Feasibility Study

Eastern Trail Connectivity Feasibility Study

Route 9 in North Berwick to Perry Oliver Road in Wells and Alfred Road to Alewive Road in Kennebunk

PREPARED FOR

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Introduction

The Eastern Trail is a vital multi-use trail of state-wide significance in Maine. Extending 65 miles from Kittery to South Portland, approximately 22 of those miles have been previously constructed as an off-road connection from Kennebunk to South Portland, with gaps in the off-road segments being filled by a scenic on-road route that mostly follows quiet country roads. With a desire to expand the off-road connection southerly towards Kittery, this feasibility study provides the exploration of the two, more challenging, outer segments of an overall larger 11-mile corridor between North Berwick and Kennebunk. This 11-mile corridor continues to advance the vision of the East Coast Greenway that started in the early 1990's to create a continuous, traffic-free trail from Florida to Maine linking 25 major eastern seaboard cities.

VHB is working with the municipalities of North Berwick, Wells, and Kennebunk, in collaboration with The Eastern Trail Alliance (ETA), Eastern Trail Management District (ETMD), and the Maine Department of Transportation (MaineDOT) to conduct a Bicycle and Pedestrian Trail Connectivity Feasibility Study along the Eastern Trail. This team of professionals form the project Technical Advisory Committee (TAC), which collectively evaluate the inventory of data and provide input and guidance on the alternatives evaluated to confirm they meet the purpose and need.

The study's purpose is to evaluate and analyze alternatives to extend the Eastern Trail off-road segments from Route 9 in North Berwick to Perry Oliver Road in Wells, and from Alfred Road to Route 35 (Alewive Road) in Kennebunk. These two segments, which represent both the first and last section of this 11-mile corridor, were selected because they contain some of the more challenging aspects of design, however, design funding for the entire 11-mile corridor is being pursued and all three segments are expected to be designed simultaneously.

This study discusses the project purpose and need and identifies challenges and opportunities along the study area. It also evaluates the feasibility, cost, and impacts of alternatives in key locations and recommends solutions for further project development.

1.1 Project Description

The study area includes the two outer segments of a much larger future Eastern Trail corridor between Route 9 in North Berwick and Route 35 (Alewive Road) in Kennebunk. The first segment is approximately 2 miles ending on the south side at Perry Oliver Road in Wells. The second segment is approximately 0.7 miles starting at Alfred Road in Kennebunk. The study area focuses on the Unitil/Granite State Gas Transmission corridor and at times includes several adjacent properties and nearby on-road facilities. The below graphic illustrates the Eastern Trail study areas.

Eastern Trail Study Areas

At the intersection of the historic Eastern Railroad Corridor and Route 9 in North Berwick the southern limit of the study corridor is defined. At this location, the Pratt & Whitney Company facility abuts the historic Eastern Railroad Corridor to the west. The historic Eastern Railroad Corridor has been sold to Unitil/Granite State Gas, which currently serves as a corridor supporting their natural gas line and equipment throughout the study area.

Proceeding northerly along the historic Eastern Railroad Corridor, the next roadway intersected is Perry Oliver Road, approximately 2 miles from Route 9. Perry Oliver Road is a residential collector road that connects multiple neighborhoods within the town of Wells south to Route 9 or north toward Route 4. This intersection between the Unitil/Granite State Gas corridor and Perry Oliver Road defines the northern limit of the first segment of this study.

Approximately 8 ¼ Miles along the historic Eastern Railroad Corridor, north of Perry Oliver Road this feasibility study resumes at the intersection with Alfred Road in Kennebunk. This portion of Alfred Road is a more urban-residential area that includes local amenities, on-street parking, and sidewalks. The study corridor proceeds northerly paralleling Warrens Way to the west until intersecting with Route 35 (Alewive Road). Adjacent to a notable portion of the Unitil/Granite State Gas corridor on

the eastern side are multiple Kennebunk Savings Bank parcels, who are strong supporters of this project. The northern terminus at Alewive Road is currently the southern terminus to the existing off-road segment of the Eastern Trail.

1.2 Local Concerns

An important initial step in the project development process is to invite input from the local community, including public officials, residents, and other interacted groups. This provides both the TAC and the consultant team an understanding of the public's vision for the project, their concerns, and any local information that may impact the study corridor as well as the feasibility of alternatives being considered.

An initial public meeting was held on November 4, 2021, which was conducted virtually as an online interactive webinar. Represented among the attendees were Town Representatives, members from the Eastern Trail Alliance, and local community members with focused interest around the Eastern Trail and this section of the Study. VHB presented the project corridor, existing conditions observed, and findings from coordination with key property owners within the study limits. Questions and comments were received from the participants regarding local concerns and developments that may impact the future Eastern Trail through this corridor. The major take-away from this first public meeting yielded an overwhelming general support for this project to move forward.

Following the initial public meeting VHB prepared an Alternatives Analysis Memorandum to define the possibilities for the Eastern Trail within the study limits and provided the Memorandum to the TAC for review. VHB then led a discussion with a presentation of the conceptual alternatives for each segment of the project and solicited input from the TAC to determine the recommended alternatives.

On February 17, 2022, a second virtual public meeting was held to solicit public input on the alternatives developed and the Recommended Alternatives chosen. The support for the trail remained positive and the recommended alternatives received favorable comments to move the project forward.

1.3 Project Purpose and Need

Purpose

Develop a continuous bicycle and pedestrian facility that will safely accommodate all ETMD approved trail uses within the project study limits.

Need

65 miles of continuous off-road multi-use trail from Kittery to Portland would complete the vision for the Eastern Trail. Currently the project study location is serviced by an on-road route connecting to the off-road trail starting at the intersection of Alewive Road in Kennebunk. This study provides design recommendations to proceed toward preliminary design for the two outer, more challenging, sections of a larger 11-mile off-road Eastern Trail connection from North Berwick to Kennebunk.

2

Data Collection and Design Considerations

Prior to developing alternatives, it is first necessary to document the existing physical, environmental, operational and land use conditions for these segments. This was accomplished through a cursory evaluation of the various features within the project area using readily available resources as well as field-based observations and measurements. The following section describes the results of this data gathering. A more detailed summary of existing conditions within specific segments of the project is provided in the Alternatives Analysis sections to follow.

2.1 Summary of Data Collection

2.1.1 Base Mapping

A limited ground survey was provided to VHB for the road crossing locations with LIDAR information provided along the corridor. That work was completed by Sebago Technics in 2019 for the Eastern Trail. The survey was limited to the Unitil/Granite State Gas Transmission, Inc. property. The survey data was combined with available town and state GIS data, aerial survey files, and ortho-photography to develop the base map shown in Figure 1. Some additional ground Survey would likely be required as part of the Preliminary Design of the chosen preferred alternative.

2.1.2 Field Reviews

VHB engineers, alongside Eastern Trail and MaineDOT representatives conducted field reviews to evaluate and document existing conditions. The work included collecting photographs of existing conditions along the corridor, measurements and assessment of key features, and conversations with project stakeholders. A GIS mapping tool was utilized to document and photograph the corridor

geospatially. This data has been processed in a GIS interface to create an interactive map of the study area.

2.1.3 Wetlands

Wetland boundaries were provided in the Sebago Technics survey file. During VHB's field review, several sections of the Unitil corridor appeared to have standing water, some of which correlated with the previously surveyed wetlands. Wetland avoidance strategies were discussed and noted afield. Where avoidance is not feasible, mitigation techniques, such as steepening slopes or constructing small retaining walls would be considered. As part of a future preliminary design phase, wetland specialists would field review and delineate the preferred Eastern Trail Corridor, and following the delineation, specific wetland impacts would be identified for mitigation and permitting purposes.

2.1.4 Registered Historic Properties

No properties along the Unitil corridor or the project area are currently listed in the National Register of Historic Places. However, eight buildings are identified in the Maine Department of Transportation's online GIS database as being historically categorized as "Not Eligible". The properties are in the vicinity of the Warrens Way, Alfred Road, and Unitil Corridor intersection. Due to their designation as "Not Eligible" these properties would not limit the project possibilities from a historic perspective.

2.1.5 Traffic

Existing traffic statistics along roadways within the study area, including Average Annual Daily Traffic (AADT) counts and high crash locations are available using the MaineDOT's online Public Map Viewer. On-site traffic counts will not be obtained as part of this study. Although vehicular crashes have been recorded at the study area intersections, they are not designated as high crash locations, and did not involve bicycle or pedestrian crashes.

2.1.6 Right-of-Way

Right-of-way lines for the Unitil corridor and nearby streets, along with property lines for abutting parcels were obtained from the Maine State GIS database. Additionally, the Sebago Technics survey files contained Right-of-way lines which were compared to the GIS data to help better determine the approximate location of the Unitil corridor right-of-way. These lines would need to be confirmed with ground survey and further researched as part of a future preliminary design phase.

The second segment of this study largely abuts Kennebunk Savings Bank to the east. In this area the Unitil Corridor is moderately wet and appeared to have challenging features for trail construction. Initial communications with Kennebec Savings Bank suggest that there is support and a willingness to allow for trail alternatives on their property and avoid potential wetland impacts.

2.2 Observed Current Conditions

2.2.1 Corridor Description

For the purposes of this study, the preferred Eastern Trail location is intended to follow along the Unitil Corridor. This corridor retains most of the historic railroad ballast and timber ties through the center of the right-of-way, although the tracks have been removed. The gas line generally runs along the eastern edge of the corridor.

Rail embankments range from 0'-15' with about 10% of the North Berwick/Wells section and 100% of the Kennebunk section being in a cut slope. Vegetation within the rail embankments range from minimal to low with the largest being about 10' in height in a small handful of locations. Larger caliper trees and denser vegetation was observed along the edges of the Railroad Right of Way.

Six culverts were inventoried within the study area. Four of which are stone or concrete box culverts, one being a twelve-inch corrugated metal pipe and the sixth being a twelve-inch smooth lined, corrugated polyethylene pipe. All culverts were in fair to good condition. Two bridges were inventoried within the North Berwick/Wells study area. The first was a temporary timber matting bridge just north of the parking area near Pratt & Whitney, and the other was a ballasted deck girder bridge over the West Brook.

2.2.2 Signage and Lighting

Crosswalks and pedestrian signs exist at Alfred Road, Warrens Way, Maple Avenue, and Route 35 in Kennebunk. There is an existing Rectangular Rapid Flashing Beacon (RRFB) at the crossing of Alfred Road just west of Warrens Way. Street lighting is present at this crossing as well as the Route 35 crossing but absent at all other crossings throughout the study area. Warrens Way has intermittent street lighting mounted on the utility poles that run adjacent to the roadway.

2.2.3 Crossings and On-road Facilities

The study area intersects four roadways. The project starts on the north side of Route 9 in North Berwick, adjacent to Pratt & Whitney. There is a large gravel area at this location that could possibly act as a formalized trail head. Vehicular speed and traffic counts on Route 9 are high, which makes this a challenging location for trail users to cross. This crossing will likely be addressed as part of a future trail connection to the south.

Heading north along the Unitil corridor, the study area intersects Perry Oliver Road in Wells. Perry Oliver Road is approximately ten or more feet higher than the historic rail corridor with wet areas along the rail corridor. In this stretch of the study area there are also two other crossings of the corridor. One is a utility crossing for Central Maine Power and the other is the Perkinstown Wildlife Commons Trail.

In Kennebunk the study area crosses Alfred Road and Route 35. Both locations are challenged vertically with the rail bed being approximately ten or more feet lower than the roadways and noticeable wet areas. Traffic volumes at these intersections are high, and vehicular speeds along Route 35 are notably high as well.

An alternative study alignment was also discussed along Warrens Way in Kennebunk. This section is currently designated as the Eastern Trail On-Road route. The roadway has approximately a twenty-foot pavement width with one-foot gravel shoulders and a 25 mile-per-hour speed limit. Vegetation is generally offset five feet from the edge of pavement with large diameter trees. Aerial utility lines parallel the roadway with poles ranging from five feet to fifteen feet offset from the edge of pavement.

2.3 Design Considerations

2.3.1 Design Parameters

Trail Surface

This section of the Eastern Trail is intended to maintain similar standards to the previously constructed off-road segments of the corridor. For most of the study corridor, the trail will be surfaced with a 2"-3" depth Aggregate Surface Course designed for trail uses. By maintaining this surface material like the previously completed trail section abutting this study corridor in Kennebunk, the trail users will experience a cohesive feeling between the various segments.

The trail surface material may vary in one specific location along this study corridor. For approximately 500 linear feet the trail is recommended to follow a re-aligned Warrens Way. Within these limits the trail is reduced in width and there is a strong chance snow, sand, salt, and debris from the roadway may impact the trail. Within the preliminary design phase of this project, the appropriate trail surface will be further evaluated for this section.

Trail Width

This segment of trail is proposed to be twelve feet wide in most locations. Preferred multi-use trail widths range from ten to twelve feet, with an allowable minimum width of eight feet. Within the limits described above adjacent to Warrens Way, the trail width is reduced to ten feet. Warrens Way and the Eastern Trail are constrained by right-of-way, elevation change, and natural resource challenges through this 500 linear foot section that both facilities co-exist. The majority of the previously constructed Eastern Trail off-road segments were built to a twelve-foot surfaced width, with grass shoulders.

Trail Grade

While design standards allow for grades up to, and sometimes exceeding 5% for long stretches of trail, the conceptual profiles developed for the recommended alternatives are generally well below a 5% longitudinal grade. Locations with challenging grade changes requiring moderate recommended longitudinal slopes for the trail are as follows:

› The Intersection of the Unitil/Granite State Gas corridor and Perry Oliver Road in Wells has a grade change of approximately fifteen vertical feet over a sixty-foot distance. This equates to a 25% slope, which is inadequate for trail construction. The large elevation difference also traps water within this corridor creating drainage and wetland issues. The proposed conceptual design alternative for this section of trail utilizes a more gradual approach over approximately 800 linear

feet, with only approximately 100 linear feet of that approach reaching a 5% slope, along the eastern embankment of the Unitil corridor.

› The entire Unitil/Granite State Gas corridor within the Kennebunk study area has a challenging grade difference when compared to the surrounding area. The center of the Unitil corridor maintains grade at approximately elevation 130' for the southern half, before gradually sloping downward to the north, where it reaches elevation 116' approaching the Alewive Roadway embankment. The surrounding area generally maintains a grade approximately eight to twelve feet higher with embankment slopes approximately 40%-50% between the grades.

2.3.2 Trail Design Standards and Guidelines

The trail geometric design will generally follow the applicable principles in the 2012 AASHTO Guide for the Development of Bicycle Facilities, 4th Edition, and the supplemental references listed throughout.

Signage and pavement markings, where applicable, will follow the guidance contained within the 2009 Manual on Uniform Traffic Control Devices (MUTCD), as amended.

Where connecting to an at-grade crossing of roadway facilities, sidewalk ramps, crossings, and other applicable impacted facilities will follow the principles in the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

3

Alternatives Analysis

The observations from the data collection phase, combined with applied design principles and public input, shape the range of design solutions that are possible or necessary to satisfy the project Purpose and Need. The following section identifies and evaluates conceptual design solutions, and then identifies the final recommended alternatives that address the project needs and are depicted within the conceptual plans.

3.1 Improvement Alternatives

The study area includes the two outer segments of a much longer future Eastern Trail corridor between Route 9 in North Berwick and Route 35 (Alewive Road) in Kennebunk. The first segment is approximately 2 miles long, ending on the south side at Perry Oliver Road in Wells. The second segment is approximately 0.7 miles long, starting at Alfred Road in Kennebunk. The discussion of alternatives is broken into two primary sections for the first segment of the study area, and into five primary sections for the second segment of the study area. At the end of this list, an "Additional Features" section discusses alternatives to address the intersection of the Unitil/Granite State Gas Transmission corridor with Perry Oliver Road and Alfred Road.

Segment 1 (Route 9 in North Berwick to Perry Oliver Road in Wells)

Section 1.1 – Route 9 to 700 Linear Feet South of Perry Oliver Road (~1.82 Miles)

1.1.1 Historic Rail Alignment

1.1.2 Natural Resource Avoidance Within Utility Corridor

Section 1.2 – 700 Linear Feet South of Perry Oliver Road

1.2.1 Historic Rail Alignment

1.2.2 Natural Resource Avoidance Within Utility Corridor

Segment 2 (Alfred Road to Alewive Road in Kennebunk)

Alternative 2.W – Warrens Way

2.W.1 Pavement Preservation, Add Signage and Striping

2.W.2 Roadway Improvements

2.W.3 Shared-Use Path Adjacent to Roadway

Section 2.1 – Alfred Road to Kennebunk Savings Bank – Southern Parcel (~300 Feet)

2.1.1 Historic Rail Alignment

2.1.2 Boardwalk Along Historic Rail Alignment

2.1.3 Trail on Eastern Embankment

Section 2.2 – Kennebunk Savings Bank – Southern Parcel (~0.27 Miles)

2.2.1 Historic Rail Alignment

2.2.2 Boardwalk Along Historic Rail Alignment

2.2.3 Trail on Eastern Embankment

2.2.4 Trail Within Kennebunk Savings Bank – Southern Parcel Development

Section 2.3 – Kennebunk Savings Bank – Northern Parcel (~0.20 Miles)

2.3.1 Historic Rail Alignment

2.3.2 Boardwalk Along Historic Rail Alignment

2.3.3 Trail on Eastern Embankment

2.3.4 Trail Along Top of Eastern Embankment

Section 2.4 – Kennebunk Savings Bank – Northern Parcel to Alewive Road (~500 Feet)

2.4.1 Historic Rail Alignment

2.4.2 Boardwalk Along Historic Rail Alignment

2.4.3 Trail on Eastern Embankment

2.4.4 Trail Along Top of Eastern Embankment

2.4.5 Cross Railroad Corridor to Warrens Way

Additional Crossing Features

Feature C – Perry Oliver Road and Alfred Road Crossings

C.1 Ramp to At-Grade Roadway Crossing

C.2 Roadway Underpass

Segment 1 (Route 9 in North Berwick to Perry Oliver Road in Wells)

Improvement Alternative Breakdown – Segment 1

Segment 1 from Route 9 to Perry Oliver Road. Section 1.1 depicted in red, Section 1.2 depicted in blue.

Section 1.1 – Route 9 to 700 Linear Feet South of Perry Oliver Road (~1.82 Miles)

Existing Conditions:

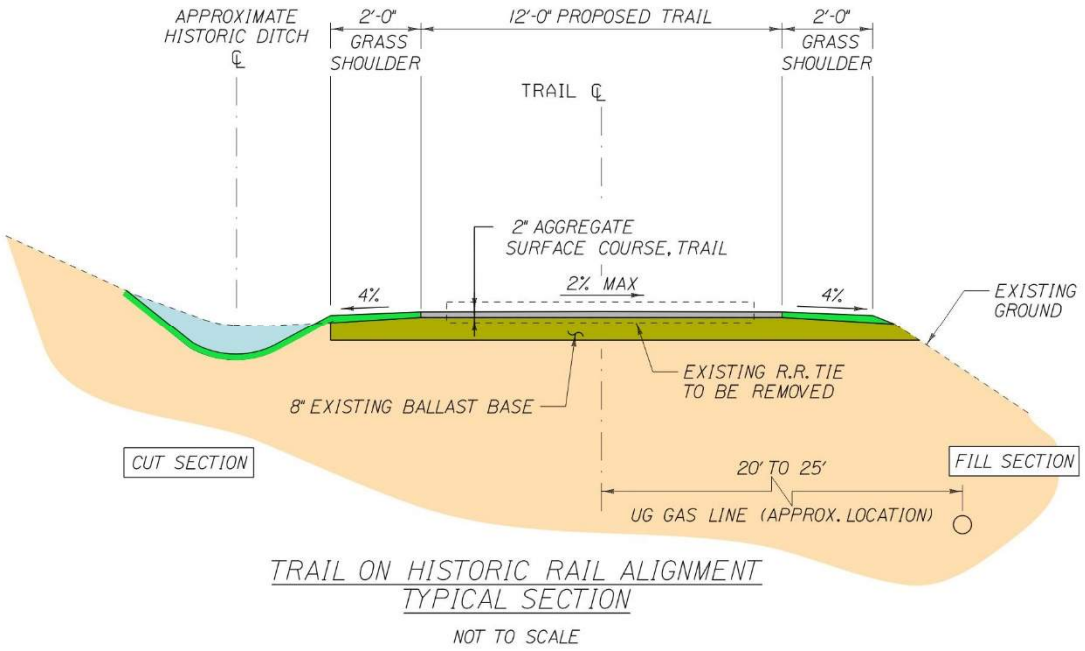
This study area of the Eastern Trail is intended to follow along the historic Railroad/current Unitil Corridor. This corridor retains most of the historic railroad ballast and timber ties through the center of the right-of-way, although the tracks have been removed. The gas line generally runs along the eastern edge of the corridor. Rail embankments range from 0'-15' in height with about 10% being in a cut slope. Vegetation within the rail embankments range from minimal to low with larger caliper trees and denser vegetation observed along the edges of the Railroad Right of Way.

Typical segment current condition

Various natural resources encroach into the Railroad Right of Way but are mostly avoidable while remaining true to the historic railroad alignment. The West Brook crosses under the corridor near the North Berwick/Wells town line. At this crossing a ballasted deck girder bridge is present, which supported the historic rail line.

Conceptual Alternatives:

- **Alternative 1.1.1 Historic Rail Alignment** – Trail construction along the historic rail alignment utilizes the existing railroad embankment as a base for the trail to be constructed upon. Since the railroad ballast and ties are still present throughout this section, the corridor would first be prepped by removing the existing ties and any lingering railroad debris that may remain on the embankment. The ballast would then be windrowed to remove silt and organic debris, and the top eight inches of the ballast would be graded and shaped to create a sturdy base for the trail. The ballast would lastly be choked with a granular material such that no additional material could be compacted into the ballast. The preferred surface treatments would then be applied atop the choked base to form the trail.



Alternative 1.1.1 typical section

Advantages:

- Existing RR ballast and infrastructure utilized to support the trail
- Observed natural resources and ponding outside of historic rail alignment would be less impacted
- Reduced concern about possible conflicts with the Unitil Gas Line

Disadvantages:

- Requires removal and disposal of existing RR ties

Recommendations:

Although the cost to remove and dispose of the existing railroad ties increases this alternative to a notable amount, the savings of utilizing the existing railroad ballast and infrastructure is not inconsequential. Due to the lack of observed natural resources present within the historic rail alignment, this is the recommended alternative for this study section.

› **Alternative 1.1.2 Natural Resource Avoidance Within Utility Corridor** – Natural resource mitigation techniques range from deviating from the historic rail alignment to constructing small retaining walls to reduce slope impacts in restrictive areas. When deviating from the ballasted areas of the corridor, additional ground treatments would be required to create a sturdy trail base. A probable trail base construction would be removal of organic matter from the surface, about six inches of existing material, followed by the installation of a geotextile material, six inches of sand and nine inches of subbase material all below a surface treatment.

In locations where alignment deviation is insufficient to avoid delineated natural resources within the corridor, steepened slopes or retaining walls may be warranted to reduce the trail footprint. Retaining walls may be a variety of materials. Common materials would be concrete waste blocks, or if a more decorative finish is desired, Redi-Rock retaining blocks would be a viable product. Atop any retaining walls and steep slopes that don't meet the minimum required recovery area

for trail users, railing or fence installation would be installed. All natural resource avoidance and mitigation strategies within this section involve the trail remaining within the Unitil/Granite State Gas Transmission corridor.

Advantages:

- Does not require removal and disposal of existing RR ties

Disadvantages:

- Probable conflicts with adjacent natural resources including tree clearing, wetland impacts, and channelized water impacts
- Probable conflicts with the Unitil Gas Line
- Requires construction of a sturdy base for the trail
- Could require additional infrastructure including retaining walls

Recommendations:

This is not the recommended alternative for this study section. The conflicts, impacts, and mitigation techniques required to construct the trail off the historic railroad alignment would outweigh the cost to remove the existing railroad ties for a similar quality of trail.

Section 1.2 – Route 9 to 700 Linear Feet South of Perry Oliver Road (~1.82 Miles)

Existing Conditions:

Corridor approaching Perry Oliver Road

This section of the Eastern Trail study area is intended to follow along the historic Railroad/current Unitil Corridor. This corridor retains most of the historic railroad ballast and timber ties through the center of the right-of-way, although the tracks have been removed. The gas line generally runs along the eastern edge of the corridor. This section of the corridor is primarily in a cut slope with grassy and plant vegetation ranging from knee to waist height. Larger caliper trees and denser vegetation was observed along the edges of the Railroad Right of Way.

Various natural resources are present within the Railroad Right of Way, which will be tough to avoid while remaining true to the historic railroad alignment. Ponding is present within the ideal alignment locations due to the cut scenario the trail finds itself in as it approaches Perry Oliver Road (discussed further in the "Additional Features" section). For these reasons, this section has been evaluated separately from Section 1.1, where most of the surveyed wetlands are outside of the historic railroad alignment.

Conceptual Alternatives:

› **Alternative 1.2.1 Historic Rail Alignment** – Trail construction along the historic rail alignment utilizes the existing railroad embankment as a base for the trail as described in Conceptual Alternatives Section 1.1.1. This section may require less railroad tie and debris removal as well as lack sufficient ballast for a trail base. Where the existing rail bed lacks eight inches of salvageable ballast or well drained granular material, a granular borrow would have to be added to achieve the required eight-inch base.

Advantages:

- Existing RR ballast and infrastructure utilized to support the trail
- Reduced concern about possible conflicts with the Unitil Gas Line

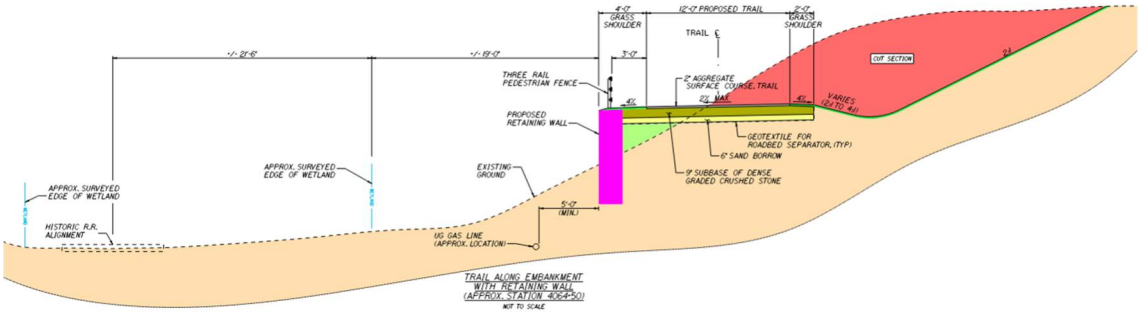
Disadvantages:

- Observed ponding and surveyed wetland within historic rail alignment
- Requires removal and disposal of existing RR ties
- Does not establish an adequate starting point for an at grade crossing of Perry Oliver Road

Recommendations:

This is not the recommended alternative for this study section. The impacts and mitigation techniques required to construct the trail along the historic railroad alignment would be detrimental to the project being permitted.

› **Alternative 1.2.2 Natural Resource Avoidance Within Utility Corridor** – Natural resource mitigation techniques would be similar as described in Conceptual Alternatives Section 1.1.2. A greater number of natural resources were observed within this section, thus would result in a larger effort of mitigation techniques.



Alternative 1.2.2 typical section

Advantages:

- Avoids observed ponding and surveyed wetlands within historic rail alignment
- Promotes a gradual approach to raise the trail for an at-grade crossing of Perry Oliver Road
- Promotes positive drainage away from the trail

Disadvantages:

- Tree clearing required
- Possible conflicts with the Unitil Gas Line
- Requires construction of a sturdy base for the trail
- Requires additional infrastructure, i.e., retaining walls

Recommendations:

Although the construction costs and possible conflicts are higher for this alternative, the constructability and environmental impacts are far preferable. This is the recommended alternative for this section of trail.

Segment 2 (Alfred Road to Alewive Road in Kennebunk)

Improvement Alternative Breakdown – Segment 2

Segment 2 from Alfred Road to Alewive Road. Section 2.1 depicted in red, Section 2.2 depicted in blue, Section 2.3 depicted in pink, Section 2.4 depicted in cyan, Warrens Way alternative depicted in orange.

Alternative 2.W – Warrens Way

Existing Conditions:

An alternative study alignment is being analyzed along Warrens Way in Kennebunk. This section is currently designated as the Eastern Trail On-Road route. The roadway has approximately a twenty-foot pavement width with one-foot gravel shoulders and a 25 mile-per-hour speed limit. Vegetation is offset about five feet from the edge of pavement with large diameter trees. Aerial utility lines parallel the roadway with poles ranging from five feet to fifteen feet offset from the edge of pavement.

Warrens Way

The current infrastructure condition of the roadway is moderate at best. There are various types of pavement distress present on the surface, with the most observed conditions being transverse cracking, edge cracking, and light alligator cracking.

Conceptual Alternatives:

› **Alternative 2.W.1 Pavement Preservation, Add Signage and Striping –** Pavement preservation with added striping and signage would be a minimal effort to improve the currently designated On-road connection of the Eastern Trail. The crossings at either end of Warrens Way would be improved, and trail route signs could be installed. Additional installations could be regulatory, warning, and guide signs for Bicycle Facilities with supplemental striping to inform roadway users of the shared facility designation.

Advantages:

- Minimal scope and cost
- Could be a short-term or phased solution

Disadvantages:

- Does not satisfy the purpose and need
- Minimally reduces conflict between roadway and trail users

Recommendations:

This alternative does not satisfy the purpose and need for the corridor, therefor it is not considered a long-term solution or recommendation for this section.

› **Alternative 2.W.2 Roadway Improvements** – Roadway improvements would create a safer space for a shared facility between trail users and motorists. These improvements could include resurfacing the roadway to improve the surface for bicyclists, as well as the addition of a sidewalk on one side of the road to create a separated space for pedestrians. Following roadway improvements, similar safety measures as described in Alternative 2.W.1 would be implemented. The addition of a sidewalk along Warrens Way may require either aerial utility relocations, minor right-of-way acquisitions, and/or minor shifting of the roadway alignment.

Advantages:

- Moderate construction complexity and cost
- Could be a supplemental solution to assist the adjacent communities in accessing the trail

Disadvantages:

- Does not satisfy the purpose and need
- Moderately reduces conflict between roadway and trail users

Recommendations:

This alternative does not satisfy the purpose and need for the corridor, therefor it is not considered a viable solution or recommendation for this section. The addition of a sidewalk with moderate roadway improvements could satisfy a different need by creating a connection from adjacent communities to the trail.

› **Alternative 2.W.3 Shared-Use Path Adjacent to Roadway** – The addition of a shared use path adjacent to Warrens Way would create a separated facility for trail users and motorists. This alternative would require aerial utility relocations and most likely right-of-way acquisitions. To reduce the impacts of this alternative the trail width could be reduced in challenging locations. Trail construction would be similar to as described in Conceptual Alternatives Section 1.1.2.

Advantages:

- Satisfies purpose and need and creates a connection to adjacent communities

Disadvantages:

- ROW and Utility impacts anticipated
- Does not amplify the trail users experience while adjacent to a roadway
- Significant impacts to roadway users during construction

Recommendations:

This alternative does satisfy the purpose and need for the corridor, but it is not a recommended alternative for the entire length of the corridor due to the potential ROW and Utility impacts, trail user experience, and connectivity to the Kennebunk Savings Bank parcels. However, this alternative is recommended for the northern most ~500 linear feet of the corridor to create a

connection from Section 2.3 to the at-grade crossing of Alewive Road, as described in further detail in Section 2.4.

Section 2.1 – Alfred Road to Kennebunk Savings Bank – Southern Parcel (~300 Feet)

Existing Conditions:

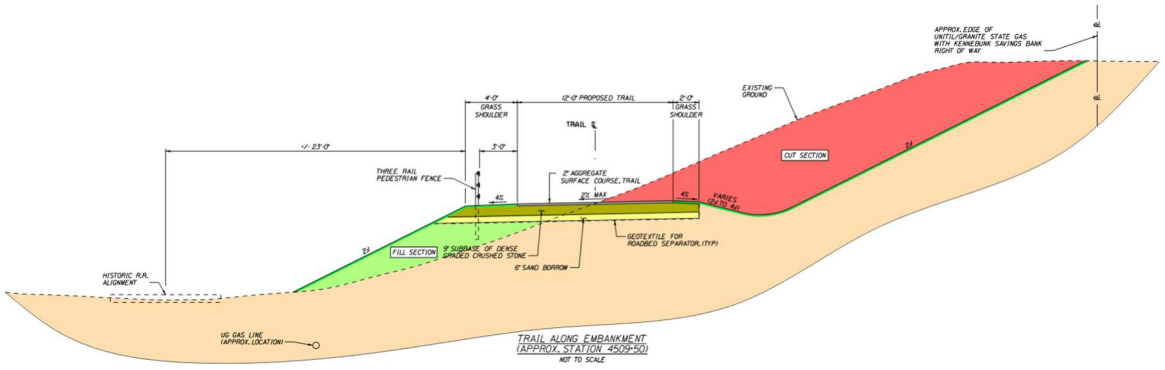
This study area of the Eastern Trail is intended to follow along the Unitil Corridor. The historic railroad ballast and timber ties were not observed during the site investigations along the railroad alignment. The gas line generally runs along the eastern edge of this section. This corridor is primarily in a cut slope with generally low brushy vegetation. Larger caliper trees and denser vegetation is present along the edges of the Railroad Right of Way.

Segment 2, Section 1 Looking South

Various wet areas are present within the Railroad Right of Way, which will be tough to avoid while remaining true to the historic railroad alignment. Ponding is present within the ideal alignment locations due to the cut scenario the trail finds itself in as departing the embankment from Alfred Road.

Conceptual Alternatives:

- **Alternative 2.1.1 Historic Rail Alignment** – Due to the lack of observed existing railroad ballast present, trail construction along the historic rail alignment utilizing the existing railroad embankment as a base as described in Conceptual Alternatives Section 1.1.1 may not provide an adequate corridor preparation. Where the existing rail bed lacks eight inches of salvageable ballast or well drained granular material, a granular borrow would have to be added to achieve the required eight-inch base. If minimal to no ballast is found after removing the existing vegetation and earthen material from the historic rail alignment, the trail construction shall be similar to as described in Conceptual Alternatives Section 1.1.2.



Alternative 2.1.3 and 2.2.3 typical section

Advantages:

- Promotes an overpass alternative for crossing under Alfred Road

Disadvantages:

- Environmental impacts anticipated
- Large elevation changes required to create an at-grade crossing of Alfred Road

Recommendations:

This is not the recommended alternative for this study section. The impacts and mitigation techniques required to construct the trail along the historic railroad alignment would be detrimental to the project being permitted. There would also be constructability challenges to create an at-grade connection to Alfred Road.

› **Alternative 2.1.2 Boardwalk Along Historic Rail Alignment** – The wet areas observed within this section expand to the entire width of the historic railroad alignment and will require mitigation techniques similar as described in Conceptual Alternatives Section 1.1.2. A possible mitigation technique, that could retain a historic alignment of the trail while minimizing impacts, is to utilize a boardwalk design through the ecologically sensitive areas. Impacts to the resources would be reduced to where the supports are driven into the earth, and users would retain a dry trail corridor to travel on through this section. Special thought will be required for this alternative as the life span of the wood used for the boardwalk would be less than an earthen trail and subbase, and wood tends to have less traction than other surface treatments present along the trail. Additional safety considerations regarding a boardwalk would involve fall protection, which may require the installation of a wooden pedestrian rail along either side of the boardwalk. Additional maintenance may also be required with a boardwalk as the timber materials may be less durable than earthen materials. Shade created by the boardwalk itself may also be considered an environmental impact.

Advantages:

- Promotes an overpass alternative for crossing under Alfred Road
- Reduces impacts to observed wet areas

Disadvantages:

- Increases safety challenges with wet decking and railings installed
- More expensive than constructing with earthen materials
- Large elevation changes required to create an at-grade crossing of Alfred Road

Recommendations:

Due to the constructability challenges to create an at-grade connection to Alfred Road, possible safety concerns, and increased construction costs, this alternative is not recommended.

› **Alternative 2.1.3 Trail on Eastern Embankment –** By constructing the trail along the eastern railroad embankment, most wet areas present within the historic alignment could be avoided. This alternative would start with the clearing of vegetation and debris along the embankment, as well as the removal of about six inches of organic matter from the sloped surface. From there, a shelf along the embankment would be constructed and additional material required would be imported granular or suitable earth borrow. The trail would then be constructed upon the shelf and side slope treatments could be installed to further reduce impacts, similar to as described in Conceptual Alternatives Section 1.1.2.

Advantages:

- Avoids observed ponding within historic rail alignment
- Promotes a gradual approach to raise the trail for an at-grade crossing of Alfred Road
- Promotes positive drainage away from the trail

Disadvantages:

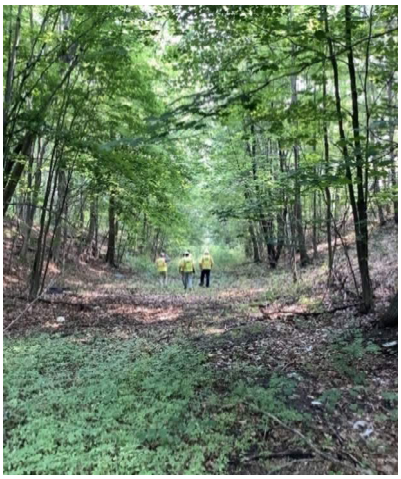
- Tree clearing required
- Possible complications with the Unitil Gas Line
- Requires additional infrastructure, i.e., retaining walls

Recommendations:

Although the construction costs and possible conflicts are higher for this alternative, the constructability and environmental impacts are far preferable. This alternative also promotes a better user experience as the trail is not confined by an earthen valley. This is the recommended alternative for this section of trail.

Section 2.2 – Kennebunk Savings Bank – Southern Parcel (~0.27 Miles)

Existing Conditions:



Segment 2, Section 2 Looking North

Along the historic railroad alignment ballast and timber ties were not observed during the site investigations. The gas line delineators generally run down the center of this section. This corridor is primarily in a cut slope with low brushy vegetation. Larger caliper trees and denser vegetation is present along the edges of the Railroad Right of Way.

A few wet areas encroach into the Railroad Right of Way but are mostly avoidable while remaining true to the historic railroad alignment. Ponding is present within the ideal alignment locations as you proceed further north due to the lower proximity of the corridor compared to the surrounding area. A larger waterbody is present towards the beginning of this section that is approximately half an acre in size along the eastern edge of the railroad right of way.

This Kennebunk Savings Bank (KSB) parcel is partially cleared in the southern half with large trees and dense vegetation along the edges. The northern portion of the parcel has a parking lot adjacent to the rail corridor with large trees and dense vegetation around the park ing lot. An existing, slightly overgrown, trail is present within the vegetation in the proximity of the parking lot and railroad right of way.

Kennebunk Savings Bank - Undeveloped Portion of Southern Parcel Viewed from R.R. ROW

Conceptual Alternatives:

› **Alternative 2.2.1 Historic Rail Alignment** – Trail construction along the historic rail alignment utilizes the same methodology as described in Conceptual Alternatives Section 2.1.1.

Advantages:

- Constructability and construction costs are low

Disadvantages:

- Moderate environmental impacts anticipated
- Notable trail elevation changes required when connecting to the previous section's recommended alternative
- Does not promote connectivity to possible future trail infrastructure on the Kennebunk Savings Bank Parcel

Recommendations:

Although constructability and construction costs are favorable for this alternative, due to the lack of connectivity between other recommended alternatives and appealing adjacent developments that may support the Eastern Trail, this is not the recommended alternative for this study section.

› **Alternative 2.2.2 Boardwalk Along Historic Rail Alignment** – Trail construction along the historic rail alignment via a boardwalk would be constructed similarly to as described in Conceptual Alternatives Section 2.1.2. With minimal wet areas observed in this section of the study area, the boardwalk alternative would be utilized to maintain a feeling of continuity for trail users along segment 2, rather than as a necessity to mitigate impacts.

Advantages:

- Reduces impacts to possible natural resources or wet areas

Disadvantages:

- Increases safety challenges with wet decking and railings installed
- More expensive than constructing with earthen materials
- Notable trail elevation changes required when connecting to the previous section's recommended alternative
- Does not promote connectivity to possible future trail infrastructure on the Kennebunk Savings Bank Parcel

Recommendations:

Due to the connectivity challenges, possible safety concerns, and increased construction costs, this alternative is not recommended.

› **Alternative 2.2.3 Trail on Eastern Embankment** – Trail construction along the eastern railroad embankment would be constructed similarly to as described in Conceptual Alternatives Section 2.1.3. Due to the minimal wet areas observed within this section of the study area, trail construction on the embankment would only be proposed as needed. In locations where an alignment on the embankment would not be beneficial, the trail could be constructed along the historic rail alignment.

Advantages:

- Avoids ponding within historic rail alignment
- Promotes gradual grade changes between the adjacent section's preferred alternatives
- Promotes positive drainage away from the trail
- Promotes connectivity to possible future trail infrastructure on the Kennebunk Savings Bank Parcel

Disadvantages:

- Tree clearing required
- Possible complications with the Unitil Gas Line
- Increased construction costs

Recommendations:

Although the construction costs and possible conflicts are higher for this alternative, the connectivity between other sections' recommended alternatives and appealing adjacent developments that may support the Eastern Trail are greatly increased with this alternative. This alternative also promotes a better user experience as the trail is not confined by an earthen valley. This is the recommended alternative for this section of trail.

› **Alternative 2.2.4 Trail Within Kennebunk Savings Bank – Southern Parcel Development –** VHB has been informed that the KSB southern parcel is undergoing a master plan study which will result in a re-development in the coming years. As part of this re-development there is a possibility to incorporate the Eastern Trail within the plans. KSB has openly expressed their support and willingness to accommodate the Eastern Trail development where feasible. As this master plan is still within the beginning phases of coming together, this would not be an immediate solution for the Eastern Trail, and there are a large number of unknowns with how these two assets would be tied together. For the purposes of this study, VHB assumes this alternative would be similar to the construction methods described in Conceptual Alternatives Section 1.1.2.

Advantages:

- Avoids ponding within historic rail alignment
- Promotes gradual grade changes between the adjacent sections' preferred alternatives
- Promotes connectivity to possible future trail infrastructure on the Kennebunk Savings Bank Parcel
- Possible reduced construction costs if constructed in conjunction with parcel development

Disadvantages:

- Tree clearing required
- Completely deviated from Unitil/Granite State Gas Right of Way
- Construction timeline dependent on Kennebunk Savings Bank

Recommendations:

There are too many unknowns at this time to recommend this alternative, but it is recommended that continued coordination with KSB take place during preliminary design to see if this becomes a more viable alternative as KSB advances their master plan.

Section 2.3 – Kennebunk Savings Bank – Northern Parcel (~0.20 Miles)

Existing Conditions:

Along the historic railroad alignment ballast and timber ties were not observed during the site investigations. The gas line delineators generally run down the center of this section. This corridor is primarily in a 10-15 foot cut slope with mostly low brushy vegetation. Larger caliper trees and denser vegetation is present along the edges of the Railroad Right of Way.

Segment 2, Section 3 Vegetated Area Between RR Embankment and Kennebunk Savings Bank

Various natural resources are present within the Railroad Right of Way, which will be tough to avoid while remaining true to the historic railroad alignment. Ponding was observed throughout the ideal alignment locations due to the lower proximity of the corridor compared to the surrounding area.

The KSB parcel is mostly developed with a large office building in the southern half and a parking lot for the employees in the northern half. An access road for the loading dock and deliveries is between the building and the railroad corridor. Large trees and dense vegetation surround the development along the edges of the property. There is approximately 35 feet of vegetation between the access road for the loading dock and the top of the embankment within the railroad right of way. As you proceed north along this parcel the pavement edge of the parking lot pushes slightly further away from the top of the embankment within the Unitil Corridor, increasing this vegetated width to 45 feet.

Conceptual Alternatives:

› **Alternative 2.3.1 Historic Rail Alignment** – Trail construction along the historic rail alignment utilizes the same methodology as described in Conceptual Alternatives Section 2.1.1.

Advantages:

- Constructability and construction costs are low

Disadvantages:

- Significant environmental impacts anticipated
- Notable trail elevation changes required when connecting to the previous section's recommended alternative
- Does not promote connectivity to possible future trail infrastructure on the Kennebunk Savings Bank Parcel

Recommendations:

Although constructability and construction costs are favorable for this alternative, due to the environmental impacts and lack of connectivity between other recommended alternatives and appealing adjacent developments that may support the Eastern Trail, this is not the recommended alternative for this study section.

› **Alternative 2.3.2 Boardwalk Along Historic Rail Alignment –** Trail construction along the historic rail alignment via a boardwalk would be constructed similarly to as described in Conceptual Alternatives Section 2.1.2.

Advantages:

- Reduces impacts to possible natural resources or wet areas

Disadvantages:

- Increases safety challenges with wet decking and railings installed
- More expensive than constructing with earthen materials
- Notable trail elevation changes required when connecting to the previous section's recommended alternative
- Does not promote connectivity to possible future trail infrastructure on the Kennebunk Savings Bank Parcel

Recommendations:

Due to the connectivity challenges, possible safety concerns, and increased construction costs, this alternative is not recommended.

› **Alternative 2.3.3 Trail on Eastern Embankment** – Trail construction along the eastern railroad embankment would be constructed similarly to as described in Conceptual Alternatives Section 2.1.3.

Advantages:

- Reduces impacts to ponding and surveyed wetland within historic rail alignment
- Promotes gradual grade changes between the adjacent section's preferred alternatives
- Promotes positive drainage away from the trail
- Promotes connectivity to possible future trail infrastructure on the Kennebunk Savings Bank Parcel

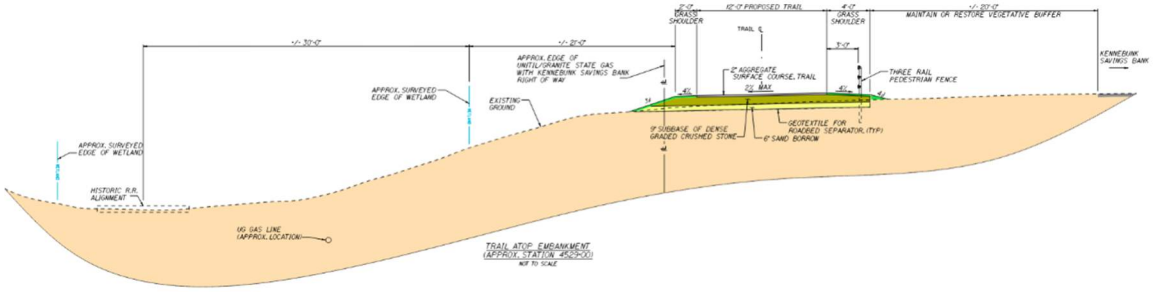
Disadvantages:

- Tree clearing required
- Possible complications with the Unitil Gas Line
- Increased construction costs

Recommendations:

The construction costs and possible conflicts are higher for this alternative than alternative 2.3.4 and although there is increased connectivity between other sections' recommended alternatives and appealing adjacent developments that may support the Eastern Trail with this alternative, it is also less than alternative 2.3.4. This is not the recommended alternative for this section of trail.

› **Alternative 2.3.4 Trail Along Top of Eastern Embankment** – VHB has discussed possible right of way impacts with KSB along their northern parcel. This alternative would consist of clearing an adequate corridor of timber atop the eastern railroad embankment as well as the removal of about six inches of organic matter from the earthen surface. The trail would then be constructed similar to as described in Conceptual Alternatives Section 1.1.2. A fence or vegetated buffer would be installed between the trail and the KSB facility to create a separation between trail users and KSB employees.



Alternative 2.3.4 typical section

Advantages:

- Avoids ponding within historic rail alignment
- Promotes gradual grade changes between the adjacent section's preferred alternatives
- Promotes positive drainage away from the trail
- Promotes connectivity to possible future trail infrastructure on the Kennebunk Savings Bank Parcel
- Avoids possible conflicts with the Unitil gas line

Disadvantages:

- Tree clearing required
- Right of Way impacts

Recommendations:

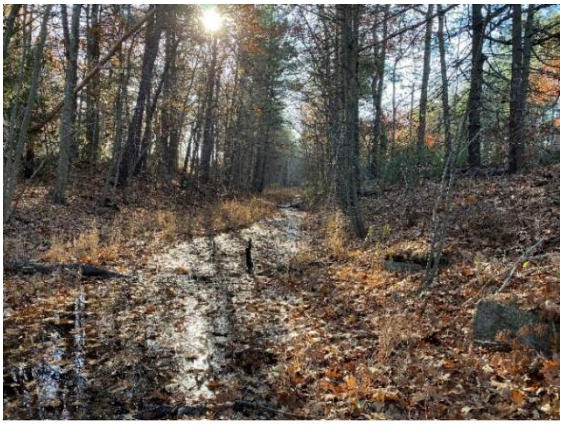
Although the construction costs and possible conflicts are higher for this alternative, the connectivity between other sections' recommended alternatives and appealing adjacent developments that may support the Eastern Trail are greatly increased with this alternative. This alternative also promotes a better user experience as the trail is not confined by an earthen valley. This is the recommended alternative for this section of trail.

Section 2.4 – Kennebunk Savings Bank – Northern Parcel to Alewive Road (~500 Feet)

Existing Conditions:

Along the historic railroad alignment, ballast and timber ties were not observed during the site investigations. The gas line delineators generally run down the center of this section. This corridor is primarily in a 10-15 foot cut slope with low brushy vegetation. Larger caliper trees and denser vegetation is present along the edges of the Railroad Right of Way.

Various natural resources are present within the Railroad Right of Way, which will be tough to avoid while remaining true to the historic railroad alignment. Ponding and a channelized wet area that flows toward Alewive Road is present throughout the ideal alignment locations due to the lower proximity of the corridor compared to the surrounding area.



Segment 2, Section 3 & 4 Along RR Alignment

There is an approximately 5-10 foot flat area along the eastern top of embankment bordering the private fence lines. This area is moderately vegetated with some larger caliper trees present. At the top of the western embankment lies Warrens Way. Along the embankment between the historic rail alignment and Warrens Way there is moderately thick vegetation with several larger caliper trees and utility poles present. The existing Eastern Trail starts at the intersection with Alewive Road.

Conceptual Alternatives:

› **Alternative 2.4.1 Historic Rail Alignment** – Trail construction along the historic rail alignment utilizes the same methodology as described in Conceptual Alternatives Section 2.1.1.

Advantages:

- Constructability and construction costs are low

Disadvantages:

- Significant environmental impacts anticipated
- Notable trail elevation changes required when connecting to the previous section's recommended alternative and to an at-grade crossing of Alewive Road

Recommendations:

Although constructability and construction costs are favorable for this alternative, due to the environmental impacts and lack of connectivity between other recommended alternatives and appealing adjacent developments that may support the Eastern Trail, this is not the recommended alternative for this study section.

› **Alternative 2.4.2 Boardwalk Along Historic Rail Alignment** – Trail construction along the historic rail alignment via a boardwalk would be constructed similarly to as described in Conceptual Alternatives Section 2.1.2.

Advantages:

- Reduces impacts to possible natural resources or wet areas

Disadvantages:

- Increases safety challenges with wet decking and railings installed
- More expensive than constructing with earthen materials
- Notable trail elevation changes required when connecting to the previous section's recommended alternative and to an at-grade crossing of Alewive Road

Recommendations:

Due to the connectivity challenges, possible safety concerns, and increased construction costs, this alternative is not recommended.

› **Alternative 2.4.3 Trail on Eastern Embankment** – Trail construction along the eastern railroad embankment would be constructed similarly to as described in Conceptual Alternatives Section 2.1.3.

Advantages:

- Reduces impacts to the ponding and surveyed wetland within historic rail alignment
- Promotes gradual grade changes between the adjacent section preferred alternative
- Promotes positive drainage away from the trail

Disadvantages:

- Tree clearing required
- Possible complications with the Unitil Gas Line
- Increased construction costs
- Grading challenges at Alewive Road approach

Recommendations:

Although the possible conflicts with the Unitil gas line and wetlands surveyed within the corridor are reduced with this alternative, there is still conflicts anticipated. The mitigation strategies increase the construction costs greatly resulting in this not being the recommended alternative for this section of trail.

› **Alternative 2.4.4 Trail Along Top of Eastern Embankment** – Trail construction atop the eastern railroad embankment would be constructed similarly to as described in Conceptual Alternatives Section 2.3.4. VHB has not discussed possible right of way impacts with the adjacent property owners at this time. If rights could not be attained from the adjacent property owners for this alternative, the embankment could be lowered, right-of-way mitigation techniques could be implemented similar to natural resource mitigations discussed in Conceptual Alternatives Section 1.1.2, and the trail footprint reduced in width to possibly retain this as a viable alternative. A fence or vegetated buffer would be installed between the trail and the adjacent property owners.

Advantages:

- Avoids ponding within historic rail alignment
- Promotes gradual grade changes between the adjacent section's preferred alternatives
- Promotes positive drainage away from the trail
- Avoids possible conflicts with the Unitil gas line

Disadvantages:

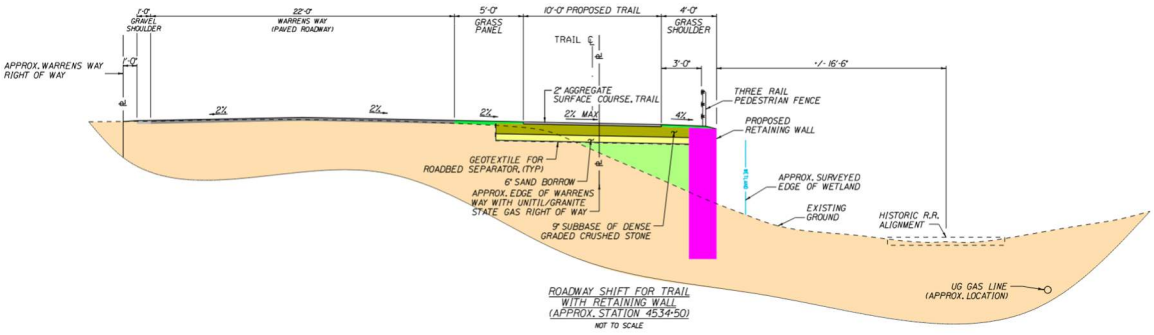
- Tree clearing required
- Right of Way impacts
- Possible reduced trail width
- Includes grading challenges at Alewive Road approach

Recommendations:

Due to right of way and trail width constraints, this is not the preferred alternative.

› **Alternative 2.4.5 Cross Railroad Corridor to Warrens Way** – By crossing the railroad corridor at the northern end of the KSB parcel and utilizing the Warrens Way corridor for the remaining trail length, trail users retain a mostly off-road facility through this corridor with only a shared space for approximately 500 linear feet. Since there are natural resources present within this section of the corridor, a bridge or culvert would most likely be necessary to ensure water can be conveyed from one side of the crossing to the other. If a culvert is utilized the trail would likely create a sag curve between the embankments to minimize the need for off-site embankment material to the extent feasible. Along Warrens Way the roadway improvement options are similar to the alternatives presented in Section 2.W, but at a reduced cost as the improvements would only be required for 500 linear feet of roadway versus approximately 0.7 miles of roadway.

Alternative 2.4.5 Trail Alignment, depicted in Orange



Alternative 2.4.5 in conjunction with 2.W.3 typical section

Advantages:

- Satisfies purpose and need
- Creates a connection to an at-grade crossing of Alewive Road

Disadvantages:

- Possible roadway rehabilitation required
- Probable reduced width in trail
- Does not amplify the trail users experience while adjacent to a roadway
- Probable impacts to roadway users during construction

Recommendations:

A prefabricated bridge from the Kennebunk Savings Bank parcel to a Warrens Way connection avoids right of way, utility, and surveyed wetland impacts throughout this section. The purpose and need are still met by creating a separated trail adjacent to the roadway. This is the recommended alternative for this section of trail.

Improvement Alternative Breakdown – Additional Features

Roadway Crossings

Existing Conditions:

Roadway Embankment Looking South Toward Alfred Road

Railroad Corridor from Perry Oliver Road

Perry Oliver Road is the northern terminus of the study area in Wells, and Alfred Road is the southern terminus of the study area in Kennebunk. Although the road crossings mark the limits of the study area, it is important to evaluate potential connections to the crossing roadways as well as the trail connectivity continuing along the corridor. These existing roadways are approximately 10-15 feet higher than the historic railroad alignment. Due to this elevation difference between the historic railroad alignment and the surrounding areas, standing water was observed at both locations.

Conceptual Alternatives:

› **Alternative C.1 Ramp to At-Grade Roadway Crossing** – Ramping the trail up to the roadway at crossings would create a connection to the on-street facility for all trail users traveling the corridor. Access ramp design shall follow guidance from the AASHTO Guide for the Development of Bicycle Facilities (2012), and grades shall not exceed slopes as described in Section 5.2.7 and/or in the ANPRM on Shared Use Paths (12), Section 5. Following this guidance, ramps for 10-15 foot elevation changes would range from 150 to 300 feet long. As the areas adjacent to the roadway facilities were observed to contain standing water, natural resource mitigation strategies as described in Conceptual Alternatives Section 1.1.2 would be required. A roadside level landing for trail users to collect, mount/dismount their bicycles, and prepare to safely enter the roadway would be essential. Roadway crossing upgrades may also be warranted, which could consist of crosswalk striping, enhanced signing, and possibly improved street lighting.

Advantages:

- Creates a connection for trail users to access the roadway facilities
- Construction costs are generally lower

Disadvantages:

- Could create certain trail elevation changes to reach the roadway grad
- Creates conflict between the two facilities with trail users crossing the roadway

Recommendations:

Although alternatives are evaluated for the roadway crossings within this study, the study limits are met at each roadway approach. For the purposes of this study, an at grade crossing is recommended to create closure to the trail corridor being analyzed.

› **Alternative C.2 Roadway Underpass** – A roadway underpass would enhance the user experience and safety along the trail corridor, by reducing the interactions between the roadway and trail facilities. Although there are ways to tunnel under the roadway without effecting the infrastructure of the road, since these embankments are minimally complex VHB recommends installation methods that would occur from the roadway surface. A variety of options are available for this underpass. Pre-cast concrete structures, metal pipe arches, and a bridge with concrete abutments would be the explored alternatives. A trail connection along the same gradient of the historic rail alignment would allow water conveyance from one side of the roadway embankment to the other, reducing ponding issues in these locations. Supplemental access to the roadway corridors would be included in the design of this alternative. A supplemental access for Perry Oliver Road may involve a five-foot wide access path and a staircase along the eastern edge of the corridor. For access to the Alfred Road corridor there could be a staircase at the eastern edge of the trail and then a more formal access ramp and trail head tied into a proposed parking lot south of the Village Tavern.

Advantages:

- Reduces conflict between the trail users and the roadway
- Reduces grading challenges at locations where the roadway is significantly higher than the recommended trail elevation
- Could promote a positive drainage from a wet area trapped by a roadway embankment

Disadvantages:

- Generally higher construction costs
- Additional access points would be required to connect trail users to roadway facilities

Recommendations:

Although alternatives are evaluated for the roadway crossings within this study, the study limits are met at each roadway approach. For the purposes of this study, an at grade crossing is recommended to create closure to the trail corridor being analyzed. Future efforts that involve connectivity to further limits of the Eastern Trail could promote underpass options at viable crossings.

3.2 Summary of Recommendations

The study area includes the two outer segments of a much longer future Eastern Trail corridor between Route 9 in North Berwick and Route 35 (Alewive Road) in Kennebunk. The first segment is approximately 2 miles ending on the south side at Perry Oliver Road in Wells. The second segment is approximately 0.7 miles starting at Alfred Road in Kennebunk. These two outer segments of this 11-mile Eastern Trail corridor have been stated as the most challenging pieces of that puzzle. It is recommended that the entire 11-mile corridor be progressed to preliminary design to further

determine the entire limits of work, property impacts, and natural resource impacts that may affect this project.

A recommended alternative for each section of the study corridor that satisfies the Eastern Trail's purpose and need; provides a safe corridor for trail users; identifies the possible right-of-way, environmental, and utility impacts; evaluates the constructability; and compares the estimated constructions costs to the other considered alternatives; has been identified. The following table highlights a comparison of alternatives and identifies the recommended alternative for each section of the study corridor.

EASTERN TRAIL FEASIBILITY STUDY

SEGMENT 1 - ROUTE 9 TO PERRY OLIVER ROAD

PRELIMINARY ALTERNATIVES COMPARISON TABLE

Section 1.1	Aspect	Alt. 1.1.1 - Historic Rail Alignment	Alt. 1.1.2 - Natural Resource Avoidance Within Utility Corr.			
Route 9 to 700 Linear Feet South of Perry Oliver Road (~1.82 Miles)	Satisfies Purpose & Need	Yes	Yes			
	Safety & Mobility	Dedicated path for bikes/peds	Dedicated path for bikes/peds			
	ROW, Env. & Utility Impacts	Minimal Env. Impacts Anticipated	Possible Utility Impacts Anticipated			
	Constructability	Minimal Construction Complexity	Moderate Construction Complexity			
	Estimated Cost	Low	Moderate			
Section 1.2	**Aspect**	**Alt. 1.2.1 - Historic Rail Alignment**	**Alt. 1.2.2 - Natural Resource Avoidance Within Utility Corr.**			
700 Linear Feet South of Perry Oliver Road	Satisfies Purpose & Need	Yes	Yes			
	Safety & Mobility	Dedicated path for bikes/peds	Dedicated path for bikes/peds			
	ROW, Env. & Utility Impacts	Env. Impacts Anticipated	Possible Utility, Moderate Env. Anticipated			
	Constructability	Minimal Construction Complexity if Permitted	Moderate Construction Complexity			
	Estimated Cost	Low	Moderate			

Feature Color Coding:	More Desireable	Neutral	Less Desireable	Not Considered	Recommended

EASTERN TRAIL FEASIBILITY STUDY

SEGMENT 2 - ALFRED ROAD TO ALEWIVE ROAD

PRELIMINARY ALTERNATIVES COMPARISON TABLE

Section 2.W	Aspect	Alt. 2.W.1 - Pvmt. Preserv., Add Signage and Striping	Alt. 2.W.2 - Roadway Improvements	Alt. 2.W.3 - Shared-Use Path Adjacent to Roadway		
Warrens Way	Satisfies Purpose & Need	No	No	Yes		
	Safety & Mobility	Minimal improvement	Moderate improvement Shared roadway options	Dedicated path for bikes/peds		
	ROW, Env. & Utility Impacts	None anticipated	Possible ROW or Utility Impacts Anticipated	ROW and Possible Utility Impacts Anticipated		
	Constructability	Minimal Construction Complexity, Minor Traffic Impacts	Moderate Construction Complexity and Traffic Impacts	Major Construction Complexity and Traffic Impacts		
	Estimated Cost	Low	Moderate	High		
Section 2.1	**Aspect**	**Alt. 2.1.1 - Historic Rail Alignment**	**Alt. 2.1.2 - Boardwalk Along Historic Rail Alignment**	**Alt. 2.1.3 - Trail on Eastern Embankment**		
Alfred Road to Kennebunk Savings Bank - Southern Parcel (~300 Linear Feet)	Satisfies Purpose & Need	Yes	Yes	Yes		
	Safety & Mobility	Dedicated path for bikes/peds	Possible Safety Concerns	Dedicated path for bikes/peds		
	ROW, Env. & Utility Impacts	Major Environmental Impacts	Minor Environmental Impacts Anticipated	Possible Environmental Impacts Anticipated		
	Constructability	Likely would not get permitted	Moderate Construction Complexity	Moderate Construction Complexity		
	Estimated Cost	Low	Moderate	Moderate		
Section 2.2	**Aspect**	**Alt. 2.2.1 - Historic Rail Alignment**	**Alt. 2.2.2 - Boardwalk Along Historic Rail Alignment**	**Alt. 2.2.3 - Trail on Eastern Embankment**	**Alt. 2.2.4 - Trail Within Kennebunk Savings Bank - Southern Parcel Development**	
Kennebunk Savings Bank - Southern Parcel (~0.27 Miles)	Satisfies Purpose & Need	Yes	Yes	Yes	Eventually	
	Safety & Mobility	Dedicated path for bikes/peds	Possible Safety Concerns	Dedicated path for bikes/peds	Dedicated path for bikes/peds	
	ROW, Env. & Utility Impacts	Moderate Environmental Impacts Anticipated	Possible Environmental Impacts Anticipated	Possible Environmental Impacts Anticipated	100% off Unitil ROW	
	Constructability	Minor Construction Complexity	Moderate Construction Complexity	Moderate Construction Complexity	Minimal Construction Complexity if coordinated with site development	
	Estimated Cost	Low	Moderate	Moderate	Low	
Section 2.3	**Aspect**	**Alt. 2.3.1 - Historic Rail Alignment**	**Alt. 2.3.2 - Boardwalk Along Historic Rail Alignment**	**Alt. 2.3.3 - Trail on Eastern Embankment**	**Alt. 2.3.4 - Trail Along Top of Eastern Embankment**	
Kennebunk Savings Bank - Northern Parcel (~0.20 Miles)	Satisfies Purpose & Need	Yes	Yes	Yes	Yes	
	Safety & Mobility	Dedicated path for bikes/peds	Possible Safety Concerns	Dedicated path for bikes/peds	Dedicated path for bikes/peds	
	ROW, Env. & Utility Impacts	Major Environmental Impacts	Minor Environmental Impacts Anticipated	Moderate Environmental Impacts	Significant ROW Impacts	
	Constructability	Likely will not get permitted	Moderate Construction Complexity	Moderate Construction Complexity	Moderate Construction Complexity	
	Estimated Cost	Low	Moderate	Moderate	Low	
Section 2.4	**Aspect**	**Alt. 2.4.1 - Historic Rail Alignment**	**Alt. 2.4.2 - Boardwalk Along Historic Rail Alignment**	**Alt. 2.4.3 - Trail on Eastern Embankment**	**Alt. 2.4.4 - Trail Along Top of Eastern Embankment**	**Alt. 2.4.5 - Cross Railroad Corridor to Warrens Way**
Kennebunk Savings Bank - Northern Parcel to Alewive Road (~500 Linear Feet)	Satisfies Purpose & Need	Yes	Yes	Yes	Yes	Yes, Utilizing Alt. 2.W.3 Methodology
	Safety & Mobility	Dedicated path for bikes/peds	Possible Safety Concerns	Dedicated path for bikes/peds	Dedicated reduced width path for bikes/peds	Dedicated reduced width path for bikes/peds
	ROW, Env. & Utility Impacts	Major Environmental Impacts	Minor Environmental Impacts Anticipated	Moderate Environmental Impacts	Significant ROW Impacts	Minor Clearing Impacts
	Constructability	Likely will not get permitted	Moderate Construction Complexity	Moderate Construction Complexity	Limited space for construction activites	Moderate Construction Complexity
	Estimated Cost	Low	Moderate	Moderate	Moderate	Moderate

Feature Color Coding:	More Desireable	Neutral	Less Desireable	Not Considered	Recommended

The following is a segment-by-segment summary of recommendations.

Segment 1 (Route 9 in North Berwick to Perry Oliver Road in Wells)

Section 1.1 – Route 9 to 700 Linear Feet South of Perry Oliver Road (~1.82 Miles)

› Construct Alternative 1.1.1 (Historic Rail Alignment) – The trail shall follow the historic railroad alignment utilizing the existing ballast as a trail base and removing the existing railroad timber ties to do so.

Section 1.2 – 700 Linear Feet South of Perry Oliver Road

› Construct Alternative 1.2.2 (Natural Resource Avoidance Within Utility Corridor) – The trail will deviate from the historic railroad alignment and be constructed along the eastern embankment to avoid challenges with surveyed wetlands and Unitil gas infrastructure.

Segment 2 (Alfred Road to Alewive Road in Kennebunk)

Alternative 2.W – Warrens Way

› Alternative 2.W.1 (Pavement Preservation, Add Signage and Striping) could be utilized as a temporary solution, but was not further analyzed within this study due to its lack of satisfying the Eastern Trail's purpose and need.

› Alternative 2.W.2 (Roadway Improvements) could be utilized as a separate enhancement to the corridor to create a connection for local residences to safely access the Eastern Trail but was not further analyzed within this study due to its lack of satisfying the Eastern Trail's purpose and need.

› Alternative 2.W.3 (Shared-Use Path Adjacent to Roadway) discusses the methodology that is recommended as part of Alternative 2.4.5 but is not a recommended alternative for the entire length of Segment 2.

Section 2.1 – Alfred Road to Kennebunk Savings Bank – Southern Parcel (~300 Feet)

› Construct Alternative 2.1.3 (Trail on Eastern Embankment) – The trail will be constructed along the eastern embankment to avoid surveyed wetlands, large elevation changes, and Unitil gas infrastructure.

Section 2.2 – Kennebunk Savings Bank – Southern Parcel (~0.27 Miles)

› Construct Alternative 2.2.3 (Trail on Eastern Embankment) – The trail construction will remain along the eastern embankment to avoid large elevation changes, Unitil gas infrastructure, and create connectivity opportunities to the Kennebunk Savings Bank parcel.

Section 2.3 – Kennebunk Savings Bank – Northern Parcel (~0.20 Miles)

› Construct Alternative 2.3.4 (Trail Along Top of Eastern Embankment) – The trail will be constructed atop of the eastern embankment and partially within the Kennebunk Savings Bank parcel to avoid Unitil gas infrastructure, surveyed wetlands, and create connectivity opportunities to the Kennebunk Savings Bank parcel.

Section 2.4 – Kennebunk Savings Bank – Northern Parcel to Alewive Road (~500 Feet)

- Construct Alternative 2.4.5 (Cross Railroad Corridor to Warrens Way) – The trail will cross the Unitil corridor from the Kennebunk Savings Bank to the Warrens Way corridor via a prefabricated bridge.
- Warrens Way will be shifted to the west and the trail will be constructed between Warrens Way and the surveyed wetlands within the Unitil corridor.
- The trail may be necked down to a 10' width pending the level of wetland impacts permitted.

Additional Crossing Features

- Alternative C.1 (Ramp to At-Grade Roadway Crossing) – Although alternatives are evaluated for the roadway crossings within this study, the study limits are met at each roadway approach. For the purposes of this study, an at grade crossing is recommended to create closure to the trail corridor being analyzed.
- Alternative C.2 (Roadway Underpass) – Although alternatives are evaluated for the roadway crossings within this study, the study limits are met at each roadway approach. For the purposes of this study, an at grade crossing is recommended to create closure to the trail corridor being analyzed. Future efforts that involve connectivity to further limits of the Eastern Trail could promote underpass options at viable crossings.

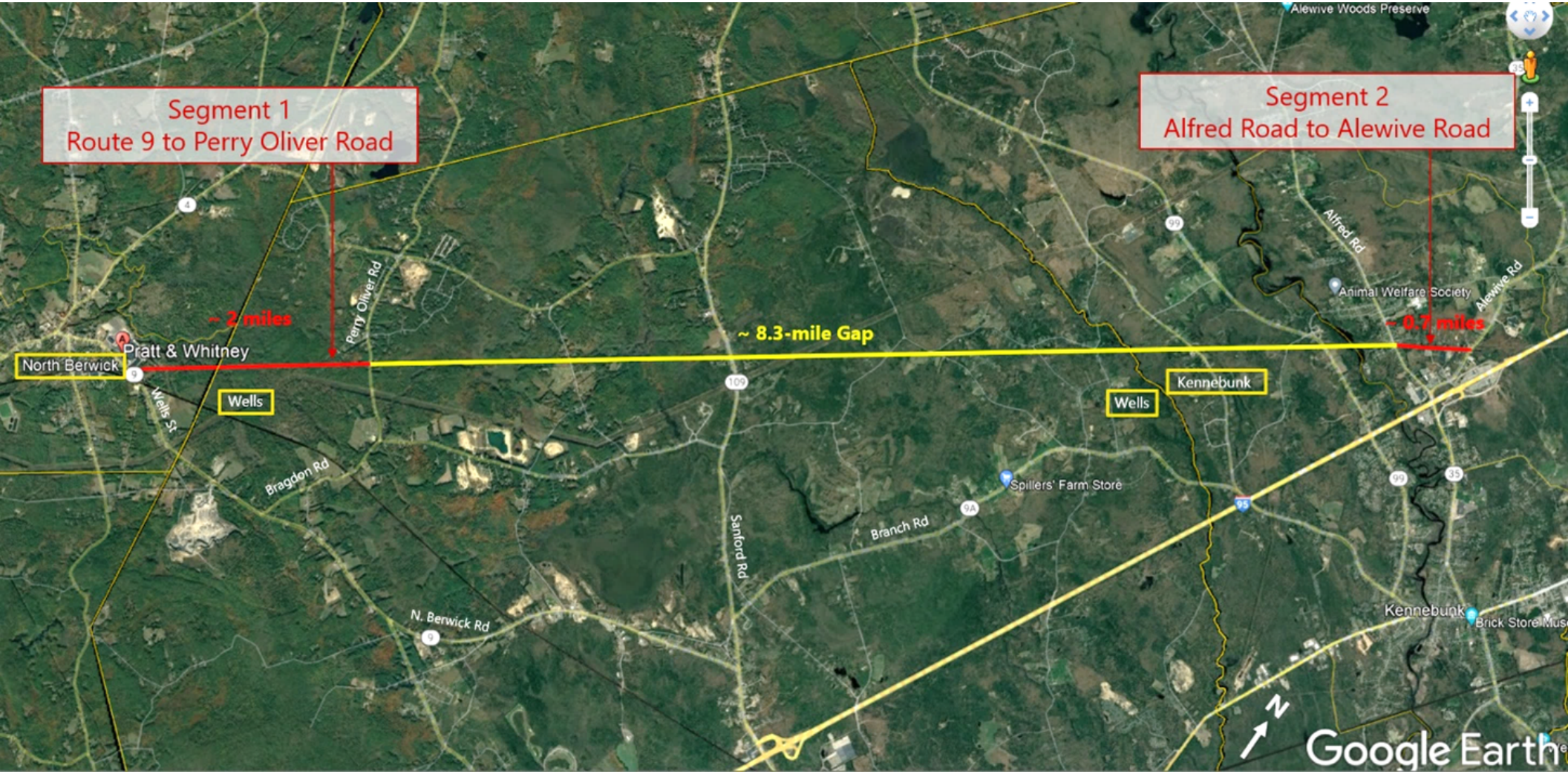
4

Assessment of Probable Costs

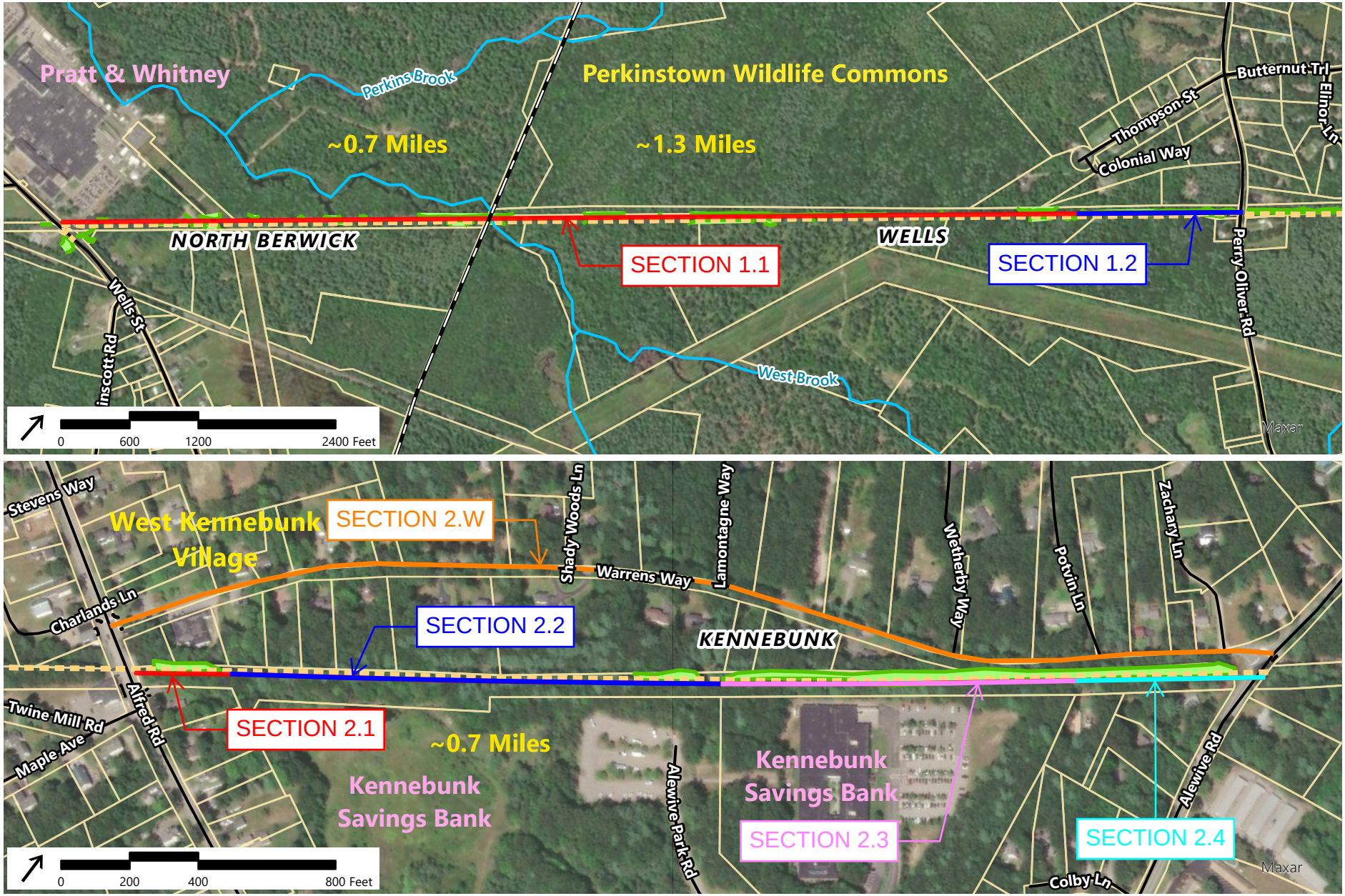
The following is a summary of the conceptual estimate of probable costs for the alternatives described in the Summary of Recommendations. The conceptual cost estimate was developed utilizing an order of magnitude evaluation of each aspect of the trail construction and includes contingencies to cover the summation of all the minor construction costs not evaluated at this time. A more accurate estimate with calculated costs based on a developed plan set would be expected during the preliminary engineering stage.

SUMMARY OF CONCEPTUAL COSTS		
DESCRIPTION		AMOUNT
Segment 1 – Route 9 to Perry Oliver Road		
Section 1.1 – Alt. 1.1.1 (Historic Rail Alignment ~1.82 Miles)	$	786,000.00
Section 1.2 – Alt. 1.2.2 (Natural Resource Avoidance Within Utility Corridor ~700 LF)	$	459,000.00
Segment 1 Subtotal	$	1,245,000.00
Segment 2 – Alfred Road to Alewive Road		
Section 2.1 – Alt. 2.1.3 (Trail on Eastern Embankment ~300 LF)	$	356,000.00
Section 2.2 – Alt. 2.2.3 (Trail on Eastern Embankment ~0.27 Miles)	$	261,000.00
Section 2.3 – Alt. 2.3.4 (Trail Along Top of Eastern Embankment ~0.20 Miles)	$	170,000.00
Section 2.4 – Alt. 2.4.5 (Cross Railroad Corridor to Warrens Way ~500 LF)	$	1,003,000.00
Segment 2 Subtotal	$	1,790,000.00
TOTAL CONSTRUCTION COST ESTIMATE	$	3,035,000.00
PROFESSIONAL ENGINEERING (10%)	$	303,500.00
CONSTRUCTION ENGINEERING (15%)	$	455,250.00
RIGHT-OF-WAY, PERMITTING, MITIGATION (Not Included)	$	-
ROUNDING	$	36,250.00
ESTIMATED PROJECT TOTAL	$	3,830,000.00

Appendix A1 – Eastern Trail Study Areas

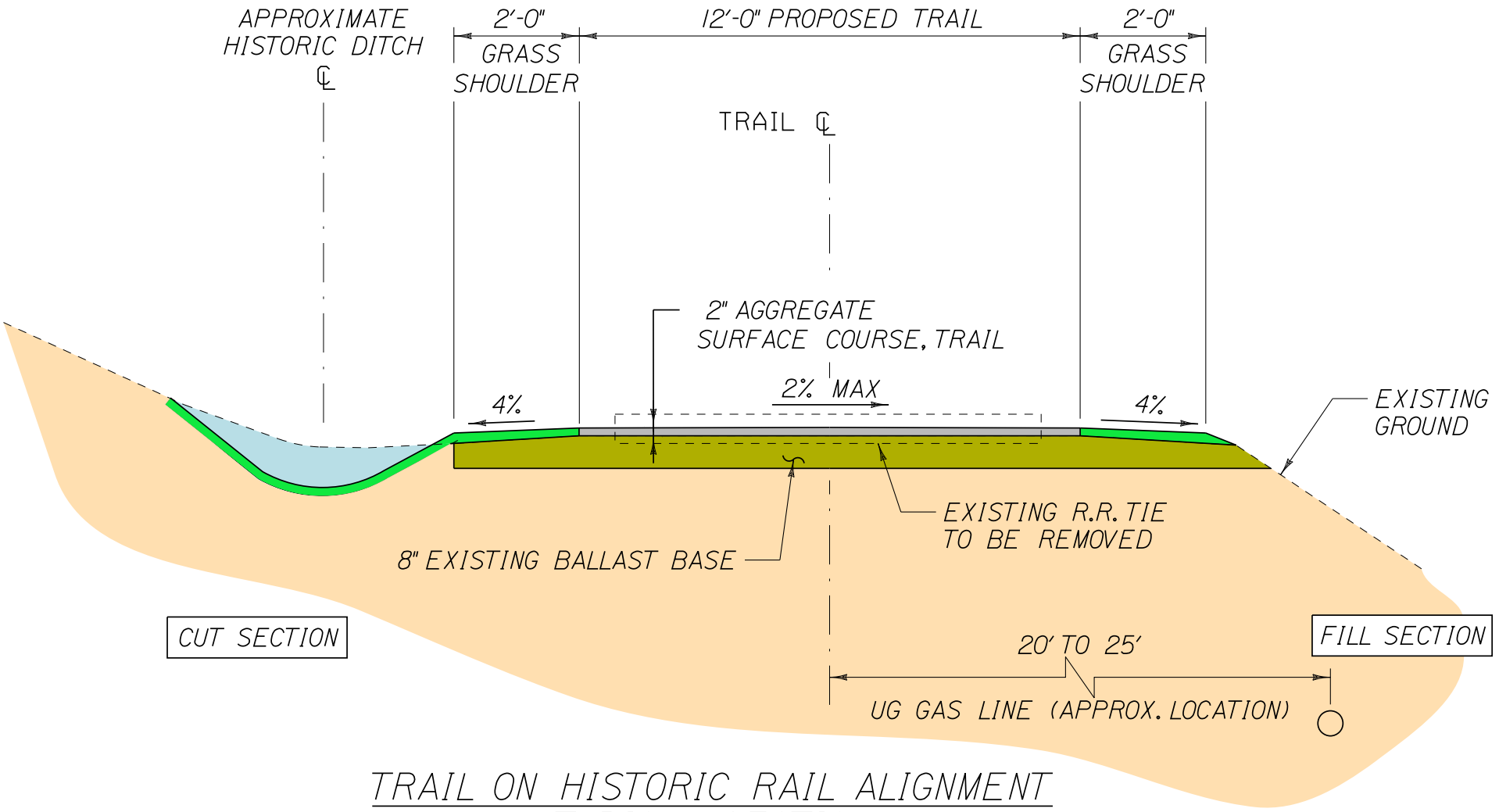


EASTERN TRAIL STUDY AREAS



IMPROVEMENT ALTERNATIVE BREAKDOWN FOR SEGMENT 1 (TOP) AND SEGMENT TWO (BOTTOM)

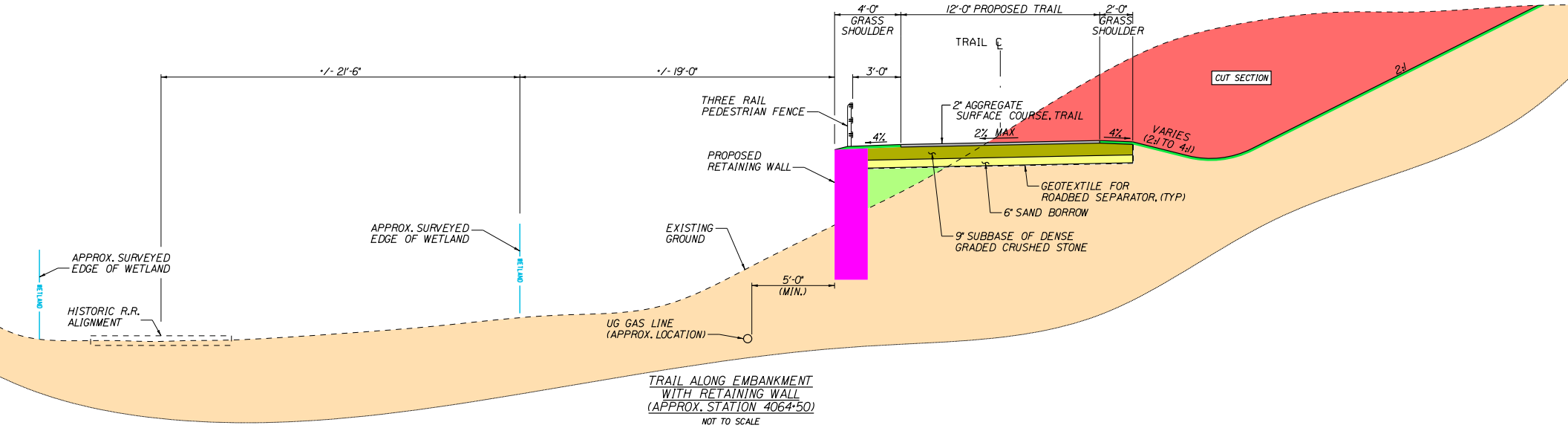
Appendix A2 – Recommended Typical Sections



TRAIL ON HISTORIC RAIL ALIGNMENT
TYPICAL SECTION

NOT TO SCALE

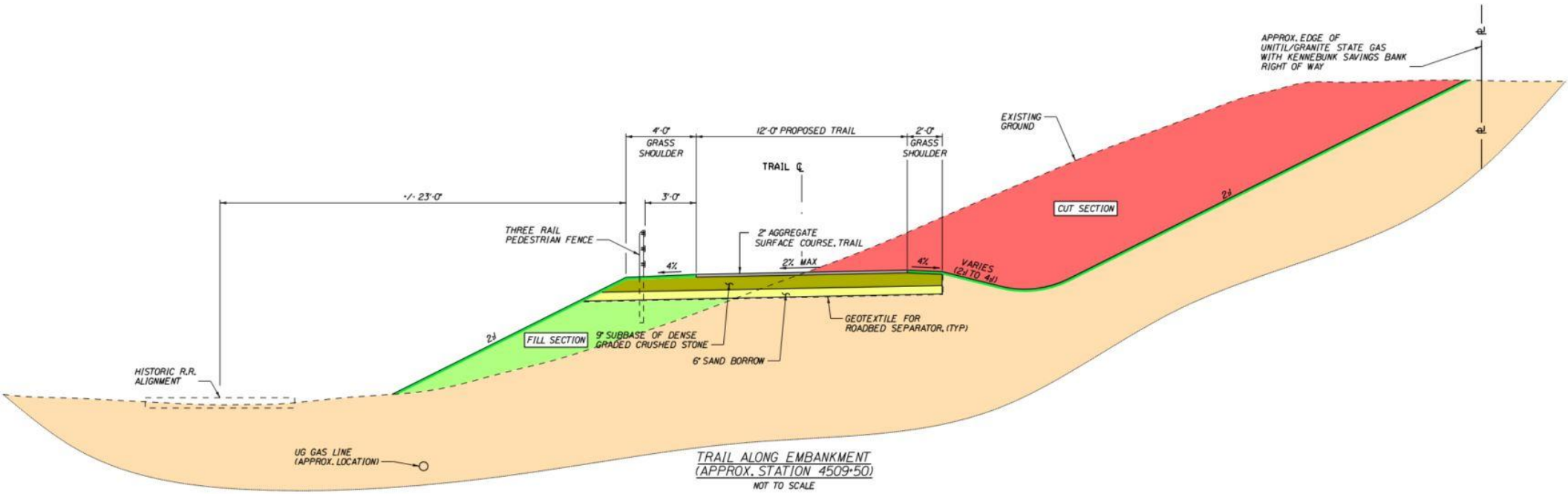
ALTERNATIVE 1.1.1 TYPICAL SECTION



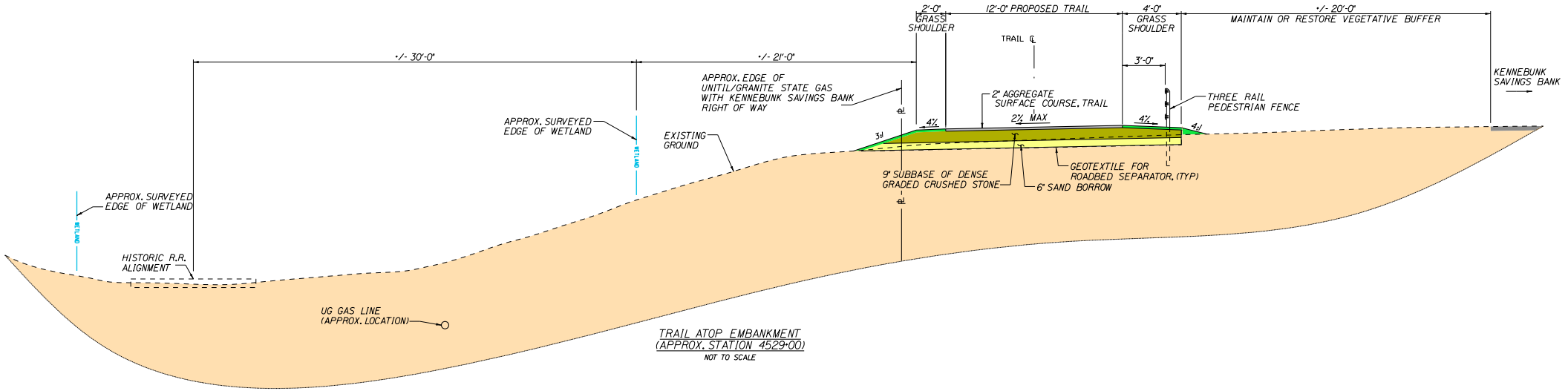
TRAIL ALONG EMBANKMENT WITH RETAINING WALL (APPROX. STATION 4064+50)

NOT TO SCALE

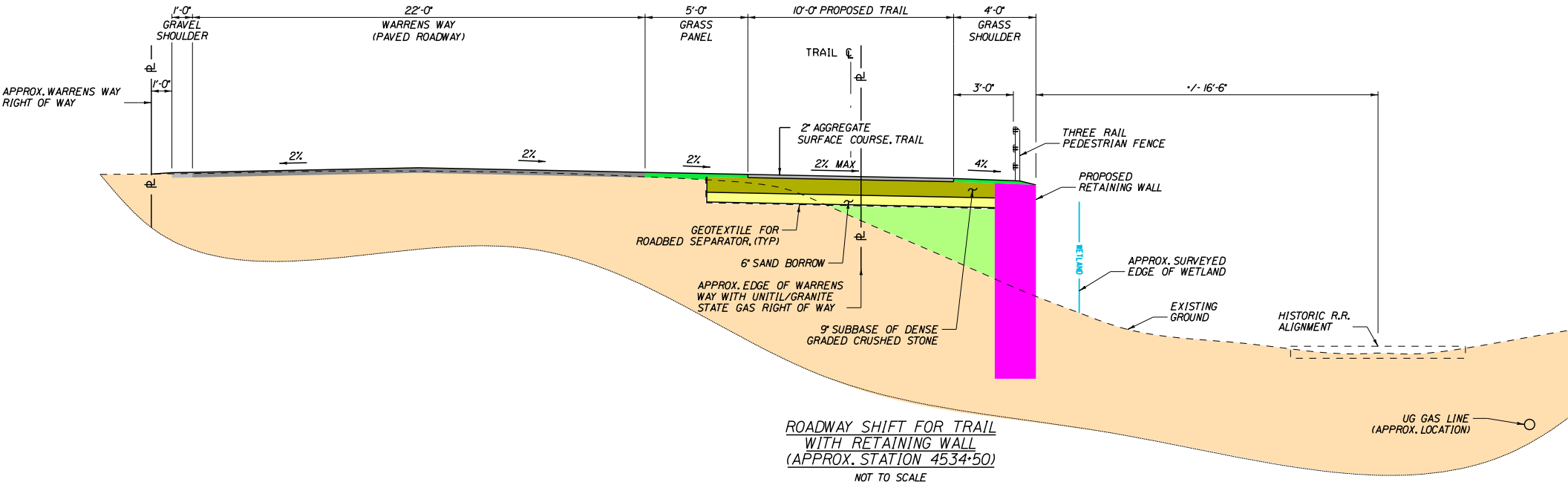
ALTERNATIVE 1.2.2 TYPICAL SECTION



ALTERNATIVE 2.1.3 AND 2.2.3 TYPICAL SECTION

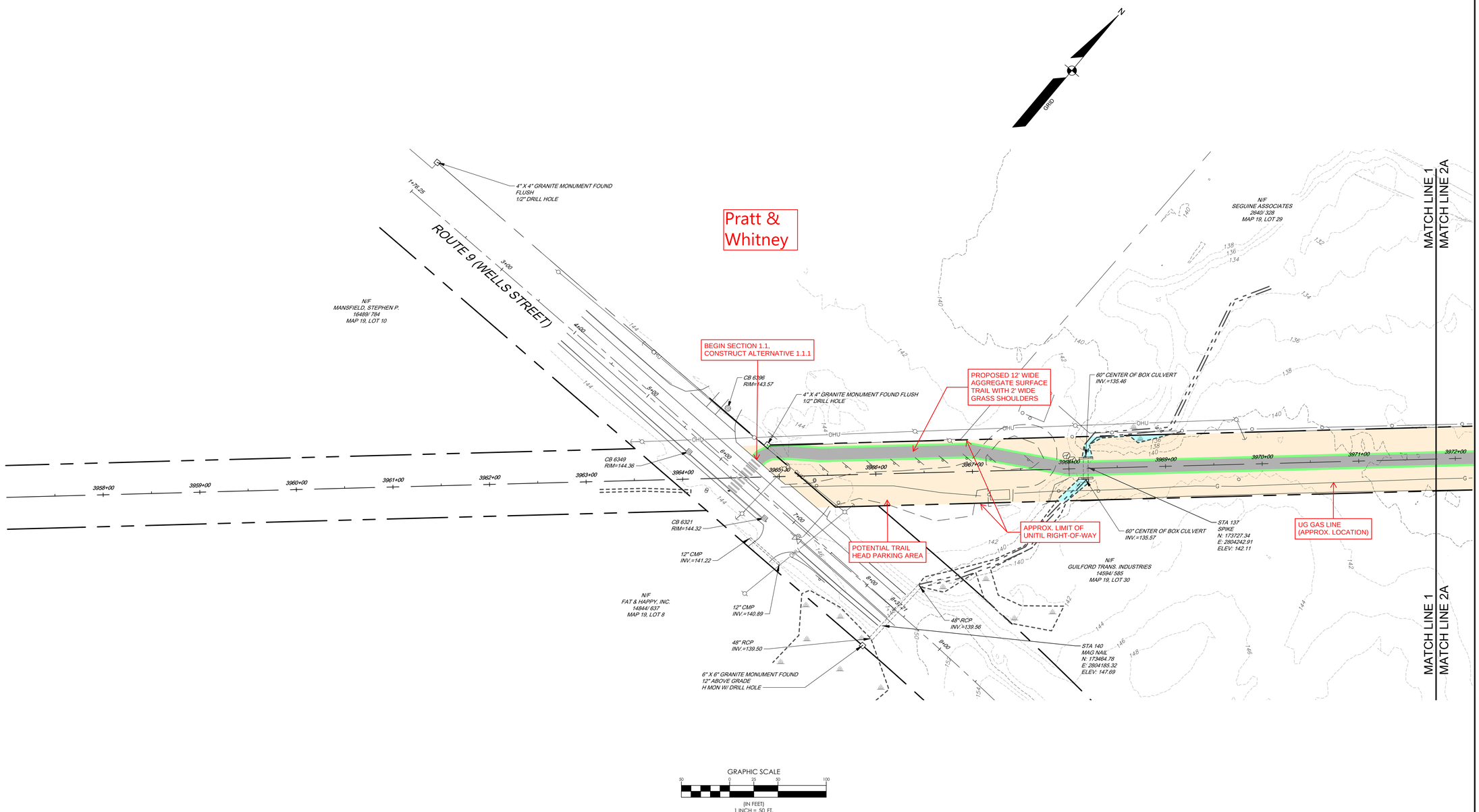


ALTERNATIVE 2.3.4 TYPICAL SECTION



ALTERNATIVE 2.4.5 IN CONJUNCTION WITH ALTERNATIVE 2.W.3 TYPICAL SECTION

Appendix A3 – Conceptual Plans of Recommendations



Note: Base Plan information completed by Sebago Technics.

EASTERN TRAIL CONNECTIVITY FEASIBILITY STUDY
CONCEPTUAL PLAN

(ROUTE 9 IN NORTH BERWICK TO PERRY OLIVER ROAD IN WELLS AND ALFRED ROAD TO ALEWIVE ROAD IN KENNEBUNK)

NOT FOR CONSTRUCTION

MATCH LINE 1
MATCH LINE 2A

MATCH LINE 2A
MATCH LINE 2B

MATCH LINE 2A
MATCH LINE 2B

MATCH LINE 2B
MATCH LINE 3A

MATCH LINE 2A
MATCH LINE 2B

MATCH LINE 2A
MATCH LINE 2B

N

GRID

N/F
CENTRAL MAINE POWER COMPANY
1753/ 421
MAP 2, LOT 28

60" CENTER OF BOX CULVERT
INV.=129.16

60" CENTER OF BOX CULVERT
INV.=129.77

N/F
HENRY A. LAUGHLIN III
REVOCABLE LIVING TRUST
16202/ 526
MAP 2, LOT 29

N/F
CENTRAL MAINE POWER COMPANY
1753/ 421
MAP 2, LOT 28

N/F
LUDINGTON, DEAN
8622/ 183
MAP 19, LOT 31

STA 136
SPIKE
N: 174056.83
E: 2804617.10
ELEV: 138.71

STA 135
REBAR
N: 174482.38
E: 2805097.40
ELEV: 134.94

3972+00
3973+00
3974+00
3975+00
3976+00
3977+00
3978+00
3979+00
3980+00
3981+00
3982+00
3983+00
3984+00
3985+00
3986+00
3987+00

N/F
SEGUINE ASSOCIATES
2640/ 328
MAP 19, LOT 29

N/F
HENRY A. LAUGHLIN III
REVOCABLE LIVING TRUST
16202/ 526
MAP 2, LOT 29

STA 134
REBAR
N: 175101.19
E: 2805795.40
ELEV: 131.05

STA 133
SPIKE
N: 175598.15
E: 2806358.78
ELEV: 132.16

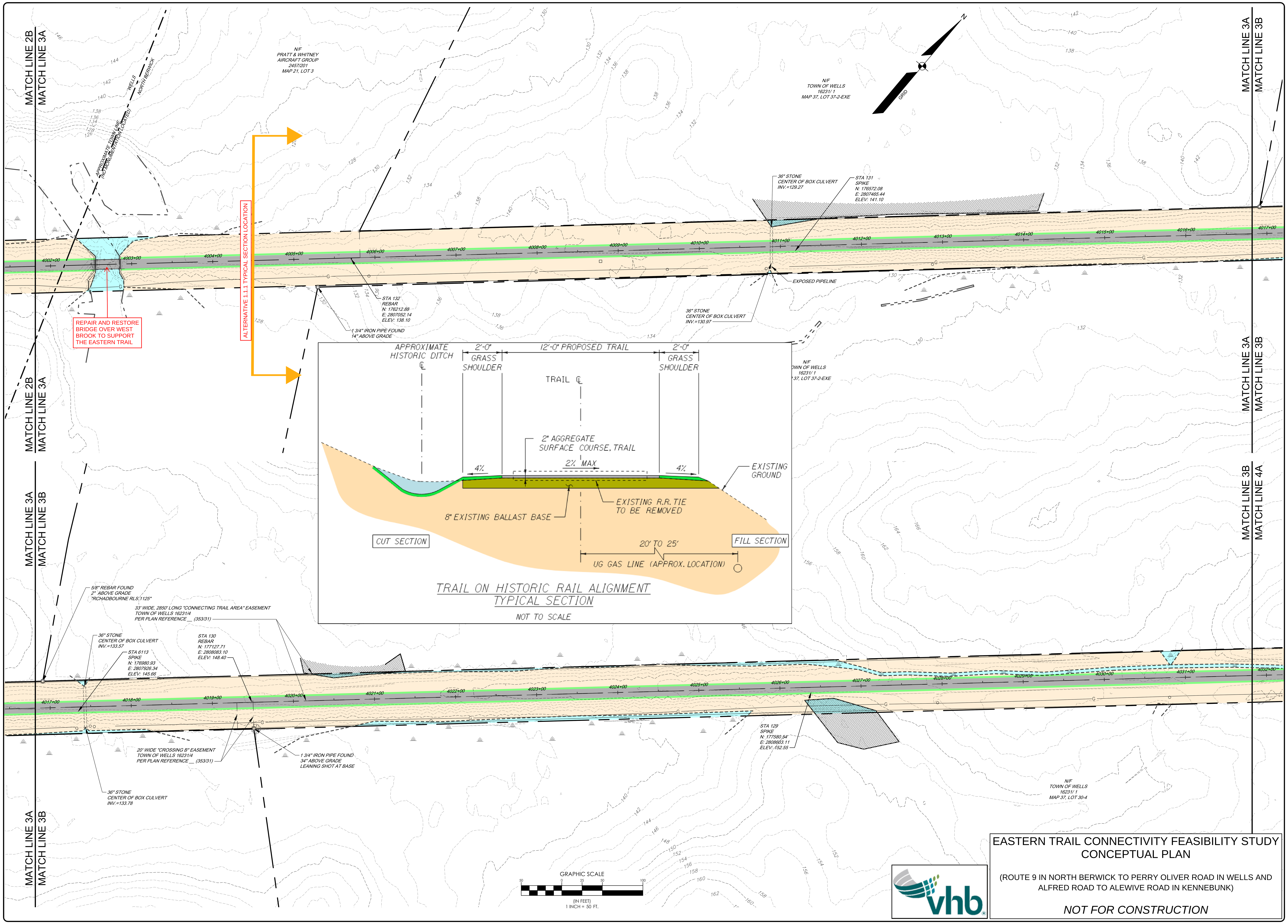
3987+00
3988+00
3989+00
3990+00
3991+00
3992+00
3993+00
3994+00
3995+00
3996+00
3997+00
3998+00
3999+00
4000+00
4001+00
4002+00

GRAPHIC SCALE
50 0 25 50 100
(IN FEET)
1 INCH = 50 FT.

EASTERN TRAIL CONNECTIVITY FEASIBILITY STUDY
CONCEPTUAL PLAN

(ROUTE 9 IN NORTH BERWICK TO PERRY OLIVER ROAD IN WELLS AND ALFRED ROAD TO ALEWIVE ROAD IN KENNEBUNK)

NOT FOR CONSTRUCTION


MATCH LINE 2B
MATCH LINE 3A
MATCH LINE 3A
MATCH LINE 3B
MATCH LINE 3B
MATCH LINE 4A
N/F
PRATT & WHITNEY
AIRCRAFT GROUP
2457/201
MAP 21, LOT 3
N/F
TOWN OF WELLS
16231/ 1
MAP 37, LOT 37-2-EXE
WELLS
NORTH BERWICK
APPROXIMATE TOWN LINE
ALTERNATIVE 1.1.1 TYPICAL SECTION LOCATION
REPAIR AND RESTORE
BRIDGE OVER WEST
BROOK TO SUPPORT
THE EASTERN TRAIL
36" STONE
CENTER OF BOX CULVERT
INV.=129.27
STA 131
SPIKE
N: 176572.08
E: 2807465.44
ELEV: 141.10
EXPOSED PIPELINE
36" STONE
CENTER OF BOX CULVERT
INV.=130.97
STA 132
REBAR
N: 176212.88
E: 2807052.14
ELEV: 138.10
1 3/4" IRON PIPE FOUND
14" ABOVE GRADE
APPROXIMATE
HISTORIC DITCH
2'-0"
GRASS
SHOULDER
12'-0" PROPOSED TRAIL
TRAIL ℄
2" AGGREGATE
SURFACE COURSE, TRAIL
2% MAX
4%
EXISTING
GROUND
EXISTING R.R. TIE
TO BE REMOVED
8" EXISTING BALLAST BASE
CUT SECTION
FILL SECTION
20' TO 25'
UG GAS LINE (APPROX. LOCATION)
TRAIL ON HISTORIC RAIL ALIGNMENT
TYPICAL SECTION
NOT TO SCALE
5/8" REBAR FOUND
2" ABOVE GRADE
"RCHADBOURNE RLS 1125"
33' WIDE, 2850' LONG "CONNECTING TRAIL AREA" EASEMENT
TOWN OF WELLS 16231/4
PER PLAN REFERENCE __ (353/31)
36" STONE
CENTER OF BOX CULVERT
INV.=133.57
STA 6113
SPIKE
N: 176980.93
E: 2807926.34
ELEV: 145.66
STA 130
REBAR
N: 177127.71
E: 2808083.10
ELEV: 148.40
20' WIDE "CROSSING B" EASEMENT
TOWN OF WELLS 16231/4
PER PLAN REFERENCE __ (353/31)
1 3/4" IRON PIPE FOUND
34" ABOVE GRADE
LEANING SHOT AT BASE
36" STONE
CENTER OF BOX CULVERT
INV.=133.78
STA 129
SPIKE
N: 177580.54
E: 2808603.11
ELEV: 152.55
N/F
TOWN OF WELLS
16231/ 1
MAP 37, LOT 30-4
GRAPHIC SCALE
(IN FEET)
1 INCH = 50 FT.

EASTERN TRAIL CONNECTIVITY FEASIBILITY STUDY
CONCEPTUAL PLAN

(ROUTE 9 IN NORTH BERWICK TO PERRY OLIVER ROAD IN WELLS AND ALFRED ROAD TO ALEWIVE ROAD IN KENNEBUNK)

NOT FOR CONSTRUCTION

vhb

MATCH LINE 3B
MATCH LINE 4A

MATCH LINE 4A
MATCH LINE 4B

MATCH LINE 4A
MATCH LINE 4B

MATCH LINE 4B
MATCH LINE 5A

N

GRID

33' WIDE, 2850' LONG "CONNECTING TRAIL AREA" EASEMENT
TOWN OF WELLS 16231/4
PER PLAN REFERENCE __ (353/31)

12' WIDE "CROSSING A" EASEMENT
TOWN OF WELLS 16231/4
PER PLAN REFERENCE __ (353/31)

N/F
TOWN OF WELLS
16231/ 1
MAP 37, LOT 37-2-EXE

24" STONE
CENTER OF BOX CULVERT
INV.=148.98

5/8" REBAR FOUND
FLUSH IN TRAIL
"OEST PLS 1245"

4032+00 4033+00 4034+00 4035+00 4036+00 4037+00 4038+00 4039+00 4040+00 4041+00 4042+00 4043+00 4044+00 4045+00 4046+00 4047+00

CONSTRUCT TRAIL INTERSECTION
WITH PERKINSTOWN WILDLIFE
COMMONS TRAIL

STA 128
SPIKE
N: 177964.48
E: 2809059.31
ELEV: 159.77

STA 126
STA
N: 178280.65
E: 2809388.15
ELEV: 165.98

STA 125
SPIKE
N: 178511.76
E: 2809648.73
ELEV: 162.09

STA 6059
SPIKE
N: 178621.97
E: 2809770.80
ELEV: 163.25

24" STONE
CENTER OF BOX CULVERT
INV.=149.05

1.75" IRON PIPE FOUND
20" ABOVE GRADE

STA 124
SPIKE
N: 178763.16
E: 2809931.13
ELEV: 164.83

N/F
TOWN OF WELLS
16231/ 1
MAP 37, LOT 30-4

N/F
TOWN OF WELLS
16720/ 172
MAP 29, LOT 4-EXE

N/F
CLARK, DAVID E. & KELLY A.
16230/ 996
MAP 29, LOT 11-2

N/F
SHANGRAW, KEITH L. & KELLY J.
17143/ 526
MAP 29, LOT 10C

N/F
LIVINGSTON, MICHAEL C. & DEBRA B.
10649/ 72
MAP 29, LOT 10B-1

END SECTION 1.1
BEGIN SECTION 1.2
CONSTRUCT ALTERNATIVE 1.2.2

PROPOSED 12' WIDE
AGGREGATE SURFACE
TRAIL WITH 2' WIDE
GRASS SHOULDERS

STA 6040
SPIKE
N: 179000.16
E: 2810213.18
ELEV: 169.68

1-1/4" IRON PIPE FOUND
10" ABOVE GRADE
WITH CAP

INV.=160.18

STA 122
REBAR
N: 179359.08
E: 2810612.14
ELEV: 171.62

1-1/4" IRON PIPE FOUND
1" ABOVE GRADE
WITH CAP

1-1/4" IRON PIPE FOUND
6" ABOVE GRADE

APPROX. FILL
SLOPE LIMIT

4047+00 4048+00 4049+00 4050+00 4051+00 4052+00 4053+00 4054+00 4055+00 4056+00 4057+00 4058+00 4059+00 4060+00 4061+00 4062+00

STA 123
SPIKE
N: 179126.68
E: 2810350.67
ELEV: 168.72

INV.=159.77
24" STONE
CENTER OF BOX CULVERT

STA 6022
SPIKE
N: 179698.45
E: 2811018.73
ELEV: 175.36

STA 121
STA
N: 179861.24
E: 2811209.81
ELEV: 177.88

APPROX. CUT
SLOPE LIMIT

1" IRON PIPE FOUND
2" ABOVE GRADE
WITH CAP

1-1/4" IRON PIPE FOUND
2" ABOVE GRADE
WITH CAP

N/F
TOWN OF WELLS
16720/ 172
MAP 29, LOT 4-EXE

N/F
BRAGDON ESTATE, INC.
5995/ 214
MAP 29, LOT 5

N/F
BRAGDON ESTATE, INC.
5995/ 208
MAP 29, LOT 5

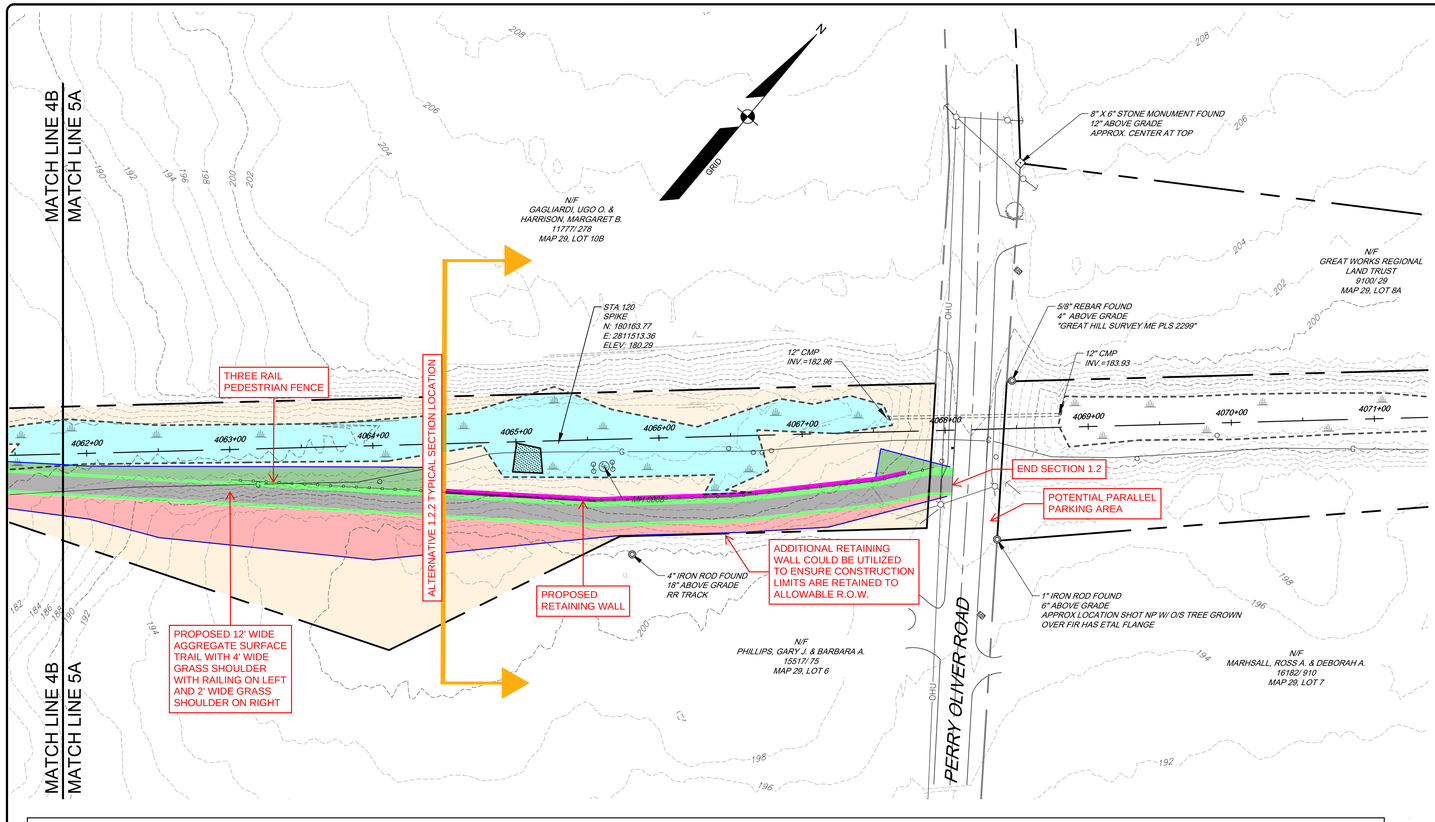
N/F
TOWN OF WELLS
16720/ 172
MAP 29, LOT 4-EXE

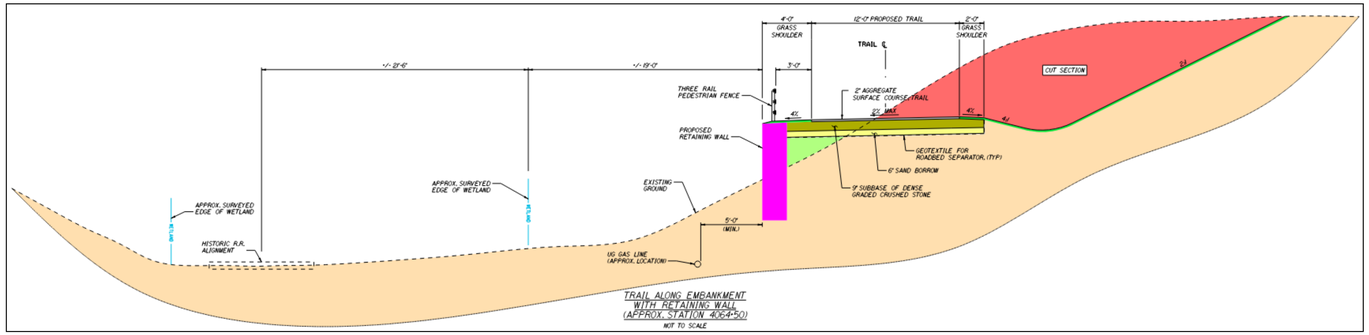
GRAPHIC SCALE
50 0 25 50 100
(IN FEET)
1 INCH = 50 FT.

EASTERN TRAIL CONNECTIVITY FEASIBILITY STUDY
CONCEPTUAL PLAN

(ROUTE 9 IN NORTH BERWICK TO PERRY OLIVER ROAD IN WELLS AND ALFRED ROAD TO ALEWIVE ROAD IN KENNEBUNK)

NOT FOR CONSTRUCTION

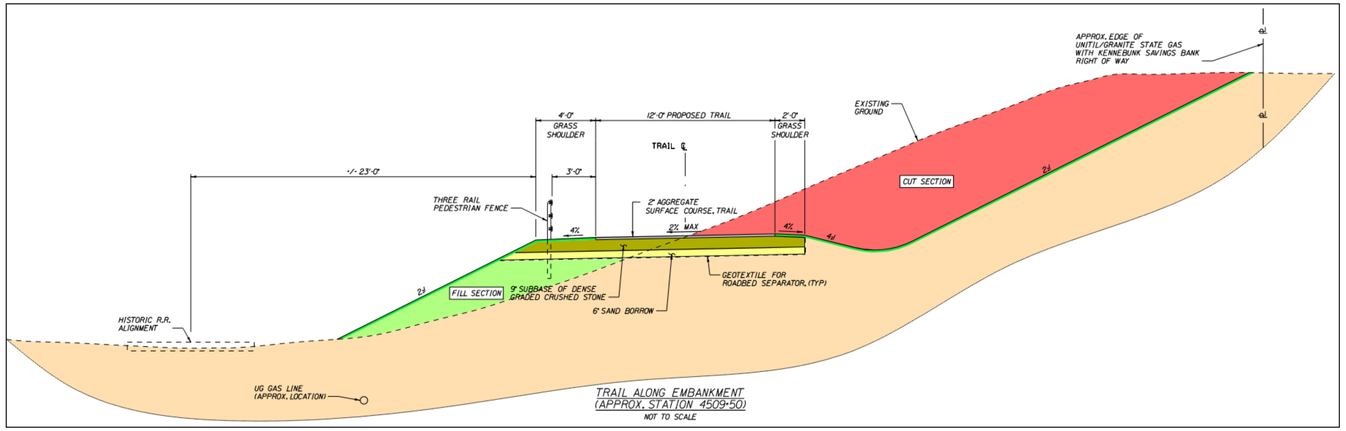




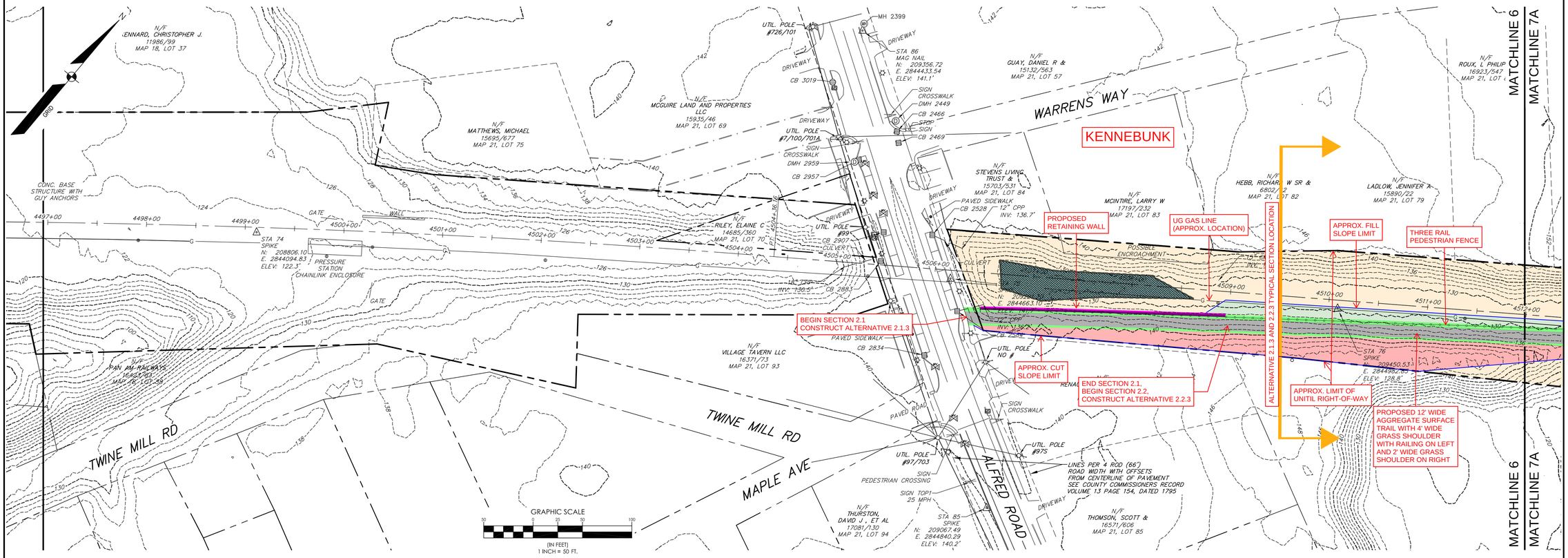
EASTERN TRAIL CONNECTIVITY FEASIBILITY STUDY
CONCEPTUAL PLAN

(ROUTE 9 IN NORTH BERWICK TO PERRY OLIVER ROAD IN WELLS AND ALFRED ROAD TO ALEWIVE ROAD IN KENNEBUNK)

NOT FOR CONSTRUCTION



TRAIL ALONG EMBANKMENT
(APPROX. STATION 4509+50)
NOT TO SCALE



EASTERN TRAIL CONNECTIVITY FEASIBILITY STUDY
CONCEPTUAL PLAN

(ROUTE 9 IN NORTH BERWICK TO PERRY OLIVER ROAD IN WELLS AND ALFRED ROAD TO ALEWIVE ROAD IN KENNEBUNK)

NOT FOR CONSTRUCTION

MATCHLINE 6
MATCHLINE 7A

MATCHLINE 7A
MATCHLINE 7B

N/F
EDES, WAYNE &
9602/117
MAP 21, LOT 78

N/F
PARLEE, DONALD L &
16600/785
MAP 21, LOT 76

5/8" CAPPED REBAR
6" ABOVE GRADE
DESPER
#1279

1" IRON PIPE
4" ABOVE GRADE
PINCHED

N/F
LEVEILLE, JAMIE B &
16652/309
MAP 21, LOT 113

5/8" CAPPED REBAR
6" ABOVE GRADE
DESPER
#1279

N/F
LELAND, JOHN
15669/197
MAP 26, LOT 21

5/8" CAPPED REBAR
4" ABOVE GRADE
DESPER
#1279

N/F
ANTONELLI
JILL C. & JOHN D.
15097/ 468
MAP 26, LOT 26

N/F
MARTIN, PETER P &
15497/300
MAP 26, LOT 25

N/F
STEVENS, MARK W
9600/76
MAP 26, LOT 18

WARRENS WAY

N/F
COFFRON, MATTHEW R
14012/629
MAP 26, LOT 18

NORTHERN UTILITIES INC

WOVEN WIRE FENCE

5/8" CAPPED REBAR
4" ABOVE GRADE
DESPER
#1279

PC=4527+41

STA 77
SPIKE
N: 209657.41
E. 2845277.20
ELEV: 128.7'

STA 78
SPIKE
N: 209917.65
E. 2845635.49
ELEV: 128.0'

STA 79
SPIKE
N: 210203.17
E. 2846025.10
ELEV: 131.9'

SMH 1823
8" CPP
INV: 124.1'

1" IRON PIPE
24" ABOVE GRADE

PROPOSED 12' WIDE
AGGREGATE SURFACE
TRAIL WITH 4' WIDE
GRASS SHOULDER
WITH RAILING ON RIGHT
AND 2' WIDE GRASS
SHOULDER ON LEFT

PROPOSED 12' WIDE
AGGREGATE SURFACE
TRAIL WITH 2' WIDE
GRASS SHOULDERS

8" CPP
INV: 124.5'
8" CPP
INV: 124.6'
5/8" CAPPED REBAR
1" ABOVE GRADE
PRS INC.
#1311

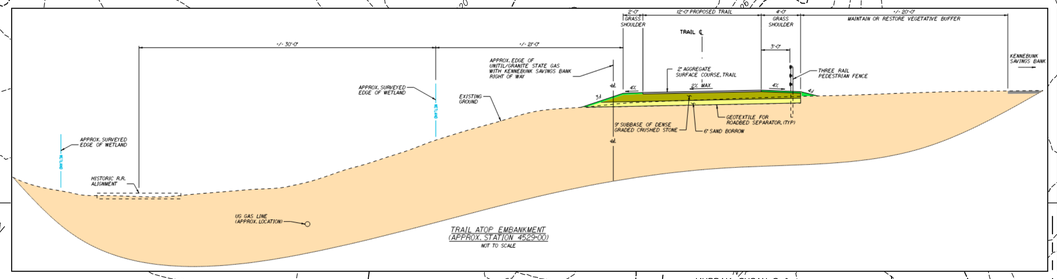
8" CPP
INV: 124.0'
5/8" CAPPED REBAR
6" ABOVE GRADE
UNDERDRAIN
5/8" CAPPED REBAR
2" ABOVE GRADE
PRS INC.
#1311

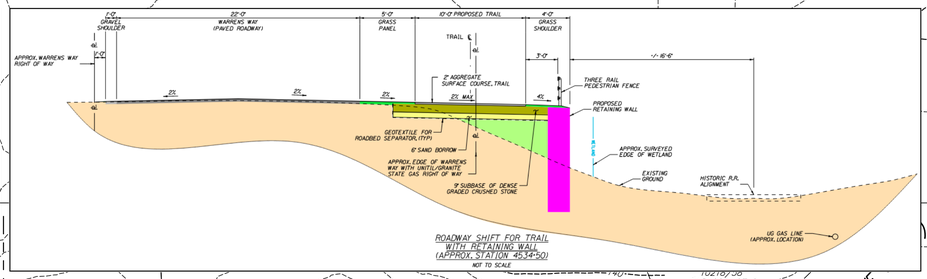
END SECTION 2.2,
BEGIN SECTION 2.3,
CONSTRUCT ALTERNATIVE 2.3.4

APPROX. LOCATION OF
KENNEBUNK SAVINGS
BANK LOADING DOCK
ACCESS ROAD

STA 80
SPIKE
N: 210432.62
E. 2846331.30
ELEV: 122.3'

N/F
WILLIAM ARTHUR, INC
XXX
MAP 20, LOT 1





MATCHLINE 7A
MATCHLINE 7B

N/F
DION, DIANE
89,30/264
MAP 26, LOT 18

N/F
BURCHARD, DAVID V &
16096/473
MAP 26, LOT 11

N/F
MURRAY, SUSAN S &
15269/1744
MAP 26, LOT 27

N/F
FRASER, THEODORE
1986/782
MAP 27, LOT 1

N/F
GRAVES REAL ESTATE
& TRUST
15046/1
MAP 27, LOT 2

N/F
SWAIN GEORGIA L
14089/22
MAP 28, LOT 3

N/F
NELSON, CRAIG W &
16070/
MAP 28,

ROUTE 35
(AKA ALEWIVE

N/F
WILLIAM M. THOMPSON
3371/20
MAP 28, LOT 1

ASSUMED APPROX.
LIMIT OF WARRENS
WAY ROADWAY
REHABILITATION

22' WIDE PAVED
ROADWAY WITH 1'
GRAVEL SHOULDERS

PROPOSED 10' WIDE AGGREGATE
SURFACE TRAIL WITH 5' WIDE
GRASS PANNEL ON LEFT AND 4'
WIDE GRASS SHOULDER WITH
RAILING ON RIGHT

PROPOSED RETAINING
WALL WITH THREE RAIL
PEDESTRIAN FENCE

ASSUMED APPROX.
LIMIT OF WARRENS
WAY ROADWAY
REHABILITATION

EXISTING TERMINUS OF
OFF-ROAD SECTION OF
EASTERN TRAIL

WARRENS WAY

ALTERNATIVE 2.3.4 TYPICAL SECTION LOCATION

ALTERNATIVE 2.4.5 TYPICAL SECTION LOCATION

WOVEN WIRE FENCE

IRON PIPE

STA 81
SPIKE
N: 210698.94
E. 2846677.09
ELEV: 119.5'

STA 82
SPIKE
N: 210914.86
E. 2846951.02
ELEV: 117.3'

CAPPED REBAR

N/F
KENNEBUNK SAVINGS BANK
16935/13
MAP 27, LOT 14

APPROX. LOCATION OF
KENNEBUNK SAVINGS
BANK PARKING LOT

END SECTION 2.3,
BEGIN SECTION 2.4,
CONSTRUCT ALTERNATIVE 2.4.5

BRIDGE OVER UNITIL
CORRIDOR CONTAINING
SURVEYED WETLANDS

N/F
LEACH, STEVEN N.
12323/233
MAP 27, LOT 6

N/F
LEACH, JESSIE M
1361/354
MAP 27, LOT 3

N/F
JACKSON DRYSDALE & ASSOCIATES
13447/341
MAP 27, LOT 33

EASTERN TRAIL PARKING DIRECTION

SIGN
STOP
SIGN

CULVERT

SIGN
EASTERN TRAILS

SIGN
NO MOTORIZED VEHICLES

30"" CMP
INV: 113.6'
SIGN
PEDESTRIANS AND BIKERS

EXISTING
"EASTERN TRAIL"

STA 83
SPIKE
N: 210970.91
E. 2846948.92
ELEV: 125.7'

3/4"" IRON PIPE
8"" ABOVE GRADE
UTIL. POLE
#37
SIGN
EASTERN TRAILS

CB 2299

UTIL. POLE
#36

DRIVEWAY

MH 2319

15"" CPP
INV: 115.8'
CULVERT

5/8" CAPPED REBAR

UTIL. POLE

ARROW FOR TRAILS
SIGN
ZACHARY LANE

UTIL. POLE
#7420/1
UTIL. POLE

CB 2191

SMH 2110

UTIL. POLE
#39
SIGN
ROUTE 35

CB 2137

UTIL. POLE
#38
SIGN
EASTERN TRAILS

N/F
BEST, R DEANE &
14653/64
MAP 28, LOT 10

GRAPHIC SCALE
50 0 25 50 100
(IN FEET)
1 INCH = 50 FT.

EASTERN TRAIL CONNECTIVITY FEASIBILITY STUDY
CONCEPTUAL PLAN

(ROUTE 9 IN NORTH BERWICK TO PERRY OLIVER ROAD IN WELLS AND ALFRED ROAD TO ALEWIVE ROAD IN KENNEBUNK)

NOT FOR CONSTRUCTION

Appendix A4 – Conceptual Estimate of Probable Costs

CONCEPTUAL ESTIMATE OF PROBABLE COSTS

ITEM	UNIT	UNIT COST	SECTION 1.1 HISTORIC RAIL ALIGNMENT		SECTION 1.2 TRAIL ON EASTERN EMBANKMENT		SECTION 2.1 TRAIL ON EASTERN EMBANKMENT		SECTION 2.2 TRAIL ON EASTERN EMBANKMENT		SECTION 2.3 TRAIL ALONG TOP OF EASTERN EMBANKMENT		SECTION 2.4 CROSS RAILROAD CORRIDOR TO WARRENS WAY		TOTAL QUANTITY	COST
			QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST	QUANTITY	COST		
AGGREGATE SURFACE COURSE	CY	$ 45.00	710	$ 31,950.00	60	$ 2,700.00	25	$ 1,125.00	105	$ 4,725.00	80	$ 3,600.00	35	$ 1,575.00	1015	$ 45,675.00
CHOKING BALLAST	LF	$ 1.50	9500	$ 14,250.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	9500	$ 14,250.00
WINDROWING BALLAST	LF	$ 1.00	9500	$ 9,500.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	9500	$ 9,500.00
BALLAST GRADING AND SHAPING	LF	$ 0.76	9500	$ 7,220.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	9500	$ 7,220.00
GRANULAR BORROW	CY	$ 35.00	570	$ 19,950.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	570	$ 19,950.00
SAND BORROW	CY	$ 35.00	0	$ -	240	$ 8,400.00	90	$ 3,150.00	495	$ 17,325.00	390	$ 13,650.00	130	$ 4,550.00	1345	$ 47,075.00
SUBBASE OF DENSE GRADED CRUSHED STONE	CY	$ 40.00	0	$ -	360	$ 14,400.00	135	$ 5,400.00	730	$ 29,200.00	550	$ 22,000.00	205	$ 8,200.00	1980	$ 79,200.00
GEOTEXTILE FOR ROADBED SEPARATOR	SY	$ 1.50	0	$ -	1780	$ 2,670.00	670	$ 1,005.00	3425	$ 5,137.50	2685	$ 4,027.50	890	$ 1,335.00	9450	$ 14,175.00
COMMON EXCAVATION	CY	$ 12.50	0	$ -	2670	$ 33,375.00	1000	$ 12,500.00	4670	$ 58,375.00	780	$ 9,750.00	465	$ 5,812.50	9585	$ 119,812.50
EXCAVATION OF SURFACES AND PAVEMENTS	CY	$ 45.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	135	$ 6,075.00	135	$ 6,075.00
PAVEMENT (ROADWAY)	TON	$ 115.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	270	$ 31,050.00	270	$ 31,050.00
CLEARING AND GRUBBING	AC	$ 15,000.00	0.3	$ 4,500.00	1.1	$ 16,500.00	0.4	$ 6,000.00	1.9	$ 28,500.00	0.7	$ 10,500.00	0.3	$ 4,500.00	4.7	$ 70,500.00
THREE RAIL PEDESTRIAN FENCE	LF	$ 50.00	1000	$ 50,000.00	500	$ 25,000.00	300	$ 15,000.00	300	$ 15,000.00	800	$ 40,000.00	450	$ 22,500.00	3350	$ 167,500.00
DITCHING	LF	$ 2.00	2000	$ 4,000.00	800	$ 1,600.00	300	$ 600.00	800	$ 1,600.00	0	$ -	0	$ -	3900	$ 7,800.00
RAILROAD TIE REMOVAL AND DISPOSAL	TON	$ 250.00	570	$ 142,500.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	570	$ 142,500.00
MISCELLANEOUS CULVERT REPAIR	EA	$ 2,000.00	4	$ 8,000.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	4	$ 8,000.00
SLOPE STABILIZATION AND EROSION CONTROL	LF	$ 5.00	9500	$ 47,500.00	800	$ 4,000.00	300	$ 1,500.00	1400	$ 7,000.00	1050	$ 5,250.00	500	$ 2,500.00	13550	$ 67,750.00
RETAINING WALL	SF	$ 80.00	0	$ -	2400	$ 192,000.00	2400	$ 192,000.00	0	$ -	0	$ -	3600	$ 288,000.00	8400	$ 672,000.00
BRIDGE WORK	LS		1	$ 200,000.00	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 310,000.00	2	$ 510,000.00
TRAFFIC CONTROL	LS		1	$ 10,000.00	1	$ 20,000.00	1	$ 10,000.00	1	$ 15,000.00	1	$ 10,000.00	1	$ 15,000.00	6	$ 80,000.00
MOBILIZATION (ASSUME 10% OF ABOVE COSTS)	LS		1	$ 54,937.00	1	$ 32,064.50	1	$ 24,828.00	1	$ 18,186.25	1	$ 11,877.75	1	$ 70,109.75	6	$ 212,003.25
SUBTOTAL =				$ 604,307.00		$ 352,709.50		$ 273,108.00		$ 200,048.75		$ 130,655.25		$ 771,207.25		$ 2,332,035.75
Contingency (30%) =				$ 181,292.10		$ 105,812.85		$ 81,932.40		$ 60,014.63		$ 39,196.58		$ 231,362.18		$ 699,610.73
ROUNDING =				$ 400.90		$ 477.65		$ 959.60		$ 936.63		$ 148.17		$ 430.57		$ 3,353.52
CONSTRUCTION COST =				**$ 786,000.00**		**$ 459,000.00**		**$ 356,000.00**		**$ 261,000.00**		**$ 170,000.00**		**$ 1,003,000.00**		**$ 3,035,000.00**
10% FOR PROFESSIONAL ENGINEERING =				**$ 78,600.00**		**$ 45,900.00**		**$ 35,600.00**		**$ 26,100.00**		**$ 17,000.00**		**$ 100,300.00**		**$ 303,500.00**
15% FOR CONSTRUCTION ENGINEERING =				**$ 117,900.00**		**$ 68,850.00**		**$ 53,400.00**		**$ 39,150.00**		**$ 25,500.00**		**$ 150,450.00**		**$ 455,250.00**
ROUNDING =				**$ 7,500.00**		**$ 6,250.00**		**$ 5,000.00**		**$ 3,750.00**		**$ 7,500.00**		**$ 6,250.00**		**$ 36,250.00**
TOTAL =				**$ 990,000.00**		**$ 580,000.00**		**$ 450,000.00**		**$ 330,000.00**		**$ 220,000.00**		**$ 1,260,000.00**		**$ 3,830,000.00**

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