Falls and the Sebago Lake area to experience the benefits of the trail sooner than if the trail were to be constructed chronologically from the north.

Part 5: Conclusion

5.1 Conclusion/Recommendation

To summarize the final recommendations noted previously in this report, the recommended alternative through the PWD study area is Alternative 1. Alternative 1 provides the most cost-effective solution, while meeting the needs of the project by providing a mostly off road experience and is on road only when necessary to cross two streams. In addition, the phasing recommendation is that the project be broken out into six different segments for design and construction. Construction of the segments is recommended to be sequenced so that construction would begin at the northernmost segment (Segment 1) matching the existing Mountain Division rail trail in Fryeburg. Ideally design and construction of Segment 6 would begin next in order to expand existing trail network on the south end and serve more populated regions of the trail quicker. Design and construction on the south and north ends of the corridor should continue and eventually meet in the middle to complete the corridor.