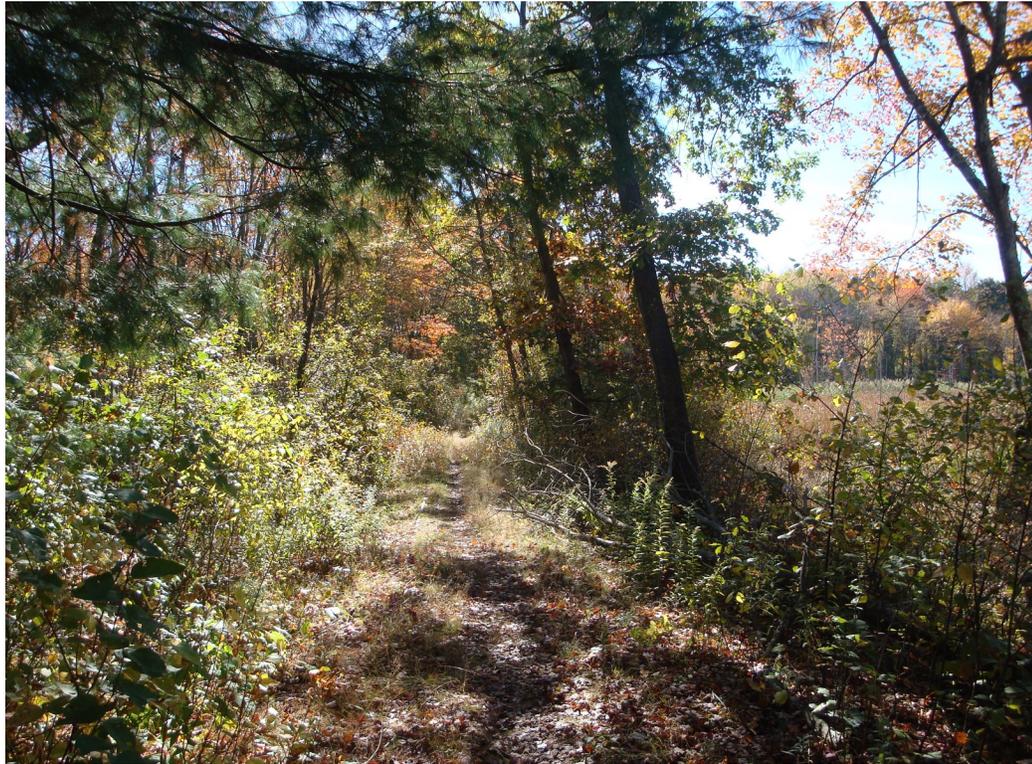


Photo 1



Approximately STA 128+00—Looking south

Photo 2



Approximately STA 130+00—Looking south at Bordering Vegetation Wetlands

PHOTOGRAPHIC DOCUMENTATION

Assabet River Rail Trail

Acton, Massachusetts

Photographs Documented October 14, 2013

Photo 3



Approximately STA 139+00—Looking south at Boardwalk location

Photo 4



Approximately STA 139+00—Looking north at Boardwalk location

PHOTOGRAPHIC DOCUMENTATION

Assabet River Rail Trail

Acton, Massachusetts

Photographs Documented October 14, 2013 and July 29, 2014

Photo 5



Approximately STA 140+00—Looking east near Boardwalk location

Photo 6



Approximately STA 159+00—Railroad ditches, looking south

PHOTOGRAPHIC DOCUMENTATION

Assabet River Rail Trail

Acton, Massachusetts

Photographs Documented July 29, 2014

Photo 7



Approximately STA 152+50—End of railroad ditches, looking south

Photo 8



Approximately STA 154+00—Pedestrian footbridge from Sylvia Street to ROW

PHOTOGRAPHIC DOCUMENTATION

Assabet River Rail Trail

Acton, Massachusetts

Photographs Documented July 29, 2014

Photo 9



Approximately STA 170+00—Acton bridge

Photo 10



Acton bridge looking south

PHOTOGRAPHIC DOCUMENTATION

Assabet River Rail Trail

Acton, Massachusetts

Photographs Documented September 6, 2013 and October 20, 2013

Photo 11



Approximately STA 159+00—Potential Vernal Pool

Photo 12



Approximately STA 165+00—Potential Vernal Pool

PHOTOGRAPHIC DOCUMENTATION

Assabet River Rail Trail

Acton, Massachusetts

Photographs Documented December 1, 2014

TABLE I

Table 1: Wetland Resource Area Impacts - Acton - Assabet River Rail Trail

ROW STA No. #	Brook Name	Wetland Resource Area Impacts						Comments	
		BVW		Bank(lf)	BLSF Sq. ft	BLSF c.f.	LUW		
		Perm. (sf)	Temp. (sf)				Perm. (sf)		Temp. (sf)
122+00	Railroad drainage swale						13.11	Temporary LUW impacts to be restored at impact location.	
125 + 25 RT	Pratts Brook		38.22					Temporary BVW impacts to be restored at impact location.	
126 + 25 RT	Pratts Brook		16.23					Temporary BVW impacts to be restored at impact location.	
134+75 to 137+75	Stormwater Feature BVWs		2798.78					Limited Project - impacts associated with boardwalk over detention basins. Temporary BVW impacts to be restored in place.	
138+00 to 140+43	Shrub Swamp BVW		6276.18					Limited Project - impacts associated with boardwalk. Temporary BVW impacts to be restored in place.	
152 + 50	Railroad drainage swale					77.24		Permanent impacts to LUW will meet all performance standards detailed at 310 CMR 10.56(4).	
152+75	Railroad drainage swale			34.20			260.53	Bank resotration proposed at impact location. Temporary LUW impacts to be restored at impact location.	
153 + 25 to 153+50	Railroad drainage swale			75.00		157.16		Bank restoration proposed at impact location. Permanent impacts to LUW will meet all performance standards detailed at 310 CMR 10.56(4).	

Table 1: Wetland Resource Area Impacts - Acton - Assabet River Rail Trail

ROW STA No. #	Brook Name	Wetland Resource Area Impacts						Comments	
		BVW		Bank(lf)	BLSF Sq. ft	BLSF c.f.	LUW		
		Perm. (sf)	Temp. (sf)				Perm. (sf)		Temp. (sf)
154+50 to 155+50	Railroad drainage swale			20.60			19.64	168.68	Bank restoration proposed at impact location. Temporary LUW impacts to be restored at impact location. Permanent impacts to LUW will meet all performance standards detailed at 310 CMR 10.56(4).
169 + 50 to 170 + 00	Mill Pond							323.50	Temporary LUW impacts associated with removal of existing bridge pilings.
TOTAL		0.00	9129.41	129.80	0.00	0.00	254.04	765.82	

Notes:

1. Total vegetated wetland alteration associated with construction is 9,129.41 square feet. 9,075 square feet of the proposed vegetated wetland alteration results from the construction of a 14' wide boardwalk structure over stormwater management structures and an existing shrub swamp, a Limited Project per the Wetlands Protection Act 310 CMR 10.53(3)(j) – The construction and maintenance of catwalks and footbridges.

2. Total 200-foot Riverfront Area is approximately 127,607 square feet. Total 200-foot Riverfront Area alteration is approximately 19,978 square feet of which 9,208 square feet is within the Inner 100-feet. Additionally, 12,482 square feet of the 19,978 square feet of Riverfront Area impact is Previously Developed Riverfront Area.

ATTACHMENT A
Notice of Intent Project Narrative

NOTICE OF INTENT PROJECT NARRATIVE

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WPA FORM 3 – NOTICE OF INTENT NARRATIVE

1.0 Introduction

The proposed Assabet River Rail Trail (ARRT) through Maynard and Acton is a 3.42-mile long segment of a multi-use recreational trail along the Middleborough Branch of the former Fitchburg Line owned by the Commonwealth of Massachusetts. The Towns of Maynard and Acton have authorized the design work with the understanding that the improvements will be funded through federal and state aid programming under the jurisdiction of the Massachusetts Department of Transportation (MassDOT) - Highway Division. The proposed trail will extend from the end of the proposed ARRT in Stow and continue northeast through Maynard and Acton. Construction activities will include the following:

- Paved 8 to 12 foot wide multi-use recreational trail with one to two foot graded shoulders on either side
- Trail pavement markings and signing
- Rectangular Rapid Flashing Beacons at trail-roadway crossings
- Roadway pavement markings and signing at trail crossings
- Traffic calming features
- Repair / maintenance of existing culverts
- Construction of two parking areas/additional spaces at Winter and Florida Streets, Maynard
- Construction of two parking areas/additional spaces at Sylvia and Maple Streets, Acton
- Earthwork and landscaping
- Informational kiosks and trail signage
- Other items incidental to the construction of the trail

In addition to the listed items of work, the path will include the replacement of the bridge over Mill Pond with a 70' long prefabricated steel truss bridge. Hydraulic studies have been conducted to ensure that there will be a No Rise condition to the base flood elevation.¹

The ARRT deviates from the ROW from Sta 129+ to Sta 141+50 around an existing commercial land use in Acton requiring the construction of a 14' wide boardwalk structure supported by steel helical pilings 8' on center over stormwater management structures and an existing shrub swamp. The decking will average 5' above the existing grade.

The ARRT begins in Marlborough and continues north to Hudson, Stow, Maynard and Acton. The sections of the trail in Marlborough and Hudson have been constructed and are open to the public. The town of Stow is currently working on acquiring the rights to the privately owned land along the proposed trail location.

¹ HEC-RAS Analysis Assabet River Rail Trail Acton & Maynard, Massachusetts MassDOT Project #604531; Prepared by Nover-Armstrong Associates, Inc; prepared for Greenman-Pedersen, Inc.; dated November 2014.

2.0 Site Description

2.1 Project Locus

The Acton segment of the ARRT runs from the Maynard / Acton town line and continues north to a point north of Maple Street in South Acton. The total length of rail trail to be constructed in Acton is approximately 5,800 linear feet or approximately 1.1 miles.

2.2 Wetland Resource Areas

This NOI has been submitted under the Massachusetts Wetlands Protection Act, M.G.L. Chapter 131, Section 40 (the Act). Work is proposed within areas Subject to Protection under the Act as well as their 100-foot Buffer Zones.

Bordering Vegetated Wetland

BVW/Vegetated Wetlands associated with this section of the ARRT are divided into multiple areas within the Town of Acton; each of these areas is ultimately hydraulically connected to either Pratts Brook, the Assabet River or Mill Pond. The resource area boundaries were originally delineated in December 2010 during the 25% Design submittal process and were checked for accuracy for the 75% Design submittal and filing of the environmental permits. Most of the original wetland boundary flagging was found and refreshed with new flagging in the fall of 2013. Army Corps Wetland Determination Data Forms – Northcentral and Northeast Region are attached to the NOI submittal.

BVW exists in the southernmost section of the ARRT north of the Maynard / Acton town boundary border on Pratts Brook. Forested deciduous swamp exists in this area on the east side of the ROW with a large shrub swamp to the west. The ARRT deviates from the ROW at Sta 129+00, crossing over existing vegetated stormwater basins associated with an existing commercial development. The ARRT will be elevated here to avoid permanent impact to the existing stormwater management structures and the interests they are providing, namely flood control and prevention of pollution.

The ARRT from Sta 137+00 to 141+00 will be elevated over an existing shrub swamp. This BVW has a forested wetland edge on its western side, where the trail reenters the ROW. A wet depression connected to this BVW via a box culvert exists on the west side of the ROW.

Drainage swales coincident to the rail bed construction and jurisdictional under the Act exist within project limits at Sta. 152+75 through Sta. 158+25. Wetland vegetation was documented within and adjacent to the limits of these ditches including red maple (*Acer rubrum*), American elm (*Ulmus Americana*), royal fern (*Osmunda regalis*), sensitive fern (*Onoclea sensibilis*), and cinnamon fern (*Osmunda Cinnamomea*).

BVW in the northernmost section of the ARRT (i.e. the segment commencing at Sta. 161+00 and terminating at Sta. 174+00) is associated with Mill Pond. BVW in this vicinity occurs on both the east and west sides of the rail alignment and can be described as deciduous forested wetland containing areas of palustrine emergent wetland. Vegetation typically found within the area includes red maple, American elm, winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*) and glossy buckthorn (*Frangula alnus*).

Bordering Land Subject to Flooding - FEMA 100 Year Floodplain

The portion of the ARRT within the 100-year floodplain in the Town of Acton is depicted on the FEMA Flood Insurance Rate Map No. 25017C0354F (Effective Date July 7, 2014).

In Acton, the flood maps indicate the trail traversing Special Flood Hazard Areas: Zone AE and Floodway Areas in Zone AE. Zone AE are areas subject to inundation by the 1% annual chance flood (100-year flood) with the flood elevation determined. The floodway is the channel of the stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

200-Foot Riverfront Area

Riverfront Area (RFA) exists within the proposed project site in association with Pratts Brook. Since historic railroads typically followed rivers, rail trail projects routinely involve quantifiable impacts to degraded, previously disturbed and urban developed RFA. In total, 127,607 square feet of RFA exists within the project limitations within Acton. Of the total RFA to be impacted, 12,482 square feet can be characterized as Previously Developed RFA under the Act at 310 CMR 10.58 (5).

Inland Bank

Bank boundary identified and delineated within or directly adjacent to the rail ROW is associated with Pratts Brook, Mill Pond, and jurisdictional drainage swales associated with the historic rail bed.

Land Under Water

Land Under Water (LUW) is located in and adjacent to the linear project locus and is generally associated with Pratt Brook and Mill Pond, and jurisdictional drainage swales associated with the historic rail bed.

2.3 Buffer Zones

A significant portion of the work in the Acton stretch of the ARRT is within areas Subject to Protection and/or Jurisdiction. Much of the 100-foot Buffer Zone to BVW Bank and LUW is also located within 200-foot RFA and/or BLSF. Therefore, activities proposed in Buffer Zone have been quantified in other resource area categories and proper erosion controls and construction techniques will be utilized to protect the wetland adjacent resource areas.

2.4 NHESP-Mapped Habitat

The project locus is not situated within NHESP-mapped Priority Habitat of Rare Species. MassDOT-Highway is not required to submit to NHESP for Massachusetts Endangered Species Act (321 CMR 10.00) for project review. However, a letter detailing the proposed Project and its location has been submitted to NHESP for review and comment as part of the Massachusetts Environmental Policy Act (MEPA) review process.

3.0 Work Description

3.1 Work in Wetland Resource Areas

Bordering Vegetated Wetlands

The ARRT deviates from the ROW from Sta 129+00 to Sta 141+50 around an existing commercial land use in Acton requiring the construction of a 14' wide boardwalk structure supported by steel helical pilings eight (8) feet on center over stormwater management structures and an existing shrub swamp.

Construction of the boardwalk and structure is anticipated to result in a total of 3,703 square feet temporary and 5,426 square feet of permanent impact to BVW. The boardwalk project component qualifies under the Limited Project provision found at 310 CMR 10.53(2)(e). BVW impacts not qualifying as a limited project total 54 square feet of temporary impact.

Temporary impacts to BVW associated with the construction of the boardwalk were calculated assuming a five foot wide zone of impact from the limit of each side of the completed boardwalk footprint. The temporary impact zone allows for construction access and maneuvering during the construction of the boardwalk. Once the boardwalk is completed, the five foot wide temporary impact work zones will recover within two growing seasons.

The boardwalk has been designed to meet the pier height minimum requirement of 5-feet identified by the *MassDEP Guide to Permitting Small Pile-Supported Docks and Piers*. The 5-foot decking average above the existing grade/mud-line facilitates the minimization of shadow impacts to the underlying BVW to the extent practicable.²

The boardwalk will be supported by steel helical pilings 8 feet on center. Helical pile installation results in significantly less ground disturbance than traditional pile driving. The helical piles will be made of High Density Poly Ethanol (HDPE) and galvanized steel intended to prevent the occurrence of corrosion of the piles in the moist wetland environment.

² MassDEP *A Guide to Permitting Small, Pile-Supported Docks and Piers* (November 2003) advises, "Higher piers allow for better light penetration to underlying vegetation and assist in preventing storm damage. The Waterways regulations require a five (5) foot minimum height above mean high water mark for pier decking in Great Ponds and coastal tidelands to provide for unobstructed lateral passage under the pier . . ."

The location and quantification of the resource area impacts are presented in the attached Table 1 - Wetland Resource Area Impacts –Acton - Assabet River Rail Trail.

Bordering Land Subject to Flooding

No impacts to BLSF will occur in Acton as a result of the ARRT Project. The bridge replacement at Mill Pond will not necessitate any filling of FEMA Flood Zones. Hydraulic analyses were performed to demonstrate that there is “no-rise” in the regulatory flood level as a result of the bridge structure replacement in the vicinity of Mill Pond.³

200-Foot Riverfront Area

The total RFA area to be altered in Acton is approximately 19,978 square feet or 16% of the approximately 127,607 square feet total RFA on the Project site. Of the 19,978 square feet of RFA to be altered, 12,482 square feet is Previously Developed RFA. The ARRT is centered on the existing rail ballast to contain impacts to the extent possible on previously altered land and the proposed horizontal and vertical alignments were established to minimize impacts. Since historic railroads typically followed rivers, rail trail projects routinely involve quantifiable impacts to degraded, previously disturbed and urban developed RFA. There is no practicable alternative to the proposed project that would have less adverse effects on wetland interests. Please refer to the attached Evaluation of Alternatives provided in Attachment B.

Bank

A total of 130 linear feet of Bank associated with the historic rail bed in two separate locations - at Sta. 122+0 and between Sta. 152+50 to Sta. 156+00 will be impacted. Upon completion of the rail trail construction, the banks will be restored by re-establishment of the ditch channel. The location of the rail bed prohibits replacement planting on the restored banks.

Land Under Water

In Acton, the project will result in 506 square feet of temporary and 254 square feet of permanent impact to LUW. Temporary impacts to LUW (64 square feet) are associated with the removal of 16 historic timber bents supporting the existing wooden trestle bridge over the Mill Pond. All remaining LUW impacts are associated with drainage improvement work on railroad ditches meeting the definition of intermittent stream. Work within LUW will meet all performance standards as specified at 310 CMR 10.56(4)⁴.

³ HEC-RAS Analysis Assabet River Rail Trail Acton & Maynard, Massachusetts MassDOT Project #604531; Prepared by Nover-Armstrong Associates, Inc; prepared for Greenman-Pedersen, Inc.; dated November 2014.

⁴ Performance standards at 310 CMR 10.56(4) are as follows, “(a) Where the presumption set forth in 310 CMR 10.54(3) is not overcome, any proposed work on a Bank shall not impair the following: 1. the physical stability of the Bank; 2. the water carrying capacity of the existing channel within the Bank; 3. ground water and surface water quality; 4. the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries; 5. the capacity of the Bank to provide important wildlife habitat functions.”

It is not anticipated that in-water work will be necessary to replace the wood trestle bridge with a prefabricated steel truss bridge. Therefore, only the temporary impacts to LUW from the removal of the wooden bents was quantified.

3.2 Work in Buffer Zones

A portion of the 100-foot Buffer Zone to BVW and Bank is located within 200-foot RFA and/or BLSF. Approximately 86,723 square feet of buffer zone impacts are proposed in conjunction with the ARRT in Acton. Proper erosion controls and construction techniques will be utilized to protect the wetland adjacent resource areas.

4.0 Mitigation Measures

ARRT 75% design and construction plans were developed to avoid, minimize and mitigate impacts to wetland resource areas, wildlife habitat, and other sensitive areas. Mitigation measures provided for unavoidable impacts allow the project to be conditioned to comply with the General Performance Standards in the Wetland Regulations to the maximum extent practicable and to contribute to the interests found in the Massachusetts Wetland Protection Act.

Impacts to areas subject to protection including BVW and Bank have been compensated for through creation of three vegetated wetland replication areas providing greater than 1:1 permanent impact / replication ratio; in-place restoration of temporary impact areas; and Bank replication / restoration.

4.1 Wetland Resource Area Replacement and Restoration

In Acton, impacts to BVW total 3,703 square feet of temporary impacts and 5,426 square feet of permanent impacts. All impacts to BVW will be mitigated or will be restored in place.

The majority of BVW impacts within the town of Acton occur between Sta. 129+00 to Sta. 141+50 where the ARRT deviates from the ROW. In this location, the preferred route of the ARRT crosses two stormwater management structures and an existing shrub swamp. The BVW crossings require the construction of a 14' wide boardwalk structure supported by steel helical pilings eight (8) feet on center.

Permanent impacts resulting from the presence of the boardwalk total 5,426 square feet. Permanent impacts result entirely from associated shading alterations occurring directly below the footprint of the boardwalk. These impacts are considered wetland alteration without loss as seven of the eight interests listed in the Act at 310 CMR 10.01(2)⁵ will be maintained. The only interest altered as a result of shading is Wildlife Habitat.

⁵ 310.10(2) lists the eight interests of the Act as “protection of public and private water supply; protection of ground water supply; flood control; storm damage prevention; prevention of pollution; protection of land containing shellfish; protection of fisheries; and protection of wildlife habitat”.

The boardwalk will be supported by steel helical pilings 8 feet on center. Helical pile installation results in significantly less ground disturbance than traditional pile driving. The helical piles will be made of High Density Poly Ethanol (HDPE) and galvanized steel intended to prevent the occurrence of corrosion of the piles in the moist wetland environment.

Temporary impacts associated with the construction of the boardwalk total 3,649 square feet. Construction will be completed in a manner that insures temporary impacts to BVW are fully restored within two growing seasons.

Two new constructed wetland areas totaling 5,427 square feet will be created to replicate permanent BVW alteration. Please refer to Attachment F – Project Special Provisions for full replication and restoration details of Non-Tidal Wetland Resource Mitigation Areas.

All Bank impacts are associated with drainage swales meeting the Act definition of intermittent stream. All impacted banks will be restored. As provided in the Appendix B Wildlife Habitat Evaluation, bank impacts occur along narrow (5± wide at bank full) man-made low-energy intermittent stream located at the toe of slope along the existing railroad bed, likely excavated for stormwater management purposes. The existing bank habitat consists of generally exposed soil/fill substrate and sparsely vegetated by live saplings and small diameter pole-sized trees with a very open understory. The Wildlife Habitat Evaluation certifies that the proposed project would result in no adverse effects on wildlife habitat. Affected bank habitat would be fully restored within two growing seasons of the completion of the project, resulting in no substantial reduction in the capacity to provide the limited important wildlife functions identified within the bank impact areas.

4.2 Floodplain Compensation

The ARRT Project was designed to minimize impacts to Bordering Land Subject to Flooding (BLSF) and protect the interests specified in 310 CMR 10.57(1)(a) and meet the Performance Standards specified in 310 CMR 10.57(4)(a). The project as designed will not result in any floodplain filling.

4.3 Erosion and Sedimentation Controls

Runoff, erosion and sediment control is the responsibility of the designers, engineers, and contractors. Please refer to the attached Proposed Drainage and Stormwater Management Plan for further details and descriptions of stormwater protection. Erosion and sedimentation controls will be installed and maintained where activities are proposed within 100-feet of BVW, Bank or LUW. They will provide a limit of work barrier while preventing silt and sediments from migrating into or towards the wetland resource areas. Inspectors will assess conditions and identify problems in the field during and after construction activities.

Erosion controls shall consist of straw bales, compost filter tubes or silt fence. No hay bales shall be used at any time on this project. The erosion and sedimentation control measures will be constructed in accordance with the Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, March 1997 and the U.S.D.A. SCS's Erosion and Sediment control in the Site Development, Massachusetts Conservation Guide, September - 1983. Best management practices for erosion and sedimentation control will be adhered to for all phases of

construction to minimize potential impacts to wetland resource areas and wildlife habitat. Please refer to the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan included in the attached Stormwater Report.

As per the standard, the contractor will be responsible for obtaining the NPDES Construction General Permit. A Stormwater Pollution Prevention Plan (SWPPP) will be submitted prior to any land disturbance.

4.4 Stormwater Management

The Stormwater Checklist and a Stormwater Report have been completed and submitted with the NOI as required. According to the Wetland Regulations, design of a rail trail is only required to meet the Stormwater Standards to the maximum extent practicable.

Siltation and erosion controls will be installed prior to commencement of work and will be maintained during construction to protect the resources. Stormwater runoff is to be directed as sheet flow to existing and proposed swales located along the edge of the trail. With a 1% cross slope and a shallow rail profile along with a limited amount of cuts and fill, the swales will allow for some infiltration and removal of TSS while maintaining existing drainage patterns.

Although it is assumed there will be limited sediments on the rail trail since there will be no sanding activities, sweeping will be proposed as part of the normal Operation and Maintenance Plan and will provide additional removal of TSS. Temporary seeding and mulching may also be used to minimize soil erosion and provide slope stabilization.

5.0 Regulatory Compliance

The ARRT has been designed to comply with General Performance Standards and Limited Project provisions listed in 310 CMR 10.00. Table 1 - Wetland Resource Area Impacts – Acton - Assabet River Rail Trail provides a detailed analysis of all proposed resource area impacts and compensation provided.

There is a total of 5,426 square feet of permanent and 3,703 square feet of temporary BVW impacts proposed within the town of Acton. The replacement of the existing bridge over the Mill Pond and the construction of a 14' wide boardwalk structure over stormwater management structures and an existing shrub swamp is being filed under Limited Project provisions, per Wetlands Protection Act 310 CMR 10.53(3)(e) - access driveway, (i)- bridge maintenance, repair, and improvement, and (j) – The construction and maintenance of catwalks and footbridges.

Temporary impacts to BVW will be mitigated through in-place restoration. Permanent impacts to BVW will be fully mitigated through the creation of three wetland replication areas totaling 5,427 square feet, 1:1 replacement of the permanently impacted BVW. The replication areas are not able to meet the General Performance Standards specified at 310 CMR 10.55(4)(b)(1-7). The wetland replication areas are not hydraulically connected to the impacted BVWs.

No available land exists directly adjacent to wetlands in the impact area that is owned or controlled by MassDOT. The wetland replication areas have been designed to meet the performance standards to the extent feasible and practicable.

All impacts to Bank are associated with drainage ditches meeting the definition of intermittent stream located at Sta. 122+0 and between Sta. 152+50 to Sta. 156+00. All impacts to Bank will be restored. The Performance Standards listed in 310 CMR 10.54(4) will be met. The construction of the rail trail will result in impacts to 130 linear feet of Bank, exceeding the thresholds for impairment of wildlife habitat at the drainage ditches/intermittent streams. As specified in 310 CMR 10.60, an evaluation of the effected habitat has been conducted by a qualified individual. The qualified individual produced a finding of no adverse effects on wildlife habitat within the impact area (see Appendix B: Detailed Wildlife Habitat Evaluation, attached).

The General Performance Standards at 310 CMR 10.56(4) will be met as work within LUW will not impair the water carrying capacity within the defined channels, impair ground or surface water quality or wildlife habitat as supported by the Detailed Wildlife Habitat Evaluation performed in accordance with 310 CMR 10.60 and attached to the NOI.

Riverfront Area alteration that will result from the construction activities and paved trail have been minimized to the extent practical and feasible. A full Alternatives Analysis prepared in compliance with 310 CMR 10.58(4)(c)(2) has been provided documenting that there is no practicable alternative to the proposed project that would have less adverse effects on wetland interests provided by the RFA.

6.0 Summary

The Acton section of the ARRT project has a substantial WPA permitting application because of its existing wetland resource areas located in and adjacent to the linear project limits. However as designed, total impacts are relatively minor. The design approach taken was to first avoid wetland impacts where feasible and where unavoidable, minimize to the extent practical and feasible through an extensive and thoughtful review and design process.

ATTACHMENT B
Evaluation of Alternatives

**Evaluation of Alternatives
Assabet River Rail Trail
Acton, Massachusetts**

As required by the General Performance Standards for Riverfront Area at 310 CMR 10.58(4)(c)(1-3), there must be no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interests identified in M.G.L. c. 131 § 40.¹ An alternative is practicable and substantially equivalent economically if it is available and capable of being done after taking into consideration costs, existing technology, proposed use, and logistics in light of overall project purposes. Available and capable of being done means the alternative is obtainable and feasible.²

Based on the Evaluation of Alternatives presented herein, it has been determined that no practicable and substantially equivalent economic alternative to the current design and location of the Assabet River Rail Trail (ARRT) exists with less adverse effects on the interests identified in M.G.L. c. 131 § 40.

Overall Project Purpose

The overall project purpose is:

To provide a public recreational amenity through the completion of the ARRT, a public multi-use passive recreational trail along the Middleborough Branch of the former Fitchburg Line owned by the Commonwealth of Massachusetts through the towns of Maynard and Acton, approximately a 3.42 mile segment.

Project Description

The ARRT will provide a multi-use recreational trail along the former Middleborough Branch of the former Fitchburg railroad line from the end of the Stow section of the ARRT, continuing northeast through Maynard and Acton.

Construction activities will include the following:

- Paved 8 to 12 foot wide multi-use recreational trail with one to two foot graded shoulders on either side
- Trail pavement markings and signing
- Rectangular Rapid Flashing Beacons at trail-roadway crossings

¹ The eight interests of M.G.L. c. 131 § 40 include the protection of private and public water supply; protection of ground water; flood control; prevention of storm damage; prevention of pollution; protection of land containing shellfish; protection of wildlife habitat; and the protection of fisheries.

² 310 CMR 10.58(4)(c)(1) Definition of Practicable

- Roadway pavement markings and signing at trail crossings
- Traffic calming features
- Repair / maintenance of existing culverts
- Construction of two parking areas/additional spaces at Winter and Florida Sts, Maynard
- Construction of two parking areas/additional spaces at Sylvia and Maple Streets, Acton
- Earthwork and landscaping
- Informational kiosks and trail signage
- Other items incidental to the construction of the trail

In addition to the listed items of work, the path will include the replacement of the bridge over Mill Pond with a 70' long prefabricated steel truss bridge. Hydraulic studies have been conducted to ensure that there will be a No Rise condition to the base flood elevation.

The ARRT deviates from the ROW from Sta 129+ to Sta 141+50 around an existing commercial land use in Acton requiring the construction of a 14' wide boardwalk structure supported by steel helical pilings 8' on center over stormwater management structures and an existing shrub swamp. The decking will average 5' above the existing grade.

The ARRT begins in Marlborough and continues north to Hudson, Stow, Maynard and Acton. The sections of the trail in Marlborough and Hudson have been constructed and are open to the public. The town of Stow is currently working on acquiring the rights to the privately owned land along the proposed trail location.

Scope of Alternatives

According to 310 CMR 10.58(4)(c)(2), the scope of alternatives to consider shall be commensurate with the type and scope of the project. The issuing authority shall presume that alternatives beyond the scope are not practicable and therefore need not be considered. For this project, the area under consideration for practicable alternatives extends to the original parcel, any adjacent parcels, and any other land which can reasonably be obtained within the municipality. For adjacent lots if practicable, "reasonably be obtained" means to purchase at market prices. For other land, "reasonably be obtained" means adequate in size to accommodate the project purpose and listed for sale at the time of filing the Notice of Intent.

Evaluation of Alternatives

The Applicant is required to submit information to describe sites and the work both for a proposed location and alternative site locations and configurations sufficient for a No Significant Adverse Impact determination by the issuing authority. The level of detail of information shall be commensurate with the scope of the project and the practicability of alternatives. If siting of a project entirely outside the riverfront area is not practicable, the alternatives shall be evaluated to locate the project as far as possible from the river.³

Proposed Project Location

Continuation of the ARRT will be constructed within the railroad right-of-way from the Maynard / Acton town line and continues north to a point north of Maple Street. A portion of the ARRT will deviate from the publicly-owned linear right-of-way at Sta 129+00 to Sta 141+00 where the proposed multi-use recreational trail diverts around an existing commercial building (18-22 Main Street) within a varied width permanent easement. The trail also deviates from the right-of-way at Sta 172+00 to Sta 181+00 and instead will be constructed through a newly acquired farm property.

³ 310 CMR 10.58(4)(c)(3) Evaluation of Alternatives

The total RFA area to be altered in Acton is approximately 19,978 square feet or 16% of the approximately 127,607 square feet total RFA on the Project site. 12,482 square feet of the 19,978 square feet (62%) of RFA to be impacted is Previously Developed RFA. Approximately 9,208 square feet is of the impacted RFA will be within the inner riparian zone.

The majority of the ARRT within the RFA impact area will be centered on the existing rail ballast to contain impacts to the extent possible on previously altered land. The proposed horizontal and vertical alignments were established to minimize impacts.

As stated, construction will be limited to historically impacted RFA, with diminished overall value. Given the ARRT is for non-motorized use, most of the interests provided by the RFA within the right-of-way today will be maintained upon completion of construction. That is, protection of groundwater; flood control; storm damage prevention; prevention of pollution; protection of wildlife habitat; and protection of fisheries. Land immediately adjacent to the trail will be maintained with natural grass, most of which will have a wildlife habitat value component. The area outside this grassed area that will be temporarily altered during construction will be restored and allowed to naturally succeed.

Project Alternatives

Given the project is linear with its overall project purpose to provide passive recreation by extending the completed ARRT in Marlborough through Hudson and the proposed section in Acton, there are no practicable and substantially equivalent economic alternative project locations with less adverse effects on the interests identified in M.G.L. c. 131 § 40.

On-Road Project Location

An alternative site location considered is an “on-road” location within the Main Street (Route 27) corridor right-of-way. The existing rail generally runs parallel with Main Street. Taking into consideration the proposed use and logistics in light of the overall project purpose, an on-road non-motorized multi-use passive recreational trail is not capable of being done given public safety and motorized traffic use of the roads without significant land/easement purchase and road widening by the Commonwealth. Therefore, this alternative is not available or practicable and is not being considered further under this Evaluation of Alternatives.

Adjacent Lots and Other Lands within the Municipality

There are no adjacent lots or other land in the municipality that could accommodate the project purpose that could reasonably be obtained and would have with less adverse effects on the interests identified in M.G.L. c. 131 § 40. There is currently no land of adequate size and configuration to accommodate a significant length of multi-use recreational trail and listed for sale at the time of filing this Notice of Intent. Therefore, this alternative is not practicable and is not being considered further under this Evaluation of Alternatives.

No Build Scenario

The no-build scenario does not fulfill the overall project purpose of providing a public passive recreational amenity by extending the existing ARRT into Acton along the former Marlborough Branch of the abandoned Fitchburg Line owned by the Commonwealth. Public funds have been expended for the completion of the various stages of study, design and construction plans, and permitting for multiple stages of the ARRT. Not completing the ARRT in Acton is not reasonable and practicable and therefore, is not being considered further under this Evaluation of Alternatives.

Impact Avoidance – Proposed Project Location

There is no practicable alternative to the proposed project design in its current location within the railroad ROW that would have less adverse effects on the RFA and meet the overall project purpose. The multi-use pedestrian trail will be centered on the existing rail ballast to contain impacts to the extent possible. The proposed bridge replacement at Mill Pond has been designed to minimize impacts to adjacent resource areas to the extent practicable.

Since historic railroads typically followed rivers, rail trail projects routinely involve quantifiable impacts to degraded, previously disturbed and urban developed RFA. In total, the Acton segment of the ARRT proposed to impact 19,978 square feet or 16% of the 127,607 square feet total RFA on the Project Site. Of the total RFA to be impacted, 12,482 square feet can be characterized as Previously Developed RFA under the Act at 310 CMR 10.58 (5).

The ARRT deviates from the ROW from Sta 129+ to Sta 141+50 around an existing commercial land use in Acton requiring the construction of a 14' wide boardwalk structure supported by steel helical steel helical pilings 8' on center over stormwater management structures and an existing shrub swamp. MassDOT performed an alternatives analysis to evaluate alternate access options in this area. MassDOT concluded that no feasible route options exist outside of the route proposed.

Findings

Given ARRT's overall project purpose and its linear characteristic within a larger project scheme, it has been determined that alternatives that would have less adverse effects on the interests identified in M.G.L. c. 131 § 40 are not available or capable of being done after taking into consideration costs, existing technology, proposed use and logistics in light of the overall project purpose.

ATTACHMENT C
Delineation Field Data Sheets

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ Water-Stained Leaves (B9) ___ High Water Table (A2) ___ Aquatic Fauna (B13) ___ Saturation (A3) ___ Marl Deposits (B15) ___ Water Marks (B1) ___ Hydrogen Sulfide Odor (C1) ___ Sediment Deposits (B2) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Drift Deposits (B3) ___ Presence of Reduced Iron (C4) ___ Algal Mat or Crust (B4) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Iron Deposits (B5) ___ Thin Muck Surface (C7) ___ Inundation Visible on Aerial Imagery (B7) ___ Other (Explain in Remarks) ___ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
Hydrophytic Vegetation Present? Yes _____ No _____				
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ Water-Stained Leaves (B9) ___ High Water Table (A2) ___ Aquatic Fauna (B13) ___ Saturation (A3) ___ Marl Deposits (B15) ___ Water Marks (B1) ___ Hydrogen Sulfide Odor (C1) ___ Sediment Deposits (B2) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Drift Deposits (B3) ___ Presence of Reduced Iron (C4) ___ Algal Mat or Crust (B4) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Iron Deposits (B5) ___ Thin Muck Surface (C7) ___ Inundation Visible on Aerial Imagery (B7) ___ Other (Explain in Remarks) ___ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
Woody Vine Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ Water-Stained Leaves (B9) ___ High Water Table (A2) ___ Aquatic Fauna (B13) ___ Saturation (A3) ___ Marl Deposits (B15) ___ Water Marks (B1) ___ Hydrogen Sulfide Odor (C1) ___ Sediment Deposits (B2) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Drift Deposits (B3) ___ Presence of Reduced Iron (C4) ___ Algal Mat or Crust (B4) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Iron Deposits (B5) ___ Thin Muck Surface (C7) ___ Inundation Visible on Aerial Imagery (B7) ___ Other (Explain in Remarks) ___ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
Woody Vine Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ Water-Stained Leaves (B9) ___ High Water Table (A2) ___ Aquatic Fauna (B13) ___ Saturation (A3) ___ Marl Deposits (B15) ___ Water Marks (B1) ___ Hydrogen Sulfide Odor (C1) ___ Sediment Deposits (B2) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Drift Deposits (B3) ___ Presence of Reduced Iron (C4) ___ Algal Mat or Crust (B4) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Iron Deposits (B5) ___ Thin Muck Surface (C7) ___ Inundation Visible on Aerial Imagery (B7) ___ Other (Explain in Remarks) ___ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
Woody Vine Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ Water-Stained Leaves (B9) ___ High Water Table (A2) ___ Aquatic Fauna (B13) ___ Saturation (A3) ___ Marl Deposits (B15) ___ Water Marks (B1) ___ Hydrogen Sulfide Odor (C1) ___ Sediment Deposits (B2) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Drift Deposits (B3) ___ Presence of Reduced Iron (C4) ___ Algal Mat or Crust (B4) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Iron Deposits (B5) ___ Thin Muck Surface (C7) ___ Inundation Visible on Aerial Imagery (B7) ___ Other (Explain in Remarks) ___ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ Water-Stained Leaves (B9) ___ High Water Table (A2) ___ Aquatic Fauna (B13) ___ Saturation (A3) ___ Marl Deposits (B15) ___ Water Marks (B1) ___ Hydrogen Sulfide Odor (C1) ___ Sediment Deposits (B2) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Drift Deposits (B3) ___ Presence of Reduced Iron (C4) ___ Algal Mat or Crust (B4) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Iron Deposits (B5) ___ Thin Muck Surface (C7) ___ Inundation Visible on Aerial Imagery (B7) ___ Other (Explain in Remarks) ___ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
<u>Hydrophytic Vegetation Present?</u> Yes _____ No _____				
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ Water-Stained Leaves (B9) ___ High Water Table (A2) ___ Aquatic Fauna (B13) ___ Saturation (A3) ___ Marl Deposits (B15) ___ Water Marks (B1) ___ Hydrogen Sulfide Odor (C1) ___ Sediment Deposits (B2) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Drift Deposits (B3) ___ Presence of Reduced Iron (C4) ___ Algal Mat or Crust (B4) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Iron Deposits (B5) ___ Thin Muck Surface (C7) ___ Inundation Visible on Aerial Imagery (B7) ___ Other (Explain in Remarks) ___ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
Woody Vine Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> ___ Surface Water (A1) ___ Water-Stained Leaves (B9) ___ High Water Table (A2) ___ Aquatic Fauna (B13) ___ Saturation (A3) ___ Marl Deposits (B15) ___ Water Marks (B1) ___ Hydrogen Sulfide Odor (C1) ___ Sediment Deposits (B2) ___ Oxidized Rhizospheres on Living Roots (C3) ___ Drift Deposits (B3) ___ Presence of Reduced Iron (C4) ___ Algal Mat or Crust (B4) ___ Recent Iron Reduction in Tilled Soils (C6) ___ Iron Deposits (B5) ___ Thin Muck Surface (C7) ___ Inundation Visible on Aerial Imagery (B7) ___ Other (Explain in Remarks) ___ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> ___ Surface Soil Cracks (B6) ___ Drainage Patterns (B10) ___ Moss Trim Lines (B16) ___ Dry-Season Water Table (C2) ___ Crayfish Burrows (C8) ___ Saturation Visible on Aerial Imagery (C9) ___ Stunted or Stressed Plants (D1) ___ Geomorphic Position (D2) ___ Shallow Aquitard (D3) ___ Microtopographic Relief (D4) ___ FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Herb Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
Woody Vine Stratum (Plot size: _____)	1. _____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

ATTACHMENT D
Stormwater Management Checklist and Report



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

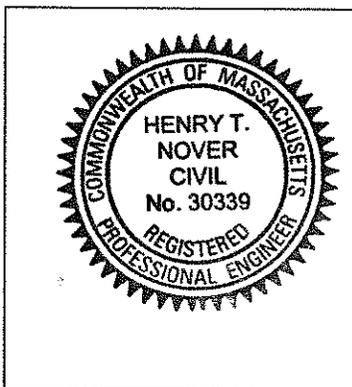
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

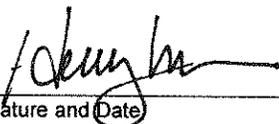
A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



 2.5.14
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
 - Credit 1
 - Credit 2
 - Credit 3
- Use of “country drainage” versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): _____

Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - is within the Zone II or Interim Wellhead Protection Area
 - is near or to other critical areas
 - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - involves runoff from land uses with higher potential pollutant loads.
 - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the proprietary BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

TOWN OF ACTON
ASSABET RIVER RAIL TRAIL

**PROPOSED DRAINAGE AND
STORMWATER MANAGEMENT PLAN**

**PREPARED BY:
NOVER-ARMSTRONG ASSOCIATES, INC.
124 MAIN STREET, UNIT 2GG
CARVER, MA 02330**

December 2014

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SECTION I **INTRODUCTION**

A. Project Purpose

The Assabet River Rail Trail is a proposed multi-use recreational trail and alternative transportation corridor along the Marlborough Branch of the former Fitchburg railroad line. The project will allow community residents to conveniently access recreation and conservation areas, schools, local businesses, Town offices, and provide a non-motorized transportation corridor to other towns in the region. In addition to providing safe and convenient transportation, the project will offer families, seniors, walkers, bicyclists, joggers and equestrians a range of recreational and educational opportunities, while protecting and preserving the Town's available open space, scenic vistas and wildlife.

This project will also provide important regional links. Development of the bicycle path will be a strong addition to the communities' transportation network and support future bicycle path connections to adjacent communities. The southernmost segment of the bike path in Maynard will eventually extend southwest to Stowe and connect to the Assabet River Rail Trail through Hudson and Marlborough. The northernmost segment in Maynard will continue north into Acton, culminating in close proximity to the South Acton MBTA Commuter Rail stop, thus providing an important link within the regional intermodal transportation network.

B. Project Description

The Massachusetts Department of Transportation (MassDOT) Highway Division, in conjunction with the Towns of Acton and Maynard, proposes to construct a paved twelve foot wide hot mix asphalt multi-use trail with grass or paved shoulders on either side. In Maynard, the trail starts at a point east of White Pond Road at the Stow / Maynard town line and heads in a northeasterly direction for approximately 2.31 miles to the Acton town line. From there, the proposed trail continues northerly for approximately 1.1 miles through Acton to a point north of Maple Street in South Acton. The total project length is 3.42 miles.

The existing flow patterns will not be altered with the construction of the bike trail. All existing drainage will be upgraded according to MassDOT criteria.

C. Stormwater Management

Stormwater from the rail trail located in areas subject to regulation under M.G.L.c.131, sec.40 will likely runoff to adjacent wetland areas and waterways. This runoff must meet the Stormwater Management Standards established in the Massachusetts Wetland Regulations, 310 CMR 10.00 to the *maximum extent practicable* since it the project is a footpath, bikepath and path for pedestrian and/or non-motorized vehicle access. This Stormwater Report and supplemental plans and

details demonstrate compliance with some or all of the Stormwater Management Standards to the maximum extent practicable and that:

- 1) The project proponent has made all reasonable efforts to meet each of the Standards;
- 2) The project proponent has made a complete evaluation of possible stormwater management measures; and
- 3) If full compliance with the Standards cannot be achieved, the project proponent is implementing the highest practicable level of stormwater management.

The Stormwater Management Standards defined and specified in the Massachusetts Stormwater Handbook require best management practices to minimize pollutants from reaching receiving wetland resources. Siltation and erosion controls will be installed prior to commencement of work and will be maintained during construction to protect the resources. Stormwater runoff is to be directed as sheet flow to existing and proposed swales located along the edge of the trail. With a 1% cross slope and a shallow rail profile and a limited amount of cuts and fill, the swales will allow for some infiltration while maintaining existing drainage patterns.

SECTION II

STORMWATER MANAGEMENT PLAN

A. Standard 1 – No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The existing flow patterns are being maintained. All existing drainage is being retained and adjusted if necessary. No new stormwater point source discharges are being created.

Unlike urban runoff conditions associated with a roadway or surface traversed by automobiles, the runoff from the rail trail should not be a source of heavy metal deposits, oils and grease, sand and de-icing chemicals. As motorized vehicle traffic (other than emergency vehicles) on the bike path will be restricted, untreated stormwater is much less of a concern.

B. Standard 2 – Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

The existing watersheds and flow patterns will not be changed by the construction of the bike trail. Although there is an increase in the impervious area, any increase in runoff is expected to be negligible in comparison with the existing flow from the entire watershed area. Runoff from the impervious portion of the trail will sheet flow across adjacent pervious areas or be directed to existing and proposed swales located along the edge of the trail. These areas will slow the runoff rate and provide storage

effectively minimizing the impact from the new impervious surface and preventing storm damage or downstream flooding.

- C. Standard 3 – Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site should approximate the annual recharge from the pre-development or existing site conditions, based on soil types.**

The existing flow patterns will be maintained as well as the contributing watersheds by retaining any existing patterns. All side slopes will be covered with loam and seed to help intercept and infiltrate stormwater runoff. As the increase in impervious area is negligible in comparison to the watershed area, the annual amount of recharge will not be adversely impacted.

- D. Standard 4 - For new development, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS).**

Since the project is a redevelopment project, the standards need to be met to the maximum extent practicable. Although it is assumed there will be limited sediments on the rail trail since there will be no sanding activities, sweeping will be proposed as part of the normal Operation and Maintenance Plan providing additional removal of TSS.

In the event of any hazardous material spill, remedial response actions will be performed immediately in accordance with the Massachusetts Contingency Plan, 310 CMR 40.0000 (MCP) where applicable. MCP response actions will be overseen by a Massachusetts Licensed Site Professional (LSP) and the appropriate regulatory agencies and local officials will be notified.

- E. Standard 5 – Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMPs. The use of infiltration practices without pretreatment is prohibited.**

The project area does not qualify as an area with higher potential pollutant loads, therefore, this standard is not applicable.

- F. Standard 6 – Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas. Critical areas are Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, cold water fisheries and recharge areas for public water supplies.**

The proposed rail trail is within a critical area. The portion of the trail from the Acton/Maynard town line to approximately 300 feet south of Mill Pond is within a Zone II Protection Area of public groundwater wells located in Maynard. No new stormwater point source discharges are being created.

G. Standard 7– Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.

The construction of the rail trail is a redevelopment project and meets the standards to the maximum extent practicable. All slopes will be loamed and seeded to aid in the prevention of erosion and encourage recharge. Railroad ties will be removed from the existing rail bed and properly disposed of off-site. The right-of-way and proximity of the wetlands to the proposed rail trail severely limits the space for intensive BMPs or for additional BMPs.

H. Standard 8 – Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.

Erosion and sedimentation will be controlled throughout the site. The contractor will be alerted that control of erosion and sedimentation is considered to be critically important in and around the areas shown on the plans and delineated as wetlands. The contractor is to implement the erosion and sedimentation controls indicated on the plans. The contractor will also be alerted to the fact that field conditions may warrant additional protection measures to comply with the regulations.

Erosion controls shall consist straw bales, compost filter tubes or silt fence. No hay bales shall be used at any time on this project. The erosion and sedimentation control measures will be constructed in accordance with the Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, March 1997, and the U.S.D.A. SCS's Erosion and Sediment control in the Site Development, Massachusetts Conservation Guide, September 1983.

Temporary erosion and sedimentation control measures shall be installed prior to the commencement of any site work, maintained during construction and remain in place until the site work is completed and ground cover is established (at least 75% uniform coverage by new seedlings). All erosion and sedimentation control measures shall be maintained in effective condition throughout the construction period. The contractor shall inspect the erosion controls daily and clean accumulated materials from behind them as necessary. All erosion and sedimentation control measures found to be in need of repair or replacement shall be immediately corrected. Any sediment removed from control structures shall be disposed of in an appropriate manner. No equipment or material of any kind shall be stockpiled or deposited in any regulated area.

Stockpiled soil within jurisdictional areas shall be surrounded with siltation fences to prevent and control siltation and erosion. Stockpiles that will remain exposed for more than 30 days shall be stabilized with mulch or seeded for temporary vegetative cover. All disturbed areas that remain exposed or undisturbed for a period of fourteen days or longer shall be stabilized with mulch or seeded for temporary vegetative cover as well.

Adequate erosion controls shall be placed around each catch basin, gutter inlet or drop inlet in the vicinity of the work during construction. The contractor shall inspect all portions of the site in anticipation of rainfall events to determine if site grading is sufficient to prevent erosion of slopes and /or the transportation of sediments to wetlands or watercourses within the project limits. All disturbed earth slopes shall be stabilized with permanent vegetative cover as soon as possible. There shall be no direct discharge from dewatering operations into any wetland, watercourse or drainage system unless allowed by regulatory permits.

A stockpile of erosion control materials shall be kept on site throughout the construction work and shall be installed at the direction of the engineer to mitigate any erosion/sedimentation conditions that may arise.

I. Standard 9 – All stormwater management systems must have an operation and maintenance plan to ensure that systems function as designed.

The following is the Operation and Maintenance Plan for the existing and proposed stormwater management system for the Assabet River Rail Trail. The Operation and Maintenance Plan will be incorporated into the Order of Conditions and filed with the Registry of Deeds prior to the start of the construction.

Responsible Party

The party responsible for the operation and maintenance of the stormwater management systems shall be the Town of Acton.

Operation and Maintenance Plan

Bike Trail

• **Paved Trail**

- The Paved Trail should be inspected annually in the spring. Significant cracks, settlement of the pavement should be repaired. The cracks should be sealed and areas of settlement brought up to grade with bituminous overlay or full depth reconstruction where necessary.
- The paved trail will be swept periodically to remove sediment or vegetative litter that may buildup over time. The sweeping schedule should start on a semiannual basis and later be appropriately modified as conditions warrant. The swept material will be disposed of properly off-site.
- Sanding, salting or plowing of the trail for use in the winter season is not planned.

• **Shoulders**

- The stone dust shoulders of the paved trail should be inspected after every major storm for the first few months. Thereafter, the shoulders and soft trail should be inspected annually in the spring.

- Any washouts or significant settlement should be repaired.
- Significant vegetation and woody growth should be removed and the stone dust fine graded and compacted as necessary.

Cross Culverts and Bridge Openings

- Cross culverts and bridge openings should be inspected at least once per year. Maintenance work should be prioritized and scheduled throughout the spring, summer and fall.
- In the spring, the inside and both ends of the culverts should be inspected. Any blockages should be removed. During the summer, the culverts should be cleaned and flushed as well as repaired and improved if necessary. All brush at the pipe ends should be trimmed and removed. The grass and weeds should be mowed. Any leaning and falling trees upstream of the culvert should be cut and removed. Any bare slopes should be replanted to prevent erosion. The fill over the pipe should be checked and fill should be added if necessary.
- In the fall, any blockages should be removed and all headwalls and pipe ends should be marked for snowplow operators.

Swales (Drainage Channels)

- Inspect swales the first few months after construction and twice a year thereafter to make sure vegetation is adequate. Repair any rills or gullies and replace dead vegetation.
- Mow swales at least once per year. Keep grass height under 6 inches but do not cut shorter than three to four inches.
- Manually remove sediment and debris at least once per year and reseed periodically to maintain a dense growth of grass vegetation.

J. Standard 10 – All illicit discharges to the stormwater management system are prohibited.

There are no known or proposed illicit discharges to the existing or proposed drainage system for the rail trail. If any potential illicit connection is detected during the work, the nature and source of the discharge will be determined. If no permit exists, the connection will be plugged and abandoned.

ATTACHMENT E
Project Special Provisions

ITEM 755.3**NON-TIDAL WETLAND MITIGATION AREAS****LUMP SUM**

Work under this item shall conform to the relevant provisions of Sections 120, 770, 771 and the following:

The work under this Item includes the furnishing of all labor, transportation, equipment, and materials required for protection, construction, and maintenance of Non-Tidal Wetland Mitigation Areas as compensation for proposed impacts to existing wetlands. Tasks include erosion controls, excavation, fine grading, soil and soil amendments as needed, planting, maintenance and removals as shown on the Plans.

The construction and re-vegetation of the replacement areas shall be in accordance with the Plans and Cross Sections and as directed by the Wetland Specialist. Limits of replacement and proposed plantings shown on the plans are approximate and may require adjustment in the field to accommodate actual conditions.

DESCRIPTION OF WORK

To ensure that no loss of wetland function results from the proposed project, Non-Tidal Wetland Mitigation Area(s) characterized by Bordering Vegetated Wetlands (BVW) shall be replicated through constructed wetlands and/or restored by planting in existing wetland areas shown on the Plans. Non-Tidal Wetland Mitigation Areas shall hereafter be referred to as Mitigation Areas. The following minimum area requirements shall be met for each area shown on the Plans.

Replication:

BVW replication area 1 = 150 sf

Wetland Replication Area 1 is located at approximately Sta. 12+75 to 13+50 on the south side of the ROW near the Maynard DPW Facility and Taylor Brook in Maynard. Wetland replication design specifications are detailed on Sheet 94 of 179 within the MassDOT - Highway Division Plan & Profile of Assabet River Rail Trail (Bridge No. M-10-012, A-02-034 & A-02-042) plan set.

BVW replication area 2 = 1,650 sf

Wetland replication area 2 is located approximately at Sta. 111+75 to 112+75 on the east side of the ROW, south of Acton Street in Maynard. Wetland replication design specifications are detailed on Sheet 95 of 179 within the MassDOT - Highway Division Plan & Profile of Assabet River Rail Trail (Bridge No. M-10-012, A-02-034 & A-02-042) plan set.

BVW replication area 3 = 968.3 sf

Wetland replication area 3 is located approximately at Sta. 153+25 on the west side of the ROW, near Sylvia Street in Acton. Wetland replication design specifications are detailed on Sheet 96 of 179 within the MassDOT - Highway Division Plan & Profile of Assabet River Rail Trail (Bridge No. M-10-012, A-02-034 & A-02-042) plan set.

BVW replication area 4 = 4,459.1 sf

Wetland replication area 4 is located approximately at Sta. 163+25 through Sta. 166+25 on the east side of the ROW, approximately 250 feet south of the bridge crossing the Fort Pond Brook at Mill Pond in Acton. Wetland replication design specifications are detailed on Sheet 97 of 179 within the MassDOT - Highway Division Plan & Profile of Assabet River Rail Trail (Bridge No. M-10-012, A-02-034 & A-02-042) plan set.

Restoration:

BVW restoration Areas - Multiple

Table 1: Wetland Resource Area Impacts – Assabet River Rail Trail provided in the Town of Maynard and Acton Notice of Intents describes the quantity and location of several distinct areas of BVW along the Assabet River Rail Trail that will be temporarily impacted and restored in place. Upon completion of construction activities, the areas will be loamed and seeded with the Seed Mix specified on within the MassDOT - Highway Division Plan & Profile of Assabet River Rail Trail (Bridge No. M-10-012, A-02-034 & A-02-042) in the towns of Maynard & Acton – 75% Submission; the MassDOT Item 755.7 Specification – Wetland Specialist; and this document.

Mitigation Areas shall be constructed to meet the requirements of permits and certifications including relevant performance standards of the Massachusetts Wetlands Protection Act (MGL C. 131, s40) and U.S. Army Corps of Engineers.

The Contractor shall be responsible for protection and preservation of natural areas adjacent to the Mitigation Areas both within and outside of the project limits for the duration of the contract period. Access to Mitigation Areas shall be clearly defined in order to minimize damage to existing vegetation and soils. The Contractor shall use duck boards or mats, as necessary, to minimize impacts from foot paths or construction equipment. All labor and materials required for protection and preservation of site shall be incidental to this item.

Damage to soils or vegetation due to trampling, vehicles, storing of materials, debris, or negligence shall be repaired to the satisfaction of the Engineer and at the Contractor's expense.

RELATED ITEMS:

The following tasks related to work within the Mitigation Areas shall be paid for under these separate items.

ITEM 755.7

WETLAND SPECIALIST

The Contractor shall retain a qualified Wetland Specialist as per Item 755.7 WETLAND SPECIALIST to coordinate and oversee work under this item. Work performed by the Wetland Specialist shall be paid for under Item 755.7. The Wetland Specialist shall report directly to the Resident Engineer and work independently of the wetland contractor

SUBMITTALS:

Photographic Documentation: Prior to any disturbance, clear and legible digital photographs with date and time stamps shall be taken of the existing site conditions including existing wetlands to be impacted, all proposed wetland mitigation sites and reference/model wetland areas, typically an adjacent undisturbed wetland. These shall be submitted to the Engineer on CD or DVD format.

Contractor shall submit the following for approval by the Engineer in consult with the MassDOT Landscape Architect at least sixty (60) days prior to installation. The Contractor shall be responsible for making all submittals to the Engineer in a timely and complete manner.

Soil and soil amendments: Contractor shall submit for approval all sources of soil and other amendments including compost prior to ordering. Off-site sources shall be identified and available for inspection by the Wetland Specialist prior to transport of material to the site to verify that they are likely to be free of invasive plant species including all viable plant parts.

Plants: Confirmation of availability, source of plant material and certification of provenance from the nursery supplier.

Seed: Source, certification of compliance and certification of provenance from supplier shall be submitted and approved prior to ordering materials.

Compost Filter Tubes: Product literature and samples of all material including compost fill.

Samples:

Cut sheets for erosion controls

Sample(s) of soils and soil amendments tested and accepted, if needed.

MATERIALS

All materials are incidental to this item unless specified otherwise.

Erosion Controls:

Compost Filter Tubes:

Materials shall conform to the requirements of Section 751 and 767 of the Standard Specifications, Plans, and the following:

Fill material for the filter tubes shall be compost meeting M1.06.0, except that no manure or bio-solids shall be used. In addition, no kiln-dried wood or construction debris shall be allowed.

Tubes for compost filters shall be a minimum of 12 inches (300 mm), a maximum of 18" (450mm) in diameter, and shall be jute mesh or approved biodegradable material. Additional tubes may be used at the direction of the Engineer.

Stakes for anchors shall be nominal 2" x 2" untreated hardwood stakes.

Planting Soil:

Wetland soil for wetland restoration or replication may be either soil excavated from impacted wetland area or manufactured hydric soil. If using soil from the impacted wetland area, soil shall not be compacted or grubbed. If the proposed mitigation site is in an area free of invasive species, wetland soil from the impacted wetland that is infested with invasive plant species shall not be used so as to avoid bringing invasive species to a new location. If the mitigation is adjacent to the infested area, wetland soils from the impacted site may be used as they will inevitably spread into the mitigation site. Manufactured wetland soil shall consist of on-site borrow from the proposed replacement site thoroughly mixed with compost to achieve a target organic content of 10-12% by weight. Where empirical data are lacking, compost to soil ratio shall be 1:1 by volume. Off-site borrow may be used for mixing if approved in advance by the Engineer per these Special Provisions.

No soil, compost, or other soil amendment imported to the work site shall contain seeds, roots, stems, or other viable parts of invasive plants. No soil or soil amendment shall be brought on site without prior approval of the material source. Soils used in the replacement area should be free of rocks greater than 4 inches (100 mm) in diameter.

Wetland soils for mitigation area shall be stockpiled outside resource areas and stored at least 100 feet from the edge of the wetland. Precautions shall be taken as necessary to prevent erosion of the stockpiled material. In the event there is excess borrow, it shall be disposed of without additional compensation.

Compost Topsoil:

Compost shall be compost meeting the requirements for Organic Soil Additives, Section M 1.06.0 of the Standard Specifications and the following:

No kiln-dried wood or construction debris shall be allowed.

Organic matter content shall be minimum 30 percent (dry weight basis) as determined by ASTM D2974 (method A) Standard Test Methods for Moisture, Ash and Organic Matter of Peat and Other Organic Soils.

Moisture content shall be 40-60 percent as measured by ASTM D2216 Standard Test Method for Laboratory Determination of Water Content of Soil and Rock and ASTM D2974 (cited above).

Plant Material:

Plants in Mitigation Areas shall conform to SECTION 771 PLANTING TREES, SHRUBS AND GROUNDCOVER of the Division I Standard Special Provisions and as amended below.

Plant species and sizes shall be as specified on the plans.

All plant material shall be species native to the region. As per current recommendations by the NOAA Restoration Center and the EPA Ecoregion Assessment, in order to maintain genetic diversity, only native species of seed and plants from the EPA Level III Ecoregion of the project area shall be used for ecosystem restoration. The EPA Level III Ecoregions of Massachusetts are

Ecoregion 84 Atlantic Coastal Pine Barrens which encompasses Barnstable, Dukes, Nantucket and Plymouth Counties. Ecoregion 59 Northeastern Coastal Zone encompasses the remainder of Massachusetts. The current EPA map, Ecoregions of the Continental United States, is available through the following link: ftp://ftp.epa.gov/wed/ecoregions/us/Eco_Level_III_US.pdf

The nursery source shall certify that the provenance, or origin, of the seed from which the plants were produced is from the applicable EPA Level III Ecoregion.

Transplants and plant material collected from the wild is prohibited unless approved in writing by the MassDOT Landscape Architect and Wetland Specialist. Plant materials shall be selected from certified nurseries that have been inspected by state and/or federal agencies. Nursery inspection certificates shall be furnished to the Engineer upon request.

No plants shall be installed until the Wetland Specialist approves the condition of the plant material and the process of installation.

Water:

Plant material shall be saturated with fresh water before delivery, upon delivery to the site and twice daily up to time of installation. The Contractor shall provide water and all equipment required at no extra cost. Water shall be suitable for irrigation and free from ingredients harmful to plants and wildlife. According to DEP requirements, water from the adjacent water body shall not be utilized. It is the Contractor's responsibility to correct injury or damage due to the lack of water, too much water or use of contaminated water.

Requests for substitutions shall be submitted in writing to the Engineer for review by the MassDOT Landscape Architect at least ninety (90) days prior to planting. The Contractor shall submit a list of nurseries that were contacted and unable to supply the species as shown on the Plans. All proposed substitutes shall be in conformance with the requirements herein and suitable for the site conditions.

Seed Mix:

Seed in the buffer zone and Mitigation Areas shall conform the Standard Specifications as amended by the 2010 Standard Special Provisions, SUBSECTION M6, ROADSIDE DEVELOPMENT MATERIALS and as amended herein.

The following seed mix shall be used:

BOTANICAL NAME	COMMON NAME	PERCENTAGE
<i>Carex vulpinoidea</i>	Fox Sedge	25%
<i>Elymus virginicus</i>	Virginia Wildrye	25%
<i>Carex lurida</i>	Lurid (Shallow) Sedge	12%
<i>Carex lupulina</i>	Hop Sedge	6%
<i>Verbena hastata</i>	Blue Vervain	4%
<i>Juncus effuses</i>	Soft Rush	3%
<i>Carex comosa</i>	Cosmos (Bristly) Sedge	3%
<i>Aster umbellatus (Doellingeria umbellate)</i>	Flat Topped White Aster	3%

<i>Aster prenanthoides (Symphyotrichum p.)</i>	Zigzag Aster	3%
<i>Scirpus atrovirens</i>	Green Bulrush	3%
<i>Helenium autumnale</i>	Common sneezeweed	2%
<i>Zizia aurea</i>	Golden Alexanders	2%
<i>Ludwigia alternifolia</i>	Seedbox	2%
<i>Lobelia siphilitica</i>	Great Blue Lobelia	1%
<i>Aster puniceus (Symphyotrichum puniceum)</i>	Purplestem Aster	1%
<i>Vernonia gigantea (V. altissima)</i>	Giant Ironweed	1%
<i>Scirpus cyperinus</i>	Woolgrass	1%
<i>Eupatorium perfoliatum</i>	Boneset	1%
<i>Euthamia graminifolia (Solidago g.)</i>	Grassleaf Goldenrod	1%
<i>Asclepias incarnata</i>	Swamp Milkweed	1%
	Total:	100%

Seeding rate shall be 20 lbs. per acre or 0.5 lbs. per 1,000 square feet. All species shall be of a local ecotype meeting the EPA Level III Ecoregion requirements as described in the Plant Materials section.

METHODS

Site Preparation:

Prior to an initial site meeting, the Contractor shall stake out Mitigation Area boundaries and set grade stakes in the field. Prior to start of work, the Contractor shall walk the site with the Engineer, Wetland Specialist, and MassDOT Landscape Architect for an initial site meeting. The purpose of the meeting is to verify limits of work, locations and installation of Phase 1 erosion controls, proposed construction methods, and grade stake elevations.

Erosion and Sediment Control:

The Contractor shall plan and execute operations in a manner minimizing the amount of excavated and exposed fill or other foreign materials that could be washed or otherwise carried into Mitigation Areas and nearby wetland resource areas. The Engineer and Wetland Specialist shall inspect and approve erosion and sediment control measures prior to excavation work. Erosion controls shall be in place prior to any construction activities.

Compost Filter Tubes shall serve as temporary erosion control during construction until establishment of erosion control seeding. Compost Filter Tubes shall also act as a limit of work barrier.

Where restoration requires planting in existing grade to fill in among existing vegetation, disturbance to existing soils will be minimal and erosion controls may not be necessary around these restoration planting areas.

Erosion controls shall be installed along the downslope perimeter of Mitigation Areas beginning and ending in the surrounding upland so that no excavated material or disturbed soil can enter adjacent wetlands or waters.

The Contractor shall remove sediment deposits as necessary to maintain the filters in working condition. The Contractor shall maintain erosion controls in a functional condition at all times, including inspections after each rainfall and at least daily during prolonged rainfall and shall immediately correct all deficiencies including replacing compost filter tubes as needed.

Upon final acceptance of seeding, the compost filter tubes shall be cut open, compost spread evenly over the soil surface a maximum depth of 2-inches and the composted area shall be seeded with same seed mix used in the surrounding area. Stakes, ropes and other non-biodegradable materials shall be removed and disposed of offsite by the Contractor. Existing vegetation disturbed by erosion control installation and removals shall be replanted as directed by the Engineer.

Excavation and Grading:

Final grades in the Mitigation Areas shall conform to target elevations as shown on the Plans and as approved by the Wetland Specialist. Restoration areas shall conform to existing and/or adjacent grades.

Mitigation Areas shall be staked and grades set for approval by the Wetland Specialist prior to excavation. To the extent possible, limits shall be a minimum of 6 feet from trunk of trees. Actual limits of mitigation areas may be adjusted in the field to protect root systems of existing trees. However, the total area of Wetland Mitigation required by all permits shall not be reduced.

Mitigation area shall be covered with 2-inch layer of Compost Topsoil to provide compost mulch for erosion control and better seed establishment. Typically, hydraulic application equipment will be required for this item, unless otherwise permitted by the Engineer, in writing.

Note: to avoid compaction, once soil has been placed, no heavy equipment shall travel across placed soil. Do not work with wet or moist soils. Work that results in compaction of soils shall result in replacement of wetland soils at no additional cost to the contract.

It is the Contractor's responsibility to identify existing areas of established invasive plants and notify the Engineer and Wetland Specialist of the condition. Soil containing invasive plant material shall be excavated and disposed of off-site at an approved facility.

All cut trees, stumps, brush, wrack or vegetation not specified to remain shall be removed from Mitigation Areas unless directed otherwise by the Engineer. Materials shall not be stockpiled in the resource areas or buffer zone while awaiting disposal.

Sequence and execution of work shall ensure minimal compaction and heavy equipment moving over placed planting soil. If heavy equipment is required to travel over existing wetland soils, wood mats shall be placed to minimize impacts. Upon acceptance of final grades, no heavy equipment shall travel across mitigation areas or adjacent wetland resource areas.

The finished grade shall be at an elevation that will provide a hydrologic connection between the replacement area and adjacent resource areas. The hydrologic connection should be in keeping with restoring the intended function of the replacement wetland. The Contractor shall verify that this elevation is not at a level that could alter the hydrology of an adjacent wetland.

Mitigation Area Planting:

Planting in Mitigation Areas shall conform to SECTION 771 PLANTING TREES, SHRUBS AND GROUND COVER of the Division I Standard Special Provisions and as amended below.

Planting shall be overseen by the Wetland Specialist. Mitigation Areas shall be planted in the dry and according to the planting details within the range of target elevations and at the spacing shown on the Plans. If Mitigation Area includes more than one planting zone, the Wetland Specialist shall flag out limits prior to planting. Plants shall be installed. Discrepancies shall be resolved by the Engineer in consultation with the Wetland Specialist and MassDOT Landscape Design Section.

Plant material shall be installed as soon as possible after delivery. Plants stored on-site prior to installation shall be maintained in acceptable condition as described in materials section. Plants showing signs of stress or compromised health may be rejected by the Engineer or Wetland Specialist with replacement at the Contractor's expense.

Mitigation Performance Standards:

The Contractor shall fulfill the following minimum Mitigation Performance Standards for the Mitigation Areas within a Planting Guarantee Period of two (2) full growing seasons. Monitoring shall be performed by the Wetland Specialist according to Item 755.7 WETLAND SPECIALIST.

1. The target elevations for Mitigation Areas and planting types have been met and maintained. A minimum of 90 percent of each wetland mitigation area must meet desired hydrology. Areas that are too high or too low should be identified along with suggested corrective measures.
2. Establish at least 80 percent uniform cover of the intended herbaceous wetland plant community.
3. Establish at least 95 percent of woody plants installed.

Plant species listed as invasive by Massachusetts Invasive Plant Advisory Group (MIPAG) and the USACE – New England District shall be identified as such in the monitoring reports and corrective measures taken to control them within the limits of the Mitigation Areas for the duration of the Planting Guarantee Period.

If at the end of the Planting Guarantee Period, the Mitigation Performance Standards have not been met according to the monitoring report, the Contractor shall provide corrective measures and install replacement plant material to achieve the required establishment. All costs associated with achieving the Mitigation Performance Standards through the Planting Guarantee Period shall be incidental to this item.

As-Built Drawings:

Following acceptance of the planting by MassDOT, as-built drawings of the Wetland Mitigation Areas shall be surveyed and prepared by the Contractor for use by the Wetland Specialist as per the USACE - New England District's Compensatory Mitigation Guidance. As-built drawings shall be prepared at a clearly legible scale including 1-ft. contours and polygons outlining each wetland mitigation area. The as-built drawings shall serve to confirm that area requirements have been met and as the base map for mitigation monitoring. The as-built drawings shall be provided in printed

paper format (full size 24" x 36" sheets, unless otherwise directed) as well as Portable Document Format (e.g., Adobe PDF) and AutoCAD files on compact disk. As-built drawings shall be completed within 30 days of acceptance of initial wetland mitigation planting.

Monitoring and Maintenance:

Monitoring shall be performed by the Wetland Specialist in order to ensure compliance with the Mitigation Performance Standards. Monitoring methods and report content shall conform to the Wetland Mitigation Report as approved by the regulatory agencies. The monitoring schedule shall be as per Item 755.7 WETLAND SPECIALIST. Work performed by the Wetland Specialist shall be according to and paid for under Item 755.7 WETLAND SPECIALIST.

Based on monitoring results and as directed by the Engineer in consult with the MassDOT Landscape Design Section, the Contractor shall make corrective measures to achieve compliance with the Mitigation Performance Standards. All plants not showing satisfactory evidence of establishment during the Planting Guarantee Period shall be replaced within the appropriate planting window. Unsatisfactory plants shall be removed and replaced along with dead and missing plants. All maintenance shall be incidental to this item.

COMPENSATION

Non-tidal wetland mitigation areas will be measured for payment by lump sum.

Within 10 days of the award of the contract, the Contractor shall submit, in duplicate, for approval by the Engineer, a schedule of quantities and unit prices for the major components of the Mitigation Areas as listed on the following table. The cost of labor and materials for any item not listed but required to complete the work under this item shall be considered incidental to the item and no further compensation will be allowed.

Item Component	Quantity	Unit	Unit Price	Amount	Notes
	BVW				
Compost Filter Tubes		FT			
Compost Topsoil		SY			
Mitigation Seeding		SY			
Red maple (<i>Acer rubrum</i>), 1"-1.5" cal	54	EA			
Blueberry Highbush (<i>Vaccinium Corymbosum</i>), 18-24"	34	EA			
Arrowwood (<i>Viburnum dentatum</i>), 18"-24"	6	EA			
Winterberry - Female (<i>Ilex</i>	17	EA			

<i>verticillata</i>), 24-30"					
Winterberry – Male (<i>Ilex verticillata</i>), 24"–30"	14	EA			
Spicebush (<i>Lindera benzoin</i>), 15-18"	18	EA			
Summersweet Shrub (<i>Clethra alnifolia</i>), 18-24"	26	EA			
Dogwood silky (<i>Cornus amomum</i> , 2-3'	21	EA			
Cinnamon fern (<i>Osmunda cinnamomea</i>)	61	EA			
Royal Fern (<i>Osmunda regalis</i>)	30	EA			
Sensitive Fern (<i>Onoclea sensibilis</i>)	16	EA			

Work for Item 755.3 NON-TIDAL WETLAND MITIGATION AREAS shall be measured and paid at the contract bid price per lump sum, which price shall include full compensation for work herein.

Such payment shall be considered full compensation for all labor, tools, equipment, materials, travel and incidentals necessary to complete the work as described herein and in a manner satisfactory to the Engineer.

PAYMENT SCHEDULE

75 percent paid upon acceptance of initial planting
25 percent paid at end of second growing season.

ITEM 755.7

WETLAND SPECIALIST

HOUR

The Contractor shall retain the services of a Coastal Ecologist, Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications hereafter referred to as the Wetland Specialist. The Wetland Specialist shall possess the knowledge and expertise to coordinate and oversee all work associated with wetland replication as defined herein, as shown on the Plans and as in Item 755.3 NON-TIDAL WETLAND MITIGATION, the bank restoration and the construction of the compensatory flood storage areas. The Wetland Specialist shall be responsible for the protection and maintenance of the bordering vegetated wetlands, bank, land under water, floodplain and riverfront area.

The Wetland Specialist shall serve as an expert advisor to the Engineer and report directly to the Resident Engineer.

QUALIFICATIONS

The Wetland Specialist shall have a minimum of ten (10) years' experience in successful construction and monitoring of wetland mitigation areas that is similar to the project. The Wetland Specialist shall be thoroughly versed in the Commonwealth of Massachusetts Wetlands Protection Act (MGL C.131, s.40); U.S. Army Corps of Engineers New England District Compensatory Mitigation Guidance; and all other relevant regulations of the Massachusetts Department of Environmental Protection and the U.S. Army Corps of Engineers - New England District.

SUBMITTALS

Within sixty (60) days following the Notice to Proceed, the Contractor shall furnish proof of qualifications for the Wetland Specialist to the Engineer for approval in consult with the MassDOT Landscape Architect.

Proof of qualifications shall include, but not be limited to, the following items:

- a. Narrative describing company, its expertise, technical qualifications and experience with wetland construction.
- b. Resumes of individuals who will perform the work, if different from company description.
- c. At least three (3) references from prior work of a similar nature that was completed in last five (5) years by the individuals who will perform the work. Provide contact information for each reference including address, phone number and email.
- d. Provide a summary of each of reference project including nature of the work, project size, dates and period of construction and monitoring, methodologies used, and summary of success or not in terms of meeting performance objectives.
- e. Provide a minimum of one before and one after photo for each reference project.
- f. Provide a minimum of one complete set of monitoring reports for a similar project including a Final Assessment Report as per the U.S. Army Corps of Engineers New England District Compensatory Mitigation Guidance.

SCOPE OF WORK

The Wetland Specialist shall be responsible for oversight and monitoring of work associated with Item 755.3 NON-TIDAL WETLAND MITIGATION including, but not limited to, the following tasks:

- Review environmental permits relevant to wetland replication and ensure compliance through the duration of the contract.
- Evaluate site and conditions prior to construction. Identify and inform the Engineer of unique site conditions that could require adjustments to the schedule, design or construction methods. For example, wildlife nesting, illegal dumping or presence of invasive plant species.
- Review suitability of material submittals prior to submission to the Engineer with copies to MassDOT Landscape Architect.
- Participate in site meetings as outlined in Item 755.3 NON-TIDAL WETLAND MITIGATION.
- Review erosion controls (within the Mitigation Areas only), monitor construction impacts to adjacent areas and regulated wetland resources.
- Provide updates at project milestones according to Item 755.3 NON-TIDAL WETLAND MITIGATION.
- Perform digital photo documentation through the duration of the contract and submit a photo archive on compact disk upon completion.
- Perform site observations at least two times during the growing season in late spring/early summer and again in late summer/early fall.
- Submit annual monitoring reports in the format provided in the US Army Corps of Engineers - New England District: Compensatory Mitigation Guidance.
- Make written recommendations on maintenance and corrective measures following each site observation in order to achieve the Mitigation Performance Standards.

The Wetland Specialist shall be responsible for oversight and approval of, including but not limited to, the following activities in coordination with the Contractor and Engineer.

- Location and boundaries of wetland replication area, location of tree protection associated with the wetland replication areas, limits of clearing and limits of work in the replication areas
- Installation and removal of erosion controls
- Target elevations and grade stakes prior to excavation
- Final grades prior to planting and/or seeding
- Flagging wetland plant locations prior to installation
- Planting installation and/or seeding procedures.
- Removal of perimeter controls, such as goose fence

Monitoring reports shall be submitted no later than November 1 of each monitoring period. For each project update and monitoring report, submit one (1) printed copy and a digital copy in Portable Document Format (e.g., Adobe PDF) to the Engineer for distribution to the MassDOT Landscape Architect, MassDOT Environmental Services, U.S. Army Corps of Engineers, National Marine Fisheries Service (Habitat Conservation) and the US Environmental Protection Agency. All reports shall be marked with the applicable permit numbers and identifying information as required in the permits.

Monitoring:

Monitoring will be performed for the wetland replication areas in order to ensure satisfactory plant establishment and compliance with the Mitigation Performance Standards as defined in Item 755.3 NON-TIDAL WETLAND MITIGATION and as defined in the Wetland Mitigation Report approved by the US Army Corps of Engineers.

Plant species listed as invasive by Massachusetts Invasive Plant Advisory Group (MIPAG) and the USACE – New England District shall be identified as such in the monitoring reports and corrective measures taken to control them within the limits of the wetland mitigation areas for the duration of the contract. The definition of invasive plant species referred to herein shall be as defined by Massachusetts Invasive Plant Advisory Group (MIPAG) and classified as Invasive, Likely Invasive or Potentially Invasive according to their current classification lists. MIPAG link: <http://www.massnrc.org/MIPAG/>

Invasive plant species shall also include those listed by the USACE New England District.

As per the monitoring schedule, the Wetland Specialist shall complete and submit a monitoring report detailing the relative success of the replication areas and make recommendations for maintenance and/or corrective measures. According to the USACE permit conditions, a growing season starts no later than May 31. Reports shall include data sheets. Data summaries shall be cumulative in each successive report.

Monitoring report requirements shall be as outlined in the USACE New England District Compensatory Mitigation Guidance and include the following.

- Identification of all plant species present
- Quantity installed and total mortality of each target plant species
- Percent cover for each plant species and overall percent cover for replication area
- Description of health and vigor of installed target species as well as volunteer plant species within the replication areas
- Changes in site conditions including topography, such as erosion, gullies, shifting or accretion of sediment, and hydrology, such as ponding, damming, breaches or other observed changes in water levels
- Condition of perimeter controls (such as goose fence) and erosion controls
- Evidence of pests, disease and invasive plant species
- If invasive plant species are identified in replication areas, measure and map approximate area of establishment for each species
- Photo documentation with date and time stamped photos

- Visual observations of fauna using or in the vicinity of the site at the time of monitoring
- Any other information required by permits, Massachusetts DEP and U.S. Army Corps of Engineers regulations and requirements.

Monitoring Report & Schedule:

1. End of First Growing Season

At the end of the first full growing season before plants enter dormancy, typically in September, inspect to document the monitoring parameters defined above.

2. End of Second Growing Season

At the end of the second growing season before plants enter dormancy, typically in September, inspect to document the monitoring parameters defined above.

Monitoring Report Appendices:

Appendix A: Soil profile description shall be provided from within wetland mitigation areas.

Appendix B: A vegetative species list of colonizing species in each plant community type. The volunteer species list shall include those that cover at least 5% of their vegetative layer.

Appendix C: Representative photos taken from the same locations for each monitoring event. Photos shall be dated and clearly labeled with the direction from which the photo was taken.

Maintenance Requirements:

Wetland replication shall show satisfactory establishment as defined according the Mitigation Performance Standards in Item 755.3 NON-TIDAL WETLAND MITIGATION. The Contractor shall be responsible for maintenance and replacement according to those items. Corrective measures requiring earth movement or changes in hydrology shall not be implemented without written approval from the Corps to MassDOT.

Maintenance of wetland mitigation areas shall include replacement of dead or missing plant material, maintaining goose fence in effective and satisfactory condition, maintaining compost filter tubes in functioning condition, removal of debris within and around perimeter of mitigation area, correcting erosion or gullies.

Based on monitoring results, plants that have not shown satisfactory evidence of establishment shall be replaced and corrective measures taken. Dead or missing plants shall be replaced within the next appropriate planting window.

If at the end of the second growing season and upon acceptance of the monitoring report, the Mitigation Performance Standards have not been met and the Contractor is required to perform corrective measures, the Wetland Specialist shall be compensated for work ordered.

The permits require a total of five-years monitoring of mitigation areas. MassDOT shall be responsible for fulfilling the permitting requirements beyond the end of the second growing season. The post-construction Final Wetland Assessment monitoring report to be submitted to the

applicable regulatory agencies at the end of the fifth growing season is not included in the scope of this item.

COMPENSATION

The work described under this item shall be measured per HOUR. The basis for measurement is as follows:

1. Permit Review\ Site Assessment\Construction Oversight - 40 HRS
2. 1st year Spring and Fall field observation\Spring Update\Monitoring Report - 16 Hours
3. 2nd year Spring and Fall field observations\Spring Update\ Monitoring Report – 16 hours

The work described under this item shall be measured and paid at the contract unit price per HOUR, which price shall include labor, tools, equipment, materials, travel and incidentals necessary to complete the work as described herein and in a manner satisfactory to the Engineer.

ITEM 756.

NPDES STORMWATER POLLUTION PREVENTION PLAN

LUMP SUM

(Rev. 09/2009)

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit.

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the U.S. Environmental Protection Agency (EPA) for coverage under the NPDES General Permit for Storm Water Discharges From Construction Activities. On July 14, 2008 (73 FR 40338), EPA issued the final NPDES Construction General Permit (CGP) for construction activity.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the U.S. EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a seven (7) day review period commencing from the date on which EPA enters the Notice into their database. The Contractor is advised that, based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The General Permit also requires the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the afore-mentioned statutes and regulations. The Plan will include the General Permit conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. It is the responsibility of the Contractor to prepare the SWPPP to meet the requirements of the most recently issued CGP.

The Contractor shall submit the Plan to the Engineer for approval at least four weeks prior to any site activities. It is the responsibility of the Contractor to be familiar with the General Permit conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to this project and to include in the Stormwater Pollution Prevention Plan the methods and means necessary to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA Construction General Permit, provide all information required, and obtain any and all certifications as required by the Construction General Permit. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

Included in the General Permit conditions is the requirement for inspection of all erosion controls and site conditions on a weekly basis as well as after each incidence of rainfall exceeding 0.5 inches in twenty-four hours. The Contractor shall choose a qualified individual who will be onsite during construction to perform these inspections. The Engineer must approve the contractor's inspector. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the General Permit. Work associated with performance of inspections is not included under this Item. The Standard Specifications require adequate erosion control for the duration of the Contract. Inspection of these controls is considered incidental to the applicable items. This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, and preparation of monthly reports. In addition, any erosion controls beyond those specified in bid items elsewhere in this contract which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved. Approval of final stabilization by the Engineer and confirmation

of submission of the NOT will be required prior to submission of the Resident Engineer's Final Estimate.

COMPENSATION

Payment for all work under this Item shall be made at the contract unit price, lump sum, which shall include all work detailed above, including Plan preparation, required revisions, and revisions/addenda during construction, monthly reports and filing fees.

Payment of fifty (50) % of the contract price shall be made upon acceptance of the Stormwater Pollution Prevention plan. Payment of forty (40) % of the contract price shall be made in equal installments for implementation of the Stormwater Pollution Prevention plan. Payment of the final ten (10) % of the contract price shall be paid upon satisfactory submissions of a Notice of termination (NOT) when final stabilization has been achieved.

ATTACHMENT F
Appendix B: Detailed Wildlife Habitat Evaluation



Wildlife Habitat Protection Guidance

Appendix A: Simplified Wildlife Habitat Evaluation

Project Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



MassDOT Assabet River Rail Trail, Acton and Maynard, Middlesex County, Massachusetts

Project Location (from NOI)

Patrick G. Fellion

Name of Person Completing Form

1/23/2015

Date

Important Habitat Features

Direct alterations to the following important habitat features in resource areas may be permitted only if they will have no adverse effect (refer to Section V).

- Habitat for state-listed animal species (receipt of a positive opinion or permit from MNHESP shall be presumed to be correct. Do not refer to Section V).
- Sphagnum hummocks and pools suitable to serve as nesting habitat for four-toed salamanders
- Trees with large cavities (≥ 18 " tree diameter at cavity entrance)
- Existing beaver, mink or otter dens
- Areas within 100 feet of existing beaver, mink or otter dens (if significant disturbance)
- Existing nest trees for birds that traditionally reuse nests (bald eagle, osprey, great blue heron)
- Land containing freshwater mussel beds
- Wetlands and waterbodies known to contain open water in winter with the capacity to serve as waterfowl winter habitat
- Turtle nesting areas
- Vertical sandy banks (bank swallows, rough-winged swallows or kingfishers)

The following habitat characteristics when not commonly encountered in the surrounding area:

- Stream bed riffle zones (e.g. in eastern MA)
- Springs
- Gravel stream bottoms (trout and salmon nesting substrate)
- Plunge pools (deep holes) in rivers or streams
- Medium to large, flat rock substrates in streams



Wildlife Habitat Protection Guidance

Appendix A: Simplified Wildlife Habitat Evaluation

Activities

When any one of the following activities is proposed within resource areas, applicants should complete a Detailed Wildlife Habitat Evaluation (refer to Appendix B).

- Activities located in mapped “Habitat of Potential Regional or Statewide Importance”
- Activities affecting certified or documented vernal pool habitat, including habitat within 100’ of a certified or documented vernal pool when within a resource area
- Activities in bank, land under water, bordering land subject to flooding (presumed significant) where alterations are more than twice the size of thresholds
- Activities affecting vegetated wetlands >5000 sq. ft. occurring in resource areas other than Bordering Vegetated Wetland
- Activities affecting the sole connector between habitats >50 acres in size
- Installation of structures that prevent animal movement
- Activities for the purpose of bank stabilization using hard structure solutions that significantly affect ability of stream channel to shift and meander, or disrupt continuity in cover that would inhibit animal passage
- Dredging (greater than 5,000 sf)



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



MassDOT Assabet River Rail Trail

Project Name

Town of Acton, Middlesex County, Massachusetts

Location

129.8 linear feet (lf)

1/23/2015

Size of Area Being Impacted

Date

Impact Areas (linear feet, square feet, or acres for each of the impact areas within the site)

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. A-1	34.2 lf			34.2 lf
2. A-2	75.0 lf			75.0 lf
3. A-3	20.6 lf			20.6 lf
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

See attached Narrative Description of Site

Certification

I hereby certify that this project has been designed to avoid, minimize, and mitigate adverse effects on wildlife habitat, and that it will not, following two growing seasons of project completion and thereafter, substantially reduce its capacity to provide important wildlife habitat functions.

Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b))

Patrick G. Fellion

Typed or Printed Name



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

MassDOT Assabet River Rail Trail, Town of Acton, Middlesex County, Massachusetts

Project Location (from NOI page 1)

A-1 (34.2 If Impact Area)

Impact Area (number/name)

January 23, 2015

Date(s) of Site Visit(s) and Data Collection

Overcast, 15 °F, Calm

Weather Conditions During Site Visit (if snow cover, include depth)

Patrick G. Fellion

1/23/2015

Person completing form per 310 CMR 10.60(1)(b)

Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

Signature

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine

Subsystem: _____

Class: Forested

Subclass: Broad-leaved Deciduous

Hydrology/Water Regime

Permanently flooded

Saturated

Intermittently exposed

Temporarily flooded

Semi-permanently flooded

Intermittently flooded

Seasonally flooded

Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following.

Use a terrestrial classification system such as one of the two listed below:

a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. ([Department of Fish & Game Website](#))

b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover: $\frac{80}{\text{Trees (> 20')}} \quad \frac{<10}{\text{Shrubs (< 20')}} \quad \frac{\quad}{\text{Woody vines}} \quad \frac{\quad}{\text{Mosses}} \quad \frac{<5}{\text{Herbaceous}}$

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	Betula lenta*		
Tree	Ulmus americana		
Shrub	Vaccinium corymbosum*		
Herbaceous	Solidago rugosa		

C. Inventory (Soils)

Ridgbury	Poorly Drained
Soil Survey Unit	Drainage Class
Fine Sandy Loam	10 to 30" to densic material
Texture (upper part)	Depth
6-12 inches (not field verified)	
Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

Abundant Present Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

Abundant Present Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

Present Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

Present Absent



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

0 0 0 0
6-12" dbh 12-18" dbh 18-24" dbh > 24" dbh

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

Abundant Present Absent

Cover/Perches/Basking/Denning/Nesting Habitat

Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

Rock piles, crevices, or hollow logs suitable for:

otter mink porcupine bear bobcat turkey vulture

Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

Present Absent

Standing water present at least part of the growing season, suitable for use by

Breeding amphibians Non-breeding amphibians (foraging, re-hydration)

Turtles Foraging waterfowl

Sphagnum hummocks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

Present Absent



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

Present Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

Present Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

Present Absent

Undercut or overhanging banks (small mammals, mink, weasels)

Present Absent

Vertical sandy banks (bank swallow, kingfisher)

Present Absent

Areas of ice-free open water in winter

Present Absent

Mud flats

Present Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

Present Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

Present Absent

Bank swallow colony

Present Absent

Nest(s) present of

Bald Eagle Osprey Great Blue Heron

Den(s) present of

Otter Mink Beaver



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Project area is within:

- 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area
- 200' of Great Blue Heron or osprey nest(s)
- 1400' of a Bald Eagle nest¹

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm Present Absent

Flooded > 25 cm (pied-billed grebe) Present Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren) Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

Fine-leaved emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least 1.0 acre in size? Yes No

(marsh and waterbirds) 2.0 acres in size? Yes No

5.0 acres in size? Yes No

10.0 acres in size? Yes No

¹ 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

- | | | | |
|---|---------------------|---|--|
| Is the impact area part of a wetland complex at least | 2.5 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (turtles, frogs, waterfowl, mammals) | 5.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| | 10.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| | 25.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| For upland resource areas is the impact area part of contiguous forested habitat at least | | | |
| (forest interior nesting birds) | 50 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 100 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 250 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 500 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (grassland nesting birds) | > 1.0 acre in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (special habitat such as gallery floodplain forest, alder thicket, etc.) | > 1.0 acre in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |

B. Connectivity with adjoining natural habitats

- No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- Evidence of significant chemical contamination
- Evidence of significant levels of dumping
- Evidence of significant erosion or sedimentation problems
- Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- Disturbance from roads or highways
- Other human disturbance
- Is the site the only resource area in the vicinity of an otherwise developed area



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12" dbh	4	12	8
Canopy cover/ overhanging limbs	50% of impact area	unknown	unknown (limit impact to canopy cover)



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

MassDOT Assabet River Rail Trail, Town of Acton, Middlesex County, Massachusetts

Project Location (from NOI page 1)

A-2 (75.0 If Impact Area)

Impact Area (number/name)

January 23, 2015

Date(s) of Site Visit(s) and Data Collection

Overcast, 15 °F, Calm

Weather Conditions During Site Visit (if snow cover, include depth)

Patrick G. Fellion

1/23/2015

Person completing form per 310 CMR 10.60(1)(b)

Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

Signature

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine

Subsystem: _____

Class: Forested

Subclass: Broad-leaved Deciduous

Hydrology/Water Regime

Permanently flooded

Saturated

Intermittently exposed

Temporarily flooded

Semi-permanently flooded

Intermittently flooded

Seasonally flooded

Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following.

Use a terrestrial classification system such as one of the two listed below:

a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. ([Department of Fish & Game Website](#))

b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

0 0 _____
6-12" dbh 12-18" dbh 18-24" dbh > 24" dbh

Number of Tree Cavities in trunks or limbs of:

0 _____
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0 _____
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0 _____
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

Abundant Present Absent

Cover/Perches/Basking/Denning/Nesting Habitat

Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

Rock piles, crevices, or hollow logs suitable for:

otter mink porcupine bear bobcat turkey vulture

Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

Present Absent

Standing water present at least part of the growing season, suitable for use by

Breeding amphibians Non-breeding amphibians (foraging, re-hydration)

Turtles Foraging waterfowl

Sphagnum hummocks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

Present Absent



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

Present Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

Present Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

Present Absent

Undercut or overhanging banks (small mammals, mink, weasels)

Present Absent

Vertical sandy banks (bank swallow, kingfisher)

Present Absent

Areas of ice-free open water in winter

Present Absent

Mud flats

Present Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

Present Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

Present Absent

Bank swallow colony

Present Absent

Nest(s) present of

Bald Eagle Osprey Great Blue Heron

Den(s) present of

Otter Mink Beaver



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Project area is within:

- 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area
- 200' of Great Blue Heron or osprey nest(s)
- 1400' of a Bald Eagle nest²

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm Present Absent

Flooded > 25 cm (pied-billed grebe) Present Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren) Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

Fine-leaved emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

- | | | | |
|---|---------------------|------------------------------|--|
| Is the impact area part of an emergent marsh at least | 1.0 acre in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (marsh and waterbirds) | 2.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| | 5.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| | 10.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |

² 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

- | | | | |
|---|---------------------|---|--|
| Is the impact area part of a wetland complex at least | 2.5 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (turtles, frogs, waterfowl, mammals) | 5.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| | 10.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| | 25.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| For upland resource areas is the impact area part of contiguous forested habitat at least | | | |
| (forest interior nesting birds) | 50 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 100 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 250 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 500 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (grassland nesting birds) | > 1.0 acre in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (special habitat such as gallery floodplain forest, alder thicket, etc.) | > 1.0 acre in size? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

B. Connectivity with adjoining natural habitats

- No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- Evidence of significant chemical contamination
- Evidence of significant levels of dumping
- Evidence of significant erosion or sedimentation problems
- Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- Disturbance from roads or highways
- Other human disturbance
- Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12" dbh	4	12	8
Large woody debris on ground	10% of impact area	unknown	unknown (replicate impacted resource)
Canopy cover/overhanging limbs	50% of impact area	unknown	unknown (limit impact to canopy cover)



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (for each wetland or non-wetland resource area)

I. General Information

MassDOT Assabet River Rail Trail, Town of Acton, Middlesex County, Massachusetts

Project Location (from NOI page 1)

A-3

Impact Area (number/name)

January 23, 2015

Date(s) of Site Visit(s) and Data Collection

Overcast, 15 °F, Calm

Weather Conditions During Site Visit (if snow cover, include depth)

Patrick G. Fellion

1/23/2015

Person completing form per 310 CMR 10.60(1)(b)

Date this form was completed

The information on this data sheet is based on my observations unless otherwise indicated

Signature

II. Site Description (complete A or B under Classification - see instructions for full description)

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Palustrine Subsystem: _____

Class: Forested Subclass: Broad-leaved Deciduous

Hydrology/Water Regime

- | | |
|--|---|
| <input type="checkbox"/> Permanently flooded | <input type="checkbox"/> Saturated |
| <input type="checkbox"/> Intermittently exposed | <input type="checkbox"/> Temporarily flooded |
| <input type="checkbox"/> Semi-permanently flooded | <input type="checkbox"/> Intermittently flooded |
| <input checked="" type="checkbox"/> Seasonally flooded | <input type="checkbox"/> Artificially flooded |

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:

- "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. ([Department of Fish & Game Website](#))
- "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Community Name

Vegetation Description

Physical Description



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	<u>70</u> Trees (> 20')	<u>60</u> Shrubs (< 20')	<u><5</u> Woody vines	<u> </u> Mosses	<u>20</u> Herbaceous
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Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species
Tree	<u>Acer rubrum*</u>	Shrub	<u>Pinus strobus</u>
Tree	<u>Quercus rubra</u>	Woody Vine	<u>Rubus hispidus</u>
Shrub	<u>Acer rubrum*</u>	Woody Vine	<u>Toxicodendron radicans</u>
Shrub	<u>Vaccinium corymbosum*</u>	Herbaceous	<u>Dryopteris marginalis*</u>
Shrub	<u>Cornus amomum</u>	Herbaceous	<u>Osmundastrum cinnamomeum*</u>
Shrub	<u>Clethra alnifolia</u>	Herbaceous	<u>Juncus effusus</u>

C. Inventory (Soils)

<u>Ridgebury</u> Soil Survey Unit	<u>Poorly Drained</u> Drainage Class
<u>Fine Sandy Loam</u> Texture (upper part)	<u>10 to 30" to densic material</u> Depth
<u>6-12" (not field verified)</u> Depth to Water Table	

III. Important Habitat Features (complete for all resource areas)

If the following habitat characteristics are present, describe & quantify them on a separate sheet & attach.

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

Abundant Present Absent

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

Abundant Present Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

Present Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

Present Absent



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 0

Number (or density) of Standing Dead Trees (potential for cavities and perches):

0 0 0 0
6-12" dbh 12-18" dbh 18-24" dbh > 24" dbh

Number of Tree Cavities in trunks or limbs of:

0
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

0
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

0
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

Abundant Present Absent

Cover/Perches/Basking/Denning/Nesting Habitat

Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

Rock piles, crevices, or hollow logs suitable for:

otter mink porcupine bear bobcat turkey vulture

Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

Depressions that may serve as seasonal (vernal/autumnal) pools

Present Absent

Standing water present at least part of the growing season, suitable for use by

Breeding amphibians Non-breeding amphibians (foraging, re-hydration)

Turtles Foraging waterfowl

Sphagnum hummocks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

Present Absent



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Important habitat characteristics (if present, describe and quantify them on a separate sheet)

Medium to large (> 6"), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

Present Absent

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

Present Absent

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

Present Absent

Undercut or overhanging banks (small mammals, mink, weasels)

Present Absent

Vertical sandy banks (bank swallow, kingfisher)

Present Absent

Areas of ice-free open water in winter

Present Absent

Mud flats

Present Absent

Exposed areas of well-drained, sandy soil suitable for turtle nesting

Present Absent

Wildlife dens/nests (if present, describe & quantify them on the back of this sheet)

Turtle nesting sites

Present Absent

Bank swallow colony

Present Absent

Nest(s) present of

Bald Eagle Osprey Great Blue Heron

Den(s) present of

Otter Mink Beaver



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Project area is within:

- 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area
- 200' of Great Blue Heron or osprey nest(s)
- 1400' of a Bald Eagle nest³

Emergent Wetlands (if present, describe & quantify them on a separate sheet)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm Present Absent

Flooded > 25 cm (pied-billed grebe) Present Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren) Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

Fine-leaved emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm Present Absent

Flooded > 25 cm (least bittern, common moorhen) Present Absent

IV. Landscape Context

A. **Habitat Continuity** (if present, describe the landscape context on a separate sheet and its importance for area-sensitive species)

Is the impact area part of an emergent marsh at least 1.0 acre in size? Yes No

(marsh and waterbirds) 2.0 acres in size? Yes No

5.0 acres in size? Yes No

10.0 acres in size? Yes No

³ 1400 feet is the distance used by NHESP for evaluating potential disturbance impacts on eagle nests under MESA. Keep in mind, however, that this doesn't give jurisdiction within 1400' of an eagle's nest; it only identifies it on the checklist so that adverse effects can be avoided if work in a resource area is within 1400 feet.



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

- | | | | |
|---|---------------------|---|--|
| Is the impact area part of a wetland complex at least | 2.5 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (turtles, frogs, waterfowl, mammals) | 5.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| | 10.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| | 25.0 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| For upland resource areas is the impact area part of contiguous forested habitat at least | | | |
| (forest interior nesting birds) | 50 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 100 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 250 acres in size? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | 500 acres in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (grassland nesting birds) | > 1.0 acre in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| (special habitat such as gallery floodplain forest, alder thicket, etc.) | > 1.0 acre in size? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |

B. Connectivity with adjoining natural habitats

- No direct connections to adjacent areas of wildlife habitat (little connectivity function)
- Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)
- Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)
- Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)
- Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

V. Habitat Degradation (describe degradation and wildlife impacts on the back of the sheet)

- Evidence of significant chemical contamination
- Evidence of significant levels of dumping
- Evidence of significant erosion or sedimentation problems
- Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)
- Disturbance from roads or highways
- Other human disturbance
- Is the site the only resource area in the vicinity of an otherwise developed area

Note: These are not the only important habitat features that may be observed on a site. If the wildlife specialist identifies other features they should be noted in the application.



Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12" dbh	4	12	8
Rocks in streambed	1	unknown	unknown (replicate impacted resource)
Rocks on bank	1	unknown	unknown (replicate impacted resource)
Bank vegetation	60% shrub cover on bank	unknown	unknown (replicate impacted resource)
Canopy cover/overhanging limbs	50% of impact area	unknown	unknown (limit impact to canopy cover)

**MASSACHUSETTS DEPARTMENT OF TRANSPORTATION – HIGHWAY DIVISION
MAYNARD & ACTON ASSABET RIVER RAIL TRAIL
TOWN OF ACTON, MIDDLESEX COUNTY, MASSACHUSETTS**

WILDLIFE HABITAT EVALUATION

Appendix B, Part 1. Narrative Description of Site

The partially completed Assabet River Rail Trail (ARRT) is a multi-use recreational trail that begins in Marlborough and continues approximately 12.5 miles north through the Towns of Hudson, Stow, Maynard, and ends in Acton. The sections of the trail in Marlborough and Hudson have been constructed and are open to the public. The Town of Stow is currently working on acquiring the rights to the privately owned land along the proposed trail location. The section of trail through Maynard and Acton are currently in the design and permitting phase, with construction anticipated in 2016.

Specifically, the proposed ARRT through Maynard and Acton is a 3.42-mile long segment along the Middleborough Branch of the former Fitchburg Line owned by the Commonwealth of Massachusetts. The Towns of Maynard and Acton have authorized the design work with the understanding that the improvements will be funded through federal and state aid programming under the jurisdiction of the Massachusetts Department of Transportation (MassDOT) – Highway Division. The proposed trail will extend from the end of the proposed ARRT in Stow and continue northeast through Maynard and Acton.

Construction activities will include the following:

- Paved 8 to 12 foot wide multi-use recreational trail with one to two foot graded shoulders on either side;
- Trail pavement markings and signing;
- Rectangular Rapid Flashing Beacons at trail-roadway crossings;
- Roadway pavement markings and signing at trail crossings;
- Traffic calming features;
- Repair / maintenance of existing culverts;
- Construction of two parking areas/additional spaces at Winter and Florida Streets, Maynard;
- Construction of two parking areas/additional spaces at Sylvia and Maple Streets, Acton;
- Earthwork and landscaping;
- Informational kiosks and trail signage; and,
- Other items incidental to the construction of the trail.

In addition to the listed items of work, the path will include the replacement of the bridge over Mill Pond with a 70' long prefabricated steel truss bridge. Hydraulic studies have been conducted to ensure that there will be a No Rise condition to the base flood elevation. The ARRT deviates from the right-of-way (ROW) from Sta 129+ to Sta 141+50 around an existing commercial land use in Acton requiring the construction of a 16' wide boardwalk structure supported by steel helical steel helical pilings 8' on center over stormwater management structures and an existing shrub swamp. The decking will average 5' above the existing grade.

This Detailed Wildlife Habitat Evaluation is being performed because the proposed project exceeds the regulatory threshold of disturbance to >50' of Bank habitat pursuant to 310 CMR 10.54(4)(a)5. Specifically, within the 1.1 mile section of trail located in Town of Acton, the proposed project will affect approximately 129.8 linear feet (lf) of intermittent stream bank habitat.

**MASSACHUSETTS DEPARTMENT OF TRANSPORTATION – HIGHWAY DIVISION
MAYNARD & ACTON ASSABET RIVER RAIL TRAIL
TOWN OF ACTON, MIDDLESEX COUNTY, MASSACHUSETTS**

WILDLIFE HABITAT EVALUATION

Appendix B, Part 1. Certification

Completion of the proposed project would result in no adverse effects on wildlife habitat. Affected bank habitat would be fully restored within two growing seasons of the completion of the project, resulting in no substantial reduction in the capacity to provide important wildlife habitat functions identified within the Bank Impact Areas. Specific avoidance and mitigation measures that will be implemented in order to reduce impacts and restore affected habitat include:

- Design of the project to avoid and minimize bank habitat disturbance to the maximum extent possible;
- Use of a conservation seed mix for post-construction bank/soil stabilization that will increase available wildlife cover and food sources;
- Allow for natural re-establishment of shrub species in impact areas; and,
- Placement of flat rocks, large woody debris, and brush piles on the bank to enhance wildlife cover/foraging opportunities.

Appendix B, Part 2, Section II. Site Description

Bank Impact Areas A-1, A-2, and A-3 occur on the eastern side of the existing abandoned railroad bed from approximate stations 152+70 to 155+20 (see attached photographic log). The Bank Impact Areas occur along a narrow ($\pm 5'$ wide at bank full) man-made low-energy intermittent stream located at the toe of slope along the existing abandoned railroad bed. This drainage channel was likely excavated and installed along the edge of the railroad bed for stormwater management purposes. The banks of the intermittent channel exhibit 5-10° slopes and terminate 6-12" above the existing water (ice) surface. Water depth could not be obtained at time of survey because of ice; however, the intermittent stream appeared to be normally $\pm 2'$ wide and $< 6''$ deep.

The existing bank habitat consists of a generally exposed soil/fill substrate and sparsely vegetated by live, fairly young, trees (ranging up to $\pm 12''$ diameter at breast height [DBH]) with a very open understory. For the purposes of evaluation, aerial extent of tree cover was estimated based on all trees that contributed to shading of the impact area (i.e., the intermittent stream bank). Accordingly, much of the percent cover is attributed to trees physically located outside of the impact area. Bank resource areas were also delineated as a bordering vegetated wetland.

Potential impacts to each Bank Impact Area could include vegetation removal, fill placement, re-contouring the existing grade, and/or channel re-alignment. Quantifiable impacts to each area include:

- A-1 – impacts to 34.2 lf of bank
- A-2 – impacts to 75.0 lf of bank; and,
- A-3 – impacts to 18.7 lf of bank.

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION – HIGHWAY DIVISION
MAYNARD & ACTON ASSABET RIVER RAIL TRAIL
TOWN OF ACTON, MIDDLESEX COUNTY, MASSACHUSETTS

WILDLIFE HABITAT EVALUATION

Appendix B, Part 2, Section III. Important Habitat Features

Important habitat features present within the Bank Impact Areas are limited in extent and value. Although limited, the habitat features include:

- upland/wetland food plants;
- large woody debris on the ground;
- live standing vegetation overhanging water;
- standing water;
- medium to large rocks within the stream; and,
- flat rocks on banks or within the streambed.

Important upland/wetland food plants present within the Bank Impact Areas include catkin-producing black birch (*Betula lenta*) and berry producers such as blackberry (*Rubus* spp.), highbush blueberry (*Vaccinium corymbosum*), and poison ivy (*Toxicodendron radicans*). This habitat feature is present in Impact Areas A-1, A-2, and A-3.

Large woody debris is present in Impact Area A-2. Generally, the woody debris consists of fallen tree limbs and logs, but also may include boards and/or old railroad ties. This habitat feature could serve as cover or foraging areas for species such as red efts (juvenile *Notophthalmus v. viridescens*), northern redback salamander (*Plethodon cinereus*), white-footed mouse (*Peromyscus leucopus*) and northern short-tailed shrew (*Blarina brevicauda*). The presence prey species could attract predators including red fox (*Vulpes vulpes*) and weasels (*Mustela ermine* and *M. frenata*).

Trees growing on the bank provide limited perches for birds over the intermittent stream. Most of the trees located on the railroad bed have the lowest perch a minimum of 8' above the ground because lower limbs have been removed by previous trail maintenance activities. Additionally, the shrub layer is sparse to nonexistent and affords few perches for species that hawk insects over water such as eastern phoebe (*Sayornis phoebe*), blue-gray gnatcatcher (*Polioptila caerulea*), and Canada warbler (*Wilsonia canadensis*).

Standing water may be intermittently present during the growing season and be utilized by a variety of mammals and birds for consumption, foraging, and/or bathing. Non-breeding amphibians such as green frog (*Rana clamitans melanota*) and gray treefrog (*Hyla versicolor*) may use the intermittent stream for foraging and rehydration. This habitat feature is present in Bank Impact Areas A-1, A-2, and A-3. An area of ice-free standing water was observed in Impact Area A-3 during the field evaluation.

Rounded and flat rocks are present in varying densities within the Impact Areas, both along the bank and within the intermittent stream. The rocks range from 4" to 12" in diameter and appear to be fully imbedded in dense substrate, thereby limiting gaps and hollows for use by aquatic or semi-aquatic salamanders or frogs. This habitat feature is present in Bank Impact Areas A-1 and A-3.

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION – HIGHWAY DIVISION
MAYNARD & ACTON ASSABET RIVER RAIL TRAIL
TOWN OF ACTON, MIDDLESEX COUNTY, MASSACHUSETTS

WILDLIFE HABITAT EVALUATION

Appendix B, Part 2, Section IV. Landscape Context

The existing railroad ROW is generally 65' wide and is comprised of semi-open to densely forested community. The ROW corridor may serve as a limited connector to larger adjacent forested habitat patches within the context of a semi-developed, primarily rural landscape. Specifically, the Impact Areas are embedded within the forested corridor between a small residential community and agricultural fields that connect the Fort Pond Brook Reservoir and a forested upland to the north with a larger undeveloped forested area to the south and west. The abandoned railroad bed, including bank habitat, could be used as a travel and dispersal corridor by common mammal species such as Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), gray squirrel (*Sciurus carolinensis*), and flying squirrels (*Glaucomys* spp.).

Appendix B, Part 2, Section V. Habitat Degradation

Habitat degradation along the ROW includes evidence of dumping and presence of invasive species. Dumping of residential yard waste and litter was observed along the ROW within and adjacent to bank habitat. Invasive species observed within the ROW and/or Bank Impact Areas include Japanese barberry (*Berberis thunbergii*), burning bush (*Euonymus alatus*), and Asian bittersweet (*Celastrus orbiculatus*).

PHOTOGRAPHIC LOG

Client Name: MassDOT – Highway Division		Site Location: Assabet River Rail Trail – Maynard and Acton Acton Wildlife Habitat Evaluation		Project No. MassDOT 604531
Photo No. 1	Date: 1/23/2015			
Direction Photo Taken: North				
Description: Bank Impact Area A-1. The proposed rail trail is located left of the channel.				

Photo No. 2	Date: 1/23/2015			
Direction Photo Taken: North				
Description: Bank Impact Area A-1. Typical profile of the intermittent stream and bank habitat.				

PHOTOGRAPHIC LOG

Client Name: MassDOT – Highway Division		Site Location: Assabet River Rail Trail – Maynard and Acton Acton Wildlife Habitat Evaluation		Project No. MassDOT 604531
Photo No. 3	Date: 1/23/2015			
Direction Photo Taken: North				
Description: Bank Impact Area A-2. Typical bank and intermittent stream habitat.				

Photo No. 4	Date: 1/23/2015			
Direction Photo Taken: North				
Description: Bank Impact Area A-2. Note the presence of large woody debris on the bank and within the intermittent stream.				

PHOTOGRAPHIC LOG

Client Name: MassDOT – Highway Division		Site Location: Assabet River Rail Trail – Maynard and Acton Acton Wildlife Habitat Evaluation		Project No. MassDOT 604531
Photo No. 5	Date: 1/23/2015			
Direction Photo Taken: North				
Description: Bank Impact Area A-3. Typical bank and intermittent stream habitat.				

Photo No. 6	Date: 1/23/2015			
Direction Photo Taken: East				
Description: Bank Impact Area A-3. Note open water, algae growth, and bank-side rock.				

ATTACHMENT G
Alternatives Analysis - Boardwalk

ATTACHMENT G
Alternatives Analysis - Boardwalk

**Alternatives Analysis – Boardwalk
Assabet River Rail Trail
Acton, Massachusetts**

As stated in the General Performance Standards for Bordering Vegetated Wetlands (BVW) at 310 CMR 10.55(4)(b), the issuing authority shall consider the extent to which adverse impacts can be avoided. The current proposed alignment of the Assabet River Rail Trail (ARRT) off the Right-of-Way (ROW) around 18-22 Main Street in Acton was deemed by the MassDOT Project Review Committee to be the only feasible route after numerous alternative options were considered.

Based on information and documents provided to Greenman-Pedersen, Inc. and Nover-Armstrong, including projected cost estimates (see Attachment 1), site plan depicting the routes (see Attachment 2), and related correspondence, this Alternatives Analysis examines the six (6) alternative routes considered in connecting the ARRT back to the ROW in Southern Acton. Options 1 through 5 were first presented to MassDOT Highway's Project Review Committee in June of 2008. Factors considered in the selection process appeared to be construction costs, constructability, impacts to protected resources, public safety, and availability of easements. Based on these factors, the Committee determined the current design (Option 5) was the only feasible option. An additional proposed route (Option 6) was considered by the Town of Acton. The Town ruled out Option 6 in January of 2008 due to the property owners' unwillingness to grant an easement over their properties.

All alternative routes are described below with the factors considered to determine feasibility.

Option 1

Option 1 is the only route that had the ARRT deviate west of the ROW. With this option, the ARRT would travel north through privately owned vacant land at 16 Main Street (as referenced by the Acton Assessor's Office as I2-20 and I2-32) before rejoining the ROW north of 30 Main Street (Property ID I2-21). This route was estimated to cost \$5,040,000, the most expensive option.

Although the information attached claims Option 1 to have minimal wetland impacts, there is a projected \$3,750,000 boardwalk listed in the provided cost estimate, indicating a wetland crossing. Nover-Armstrong's review of publically available GIS information revealed the route would travel through a large wooded deciduous swamp system (See Attachment 3), requiring the boardwalk construction through the wetland, resulting in significant impact to wetland resource areas including bordering vegetated wetland and forested Riverfront Area associated with Pratt's Brook to the south.

Option 1 will also cross existing paved parking that serves as vehicle storage for businesses at 18-22 Main Street. Placement of the trail through a commercial parking lot would create dangerous conditions for the users of the rail trail as well as the existing occupants of the commercial businesses. The installation of a fence with a gate system for access to the rear lot was included in the cost estimate to aid in reducing risks to biker and pedestrian safety. Based on the cost, impacts to wetland resource area and potential traffic, biker and pedestrian safety concerns, this option has been determined to be unfeasible.

Option 2

Option 2 depicts the ARRT deviating east of the ROW, continuing north behind a large stone wall along Main Street and then travelling west down Sylvia Street where it ultimately connects to the ROW at the street's terminus. Despite the competitive costs of constructing this route (\$1,590,000) and minimal impacts to wetland resources, it was determined to be unfeasible based on public safety concerns. The trail would cross two (2) side streets as well as three (3) commercial and four (4) residential driveways creating dangerous conditions for users of the ARRT. This route is especially dangerous for users of the trail as it requires travel alongside oncoming automobile traffic. According to information provided by Town of Acton officials 14,700 vehicles were counted on a single weekday in 2014. The volume of traffic in this section of Main Street in addition to the 40 mph speed limit and number of driveway and street crossings would contribute to public safety concerns for traffic and pedestrians alike. This option would also require the removal of a significant amount of trees, specifically fifty two (52) trees with a diameter greater than 15" and five (5) trees greater than 36". Town of Acton officials believed the substantial removal of vegetation would greatly alter the character of the area.

Option 3

This route deviates east of the ROW and travels north behind a large stone wall along Main Street briefly before diverting west along the northern end of the parking lot associated with 18-22 Main Street. The property consists of a large commercial building currently operating with a warehouse and office spaces and associated parking areas. With an estimated construction cost of \$880,000 this option has the lowest projected construction costs out of all of the alternative routes. Public safety would be a concern with the trail crossing the two (2) driveways associated with 18-22 Main Street and its close proximity to the northern parking areas. Wetland impacts resulting from Option 3 include the construction of a \$153,000 boardwalk over BVW with permanent impacts to the resource area. This route would also require an easement from the property owner of 18-22 Main Street. When approached, the current property owner was unwilling to grant an easement because construction of the trail would require the elimination of parking and snow storage areas. Without the easement Option 3 is not feasible.

Option 4

Option 4 follows the same route along Main Street as Option 3, but deviates west along the southern property line of 30 Main Street, a current Saab automotive dealership. This route would result in permanent impacts to wetlands, requiring the construction of a \$629,000 boardwalk and wetland replication estimated at \$70,000. Public safety would be concern with the trail crossing two (2) driveways associated with the adjacent commercial property at 18-22 Main Street. This route would also require an easement granted by the property owner of 30 Main Street. Although the total costs were feasible (\$2,067,000), the property owner was

unwilling to grant an easement due to the trail's close proximity to his building. Without the easement Option 4 is not feasible construct.

Option 5- Preferred Route

The preferred route travels behind a large stone wall along Main Street and deviates west through the commercial property located at 18-22 Main Street. This route has a reasonable estimated total cost of \$1,930,000. In conversations with the property owner, the necessary easement was found to be an agreeable route as the alignment of the trail will not result in a loss of available parking or snow storage for the commercial businesses. The ARRT will be traveling over BVW, requiring the construction of an elevated boardwalk resulting in 5,426 square feet of permanent impacts to wetlands, requiring 1:1 mitigation. Public safety concerns reported include the trail crossing over two (2) commercial driveways associated with 18-22 Main Street. However, the trail will be constructed apart from the adjacent parking lots, minimizing possible safety concerns of pedestrian travel along the easement. After considering the construction costs, constructability, resource area impacts, available easements, and public safety conditions, Option 5 has been determined to be the only feasible route.

Option 6

Another route was considered that continued north along Main Street and deviated west along Albertine Drive. Nover-Armstrong evaluated the publicly available GIS information and observed there would likely be impacts to forested wetlands and the buffer zone with the construction of this route. It was concluded that Option 6 would create unsafe conditions for pedestrians and drivers alike with three (3) commercial and two (2) residential driveway crossings. This option would also require easements from 3 property owners located at 38 Main Street (I2-15), 2 Albertine Drive (I2-15-1) and the Saab dealership at 30 Main Street. A letter from the Town of Acton was sent to the owners presenting Option 6 and inquiring whether they would consider granting an easement. Two (2) residential property owners were not willing to grant easements on their properties (See Attachment 4) due to concerns about the loss of privacy and potential compromise to the safety of their properties with the additional foot and bike traffic. Without the easements Option 6 is not feasible.

ATTACHMENT 1

Assabet River Rail Trail

DRAFT

Town:	Maynard	Length in feet =	3770
Section:	Acton to Sylvia Street - Option 1		
Date:	March 20, 2008		

ITEMS

Clear & Grub	\$13,275
12-foot MHA Path	\$104,569
Crushed Stone shoulders	\$10,087
Fence	\$3,000
Gate System	\$10,000
Boardwalk	\$3,750,000
Parking Areas	\$4,821
Striping	\$6,875
	<hr/>
sub total =	\$3,902,626

Contingency Includes

- Erosion Control	Mobilization @ 3%	\$117,079
- Utilities	15% contingency =	\$585,394
- Etc	sub total =	\$4,605,099
	Inflation =	1.09 3% for 3 years
	Highway Total =	\$5,032,116

Say \$5,040,000

NOTE: Does not include; Engineering, Land Acquisitions or Material Escalation Costs

MAJOR ISSUES:

1. Minimal wetlands impacts
2. No impacts to floodplain
3. Supported by the Acton Conservation Commission

Assabet River Rail Trail

DRAFT

Town:	Acton	Length in feet =	3600
Section:	Acton Street to Sylvia Street - Option 2		
Date:	March 20, 2008		

ITEMS

Clear & Grub	\$18,595
Tree Removal	\$70,000
Earthwork	\$50,763
12-foot MHA Path	\$140,992
Crushed Stone shoulders	\$13,600
Fence/Railings	\$54,500
Retaining Walls	\$314,167
Granite Curb	\$38,000
Drainage	\$50,000
WCR & Driveway interface	\$33,000
Highway Guard	\$37,500
R&R Stone Walls	\$60,000
Landscaping	\$25,000
Wetland Replication	\$70,000
R&R Force Main	\$37,500
Traffic Management	\$27,195
Police Details	\$76,800
Parking Areas	\$4,821
Striping	\$8,460
	sub total = \$1,130,893

Contingency Includes

	Mobilization @ 3%	\$33,927
- Erosion Control	25% contingency =	\$282,723
- Utilities	sub total =	\$1,447,543
- Etc	Inflation =	1.09 3% for 3 years
	Highway Total =	\$1,581,769

Say	\$1,590,000
------------	--------------------

NOTE: Does not include; Engineering, Land Acquisitions or Material Escalation Costs

MAJOR ISSUES:

1. 3350 SF of wetlands impacts
2. Approximately 2000 CY of floodplain impact
3. 725 LF of retaining walls to limit impacts to detention basins & BVW
4. 52 Trees greater than 15" to be removed
5. 5 Trees greater than 36" to be removed
6. Need further easements from Wedgewood Realty and other properties
7. Path crosses 3 side streets, 3 commercial & 5 residential driveways
8. No road work on Route 27, no increase in paved shoulder
9. No crosswalks proposed along Route 27

Assabet River Rail Trail

DRAFT

Town:	Acton	Length in feet =	3766
Section:	Acton Street to Sylvia Street - Option 3 rev - All Segments		
Date:	April 22, 2008		

ITEMS

Clear & Grub	\$19,452
Tree Removal	\$20,000
12-foot MHA Path	\$147,493
Crushed Stone shoulders	\$14,227
Fence/Railings	\$7,200
Retaining Walls	\$156,000
Boardwalk	\$153,000
WCR & Driveway interface	\$10,000
R&R Stone Walls	\$50,000
Landscaping	\$20,000
Traffic Management	\$5,666
Police Details	\$16,000
Parking Areas	\$4,809
Striping	\$8,744
	<hr/>
sub total =	\$632,592

<u>Contingency Includes</u>	Mobilization (sum of segments) =	\$18,978
- Erosion Control	Contingency (sum of segments) =	\$147,651
- Utilities	sub total =	\$799,221
- Etc	Inflation =	1.09 3% for 3 years
	Highway Total =	\$873,331

Say \$880,000

NOTE: Does not include; Engineering, Land Acquisitions or Material Escalation Costs

Assabet River Rail Trail

DRAFT

Town:	Acton	Length in feet =	3703
Section:	Acton Street to Sylvia Street - Option 4 - All Segments		
Date:	March 20, 2008		

ITEMS

Clear & Grub	\$19,127
Tree Removal	\$25,000
Earthwork	\$50,763
12-foot MHA Path	\$145,026
Crushed Stone shoulders	\$13,989
Fence/Railings	\$55,900
Retaining Walls	\$301,167
WCR & Driveway interface	\$10,000
Highway Guard	\$37,500
R&R Stone Walls	\$60,000
Landscaping	\$25,000
Wetland Replication	\$70,000
R&R Force Main	\$37,500
Traffic Management	\$11,331
Police Details	\$32,000
Boardwalk	\$629,000
Parking Areas	\$4,809
Striping	\$8,267
	sub total = \$1,536,380

<u>Contingency Includes</u>	Mobilization (sum of segments) =	\$46,091
- Erosion Control	Contingency (sum of segments) =	\$308,809
- Utilities	sub total =	\$1,891,280
- Etc	Inflation =	1.09 3% for 3 years

Highway Total = \$2,066,653

Say \$2,067,000

NOTE: Does not include; Engineering, Land Acquisitions or Material Escalation Costs

Assabet River Rail Trail

DRAFT

Town:	Acton	Length in feet =	3805
Section:	Acton Street to Sylvia Street - Option 5 - All Segments		
Date:	April 22, 2008		

ITEMS

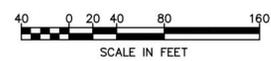
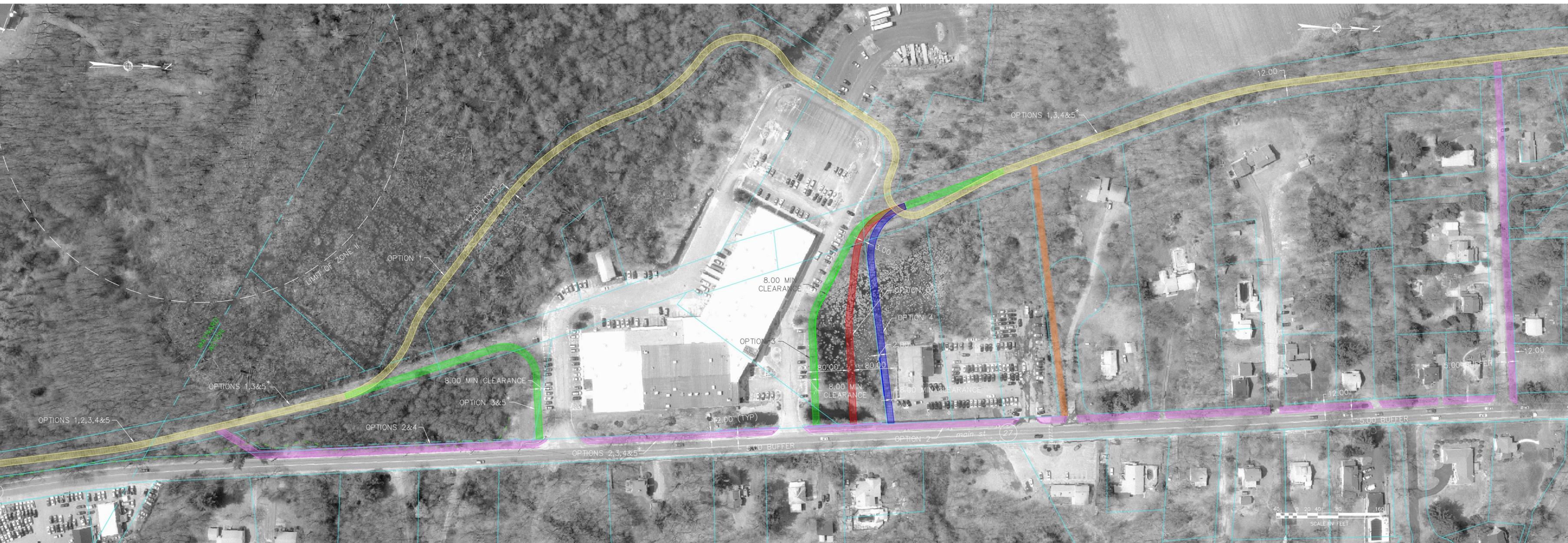
Clear & Grub	\$19,654
Tree Removal	\$20,000
12-foot MHA Path	\$149,021
Crushed Stone shoulders	\$14,374
Fence/Railings	\$4,000
Retaining Walls	\$86,667
Boardwalk	\$969,000
WCR & Driveway interface	\$10,000
R&R Stone Walls	\$60,000
Landscaping	\$20,000
Traffic Management	\$5,666
Police Details	\$16,000
Parking Areas	\$4,809
Striping	\$8,272
	<hr/>
	sub total = \$1,387,463

<u>Contingency Includes</u>	Mobilization (sum of segments) =	\$41,624
- Erosion Control	Contingency (sum of segments) =	\$336,369
- Utilities	sub total =	\$1,765,455
- Etc	Inflation =	1.09 3% for 3 years
	Highway Total =	\$1,929,161

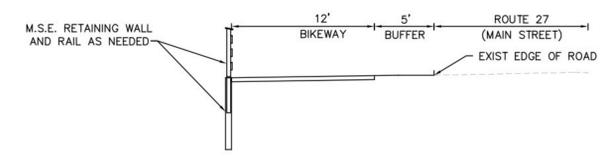
Say \$1,930,000

NOTE: Does not include; Engineering, Land Acquisitions or Material Escalation Costs

ATTACHMENT 2



- LEGEND**
- 12' WIDE HMA BIKEWAY (OPTION 1) █
 - 12' WIDE HMA BIKEWAY (OPTION 2) █
 - 12' WIDE HMA BIKEWAY (OPTION 3) █
 - 12' WIDE HMA BIKEWAY (OPTION 4) █
 - 12' WIDE HMA BIKEWAY (OPTION 5) █ ---PREFERRED OPTION
 - 12' WIDE HMA BIKEWAY (OPTION 6) █
 - EASEMENT ---
 - PROP EASEMENT ---
 - WETLAND LIMIT +



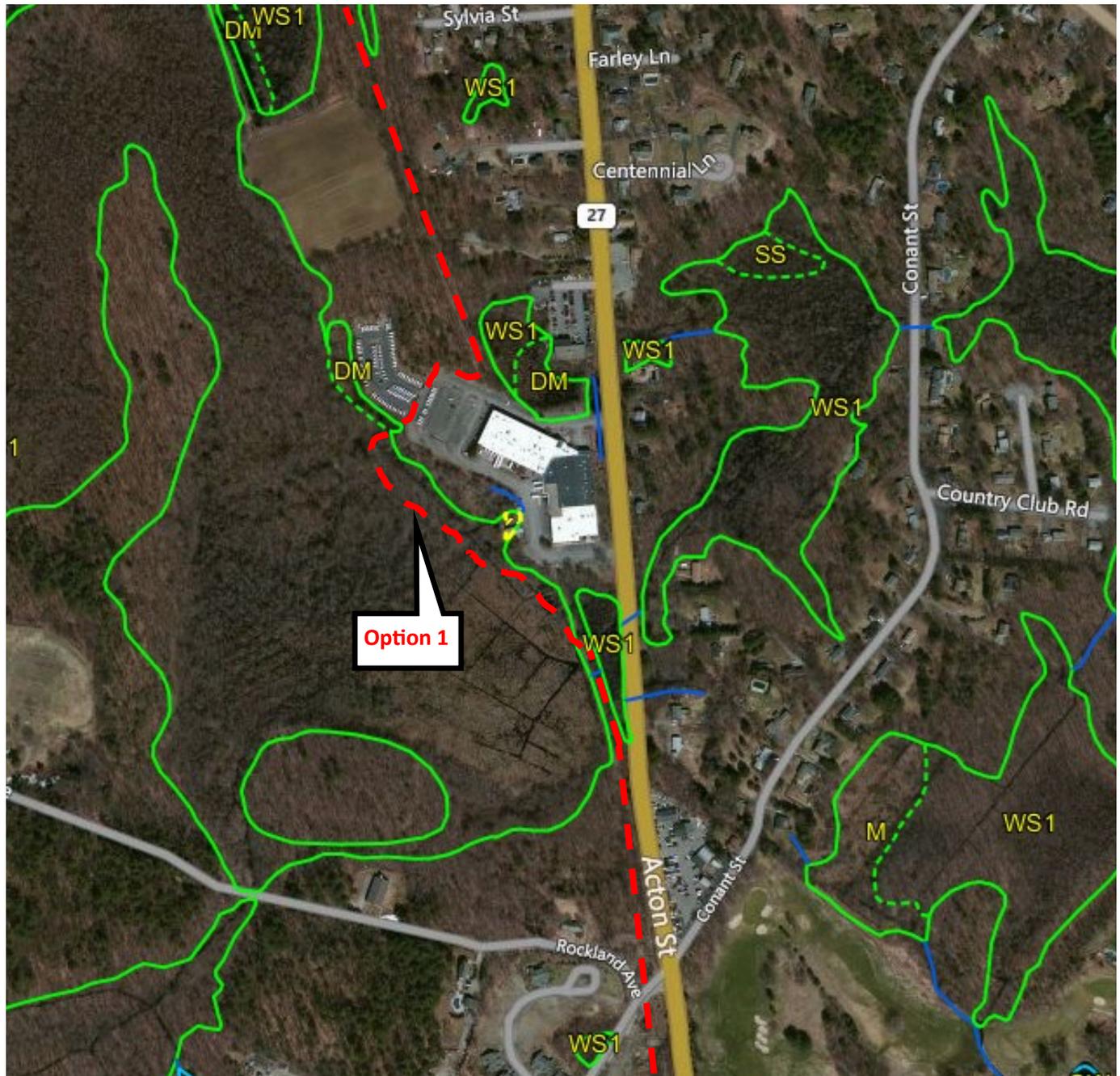
MAIN STREET ALTERNATIVE
TYPICAL SECTION - scale: 1"=4'

ASSABET RIVER RAIL TRAIL
MAYNARD & ACTON
MASSHIGHWAY 10% MEETING
MAY 15, 2008
ACTON STREET TO SYLIVA STREET
OPTIONS 1-5

*NOTE: OPTION 5 IS THE PREFERRED OPTION



ATTACHMENT 3



Wetland and Wetland Change Areas

Option # 1– Approximate Location

Assabet River Rail Trail

Acton, MA

Project File P3307

Source: "Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division"

LEGEND

- - - Option 1
- Shoreline
- Hydrologic Connection
- - - Mean Low Water Line
- Apparent Wetland Limit
- - - Closure Line
- Edge of Interpreted Area
- Wetland Change Areas (2001 & 2003)
- Wetland Change Areas (2005)
- Wetland Change Areas (2008 & 2009)
- - - - Town Boundary

ATTACHMENT 4



Planning Department

TOWN OF ACTON
472 Main Street
Acton, Massachusetts 01720
Telephone (978) 264-9636
Fax (978) 264-9630
planning@acton-ma.gov
www.acton-ma.gov

January 7, 2008

Ms. Michele McDonald
38 Main Street
Acton, MA 01720

Ms. Cathelene Connor
Mr. Michael Healy
2 Albertine Drive
Acton, MA 01720

Mr. Ronald Santilli
A and D Nominee Trust, Village Saab
30 Main Street
Acton, MA 01720

Re: Assabet River Rail Trail (ARRT) – Alternative Route Exploration

Ladies and Gentlemen:

The ARRT in Acton is currently in the beginning stages of design. The route follows the former MBTA right-of-way south from Maple and Main Streets in South Acton and then crosses on an easement over the 20 Main Street property to the Maynard town line. The Town of Acton now owns both, the right-of-way and the easement.

On the 20 Main Street property, the easement route would require an extensive elevated structure (boardwalk) across wetlands. MassHighway oversees the design and construction of the ARRT. It is concerned about the anticipated cost of the boardwalk. After a site visit MassHighway officials asked me to explore an alternative, potentially cost saving route that would require a rail trail easement from you.

The suggested easement would connect the former railroad right-of-way and Main Street more or less along the property line between 30 Main Street and 2 Albertine Circle and along the southern edge of the subdivision layout of Albertine Drive, which is private way.¹ There

¹ From there the rail trail could run along Main Street to the southerly entrance of the building at 20 Main Street, more or less, and there reconnect with the former railroad bed.

appears to be room for such an easement with much less wetlands construction involved. Enclosed is a photo of the area, marked up to show the possible connection schematically.

I am now writing you to explore that possibility with you and find out if you are receptive to hosting an easement for the ARRT on your properties. Please, contact me in this regard to hopefully meet with me and discuss it further. Since time is critical, I hope you will not mind me calling you if I do not receive a reply from within about 2 weeks.

Sincerely,

A handwritten signature in blue ink that reads "Roland Bartl". The signature is fluid and cursive, with a long horizontal line extending to the right.

Roland Bartl, AICP
Planning Director
Town of Acton

cc: John Murray, Temporary Town Manager
Arthur Frost, MassHighway - District 3
Nicolas Rubino, EarthTech

I:\planning\projects\vail trails\art\design project\alternative route exploration 1.doc

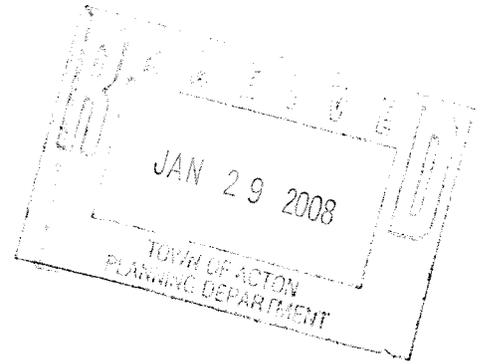
Location result for 30 Main St, Acton, MA 01720-3506

||
||



January 14, 2008

Mr. Roland Bartl, AICP
Planning Director
Town of Acton



Dear Mr. Bartl,

We are writing in response to your letter dated January 7, 2008, regarding your request that we host an easement on our respective properties for the Assabet River Rail Trail. We are both unwilling to host the easement for several reasons. The two most prominent are noted below.

First is the issue of privacy, which would be significantly compromised for both of our families. As for Ms. Denson (McDonald), of 38 Main Street, the proposed easement would include removing the trees and shrubbery that comprise the entirety of the barrier between her property and the Saab dealership immediately next door. As for Dr. Healy & Ms. Connor, of 2 Albertine Drive, the proposed easement would absolutely detract from the very privacy that defines the property, set far back from Main Street.

Secondly, of equal if not greater importance, we have strong concerns about the potential compromise to the safety of our properties, particularly relevant as we have young children (Ms. Denson) and have a baby on the way (Dr. Healy & Ms. Connor). The safety of our properties is of utmost importance to us; and, quite plainly, we would not feel safe on our properties with the amount of foot and bicycle traffic the proposed easement would bring.

We wish you good luck in your planning of the trail.

Regards,

Ms. Michele Denson (McDonald), of 38 Main St.

Michele McDonald Denson

Dr. Michael Healy and Ms. Cathelene Connor, of 2 Albertine Dr.

Dr. Michael C. Healy + Cathelene Connor

ATTACHMENT H
Project Plans – *Bound Separately*

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION

MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	214
PROJECT FILE NO.		604531	

TITLE SHEET & INDEX

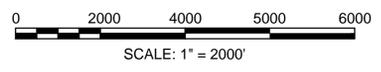
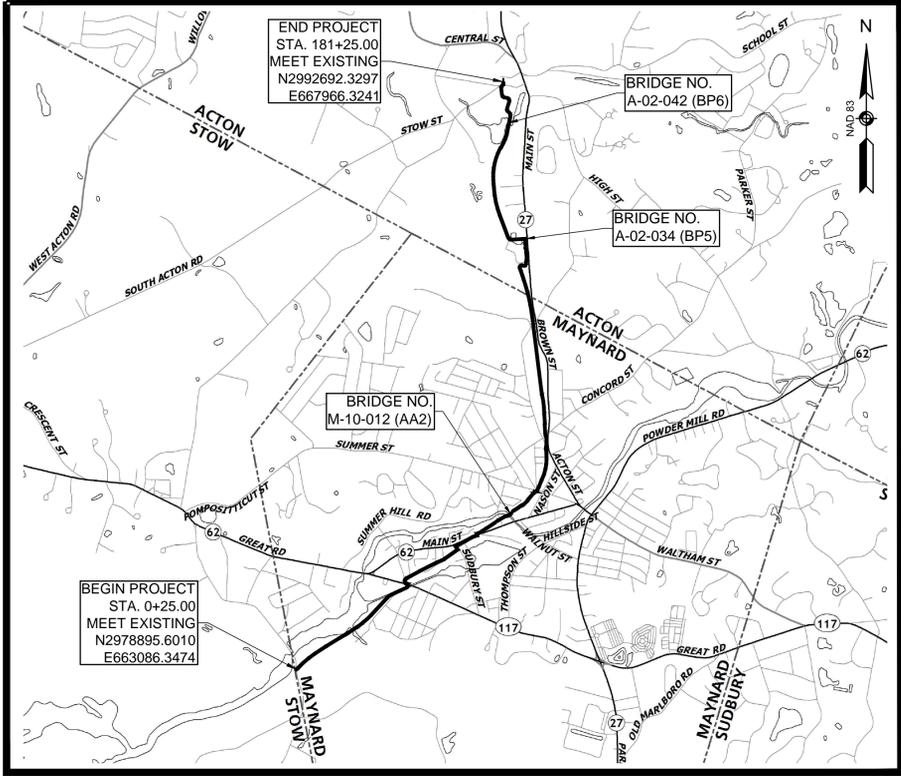
PLAN AND PROFILE OF
ASSABET RIVER RAIL TRAIL
(BRIDGE NOS. M-10-012, A-02-034 & A-02-042)

IN THE TOWNS OF
MAYNARD & ACTON
MIDDLESEX COUNTY

THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 1988, AS AMENDED, THE SUPPLEMENTAL SPECIFICATIONS DATED JUNE 15, 2012, THE 2014 CONSTRUCTION STANDARD DETAILS, THE 1996 CONSTRUCTION AND TRAFFIC STANDARD DETAILS, (AS RELATED TO TRAFFIC STANDARD DETAILS ONLY), THE LATEST MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS WITH MASSACHUSETTS AMENDMENTS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK, WILL GOVERN.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
2	LEGEND & ABBREVIATIONS
3	KEY PLAN & BORING LOCATIONS
4-7	BORING LOGS
8-13	TYPICAL SECTIONS
14-30	CONSTRUCTION BASELINE TIES
53 31-66 64	CONSTRUCTION PLANS & PROFILES
67-76	CURB-TIE & GRADING PLANS
77-97	TRAFFIC SIGN & PAVEMENT MARKINGS
98-99	TRAFFIC SIGN SUMMARY SHEET
100-102	TEMPORARY TRAFFIC CONTROL PLANS
103-119	LANDSCAPING PLANS AND DETAILS
122 120-123	WETLAND REPLICATION PLANS
124-129	CONSTRUCTION DETAILS
130-131	WHEELCHAIR RAMP/DRIVEWAY DETAILS
133-133	RETAINING WALL DETAILS
134-146	BRIDGE PLANS (SKETCH PLANS)
147-214	CROSS SECTIONS (ONLY CROSS SECTIONS WITHIN ENVIRONMENTALLY IMPACTED AREAS HAVE BEEN PROVIDED)



LENGTH OF PROJECT = 18,075 FEET = 3.423 MILES

NOTICE OF INTENT
APRIL 15, 2015

TRAIL DESIGN DESIGNATION

DESIGN SPEED	18 MPH (12 MPH IN CONSTRAINED AREAS)
MINIMUM HORIZONTAL CURVE RADIUS	60' (27' IN CONSTRAINED AREAS)
MINIMUM LENGTH OF CREST VERTICAL CURVE	100'
MAXIMUM GRADE FOR LEVEL TERRAIN	4.5%

GPI Greenman-Pedersen, Inc.
Engineering and Construction Services
181 Ballardvale Street, Suite 202, Wilmington, MA 01887
Tel: (978) 570-2999 Fax: (978) 658-3044
http://www.gpinet.com
Other Offices In: FL, MD, MI, NH, NJ, NY, OH, PA, VA, VT, WA

DATE	DESCRIPTION	REV #



RECOMMENDED FOR APPROVAL

CHIEF ENGINEER _____ DATE _____

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
APPROVED:

APPROVED

DIVISION ADMINISTRATOR _____ DATE _____

HIGHWAY ADMINISTRATOR _____ DATE _____

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	214
PROJECT FILE NO.		604531	

LEGEND & ABBREVIATIONS

GENERAL NOTES

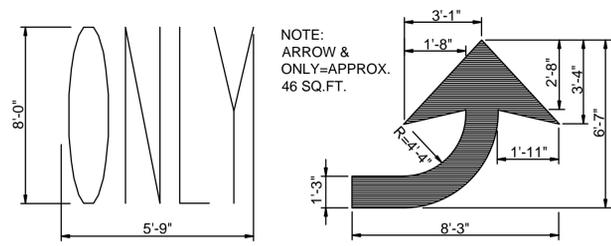
- TOPOGRAPHICAL INFORMATION WAS PROVIDED IN NGVD 1929 VERTICAL DATUM AND MA MAINLAND NAD 83 HORIZONTAL DATUM. EXISTING CONDITIONS AND TOPOGRAPHICAL SURVEY PROVIDED BY THOMAS LAND SURVEYORS & ENGINEERING CONSULTANTS, INC., MARCH 23, 2006 AND UPDATED BY SUPPLEMENTAL SURVEY IN 2013 & 2014.
- THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE EXACTLY AND TO PRESERVE ANY AND ALL UNDERGROUND UTILITIES. CALL "DIG-SAFE" 1-888-DIGSAFE (344-7233) AT LEAST 72 HOURS BEFORE COMMENCING CONSTRUCTION.
- WHERE AN EXISTING UNDERGROUND UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
- AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
- THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS, OR, WHERE APPLICABLE, RE-USING EXISTING MATERIALS IDENTIFIED AS "REMOVE & RESET" (R&R).
- ALL EXISTING SIGNS WITHIN THE PROJECT LIMITS SHALL BE RETAINED UNLESS NOTED OTHERWISE.
- ALL PROPOSED PAVEMENT MARKINGS SHALL BE THERMOPLASTIC.
- ALL EXISTING STATE, COUNTY, CITY AND TOWN LOCATION LINES AND PRIVATE PROPERTY LINES HAVE BEEN ESTABLISHED FROM AVAILABLE INFORMATION AND THEIR EXACT LOCATIONS ARE NOT GUARANTEED.
- ALL TRANSVERSE JOINTS, AND ALL LONGITUDINAL JOINTS BETWEEN NEW SURFACE PAVEMENT AND EXISTING SURFACE PAVEMENT TO REMAIN SHALL BE COATED WITH A HOT POURED RUBBERIZED ASPHALT SEALANT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION NUMBER SS-S-1401.
- ALL DISTURBED AREAS NOT DESIGNATED TO BE PAVED SHALL HAVE LOAM BORROW PLACED AND SEEDDED. THE LOAM BORROW SHALL HAVE A MINIMUM DEPTH OF 4 INCHES AND SHALL BE PLACED FLUSH WITH THE TOP OF THE ADJACENT CURB, EDGING, BERM OR PAVEMENT SURFACE.
- THE LIMIT OF WORK AREA SHALL BE THE STREET RIGHT OF WAY UNLESS SHOWN OTHERWISE.
- ALL PROPERTY LINES BETWEEN ABUTTERS ARE APPROXIMATE ONLY.
- PRIOR TO THE START OF ANY NEW UTILITY WORK, ALL ELEVATIONS OF EXISTING UTILITIES IN THOSE AREAS ARE TO BE VERIFIED. THE ENGINEER IS TO BE NOTIFIED IMMEDIATELY SHOULD ANY DISCREPANCIES OCCUR.
- ALL CASTINGS SHALL BE SET FLUSH WITH FINISHED GRADE.
- ALL PUBLICLY OWNED GATE BOXES, SERVICE BOXES, MANHOLE FRAMES AND COVERS SHALL BE ADJUSTED TO GRADE BY THE CONTRACTOR.
- ALL NEW SIDEWALKS AND DRIVEWAY GRADES SHALL MATCH EXISTING GRADES AT BACK OF SIDEWALK LINE UNLESS SHOWN OTHERWISE ON THE PLANS AND CROSS-SECTIONS.
- THE CONTRACTOR SHALL TAKE EVERY PRECAUTION TO PROTECT ALL EXISTING TREES AND ROOTS THAT ARE NOT DESIGNATED FOR REMOVAL.
- CONTRACTOR TO CONTACT ENGINEER PRIOR TO INSTALLATION OF BOUNDS FOR FINAL LOCATIONS.
- DRAINAGE ELEVATIONS ARE PROVIDED FOR DESIGN PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY BY TEST PIT, THE LOCATIONS OF EXISTING UTILITIES WHICH MAY CONFLICT WITH THE PROPOSED DRAINAGE DESIGN. ANY FIELD ADJUSTMENTS REQUIRED WILL BE MADE AS APPROVED OR DIRECTED BY THE ENGINEER. ONLY AFTER THE CONTRACTOR VERIFIES ELEVATIONS FOR THE CONSTRUCTABILITY OF THE DRAINAGE SYSTEM SHALL ANY STRUCTURES BE ORDERED. ANY FIELD ADJUSTMENTS TO LINE & GRADE UP TO A DEPTH OF 5' SHALL BE INCLUDED IN THE COST OF THE PIPE. PIPE EXCAVATION GREATER THAN 5' WILL BE PAID UNDER CLASS B TRENCH EXCAVATION.

GENERAL SYMBOLS

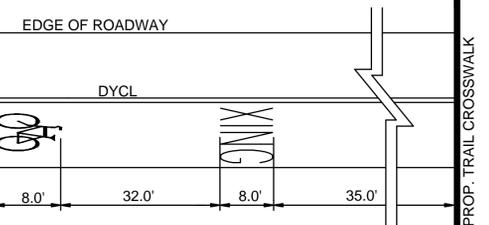
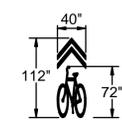
EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER ON BRIDGE OR JERSEY BARRIER
CB	CB	CATCH BASIN
FP	FP	CATCH BASIN CURB INLET
GP	GP	FLAG POLE
MB	MB	GAS PUMP
WELL	WELL	MAIL BOX
EHH	EHH	POST SQUARE
GG	GG	POST CIRCULAR
BHL #	BHL #	WELL
MW #	MW #	ELECTRIC HANDHOLE
TP #	TP #	FENCE GATE POST
CO.BD.		GAS GATE
		BORING HOLE
		MONITORING WELL
		TEST PIT
		HYDRANT
		LIGHT POLE
		COUNTY BOUND
		GPS POINT
		CABLE MANHOLE
		DRAINAGE MANHOLE
		ELECTRIC MANHOLE
		GAS MANHOLE
		MISC MANHOLE
		SEWER MANHOLE
		TELEPHONE MANHOLE
		WATER MANHOLE
		MASSACHUSETTS HIGHWAY BOUND
		MONUMENT
		STONE BOUND
		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W/ 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100	99	CONTOURS
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCE STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		HAY BALES/SILT FENCE
		TREE LINE OR LIMIT OF CLEARING AND GRUBBING
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
ONLY	ONLY	PAVEMENT ARROW - WHITE
		LEGEND "ONLY" - WHITE
	SL	STOP LINE
	CW	CROSSWALK
	SWL	SOLID WHITE LINE
	SYL	SOLID YELLOW LINE
	BWL	BROKEN WHITE LINE
	BYL	BROKEN YELLOW LINE
	DWL	DOTTED WHITE LINE
	DYL	DOTTED YELLOW LINE
	DWLEx	DOTTED WHITE LINE EXTENSION
	DYLEx	DOTTED YELLOW LINE EXTENSION
	DBWL	DOUBLE WHITE LINE
	DBYL	DOUBLE YELLOW LINE

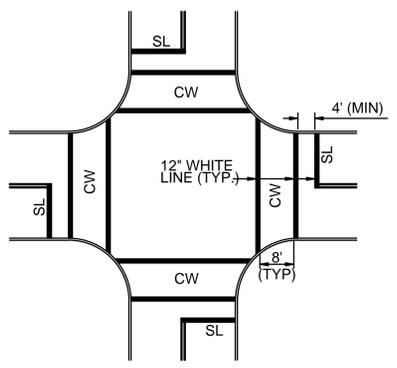


SHARED LANE "SHARROW" MARKING DETAIL
NOT TO SCALE



ADVANCE ROADWAY MARKINGS
NOT TO SCALE

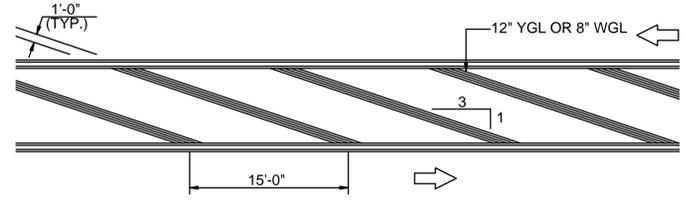
AT TRAIL XING
NOT TO SCALE



TYPICAL CROSSWALK MARKINGS
NOT TO SCALE



ARROW & ONLY DETAIL
NOT TO SCALE



GORE AREA DETAIL
NOT TO SCALE

GENERAL ABBREVIATIONS

AADT	ANNUAL AVERAGE DAILY TRAFFIC	EXIST (or EX)	EXISTING	PVC	POINT OF VERTICAL CURVATURE
ABAN	ABANDON	EXC	EXCAVATION	PVI	POINT OF VERTICAL INTERSECTION
ADJ	ADJUST	F&C	FRAME AND COVER	PVT	POINT OF VERTICAL TANGENCY
APPROX.	APPROXIMATE	F&G	FRAME AND GRATE	PVMT	PAVEMENT
A.C.	ASPHALT CONCRETE	FDN.	FOUNDATION	PWV	PAVED WATER WAY
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE	FLDSTN	FIELDSTONE	R	RADIUS OF CURVATURE
BIT.	BITUMINOUS	GAR	GARAGE	R&D	REMOVE AND DISPOSE
BC	BOTTOM OF CURB	GD	GROUND	RCP	REINFORCED CONCRETE PIPE
BD.	BOUND	GG	GAS GATE	RD	ROAD
BL	BASELINE	GI	GUTTER INLET	RDWY	ROADWAY
BLDG	BUILDING	GIP	GALVANIZED IRON PIPE	REM	REMOVE
BLSF	BORDERING LAND SUBJECT TO FLOODING	GRAN	GRANITE	RET	RETAIN
BM	BENCHMARK	GRAV	GRAVEL	RET WALL	RETAINING WALL
BO	BY OTHERS	GRD	GUARD	ROW	RIGHT OF WAY
BOS	BOTTOM OF SLOPE	HDW	HEADWALL	RR	RAILROAD
BR.	BRIDGE	HMA	HOT MIX ASPHALT	R&R	REMOVE AND RESET
BVW	BORDERING VEGETATED WETLAND	HOR	HORIZONTAL	R&S	REMOVE AND STACK
CB	CATCH BASIN	HYD	HYDRANT	RT	RIGHT
CBCI	CATCH BASIN WITH CURB INLET	INV	INVERT	SB	STONE BOUND
CC	CEMENT CONCRETE	JCT	JUNCTION	SHLD	SHOULDER
CCM	CEMENT CONCRETE MASONRY	L	LENGTH OF CURVE	SMH	SEWER MANHOLE
CEM	CEMENT	LB	LEACH BASIN	ST	STREET
CI	CURB INLET	LP	LIGHT POLE	STA	STATION
CIP	CAST IRON PIPE	LT	LEFT	SSD	STOPPING SIGHT DISTANCE
CLF	CHAIN LINK FENCE	MAX	MAXIMUM	SHLO	STATE HIGHWAY LAYOUT LINE
CL	CENTERLINE	MB	MAILBOX	SW	SIDEWALK
CMP	CORRUGATED METAL PIPE	MH	MANHOLE	T	TANGENT DISTANCE OF CURVE/TRUCK %
CSP	CORRUGATED STEEL PIPE	MHB	MASSACHUSETTS HIGHWAY BOUND	TAN	TANGENT
CO.	COUNTY	MIN	MINIMUM	TEMP	TEMPORARY
CONC	CONCRETE	NIC	NOT IN CONTRACT	TC	TOP OF CURB
CONT	CONTINUOUS	NO.	NUMBER	TOS	TOP OF SLOPE
CONST	CONSTRUCTION	PC	POINT OF CURVATURE	TYP	TYPICAL
CR GR	CROWN GRADE	PCC	POINT OF COMPOUND CURVATURE	UP	UTILITY POLE
DHV	DESIGN HOURLY VOLUME	P.G.L.	PROFILE GRADE LINE	UPL	UTILITY POLE WITH LIGHT
DI	DROP INLET	PI	POINT OF INTERSECTION	VAR	VARIABLE/VARIABLE
DIA	DIAMETER	POC	POINT ON CURVE	VERT	VERTICAL
DIP	DUCTILE IRON PIPE	POT	POINT ON TANGENT	VC	VERTICAL CURVE
DW	STEADY DON'T WALK - PORTLAND ORANGE	PRC	POINT OF REVERSE CURVATURE	VGC	VERTICAL GRANITE CURB
DWY	DRIVEWAY	PROJ	PROJECT	WCR	WHEEL CHAIR RAMP
ELEV (or EL.)	ELEVATION	PROP	PROPOSED	WG	WATER GATE
EMB	EMBANKMENT	PSB	PLANTABLE SOIL BORROW	WM	WATER METER/WATER MAIN
EOP	EDGE OF PAVEMENT	PT	POINT OF TANGENCY	X-SECT	CROSS SECTION

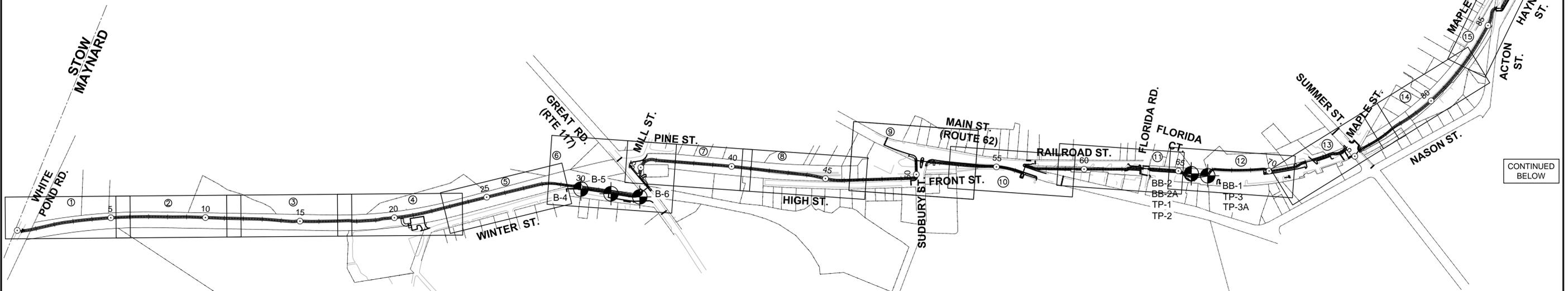
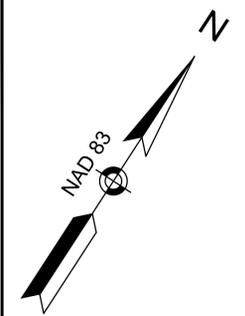
MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	214
PROJECT FILE NO.		604531	

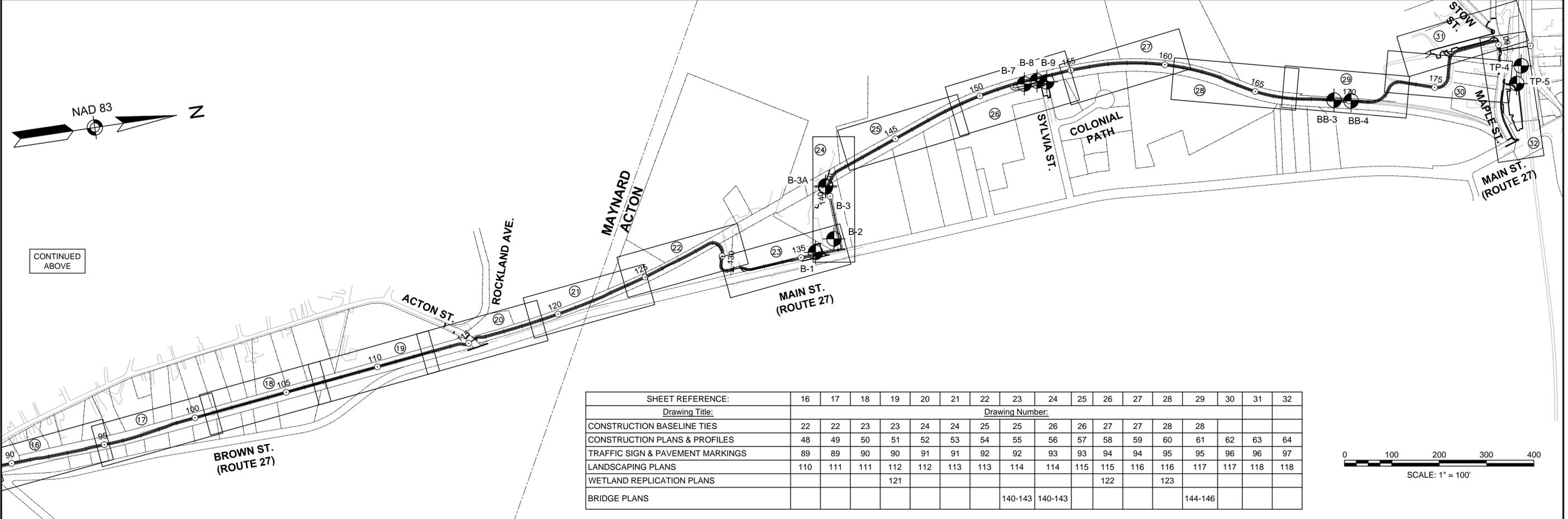
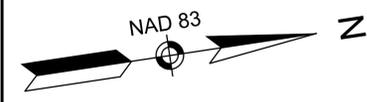
KEY PLAN & BORING LOCATIONS

SHEET REFERENCE:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Drawing Title:	Drawing Number:														
CONSTRUCTION BASELINE TIES	14	14	15	15	16	16	18	18	17	19	20	20	21	21	
CONSTRUCTION PLANS & PROFILES	31	32	33	34	35	36-37	38	39	40-41	42	43	44	45	46	47
TRAFFIC SIGN & PAVEMENT MARKINGS	77	77	78	78	79	80	81	81	82	83	84	85	86	87	88
LANDSCAPING PLANS	103	103	104	104	105	105	106	106	107	107	108	108	109	109	110
WETLAND REPLICATION PLANS			120												
BRIDGE PLANS												134-139			

● - BORING/TEST PIT LOCATION
 B/BB-# = BORING NUMBER
 (SEE BRIDGE PLANS FOR BRIDGE BORING LOGS)
 TP-# = TEST PIT NUMBER

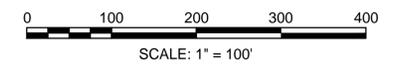


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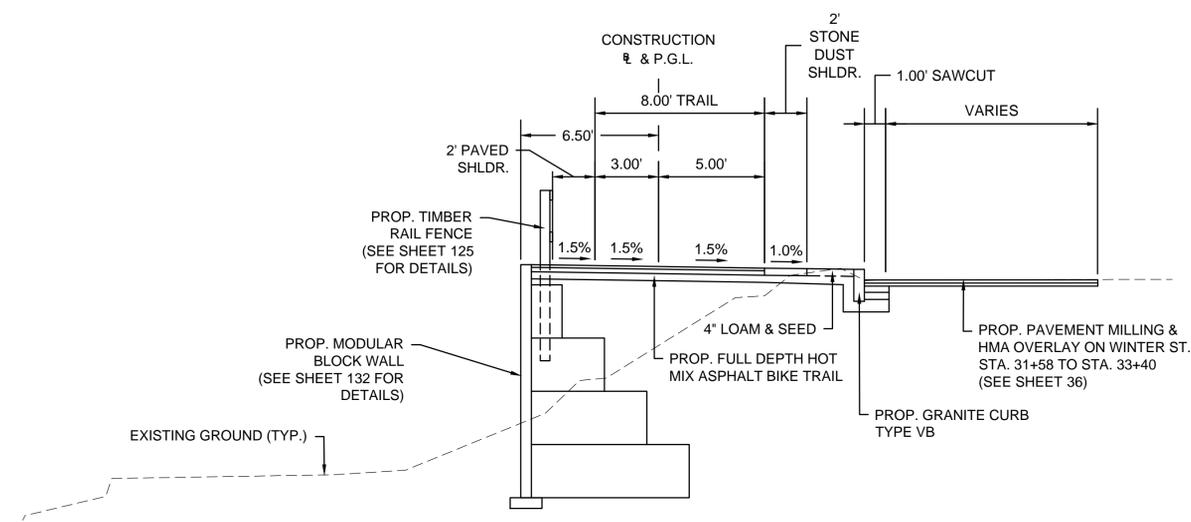
CONTINUED ABOVE

SHEET REFERENCE:	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Drawing Title:	Drawing Number:																
CONSTRUCTION BASELINE TIES	22	22	23	23	24	24	25	25	26	26	27	27	28	28			
CONSTRUCTION PLANS & PROFILES	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
TRAFFIC SIGN & PAVEMENT MARKINGS	89	89	90	90	91	91	92	92	93	93	94	94	95	95	96	96	97
LANDSCAPING PLANS	110	111	111	112	112	113	113	114	114	115	115	116	116	117	117	118	118
WETLAND REPLICATION PLANS				121							122		123				
BRIDGE PLANS									140-143	140-143						144-146	



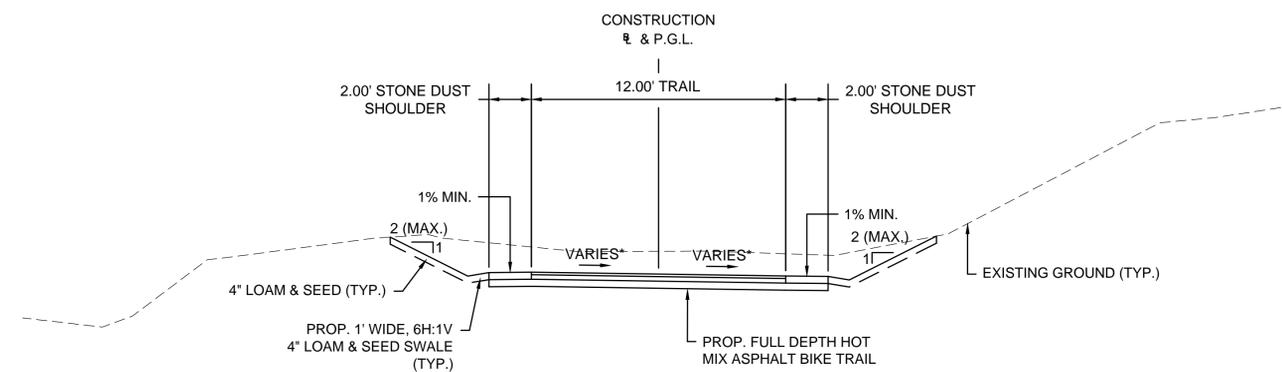
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MA	-	8	214
PROJECT FILE NO.		604531	

TYPICAL SECTIONS

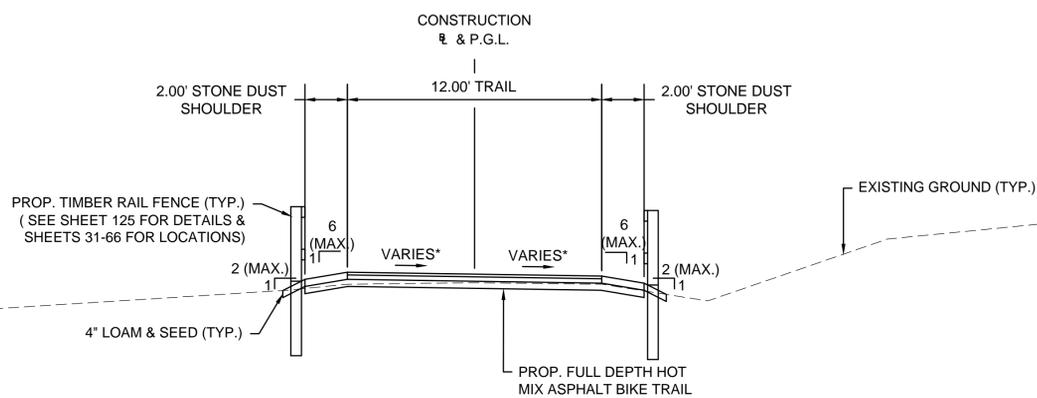


TYPICAL SECTION - 8' TRAIL WITH MODULAR BLOCK WALL (WINTER ST.)

SCALE 1" = 4'
STA. 29+78± - STA. 33+20±



CUT SECTION



FILL SECTION
TYPICAL SECTION - 12' WIDE TRAIL

SCALE 1" = 4'
STA. 0+38± - STA. 27+79±
STA. 34+85± - STA. 45+05±
STA. 77+92± - STA. 100+36±
STA. 112+86± - STA. 126+02±
STA. 126+64± - STA. 128+90±
STA. 129+70± - STA. 131+35±
STA. 140+62± - STA. 177+03±
STA. 500+06± - STA. 501+00± (SYLVIA ST)
STA. 0+06± - STA. 0+62± (ICEHOUSE LANDING)

*CROSS SLOPES OF THE TRAIL VARIES, SEE SHEETS 147-214 FOR MORE DETAIL.



PAVEMENT NOTES

FULL DEPTH HOT MIX ASPHALT BIKE TRAIL

SURFACE COURSE: 1 1/2" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)
INTERMEDIATE COURSE: 2 1/2" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
FOUNDATION: 2" - 8" GRAVEL BORROW (M1.03.0 TYPE B) (SEE NOTE BELOW)
24" SPECIAL BORROW (SEE NOTE 2)

FULL DEPTH HOT MIX ASPHALT CONSTRUCTION (AT ROADWAY CROSSINGS AS SHOWN ON PLANS)

SURFACE COURSE: 1-3/4" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5)
1-3/4" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
BASE COURSE: 3-1/2" SUPERPAVE BASE COURSE - 37.5 (SBC-37.5)
SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER 8" GRAVEL BORROW (M1.03.0 TYPE B) (OR TO DEPTH OF EXISTING GRAVEL SUBBASE, WHICHEVER IS GREATER)

PAVEMENT MILLING & HOT MIX ASPHALT OVERLAY

SURFACE COURSE: 1-3/4" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5)
SURFACE MILLING: 1-3/4" PAVEMENT MILLING TO MATCH EXISTING CROSS SLOPE
TACK COAT: ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED AT THE RATE OF 0.07 GAL/S.Y. FOR MILLED SURFACES AND 0.05 GAL/S.Y. FOR SMOOTH TIGHT PAVED SURFACES

STONE DUST SHOULDER

SURFACE: 4" STONE DUST OVER WEED CONTROL FABRIC
FOUNDATION: 2" - 8" GRAVEL BORROW (M1.03.0 TYPE B) (SEE NOTE 2)

CEMENT CONCRETE SIDEWALKS, REST AREAS & WHEELCHAIR RAMPS:

SURFACE COURSE: 4" CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610)
SUBBASE: 8" GRAVEL BORROW (M1.03.0 TYPE B)

CEMENT CONCRETE SPLITTER ISLANDS:

SURFACE COURSE: 4" STAMPED CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610)
SUBBASE: 8" GRAVEL BORROW (M1.03.0 TYPE B)

FULL DEPTH WIDENING LESS THAN 4 FEET

SURFACE: 1-3/4" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5)
1-3/4" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
BASE: 8" HIGH-EARLY-STRENGTH CEMENT CONCRETE BASE COURSE
SUBBASE: 8" GRAVEL BORROW (M1.03.0 TYPE B)

HOT MIX ASPHALT WALKS

SURFACE: 1 1/4" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)
1 1/4" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
SUBBASE: 8" GRAVEL BORROW (M1.03.0 TYPE B OR EXISTING GRAVEL BORROW TO REMAIN)

HOT MIX ASPHALT PARKING LOTS & DRIVEWAYS

SURFACE COURSE: 1 1/2" SUPERPAVE SURFACE COURSE -12.5 (SSC-12.5)
INTERMEDIATE COURSE: 2" SUPERPAVE INTERMEDIATE COURSE -12.5 (SIC-12.5)
FOUNDATION: 8" GRAVEL BORROW (M1.03.0 TYPE B OR EXISTING GRAVEL BORROW TO REMAIN)

BRICK WALK

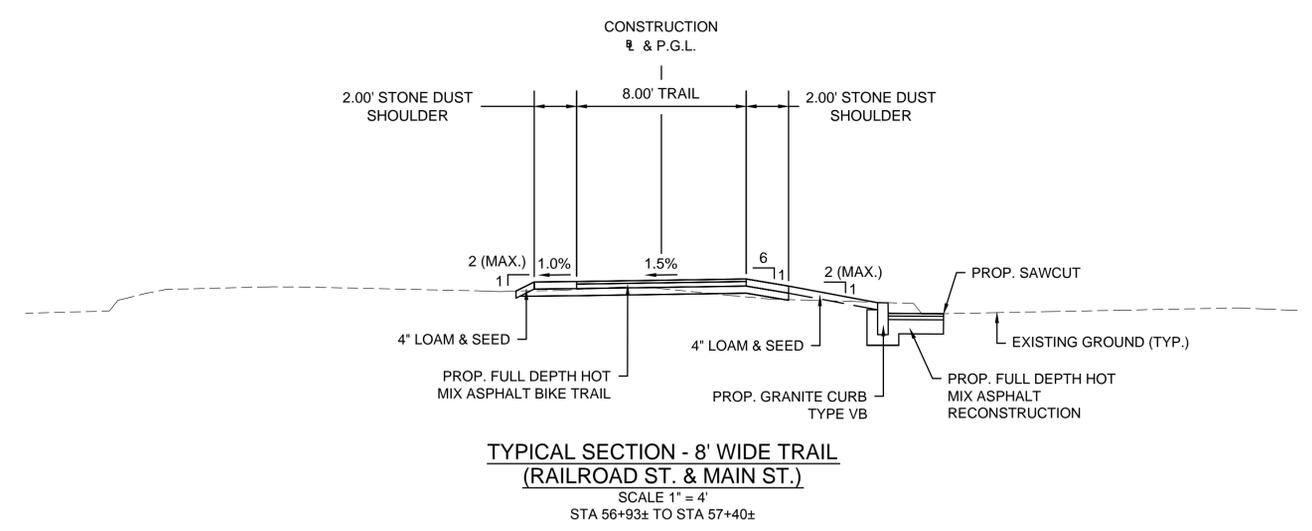
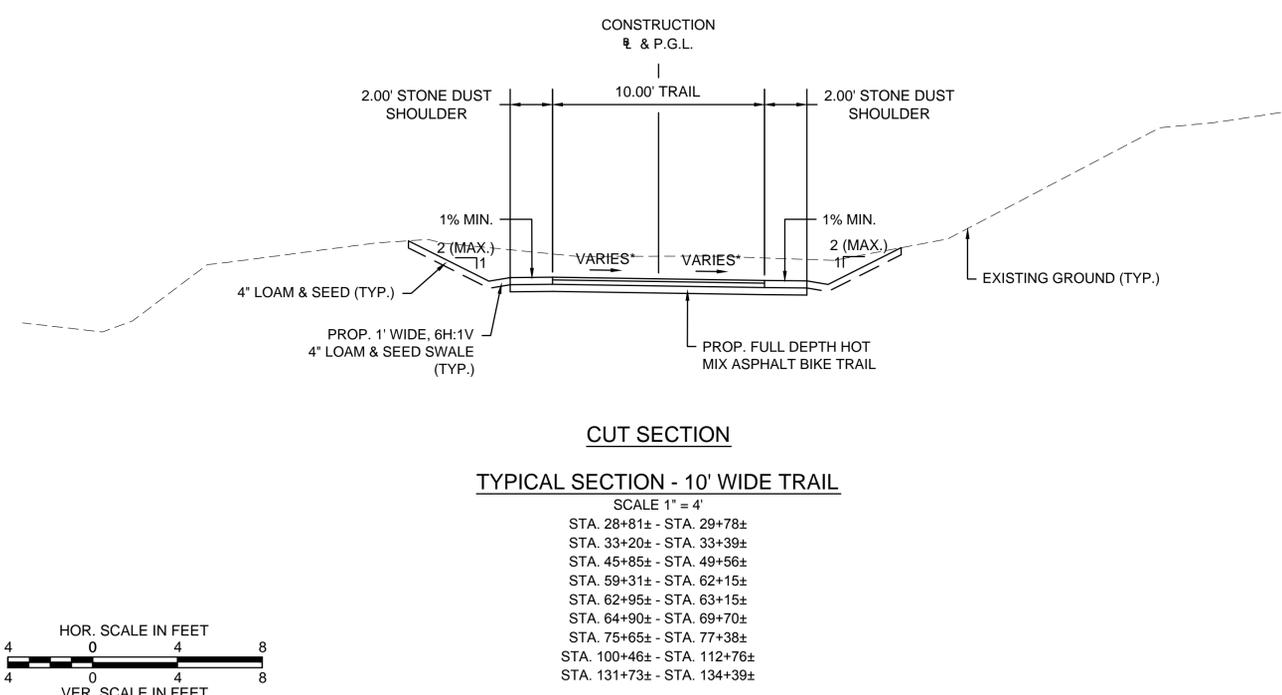
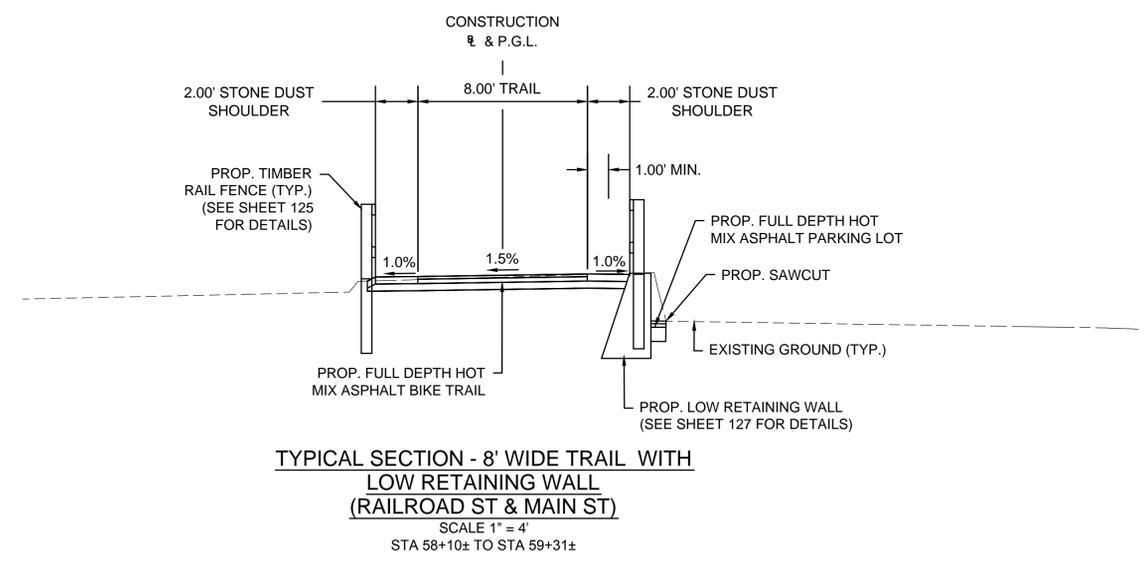
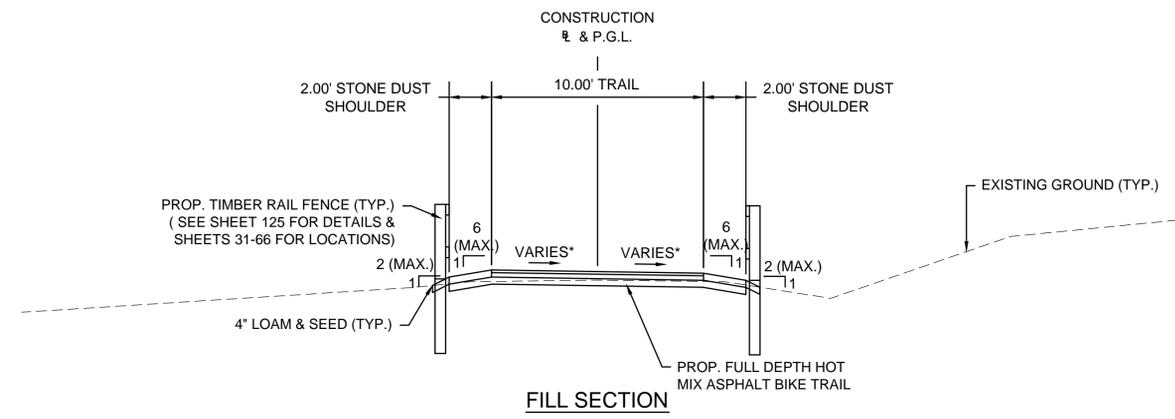
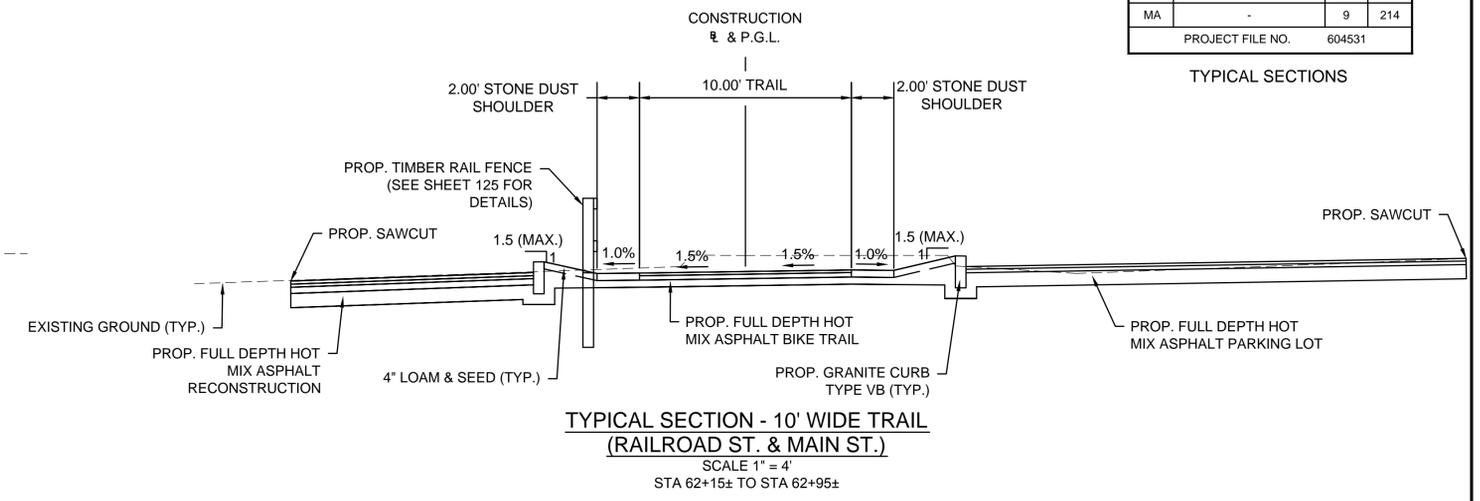
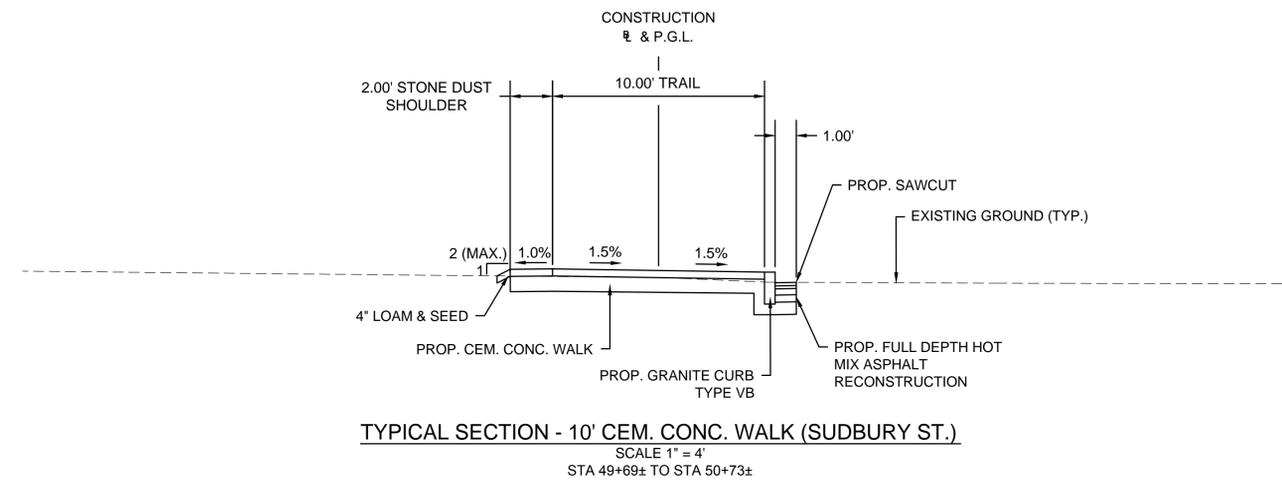
SURFACE: KILN FIRED BRICKS SET ON A BED OF MORTAR
BASE: 4" CEMENT CONCRETE BASE
SUBBASE: 8" GRAVEL BORROW (M1.03.0 TYPE B)

NOTE:

- THE SECTIONS OF PROPOSED TRAIL NOT COVERED IN THE RANGE OF STATIONS ASSOCIATED WITH THE TYPICAL SECTIONS ARE EITHER AT INTERSECTIONS OR ARE IN AREAS OF TRANSITION AND THEREFORE HAVE NOT BEEN SHOWN. REFER TO SHEETS 147-214 FOR MORE DETAILS.
- SUBBASE SHALL BE A MINIMUM OF 2" GRAVEL BORROW FOR LEVELING OVER RAILROAD BALLAST. SUBBASE SHALL BE 8" GRAVEL BORROW OVER MINIMUM 24" SPECIAL BORROW AT FILL SECTIONS IN AREAS OF WETLANDS AND OTHER UNSUITABLE MATERIAL IN ACCORDANCE WITH SECTIONS 150 AND 170 OF THE STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	214
PROJECT FILE NO.		604531	

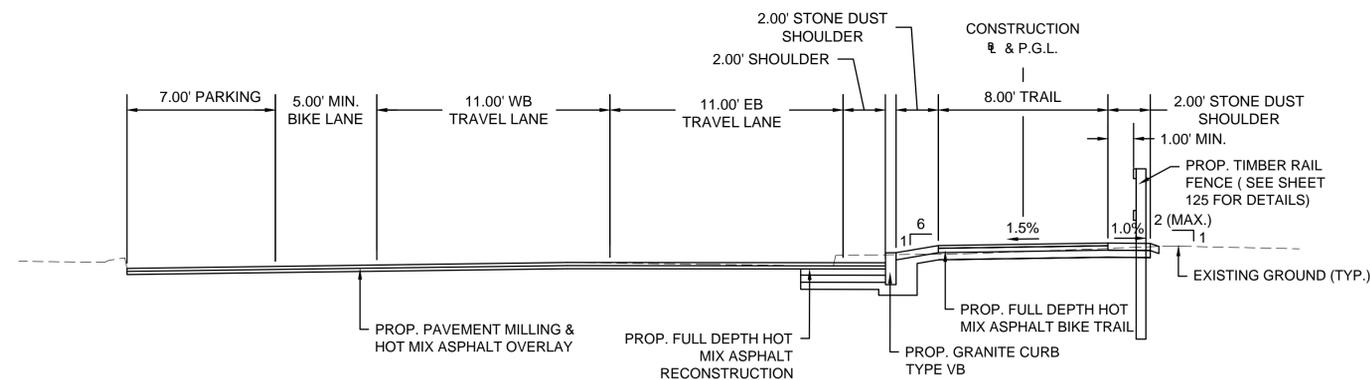
TYPICAL SECTIONS



*CROSS SLOPES OF THE TRAIL VARIES, SEE SHEETS 147-214 FOR SLOPES.

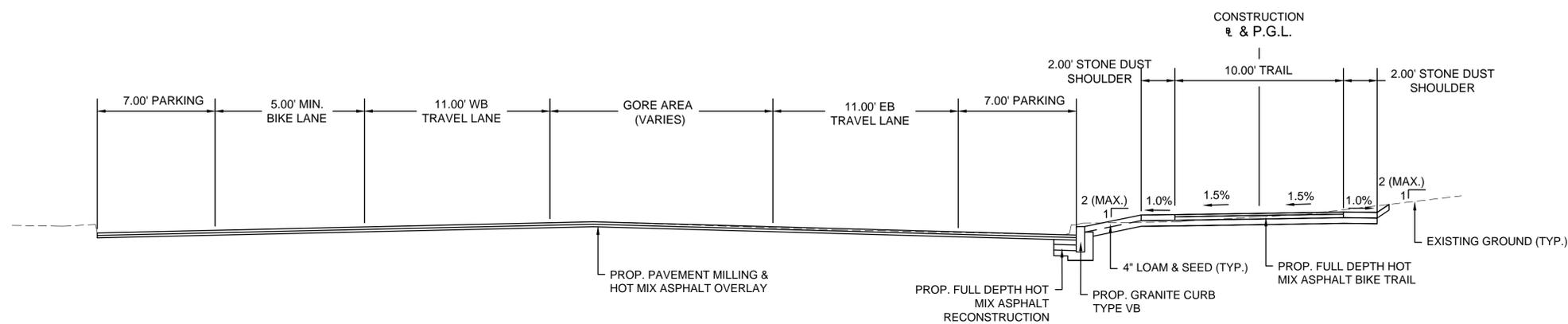
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MA	-	10	214
PROJECT FILE NO.		604531	

TYPICAL SECTIONS



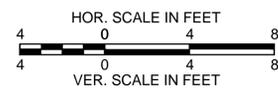
TYPICAL SECTION - 8' WIDE TRAIL
ADJACENT TO MAIN ST. WITH PARKING ON
ONE SIDE

SCALE 1" = 4'
STA. 54+54± - STA. 56+37±



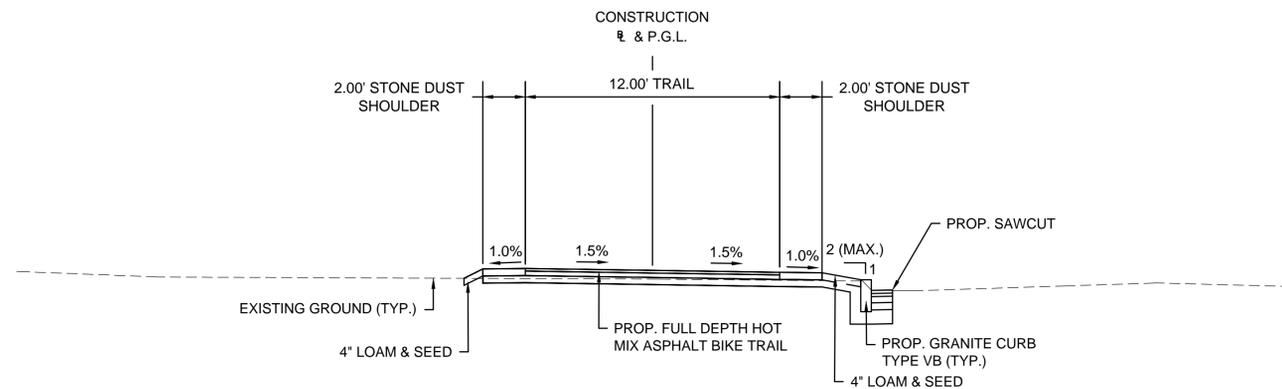
TYPICAL SECTION - 10' WIDE TRAIL
ADJACENT TO MAIN ST. WITH PARKING ON
BOTH SIDES

SCALE 1" = 4'
STA. 51+50± - STA. 53+33±

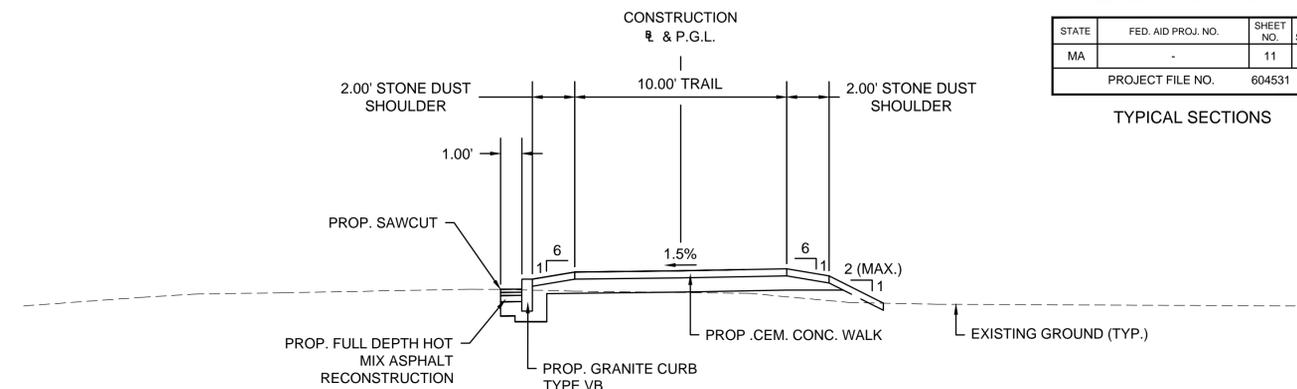


STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	214
PROJECT FILE NO.		604531	

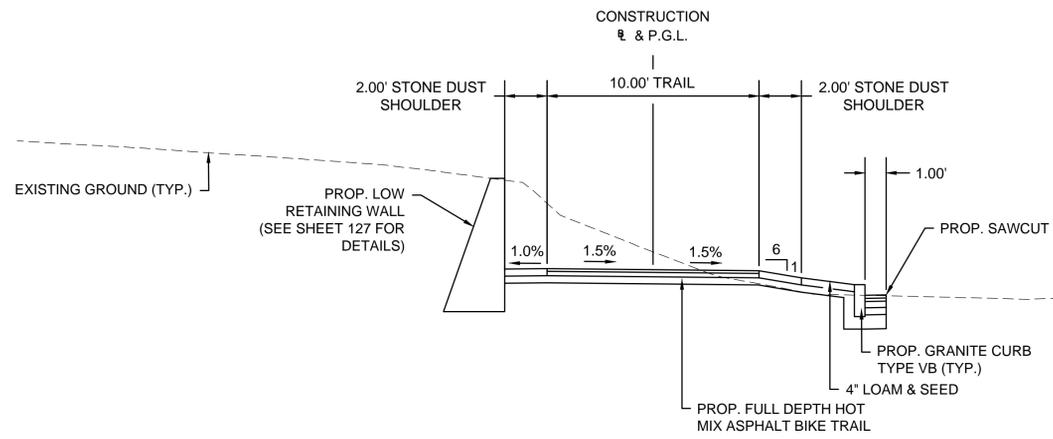
TYPICAL SECTIONS



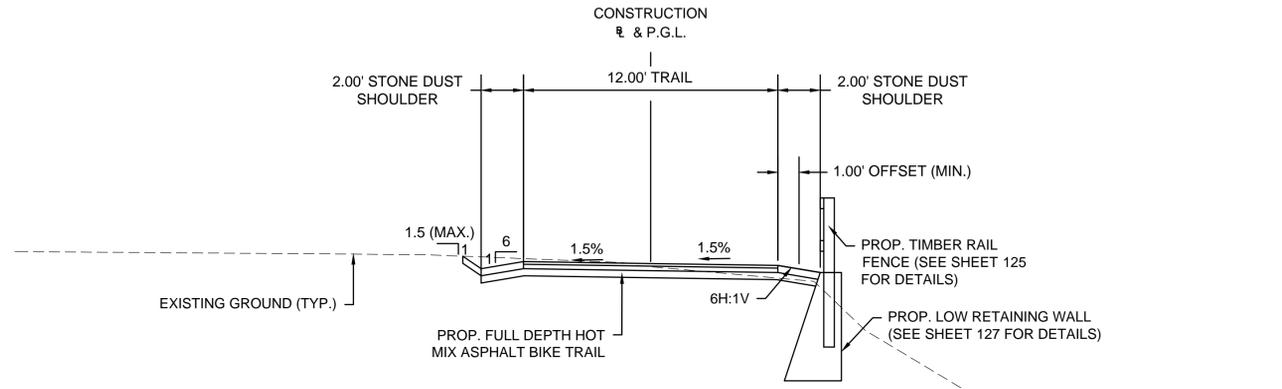
TYPICAL SECTION - 12' WIDE TRAIL
(HAYNES ST.)
SCALE 1" = 4'
STA 86+34± TO STA 88+38±



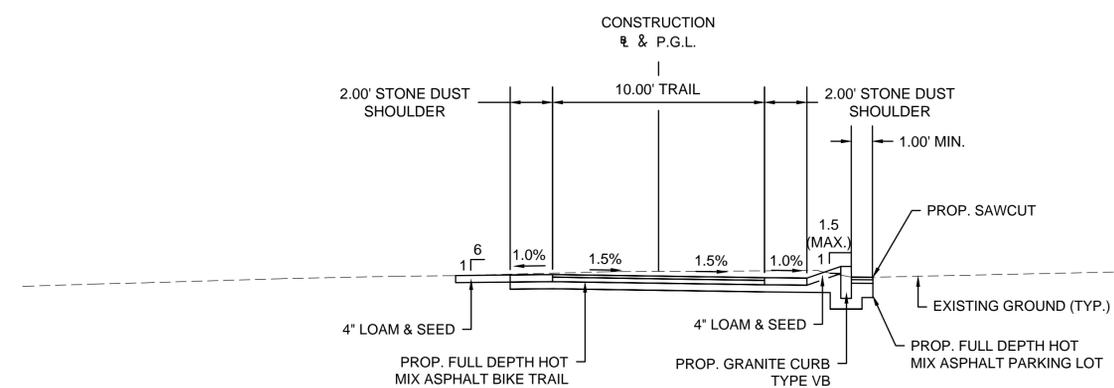
TYPICAL SECTION - 10' CEM. CONC. WALK
(MAPLE ST.)
SCALE 1" = 4'
STA 179+75± TO STA 180+33±



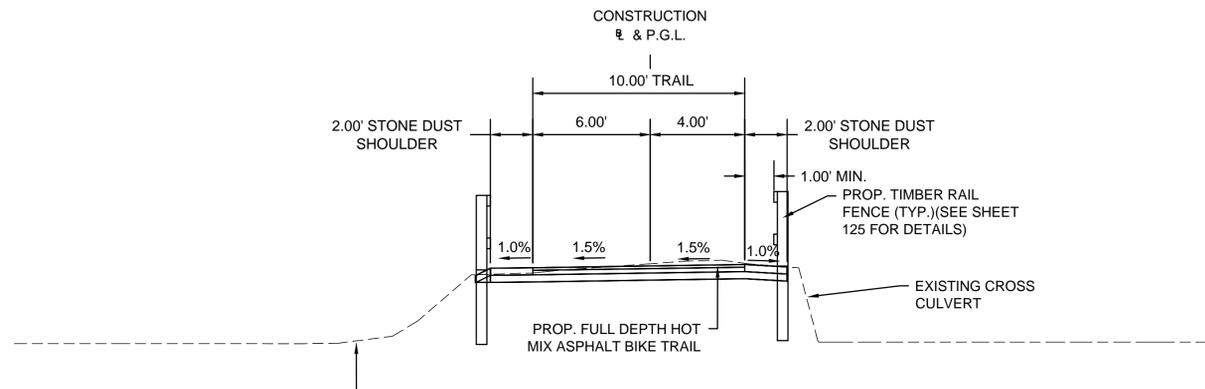
TYPICAL SECTION - 10' WIDE TRAIL WITH LOW RETAINING WALL
SCALE 1" = 4'
STA 73+26± TO STA 74+15±



TYPICAL SECTION - 12' TRAIL WITH LOW RETAINING WALL
SCALE 1" = 4'
STA. 129+20± - STA. 129+70±



TYPICAL SECTION - 10' WIDE TRAIL
(FLORIDA RD. & MUNICIPAL PARKING LOT)
SCALE 1" = 4'
STA 63+41± TO STA 64+90±
STA 69+70± TO STA 73+26±

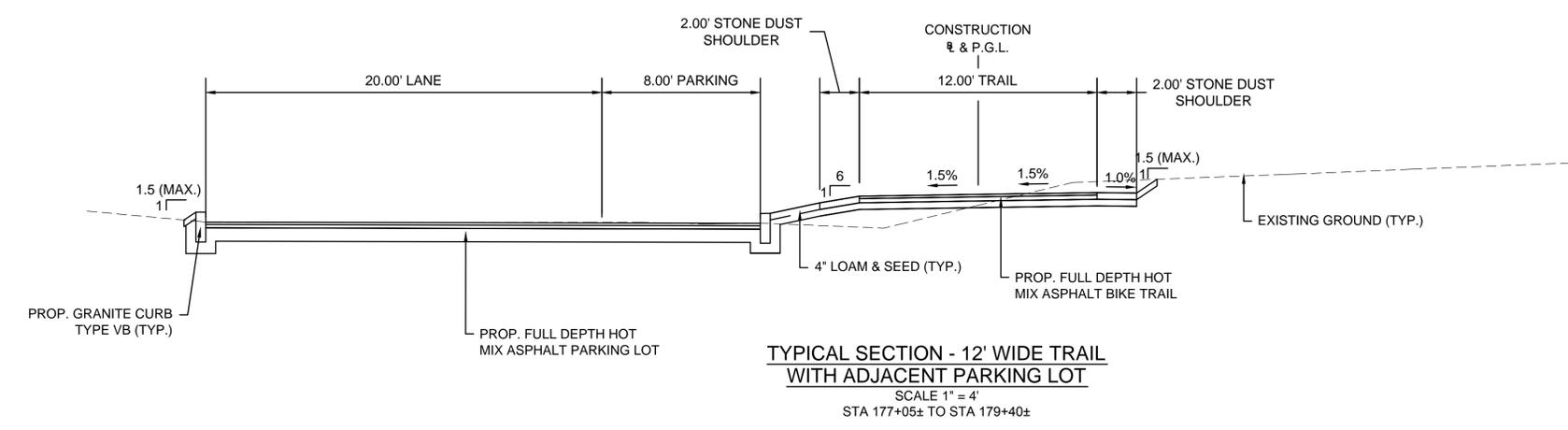


TYPICAL SECTION - 10' TRAIL OVER CROSS CULVERT
SCALE 1" = 4'
STA. 126+12± - STA. 126+54±

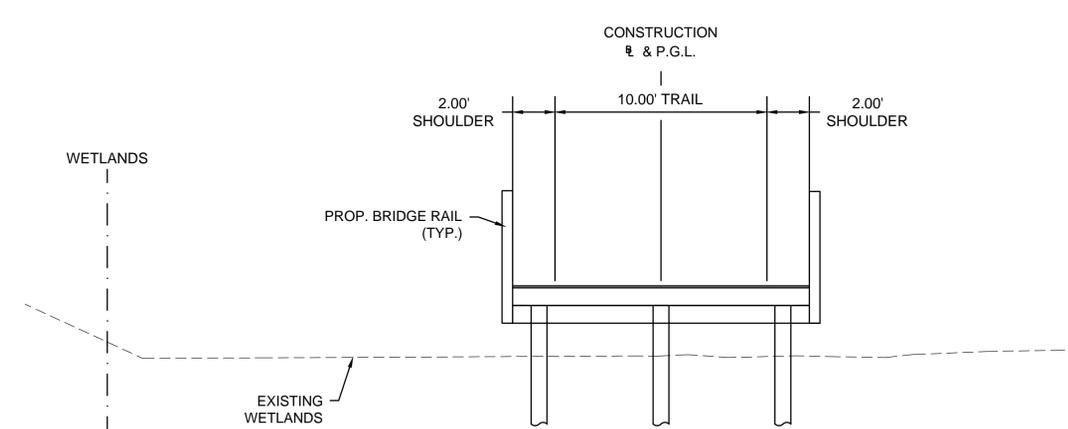


STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	214
PROJECT FILE NO.		604531	

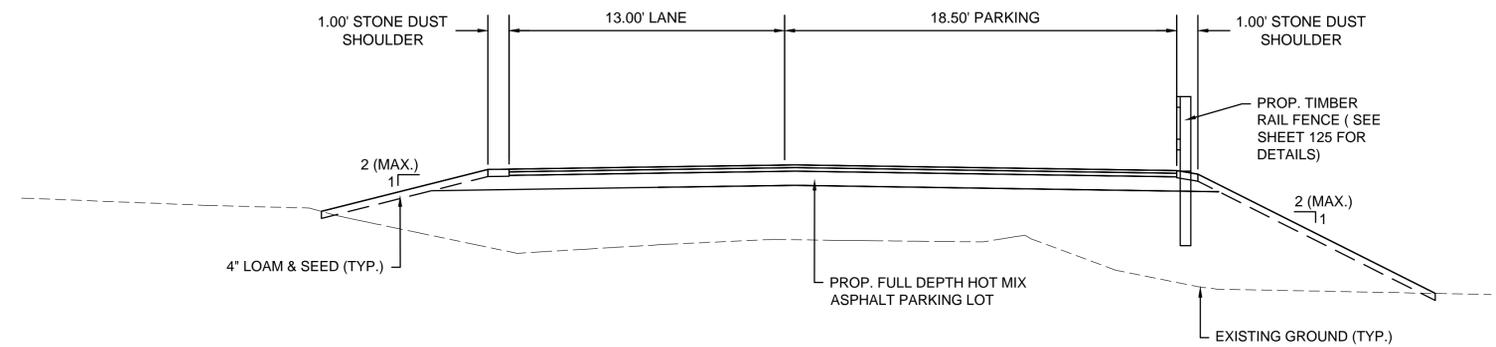
TYPICAL SECTIONS



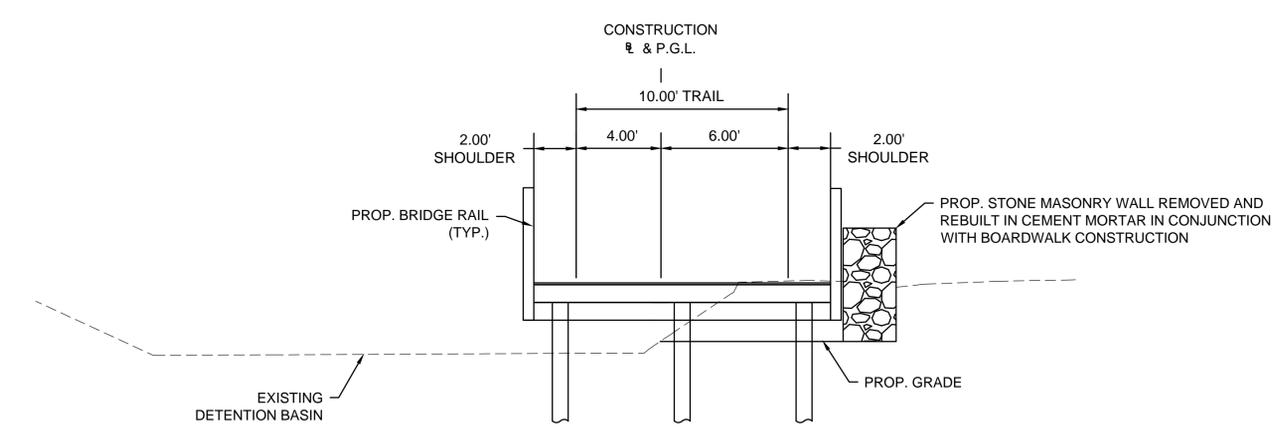
**TYPICAL SECTION - 12' WIDE TRAIL
WITH ADJACENT PARKING LOT**
SCALE 1" = 4'
STA 177+05± TO STA 179+40±



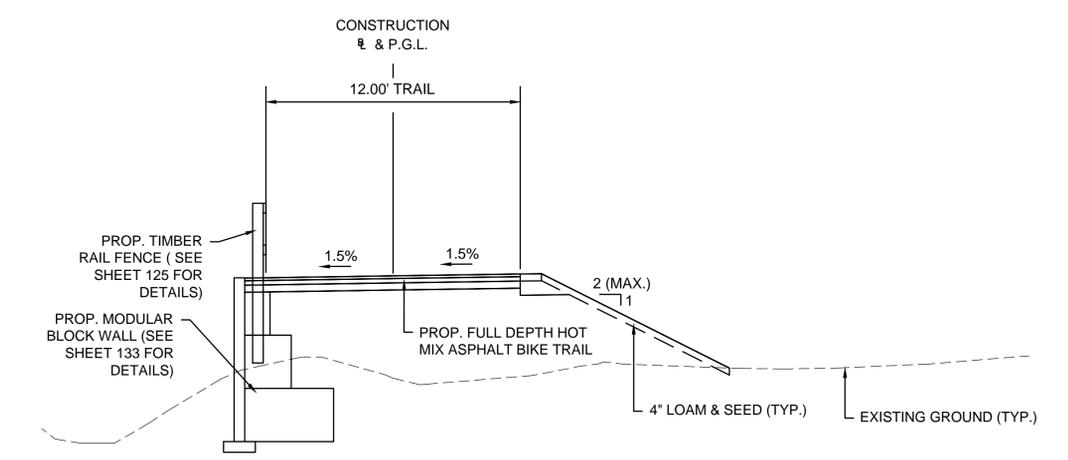
TYPICAL SECTION - 14' BOARDWALK
SCALE 1" = 4'
STA 137+18± TO STA 140+43±



**TYPICAL SECTION - PARKING LOT
(SYLVIA ST.)**
SCALE 1" = 4'
STA. 502+12± - STA. 502+85± (SYLVIA ST.)



**TYPICAL SECTION - 14' BOARDWALK
WITH STONE MASONRY WALL**
SCALE 1" = 4'
STA 134+53± TO STA 137+18±

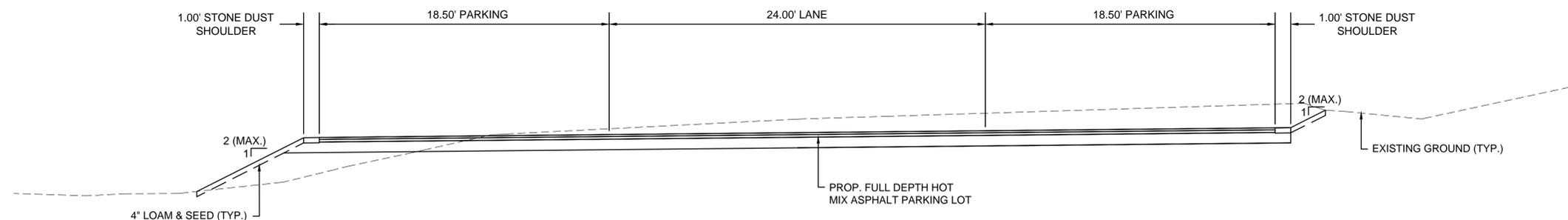


**TYPICAL SECTION - 12' TRAIL
WITH MODULAR BLOCK WALL
(SYLVIA ST.)**
SCALE 1" = 4'
STA. 501+00± - STA. 502+04± (SYLVIA ST.)

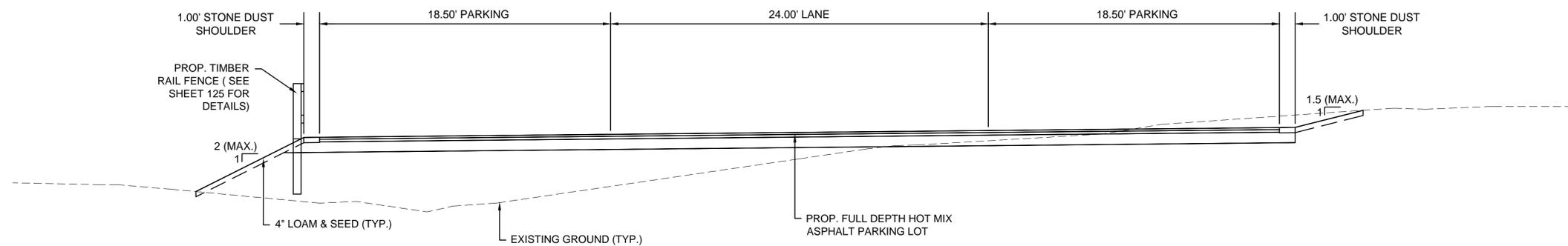


STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	214
PROJECT FILE NO.		604531	

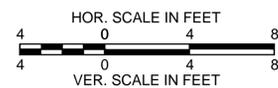
TYPICAL SECTIONS

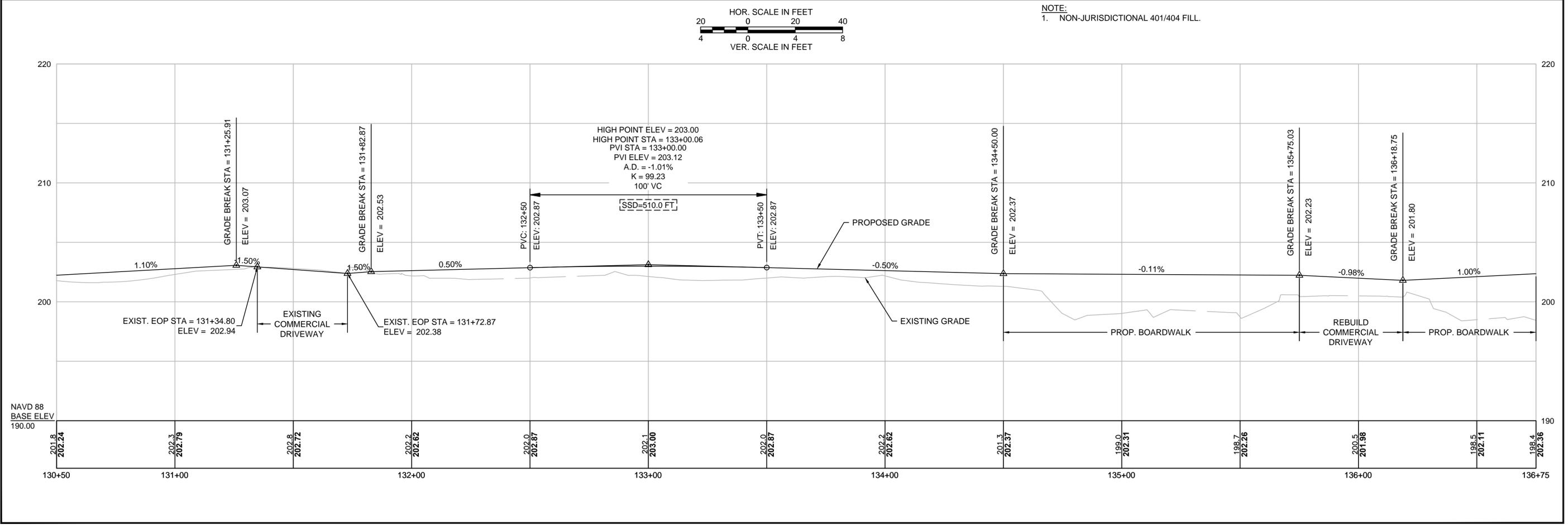
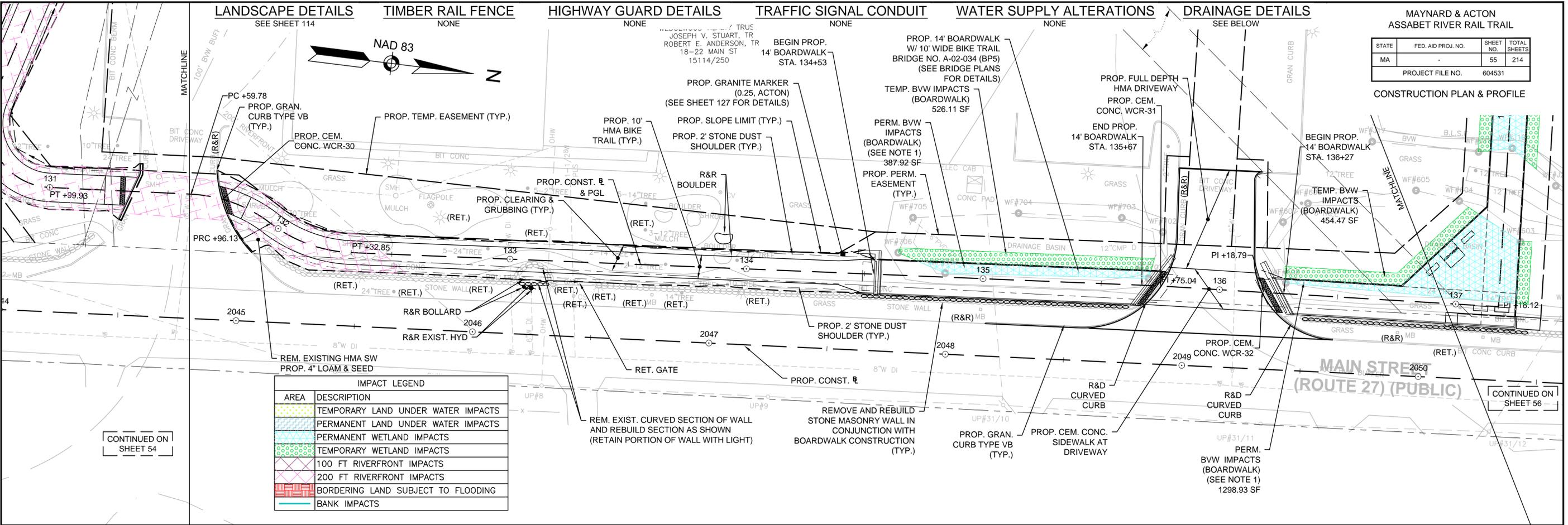


TYPICAL SECTION - PARKING LOT
(MAPLE STREET PARKING)
SCALE 1" = 4'
STA. 0+78± - STA. 2+04± (MAPLE PARKING)



TYPICAL SECTION - PARKING LOT
(ICE HOUSE LANDING)
SCALE 1" = 4'
STA. 0+77± - STA. 1+76± (ICEHOUSE LANDING)





LANDSCAPE DETAILS
SEE SHEET 115

TIMBER RAIL FENCE
NONE

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

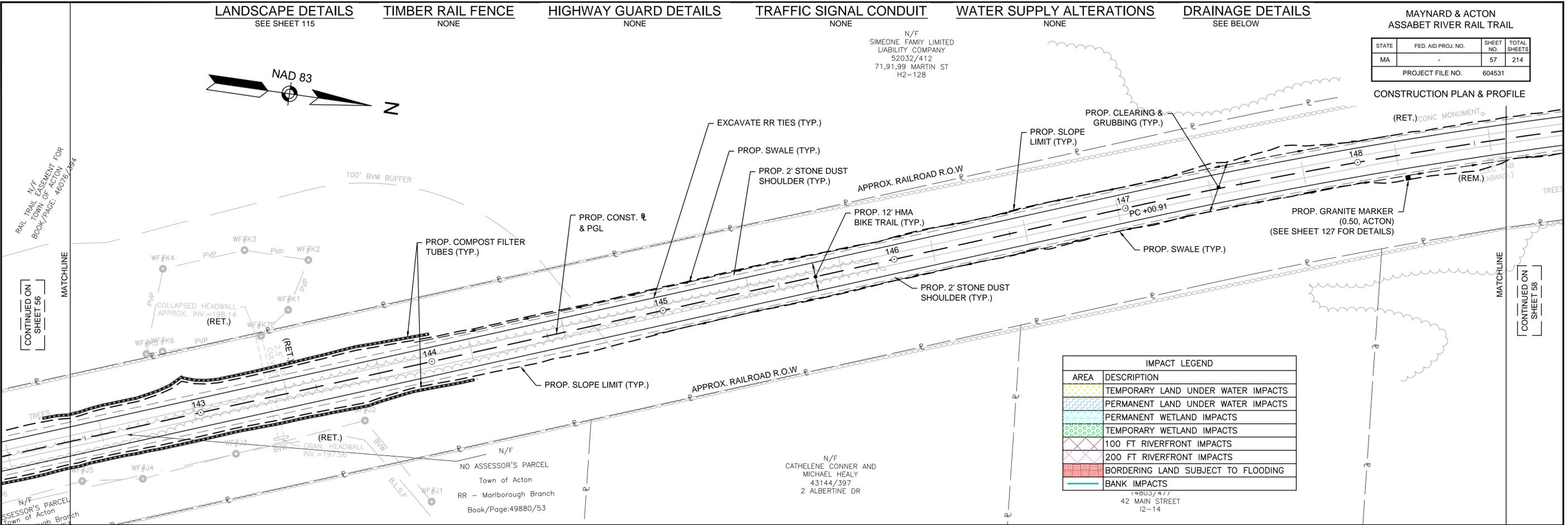
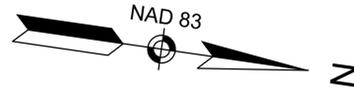
DRAINAGE DETAILS
SEE BELOW

MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

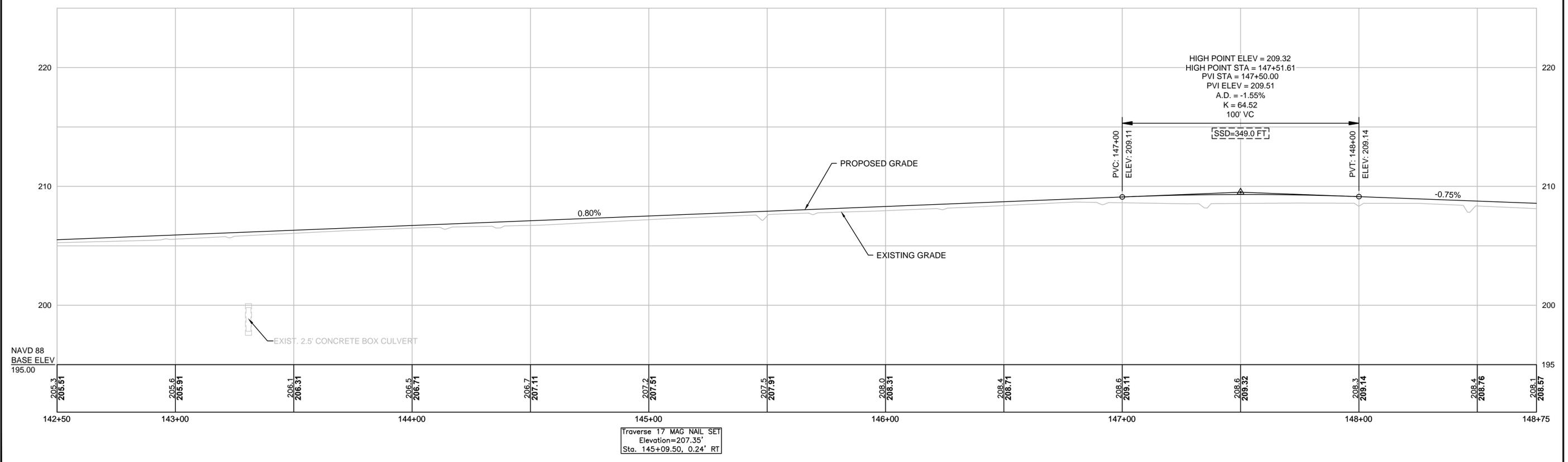
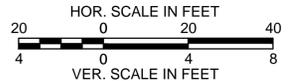
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	57	214
PROJECT FILE NO.		604531	

CONSTRUCTION PLAN & PROFILE

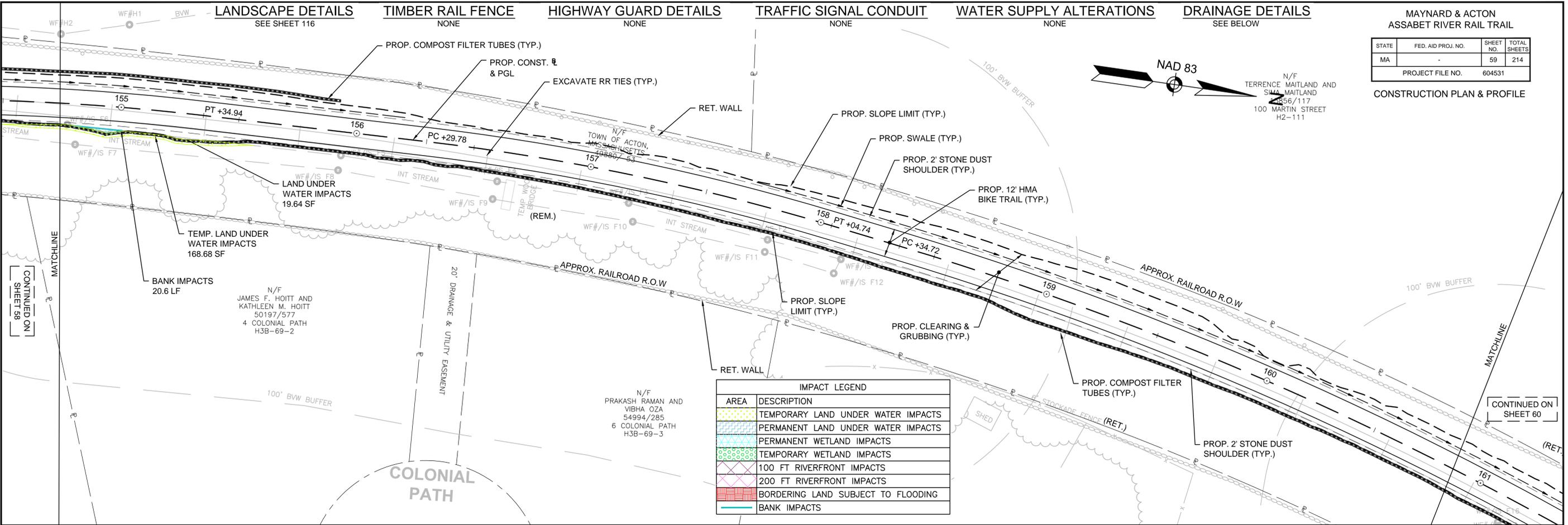
N/F
SIMEONE FAMY LIMITED
LIABILITY COMPANY
52032/412
71,91,99 MARTIN ST
H2-128



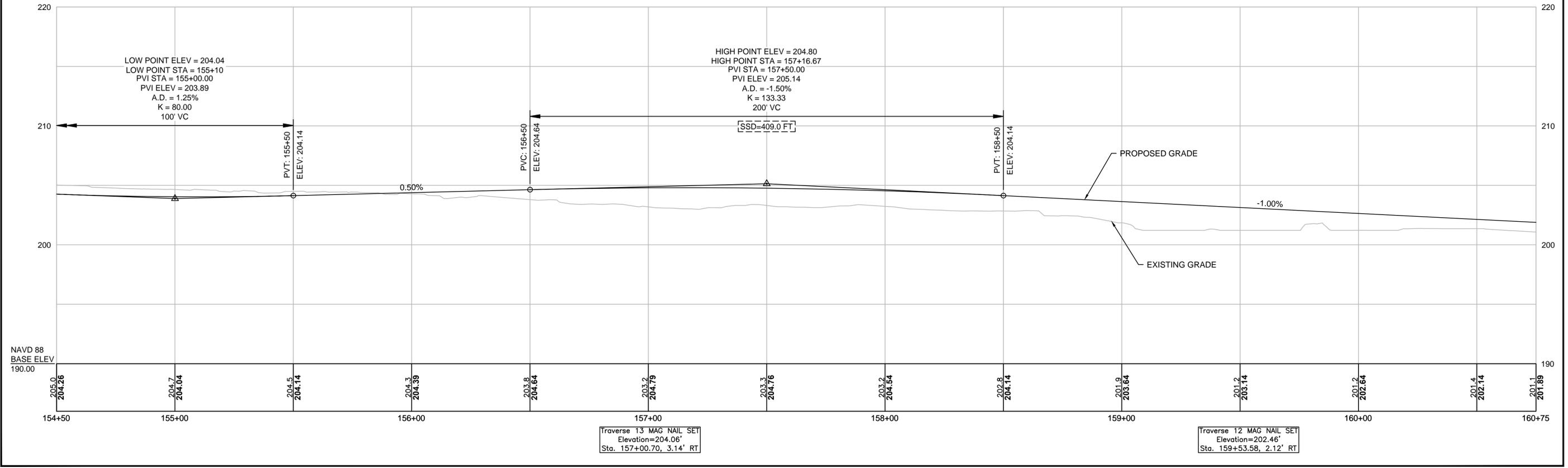
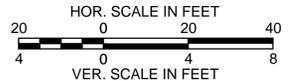
IMPACT LEGEND	
AREA	DESCRIPTION
[Pattern]	TEMPORARY LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT WETLAND IMPACTS
[Pattern]	TEMPORARY WETLAND IMPACTS
[Pattern]	100 FT RIVERFRONT IMPACTS
[Pattern]	200 FT RIVERFRONT IMPACTS
[Pattern]	BORDERING LAND SUBJECT TO FLOODING
[Pattern]	BANK IMPACTS



Traverse 17 MAG NAIL SET
Elevation=207.35'
Sta. 145+09.50, 0.24' RT



IMPACT LEGEND	
AREA	DESCRIPTION
[Pattern]	TEMPORARY LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT WETLAND IMPACTS
[Pattern]	TEMPORARY WETLAND IMPACTS
[Pattern]	100 FT RIVERFRONT IMPACTS
[Pattern]	200 FT RIVERFRONT IMPACTS
[Pattern]	BORDERING LAND SUBJECT TO FLOODING
[Pattern]	BANK IMPACTS



LANDSCAPE DETAILS
SEE SHEET 117

TIMBER RAIL FENCE
NONE

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE BELOW

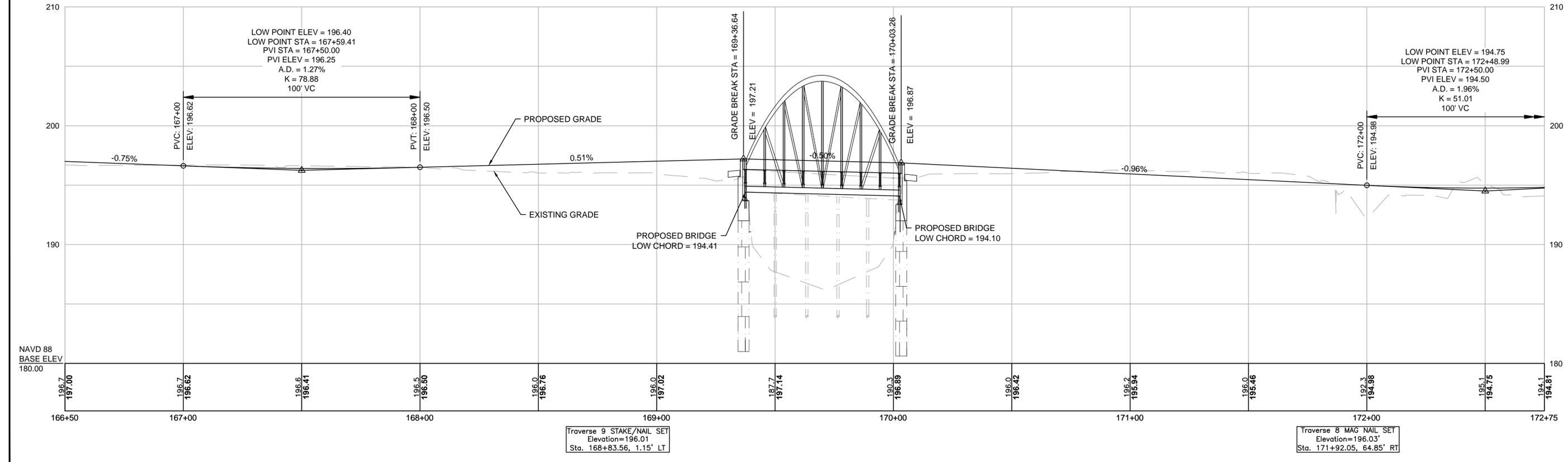
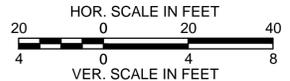
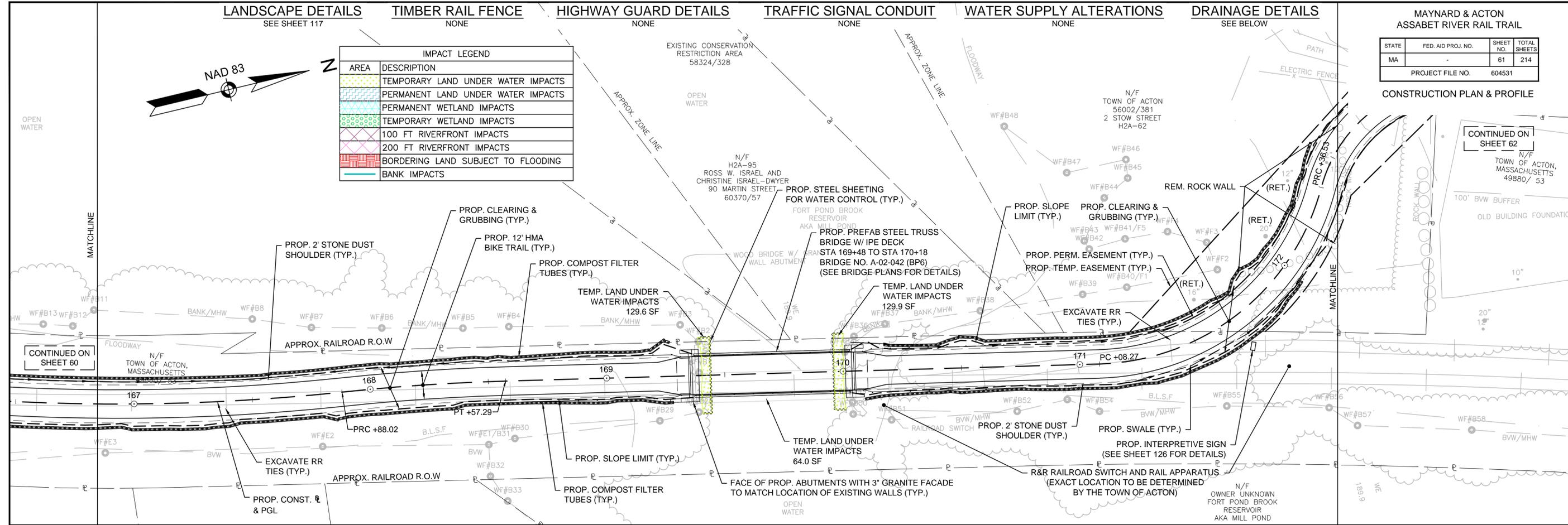
MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		61	214
PROJECT FILE NO.		604531	

CONSTRUCTION PLAN & PROFILE

IMPACT LEGEND

AREA	DESCRIPTION
[Pattern]	TEMPORARY LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT WETLAND IMPACTS
[Pattern]	TEMPORARY WETLAND IMPACTS
[Pattern]	100 FT RIVERFRONT IMPACTS
[Pattern]	200 FT RIVERFRONT IMPACTS
[Pattern]	BORDERING LAND SUBJECT TO FLOODING
[Pattern]	BANK IMPACTS



Traverse 9 STAKE/NAIL SET
Elevation=196.01
Sta. 168+83.56, 1.15' LT

Traverse 8 MAG NAIL SET
Elevation=196.03'
Sta. 171+92.05, 64.85' RT

LANDSCAPE DETAILS
SEE SHEET 117

TRAFFIC SIGNAL CONDUIT
NONE

TIMBER RAIL FENCE
NONE

HIGHWAY GUARD DETAILS
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE BELOW

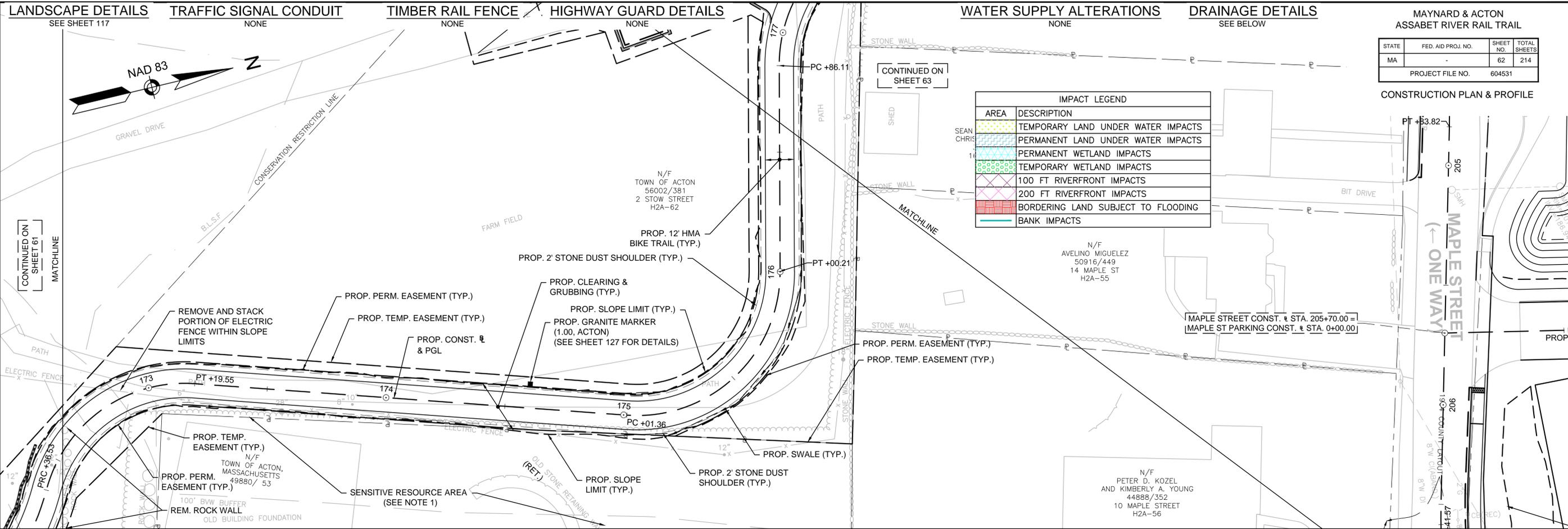
MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		62	214
PROJECT FILE NO.		604531	

CONSTRUCTION PLAN & PROFILE

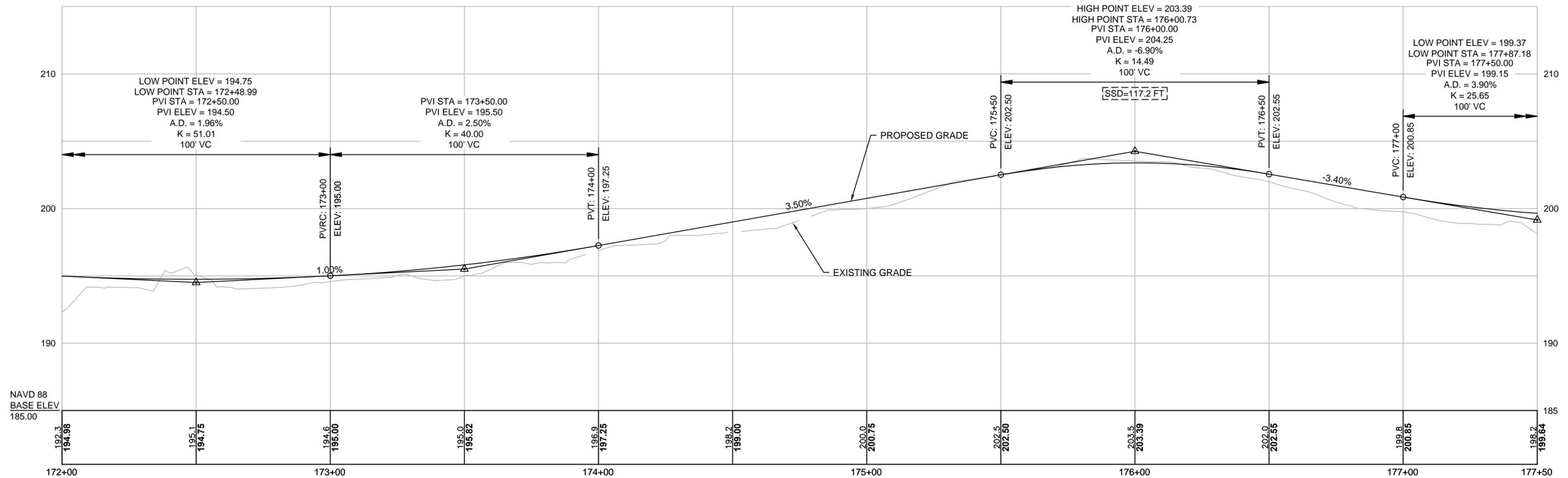
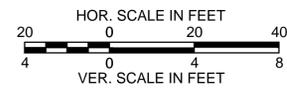


AREA	DESCRIPTION
[Pattern]	TEMPORARY LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT WETLAND IMPACTS
[Pattern]	TEMPORARY WETLAND IMPACTS
[Pattern]	100 FT RIVERFRONT IMPACTS
[Pattern]	200 FT RIVERFRONT IMPACTS
[Pattern]	BORDERING LAND SUBJECT TO FLOODING
[Pattern]	BANK IMPACTS



NOTE:

1. THE CONTRACTOR SHALL AVOID & PROTECT THIS SENSITIVE RESOURCE AREA DURING CONSTRUCTION.



Traverse 6.3000 REBAR-CAP
Elevation=194.09
Sta. 172+82.11, 22.74' LT

Traverse 6 STAKE/NAIL SET
Elevation=211.34'
Sta. 175+64.22, 349.47' RT

LANDSCAPE DETAILS
SEE SHEET 118

TIMBER RAIL FENCE
(SEE SHEET 125 FOR DETAILS)
STA. 177+49 RT TO STA. 179+87 RT

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

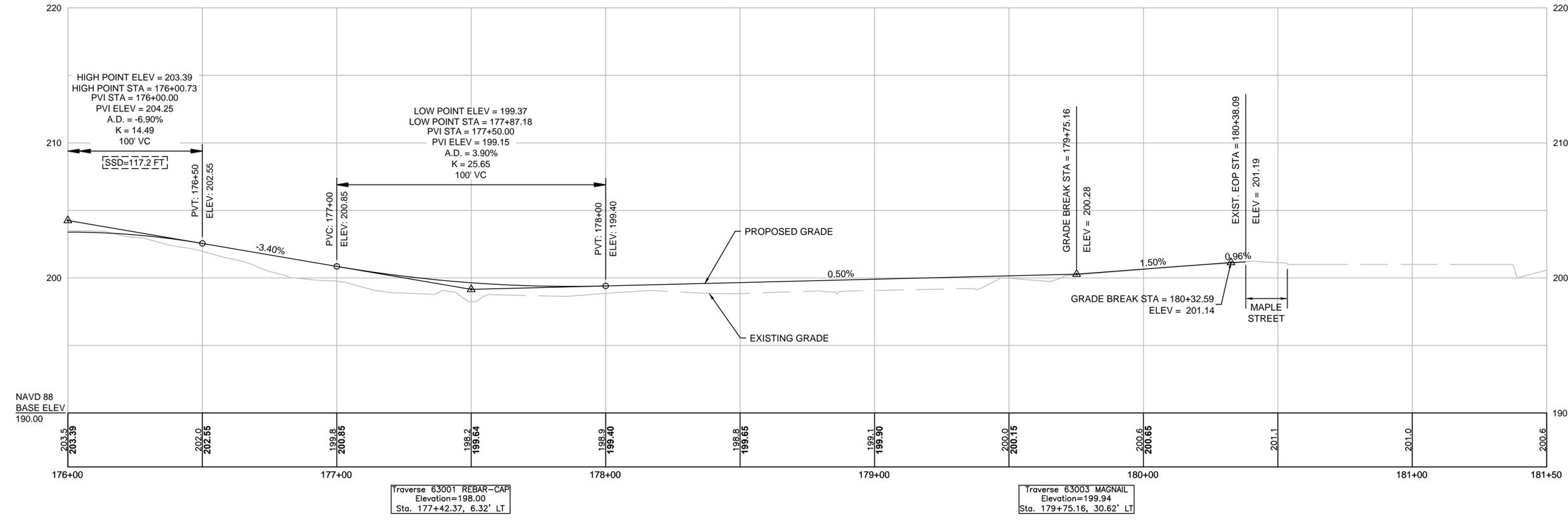
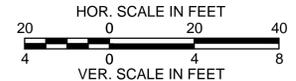
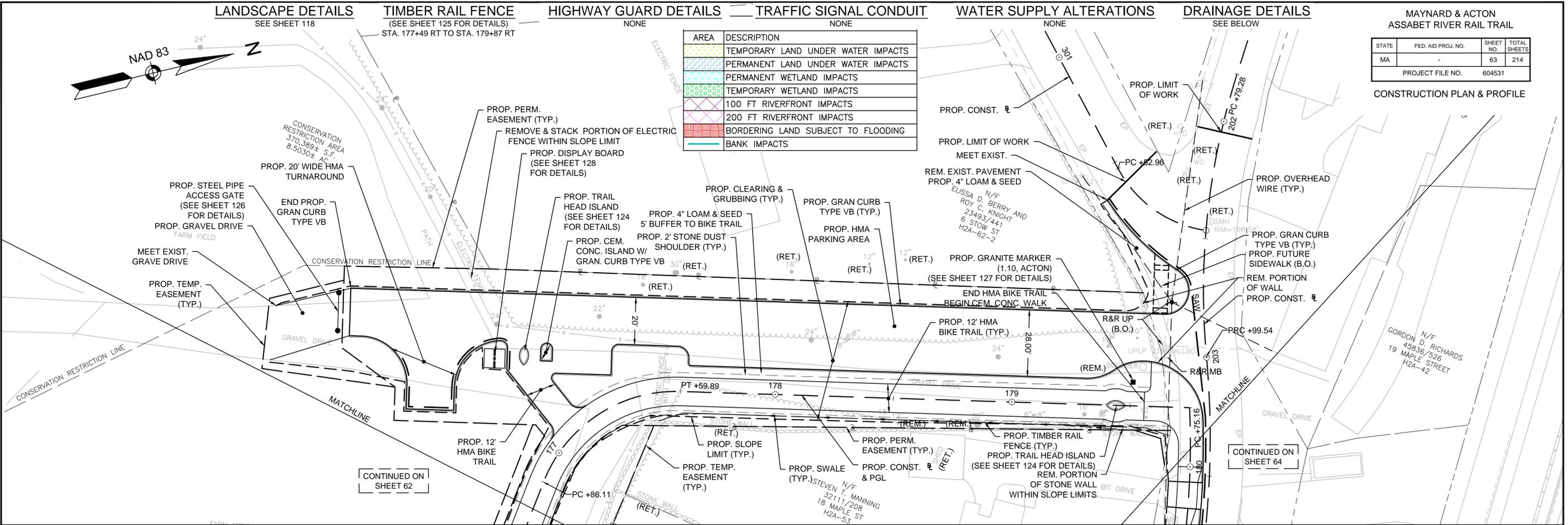
DRAINAGE DETAILS
SEE BELOW

**MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		63	214
PROJECT FILE NO.		604531	

CONSTRUCTION PLAN & PROFILE

AREA	DESCRIPTION
[Pattern]	TEMPORARY LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT WETLAND IMPACTS
[Pattern]	TEMPORARY WETLAND IMPACTS
[Pattern]	100 FT RIVERFRONT IMPACTS
[Pattern]	200 FT RIVERFRONT IMPACTS
[Pattern]	BORDERING LAND SUBJECT TO FLOODING
[Pattern]	BANK IMPACTS

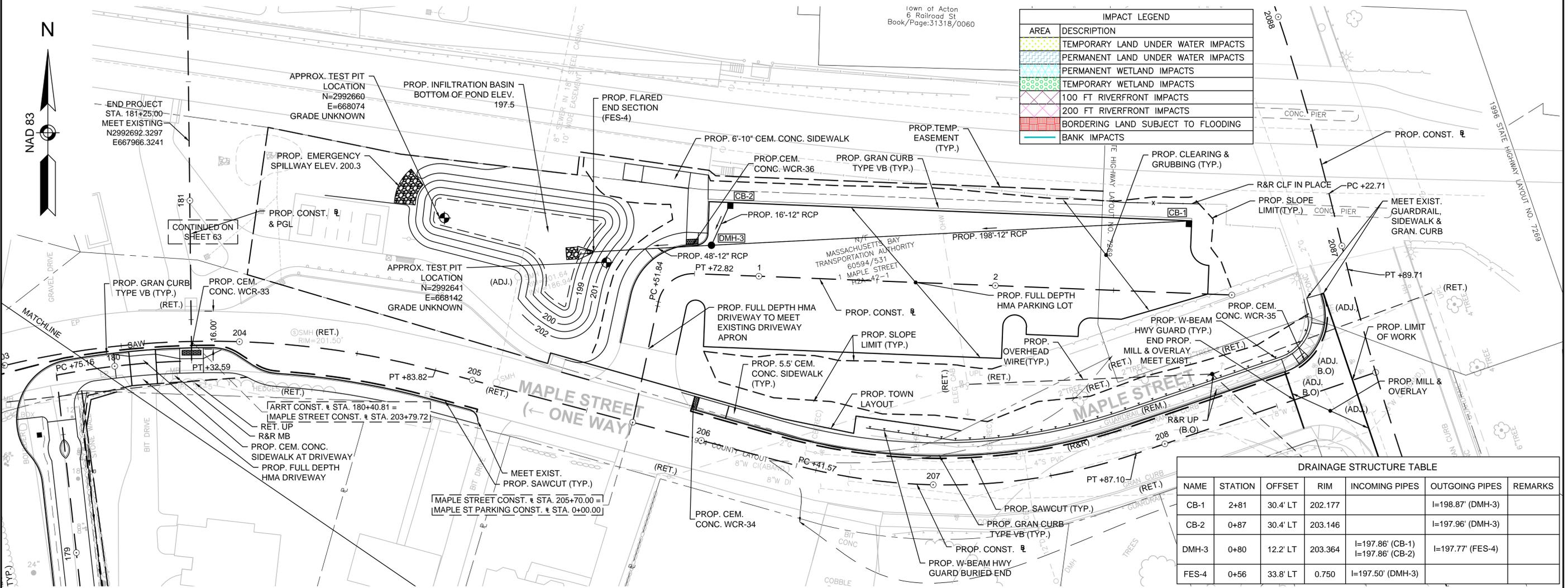


Traverse 63001 REBAR-CAP
Elevation=198.00
Sta. 177+42.37, 6.32' LT

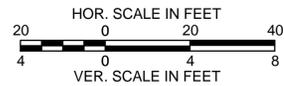
Traverse 63003 MAGNAIL
Elevation=199.94
Sta. 179+75.16, 30.62' LT

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	64	214
PROJECT FILE NO.		604531	

IMPACT LEGEND	
AREA	DESCRIPTION
[Pattern]	TEMPORARY LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT LAND UNDER WATER IMPACTS
[Pattern]	PERMANENT WETLAND IMPACTS
[Pattern]	TEMPORARY WETLAND IMPACTS
[Pattern]	100 FT RIVERFRONT IMPACTS
[Pattern]	200 FT RIVERFRONT IMPACTS
[Pattern]	BORDERING LAND SUBJECT TO FLOODING
[Pattern]	BANK IMPACTS

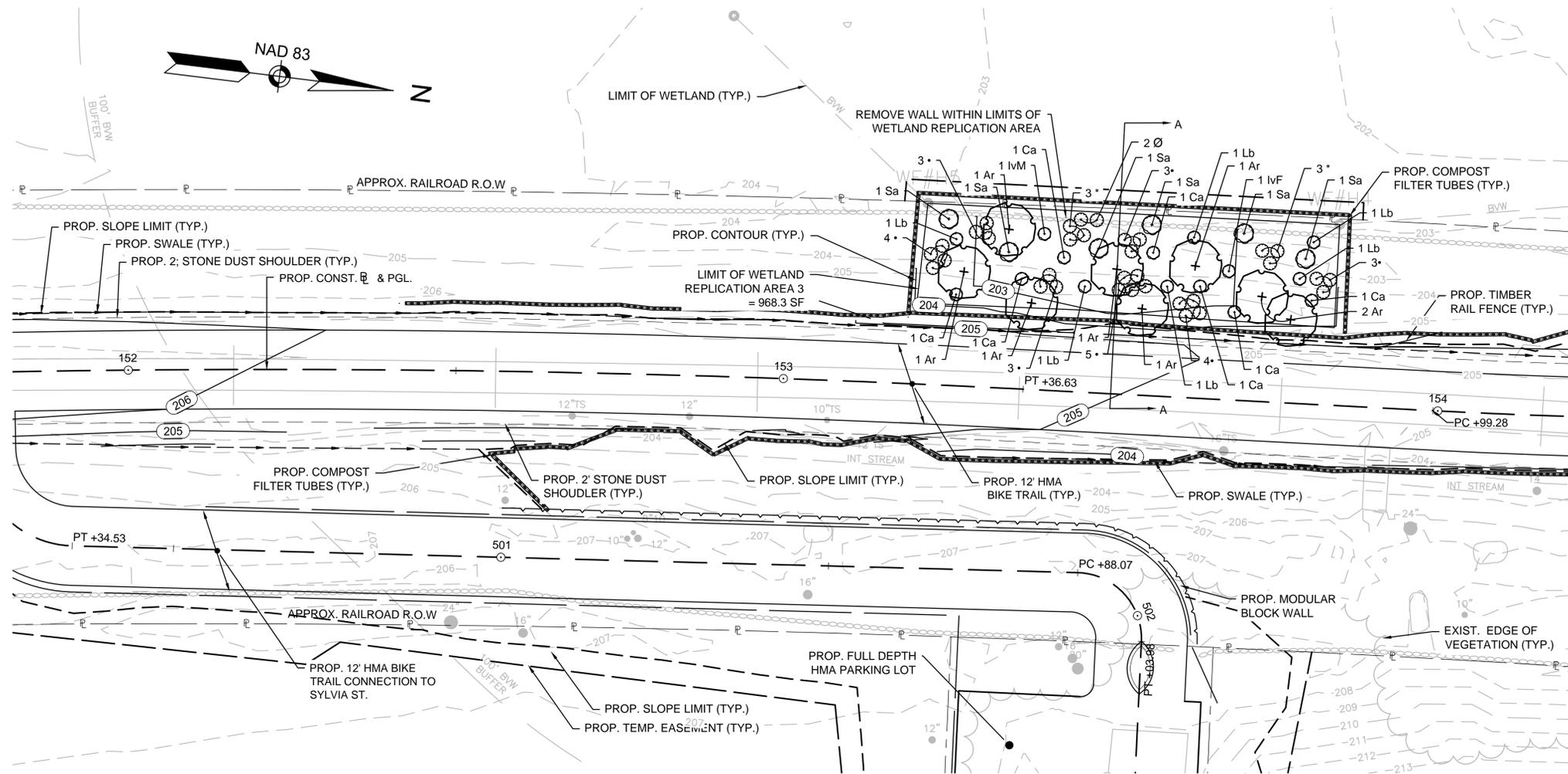


DRAINAGE STRUCTURE TABLE						
NAME	STATION	OFFSET	RIM	INCOMING PIPES	OUTGOING PIPES	REMARKS
CB-1	2+81	30.4' LT	202.177		I=198.87' (DMH-3)	
CB-2	0+87	30.4' LT	203.146		I=197.96' (DMH-3)	
DMH-3	0+80	12.2' LT	203.364	I=197.86' (CB-1) I=197.86' (CB-2)	I=197.77' (FES-4)	
FES-4	0+56	33.8' LT	0.750		I=197.50' (DMH-3)	



STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	122	214
PROJECT FILE NO.		604531	

WETLAND REPLICATION PLANS AND DETAILS



PLANTING LEGEND

- PROPOSED DECIDUOUS SHRUB
- PROPOSED DECIDUOUS TREE
- PROPOSED FERN/ HERBACEOUS

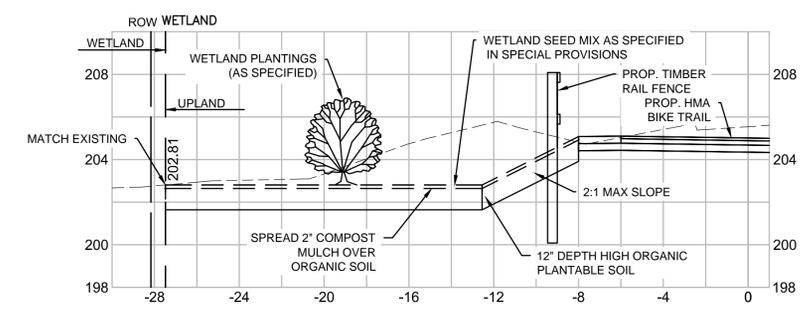
- NOTES**
- FOR BORDERING VEGETATED WETLAND IMPACTS SEE CONSTRUCTION PLANS & PROFILES.
 - SEE SPECIAL PROVISIONS FOR PLANTING INSTALLATION INSTRUCTIONS.

PLANTING PLAN

0 10 20 30 40
SCALE: 1" = 10'

PLANTING SPECIFICATIONS: AREA 3

PLANT TYPE	SYMBOL	SCIENTIFIC NAME	COMMON NAME	SIZE	QTY
SHRUBS	Ca	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	18-24"	7
	IvF	ILEX VERTICILLATA	WINTERBERRY- FEMALE	24-30"	1
	IvM	ILEX VERTICILLATA	WINTERBERRY- MALE	24-30"	1
	Sa	CORNUS AMOMUM	SILKY DOGWOOD	2-3'	6
	Lb	LINDERA BENZOIN	SPICEBUSH	15-18"	6
TREES	Ar	ACER RUBRUM	RED MAPLE	1"-1.5" CAL	8
FERN/ HERB ACEOUS	•	OSMUNDA CINNAMOMEA	CINNAMON FERN	GALLON	25
	*	ONOCLEA SENSIBILIS	SENSITIVE FERN	GALLON	6
	Ø	OSMUNDA REGALIS	ROYAL FERN	GALLON	2

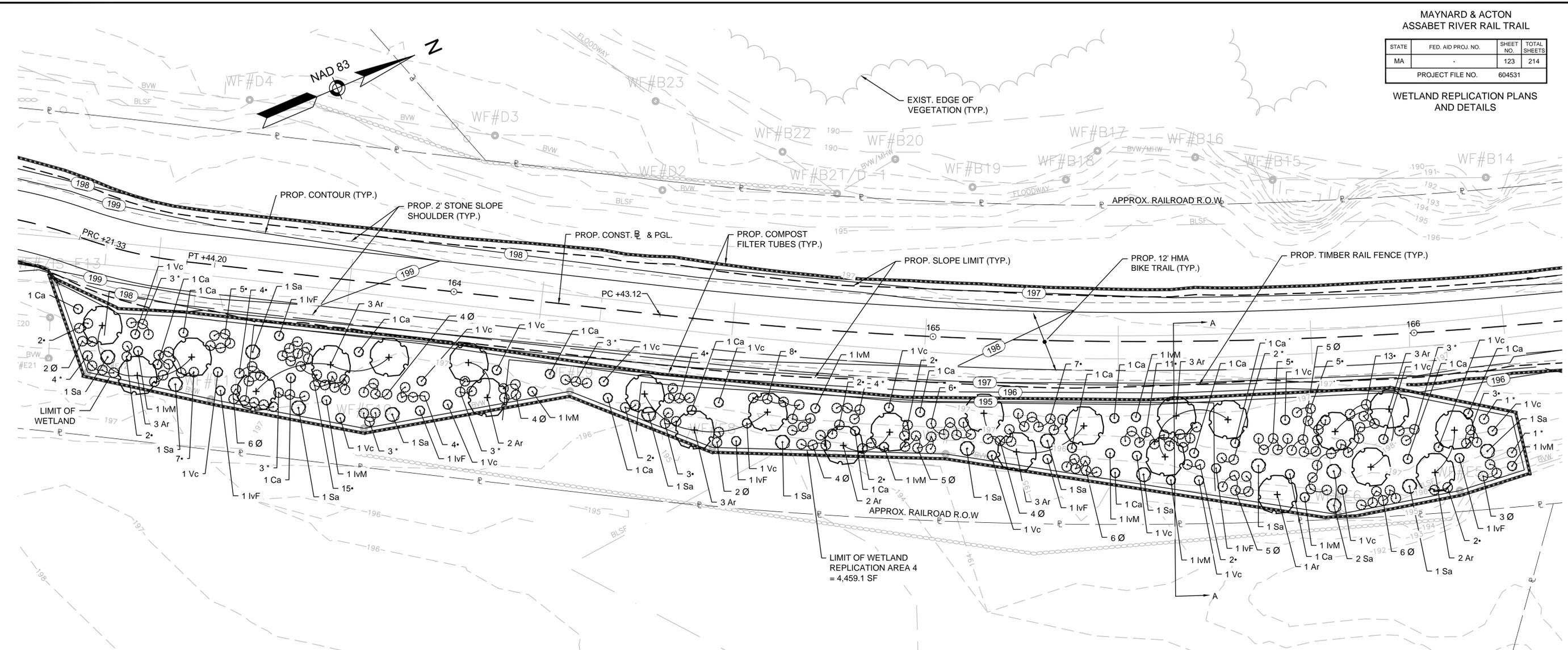


TYPICAL CROSS SECTION OF WETLAND REPLICATION AREA 3 SECTION A-A

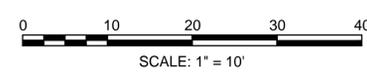
HOR. SCALE IN FEET
4 0 4 8
VER. SCALE IN FEET
4 0 4 8

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA		123	214
PROJECT FILE NO.		604531	

WETLAND REPLICATION PLANS AND DETAILS



PLANTING PLAN

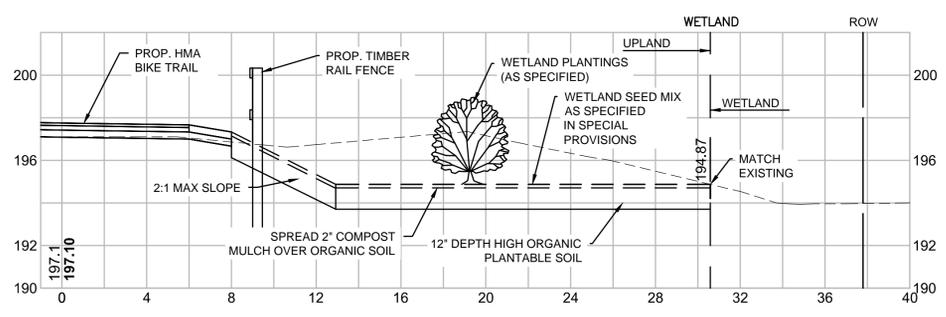


PLANTING SPECIFICATIONS: AREA 4					
PLANT TYPE	SYMBOL	SCIENTIFIC NAME	COMMON NAME	SIZE	QTY
SHRUBS	Ca	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	18-24"	19
	IvF	ILEX VERTICILLATA	WINTERBERRY- FEMALE	24-30"	7
	IvM	ILEX VERTICILLATA	WINTERBERRY- MALE	24-30"	10
	Sa	CORNUS AMOMUM	SILKY DOGWOOD	2-3'	15
	Vc	VACCINIUM CORYMBOSUM	BLUEBERRY HIGHBUSH	18-24"	18
TREES	Ar	ACER RUBRUM	RED MAPLE	1"-1.5" CAL	25
FERN/ HERB ACEOUS	•	OSMUNDA CINNAMOMEA	CINNAMON FERN	GALLON	116
	*	ONOCLEA SENSIBILIS	SENSITIVE FERN	GALLON	30
	Ø	OSMUNDA REGALIS	ROYAL FERN	GALLON	57

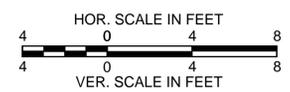
PLANTING LEGEND	
	PROPOSED DECIDUOUS SHRUB
	PROPOSED DECIDUOUS TREE
	PROPOSED FERN/ HERBACEOUS

NOTES

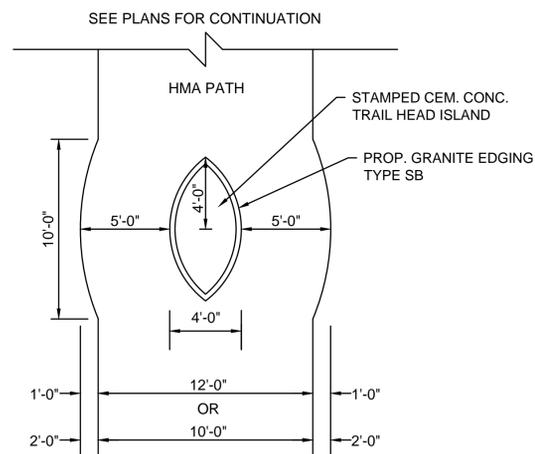
- FOR BORDERING VEGETATED WETLAND IMPACTS SEE CONSTRUCTION PLANS & PROFILES.
- SEE SPECIAL PROVISIONS FOR PLANTING INSTALLATION INSTRUCTIONS.



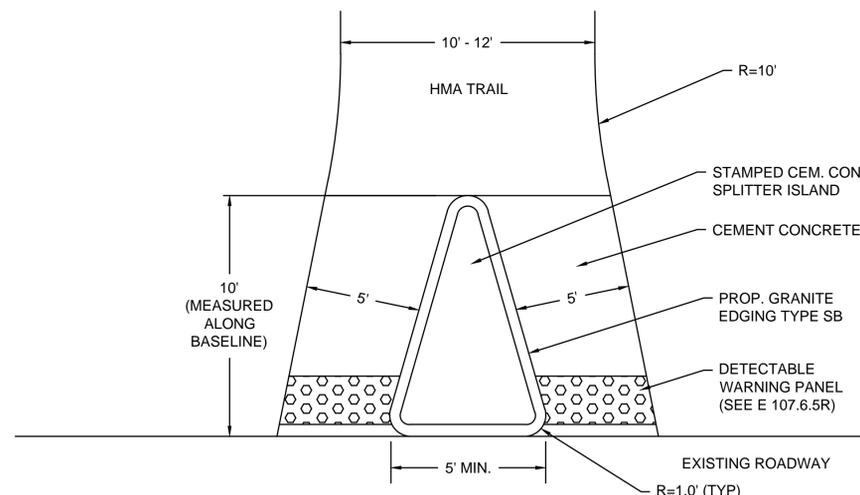
TYPICAL CROSS SECTION OF WETLAND REPLICATION AREA 4 SECTION A-A



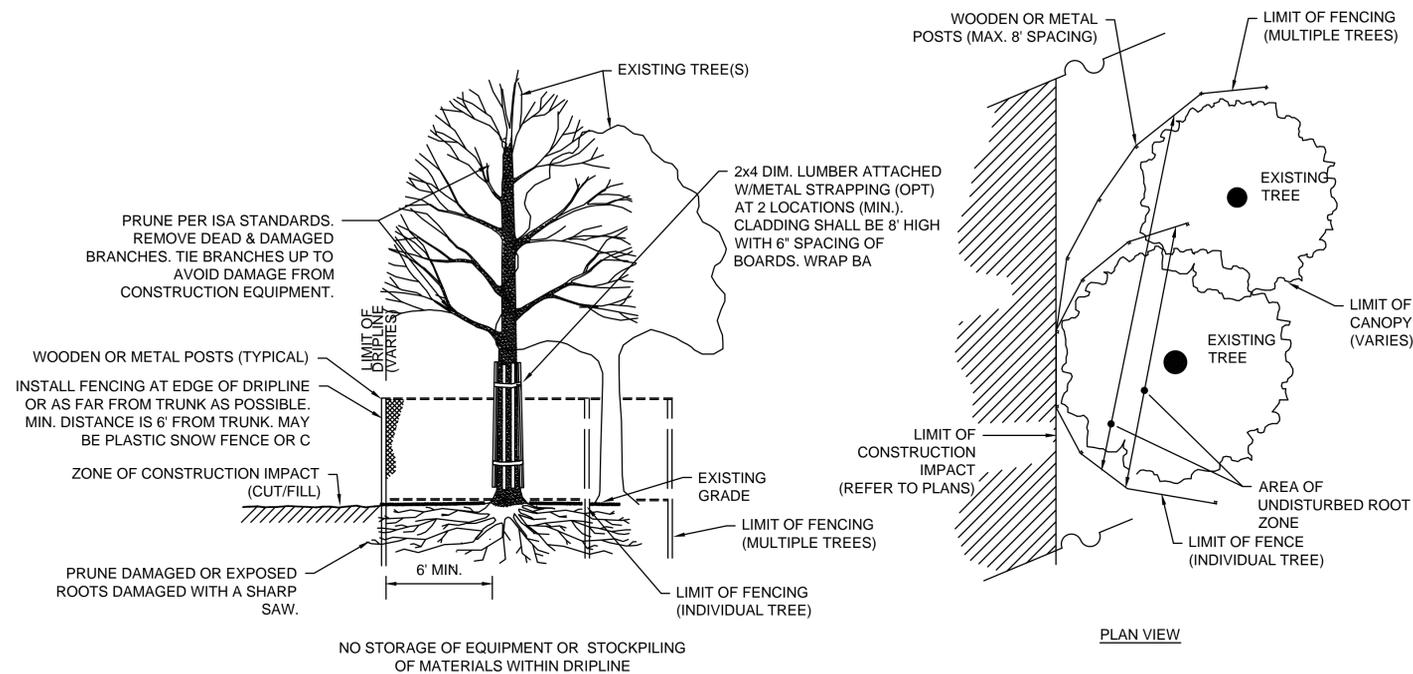
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	124	214
PROJECT FILE NO.		604531	



TRAIL HEAD ISLAND DETAIL
(TO BE USED AT PATH OPENINGS NOT ABUTTING ROADWAYS)
N.T.S.



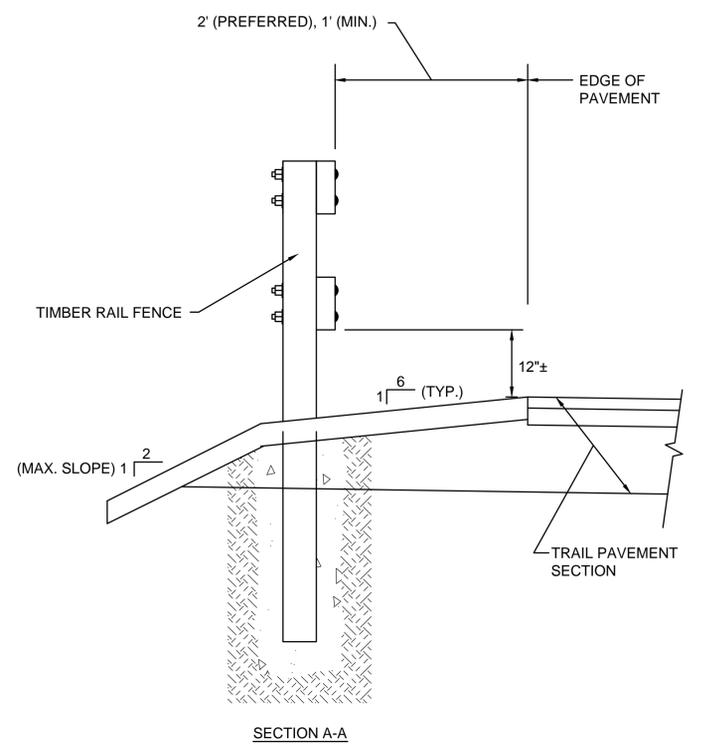
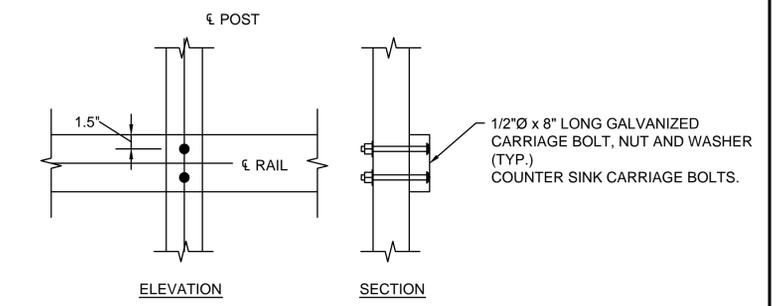
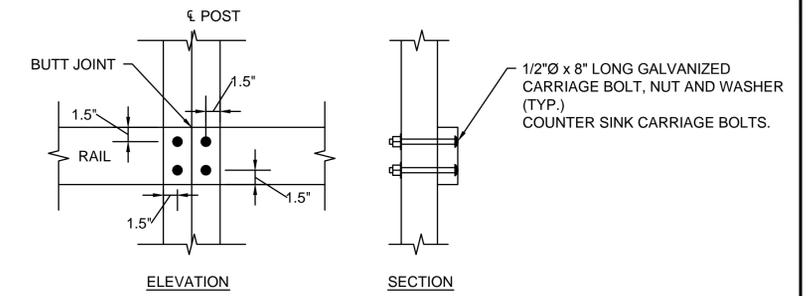
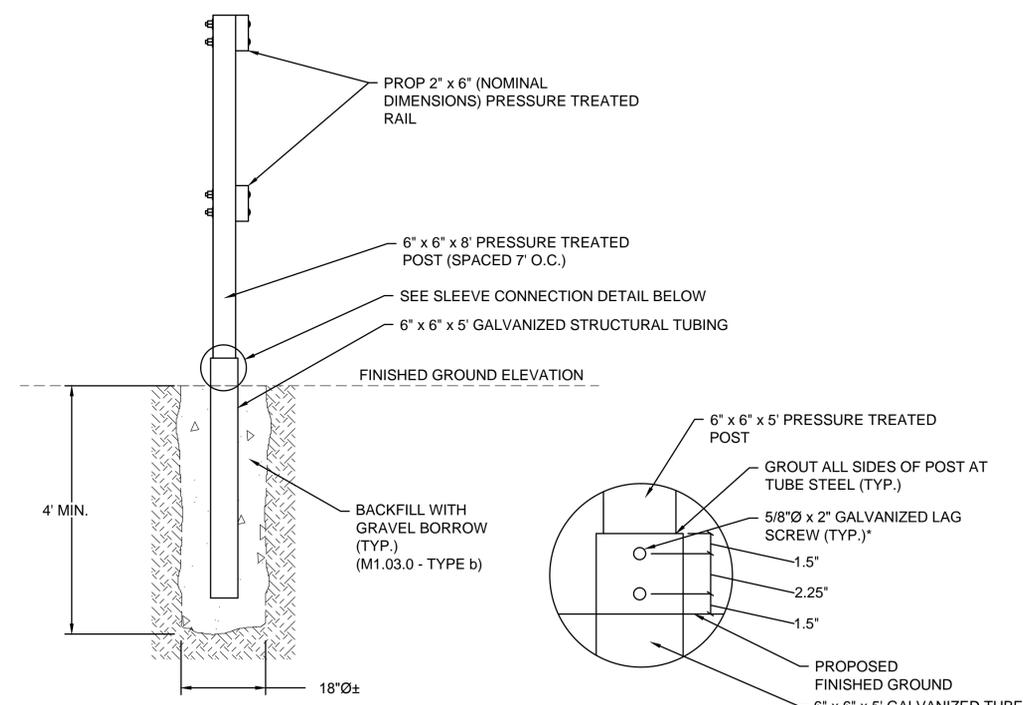
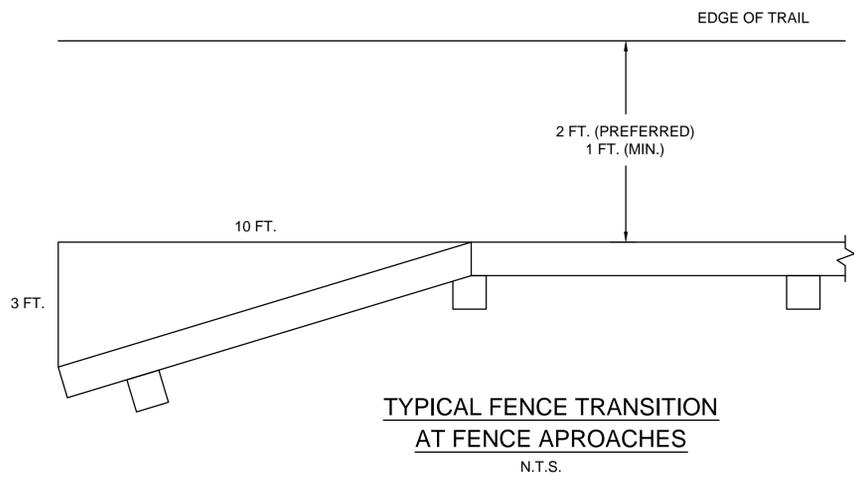
CEMENT CONCRETE TRAIL ENTRANCE WITH SPLITTER ISLAND
(TO BE USED AT PATH OPENINGS ABUTTING ROADWAYS)
N.T.S.



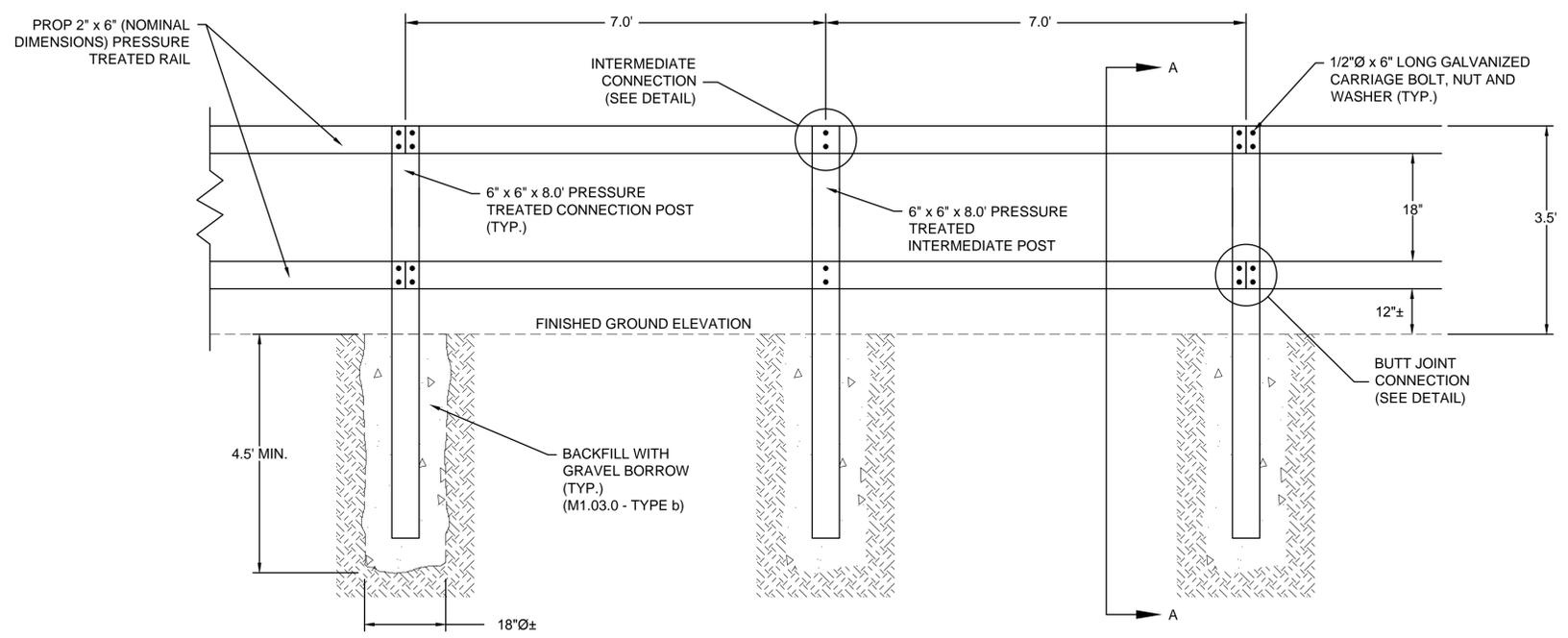
TREE PROTECTION PLAN
N.T.S.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	125	214
PROJECT FILE NO.		604531	

CONSTRUCTION DETAILS



**TIMBER RAIL FENCE TUBE STEEL SLEEVE
(FOR USE IN SATURATED LOCATIONS)**
N.T.S.

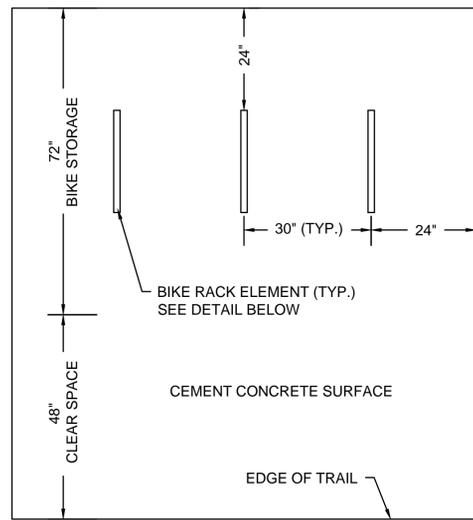


SUGGESTED TIMBER RAIL FENCE CONSTRUCTION SEQUENCE

1. AUGER OR DIG POST HOLE TO REQUIRED DIMENSIONS.
2. IF GROUND IS SATURATED, USE TUBE STEEL SLEEVE. SEE DETAIL ON THIS SHEET.
3. BACKFILL BOTTOM 6"± OF HOLE WITH GRAVEL AND COMPACT THOROUGHLY.
4. SET POST AND HOLD PLUMB DURING BACKFILLING.
5. BACKFILL WITH GRAVEL IN 12" LIFTS. COMPACT EACH LIFT THOROUGHLY.
6. CLAMP RAILS TO POSTS AND FIELD DRILL BOLT HOLES.
7. SET BOLTS, WASHERS AND NUTS.
8. IF CCA PRESSURE TREATED LUMBER IS NOT READILY AVAILABLE AT THE TIME OF CONSTRUCTION OR IT IS DEEMED ENVIRONMENTALLY UNACCEPTABLE FOR COMMERCIAL USES BY THE EPA, USE ACQ PRESSURE TREATED LUMBER.

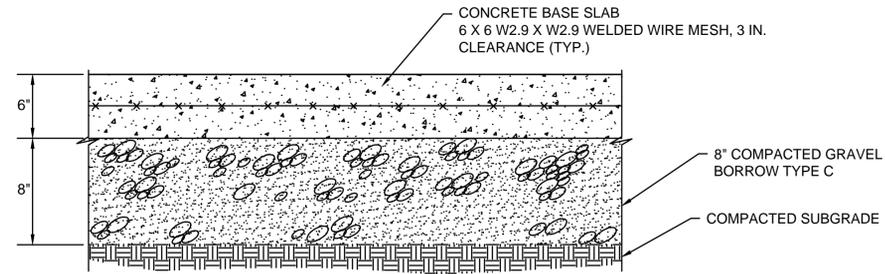
TIMBER RAIL FENCE ELEVATION
N.T.S.
SEE PLANS FOR LOCATIONS

- NOTES:
1. FOR RADII LESS THAN 165', USE CONNECTION POSTS SET AT 7.0' O.C. AND SHORTEN RAILS ACCORDINGLY.

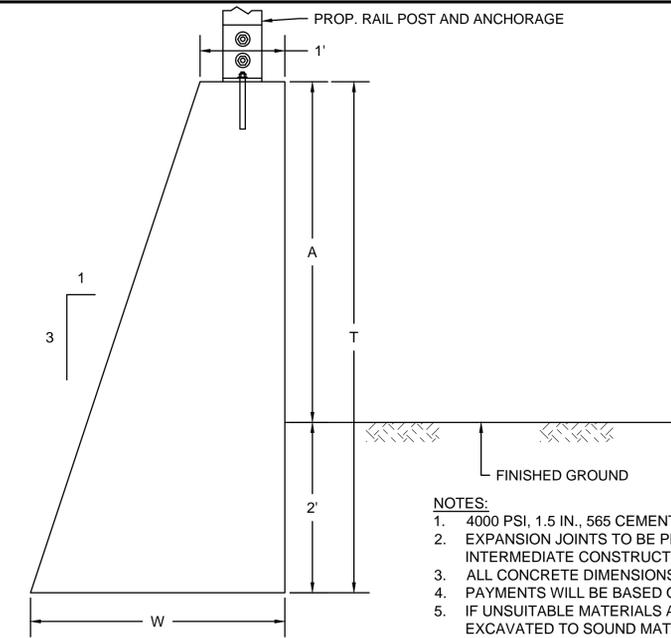


- NOTES:
- ALL DIMENSIONS MINIMUM
 - SEE PLANS FOR QUANTITY OF BIKE RACK ELEMENTS

BICYCLE RACK PLACEMENT



CEMENT CONCRETE FOUNDATION

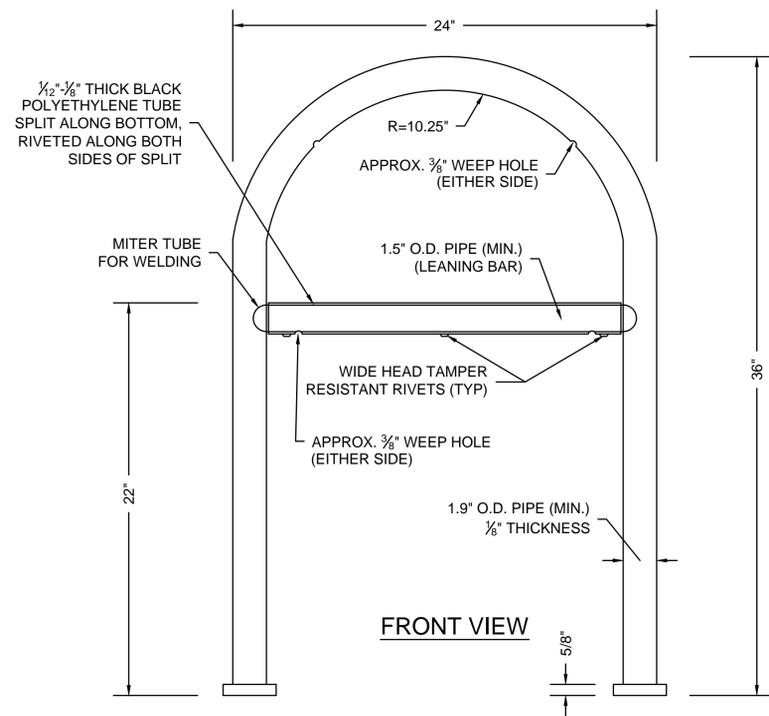


- NOTES:
1. 4000 PSI, 1.5 IN., 565 CEMENT CONCRETE TO BE USED.
 2. EXPANSION JOINTS TO BE PLACED 90' O.C. MAXIMUM WITH INTERMEDIATE CONSTRUCTION JOINTS PLACED AT 30' O.C. MAXIMUM.
 3. ALL CONCRETE DIMENSIONS SHOWN ARE MINIMUM.
 4. PAYMENTS WILL BE BASED ON TABLE BELOW.
 5. IF UNSUITABLE MATERIALS ARE ENCOUNTERED, THEY SHALL BE EXCAVATED TO SOUND MATERIAL AND BACKFILLED WITH CRUSHED STONE. COSTS ASSOCIATED WITH OVER EXCAVATION ARE TO BE PAID UNDER ITEMS 141. AND 156.

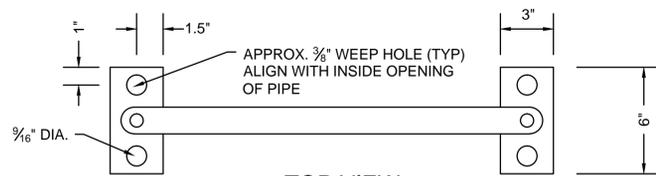
HEIGHTS		WIDTH	AREA SQ. FT.	CU. YDS. PER LIN. FT.
A	T	W		
2'-0"	4'-0"	2'-4"	6.667	0.247
2'-6"	4'-6"	2'-6"	7.875	0.292
3'-0"	5'-0"	2'-8"	9.165	0.339
3'-6"	5'-6"	2'-10"	10.541	0.390
4'-0"	6'-0"	3'-0"	12.000	0.444
4'-6"	6'-6"	3'-2"	13.541	0.502
5'-0"	7'-0"	3'-4"	15.162	0.562

LOW RETAINING WALL

N.T.S.



FRONT VIEW

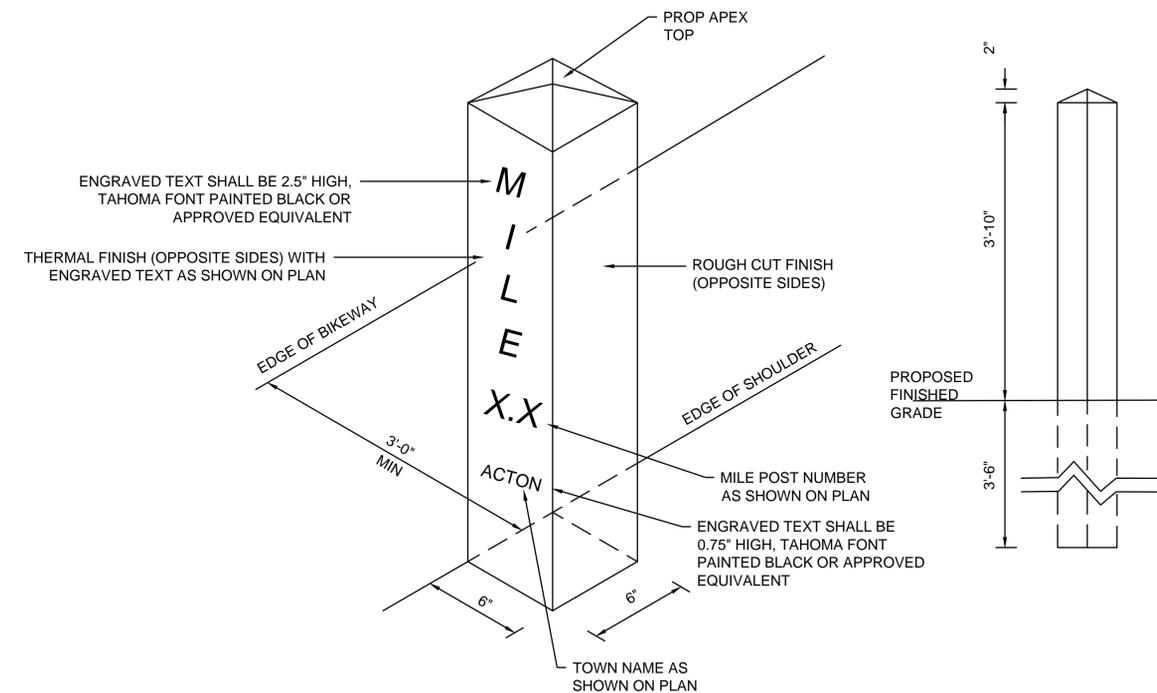


TOP VIEW

BICYCLE RACK ELEMENT DETAIL

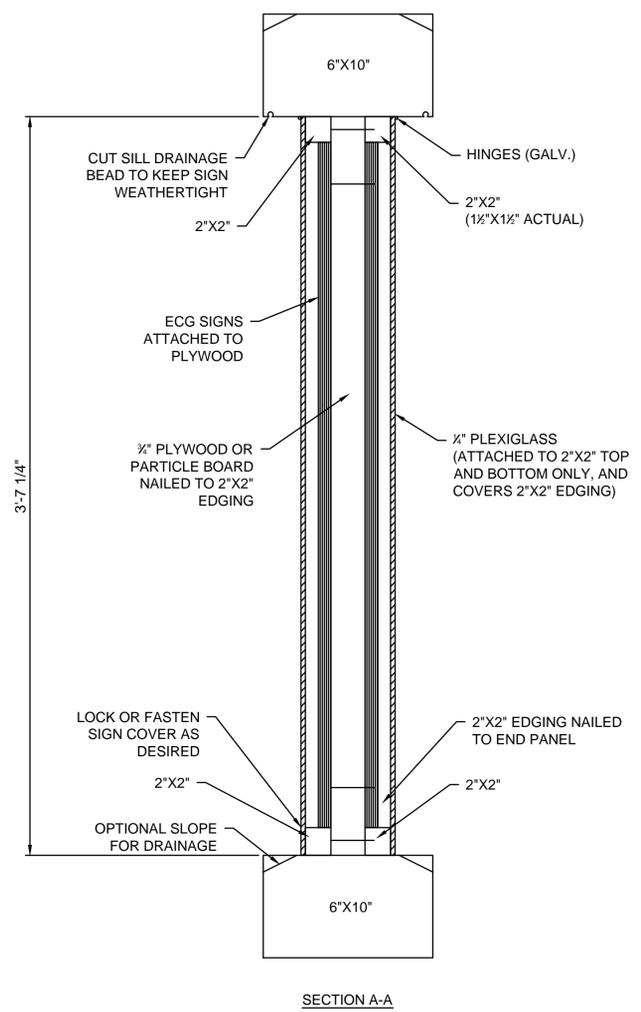
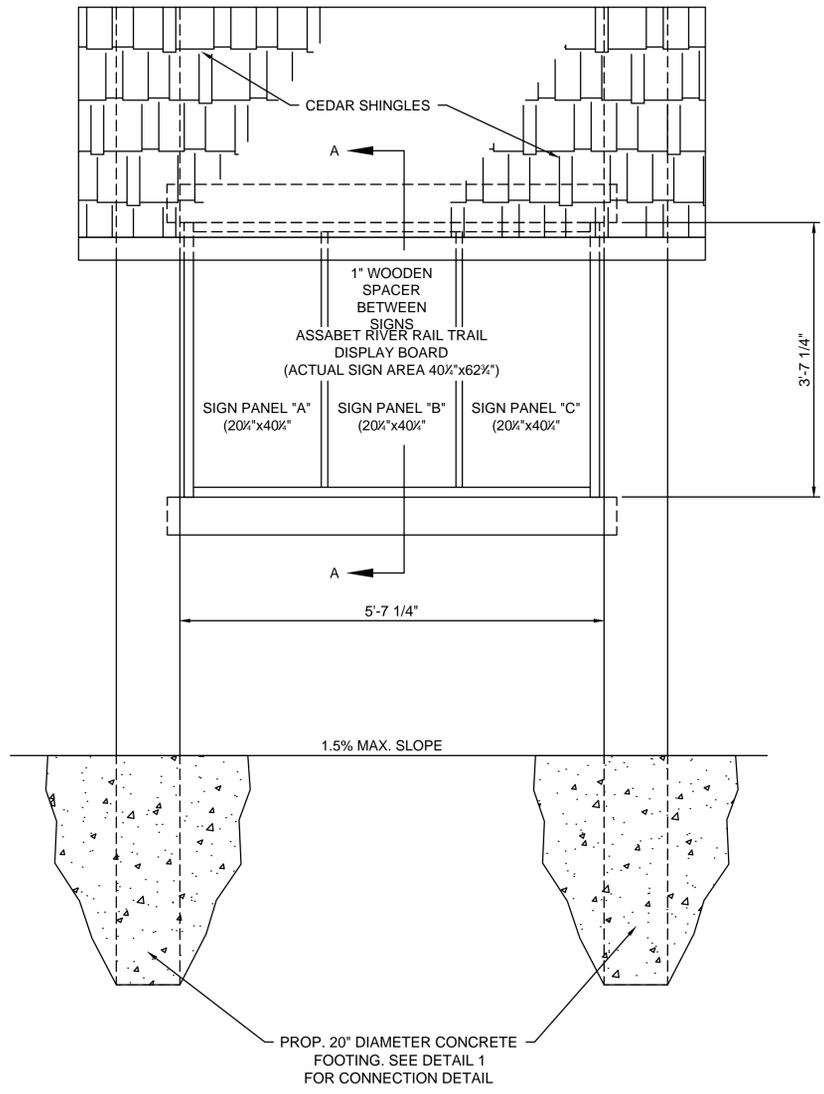
N.T.S.

NOTE:
DIMENSIONS ARE APPROXIMATE AND WILL BE DETERMINED IN COORDINATION WITH THE MANUFACTURER. BIKE RACK ELEMENTS TO BE OF THE INVERTED "U" OR "A" TYPE AS DEFINED IN "BICYCLE PARKING GUIDELINES" BY ASSOCIATION OF PEDESTRIAN AND BICYCLE PROFESSIONALS. EACH BIKE RACK ELEMENT SHALL ACCOMMODATE TWO BICYCLES.

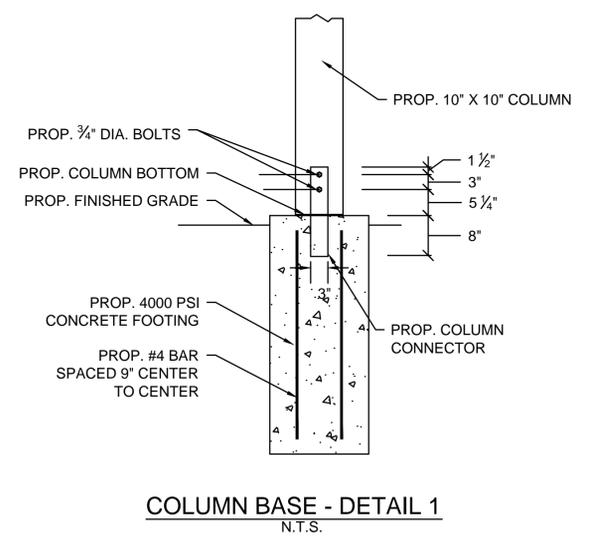
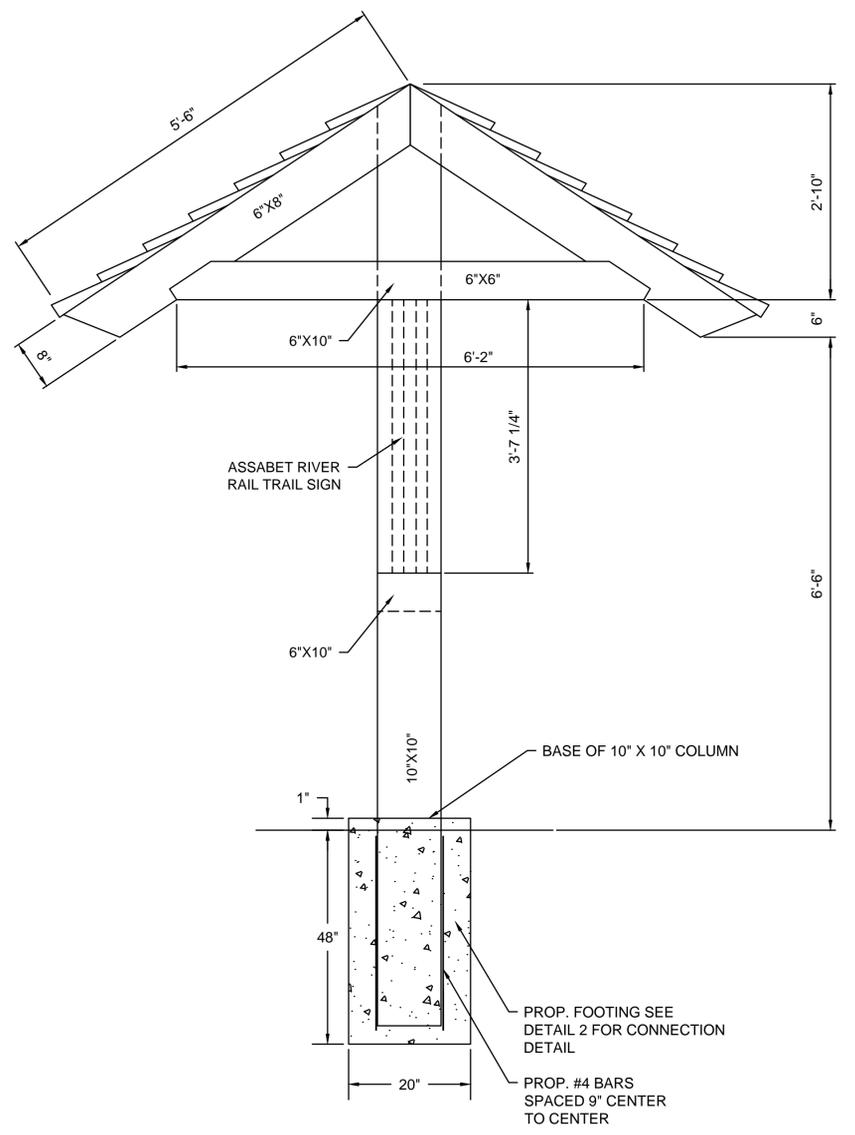


GRANITE MARKER

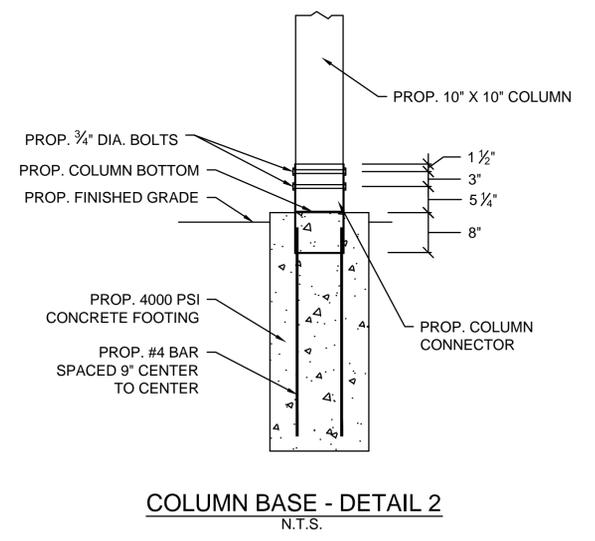
N.T.S.



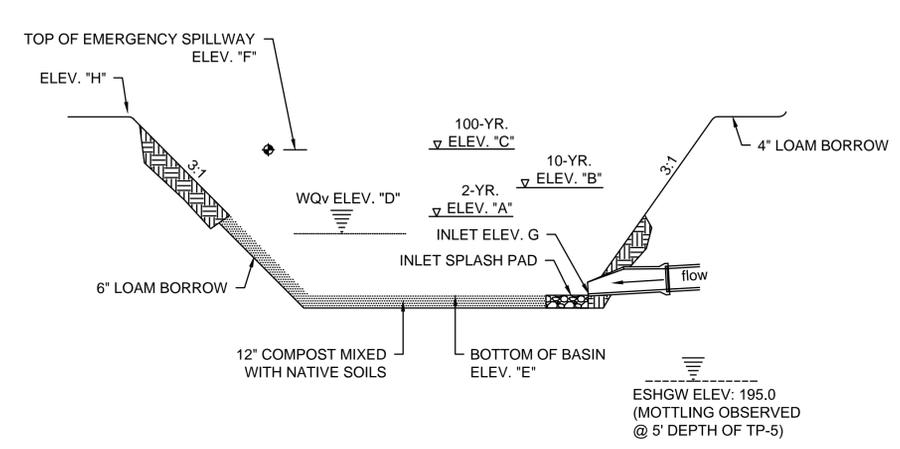
DISPLAY BOARD DETAILS
 N.T.S.



COLUMN BASE - DETAIL 1
 N.T.S.

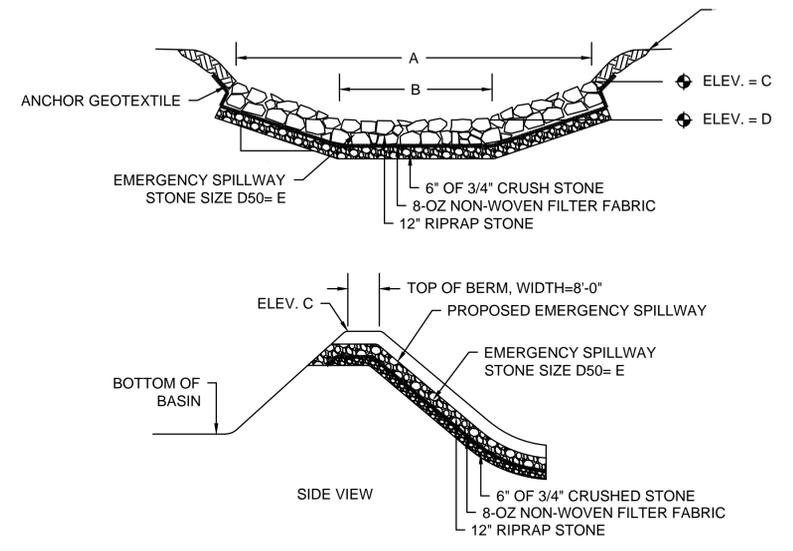


COLUMN BASE - DETAIL 2
 N.T.S.



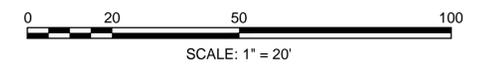
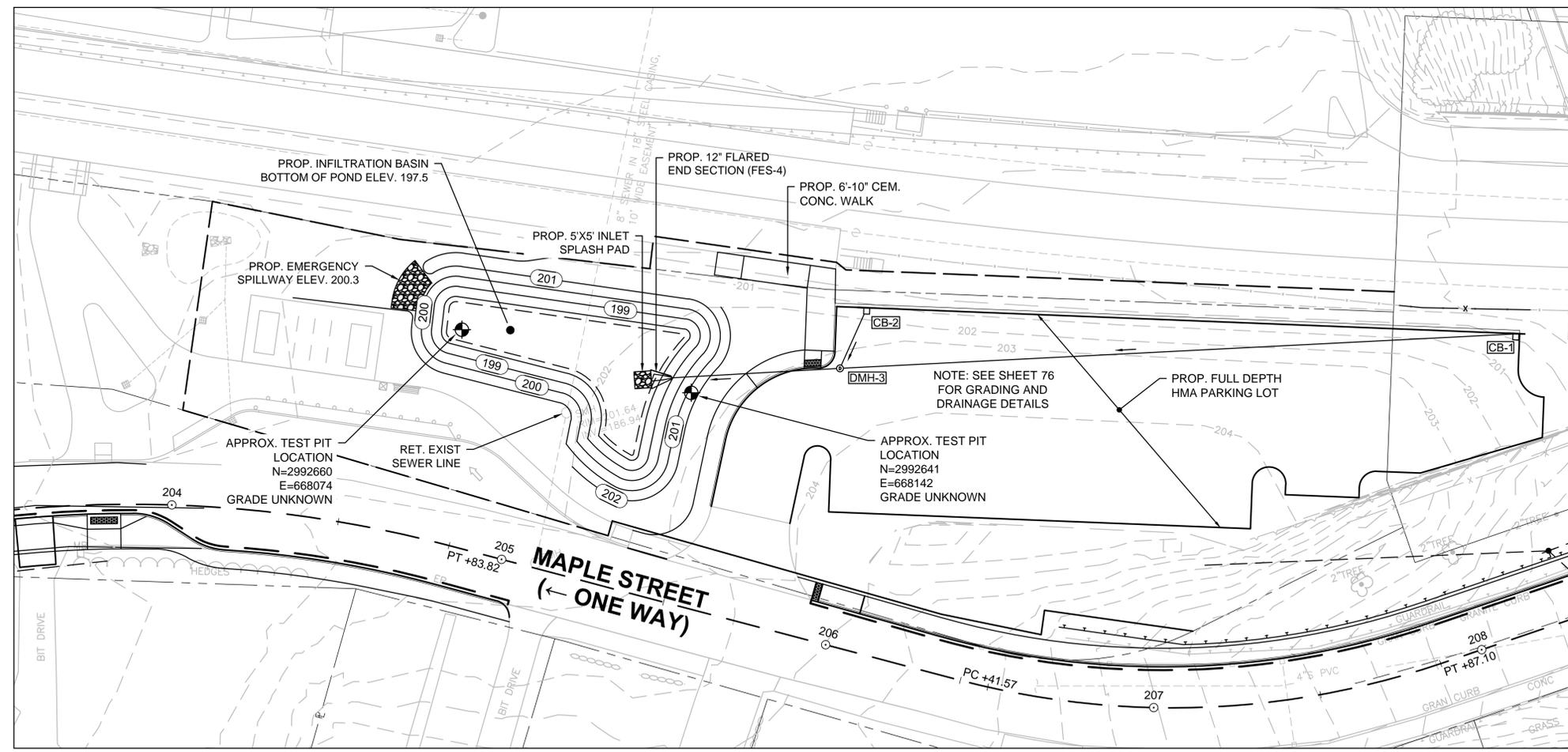
BASIN DESIGN TABLE								
	A	B	C	D	E	F	G	H
INFILTRATION BASIN	198.70	199.65	200.37	197.93	197.50	200.30	197.60	201.3

TYPICAL INFILTRATION/ EXTENDED DETENTION BASIN
CROSS-SECTION
NTS



SPILLWAY DESIGN TABLE					
	A	B	C	D	E
IB-1	12'	6'	201.30	200.30	4"

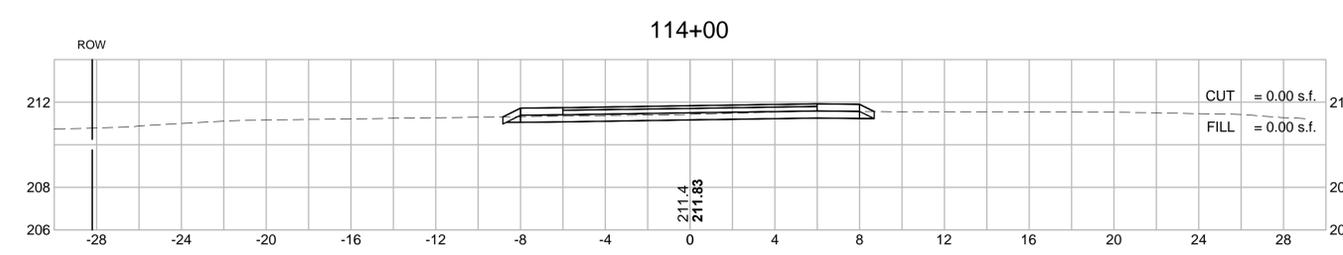
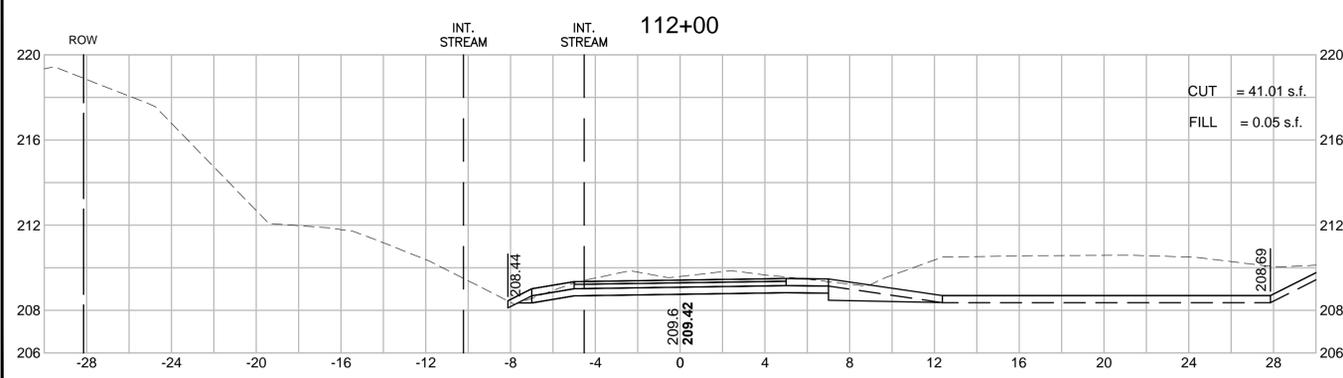
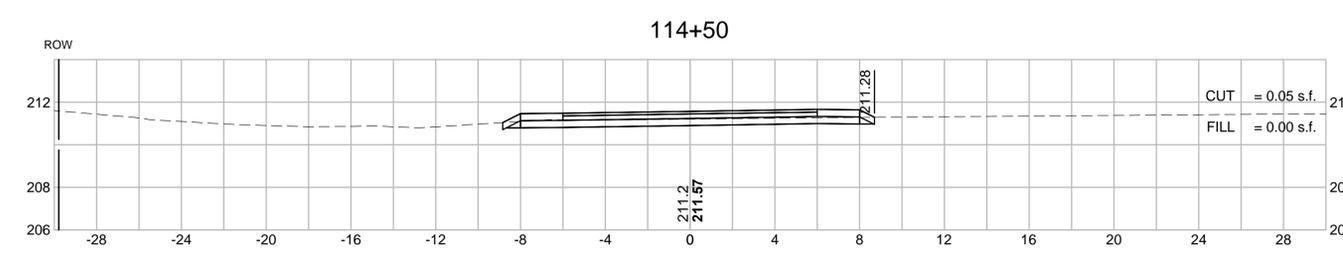
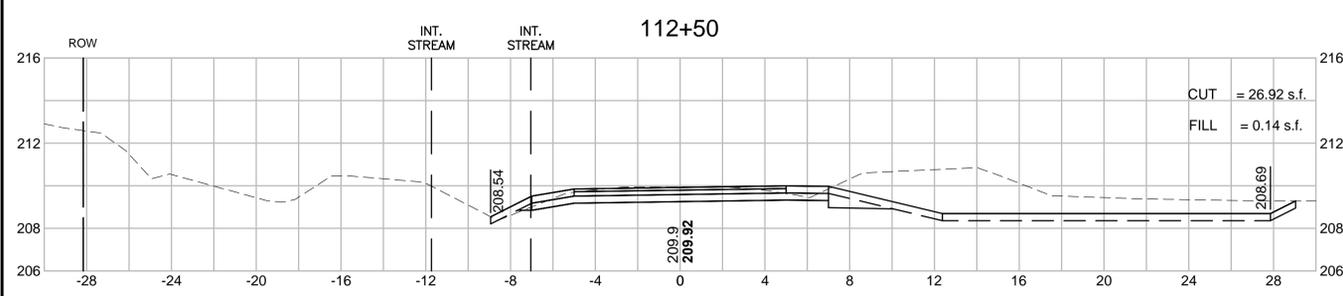
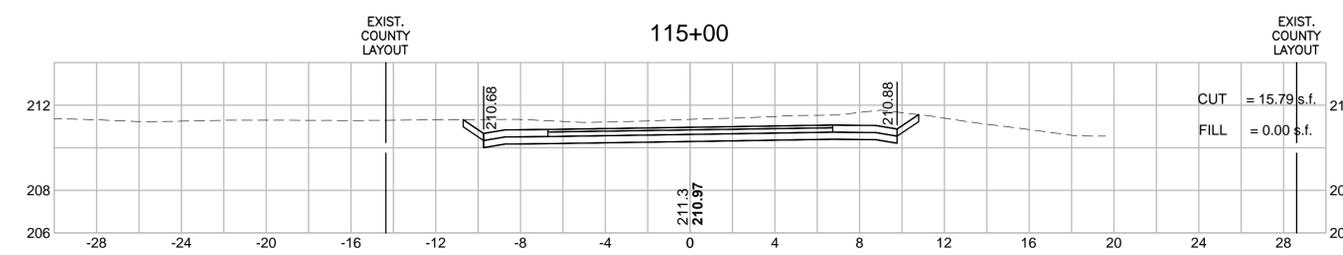
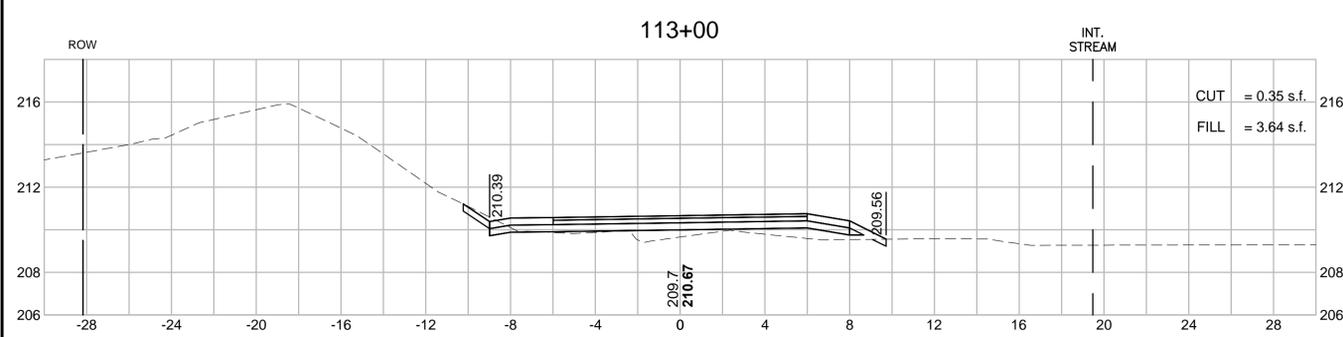
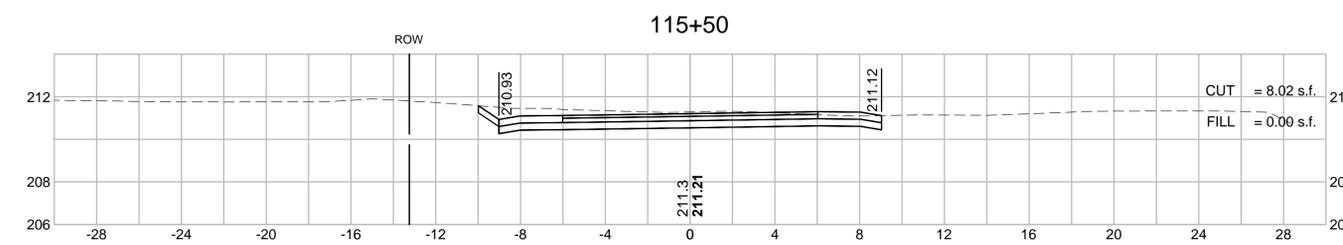
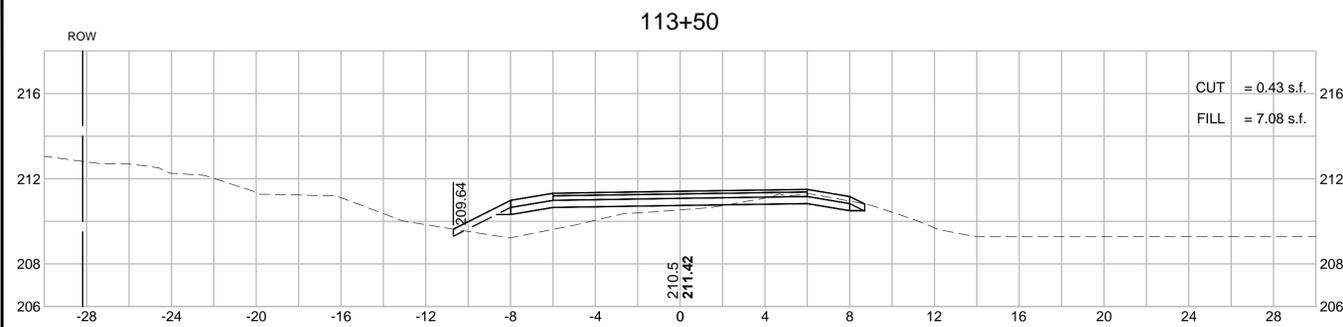
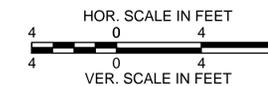
SPILLWAY CROSS-SECTION
NTS



MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	185	214
PROJECT FILE NO.		604531	

CROSS SECTIONS

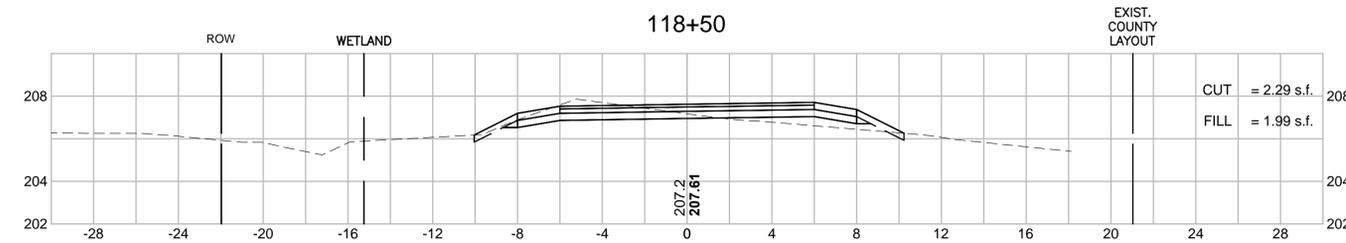
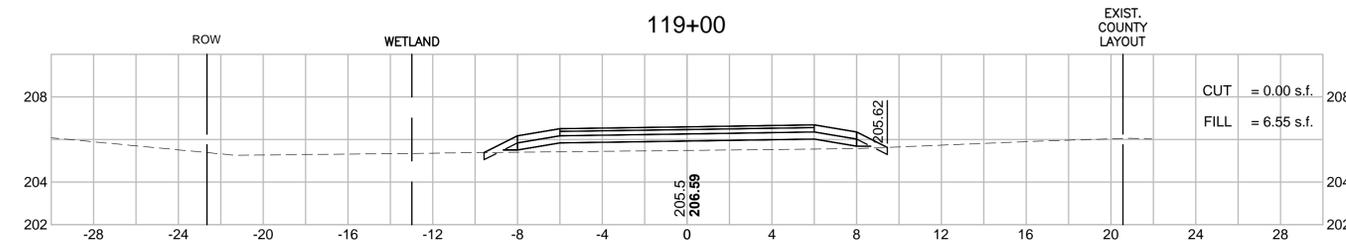
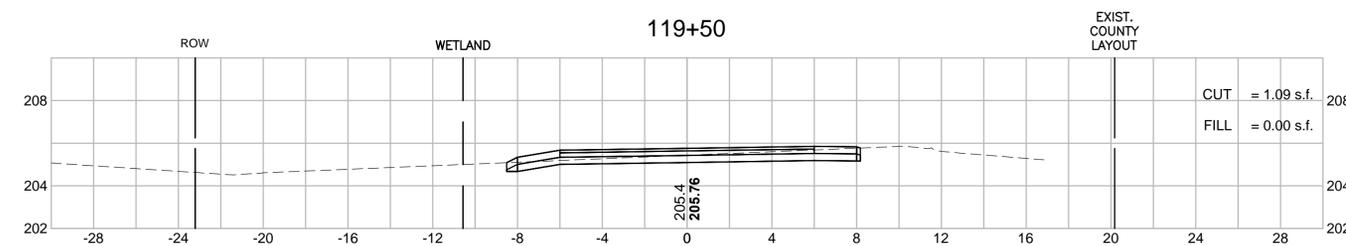
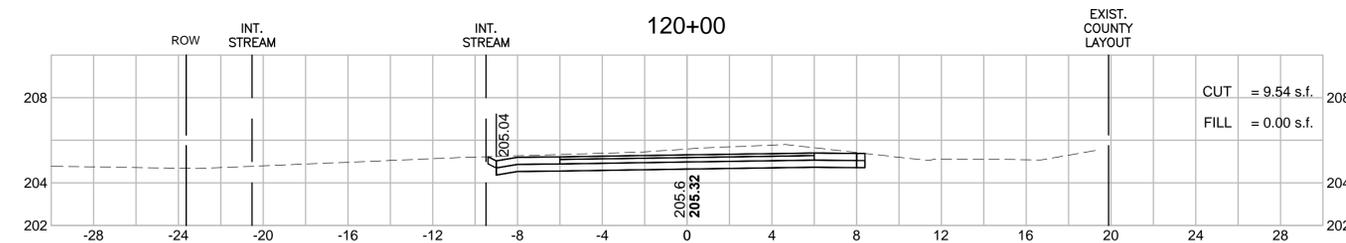
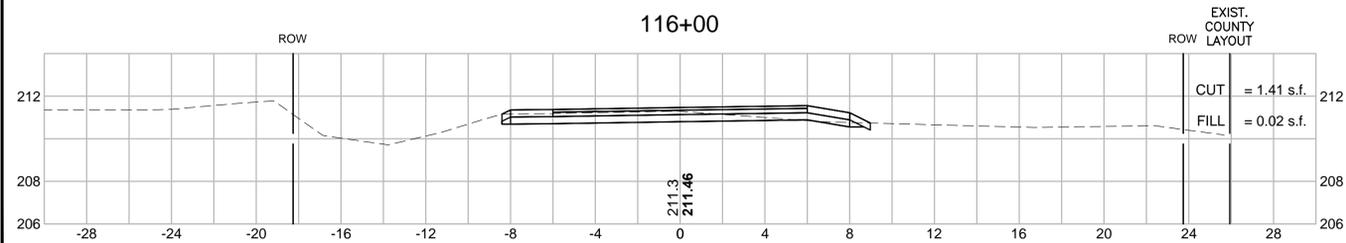
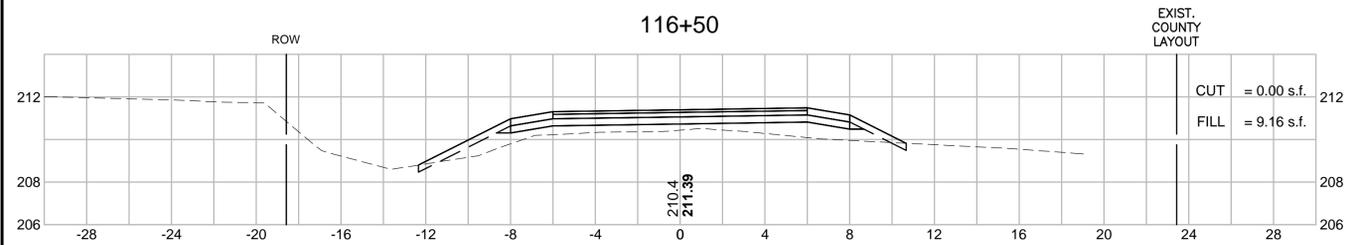
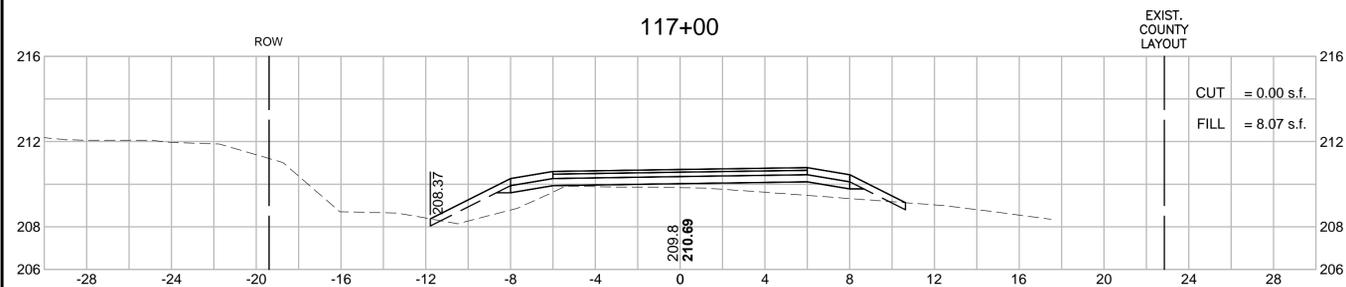
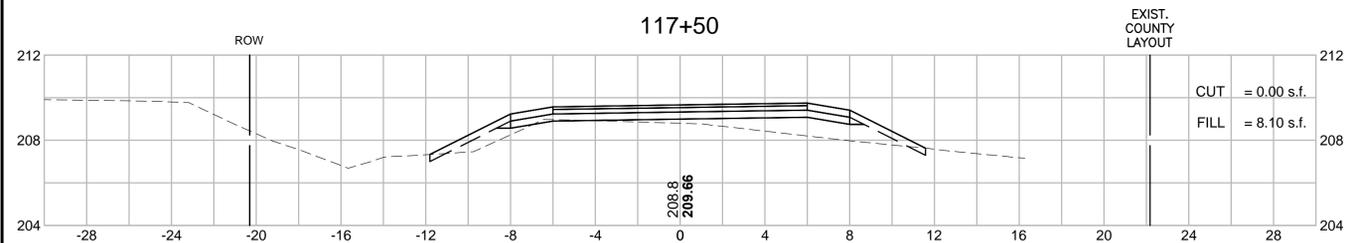
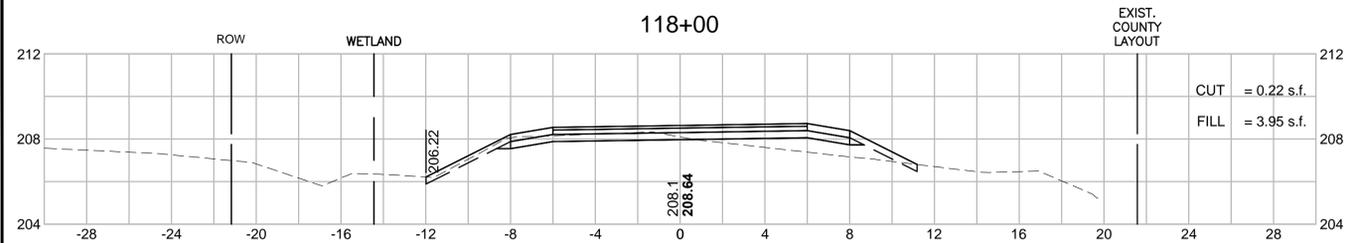
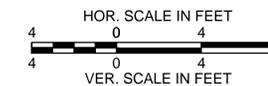


MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	186	214

PROJECT FILE NO. 604531

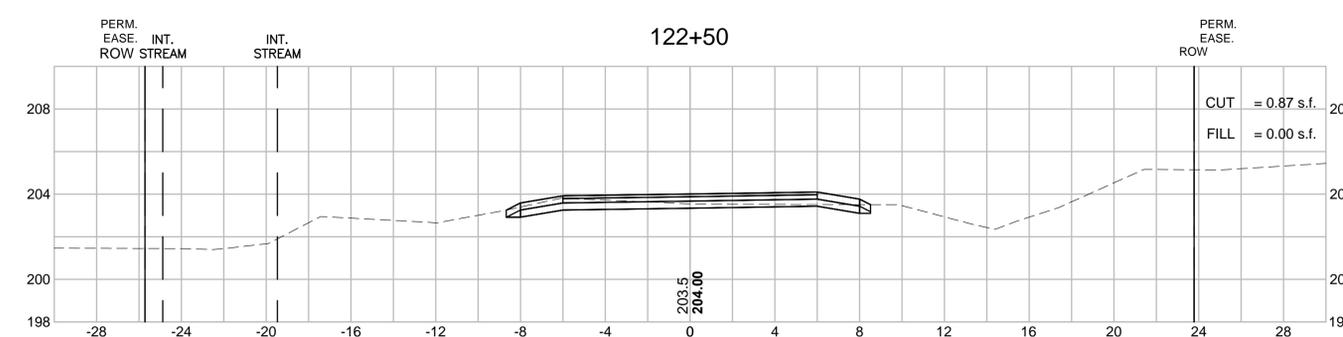
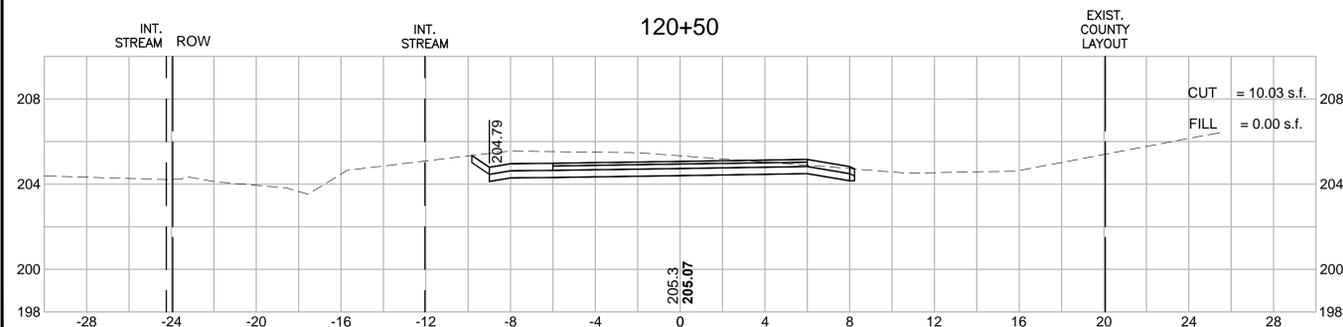
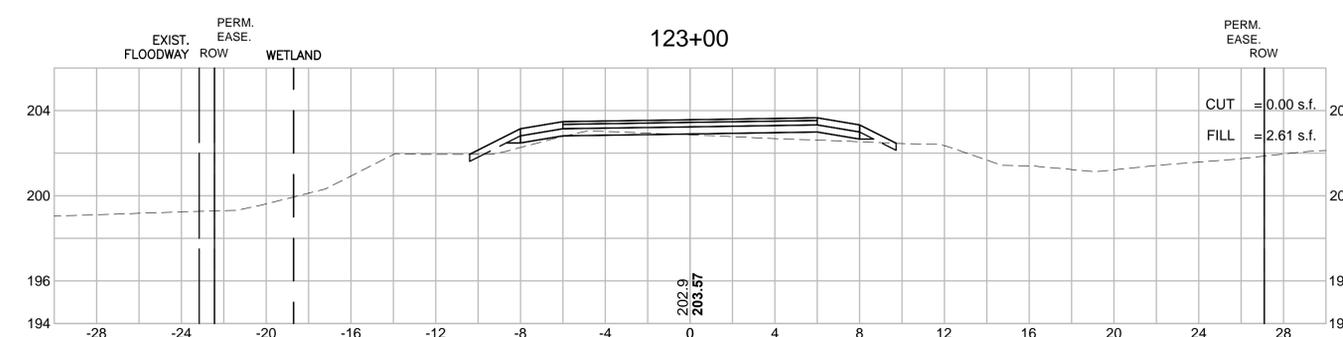
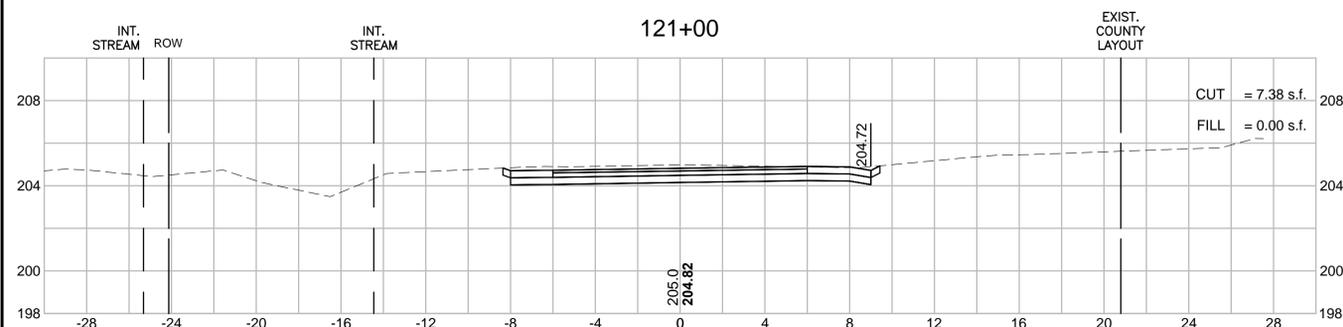
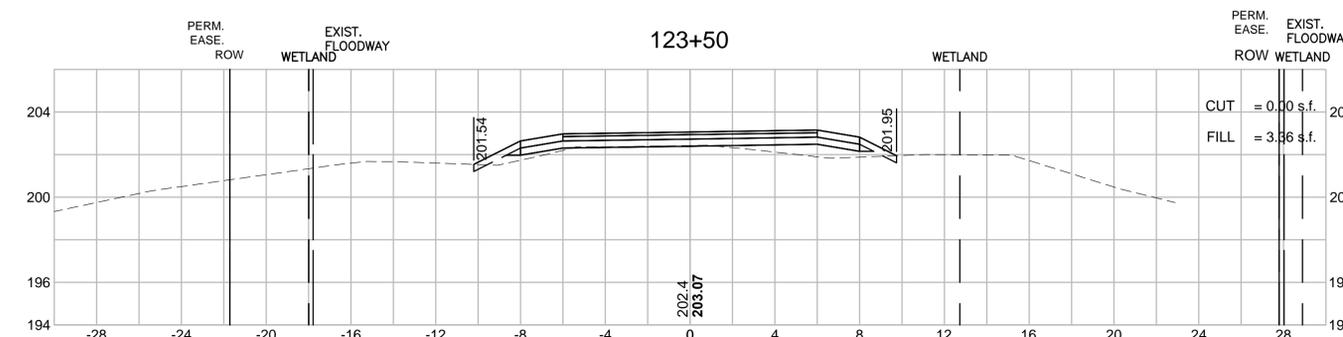
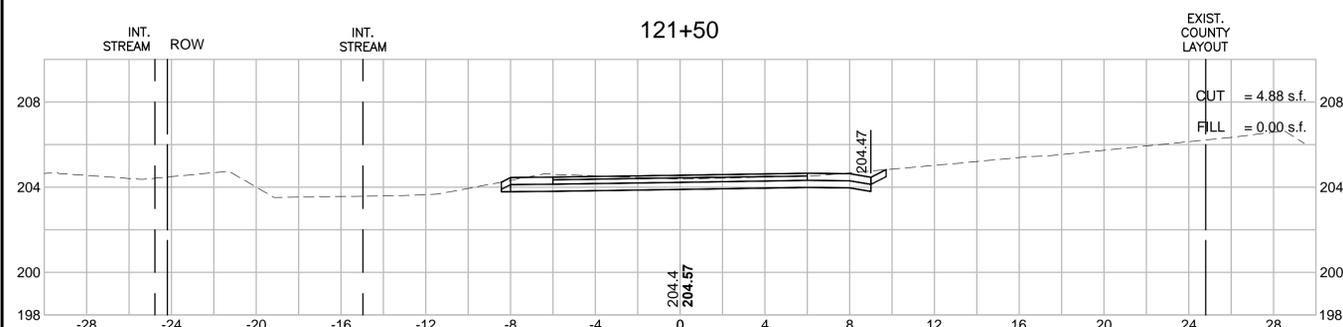
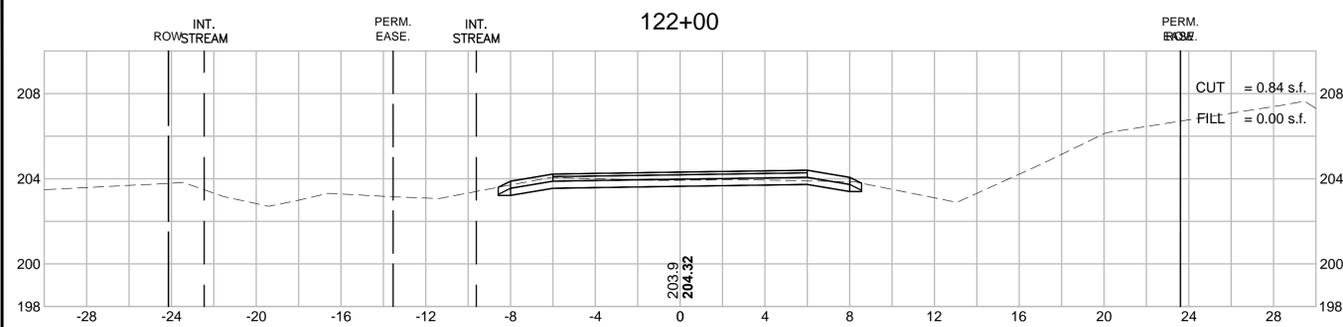
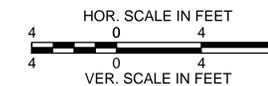
CROSS SECTIONS



MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	187	214
PROJECT FILE NO.		604531	

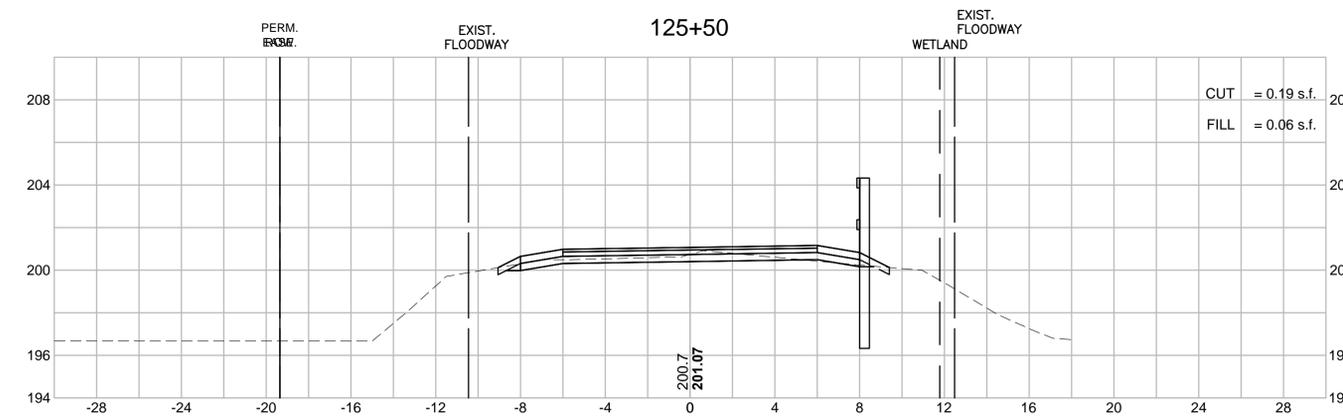
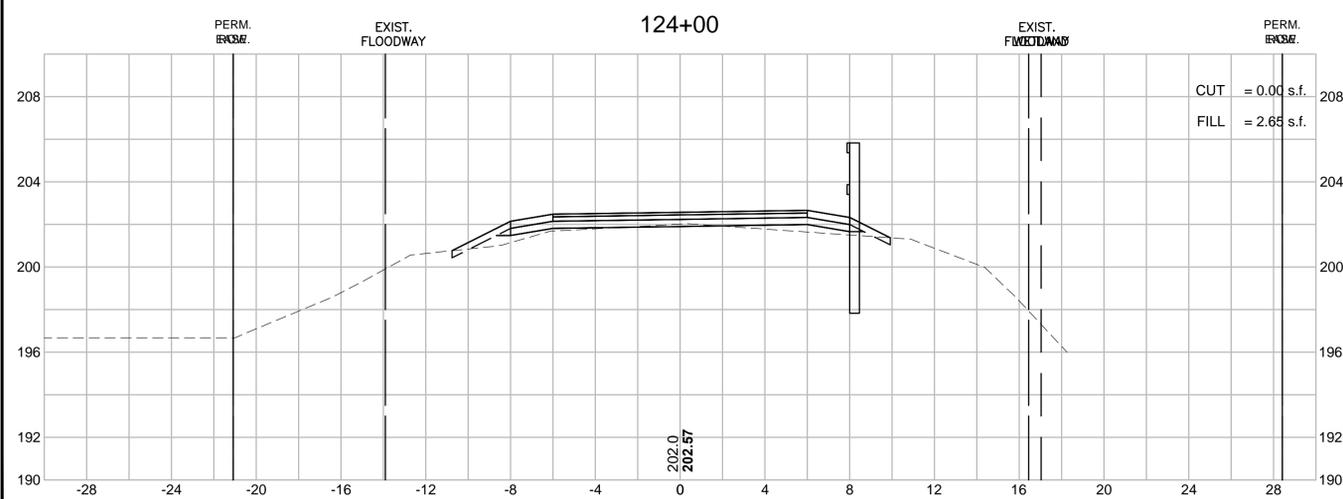
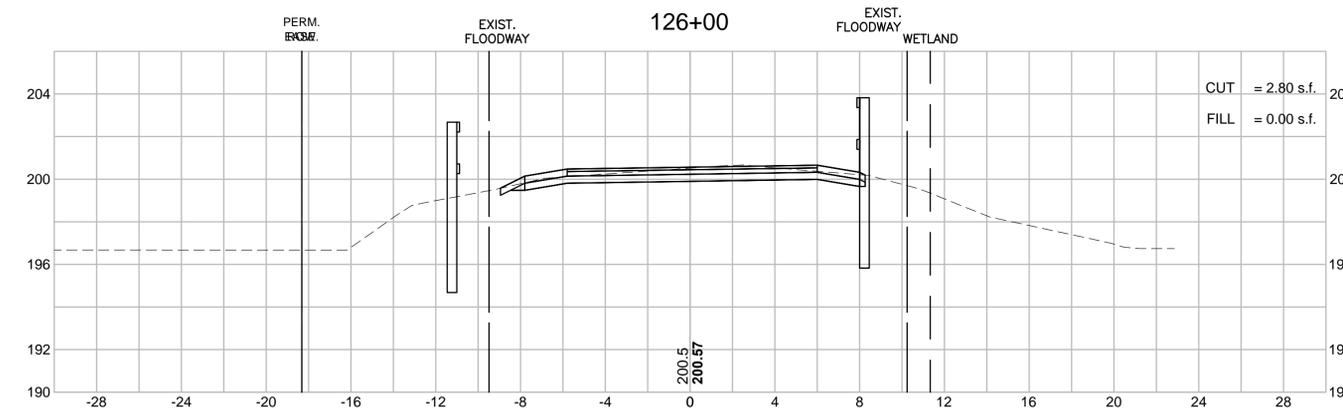
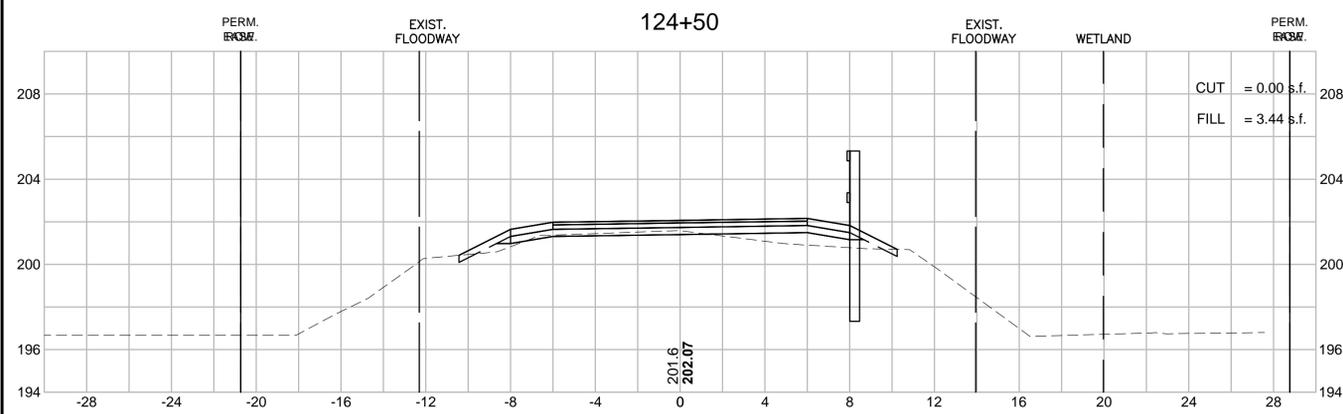
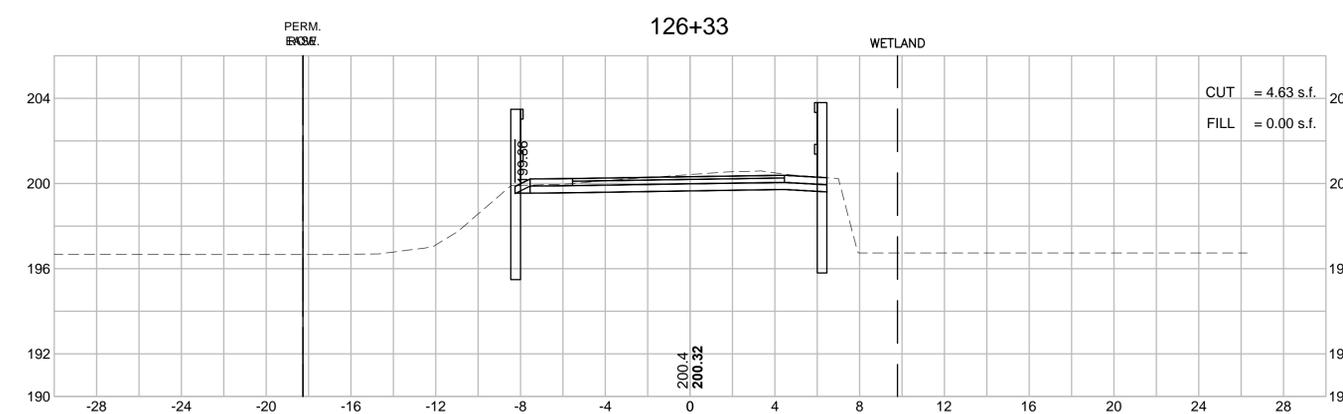
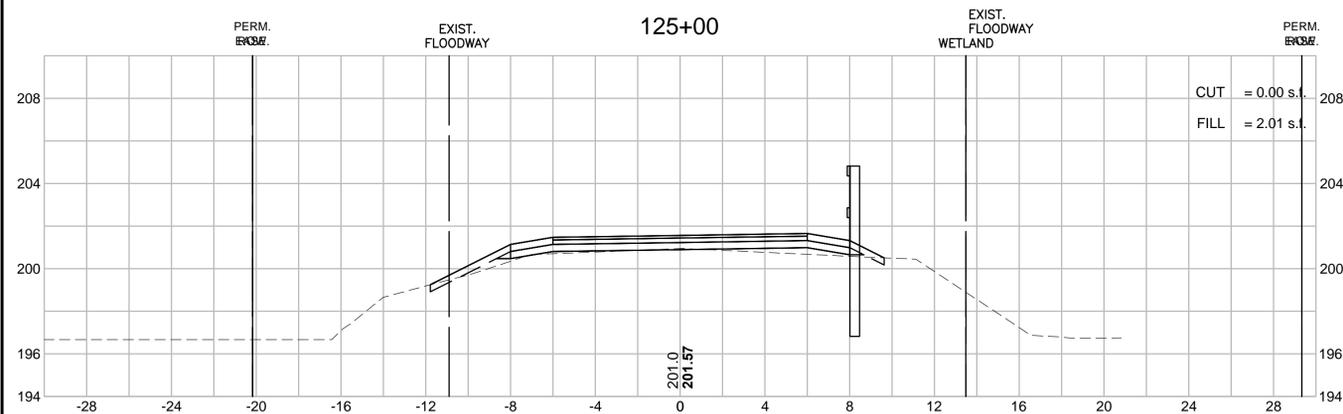
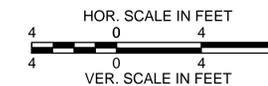
CROSS SECTIONS



MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	188	214
PROJECT FILE NO.		604531	

CROSS SECTIONS

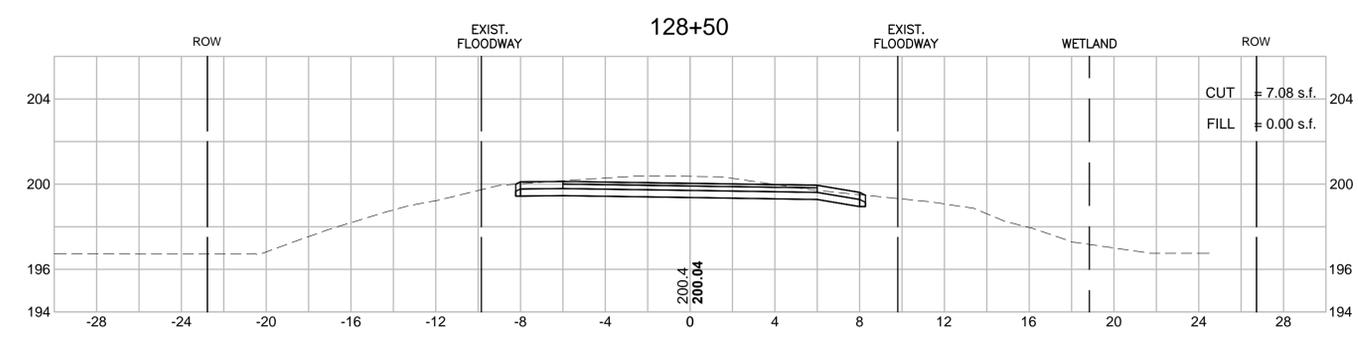
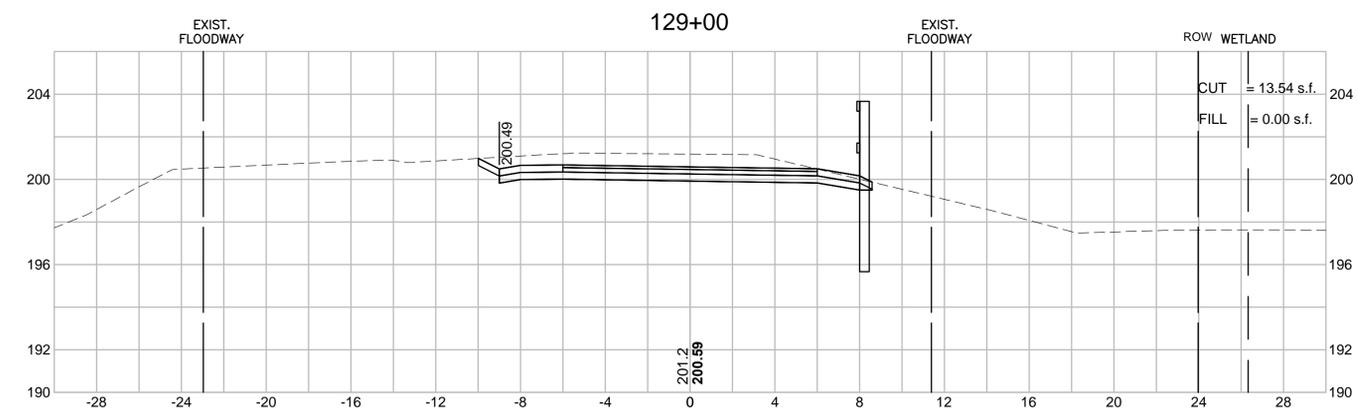
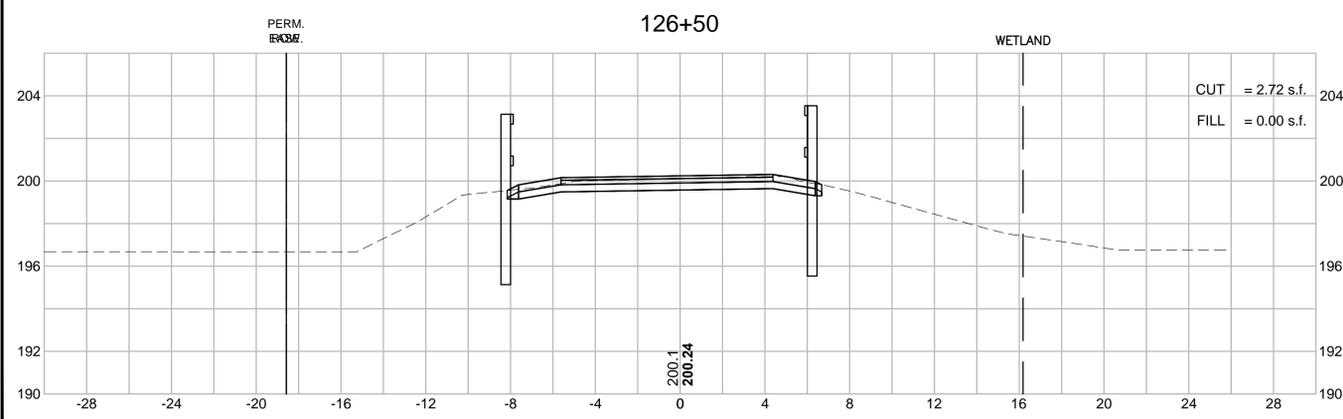
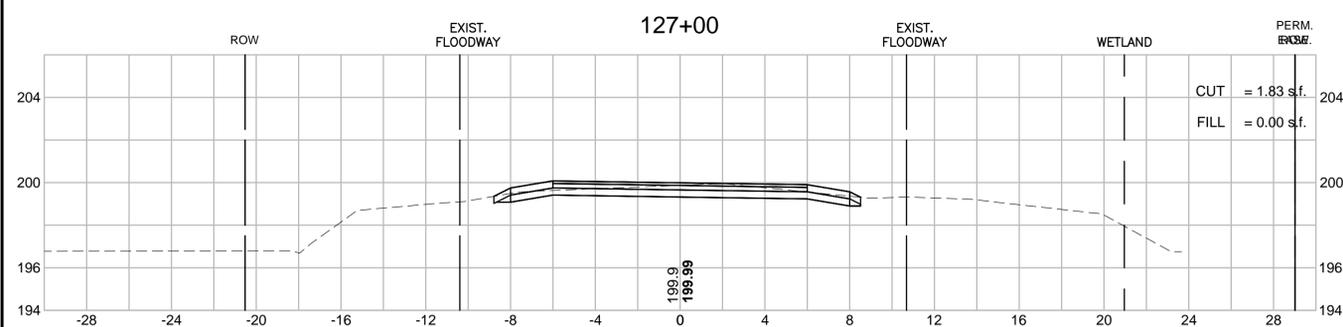
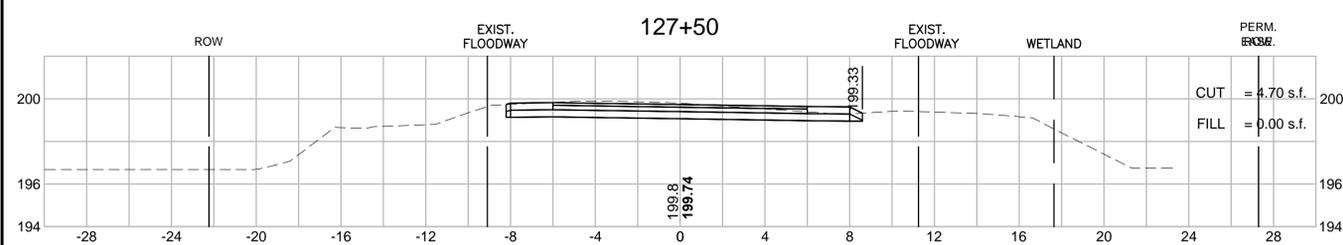
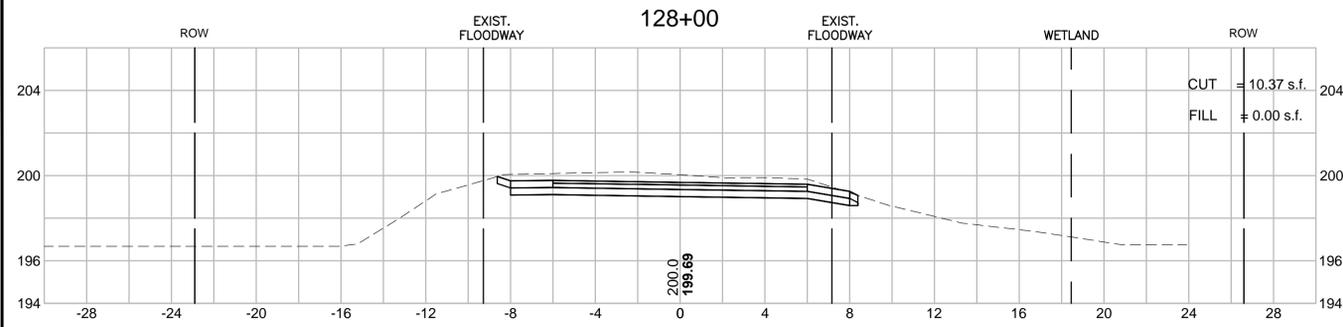
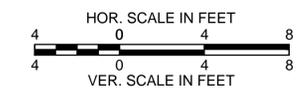


MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	189	214

PROJECT FILE NO. 604531

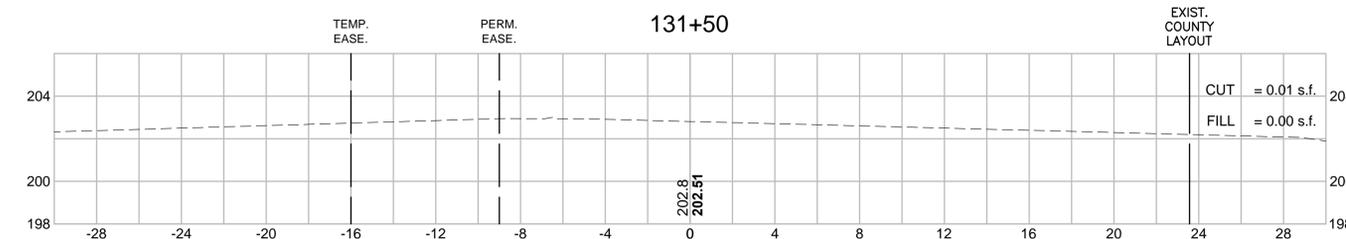
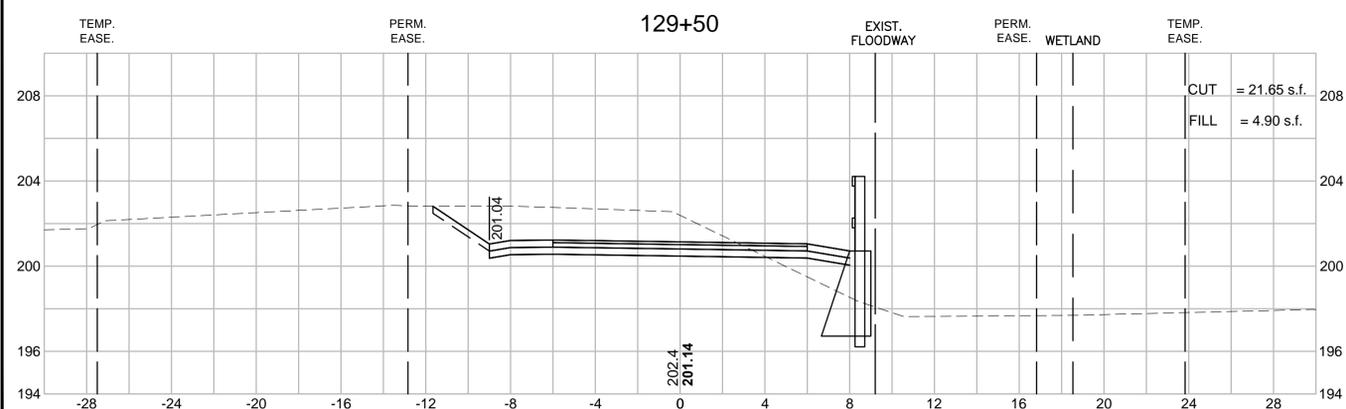
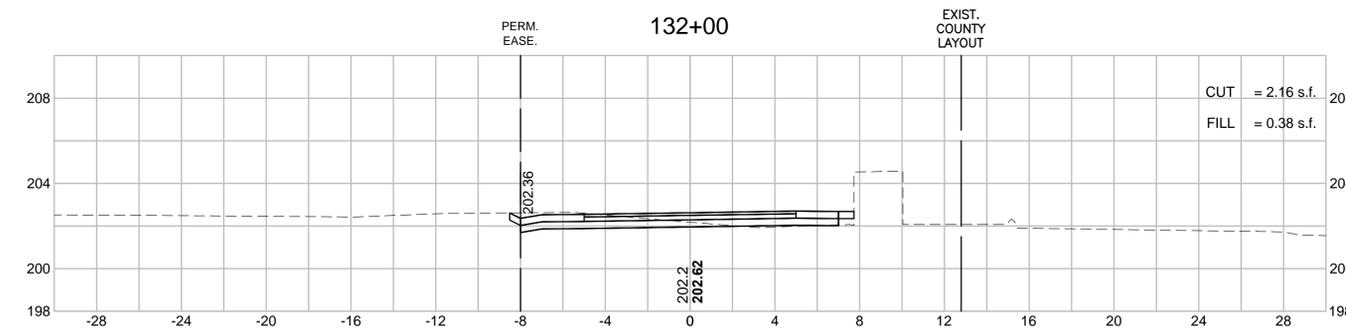
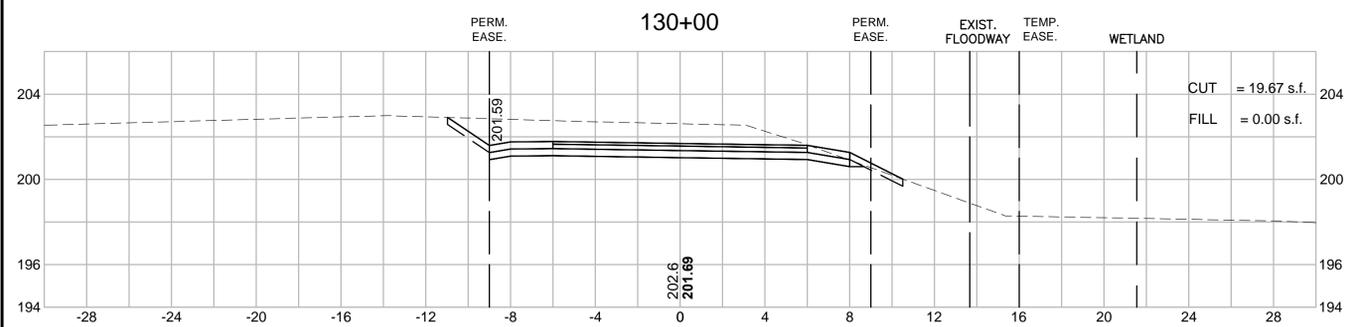
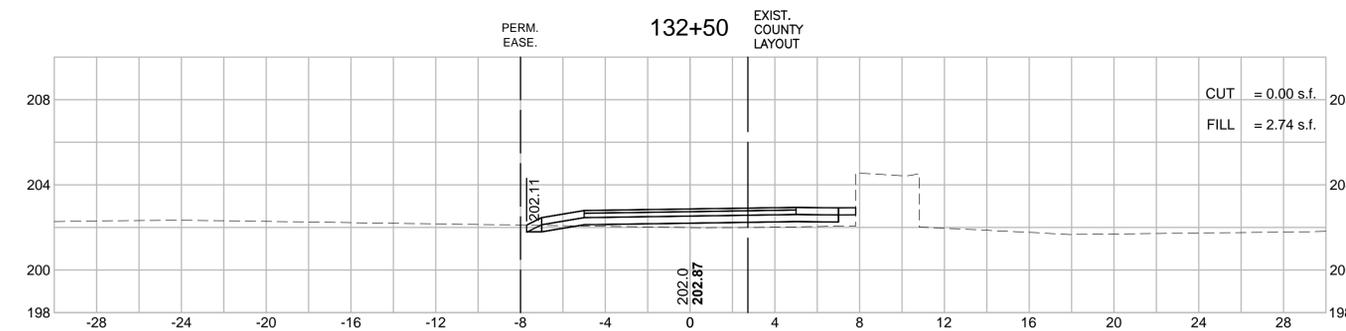
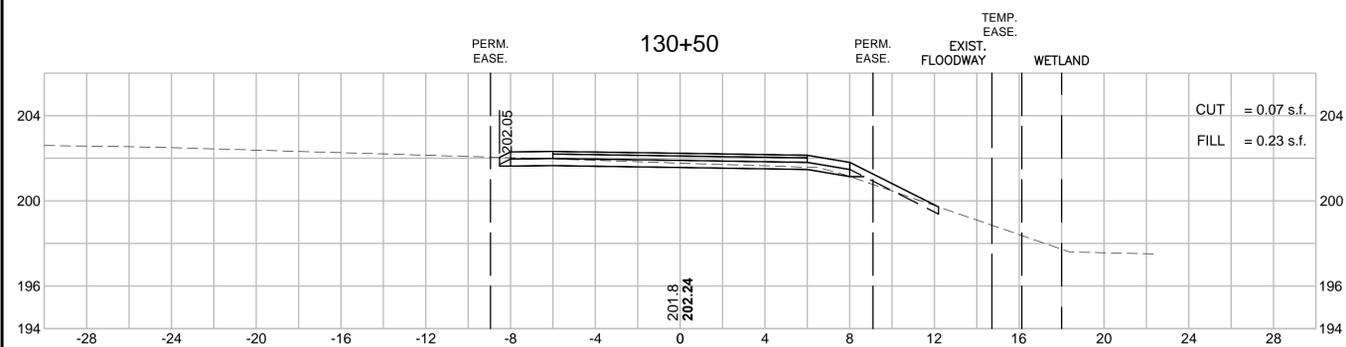
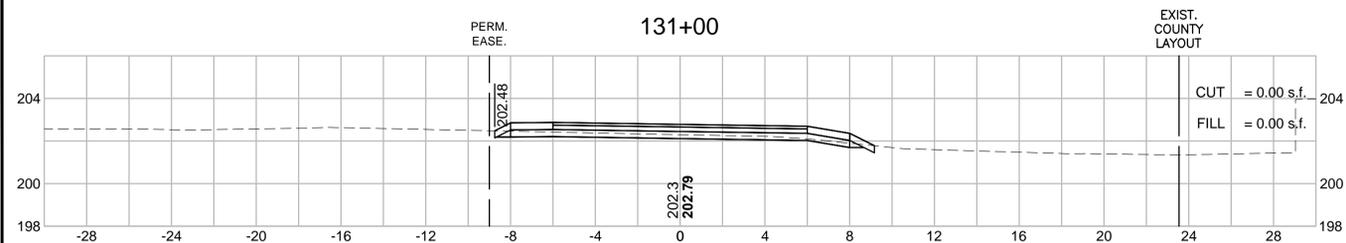
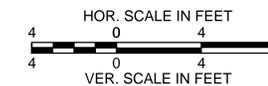
CROSS SECTIONS



MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

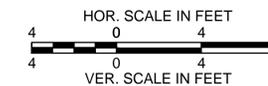
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	190	214
PROJECT FILE NO.		604531	

CROSS SECTIONS

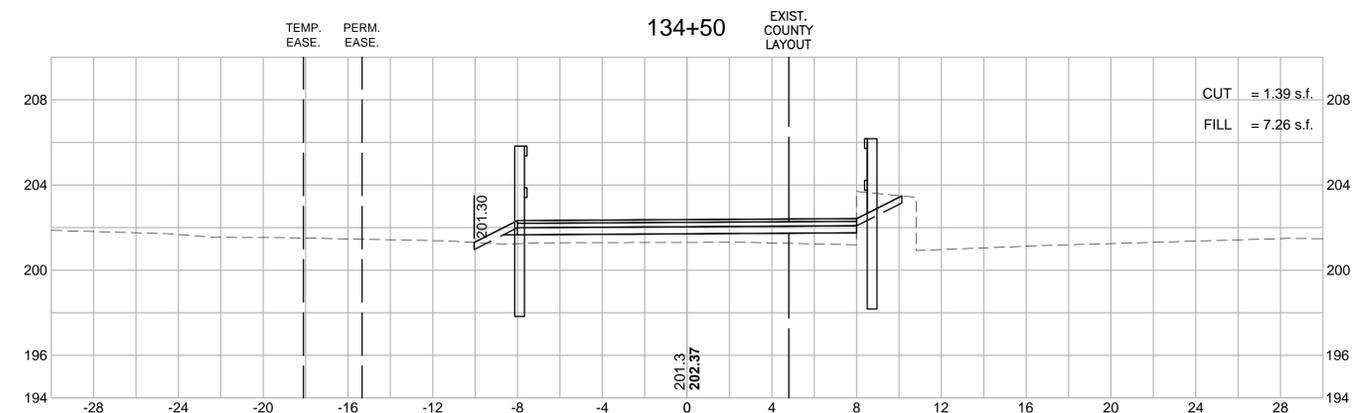
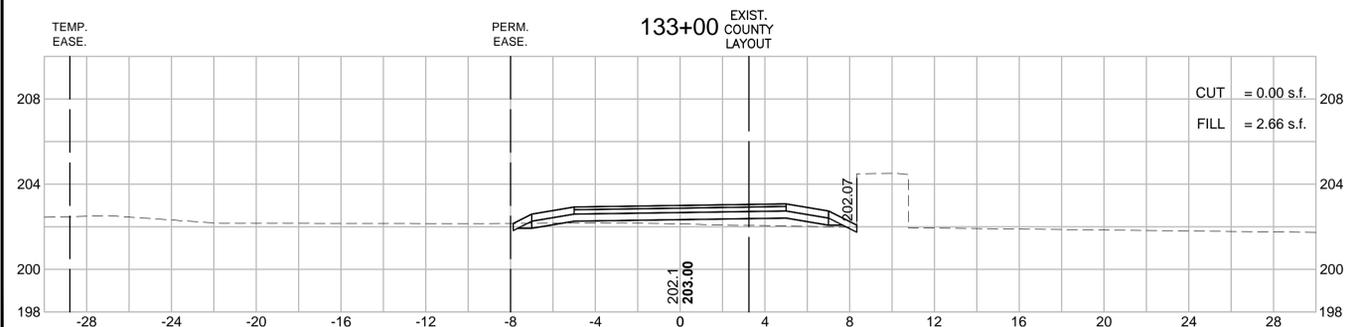
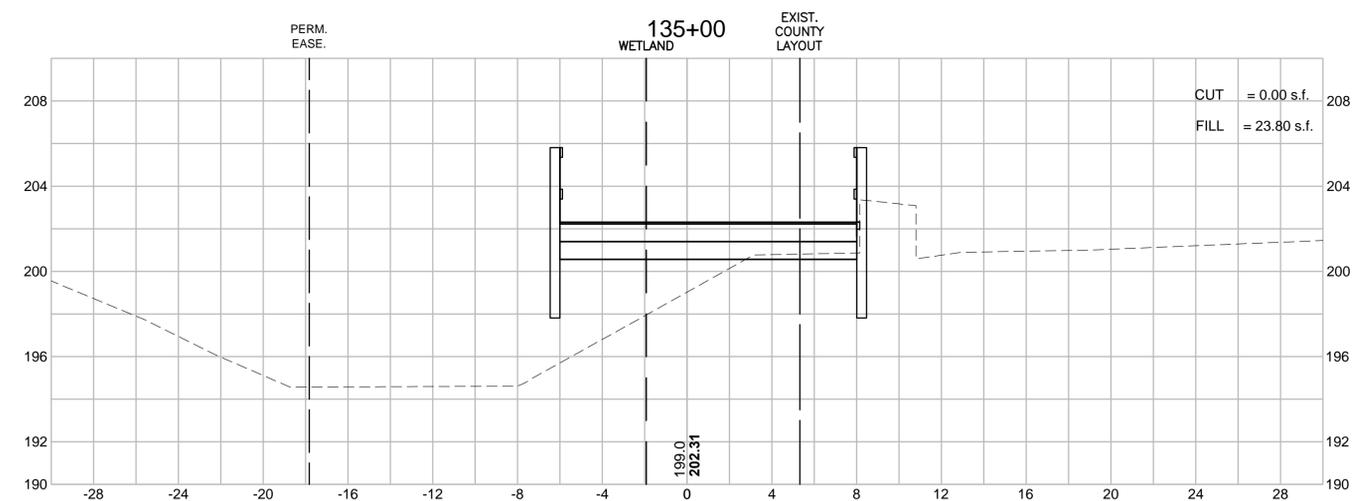
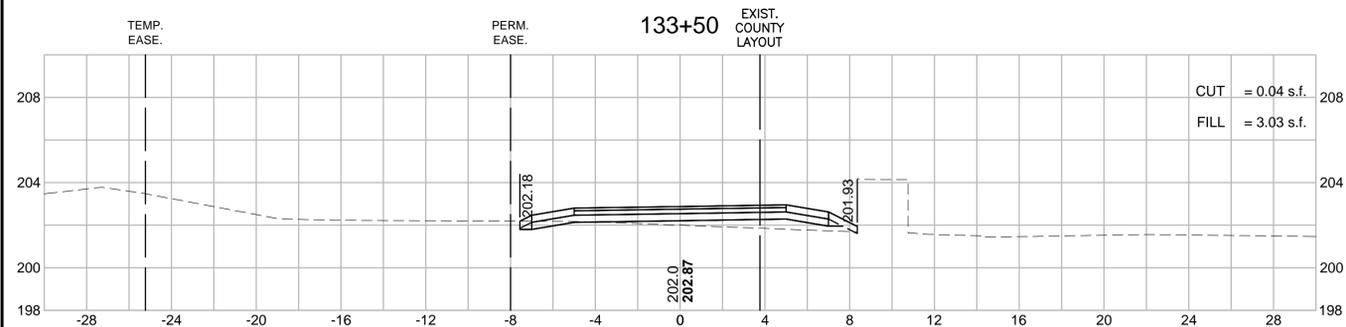
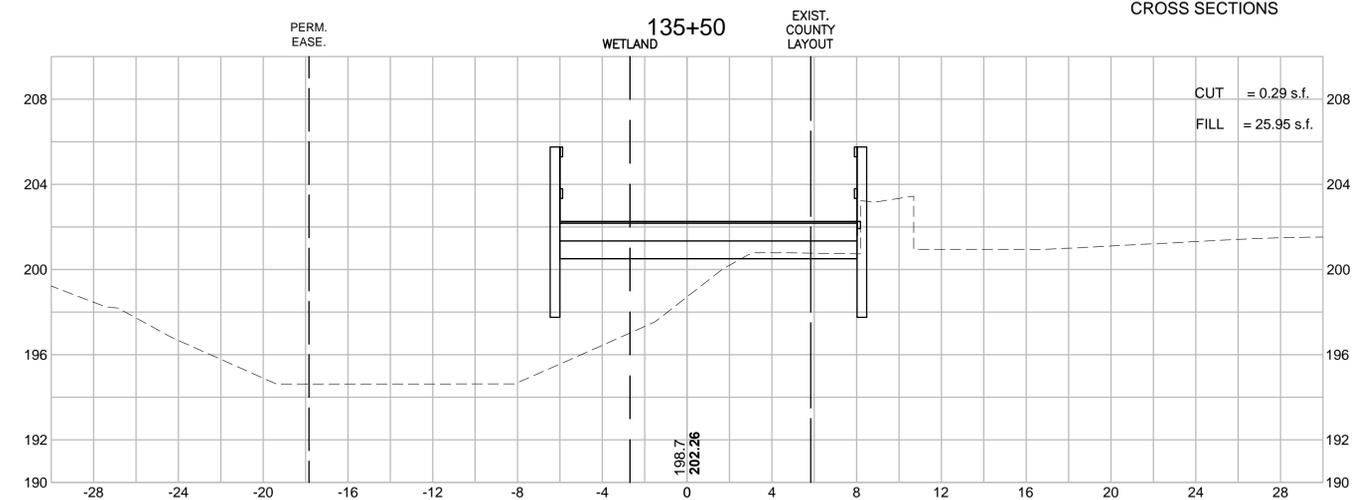
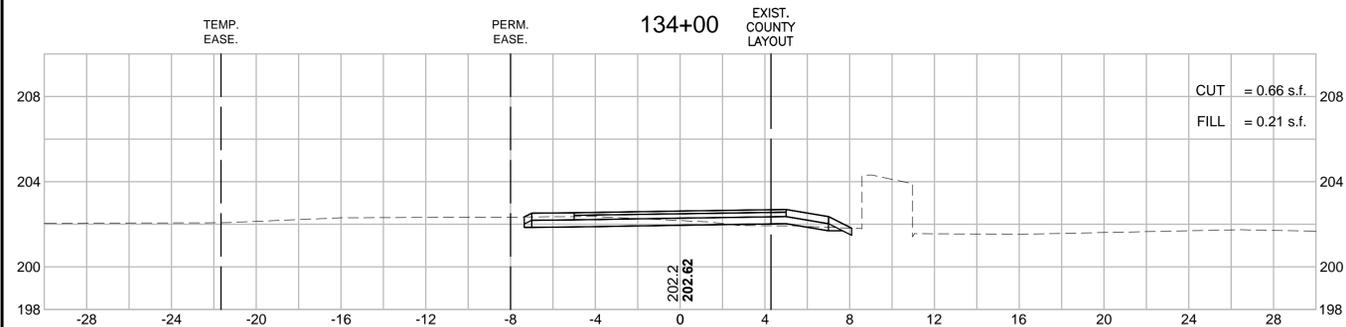


MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	191	214
PROJECT FILE NO.		604531	



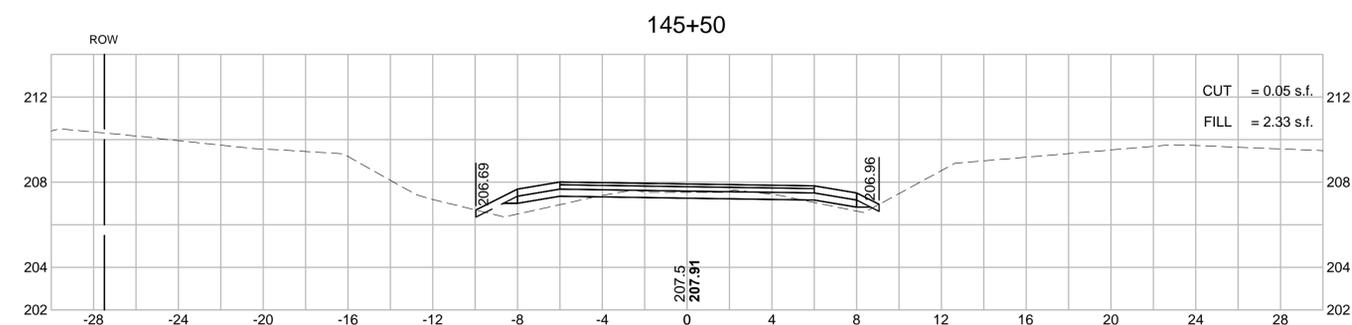
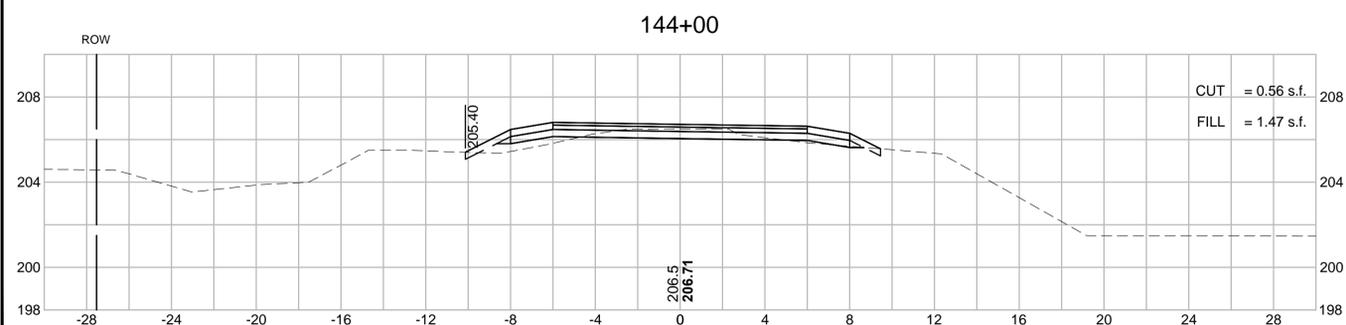
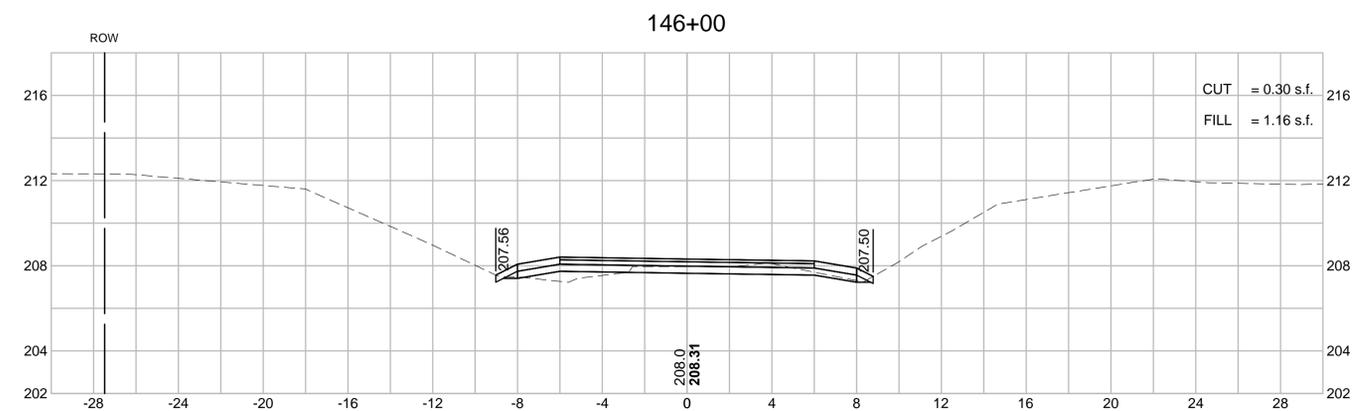
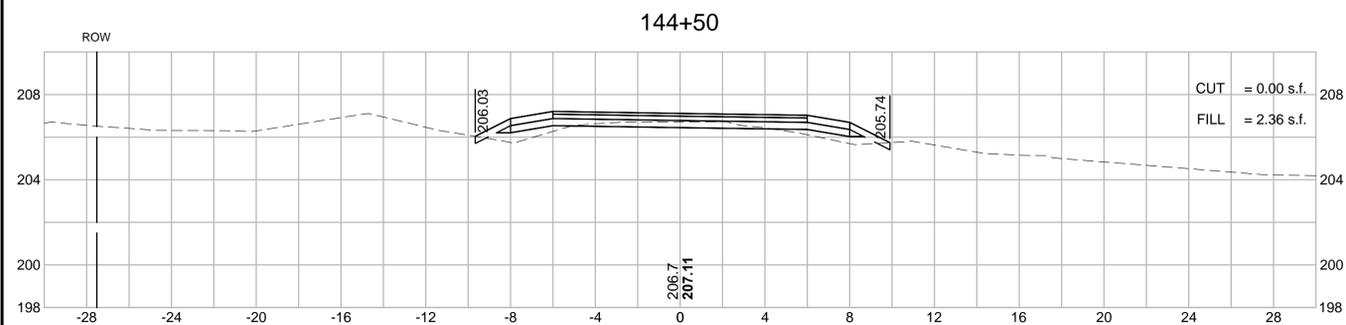
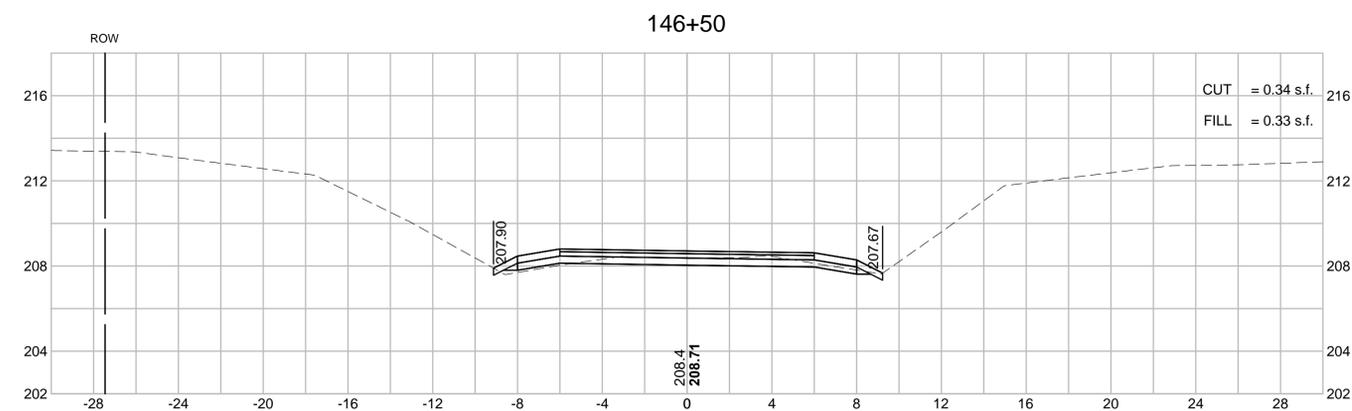
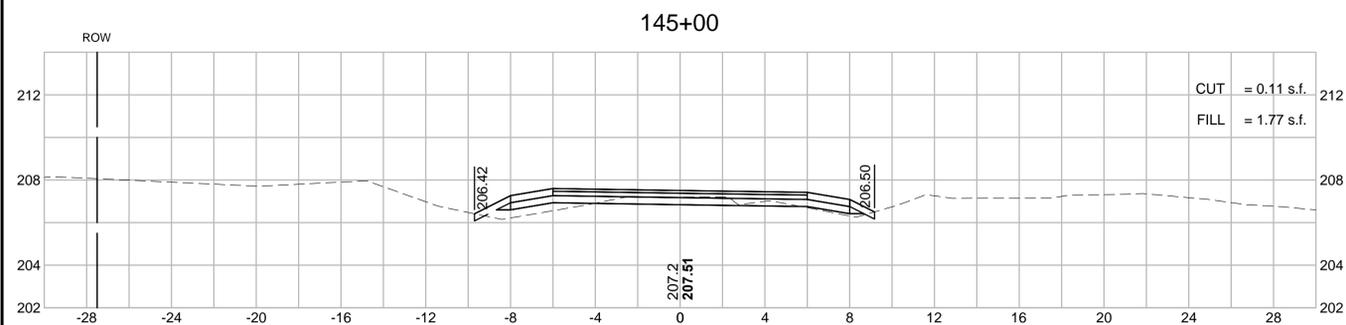
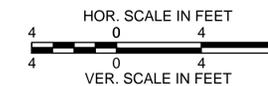
CROSS SECTIONS

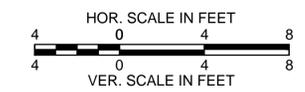


MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

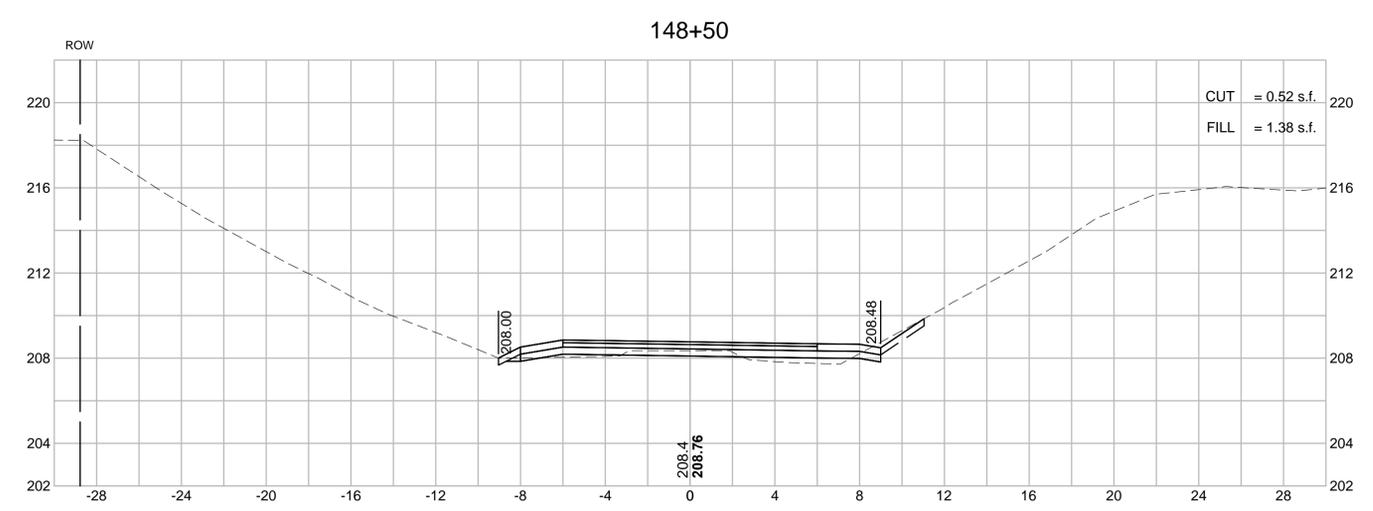
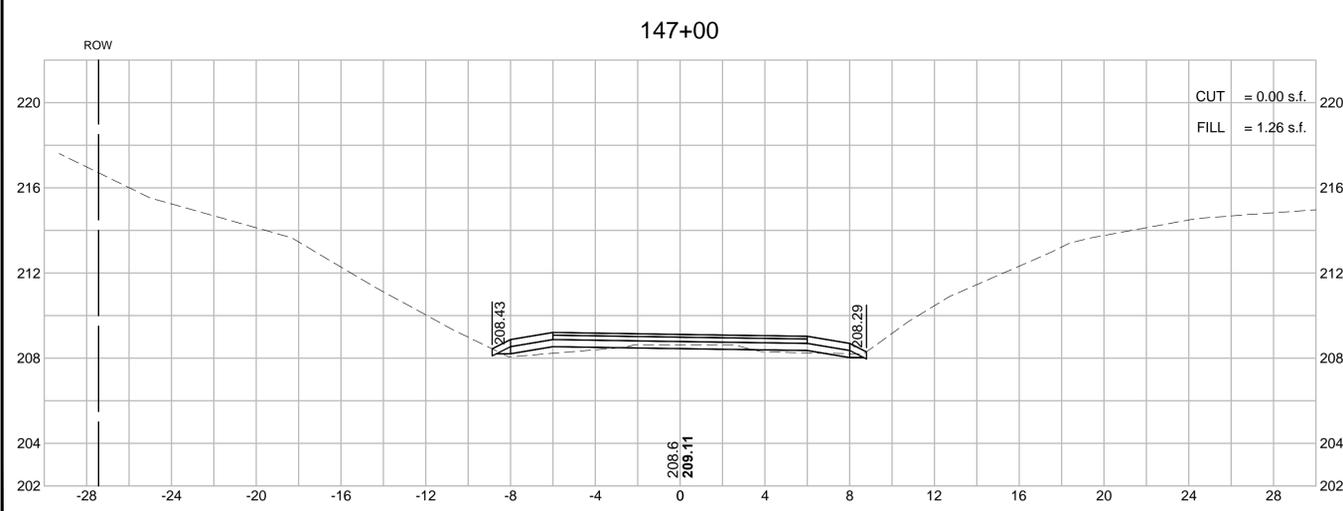
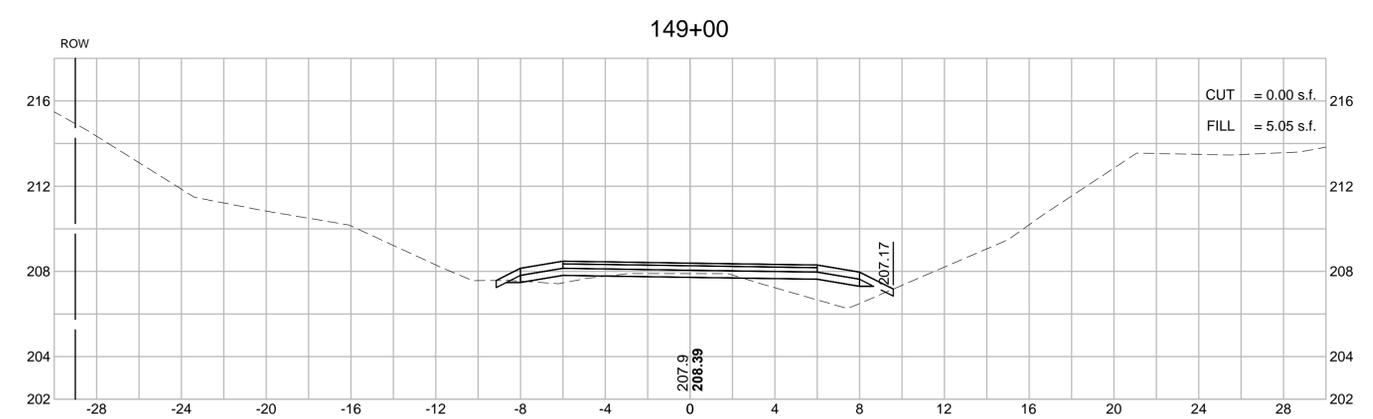
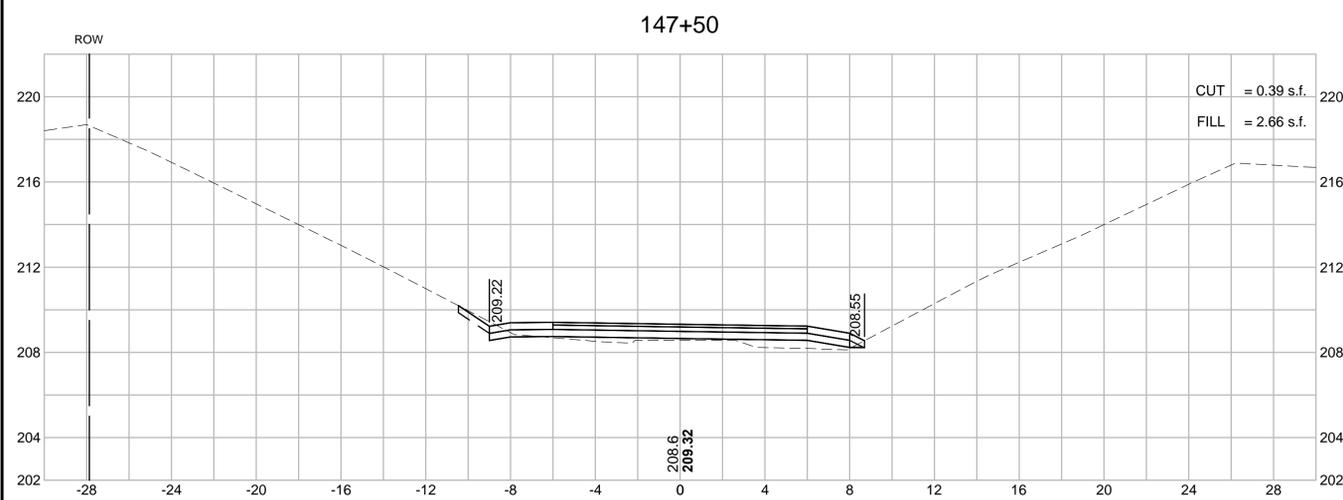
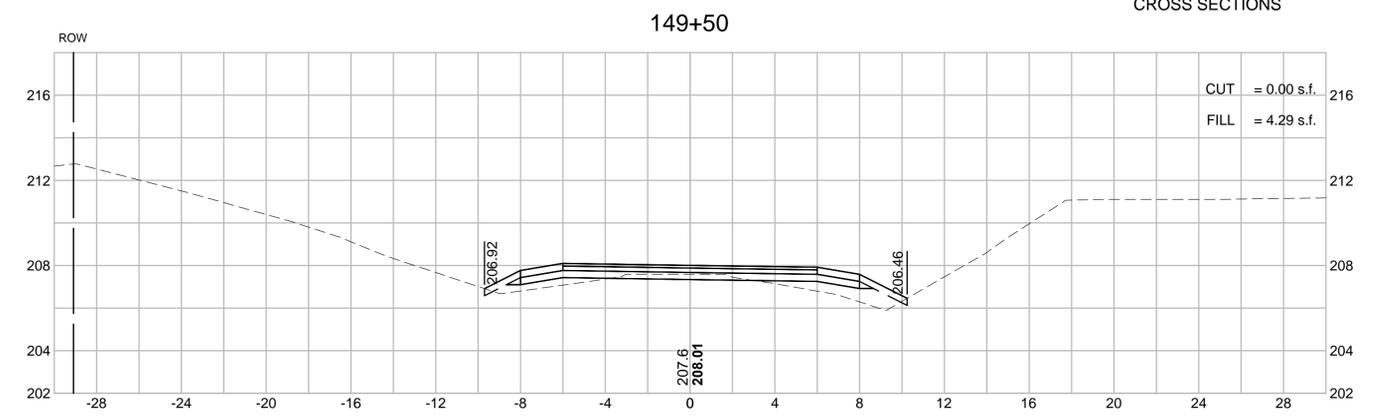
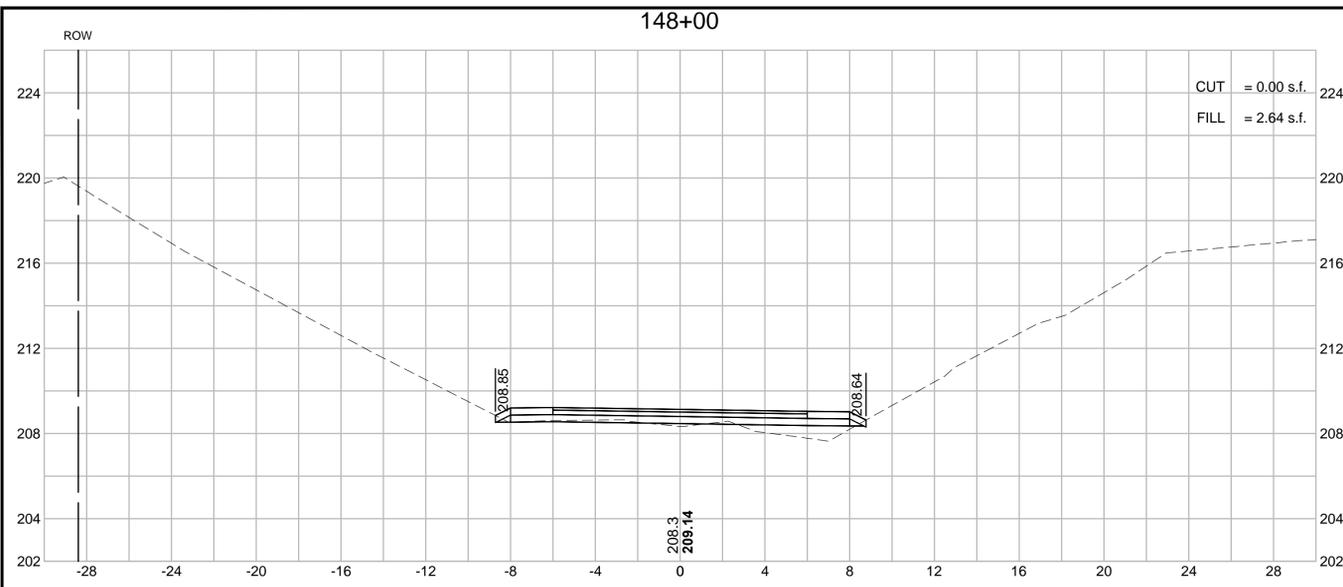
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	195	214
PROJECT FILE NO.		604531	

CROSS SECTIONS





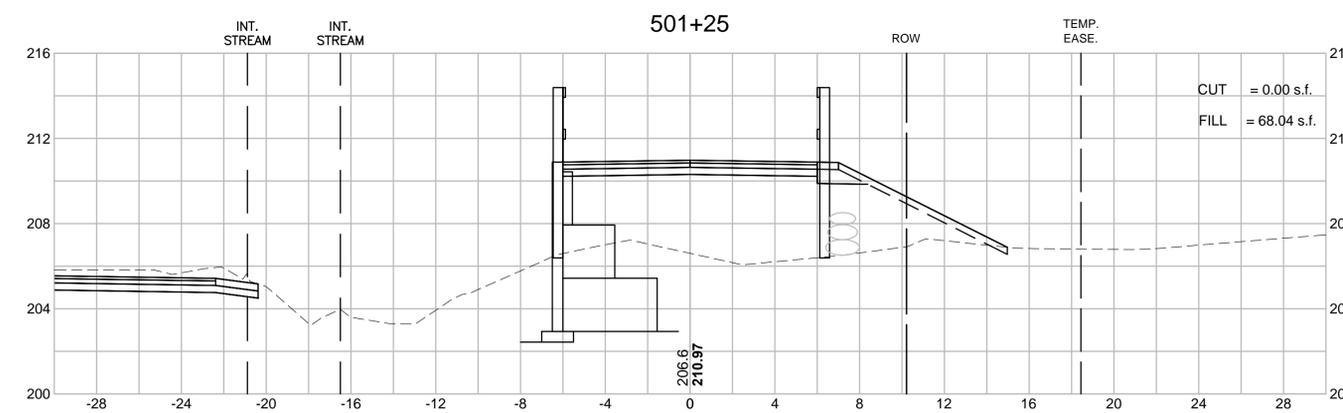
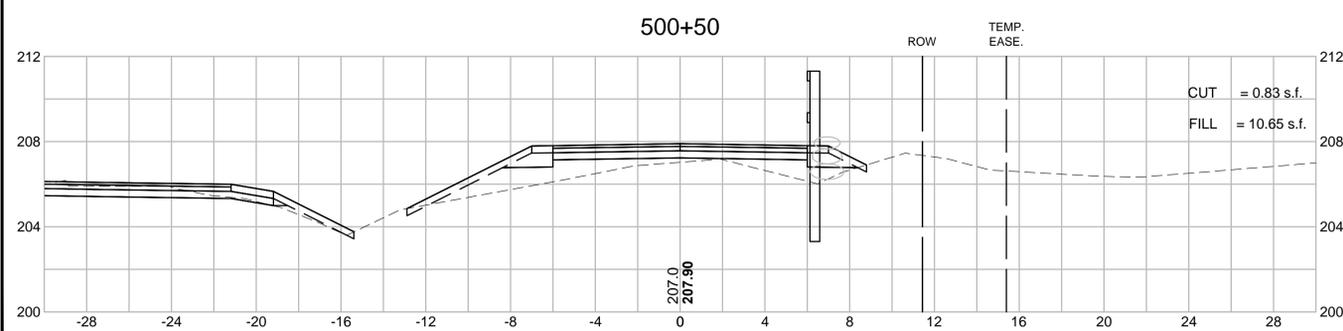
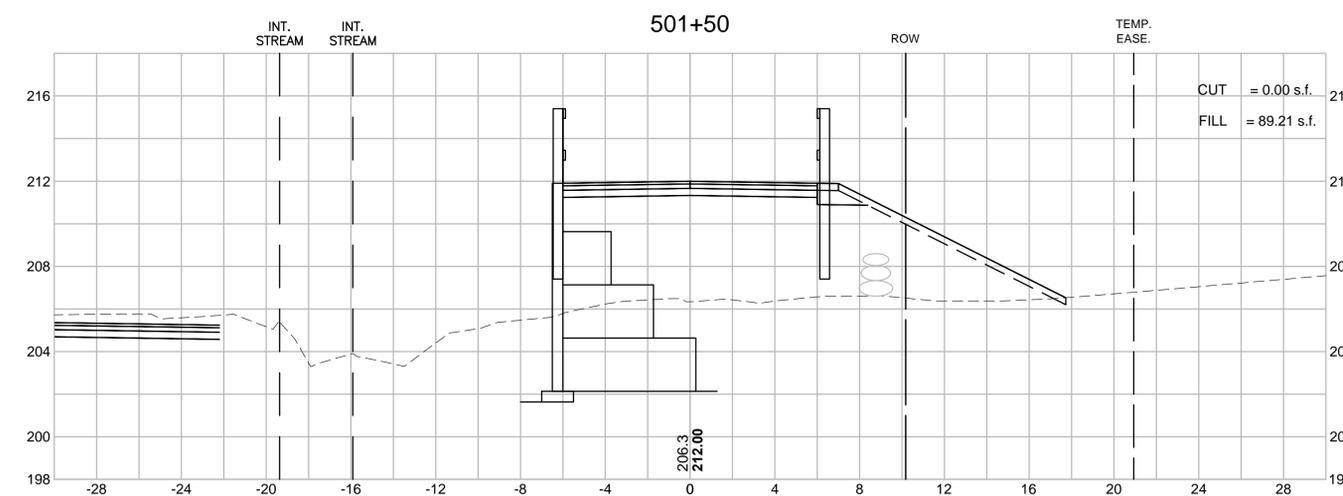
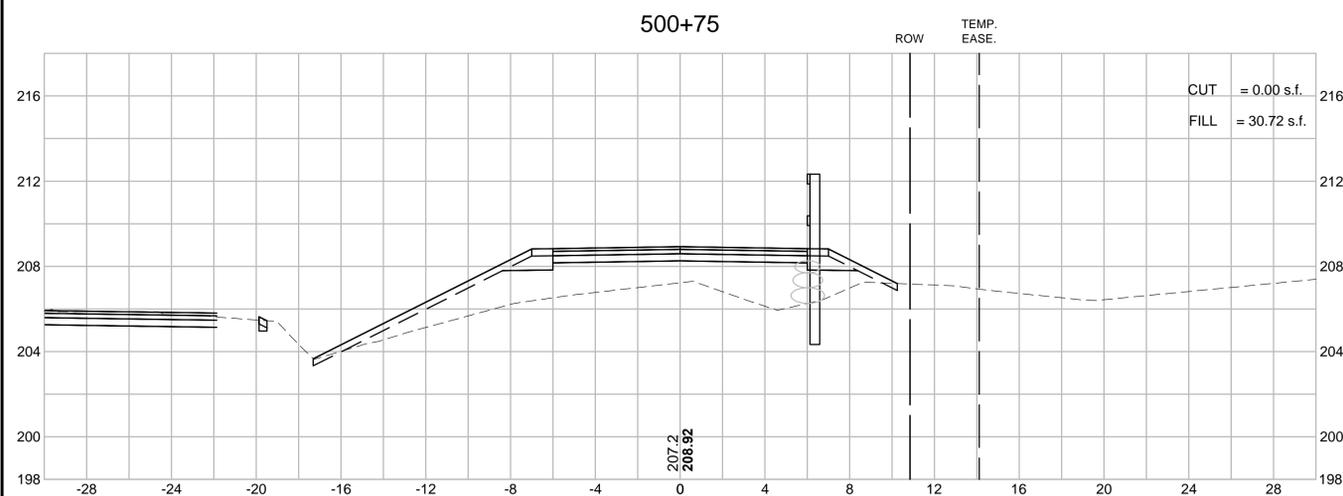
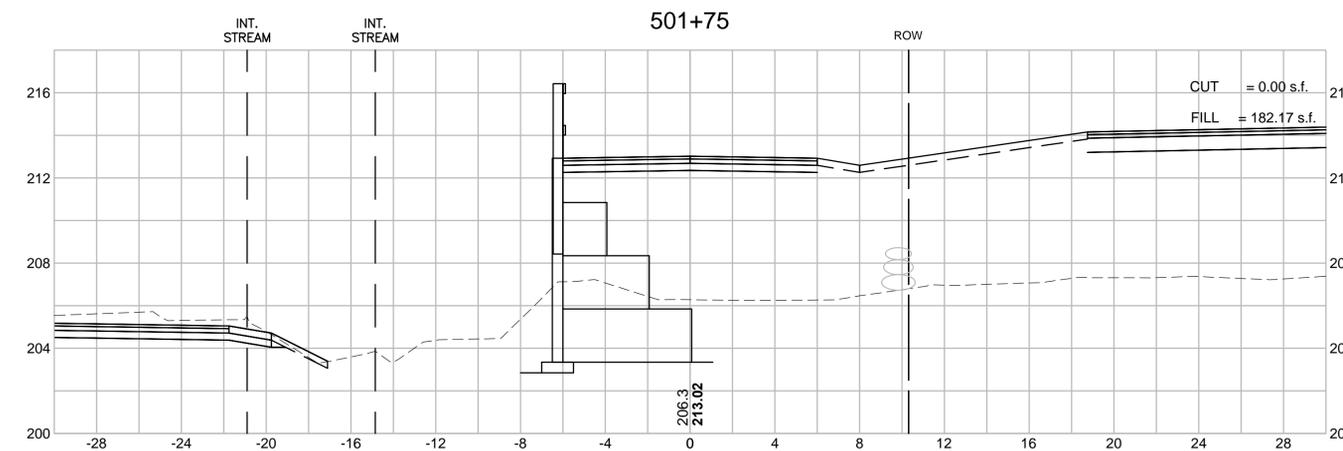
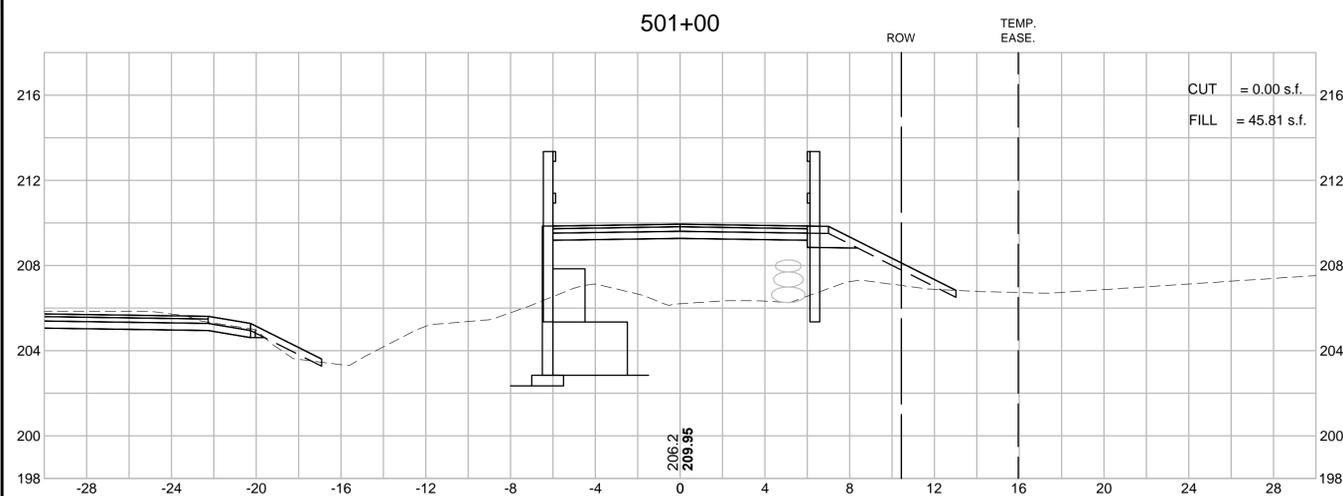
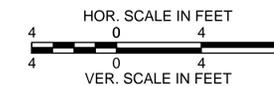
CROSS SECTIONS



MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	207	214
PROJECT FILE NO.		604531	

CROSS SECTIONS
SYLVIA STREET



MAYNARD & ACTON
ASSABET RIVER RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	208	214
PROJECT FILE NO.		604531	

CROSS SECTIONS
SYLVIA STREET

