NOTICE OF INTENT - ACTON

Bruce Freeman Rail Trail (Phase 2A)
Westford, Carlisle and Acton, Massachusetts
MassDOT Project #604532

March 2014

Prepared for:

Town of Acton
472 Main Street
Acton, Massachusetts

Prepared by:

GPI Greenman - Pedersen, Inc.

Greenman-Pedersen, Inc.
181 Ballardvale Street, Suite 202
Wilmington, Massachusetts 01887

NOVER-ARMSTRONG ASSOCIATES, INC.

Nover-Armstrong Associates, Inc.
124 Main Street, Unit 2GG
Carver, Massachusetts 02330

NOVER-ARMSTRONG ASSOCIATES, INC.
124 Main Street, Unit 2GG
Carver, Massachusetts 02330
Telephone 508.866.8383
Facsimile 508.866.9898
SDO-certified DBE & WBE
www.noverarmstrong.com

March 10, 2014

Terry Maitland, Chairman
Acton Conservation Commission
472 Main Street
Acton, MA 01720

RE: Notice of Intent
Bruce Freeman Rail Trail Phase 2A
Acton, Massachusetts

Dear Mr. Maitland and Members of the Commission:

On behalf of the Town of Acton, Nover-Armstrong Associates, Inc. and Greenman-Pedersen, Inc. are submitting for your review a Notice of Intent (NOI) and associated documents under the Massachusetts Wetlands Protection Act, M.G.L. Chapter 131, Section 40 and the Town of Acton Wetlands Protection Bylaw. The proposed project calls for the redevelopment of an abandoned railroad line into a recreational trail within the towns of Westford, Carlisle and Acton, Massachusetts. Phase 2A of the Bruce Freeman Rail Trail in Acton will consist of a multi-use recreational trail along the former Lowell Secondary railroad line starting at a point 1,000 feet southerly of Weatherbee Street heading north for approximately 4.5 miles to the Carlisle town line.

Local WPA filings fees have been submitted with this NOI and the state fee portion sent concurrently to the DEP Lock Box. A copy of each check has been included in this submission. The Massachusetts Department of Transportation is exempt from abutter notification under the Act.

The NOI will be concurrently submitted to the Natural Heritage & Endangered Species Program due to the project's location situated within a 2008 NHESP-mapped Priority Habitats of Rare Species. As per the standard, the contractor will be responsible for obtaining the NPDES Construction General Permit for stormwater discharges from the proposed work site.

Please feel free to contact us if you have any questions.

Sincerely,
Nover-Armstrong Associates, Inc.

Marta J. Nover
Principal

cc: Massachusetts Department of Transportation
MassDEP Northeast Regional Office
David Paulson, M.S.; Natural Heritage & Endangered Species Program; Attn: David
Rebecca S. Williamson, P.E. Greenman-Pedersen, Inc.

TABLE OF CONTENTS

Notice of Intent
WPA Form 3
NOI Wetland Fee Transmittal Form

Notice of Intent Figures
Figure 1 – Site Locus
Figure 2 – NHESP 2008 Priority and Estimated Habitats
Figure 3 – MassDEP Priority Resource Map (North)
Figure 4 – MassDEP Priority Resource Map (South)
Figure 5 – Wetland and Wetland Change Maps (North)
Figure 6 – Wetland and Wetland Change Maps (South)
Figure 7 - 15 – FEMA Flood Insurance Rate Maps
Site Photographs

TABLE 1 – Wetland Resource Area Impacts

ATTACHMENTS

Attachment A - Notice of Intent Project Narrative

Attachment B - Evaluation of Alternatives

Attachment C - Order of Resource Area Delineation – ***dated January 21, 2009***

Attachment D - Wetland Replication – ***Included in Project Plans***

Attachment E - Stormwater Management Checklist and Report

Attachment F - Appendix A Simplified Wildlife Evaluation

Attachment G - Project Special Provisions

Attachment H - Project Plans – ***Bound Separately***

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Acton
City/Town

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

Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

Bruce Freeman Rail Trail — a. Street Address
Acton — b. City/Town
01720 — c. Zip Code

Latitude and Longitude: Start 42.53218, -71.399163 End 42.477272, -71.413098

N/A — f. Assessors Map/Plat Number
N/A — g. Parcel /Lot Number

2. Applicant:

Susan — a. First Name
McArthur — b. Last Name
Commonwealth of Massachusetts Department of Transportation — c. Organization
10 Park Plaza, Suite 4160 — d. Street Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code
857.368.8807 — h. Phone Number
i. Fax Number
susan.mcarthur@state.ma.us — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name
b. Last Name
c. Organization
d. Street Address
e. City/Town
f. State
g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Marta J. — a. First Name
Nover — b. Last Name
Nover-Armstrong Associates, Inc. — c. Company
124 Main Street, Unit 2GG — d. Street Address
Carver — e. City/Town
MA — f. State
02330 — g. Zip Code
508.866.8383 — h. Phone Number
508.866.9898 — i. Fax Number
mnover@noverarmstrong.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

$ 1,500.00 — a. Total Fee Paid
$ 737.50 — b. State Fee Paid
$ 762.50 — c. City/Town Fee Paid

A. General Information (continued)

6. General Project Description:

Phase 2A of the Bruce Freeman Rail Trail, a multi-use recreational trail along the former Lowell Secondary railroad line starting at a point 1,000 feet southerly of Weatherbee Street heading north for approximately 4.5 miles to the Carlisle town line.

7a. Project Type Checklist:

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☐ Limited Project Driveway Crossing
4. ☐ Commercial/Industrial
5. ☐ Dock/Pier
6. ☐ Utilities
7. ☐ Coastal Engineering Structure
8. ☐ Agriculture (e.g., cranberries, forestry)
9. ☒ Transportation
10. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☒ Yes ☐ No If yes, describe which limited project applies to this project:

310 CMR 10.53(3)(e) - access driveway and (i) - bridge and culvert maintenance, repair and improvement

8. Property recorded at the Registry of Deeds for:

Middlesex South	
a. County	b. Certificate # (if registered land)
c. Book	d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☒ Bank	69 1. linear feet	69 (restored in place) 2. linear feet
b. ☒ Bordering Vegetated Wetland	Limited project= 2,024 Non-limited Project= 2,046	5,489 total (2,310 restore/3,179 replicate)
c. ☒ Land Under Waterbodies and Waterways	262 (temporary) 1. square feet 0 3. cubic yards dredged	262 (restored in place) 2. square feet

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	260,093 1. square feet	165,515 Paved, 94,575 Restored - vegetated
	2,565 3. cubic feet of flood storage lost	2,901 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	Butter Brook, Nashoba Brook, unnamed tributaries to Nashoba Brook.	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 1,105,000 square feet

4. Proposed alteration of the Riverfront Area:

425,000	385,875	39,125
a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.

5. Has an alternatives analysis been done and is it attached to this NOI? ☒ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet	
	2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW _____ b. square feet of Salt Marsh _____

5. ☒ Project Involves Stream Crossings

a. number of new stream crossings: 0
b. number of replacement stream crossings: six (6) bridge replacements

C. Other Applicable Standards and Requirements

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/online_viewer.htm.

a. ☒ Yes ☐ No

If yes, include proof of mailing or hand delivery of NOI to:

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
100 Hartwell Street, Suite 230
West Boylston, MA 01583

b. Date of map: 2008

C. Other Applicable Standards and Requirements (cont'd)

If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.C, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.1.d, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

1. c. Submit Supplemental Information for Endangered Species Review*

   1. ☒ Percentage/acreage of property to be altered:

      (a) within wetland Resource Area — 11.1% / 5.33 ac (percentage/acreage)

      (b) outside Resource Area — 1.76% / 0.85 ac (percentage/acreage)

   2. ☒ Assessor's Map or right-of-way plan of site

   3. ☒ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work ********

      (a) ☒ Project description (including description of impacts outside of wetland resource area & buffer zone)

      (b) ☒ Photographs representative of the site

      (c) ☐ MESA filing fee (fee information available at: http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

      *Projects altering **10 or more acres** of land, also submit:*

      (d) ☐ Vegetation cover type map of site

      (e) ☐ Project plans showing Priority & Estimated Habitat boundaries

   d. OR Check One of the Following

      1. ☐ Project is exempt from MESA review.
         Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

      2. ☐ Separate MESA review ongoing. — a. NHESP Tracking # — b. Date submitted to NHESP

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/dfwele/dfw/nhesp/nhesp.htm, regulatory review tab). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

C. Other Applicable Standards and Requirements (cont'd)

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

2. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only

b. ☐ Yes ☐ No If yes, include proof of mailing or hand delivery of NOI to either:

South Shore - Cohasset to Rhode Island, and the Cape & Islands:

Division of Marine Fisheries - Southeast Marine Fisheries Station
Attn: Environmental Reviewer
1213 Purchase Street – 3rd Floor
New Bedford, MA 02740-6694

North Shore - Hull to New Hampshire:

Division of Marine Fisheries - North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

3. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

b. ACEC

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

a. ☐ Yes ☒ No

5. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

a. ☐ Yes ☒ No

6. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

2. ☒ A portion of the site constitutes redevelopment

3. ☐ Proprietary BMPs are included in the Stormwater Management System.

b. ☐ No. Check why the project is exempt:

1. ☐ Single-family house

C. Other Applicable Standards and Requirements (cont'd)

2. ☐ Emergency road repair

3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

MassDOT - Highway Division Plan & Profile of Bruce Freeman Rail Trail Phase 2A in the Towns of Westford, Carlisle & Acton - 75% Submission

Greenman-Pedersen, Inc.	Not Signed, Not Stamped - 75% submission
b. Prepared By	c. Signed and Stamped by
February 27, 2014	Scale as shown
d. Final Revision Date	e. Scale
See Attachment G for plan set	
f. Additional Plan or Document Title	g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Acton
City/Town

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

1706722	3/11/2014
2. Municipal Check Number	3. Check date
1706716	3/11/2014
4. State Check Number	5. Check date
Joanne	Peavey
6. Payor name on check: First Name	7. Payor name on check: Last Name

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any)	6. Date

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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

A. Applicant Information

1. Location of Project:

Bruce Freeman Rail Trail	Acton
a. Street Address	b. City/Town
	$737.50
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Susan	McArthur	
a. First Name	b. Last Name	
Commonwealth of Massachusetts Department of Transportation		
c. Organization		
10 Park Plaza, Suite 4160		
d. Mailing Address		
Boston	MA	02116
e. City/Town	f. State	g. Zip Code
857.368.8807		susan.mcarthur@state.ma.us
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name	b. Last Name	
c. Organization		
d. Mailing Address		
e. City/Town	f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email Address

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

B. Fees

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 2(b) - Parking Lot	1	$500	$500
Category 2(e) - 10.53(e) driveway	1	$500	$500
Category 2(i) - bridges & culverts	1	$500	$500

Step 5/Total Project Fee: $1,500.00

Step 6/Fee Payments:

Total Project Fee:	$1,500.00 a. Total Fee from Step 5
State share of filing Fee:	$ 737.50 b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	$762.50 c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

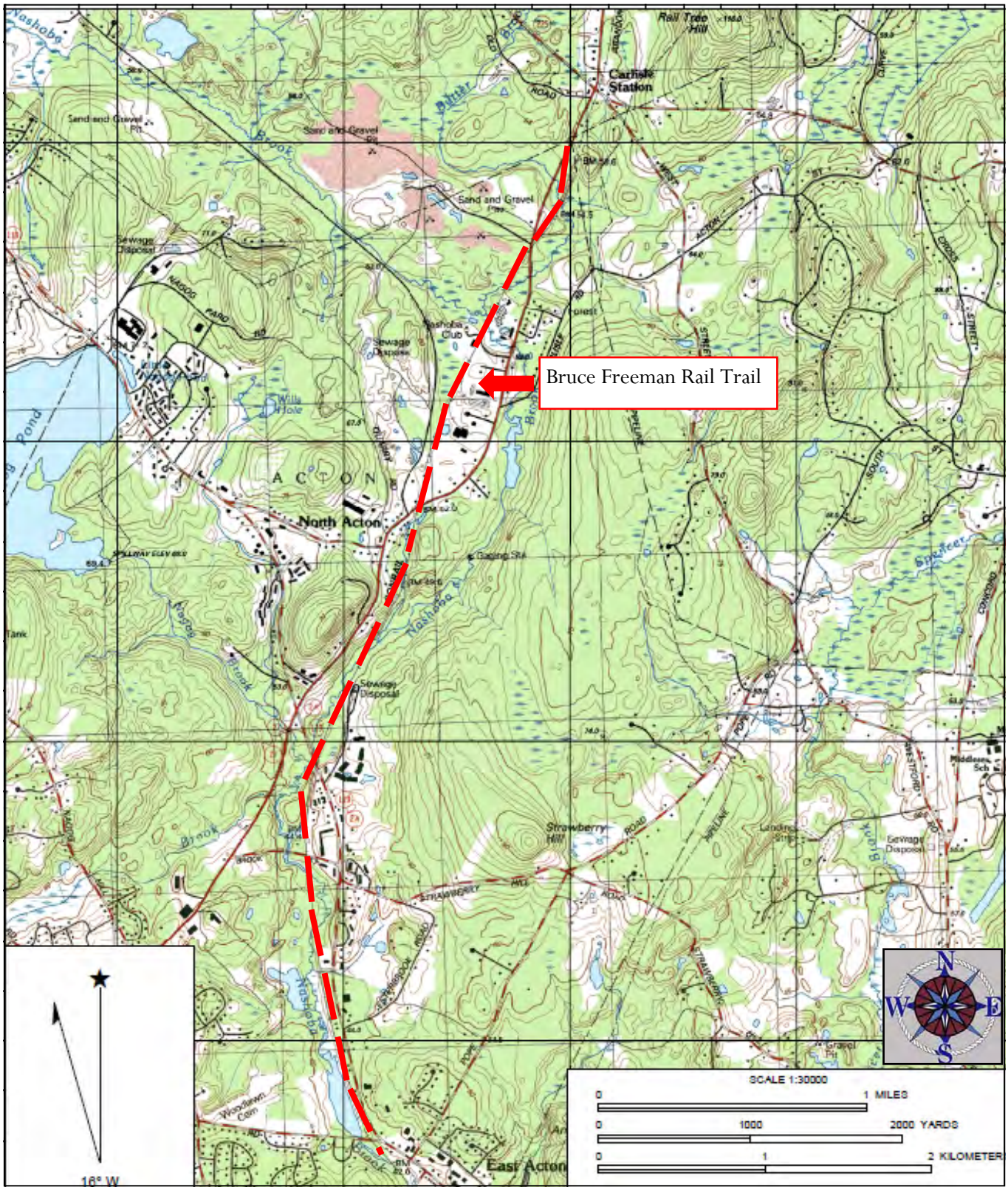
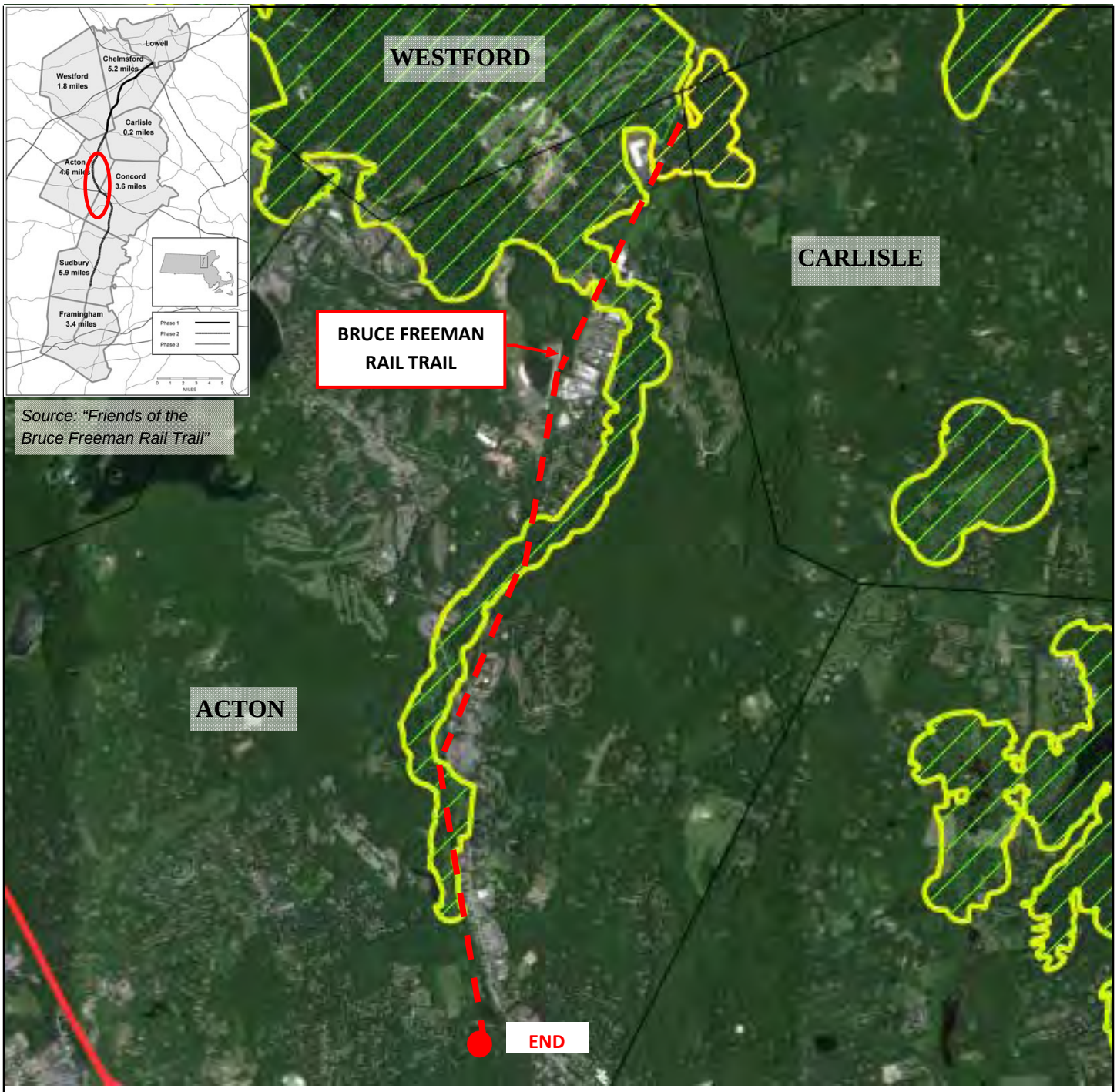


Figure 1—Site Locus

USGS Topographic Map

Bruce Freeman Rail Trail, Phase 2A

Acton, Massachusetts



Source: "Friends of the Bruce Freeman Rail Trail"

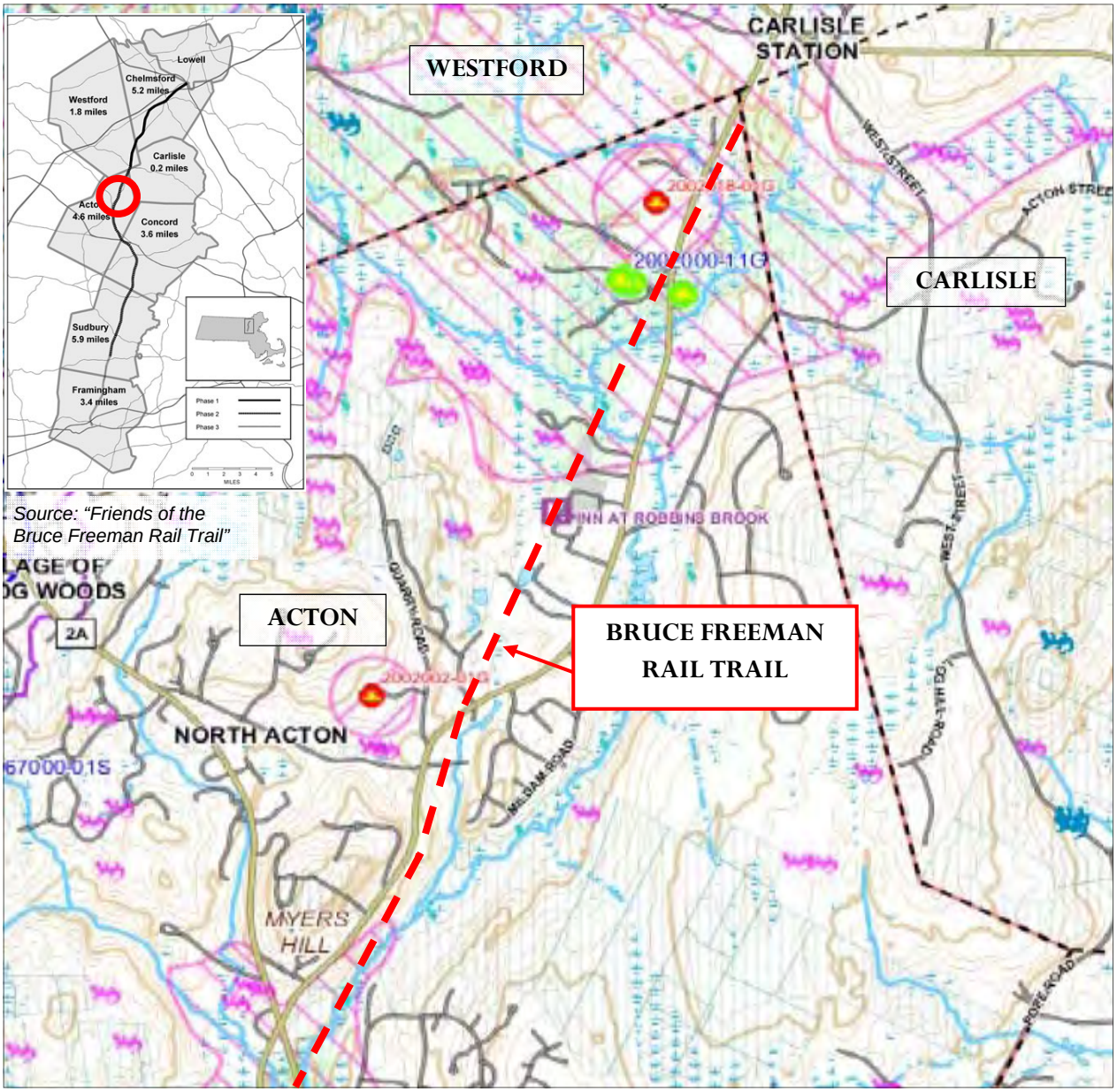
LEGEND

Figure 2 - NHESP 2008 Priority and Estimated Habitats

Bruce Freeman Rail Trail, Phase 2A

Acton, Massachusetts

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



Source: "Friends of the Bruce Freeman Rail Trail"

DEP MCP 21e Map Legend

- Zone IIs
- IWPAs
- Zone A
- Sole Source Aquifers
- Solid Waste Landfill
- Protected Openspace
- ACECs
- NHESP Estimated Habitat of Rare Wildlife in Wetland Areas
- Certified Vernal Pools 2003 NHESP
- Subbasins
- Mass Major Basins
- DEP Region
- Town Arcs
- County Boundaries

Aquifers, By Yield
- HIGH YIELD
- MEDIUM YIELD

Non Potential Drinking Water Source Area
- HIGH YIELD
- MEDIUM YIELD

FEMA Floodplains
- 100 YEAR FLOODPLAIN

Hydrography
- WATER
- RESERVOIR
- WETLANDS
- SALTWATER WETLANDS
- FLATS,SHOALS

Rivers and Streams
- PERENNIAL
- INTERMITTENT
- SHORELINE
- MAN MADE SHORE
- DAM
- AQUEDUCT

EOT-OTP Roads
- LIMITED ACCESS HIGHWAY
- MULTI LANE HWY, NOT LIMITED ACCESS
- OTHER NUMBERED HWY
- MAJOR ROAD - COLLECTOR
- MINOR STREET OR ROAD, RAMP

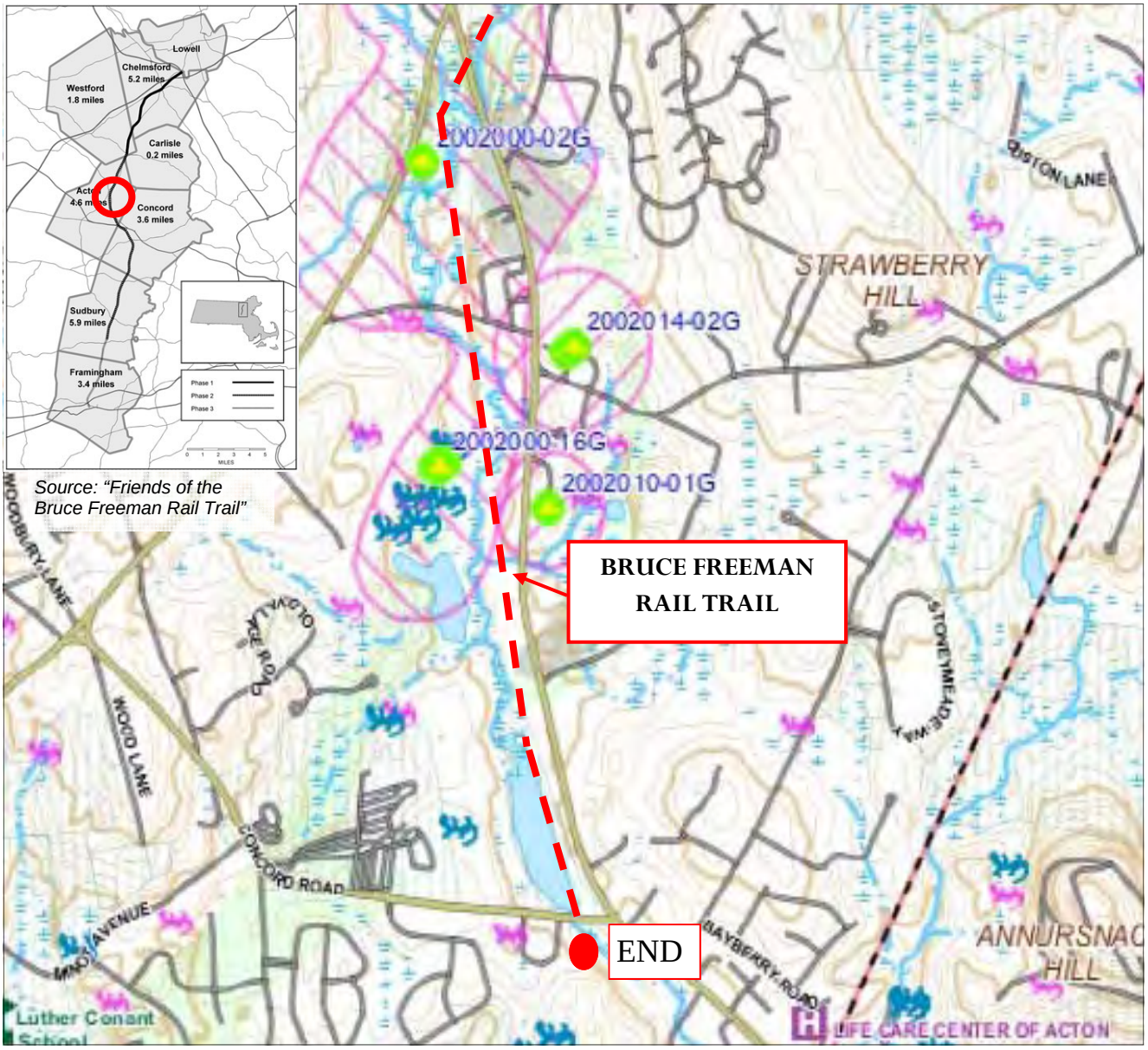
Tracks and Trails MHD
- TRACK
- TRAIL

Transmission Lines
- PIPELINE
- POWERLINE
- TRAIN

Figure 3 - MassDEP Priority Resource Map (North)

Bruce Freeman Rail Trail, Phase 2A
Acton, Massachusetts

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



DEP MCP 21e Map Legend

- Zone IIs
- IWPAs
- Zone A
- Sole Source Aquifers
- Solid Waste Landfill
- Protected Openspace
- ACECs
- NHESP Estimated Habitat of Rare Wildlife in Wetland Areas
- Certified Vernal Pools 2003 NHESP
- Subbasins
- Mass Major Basins
- DEP Region
- Town Arcs
- County Boundaries

Aquifers, By Yield
- HIGH YIELD
- MEDIUM YIELD

Non Potential Drinking Water Source Area
- HIGH YIELD
- MEDIUM YIELD

FEMA Floodplains
- 100 YEAR FLOODPLAIN

Hydrography
- WATER
- RESERVOIR
- WETLANDS
- SALTWATER WETLANDS
- FLATS,SHOALS

Rivers and Streams
- PERENNIAL
- INTERMITTENT
- SHORELINE
- MAN MADE SHORE
- DAM
- AQUEDUCT

EOT-OTP Roads
- LIMITED ACCESS HIGHWAY
- MULTI LANE HWY, NOT LIMITED ACCESS
- OTHER NUMBERED HWY
- MAJOR ROAD - COLLECTOR
- MINOR STREET OR ROAD, RAMP

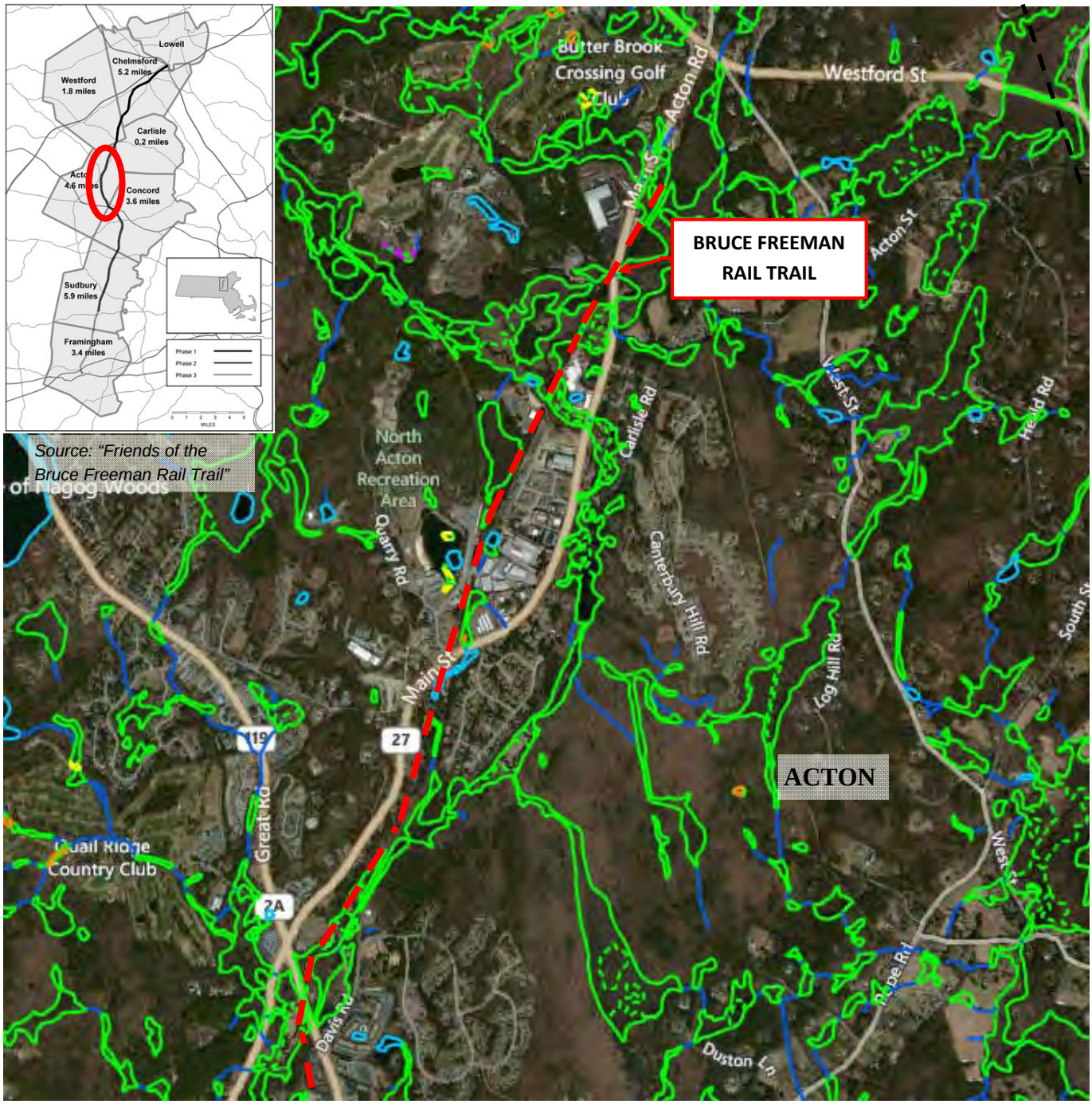
Tracks and Trails MHD
- TRACK
- TRAIL

Transmission Lines
- PIPELINE
- POWERLINE
- TRAIN

Figure 4 - MassDEP Priority Resource Map (South)

Bruce Freeman Rail Trail, Phase 2A
Acton, Massachusetts

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



Source: "Friends of the Bruce Freeman Rail Trail"

LEGEND

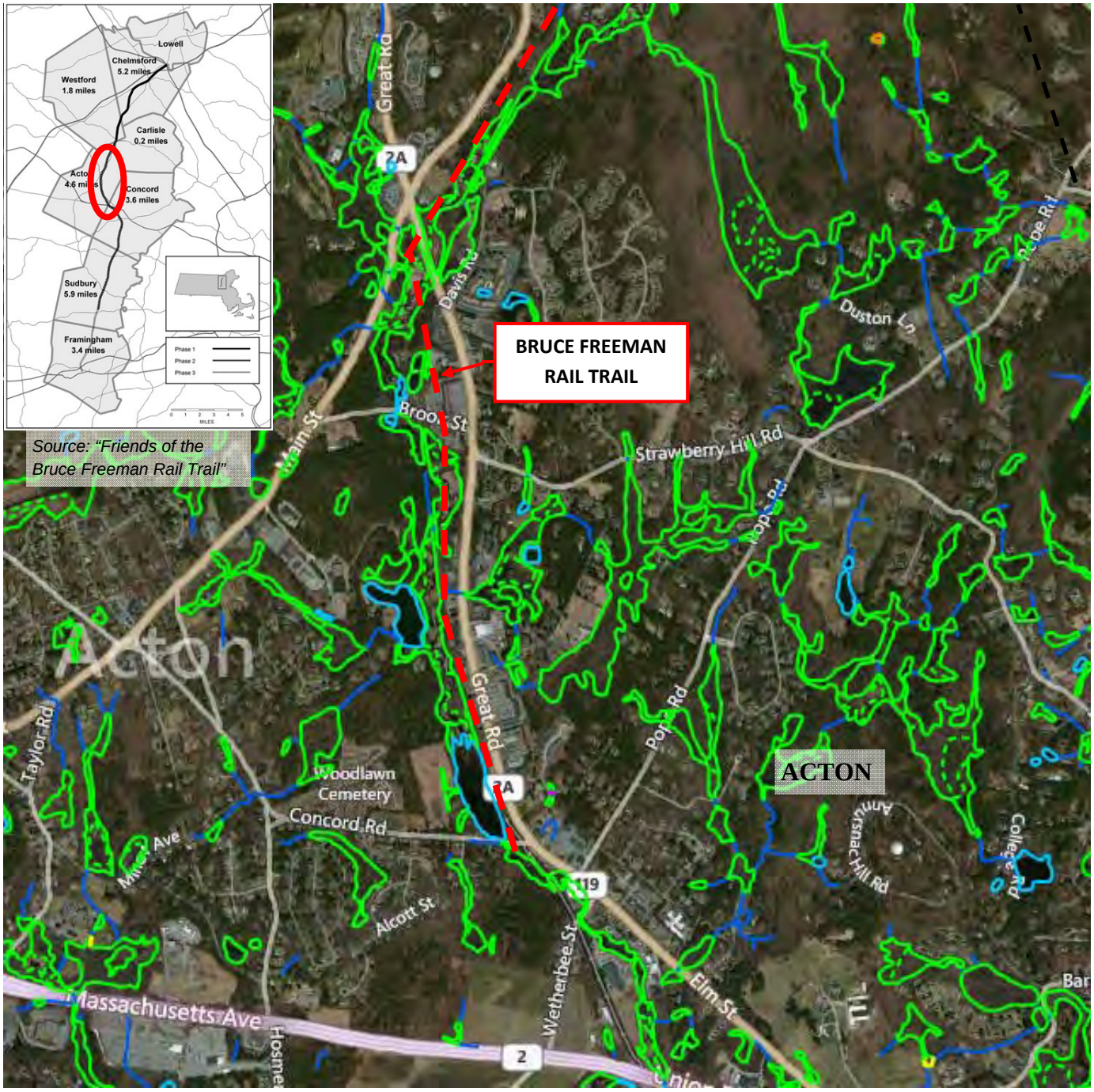
- Shoreline
- Hydrologic Connection
- Mean Low Water Line
- Apparent Wetland Limit
- Closure Line
- Edge of Interpreted Area
- Wetland Change Areas (2001 & 2003)
- Wetland Change Areas (2005)
- Wetland Change Areas (2008 & 2009)
- Town Boundary

Figure 5 - Wetland and Wetland Change Areas (North)

Bruce Freeman Rail Trail, Phase 2A

Acton, Massachusetts

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



LEGEND

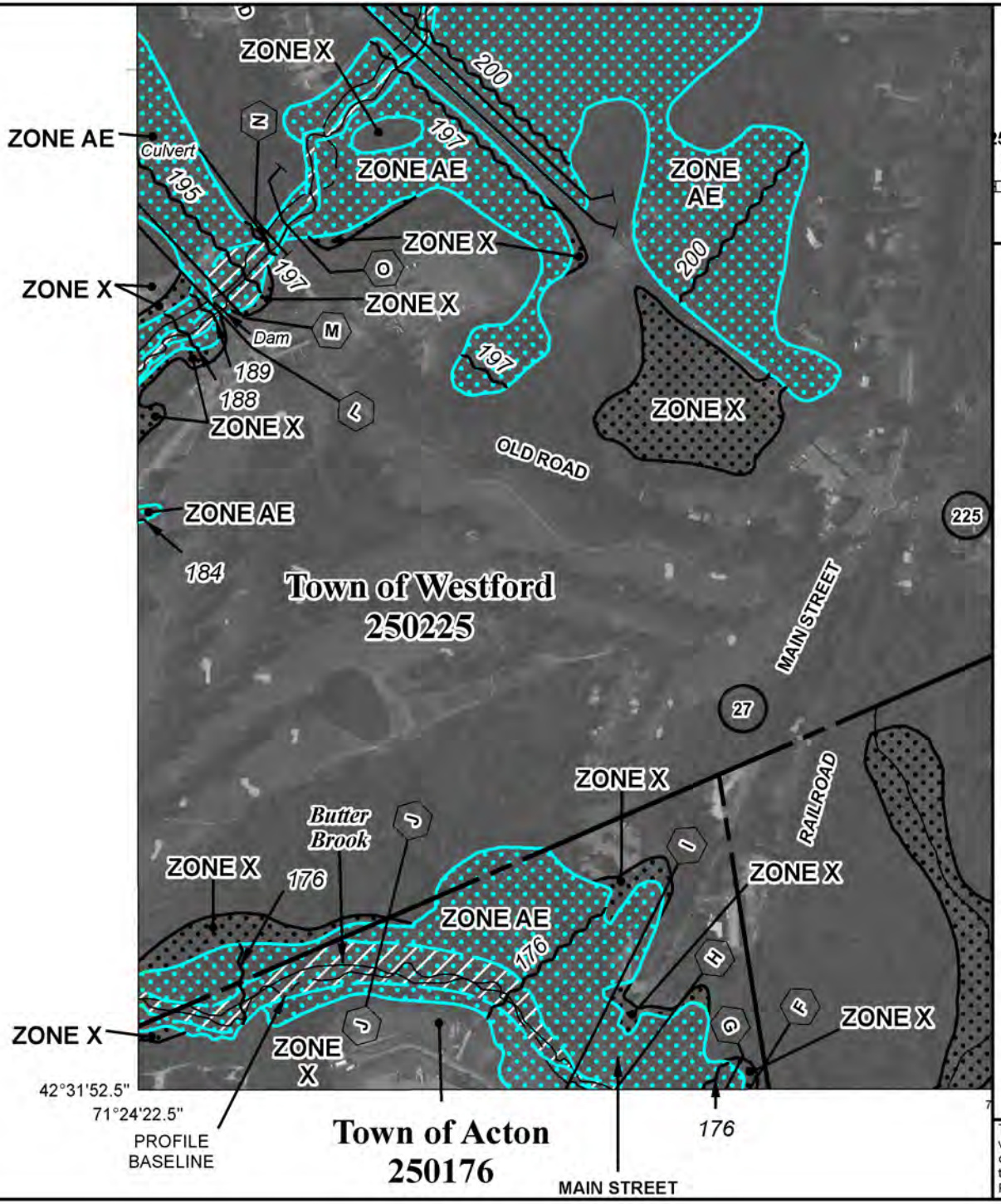
- Shoreline
- Hydrologic Connection
- Mean Low Water Line
- Apparent Wetland Limit
- Closure Line
- Edge of Interpreted Area
- Wetland Change Areas (2001 & 2003)
- Wetland Change Areas (2005)
- Wetland Change Areas (2008 & 2009)
- Town Boundary

Figure 6 - Wetland and Wetland Change Areas (South)

Bruce Freeman Rail Trail, Phase 2A

Acton, Massachusetts

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



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0242E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 242 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0242	E
CARLISLE, TOWN OF	250187	0242	E
CHELMSFORD, TOWN OF	250188	0242	E
WESTFORD, TOWN OF	250225	0242	E

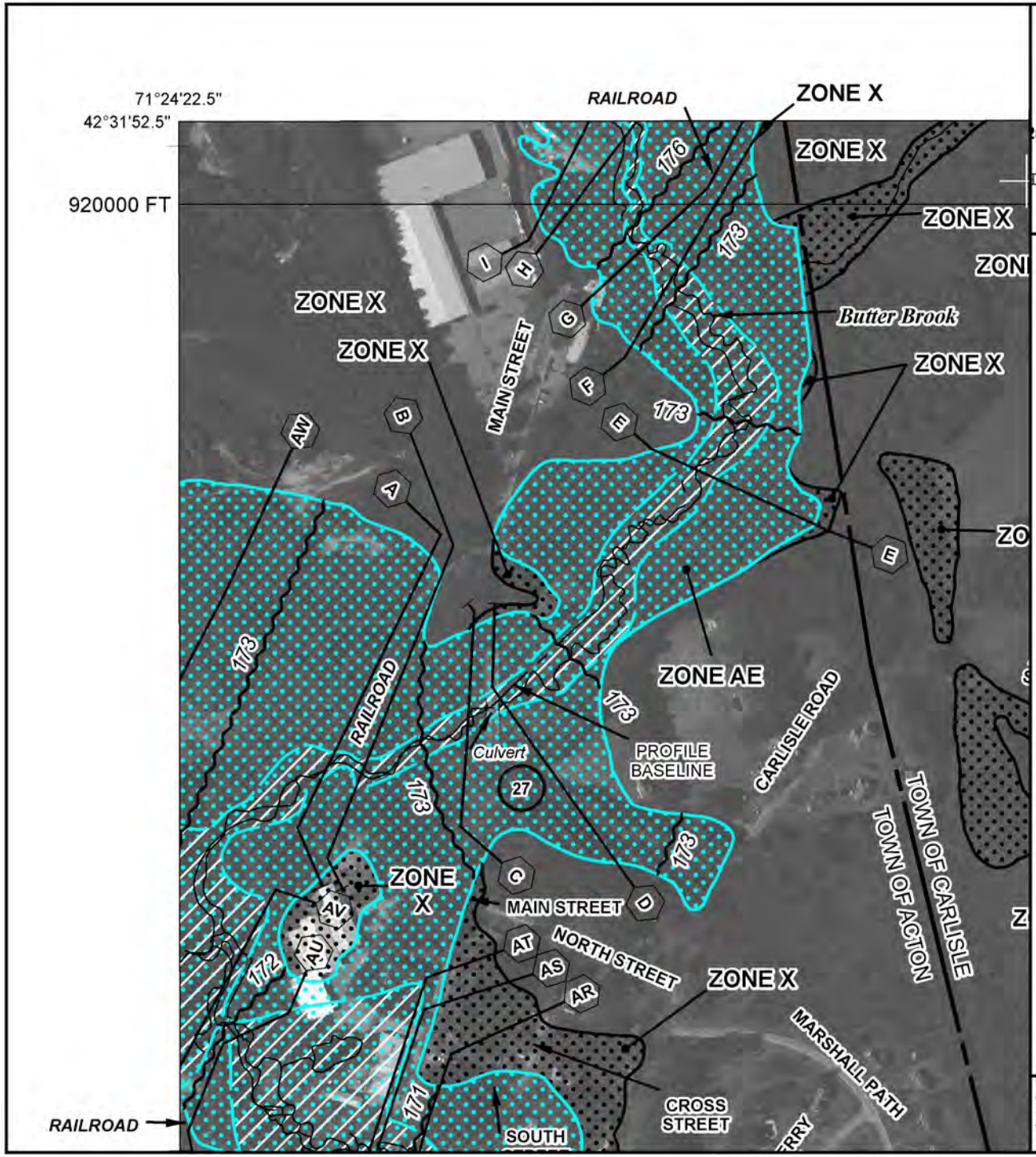
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0242E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0244E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 244 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0244	E
CARLISLE, TOWN OF	250187	0244	E
CONCORD, TOWN OF	250189	0244	E

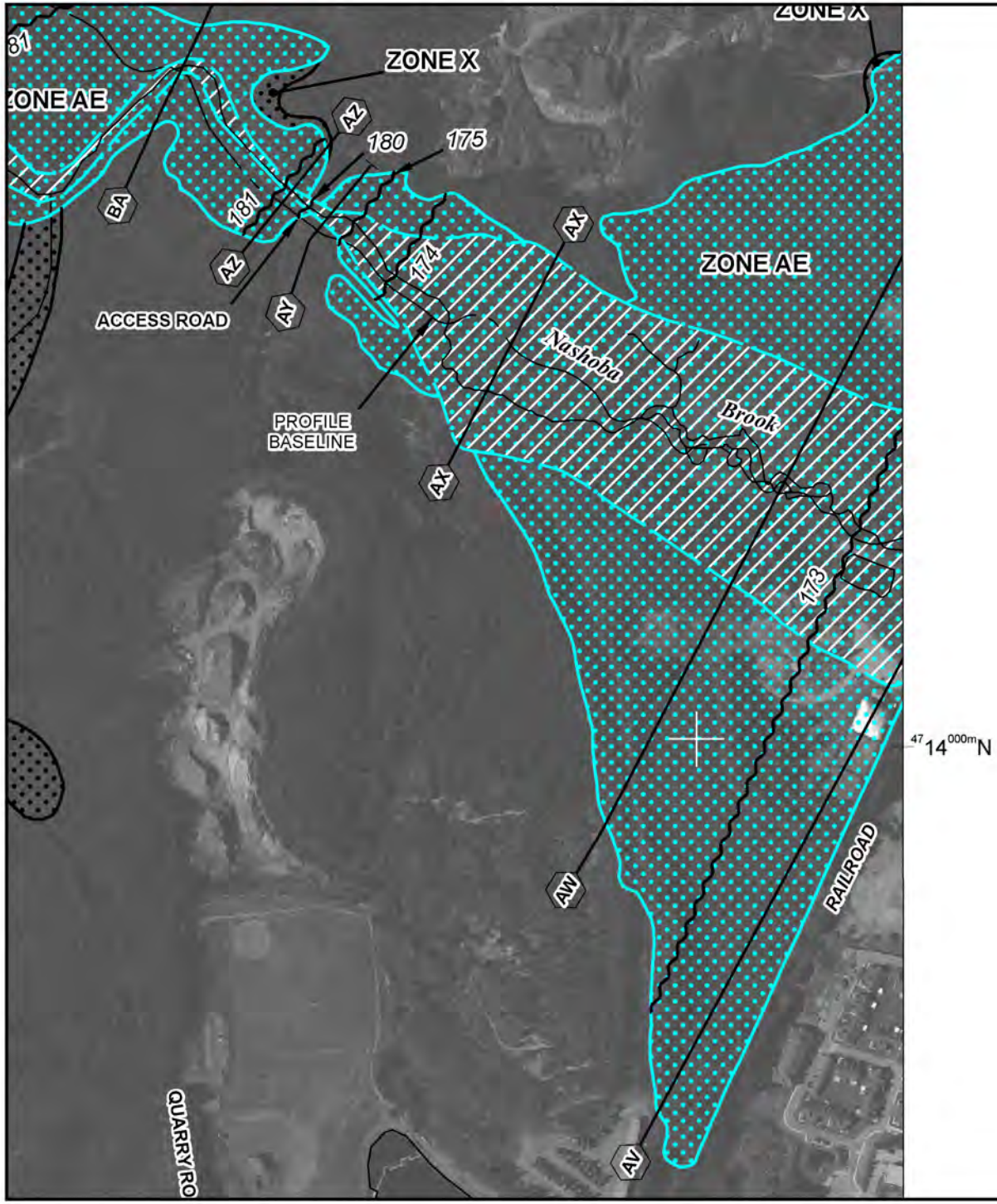
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0244E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0243E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 243 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0243	E
LITTLETON, TOWN OF	250200	0243	E
WESTFORD, TOWN OF	250225	0243	E

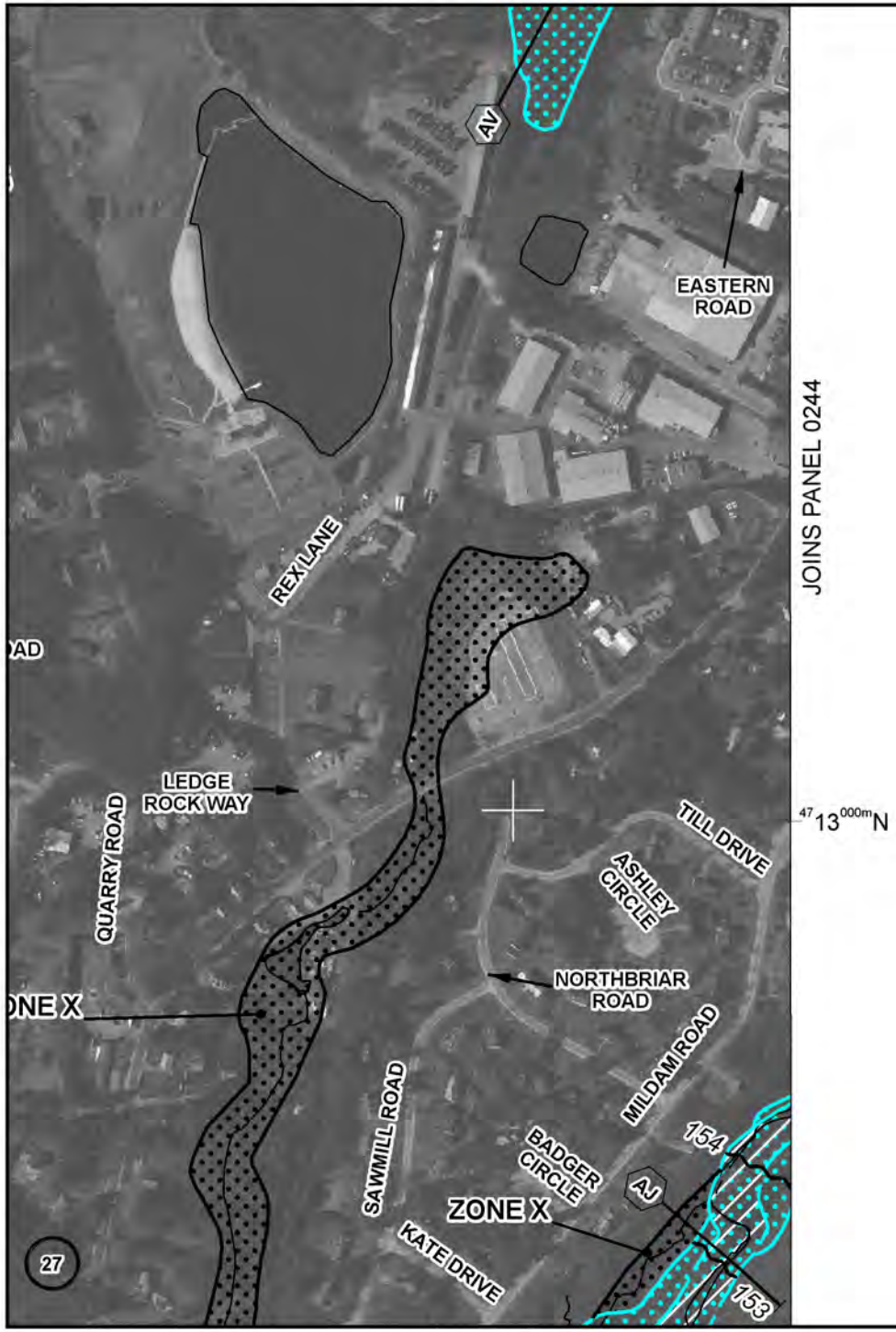
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0243E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0243E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 243 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0243	E
LITTLETON, TOWN OF	250200	0243	E
WESTFORD, TOWN OF	250225	0243	E

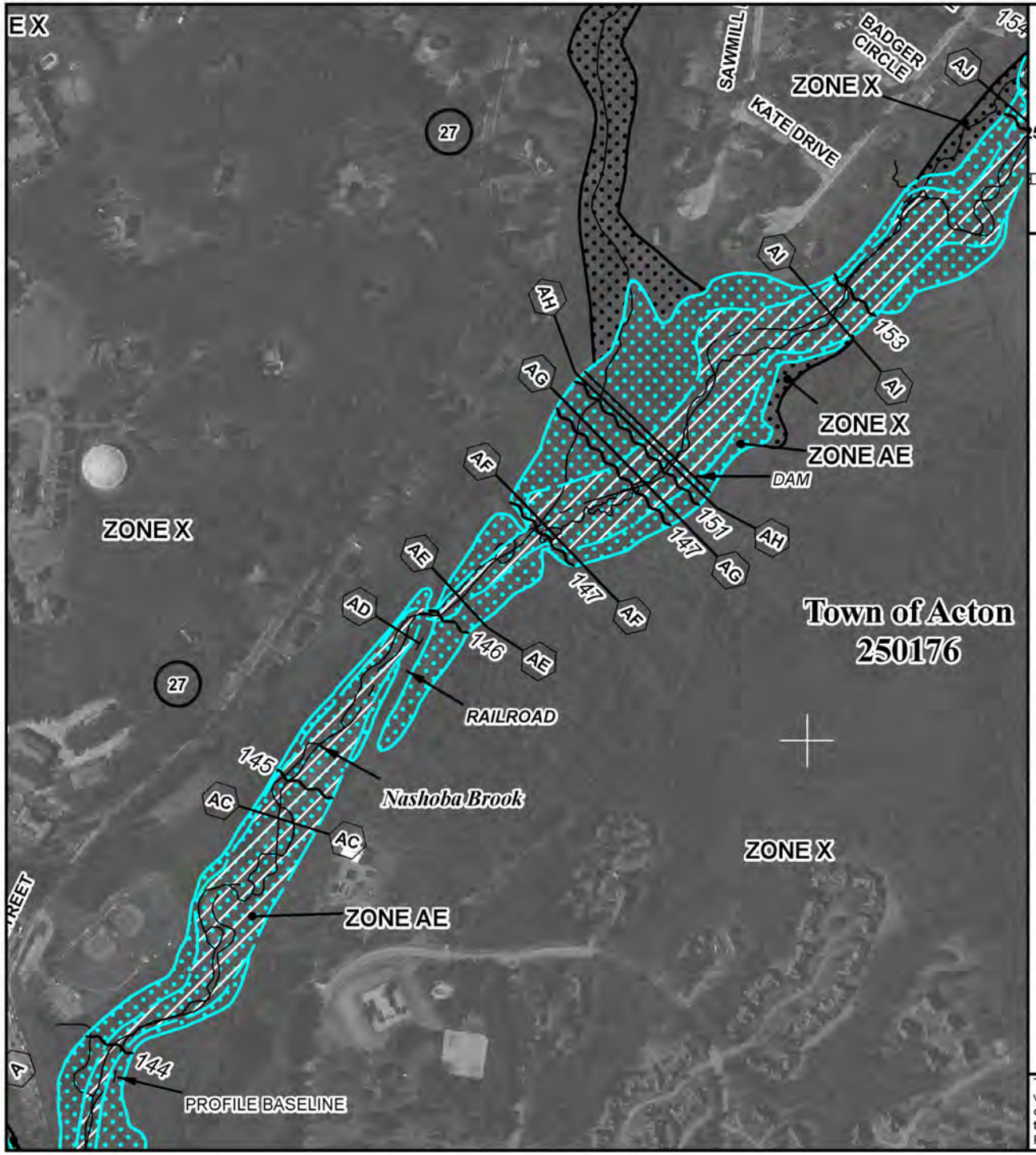
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0243E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0243E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 243 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0243	E
LITTLETON, TOWN OF	250200	0243	E
WESTFORD, TOWN OF	250225	0243	E

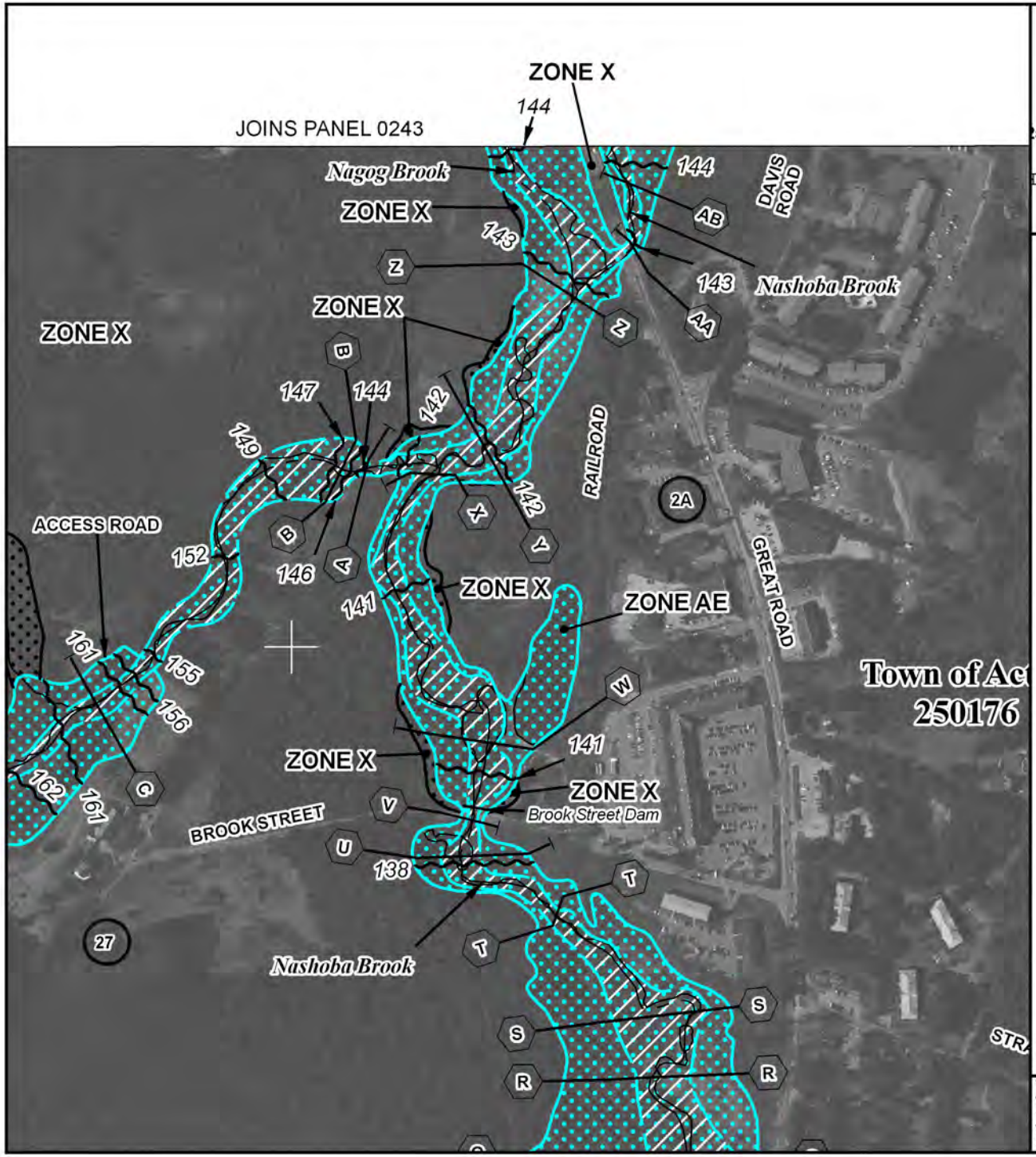
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0243E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0356E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 356 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0356	E
CONCORD, TOWN OF	250189	0356	E

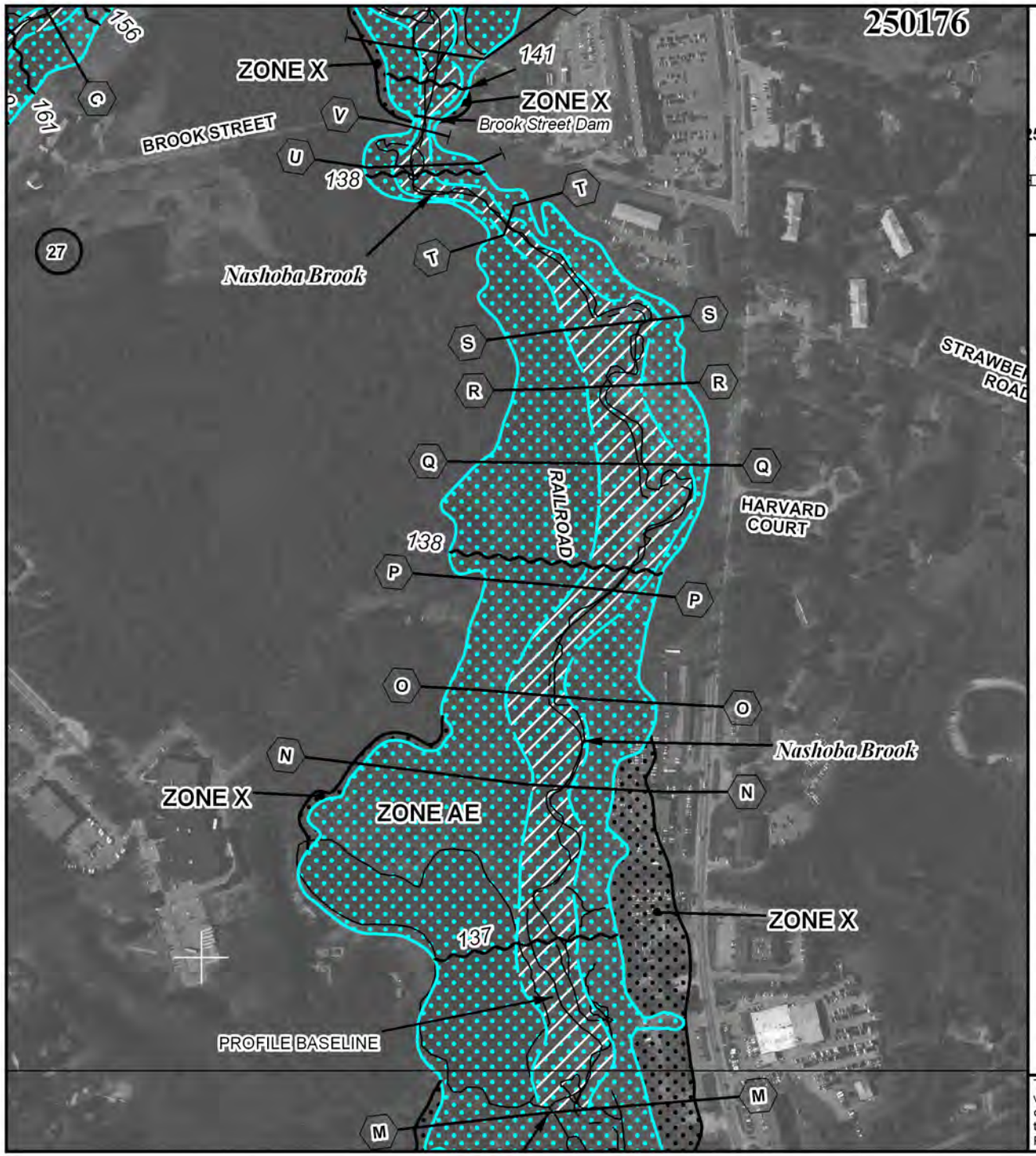
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0356E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0356E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 356 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0356	E
CONCORD, TOWN OF	250189	0356	E

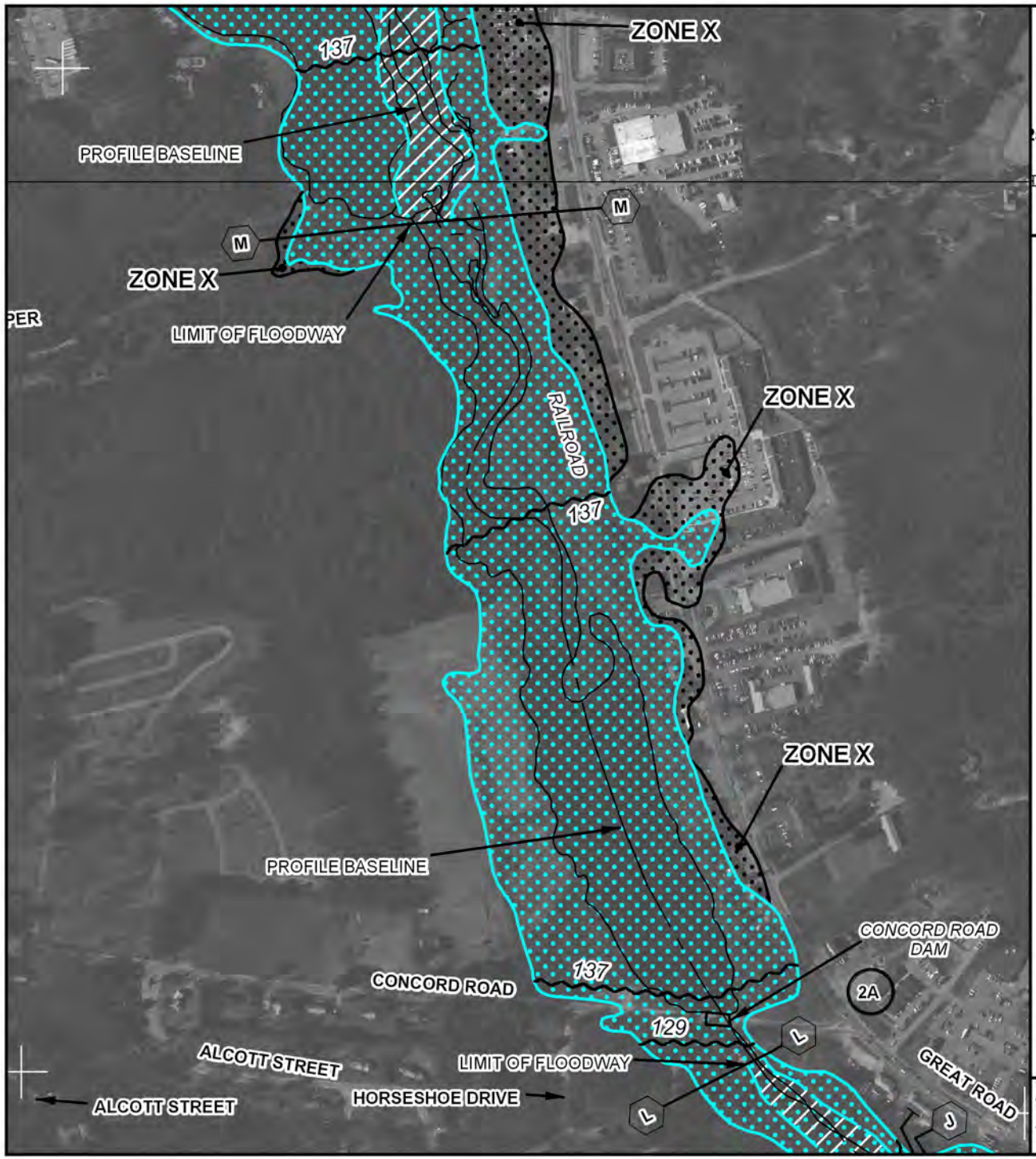
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0356E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0356E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 356 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0356	E
CONCORD, TOWN OF	250189	0356	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0356E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0356E

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 356 OF 656

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ACTON, TOWN OF	250176	0356	E
CONCORD, TOWN OF	250189	0356	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0356E

EFFECTIVE DATE
JUNE 4, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Photo 1

Proposed Parking Lot Location - Town of Acton

Photo 2

Solid Waste Dumping in bordering vegetated wetland adjacent to parking area.

PHOTOGRAPHIC DOCUMENTATION

Bruce Freeman Rail Trail Phase 2A

Acton, Massachusetts

Photographs Documented August 19, 2013

Photo 3

Location of Bank alteration at Rail Trail Sta. 118+00 .

Photo 4

Adjacent wetland resource area at Rail Trail Sta 117+00

PHOTOGRAPHIC DOCUMENTATION

Bruce Freeman Rail Trail Phase 2A

Acton, Massachusetts

Photographs Documented August 19, 2013

Location of proposed BVW Replication near Rail Trail Sta 223+00.

PHOTOGRAPHIC DOCUMENTATION

Bruce Freeman Rail Trail Phase 2A

Acton, Massachusetts

Photographs Documented August 19, 2013

Location of proposed BVW Replication at Rail Trail Sta 29+50 near proposed parking area.

PHOTOGRAPHIC DOCUMENTATION

Bruce Freeman Rail Trail Phase 2A

Acton, Massachusetts

Photographs Documented August 19, 2013

TABLE I

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
21 + 25 LT	Butter	**494**	**137**							**"New driveway" Limited Project per 310 CMR 10.53(3)(e) providing access from proposed parking lot and public roadway.** Temporary vegetated wetland impacts will be restored in place. Permanent impacts will be replicated.
21 + 50 RT	Butter	**80**	**84**							**"New driveway" Limited Project per 310 CMR 10.53(3)(e) providing access from proposed parking lot and public roadway.** Temporary vegetated wetland impacts will be restored in place. Permanent impacts will be replicated.
22 + 00 LT	Butter		**6**							**"New driveway" Limited Project per 310 CMR 10.53(3)(e) providing access from proposed parking lot and public roadway.** Temporary vegetated wetland impacts will be restored in place.
22 + 00 RT	Butter		**9**							**"New driveway" Limited Project per 310 CMR 10.53(3)(e) providing access from proposed parking lot and public roadway**. Temporary vegetated wetland impacts will be restored in place.

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
22 + 00	Butter				**5,533**	0				**"New driveway" Limited Project per 310 CMR 10.53(3)(e) providing access from proposed parking lot and public roadway**. Clearing & Grubbing and Cut grading only. See Profile Sheet 42 & FIRM Panel 242.
35 + 50	Butter				18,106	0				100-year Floodplain Impact 2. Cut grading only – NO FILL. See Firm Panel 242.
29+50	Butter									**1,233 s.f. Wetland Replication Area #1**
37 + 50	Butter						-57			Floodway Impact 1 – Cut grading only. NO FILL.
45 + 50	Butter				5,280	108				100-year Floodplain Impact 3. Most of work does not appear to be below BFE 173. See Firm Panel 242 & 244; the BFE is controlled by the backwater of Nashoba Brook (lake effect).
45+25	Butter									**1,259 cubic feet flood storage compensation**
46 + 50	Butter		9							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place.
47+21	Butter				1,246	54				100-year Floodplain Impact 4. Clearing & Grubbing and regrading Main St. to improve site distance (safety).

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
47 + 75	Butter		6							Limit of work encroachment. Temporary vegetated wetland impacts to be restored in place.
56 + 25	Butter						7			Floodway Impact 2 – Fill (NHESP Focus Area #3)
58 + 75	Butter				35,481	972				100-year Floodplain Impact 5. HEC-RAS shows No rise in BFE using proposed Profile elevations – FIRM Panel 244. The BFE is controlled by the backwater of Nashoba Brook – lake effect.
63 + 50	Nashoba		5							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. (NHESP Focus Area #3)
64 + 00	Nashoba		22							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. (NHESP Focus Area #3)
65 + 50	Nashoba						6			Floodway Impact 3 – Fill. (NHESP Focus Area #3)
68 + 50	Nashoba				2,170	0				100-year Floodplain Impact – grade crossing at Nashoba Sportsman Club driveway.
76 + 00	Nashoba	15	47							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place.
76 + 50	Nashoba		5							Limit of Work encroachment. To be restored in place.

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
77 + 75	Nashoba		50							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place.
79 + 50 RT	Nashoba	24	62							Limit of work encroachment. Temporary vegetated wetland impacts to be restored in place.
84 + 50 LT	Nashoba		15							Limit of Work encroachment. Temporary vegetated wetland impacts o be restored in place.
84 + 75	Nashoba				3,132	0				100-year Floodplain Impact 7. The area of the trail appears to be above the BFE 173 – FIRM Panel 243. BFE controlled by existing railroad Bridge A-02-030.
85 + 00 RT	Nashoba	**216**	**123**					7*		Limit of Work encroachment. Temporary impacts to be restored in place. Permanent impacts to be replicated. **Falls under WPA Limited Project Provision 310 CMR 10.53(3)(i) – maintenance of bridges and culverts.**
109 + 00	Tributary to Nashoba		9							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place.
110 + 75	Tributary to Nashoba		1							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place.

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
116 + 00 RT	Tributary to Nashoba				5,540	0				100-year Floodplain Impact 8
116 + 25 LT	Tributary to Nashoba			15						Culvert improvements – extension. Bike path reduced to 10 foot width here to minimize impacts.
117 + 00	Tributary to Nashoba			10						Limit of Work encroachment. To be stabilized. Bike path reduced to 10 foot width here to minimize impacts.
117 + 75	Tributary to Nashoba			44						Limit of Work encroachment. To be stabilized. Bike path reduced to 10 foot width here to minimize impacts.
130 + 25	Tributary to Nashoba	**101**	**56**							Limit of Work encroachment. Temporary impacts to be restored in place. Permanent impacts to be replicated. **Falls under WPA Limited Project Provision 310 CMR 10.53(3)(i) – maintenance of bridges and culverts.**
131 + 75	Tributary to Nashoba				10,666	0				100-year Floodplain Impact 9. Zone X – Area appears to be 500YR flood plain, ground elevations greater than BFE 152 feet. No fill. See Note 3.
144 + 25	Tributary to Nashoba				**866**	0				100-year Floodplain Impact 10. **Falls under WPA Limited Project Provision 310 CMR 10.53(3)(i) – maintenance of bridges and culverts.** No Fill. (NHESP Focus Area #1)

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
144 + 50	Nashoba						874			Floodway Impact 4 – Fill. Compensatory floodplain provided. HEC-RAS shows No Rise.
146 + 00	Nashoba				207	0				100-year Floodplain Impact 11. Clearing & Grubbing only. No Fill. (NHESP Focus Area #1)
147+25	Nashoba									**660 cubic feet compensatory flood storage**
147 + 75	Nashoba		37							Limit of Work encroachment. To be restored in place. (NHESP Focus Area #1)
150 + 00	Nashoba				1,401	0				100-year Floodplain Impact 12. Existing HEC-2 in 2010 FIS did not use this area to estimate BFE. The area along the RR embankment was "Ineffective Flow Area" – FIRM Panel 243. (NHESP Focus Area #1)
151 + 00	Nashoba		3							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. (NHESP Focus Area #1)
152 + 50	Nashoba				3,953	702				100-year Floodplain Impact 13. Existing HEC-2 in 2010 FIS did not use this area to estimate BFE. The area along the RR embankment was "Ineffective Flow Area" – FIRM Panel 243. (NHESP Focus Area #1)

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
153 + 25	Nashoba		29							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. (NHESP Focus Area #1)
155 + 00	Nashoba		14							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. (NHESP Focus Area #1)
157 + 25	Nashoba				552	135				100-year Floodplain Impact 14. Area appears to be within "Ineffective Flow Area" of BFE – FIRM Panel 243. (NHESP Focus Area #1)
157 + 75	Nashoba				184	0				100-year Floodplain Impact 15. Area appears to be within "Ineffective Flow Area" of BFE – FIRM Panel 243. (NHESP Focus Area #1)
158 + 50	Nashoba				306	135				100-year Floodplain Impact 16
158 + 75	Nashoba		1							Limit of Work encroachment. To be restored in place. (NHESP Focus Area #1)
165 + 50	Nashoba	49	136							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. Permanent impacts to be replicated.
166 + 00	Nashoba	69								Limit of Work encroachment. Permanent vegetated wetland impact to be replicated. (NHESP Focus Area #1)

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
167+00	Nashoba								262	Falls under WPA Limited Project Provision 310 CMR 10.53(3)(i) – maintenance of bridges and culverts. (NHESP Focus Area #3)
600 + 50	Nashoba		196							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place.
600 + 75 LT	Nashoba	192	297							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. Permanent impacts to be replicated. (NHESP Focus Area #1)
601 + 75 to 602 + 75	Nashoba	4	50							Bridge over Rte 2A/Great Road Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. Permanent impacts to be replicated. (NHESP Focus Area #1)
603 + 25	Nashoba	102	119							Bridge over Rte 2A/Great Road Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. Permanent impacts to be replicated.
181 + 25	Nashoba		11							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place.
191 + 75	Nashoba						5			Floodway Impact 5 – Fill. Compensatory floodplain provided. HEC-RAS shows No Rise. (NHESP Focus Area #2)

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
203 + 50	Nashoba						16			Floodway Impact 6 – Fill. Compensatory floodplain provided. HEC-RAS shows No Rise.
208 + 50	Nashoba		4							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. (NHESP Focus Area #2)
212 + 50	Nashoba		**5**						34*	Limit of Work encroachment. Temporary vegetated wetland impact to be restored in place. **Falls under Limited Project provision 310 CMR 10.53(i) – maintenance and repair of culverts.** (NHESP Focus Area #2)
212 + 75	Nashoba	3	92							Limit of Work encroachment. Temporary impacts to be restored in place. Permanent impacts to be replicated. (NHESP Focus Area #2)
216 + 75 LT	Nashoba		**29**							Limit of Work encroachment. Temporary impacts to be restored in place. **Falls under Limited Project provision 310 CMR 10.53(i) – maintenance and repair of culverts.** (NHESP Focus Area #2)
216 + 75 RT	Nashoba								17 *	Rebuild existing headwall to swale. (NHESP Focus Area #2)
219 + 00	Nashoba				152,160	459				100-year Floodplain Impact 17. Clearing and grubbing. (NHESP Focus Area #2)

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
221 + 25 LT	Nashoba		3							Limit of Work encroachment. Temporary vegetated wetland impacts o be restored in place. (NHESP Focus Area #2)
221 + 25 RT	Nashoba		4							Limit of Work encroachment. Temporary vegetated wetland impacts o be restored in place. (NHESP Focus Area #2)
223+75	Nashoba									**1,946 s.f Wetland Replication Area #2**
227 + 25	Nashoba	**162**	**143**							Temporary and permanent vegetated wetland impacts associated with pedestrian access. Falls under the Limited Project Provision 310 CMR 10.53(e) – access from a public way.
227 + 50	Nashoba	**56**	**234**							Temporary and permanent vegetated wetland impacts associated with pedestrian access. **Falls under the Limited Project Provision 310 CMR 10.53(e) – access from a public way.**
230 + 75	Nashoba	38	14							Limit of Work encroachment. Temporary vegetated wetland impacts to be restored in place. Permanent impacts to be replicated.
233+00	Nashoba									**982 cubic feet compensatory flood storage**
236 + 50	Nashoba									Temporary and permanent vegetated wetland impacts associated with

Table 1: Wetland Resource Area Impacts – Acton - Bruce Freeman Rail Trail Phase 2A – 03/10/2014

ROW STA No. #	Brook Name	Wetland Resource Area Impacts								Comments
		BVW/VW		Bank (lf)	BLSF Sq. ft	BLSF c.f.	Floodway (cy)	LUW/other Waters of the U.S. (*only)		
		Perm. (sf)	Temp. (sf)					Perm. (sf)	Temp. (sf)	
		49	**40**						30*	pedestrian access to trail from Great Road. **Falls under the Limited Project Provision 310 CMR 10.53(i) – culvert maintenance and repair.**
253 + 25	Nashoba				12,591	0				100-year Floodplain Impact 18.
253 + 50	Nashoba	106	203							Limit of Work encroachment. Temporary impacts to be restored in place. Permanent impacts to be replicated.
254 + 25	Nashoba						3			Floodway Impact 7 – Fill.
259 + 00	Nashoba				719	0				100-year Floodplain Impact 19.
TOTAL		**1,760**	**2,310**	**69**	**260,093**	**2,565**	**854**	**7**	**343**	

Notes:

1. **Total Permanent and temporary vegetated wetland alteration is 4,070 square feet.**
2. **Total bordering vegetated wetland impacts falling under a Limited Project provision in 210 CMR 10.53 is 2,024 square feet.**
3. **FEMA Zone X area is above the 100-year floodplain elevation / area and therefore, is not defined as an Area Subject to Protection pursuant to 310 CMR 10.57(2)(a)3.**
4. **Total temporary and permanent LUW impacts (WPA only) is 448 square feet.**
5. **Total 200-foot Riverfront Area is approximately 1,105,000 square feet or 25.37 acres. Total 200-foot Riverfront Area alteration is approximately 425,000 square feet or 9.76 acres of which 385,875 square feet or 8.86 acres is within the Inner 100-feet.**

ATTACHMENT A

Notice of Intent Project Narrative

NOTICE OF INTENT PROJECT NARRATIVE

Table of Contents

1.0 Introduction 2

2.0 Site Description 3

2.1 Project Locus 3

2.2 Wetland Resource Areas 3

Bordering Vegetated Wetland 4

Bordering Land Subject to Flooding - FEMA 100 Year Floodplain 5

200-Foot Riverfront Area 5

2.3 Buffer Zones 6

2.4 NHESP-Mapped Habitat 6

3.0 Work Description 6

3.1 Work in Wetland Resource Areas 6

Bordering Vegetated Wetlands 6

Bordering Land Subject to Flooding 7

200-Foot Riverfront Area 7

Bank 8

3.2 Work in Buffer Zones 8

4.0 Mitigation Measures 9

4.1 Wetland Resource Area Replacement and Restoration 9

4.2 Floodplain Compensation 9

4.3 Erosion and Sedimentation Controls 9

4.4 Stormwater Management 10

5.0 Regulatory Compliance 10

6.0 Summary 11

WPA FORM 3 – NOTICE OF INTENT NARRATIVE

1.0 Introduction

Phase 2A of the Bruce Freeman Rail Trail (BFRT) is a 4.88-mile long segment of land that is referred to as the Proposed Phase 2A of the Bruce Freeman Rail Trail (BFRT), a multi-use recreational trail along the former Lowell Secondary railroad line owned by the Commonwealth of Massachusetts. The Towns of Westford, Carlisle 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 2009 completed BFRT Phase I (Westford - Lowell Phase) and continue south through Westford, Carlisle and Acton. Improvement activities will include: a new varying width paved asphalt multi-use trail with one to two foot stabilized shoulders, an adjacent six foot stone dust trail (provided where feasible) within the right-of-way, trail pavement markings and signing, Rectangular Rapid Flashing Beacons at trail-roadway crossings, new roadway pavement markings and signage at trail crossings, construction of a pre-fabricated pedestrian bridge structure over Route 2A/119, rehabilitation of six existing railroad trestle bridges along the trail, construction of culverts, stormwater and drainage improvements, earthwork, landscaping, existing culvert improvements and other items incidental to the construction of the rail trail.

Phase 2 of the BFRT is separated into four distinct and independent segments: Phase 2A, Phase 2B, Phase 2C and Phase 2D. Phase 2A, the subject of this NOI, begins at the termination of Phase I at the intersection of Route 225 and Route 27 in Westford and heads southerly approximately 700 feet where it intersects the Carlisle town line. The trail then continues southerly for approximately 850 feet through Carlisle to the Acton town line. From there, the proposed trail continues southerly through Acton for a distance of approximately 4.5 miles to a point 1,000 feet south of Wetherbee Street for a total project length of 4.88 miles. Construction funding has been allocated for Phase 2A and the project is programmed for FY2014.

The wetland resource area boundaries along the Phase 2A stretch of the BFRT have been confirmed through issuance of an Order of Resource Area Delineation (ORAD) in Westford, Carlisle and Acton. With the 2012 Permit Extension Act amendment, the ORAD decision issued by the Acton Conservation Commission on January 21, 2009 now expires on January 21, 2016. Resource area boundaries have been modified slightly in places to more accurately describe the resource area boundary and location. Modifications to the boundaries were limited to re-defining some to be consistent with their definition found in the Massachusetts Wetland Regulations, 310 CMR 10.00 and eliminating drainage ditches along the existing rail ROW that did not meet the definition of a stream as defined in 310 CMR 10.04. The modification locations are described in the following table.

Table 1 – Resource Area Boundary Modifications

LOCATION	MODIFICATION	NOTES
Sta 48+00 West side	Removed MHW flags from NOI plan. Only vegetated wetland boundary here.	Per definition at 310 CMR 10.58(2)(a).
Sta 66+00 to 68+00 West side	Removed vegetated wetland boundary flags from NOI plan. Only MHW / Bank here.	Per definition at 310 CMR 10.54(2) and 10.58(2).
Sta 114+00 to 117+00 East side	Redefined boundary as Bank to a pond instead of vegetated wetland boundary.	Per definition at 310 CMR 10.54(2).
Sta 117+00 Southeast side	Resource area south of pond and current Bank delineation removed.	Per definition of stream at 310 CMR 10.04. No up-gradient jurisdictional areas.
Sta 225+00 to 228+00 East side	Remove flagging along drainage ditch.	Per definition of stream at 310 CMR 10.04. No up-gradient jurisdictional areas.
Sta 231+00 to 234+00 East side	Remove flagging along drainage ditch.	Per definition of stream at 310 CMR 10.04. No up-gradient jurisdictional areas.
Sta 245+00 to 248+00 East side	Remove flagging along drainage ditch.	Per definition of stream at 310 CMR 10.04. No up-gradient jurisdictional areas.
Sta 245+50	Remove flagging to MHW boundary (from cross culvert not defined as a stream per 10.04)	No Land Under Water or vegetated wetlands in drainage channel leading to MHW boundary per 310 CMR 10.56(2) and 10.55(2).

2.0 Site Description

2.1 Project Locus

The Acton segment of the BFRT Phase 2A runs from approximately ROW Sta. 28+25 to Sta. 268+00, from the Carlisle/Acton town line to a point 1,000 feet south of Wetherbee Street in Acton. The total length of rail trail to be constructed in Acton is approximately 23,975 linear feet or approximately 4.5 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

As described in the 2009 Abbreviated Notice of Resource Area Delineation submitted to the Acton Conservation Commission for their review of the resource area boundaries within the project limits, the BVW/ Vegetated Wetlands associated with this section of the BRFT are divided into multiple areas within the Town of Acton; each of these areas is ultimately hydraulically connected to either Butter Brook or Nashoba Brook and/or their intermittent tributaries. Each individual wetland area was not described in detail; however, general descriptions of each type of wetland area encountered from north to south are provided in the following paragraphs.

The BVW in the northernmost sections of the BFRT corridor (i.e., the segment located to the east of Main Street/ Route 27) are associated with Butter Brook, a perennial tributary to Nashoba Brook. Forested swamps in this area are located both to the west and east of the railbed, where the BVW is dominated by a canopy of red maple (*Acer rubrum*) and eastern white pine (*Pinus strobus*) and a shrub community dominated by highbush blueberry (*Vaccinium corymbosum*), European buckthorn (*Rhamnus cathartica*), Northern arrowwood (*Vibrunum dentatum*), scattered winterberry (*Ilex verticillata*) and fetterbush (*Leucothoe racemosa*). Groundcover species include scattered clumps of tussock sedge (*Carex stricta*), cinnamon fern (*Osmunda cinnamomea*) and skunk cabbage (*Symplocarpus foetidus*) along with patches of sphagnum moss (*Sphagnum sp*).

Northwest of the first (northernmost) intersection with Route 27 is a small isolated wetland (flagging series W58 through W64) confined by moderate slopes on all sides, which is dominated by European buckthorn and seedlings of red maple and eastern white pine, with skunk cabbage dominating the ground cover.

The rail bed crosses Butter Brook twice with wooden bridges, which are in somewhat close proximity to each other. At the time of the resource area boundary delineation, beaver activity was particularly prevalent in these areas, where Butter Brook traverses an open shrub swamp community dominated by silky dogwood (*Cornus amomomum*), winterberry and buttonbush (*Cephalanthus occidentalis*); purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*) and various sedges were also observed. A heron rookery is located in the forested area to the west, a distance from the rail bed. The rail bed in this location is somewhat narrow with moderately sloping embankments dominated by eastern white pine, various oaks and European buckthorn.

Southwest of the driveway to the Nashoba River Sportsman's Club, is a second, open shrub swamp community located at the base of the steeply sloping western embankment of the BFRT. Here the community is dominated by a mix of highbush blueberry, swamp azalea, maleberry (*Lyonia ligustrina*) and nannyberry (*Viburnum lentago*) with seeding and sapling red maple and gray birch (*Betula populifolia*), cinnamon fern, royal fern (*Osmunda regalis)* and tussock sedge scattered among the shrubs.

Further south, beyond the condominium community off Eastern Road, the BFRT enters a light industrial area, which continues until the intersection of Route 27/ Ledge Rock Way. Here, a series of interconnected BVWs was observed and delineated along both sides of the rail bed, along with isolated wetland areas protected under the Federal *Clean Water Act*. Many of these wetlands are immediately adjacent to stormwater facilities associated with the various businesses and/or receive some stormwater runoff from these areas.

Bordering Land Subject to Flooding - FEMA 100 Year Floodplain

The portion of the BFRT within the Town of Acton is depicted on four FEMA flood maps (listed from north to south along the rail trail): Map No.'s 25017C0242E, 25017C0244E, 25017C0243E and 25017C0356E (all Effective Date June 4, 2010).

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. Both of these areas are classified as BLSF for which separate impact quantities are estimated. The location and quantification of the fills are presented in Table 1 attached. Impacts for Special Flood Hazard Area Zone X are noted on the plans but no quantities were estimated. Zone X defined as areas of 500-year flood; areas of 100-year flood with average depths of less than one foot or with drainage areas less than one square mile; and areas protected by levees from 100-year flood are not determined as BLSF.

200-Foot Riverfront Area

Riverfront Area (RFA) exists within the proposed project site in association with Butter Brook, Nashoba Brook, and an un-named perennial tributary to Nashoba Brook. The total length of the BFRT in Acton within RFA is approximately 17,000 feet or 3.2 miles.

Inland Bank

Bank boundary identified and delineated within or directly adjacent to the rail ROW is associated with the pond at Sta 116+00, south of Main Street and drainage ditches at the project's southern end, north of Concord Street where they meet the definition of a stream per 310 CMR 10.04. Temporary impact to inland Bank quantified as 69 linear feet will take place near Sta 116+00. Here, construction of the historic rail formed the pond and its bank. Construction of the rail trail will reestablish the bank in this location.

Land Under Water

Land Under Water (LUW) is located in and adjacent to the linear project locus and is generally associated with the pond south of Main Street at Sta 116+00 and Nashoba Brook near the Route 2A crossing. Temporary impacts to LUW resulting from construction of the Route 2A pedestrian bridge and culvert maintenance in this location will occur. Otherwise, LUW is located within 100 feet of the rail ROW, outside the construction limit of work and will not be impacted by this project.

2.3 Buffer Zones

A majority of the work in the Acton stretch of the BFRT Phase 2A is within areas Subject to Protection or Jurisdiction. Most 100-foot Buffer Zone to BVW, Bank or LUW is 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 situated within NHESP-mapped Priority Habitat of Rare Species requiring MassDOT-Highway to submit to NHESP for Massachusetts Endangered Species Act (321 CMR 10.00) for project review.

3.0 Work Description

3.1 Work in Wetland Resource Areas

Bordering Vegetated Wetlands

As part of this project, a number of areas within proposed work are expected to temporarily and permanently impact bordering vegetated wetlands areas. These areas range in size from 1.0 square feet to 494 square feet and are delineated on the included 75% Design Plans. All impact areas are located in the Town of Acton. The areas of anticipated vegetated wetlands impact total 4,070 square feet (sf), further quantified as 1,760 sf of permanent BVW impact and 2,310 sf of temporary BVW impact. Areas where permanent wetland impacts occur will be replicated while temporary wetland impact locations will be fully restored in place.

Two new constructed wetland areas totaling 3,179 sf will be constructed to replicate the permanent BVW alteration. The location and quantification of the alteration and replication areas are presented in that attached Table 1 – Wetland Resource Area Impacts.

Bordering Land Subject to Flooding

BFRT work in the Bordering Land Subject to Flooding (BLSF) is limited to in-kind bridge replacements and localized encroachment into the floodplain due to relatively small increases in the width and/ or height of the former railroad embankment to accommodate the new rail trail. The location and quantification of the fills are presented in Table 1 attached. Interests specified for BLSF include flood control, storm damage protection and the protection of wildlife habitat.

Work within the BLSF located on the former railroad embankment is considered to be not significant to the protection of wildlife habitat due to alteration by human activity. The areas where the existing railroad embankment increases are estimated to be cumulatively less than 5,000 square feet and therefore are not deemed to be significant to habitat protection.

Bridge replacement work for the wood trestle bridges generally involves removing existing rails and existing timber support trestles and replacing them with a new precast concrete deck. The existing stone abutments and wing walls are to remain in place as is. Where they exist, steel beam supports will be re-used and new concrete decks installed. At locations where there was some question as to whether the existing and/or proposed low-chord of the bridges were lower than the 100-year flood level, hydraulic analyses were performed to demonstrate that there is “no-rise” in the flood level.

Examination of the 2010 Middlesex County Flood Insurance Study (FIS) found the proposed BLSF filling to be within “ineffective” areas of the cross sections used in the FIS to estimate the 100-year flood levels. Therefore, placement of fill within the ineffective areas will not change the regulatory base flood elevations. Actual changes to levels of flood waters are not considered to be significant as a result of the minor loss in flood storage volume. Flood impact studies have also found that localized fills that do not displace large amounts of flood plain storage are expected to have a small influence on peak rate of flow. Although the fill associated with the BFRT is relatively minimal and should have no measurable impact to the 100-year flood level, compensatory flood storage volume is being provided.

200-Foot Riverfront Area

The total RFA area to be altered is approximately 425,000 square feet or 38.5% of the approximately 1,105,000 square feet total RFA on the Project site. The BFRT 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. 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

Approximately 69 linear feet of Bank will be altered in association with trail construction adjacent to the existing pond at Sta 116+00 to Sta 117+75. The existing rail historically formed the Bank that confines the impoundment. Bank will be restored in place and stabilized during construction activities.

Alteration of 50 linear feet of Bank exceeds the threshold where impacts would not be deemed to impair wildlife habitat.[1] When alterations exceed thresholds for Bank, Appendix A – Simplified Wildlife Habitat Evaluation is required. MassDOT representatives completed the Simplified Wildlife Evaluation and is included in Attachment F.

Land Under Water

The project will also result in 262 square feet of temporary Land Under Water (LUW) impact associated with culvert maintenance activities at Sta 167+00 (at the Route 2A bridge). LUW impacts are temporary in nature and will stabilize upon completion of construction activities.

The bridge rehabilitation work will not require in-water work. Therefore, there are is no expected LUW or Bank alteration associated with this project activity. It is anticipated for the scope of work that the Contractor will require personnel to be in boats in the waterways below the bridge in order for the contractor to place safety nets and tarps to eliminate debris from entering the waterways during the removal of the rails, ties and abutment stone masonry. The Contractor may also elect to perform some of the required removal from the boats simply for access purposes. The Contractor will also be required to work from boats where the proposed beam is being placed where the work will entail forming and placing a reinforced concrete bridge seat for the proposed beam to bear on and also bolting the proposed beam to the existing adjacent beam for support. The bridge deck will be constructed with removable forms. As such, once the concrete deck has been placed and cured, the forms would need to be removed from the underside of the bridge using boat access. It is not anticipated that the Contractor will require personnel to be physically standing or working in the water for these proposed rehabilitations.

3.2 Work in Buffer Zones

A majority of the work in the Acton stretch of the BFRT Phase 2A is within areas Subject to Protection or Jurisdiction. Most of the 100-foot Buffer Zone to BVW and Bank is 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.

[1] Per General Performance Standard listed at 310 CMR 10.54(4)(a)5.

4.0 Mitigation Measures

BFRT Phase 2A 75% design and construction plans were developed to avoid, minimize and mitigation 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 contribute to the interests found in the Massachusetts Wetland Protection Act.

Impacts to areas subject to protection including BVW, BLSF (fill), Bank and LUW have been compensated for through creation of two vegetated wetland replication areas providing a 1:1.5 permanent impact / replication ratio; in-place restoration of temporary impact areas; incremental floodplain compensation; in-place Bank replication/restoration; and in-place LUW restoration at culvert repair / maintenance locations.

4.1 Wetland Resource Area Replacement and Restoration

Approximately 69 linear of Bank and 4,070 of BVW are proposed to be either restored in place or replicated. Please refer to Attachment D – Wetland Replication for full replication and restoration details of Non-Tidal Wetland Resource Mitigation Areas in accordance with the Performance Standards. Minimal temporary impacts to LUW and Bank will be restored in place during construction activities.

4.2 Floodplain Compensation

The BFRT 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). Table 1: Wetland Resource Impacts lists 19 separate BLSF impact locations and the amount of fill in cubic yards determined. The total amount of fill was estimated to be 2,565 cubic feet. Three separate areas are proposed to provide 2,901 cubic feet of compensatory flood storage to replace the lost storage on an incremental basis.

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 and Environmental Monitors will assess conditions and identify problems in the field during and after construction activities.

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.

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. In Acton, due to project area constraints, only limited Best Management Practices (BMPs) can be proposed.

Filter strips have been proposed in six (6) locations in Acton where the trail intersects with uncurbed roadway and parking areas. Runoff from these surface areas experience constant motorized vehicle traffic and require treatment to address water quality. While these areas are already maintained under local pollution prevention and stormwater management plans, the filter strips will aid in the removal of total suspended solids in these areas to provide water quality treatment and will enhance recharge of the groundwater. The filter strips will be a minimum of 10 feet wide consisting of a 9'-0" wide dense grass strip preceded by a 6" deep x 1'- 0" wide crushed stone level spreader at the edge of the paved section of the trail. Swales have also been provided along the trail to prevent ponding of water adjacent to the trail. The swales will be of shallow depth and slope and will terminate at existing low points adjacent to the trail. Additionally, three leaching catch basins have been provided at the south end of the Rail Trail in the vicinity of the crossing of Wetherbee Street where the trail abuts un-vegetated areas.

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 BFRT Phase 2A has been designed to comply with General Performance Standards and Limited Project provisions listed in 310 CMR 10.00. Table 1 provides a detailed analysis of all proposed resource area impacts and compensation provided.

There is a total of 4,070 sf of permanent and temporary BVW impacts of which 2,024 sf of BVW impact qualifies as a Limited Project. The proposed construction of the parking area and access road to the trail from Main Street; the pedestrian access way from Great Road to the rail trail; and the proposed maintenance and repairs of existing culverts along the length of the Acton section of Phase 2A is being filed under Limited Project provisions, per Wetlands Protection Act 310 CMR 10.53(3)(e) - access driveway and (i) - bridge and culvert maintenance, repair and improvement.

The 4,070 sf total BVW impacts will be mitigated through construction of two wetland replication areas and in-place wetland restoration of temporary BVW impacts. The new replication will create 3,179 square feet of new vegetated wetland adjacent to the rail ROW providing 1:1.5 replacement of the permanently impacted BVW. One replication area is situated at the northern limits of the project near the proposed parking area and access to the trail at Sta. 29+00. The second is located between Sta. 223+00 and 224+0, in a forested upland area previously disturbed by rail construction. They have been designed to comply with the General Performance Standards listed at 310 CMR 10.55(4)(b)(1-7).

Fill placed below the 100-year floodplain (BLSF) is being fully compensated meeting the Performance Standards listed at 310 CMR 10.57(4) by providing three compensatory flood storage areas along the rail ROW.

Bank and LUW impacts are temporary in nature and the resource areas restored in place. General Performance Standards listed in 310 CMR 10.54(4) and 10.56(4) will be met.

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 BFRT Phase 2A project has a substantial WPA permitting application because of its numerous and extensive existing wetland resource areas located in and adjacent to the linear project limits. However as designed, total impacts are relatively minimal. 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

NOVER-ARMSTRONG ASSOCIATES, INC.
124 Main Street, Unit 2GG
Carver, Massachusetts 02330
Telephone 508.866.8383
Facsimile 508.866.9898
SDO-certified DBE & WBE
www.noverarmstrong.com

Evaluation of Alternatives
Bruce Freeman Rail Trail – Phase 2A
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 Phase 2A of the Bruce Freeman Rail Trail (BFRT) 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 Phase 2A, an extension of the existing BFRT, a public multi-use passive recreational trail along the former Lowell Secondary railroad line owned by the Commonwealth of Massachusetts through the towns of Westford, Carlisle and Acton, a 4.88 mile segment.*

Project Description

Phase 2A of the BFRT will extend the existing multi-use recreational trail along the former Lowell Secondary railroad line from the end of the 2009 completed BFRT Phase I (Westford - Lowell Phase) continuing south through Westford, Carlisle and Acton. Trail construction activities will include: a new varying width paved asphalt multi-use trail with 1 or 2-foot stabilized shoulders, an adjacent 6 foot stone dust trail (provided where feasible) within the right-of-way, trail pavement markings and signing, Rectangular Rapid Flashing Beacons at trail-roadway crossings, new roadway pavement markings and signage at trail crossings, construction of a pre-fabricated pedestrian bridge structure over Route 2A/119, rehabilitation of six existing railroad trestle bridges along the trail, construction of replacement culverts, stormwater and drainage improvements, earthwork, landscaping, existing culvert improvements, and other items incidental to the construction of the rail trail.

[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

The Acton segment of the BFRT Phase 2A runs from approximately public rail right-of-way Sta. 28+25 to Sta. 268+00 from the Carlisle/Acton town line to a point 1,000 feet south of Wetherbee Street in Acton. The total length of rail trail to be constructed in Acton is approximately 23,975 linear feet or approximately 4.5 miles.

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 BFRT will be constructed within the former Lowell Secondary railroad line from the end of the 2009 completed BFRT Phase 1 (Westford - Lowell Phase) and continue south through Westford, Carlisle and Acton (Phase 2A). A portion of the BFRT will deviate from the publicly-owned linear right-of-way at Sta 84+00 to Sta 106+00 where the multi-use recreational trail diverts around an existing commercial business (Rex Lumber Co.) within a varied width permanent easement. Phase 2A of the BFRT is part of a multi-phase project in various design and permitting phases. Construction of Phase 2B, 2C and 2D will ultimately extend the recreational trail through Acton and Concord, and into Sudbury.

Riverfront Area (RFA) exists within the proposed project location in association with Butter Brook, Nashoba Brook, and an un-named perennial tributary to Nashoba Brook. The total length of the BFRT within RFA is approximately 17,000 feet or 3.2 miles (Acton segment). The total RFA area that will be altered is approximately 425,000 square feet or 38.5% of the approximately 1,105,000 square feet (25.37 acres) total RFA on the Project site. Approximately 385,875 square feet (8.86 acres) is of the impacted RFA will be within the inner riparian zone.

The BFRT 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. While some of the linear project location can be considered degraded, much of the rail bed and adjacent land within the right-of-way is in various, young stages of forest succession. From Sta. 172+00 to the terminus in Acton (approximately 1,000 feet), the BFRT will be located behind existing development on Great Road (Route 2A).

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

Human impact (solid waste dumping; encroachment, etc) is occurring along this section of the BFRT. Redevelopment into a multi-use recreational trail along this stretch would have minimal impact on the RFA.

As stated, construction will be limited to historically impacted RFA, with diminished overall value. Given the BFRT 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. Specifically, the three areas NHESP has identified as priority habitat focus areas will have NHESP Restoration Area Seed Mix applied. 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 BFRT Phase 1 in Westford to Phase 2B, 2C and 2D through Concord into Sudbury, 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.

<u>On-Road Project Location</u>

An alternative site location considered is an "on-road" location within the Main Street (Route 27) and Great Road (Route 2A/119) corridor right-of-way. The existing rail generally runs parallel with Main Street and Great Road. 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.

<u>Adjacent Lots and Other Lands within the Municipality</u>

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.

<u>No Build Scenario</u>

The no-build scenario does not fulfill the overall project purpose of providing a public passive recreational amenity by extending the existing BFRT into Acton along the former Lowell Secondary railroad 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 BFRT Phase 2. Not completing Phase 2A 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 former Lowell Secondary railroad line right-of-way 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 and the bridge improvement / replacements will be located in their current locations with no enlargement or enhancements. Therefore, upon construction completion, existing conditions will not have a significant adverse impact on the interests provided by the RFA within the project limits

The final widths proposed for the project were based on requests made by NHESP in an effort to avoid a "take" of habitat. The proposed widths for Focus Area 1 (Station 143+50 to 602+00) and Focus Area 2 (Station 188+50 to 195+00) included a 2 ft. shoulder, 12 ft. paved trial, and 6 ft. soft shoulder. After reviewing requests made by NHESP, the widths were amended to include a 2 ft. shoulder, 10 ft. paved trail, and 6 ft. soft trail. In Focus Area 3 (Station 55+75 to 68+00) the proposed work consisted of a 2 ft. shoulder, 12 ft. paved trail, and 2 ft. shoulder. Following comments made by NHESP the widths were altered to a 1 ft. shoulder, 10 ft. paved trail, and 1 ft. shoulder.

Findings

Given BFRT Phase 2A'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

Order of Resource Area Delineation - *dated January 21, 2009*

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 4B – Order of Resource Area Delineation

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number: 85-1011
Provided by DEP

A. General Information

From: ACTON
1. Conservation Commission

2. This Issuance is for (check one):

   a. ☒ Order of Resource Area Delineation Only

   b. ☐ Order of Resource Area Delineation Subject to Simplified Review

      1. ☐ Not Subject to Stormwater Policy

      2. ☐ Subject to Stormwater Policy

   c. ☐ Amended Order of Resource Area Delineation

3. To: Applicant:

a. First Name	b. Last Name	c. Company
Steven	Ledoux, Town Manager	Town of Acton

d. Mailing Address: 472 Main Street

e. City/Town	f. State	g. Zip Code
Acton	MA	01720

4. Property Owner (if different from applicant):

a. First Name	b. Last Name	c. Company
Susan	McArthur	Exec. Office of Transportation (Mass Highway)

d. Mailing Address: 10 Park Plaza, Room 3170

e. City/Town	f. State	g. Zip Code
Boston	MA	02116

5. Project Location:

a. Street Address	b. City/Town
Bruce Freeman Rail Trail (Carlisle to Concord)	Acton

c. Assessors Map/Plat Number	d. Parcel/Lot Number
N/A	

Latitude and Longitude **(note:** electronic filers will click for GIS locator):

e. Latitude	f. Longitude

6. Dates:

a. Date Notice of Intent filed	b. Date Public Hearing Closed	c. Date of Issuance
November 18, 2008	January 21, 2009	January 21, 2009

7. Title and Date (or Revised Date if applicable) of Final Plans and Other Documents:

a. Title	b. Date
Topographical Plan of Land, BFRT, Acton, Carlisle, Westford, MA Sheets EX1-EX21	April 2, 2007
ANRAD – BFRT, Summary	November 2007
c. Title	d. Date

B. Order of Delineation

1. The Conservation Commission has determined the following (check whichever is applicable):

   a. ☒ **Accurate:** The boundaries described on the referenced plan(s) above and in the Abbreviated Notice of Resource Area Delineation are accurately drawn for the following resource area(s):

      1. ☒ Bordering Vegetated Wetlands

      2. ☒ Other Resource Area(s), specifically:

      Riverfront Area (Butter Brook, Nashoba Brook, Conant Brook), Inland Bank and Bordering Land Subject to Flooding.

   b. ☐ **Modified:** The boundaries described on the plan(s) referenced above, as modified by the Conservation Commission from the plans contained in the Abbreviated Notice of Resource Area Delineation, are accurately drawn from the following resource area(s):

      1. ☐ Bordering Vegetated Wetlands

      2. ☐ Other Resource Area(s), specifically:

   c. ☐ **Inaccurate:** The boundaries described on the referenced plan(s) and in the Abbreviated Notice of Resource Area Delineation were found to be inaccurate and cannot be confirmed for the following resource area(s):

      1. ☐ Bordering Vegetated Wetlands

      2. ☐ Other Resource Area(s), specifically:

      3. The boundaries were determined to be inaccurate because:

C. Simplified Buffer Zone Review

Work within the Buffer Zone pursuant to the Simplified Review (310 CMR 10.02) requires that you must comply with the following conditions. If your project does not meet these requirements, you are required to either file a Determination of Applicability or Notice of Intent or take other corrective measures as directed by the Conservation Commission.

Simplified Review Conditions:

Work conducted under Simplified Review requires the following:

1. No work of any kind shall occur within any wetland resource areas including Riverfront Area and Bordering Land Subject to Flooding.
2. The inner 0-to-50-foot wide area from the delineated wetland boundary that has a Buffer Zone shall not be disturbed by any work associated with this project, including placement of any stormwater management components.
3. No work shall occur in the Buffer Zone bordering an Outstanding Resource Water (e.g., certified vernal pool, public water supply reservoir or tributary), as defined in 314 CMR 4.00 or border coastal resource areas at 310 CMR 10.25-10.35.
4. No work shall occur in the Buffer Zone adjacent to wetland resources with estimated wildlife habitat (which is identified on the most recent Estimated Habitat Map of State-listed Rare Wetlands Wildlife).
5. Erosion and Sedimentation controls shall be installed and maintained at the 50-foot Buffer Zone line or limit of work (whichever is a greater distance from the resource area) to protect resource areas during construction.
6. If the project is subject to the Massachusetts Stormwater Policy, all work shall be conducted in conformance with an approved Stormwater Management Plan.
7. The Buffer Zone does not contain a slope greater than an average of 15% at its steepest gradient across the 100-foot Buffer Zone.
8. The amount of new impervious surface, in combination with existing impervious surfaces, shall not exceed 40% of the Buffer Zone between 50 and 100 feet.
9. No work is allowed, and no additional NOI or RDA shall be filed, for any work within the 0-to-50-foot Buffer Zone during the three-year term of an Order associated with this application.
10. Prior to any work being undertaken pursuant to this Order, the wetland resource boundary shall be flagged; all boundary delineation flagging should be maintained for the term of the Order.
11. If stormwater management structures are proposed in the Buffer Zone, the stormwater management structures shall be maintained as required in the Stormwater Plan. Such maintenance constitutes an ongoing condition and is not subject to further permitting requirements.
12. If this ORAD involves work as part of a Simplified Review, the ORAD shall be recorded at the Registry of Deeds prior to the commencement of work per the requirements of Section F.
13. Prior to proceeding with any work under Simplified Review, applicants are required to provide written notice to the Commission one week prior to commencing any work.
14. If work authorized under Simplified Review is commenced, no work is allowed, and no additional NOI or RDA may be filed, for any work within the 0-to-50-foot buffer zone during the term of an ORAD associated with this application. If work authorized under Simplified Review is **not** commenced, then future NOIs or RDAs may be filed for work within the 0-to-50-foot portion of the buffer zone.

--End of Conditions--

C. Simplified Buffer Zone Review (cont.)

Stormwater Applicability

1. ☒ The project is not subject to the Stormwater Policy.
2. ☐ The project is subject to the Stormwater Policy and the Stormwater Plan included for the project complies with all stormwater standards.

Ineligibility Determinations

Site Conditions: The applicant is not eligible for Simplified Buffer Zone review and must file a Request for Determination of Applicability or Notice of Intent prior to any work because:

3. ☐ Work is within the Buffer Zone of a Coastal Resource Area as defined at 310 CMR 10.25-10.35.
4. ☒ The Buffer Zone contains existing slopes greater than an average of 15%.
5. ☒ Buffer Zone contains estimated rare wildlife habitat.[1]
6. ☐ The site borders an Outstanding Resource Water.[2]

Stormwater

7. ☐ The project is subject to the Stormwater Policy and the applicant has not submitted sufficient information to demonstrate compliance with the Stormwater Management Policy. Prior to any work, the applicant must submit plans showing compliance with the standards in the Stormwater Policy, the location of the work, the amount of impervious surface, and the location of erosion controls, to the Commission for its concurrence. (See instructions to ANRAD Form 4A.) The following necessary stormwater information was not submitted by the applicant:

   a. _____

8. ☐ The project is subject to the Stormwater Policy but the project does not comply with one or more of the stormwater standards (specify which standard(s) not met).
   a. Standard # : _____
   b. Standard # : _____
9. ☐ Impervious surface exceeds 40% of the area of the Buffer Zone between 50 and 100 feet from the resource area.
10. ☐ The applicant did not submit plans depicting adequate erosion and sedimentation controls located at the limit of work or at least 50 feet from any resource areas, whichever will be greater.
11. ☒ Work is proposed within 50 feet of a resource area.

Notice to Commission

Any applicant proposing to proceed under Simplified Buffer Zone Review, as specified in 310 CMR 10.02, must provide written notice to the Commission one week prior to any work.

[1] *Identified on the most recent Estimated Habitat Map of State-listed Rare Wetlands Wildlife of the Natural Heritage and Endangered Species Program.*
[2] *Certified Vernal Pools, public water supplies, or inland ACECs as identified in 314 CMR 4.00.*

D. Findings

This Order of Resource Area Delineation determines that the Stormwater Plan, if applicable, and the boundaries of those resource areas noted above, have been delineated and approved by the Commission and are binding as to all decisions rendered pursuant to the Massachusetts Wetlands Protection Act (M.G.L. c.131, § 40) and its regulations (310 CMR 10.00). This Order does not, however, determine the boundaries of any resource area or Buffer Zone to any resource area not specifically noted above, regardless of whether such boundaries are contained on the plans attached to this Order or to the Abbreviated Notice of Resource Area Delineation.

The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

If the Abbreviated Notice of Resource Area Delineation was filed as Simplified Review for a Buffer Zone project, the applicant has certified that any work associated with the proposed project meets all eligibility requirements for Simplified Review listed in Section C of this Order. Any work that does not comply with the Simplified Review requirements will require a Notice of Intent or Request for Determination of Applicability.

The applicant is responsible for promptly requesting a Certificate of Compliance following completion of any work allowed pursuant to a Simplified Review or no later than three years from the date of the Order of Resource Area Delineation unless the Order is extended.

Failure to comply with the conditions of this Order is grounds for the Conservation Commission or the Department to take enforcement action.

This Order must be signed by a majority of the Conservation Commission. The Order must be sent by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate DEP Regional Office (see http://www.mass.gov/dep/about/region/findyour.htm).

E. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate DEP Regional Office to issue a Superseding Order of Resource Area Delineation. When requested to issue a Superseding Order of Resource Area Delineation, the Department's review is limited to the objections to the resource area delineation(s) stated in the appeal request. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant. Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order or Determination, or providing written information to the Department prior to issuance of a Superseding Order or Determination.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act, (M.G.L. c. 131, § 40) and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal bylaw or ordinance, and not on the Massachusetts Wetlands Protection Act or regulations, the Department of Environmental Protection has no appellate jurisdiction.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

DEP File Number:

WPA Form 4B – Order of Resource Area Delineation

85-1011
Provided by DEP

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

F. Signatures and Notary Acknowledgement

Please indicate the number of members who will sign this form: _____ 1. Number of Signers

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

Signature of Conservation Commission Member

This Order is valid for three years from the date of issuance.

This Order is issued to the applicant and the property owner (if different) as follows:

☒ by hand delivery on 2/10/09
Date

☐ by certified mail, return receipt requested on
Date

Notary Acknowledgement

Commonwealth of Massachusetts County of Middlesex South

On this 21st (Day) of January (Month) 2009 (Year)

Before me, the undersigned Notary Public, personally appeared Terrence Mattland (Name of Document Signer)

proved to me through satisfactory evidence of identification, which was/were

KNOWN TO ME
Description of evidence of identification

to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he/she signed it voluntarily for its stated purpose.

As member of ACTON (City/Town) Conservation Commission

Signature of Notary Public

Andrea H. Ristine
Printed Name of Notary Public

Place notary seal and/or any stamp above

February 27, 2009
My Commission Expires (Date)

G. Recording Information

If this Order is issued for purposes of Resource Area Delineation only, this Order should NOT be recorded.

If this Order of Resource Area Delineation is issued as part of a Simplified Review, this Order must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on Page 6 of this form shall be submitted to the Conservation Commission listed below.

ACTON
Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

ACTON
Conservation Commission

Please be advised that the Order of Conditions for the Project at:

BFRT – Carlisle to Concord
Project Location

85-1011
DEP File Number

Has been recorded at the Registry of Deeds of:

Middlesex South
County

Book

Page

for:

Property Owner

and has been noted in the chain of title of the affected property in:

Book

Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

ATTACHMENT D

Wetland Replication – *Included in Project Plans*

ATTACHMENT E

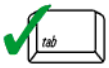
Stormwater Management Checklist and Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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 8[2]
- 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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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

12-2-2013

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): Filter Strips, Leaching Basins, & Drainage Swales

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 Field[1]

☐ 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 propriety 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
BRUCE FREEMAN RAIL TRAIL
PHASE 2A

PROPOSED DRAINAGE AND STORMWATER MANAGEMENT PLAN

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

December 2013

TABLE OF CONTENTS

SECTION I

INTRODUCTION 1

A. Project Purpose 1
B. Project Description 1
C. Stormwater Management 2

SECTION II

STORMWATER MANAGEMENT PLAN 2

A. Standard 1 2
B. Standard 2 3
C. Standard 3 3
D. Standard 4 3
E. Standard 5 4
F. Standard 6 4
G. Standard 7 4
H. Standard 8 4
I. Standard 9 5
J. Standard 10 7

SECTION I
INTRODUCTION

A. Project Purpose

The Bruce Freeman Rail Trail is a proposed multi-use recreational trail and alternative transportation corridor along the former Lowell Secondary 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 Acton will eventually extend south to South Sudbury and possibly connect to the Central Mass Rail Trail via the unused railroad right-of-way between South Sudbury and Framingham Center. The northernmost segment in Westford will connect to the Phase 1 segment running through Chelmsford and Lowell currently under construction. In the future, the bicycle path will connect to the MBTA Commuter Rail facility in West Concord, and possibly even Framingham Center, 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, Carlisle and Westford, proposes to construct a paved twelve foot wide hot mix asphalt multi-use trail with stone dust graded shoulders on either side. Where right of way and terrain permit, a six foot wide soft trail will also be provided. In Acton, the trail starts at a point 1,000 feet southerly of Weatherbee Street, behind Acton Indoor Sports and heads in a northerly direction for approximately 4.5 miles to the Carlisle town line. From there, the proposed trail continues northerly for approximately 850 feet through Carlisle to the Westford town line where it continues another 700 feet to the crossing of Carlisle Road (Route 225). The total project length is 4.8 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 area 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.

Filter strips are proposed at seven (7) locations along the trail where the trail intersects with uncurbed roadway or parking areas – one (1) location in the Town of Westford and six (6) in the Town of Acton. Landscaping is also provided at some of these areas. The filter strips will be a minimum of 10 feet wide consisting of a 9'-0" wide dense grass strip preceded by a 6" deep x 1'-0" wide crushed stone level spreader at the edge of the paved section of the trail. The filter strip will provide water quality treatment and enhance recharge of the groundwater.

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. Filter strips have been proposed in seven (7) locations where the trail intersects with uncurbed roadway and parking areas – one (1) location in the Town of Westford and six (6) in the Town of Acton. Runoff from these surface areas experience constant motorized vehicle traffic and require treatment to address water quality. These areas are already maintained under local pollution prevention and stormwater management plans. However, 10 foot wide seeded filter strips are proposed to aid in the removal of total suspended solids in these areas. 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 not within a critical area; therefore, this standard is not applicable.

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. Filter strips will be added in seven (7) areas abutting uncurbed pavement – one (1) location in the Town of Westford and six (6) in the Town of Acton. 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 haybales or bio-solid filled silt socks 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. Earthwork activity shall be performed in a manner such that runoff is directed to the temporary drainage swales and sedimentation basins. 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 Bruce Freeman 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 and Soft Trail**
    - The stone dust shoulders of the paved trail and Soft 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 wooding 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.

Vegetated Filter Strips

- The filter strips should be mowed to maintain at least four to six inches of dense grass cover or natural vegetation and should receive only the minimum fertilizer application needed to maintain the grass in a healthy condition.
- Monthly mowing is needed from May through September to maintain grass vigor. All grass clippings should be removed and disposed of properly off site.
- Any sediment deposited on the filter strip should be removed if grass growth is being inhibited or if the sediment is blocking the even spreading or entry of water to the rest of the swale.
- Annual sediment removal and spot reseeding will probably be necessary.
- They should be inspected annually for evidence of erosion or concentrated flows through or around the buffer. If flow channelization or erosion occurs, the area should be repaired and/or re-graded then reseeded and mulched as necessary.

Swales (Drainage Channels)

- Inspect swales the first few months after construction and twice a year thereafter to make sure vegetation is adequate. Repair any rilles 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.

Leaching Basins

- Inspect annually or more frequently as indicated by structure performance
- Remove sediment when the basin is 50% filled.
- Rehabilitate the basin if it fails due to clogging.

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

Appendix A: Simplified Wildlife Evaluation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wetlands program

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.

Station #118 / Dunk & Bubble
Project Location (from NOI)

Susan McArthur / Victoria Parsons — 1/15/2014
Name of Person Completing Form — 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)

ATTACHMENT G

Project Special Provisions

NHESP HABITAT FOCUS AREAS

Natural Heritage and Endangered Species Program (NHESP) has identified three priority habitat focus areas within the project limits. Focus Area 1 is located from Station 143+50 to 602+00. Focus Area 2 is located from Station 188+50 to 195+00 and 203+00 to 225+00. Focus Area 3 is located from Station 55+75 to 68+00. All three are labeled on the plans.

The Contractor is alerted to the fact that no stockpiling, staging or access is allowed within the NHESP Habitat Focus Areas.

ITEM 754.2 WOOD TURTLE PROTECTION PLAN BRUCE FREEMAN RAIL TRAIL PHASE 2A LUMP SUM

DESCRIPTION

The work to be done consists of the monitoring and protection of turtles during the construction of Phase 2A of the Bruce Freeman Rail Trail in the three designated NHESP Focus Areas as shown on the plans or other areas so designated by the Engineer and in accordance with applicable environmental permits. The three focus areas include:

1. Focus Area 1 – Station 143+50 to 602+00 (2,650 feet)
2. Focus Area 2 – Station 188+50 to 195+00 & 203+00 to 225+00 (2,850 feet)
3. Focus Area 3 – Station 55+75 to 68+00 (1,225 feet)

General

This item outlines the requirements of the Natural Heritage and Endangered Species Program (NHESP) of the Division of Fisheries and Wildlife (DFW) for projects occurring in the vicinity of wood turtle populations. The work to be done consists of the monitoring and protection of turtles during the construction of the Phase 2A of the Bruce Freeman Rail trail in Acton, MA.

It should be noted that if work is conducted in the inactive season, no sweeps are required. If the limit of work barrier is installed furing the inactive season, now sweeps are required. If the barriers are installed during the active season sweeps are required of the limit of work prior to construction. The Contractor must coordinate this work with MassDOT to determine if the work can be staggered in the focus areas to avoid the active season.

Sweeps Prior to Vegetation Clearing and In-Water Cofferdam Installation

The Turtle Monitor (Monitor) shall be a MassDOT biologist (Tim Dexter 857-368-8794 timothy.dexter@state.ma.us; Alex Murray 857-368-8811 alex.murray@state.ma.us) approved by the Natural Heritage and Endangered Species Program (NHESP). The Monitor shall obtain a scientific collecting permit from the NHESP to handle wood turtles. The NHESP-approved Monitor shall visit the site prior to the start of major work activity, during tree clearing, after barrier fence installation, and prior to the start of all cofferdam phases; the Contractor and/or Resident Engineer shall coordinate with the Monitor at least 3 weeks prior to such work. The Monitor shall sweep the site prior to any site clearing, grubbing, or site preparations. The

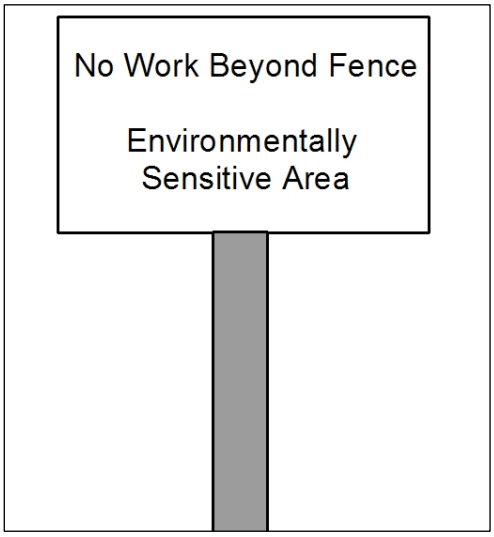
Monitor shall inspect vegetation within 200' of wetland areas, prior to the establishment on the limit of work line.

The Monitor shall also provide a sweep of the site prior to any work in water. The Monitor shall inspect all areas of land under water where cofferdams are to be installed, paying close attention to overhanging banks. The Monitor shall conduct sweeps prior to cofferdam installation for all phases of the dewatering plan.

The Monitor shall visually sweep these areas immediately before machines enter the area, and relocate any turtles to suitable habitat immediately beyond the construction site. The Monitor shall provide contact information to the project supervisor in the event a wood turtle is discovered on-site. The Monitor may visit the site on only one day if the vegetation clearing and in-water work are initiated on the same day. Upon completion of sweeps, the Monitor shall provide the NHESP with a summary of activities at the construction site. This report shall include the number and duration of visits, and rare species observation forms for all state-listed species encountered. In the event of finding an injured turtle, the turtle shall be transported to a suitable veterinarian. In the event of finding a turtle with a radio transmitter, NHESP and the contact on the transmitter shall be alerted immediately.

All state-listed species encountered in or near the project shall be reported to the NHESP through a Rare Animal/Plan Observation Report with the required supporting materials within 10 days of the observation. No state-listed species may be removed from the project site unless under the direct supervision of the biologist or the NHESP.

Establishment of a Limit of Work Turtle Barrier and Signage



Following the sweep of the work site, a limit of work turtle barrier shall be installed as shown on the plans and the sketches in the Appendix of these Special Provisions. The limit of work and turtle barrier shall consist of straw bales and silt fence (silt fence as the outer boundary) and shall contain signage clearly identifying it as the limits of work. Two signs (shown right) shall be installed on each side of the trail at the beginning of each focus area on both ends. An additional two signs, one on each side of the trail, shall be installed in the center of Focus Areas 1 and 2. This is a total of sixteen (16) signs. The Turtle Monitor shall approve the locations of the signs prior to their installation.

At four locations within the turtle barrier fence, the Contractor shall furnish a wooden gate to block turtle access to the work area. The gates shall secured to the turtle barrier to prevent access to the work area during periods of no work. During active construction days, the gates can be opened/removed to allow for staging area access. At the end of the construction day the Contractor shall close/replace the gate, to ensure the turtle barrier is secured and prevents turtle access to the staging area. The Monitor will review and approve the gates prior to their implementation.

1. Installation of the barrier must be conducted using methods that result in a minimum of disturbance (i.e., hand-dug, "2-man" trencher or auger). It is not appropriate to clear large access paths prior to sweeps for turtle. No clearing may occur outside the limit of work approved by the NHESP.
2. The barrier must be composed of at least 2 1/2 feet of vertical barrier above ground and an additional 4-6 inches buried below ground.
3. The face of the material must be relatively smooth. Materials commonly used are staked at 6 - 10 foot intervals and include tightly woven geotextile, aluminum flashing, or other such materials stapled or tacked to stakes. Loosely woven geotextile fabrics, hay/straw bales, wattles or tubular materials are not generally sufficient. Tightly staked silt fence is appropriate.
4. The bottom of the barrier fabric must be carefully buried in a 4-6 inch deep trench. The trench must be backfilled and compacted. If it is not possible to dig a trench, then the bottom of the barrier must be affixed to the surfaced.
5. The straw bales used with silt fencing shall be installed on the work-side of the silt fence to avoid turtles using these to breach the barrier.
6. Once installed, the barrier shall be taut between the stakes. Slumps or loose materials will undermine the effectiveness of the barrier. In some circumstances, geotextile fabrics may need to be reinforced with backer material to ensure integrity. Backer material is typically similar to hardware cloth.

Once per week, a person familiar with barrier maintenance and installation shall inspect the barrier and facilitate any repairs or alterations. The limit of work barrier should remain taught between stakes and any holes along the bottom repaired.

Work barrier and signage shall be removed by the Contractor at the completion of the project or when approved by the Engineer. All material shall be removed and disposed of off-site by the Contractor.

Construction Worker Training

The Monitor shall provide to the construction foreperson wood turtle identification and handling pamphlets. All construction, landscaping, and other sub-contractors associated with the Project shall be informed in writing of the likely presence of State-listed Species on the Property and what measures (observation and injury) should be implemented to minimize direct harm to State-listed Species.

Further, no wildlife shall be removed from the Property without approval of a qualified wildlife biologist or the Division except as necessary to receive veterinary treatment in the case of harm during construction.

This protocol may require only one to three days of labor, including field surveys and correspondence with the NHESP.

COMPENSATION

Basis of Payment

One-Time Sweeps Prior to Vegetation Clearing and In-Water Cofferdam Installation *and* Construction Worker Training:

There will be no payment for the work, as the Monitor will be provided to the contractor as a free service by MassDOT.

Establishment of Limit of Work Barrier and Signage:
Installation of a limit of work barrier and signage shall be paid at the lump sum bid price and shall be compensation for all labor, equipment and materials necessary for the successful installation, maintenance and removal of the work barrier and signage and the maintenance and removal of the system.

40% of the lump sum bid price shall be made following the installation of the barrier and signage. The remaining 60% shall be paid in 10% increments throughout the remaining period of the contract.

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 A = 1,233 sf.

Wetland Replication Area A is located west of Sta 29+00 through 30+00, south of the new accessway to the Bruce Freeman Rail Trail from the proposed parking lot in Acton. Wetland replication design specifications are detailed on Sheet 80 of 210 within the MassDOT - Highway Division Plan & Profile of Bruce Freeman Rail Trail Phase 2A in

the Towns of Westford, Carlisle & Acton - 100% Submission; the MassDOT Item 755.7 Specification – Wetland Specialist; and this document.

BVW replication area B = 1,946 sf

Wetland Replication Area B is located west of Sta 223+00 through 224+00. Wetland replication design specifications are detailed on Sheet 81 of 210 within the MassDOT - Highway Division Plan & Profile of Bruce Freeman Rail Trail Phase 2A in the Towns of Westford, Carlisle & Acton - 100% Submission; the MassDOT Item 755.7 Specification – Wetland Specialist; and this document.

Restoration:
BVW restoration Areas - Multiple = 2,310 sf

Table 1: Wetland Resource Area Impacts – Bruce Freeman Rail Trail provided in the Town of Acton Notice of Intent describes the quantity and location of multiple distinct areas of BVW along with Bruce Freeman Rail Trail that will be temporarily impacted and restored in place. The multiple distinct areas range in size from one (1) to 494 square feet. Upon completion of construction activities, the areas will be loamed and seeded with the Wetland Seedmix detailed on Sheets 80 and 81 within the MassDOT - Highway Division Plan & Profile of Bruce Freeman Rail Trail Phase 2A in the Towns of Westford, Carlisle & Acton - 100% 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.

As shown in the drawing details, the 1 foot (0.2 meters) wide by 2 inch (50 mm) deep wedge of compost spread along the top of the filter tube shall be incidental to this item.

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

Planting Soil:
Wetland soil for wetland restoration or replacement 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 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
Carex vulpinoidea	Fox Sedge	25%
Elymus virginicus	Virginia Wildrye	25%
Carex lurida	Lurid (Shallow) Sedge	12%
Carex lupulina	Hop Sedge	6%
Verbena hastate	Blue Vervain	4%
Juncus effuses	Soft Rush	3%
Carex comosa	Cosmos (Bristly) Sedge	3%
Aster umbellatus (Doellingeria umbellate)	Flat Topped White Aster	3%
Aster prenanthoides (Symphyotrichum p.)	Zigzag Aster	3%
Scirpus atrovirens	Green Bulrush	3%
Helenium autumnale	Common sneezeweed	2%
Zizia aurea	Golden Alexanders	2%
Ludwigia alternifolia	Seedbox	2%
Lobelia siphilitica	Great Blue Lobelia	1%
Aster puniceus (Symphyotrichum puniceum)	Purplestem Aster	1%
Vernonia gigantea (V. altissima)	Giant Ironweed	1%
Scirpus cyperinus	Woolgrass	1%
Eupatorium perfoliatum	Boneset	1%
Euthamia graminifolia (Solidago g.)	Grassleaf Goldenrod	1%
Asclepias incarnata	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 to 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 GROUNDCOVER 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 square yard, installed, approved and maintained in place.

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	455	FT			
Compost Topsoil	45	CY			assumes 4" depth
Bordering Vegetated Wetland Seeding	385	SY			
Red maple (*Acer rubrum*) plant height, container size	20	EA			
Highbush Blueberry (*Vaccinium Corymbosum*)	17	EA			
Swamp azalea (*Rhododendron viscosum*)	8	EA			
Winterberry (*Ilex verticillata*)	9	EA			
Cinnamon fern (*Osmunda cinnamomea*)	24	EA			
Royal Fern (*Osmunda regalis*)	9	EA			
Sensitive Fern (*Onoclea sensibilis*)	15	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 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 five (5) 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 767.12 COMPOST FILTER TUBES FOOT

The purpose of this item is to provide a linear, compost-filled tube for filtering suspended sediments from storm water flow. This item shall conform to the requirements of Section 751 and 767 of the Standard Specifications and the following:

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. Compost shall pass through a 3 inch sieve.

Tubes for compost filters shall be a 12 to 18 inches in diameter, and shall be jute mesh or approved biodegradable material. Additional tubes shall be used at the direction of the Engineer.

A 1 foot wide by 2 inch deep wedge of compost spread along the top of the filter tube shall be incidental to this item.

Stakes for anchors, if required, shall be nominal 2x2 stakes.

Tubes of compost may be filled on site or shipped. Tubes shall be placed, filled and staked in place as required to ensure stability against water flows. All tubes shall be tamped to ensure good contact with soil.

The Contractor shall ensure that the filter tubes function as intended at all times. Tubes shall be inspected after each rainfall and at least daily during prolonged rainfall. The Contractor shall immediately correct all deficiencies, including, but not limited, to washout, overtopping, clogging due to sediment and erosion, and review location of tubes in areas where construction activity causes drainage runoff to ensure that the tubes are properly located for effectiveness. Where deficiencies exist, such as overtopping or wash-out, additional staking or compost material shall be installed as directed by the Engineer. Sediment deposits shall be removed as necessary to maintain the filters in working condition.

Filter tube fabric and stakes shall be removed when site conditions are sufficiently stable to prevent surface erosion, and after receiving permission to do so from the Engineer. All tube fabric shall be cut and removed and disposed of off-site by the Contractor. At the direction of the

Engineer, the Contractor may rake out and seed compost so that it is no greater than 2 inches (50 mm) in depth on soil substrate.

COMPENSATION

Measurement for this item shall be by the foot of compost installed, approved, and maintained in place.

Payment shall be per foot and shall be compensation for all labor equipment and materials necessary to complete the work specified above, including, but not limited to, stakes and tube fabric, compost mulch wedge along top of tubes, removal and disposal of fabric and stakes, raking and seeding of compost.

ITEM 995.011 CULVERT STRUCTURE, CULVERT NO. A-02-xxx (xxx) LUMP SUM

The work under this Item shall conform to the applicable provisions of Section 995 of the Standard Specifications and the specific requirements stipulated below for component parts of the subject Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply, except for payment.

Work under this Item shall include all materials, equipment and labor needed to construct the 6' high by 8' wide precast concrete culvert with a natural substrate bottom that passes under the north MSE wall and connects the two wetlands.

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of this culvert structure or which may be incidental to its construction and are not specifically included for payment under another item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are a part.

PRECAST CONCRETE ARCH BRIDGE

General

This work shall consist of designing, fabricating, and installing a precast concrete culvert and appurtenances. The culvert sections shall conform to the dimensions (span and rise) and geometry shown on the Plans. Reinforcement steel will be paid for under this item.

Culvert sections shall be manufactured in accordance with the applicable requirements of Section 900 and M4 of the Standard Specifications as amended by the Supplemental Specifications, the Plans and this Special Provision. Where the Plans and Specifications do not provide specific requirements, the manufacturer's recommendations shall be followed.

Basis of Acceptance

Acceptability of the culvert sections produced shall be determined by the Engineer based upon the results of all required material tests and by inspection of the furnished precast concrete culvert sections.

Materials

Concrete – Culvert cement concrete shall conform to the requirements of M4.02.00. The minimum cementitious content shall be 705 pounds per cubic yard of cement concrete in accordance with the approved cement concrete mix design. The minimum concrete compressive strength shall be 5000 psi at 28 days.

Aggregates – Aggregates shall conform to requirements of M4.02.02.

Admixtures – Admixtures may be used in accordance with the approved cement concrete mix design.

Steel Reinforcement – All structural reinforcement shall consist of epoxy coated welded wire fabric conforming to M8.01.2 or epoxy coated deformed billet-steel bars conforming to M8.01.0. Any additional reinforcement or embedded devices required for shipping and handling purposes shall be epoxy coated and/or hot dipped galvanized and as shown on the shop drawings submitted for approval of the Engineer.

Non-Shrink Grout – All non-shrink grout shall be 5000 psi with a maximum aggregate size of ¼ inch.

Design

The Contractor shall submit design calculations and drawings for the culvert prepared in accordance with the Latest AASHTO LRFD Bridge Design Specifications and the MassDOT LRFD Bridge Design Manual using English units for approval of the Engineer. Two (2) independent sets of design computations shall be submitted for approval. To expedite the review and approval process, submissions containing computer computations shall include electronic copies of the actual input and output files. The design computations shall consider all loadings as are appropriate for each stage of fabrication, shipment, construction and upon completion. Design computations and shop drawings shall be prepared by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts.

Prior to fabrication, eight (8) sets of complete shop drawings showing, as a minimum, the following information shall be submitted to the Engineer for approval:

1. Plan layout of the structure indicating the piece mark of each culvert section;
2. Complete details of all precast sections, including all dimensions and tolerances, locations and types of reinforcement, finish treatments, and concrete strengths at lifting and at 28 days;
3. Joint dimensions and details including type and brand of joint sealing materials;
4. Locations and methods of forming lifting holes, type and location of lifting devices, and the method of handling and transporting all precast concrete sections to the job site.

Placement of Reinforcement – The minimum cover of concrete over the reinforcement shall be 2 inches. Reinforcement shall be assembled utilizing any combination of single or multiple layers of welded-wire fabric or deformed billet-steel bars. The welded-wire fabric or deformed billet-steel bars shall meet the spacing requirements shown on the Plans and as approved by the Engineer. All reinforcement tie wires shall be epoxy coated.

Joints

The precast reinforced concrete culvert shall be produced with joints/keyways per the manufacturer's recommendations and as approved by the Engineer. The frame sections shall be manufactured such that when the sections are laid together they will make a continuous line with a smooth interior surface free of appreciable irregularities, and in compliance with the permissible variations. The joints shall be sealed as shown on the Plans or as recommended by the manufacturer.

As a minimum, the joints between the culvert elements must be sealed by placing sections of 1½" diameter preformed mastic in each joint. The joint is then covered with a 9 inch self-adhering strip of rubberized asphalt flashing meeting the culvert manufacturer's minimum specifications.

Manufacturing – The manufacturing shall be in accordance with M4.02.14 except as amended below.

Concrete Mixture – The aggregates, cement and water shall be proportioned and mixed to produce a homogeneous concrete meeting the strength requirements of this specification and as approved by the Engineer.

Permissible Variations

Internal Dimensions – The internal dimensions shall not vary more than ±1" in span and ±½" in rise from the design dimensions.

Wall and top slab thickness – The thickness of the culvert components shall not be less than that shown in the design by more than ½". A thickness more than that required in the design shall not be cause for rejection.

Length of Opposite Surfaces – Variations in laying lengths of two opposite surfaces of the culvert shall not be more than ¾" in any section.

Length of Section – The length of any section shall not have more or less than ½" variance in any culvert section.

Position of Reinforcement – The maximum variation in the position of the reinforcement shall be ±½" unless otherwise stated and in accordance with ACI 318 Section 7.5. In no case, however, shall the cover over the reinforcement be less than 2", as measured to the internal surface of the external surface of the culvert. The above tolerances or cover requirements do not apply to mating surfaces of the joint.

Area of Reinforcement – The areas of steel reinforcement shall be the design steel areas as approved by the Engineer. Steel areas greater than those required shall not be cause for rejection. The permissible variation in diameter for any reinforcement shall conform to the tolerances prescribed in the ASTM Specification for that type of reinforcement.

Workmanship and Finish

The culvert sections shall be substantially free of fractures. The ends of the culvert shall conform to the angles and dimensions shown on the Plans.

Repairs

Culvert sections repaired because of occasional imperfections in manufacture or handling damage will be acceptable if, in the opinion of the Engineer, the repairs are sound, properly finished and cured, and the repaired culvert section conforms to the requirements of this specification.

Inspection

The quality of materials, the process of manufacture, and the finished culvert sections shall be subject to inspection by the Engineer.

Rejection

Culvert sections shall be subject to rejection due to the failure to conform to any of the specification requirements. Individual culvert sections may be rejected because of any of the following:

1. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint;
2. Defects that indicate imperfect proportioning, mixing, and molding;
3. Excessive honeycombed or open texture;
4. Damaged ends at time of delivery, where such damage would prevent a satisfactory joint.
5. Construction of culvert unit that is outside of the permissible tolerances.

Marking

The following information shall be clearly marked on the interior of each culvert section by indentation, waterproof paint, or other approved means:

1. Culvert span and rise;
2. Date of manufacture and lot number;
3. Name and trademark of the manufacturer.

Installation

The precast concrete culvert system shall be installed in accordance with the lines and grades indicated on the Plans and the requirements described in the Plans and specification. The Contractor shall supply competent workmen and equipment sufficient to install the culvert sections in a safe, accurate and workmanlike manner.

Backfilling operations shall not begin until the following checks have been made:

1. The joints between the sections are complete as shown on the Plans;
2. All joint seals are properly placed.

Backfill shall be paid for under separate items. The backfilling procedures shall be in accordance with Sections 120, 150, and 170 of the Standards with the following modifications:

1. Fill shall be placed and compacted in layers not exceeding 1 foot in depth;
2. Dumping of fill shall not be allowed any nearer to the structure than 3 feet from a vertical plane extending from the back of footing;
3. Backfill shall be placed as symmetrically as possible around the culvert with differential depths of backfill on each side of the culvert not exceeding 18" with respect to each other;
4. Compaction shall be achieved using hand compaction equipment for all fill within 1 foot of the structure;
5. The bare structure shall not be crossed by any equipment heavier than that specified by the culvert manufacturer. All damage resulting from equipment damage shall be rectified to the satisfaction of the Engineer at no cost;
6. Construction equipment will not be permitted atop an uncompleted structure;
7. Construction equipment whose weight exceeds the design capacity shall not be permitted atop the completed structure under any circumstances;
8. The use of vibratory rollers for compaction purposes will not be permitted.

A representative of the manufacturer shall be on site at the commencement of the installation, at no cost to the Department, to assist the Contractor. The representative shall offer advisory assistance only and shall not supplant the Contractor's representative or the Engineer.

NATURAL SUBSTRATE BOTTOM

The natural substrate construction material is to be placed within the culvert and the immediate upstream and downstream area as depicted on the plans. The intent of this item is to replicate within the culvert area an environment that is similar to the existing environment adjacent to the work area.

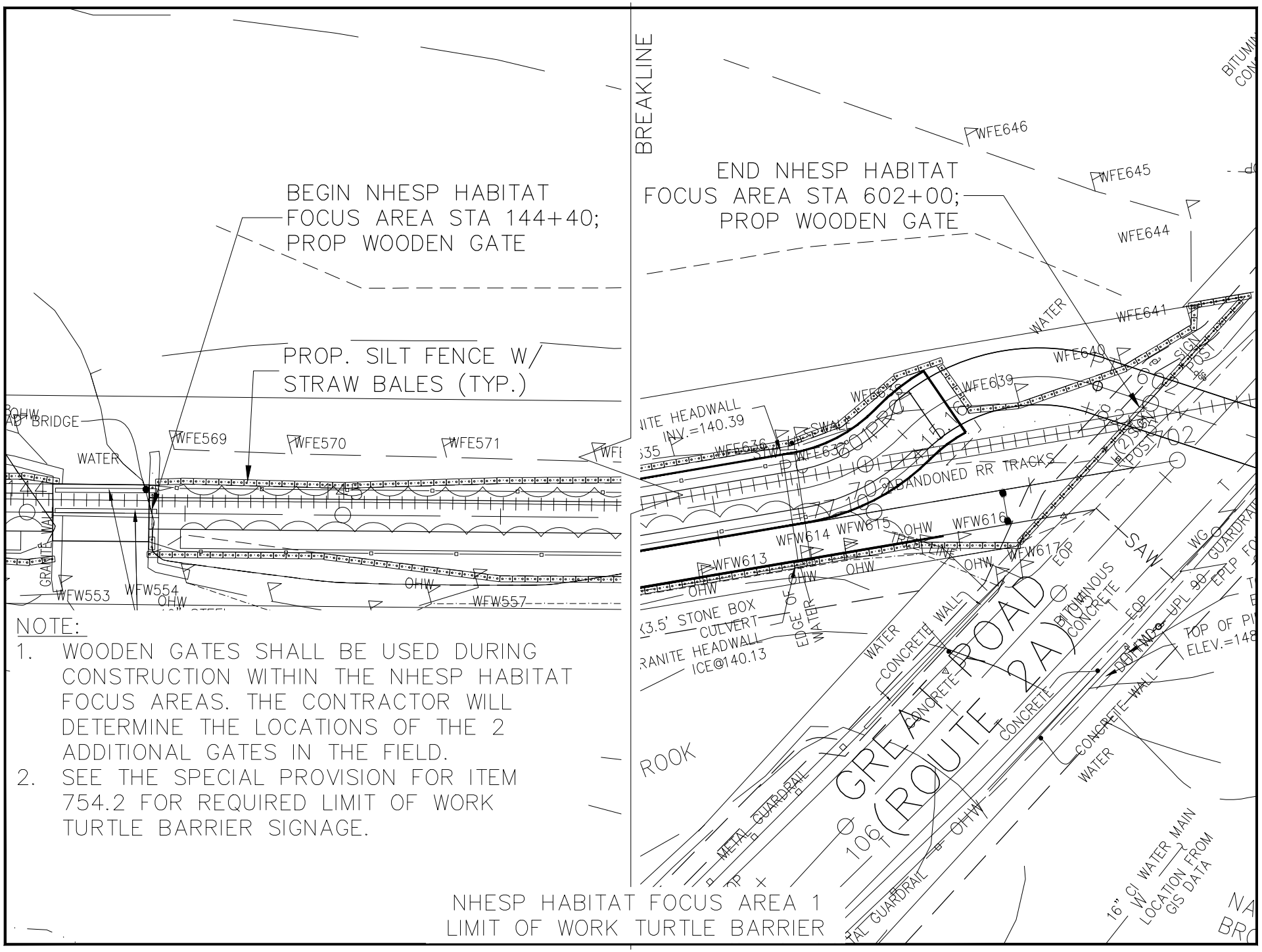
The Contractor shall excavate to install the new structures. Any material can be stockpiled and reused for the natural substrate bottom, provided the material is characteristic of the existing material upstream and downstream of the work area, or meets the criteria below. The elevations and conditions of the existing ground shall be maintained to the maximum extent practicable.

If the excavated material is not suitable or there is not enough material, the natural substrate material shall be comprised of a natural stone mix – gravel/cobble; ≤ 6"cobbles.

The natural substrate stone shall be native cobbles and gravel similar in shape and size of the stone adjacent to the work area. Large angular stones shall not be used. Crushed Stone will not be accepted.

BASIS OF PAYMENT

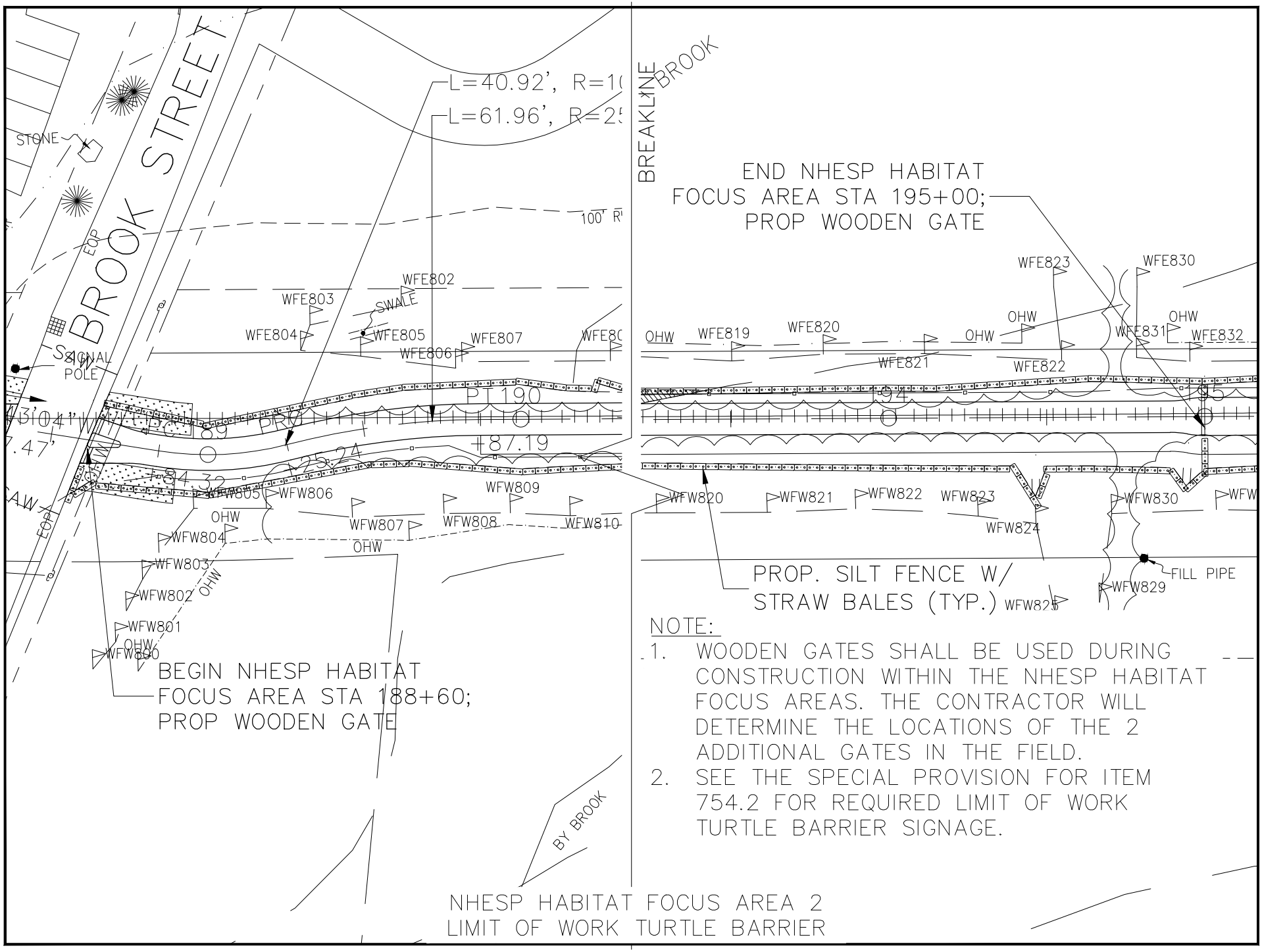
Culvert Structure, Culvert No. A-02-xxx(xxx) will be paid for at the Contract lump sum price, which price shall include all labor, materials, equipment and incidental costs required to complete the work.



NOTE:

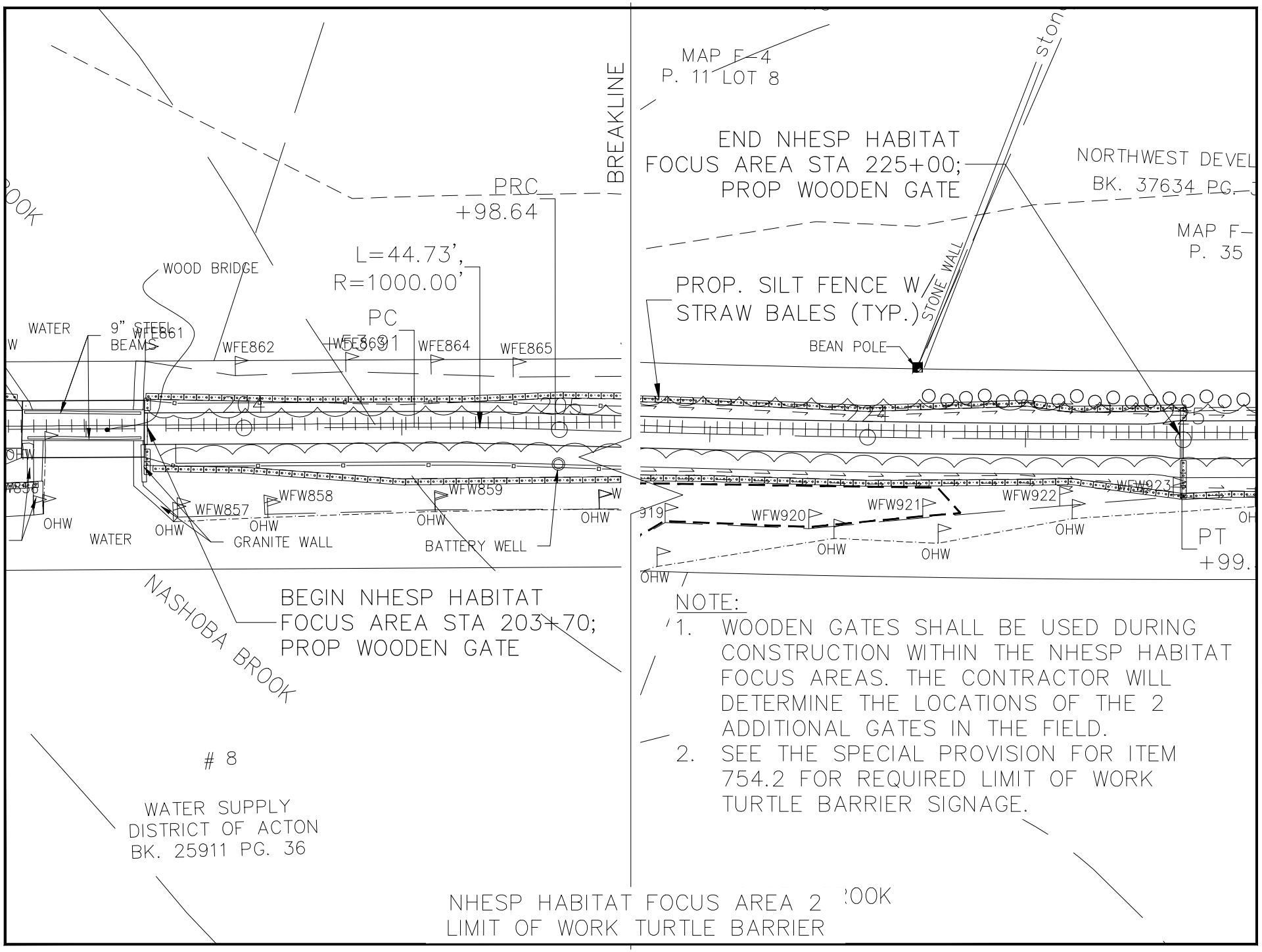
1. WOODEN GATES SHALL BE USED DURING CONSTRUCTION WITHIN THE NHESP HABITAT FOCUS AREAS. THE CONTRACTOR WILL DETERMINE THE LOCATIONS OF THE 2 ADDITIONAL GATES IN THE FIELD.
2. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

NHESP HABITAT FOCUS AREA 1
LIMIT OF WORK TURTLE BARRIER



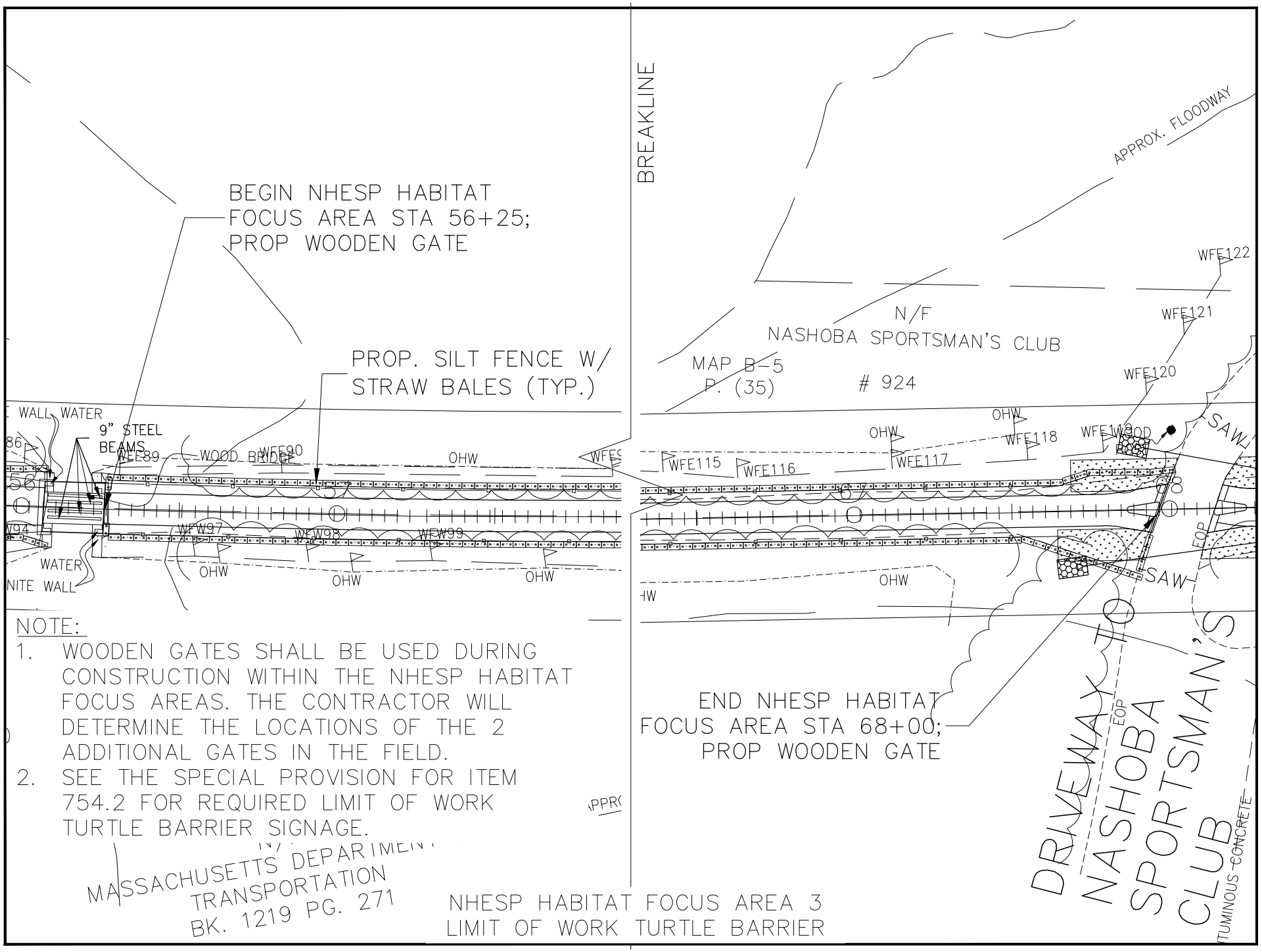
NOTE:

1. WOODEN GATES SHALL BE USED DURING CONSTRUCTION WITHIN THE NHESP HABITAT FOCUS AREAS. THE CONTRACTOR WILL DETERMINE THE LOCATIONS OF THE 2 ADDITIONAL GATES IN THE FIELD.
2. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.



NOTE:

1. WOODEN GATES SHALL BE USED DURING CONSTRUCTION WITHIN THE NHESP HABITAT FOCUS AREAS. THE CONTRACTOR WILL DETERMINE THE LOCATIONS OF THE 2 ADDITIONAL GATES IN THE FIELD.
2. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.



NOTE:

1. WOODEN GATES SHALL BE USED DURING CONSTRUCTION WITHIN THE NHESP HABITAT FOCUS AREAS. THE CONTRACTOR WILL DETERMINE THE LOCATIONS OF THE 2 ADDITIONAL GATES IN THE FIELD.
2. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

MASSACHUSETTS DEPARTMENT
TRANSPORTATION
BK. 1219 PG. 271

NHESP HABITAT FOCUS AREA 3
LIMIT OF WORK TURTLE BARRIER

ATTACHMENT H

Project Plans – *Bound Separately*

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	1	159
PROJECT FILE NO.	604532		

TITLE SHEET & INDEX

10031_2A_CS.DWG 17-Mar-2014

PLAN AND PROFILE OF

BRUCE FREEMAN RAIL TRAIL PHASE 2A

IN THE TOWNS OF

WESTFORD, CARLISLE & ACTON

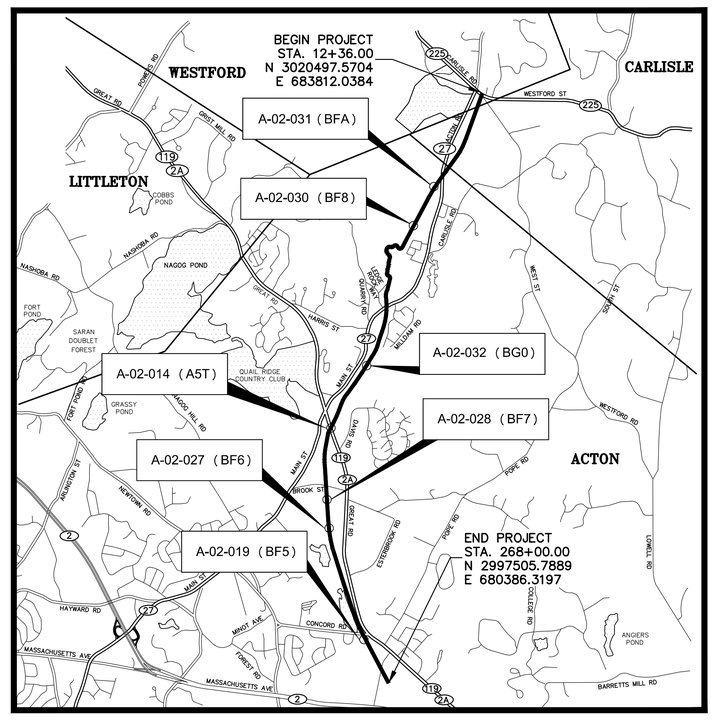
MIDDLESEX COUNTY

FEDERAL AID PROJECT NO.

THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 1988, AS AMENDED, THE SUPPLEMENTAL SPECIFICATIONS DATED FEBRUARY 25, 2010, THE 2012 CONSTRUCTION STANDARD DETAILS, THE 1996 CONSTRUCTION AND TRAFFIC STANDARD DETAILS (AS RELATES TO TRAFFIC STANDARD DETAILS ONLY), THE 2009 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
3-4	KEY PLAN & BORING LOCATIONS
~~5-9~~	~~BORING LOGS~~
10-13	TYPICAL SECTIONS
~~14-24~~	~~CONSTRUCTION BASELINE TIES~~
26~~-51~~ 47	CONSTRUCTION PLANS ~~& PROFILES~~ (20 SCALE ENLARGEMENTS OF IMPACT AREAS PROVIDED)
~~52-63~~	~~TRAFFIC SIGN & PAVEMENT MARKINGS~~
~~64~~	~~TRAFFIC SIGN SUMMARY SHEET~~
~~66~~	~~TRAFFIC SIGNAL PLANS~~
~~67-70~~	~~TRAFFIC SIGNAL DETAILS~~
~~71-72~~	~~TEMPORARY TRAFFIC CONTROL PLANS~~
75-77	LANDSCAPING PLANS & DETAILS
80-81	WETLAND REPLICATION PLANS
84-90	CONSTRUCTION DETAILS
~~91~~	~~WHEELCHAIR RAMP/DRIVEWAY DETAILS~~
~~---~~	~~BRIDGE PLANS (NOT PROVIDED IN THIS SUBMISSION)~~
92-159	CROSS SECTIONS (ONLY CROSS SECTIONS WITHIN ENVIRONMENTALLY IMPACTED AREAS HAVE BEEN PROVIDED)



SCALE 1" = 3000'

LENGTH OF PROJECT = 25784.00 FEET = 4.883 MILES

TRAIL DESIGN DESIGNATION

DESIGN SPEED	20 MPH (30 MPH AT APPROACHES TO GREAT ROAD - ROUTE 2A)
MINIMUM HORIZONTAL CURVE RADIUS	60'
MINIMUM LENGTH OF CREST VERTICAL CURVE	100'
MAXIMUM GRADE FOR LEVEL TERRAIN	4.5%

GPI Greenman-Pedersen, Inc.
Engineers, Architects, Planners, Construction Engineers & Inspectors
105 Central Street, Suite 4100, Stoneham, MA 02180
Tel: (781) 279-5500 Fax: (781) 279-5501
http://www.gpinet.com

DATE	DESCRIPTION	REV #

NOI SUBMISSION

massDOT Massachusetts Department of Transportation Highway Division

RECOMMENDED FOR APPROVAL

CHIEF ENGINEER DATE

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR DATE

APPROVED

HIGHWAY ADMINISTRATOR DATE

MassDOT CWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	2	159
PROJECT FILE NO.	604532		

LEGEND & ABBREVIATIONS

25-Feb-2014

10031_2A_LE.DWG

GENERAL LEGEND

EXISTING	PROPOSED	
		STATE BOUNDARY LINE
		CITY, TOWN OR COUNTY BOUNDARY LINE
		STATE HIGHWAY LAYOUT LINE
		CITY, TOWN OR COUNTY LAYOUT LINE
		EASEMENT LINE
		PROPERTY LINE
WF, MAHW		EDGE OF VEGETATED WETLAND/WETLAND FLAG
		MEAN ANNUAL HIGH WATER
		HIGHWAY/PROPERTY BOUND (TYPE NOTED)
PT 8 N00°00'00"E +93.16	PT 8 N00°00'00"E +93.16	CONSTRUCTION/SURVEY BASELINE
		TREE (TYPE & SIZE NOTED)
		EDGE OF WOODS/SHRUBS
		HANDICAP RAMP
		BENCH
MB	MB	MAIL BOX
PM	PM	PARKING METER
		SIGN
X X X		FENCE (SIZE & TYPE AS NOTED)
		HIGHWAY GUARD (TYPE AS NOTED)
		HIGHWAY GUARD WITH TIMBER RAIL BACK
		BALANCED WALL (SIZE & TYPE AS NOTED)
		RETAINING WALL (SIZE & TYPE AS NOTED)
76	76	CONTOURS
X100.00 , 100.15/100.00	X100.00 , 100.15/100.00	SPOT ELEVATION, TOP AND BOTTOM CURB
EOP	EOP	CURB OR BERM (TYPE AS NOTED)
		EDGE OF PAVEMENT (NO CURB OR BERM)
		BACK OF SIDEWALK
		TOP OR BOTTOM OF SLOPE (CUT OR FILL)
	SAW	SAWCUT LINE
		APPROX. COLD PLANING/TRANSITION AREA
		GRANITE RUBBLE BLOCK PAVEMENT
		SCORED CONCRETE PAVEMENT
	B-1	BORINGS, PAVEMENT CORES (SEE SPEC. PROV.)
D		DRAIN LINE
UD	UD	UNDERDRAIN (PERFORATED)
		DIRECTION OF FLOW
		PAVED WATERWAY
DMH	DMH	DRAIN MANHOLE
CB,GI,DI	CB,GI,DI	CATCH BASIN, DROP OR GUTTER INLET
CBCI,GICI	CBCI,GICI	CATCH BASIN (OR GUTTER INLET) WITH CURB INLET
LB		LEACHING BASIN
FE		FLARED END
HDWL		HEADWALL
S	S	SEWER LINE
SMH	SMH	SEWER MANHOLE
CS	CS	COMBINED SEWER LINE
CSMH	CSMH	COMBINED SEWER MANHOLE
FMGV	FMGV	FORCE MAIN GATE VALVE
W	W	WATER MAIN
WMH	WMH	WATER MANHOLE
HYD		HYDRANT
FA,FSP	FA,FSP	FIRE ALARM BOX, FIRE STAND PIPE
		REDUCER
CS,WSO		CURB STOP OR WATER SHUT OFF
WG	WG	WATER GATE
G	G	GAS MAIN
GG	GG	GAS GATE
GSO	GSO	GAS SHUT OFF
E	E	ELECTRICAL LINE OR DUCT
		ELECTRICAL CONDUIT
EMH	EMH	ELECTRICAL MANHOLE
EHH		ELECTRICAL HANDHOLE
PB	PB	PULL BOX (12" x 12")
JB,SB	JB,SB	ELECTRICAL JUNCTION OR SWITCH BOX
LCC		ELECTRICAL LOAD CENTER CABINET W/FDN
LP		LIGHT POLE
UP		UTILITY POLE
GUY	GUY	GUY WIRE & ANCHOR
T	T	TELEPHONE LINE OR DUCT
TMH	TMH	TELEPHONE MANHOLE
ST	ST	STEAM LINE
STMH	STMH	STEAM MANHOLE/TUNNEL HATCH
		PLUG OR CAP
		DELINEATOR
OHW		OVERHEAD WIRES
CATV		CABLE TV

GENERAL ABBREVIATIONS

ABAN	ABANDON
ACCMP	ASPHALT COATED CORRUGATED METAL PIPE
ADJ	ADJUST
APPROX	APPROXIMATE
BC	BOTTOM OF CURB
BD	BOUND
BIT CONC	BITUMINOUS CONCRETE
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BM	BENCH MARK
BW	BOTTOM OF WALL
CEM CONC	CEMENT CONCRETE
CC	CENTER OF CURVE
CCB	CAPE COD BERM
CI	CURB INLET
CIP	CAST IRON PIPE
CIT	CHANGE IN TYPE
CLR	CLEARANCE
CLF	CHAIN LINK FENCE
CLDI	CEMENT LINED DUCTILE IRON
CMP	CORRUGATED METAL PIPE
CONST	CONSTRUCTION
CP	CENTER POINT
CPP	CORRUGATED PLASTIC PIPE
COND	CONDUIT
DESC	DESCRIPTION
DIP	DUCTILE IRON PIPE
DR	DRIVEWAY
ELEV OR EL	ELEVATION
EOP	EDGE OF PAVEMENT
ETW	EDGE OF TRAVELED WAY
EXIST	EXISTING
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN	FOUNDATION
FND	FOUND
FWD	FILLED WITH DEBRIS
GRAN	GRANITE
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HP	HIGH POINT
HWE	HORSLEY WITTEN WEST (OF RAILBED)
HWW	HORSLEY WITTEN EAST (OF RAILBED)
HYD	HYDRANT
INV	INVERT
LB	LOAM BORROW
LO	LAYOUT
MAHW	MEAN ANNUAL HIGH WATER
MAX	MAXIMUM
MIN	MINIMUM
MHB	MASSACHUSETTS HIGHWAY BOUND
MHD	MASSACHUSETTS HIGHWAY DEPARTMENT
MLB	MODIFIED LOAM BORROW
MON	MONUMENT
NIC	NOT IN CONTRACT
NGVD	NATIONAL GEODETIC VERTICAL DATUM
N/F	NOW OR FORMERLY
OHW	OVERHEAD WIRE
PC	POINT OF CURVE
PCC	POINT OF COMPOUND CURVE
PGL	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
PRC	POINT OF REVERSE CURVE
PROP	PROPOSED
PT	POINT OF TANGENT
PVC	POINT OF VERTICAL CURVE
PVCC	POINT OF VERTICAL COMPOUND CURVE
PVCP	POLYVINYLCHLORIDE PIPE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVRC	POINT OF VERTICAL REVERSE CURVE
PVT	POINT OF VERTICAL TANGENT
PWW	PAVED WATERWAY
R	RADIUS
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
REM	REMOVE
REMOD	REMODEL
RCP	REINFORCED CONCRETE PIPE
RET	RETAIN
ROW	RIGHT OF WAY
RR	RAILROAD
SB	STONE BOUND
SB/DH	STONE BOUND/DRILL HOLE
SHLD	SHOULDER
SHLO	STATE HIGHWAY LAYOUT
SSD	STOPPING SIGHT DISTANCE
STA	STATION
STL	STEEL
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TOS	TOP OF SLOPE
TS	TRAFFIC SIGNAL
TSV & B	TAPPING SLEEVE, VALVE AND BOX
TYP	TYPICAL
TW	TOP OF WALL
UC	UNDER CONSTRUCTION
USGS	U.S. GEOLOGICAL SURVEY
UP	UTILITY POLE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
WCR	WHEELCHAIR RAMP

GENERAL NOTES

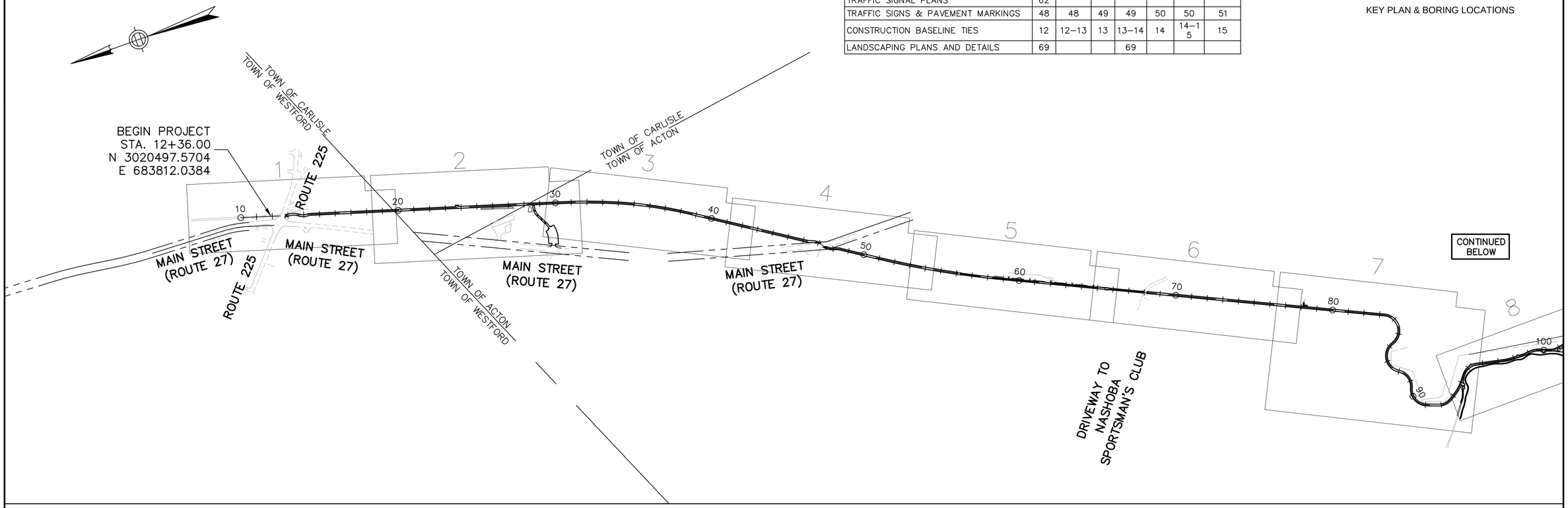
1. EXISTING CONDITIONS INFORMATION IS BASED ON SURVEY PROVIDED BY JUDITH NITSCH ENGINEERING, DATED APRIL 2, 2007. ELEVATIONS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). ALL SURVEY POINTS HAVE BEEN DETERMINED WITH RESPECT TO THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM AS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83). UNITS ARE ENGLISH.
2. 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.
3. 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.
4. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.
5. 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.
6. 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).
7. 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.
8. ALL TRANVERSE 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.
9. ALL DISTURBED AREAS NOT DESIGNATED TO BE PAVED SHALL HAVE LOAM BORROW PLACED AND SEEDED. 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.
10. THE LIMIT OF WORK AREA SHALL BE THE STREET RIGHT OF WAY UNLESS SHOWN OTHERWISE.
11. ALL PROPERTY LINES BETWEEN ABUTTERS ARE APPROXIMATE ONLY.
12. 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.
13. ALL CASTINGS SHALL BE SET FLUSH WITH FINISHED GRADE.
14. ALL GATE BOXES, SERVICE BOXES AND PUBLICLY OWNED MANHOLE FRAMES AND COVERS SHALL BE ADJUSTED TO GRADE BY THE CONTRACTOR.
15. ALL NEW SIDEWALKS AND DRIVEWAY GRADES SHALL MATCH EXISTING GRADES AT BACK OF SIDEWALK LINE UNLESS SHOWN OTHERWISE ON THE PLANS AND CROSS-SECTIONS.
16. THE CONTRACTOR SHALL TAKE EVERY PRECAUTION TO PROTECT ALL EXISTING TREES AND ROOTS THAT ARE NOT DESIGNATED FOR REMOVAL.
17. CONTRACTOR TO CONTACT ENGINEER PRIOR TO INSTALLATION OF BOUNDS FOR FINAL LOCATIONS.
18. THE INVERTS SHOWN ARE "PROPOSED" AND SHOWN FOR BIDDING PURPOSES ONLY. ACTUAL INVERT ELEVATIONS WILL BE CONFIRMED IN THE FIELD.
19. CONTRACTOR SHALL REMOVE EXISTING ORGANIC MATERIAL THAT IS UNSUITABLE FOR REUSE AND DISPOSE OF OUTSIDE OF THE PROJECT LIMITS. IT IS ASSUMED THAT ALL OTHER EXCAVATED SUITABLE MATERIAL WILL REMAIN WITHIN THE PROJECT LIMITS. SEE SPECIAL PROVISIONS FOR DETAILS.

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

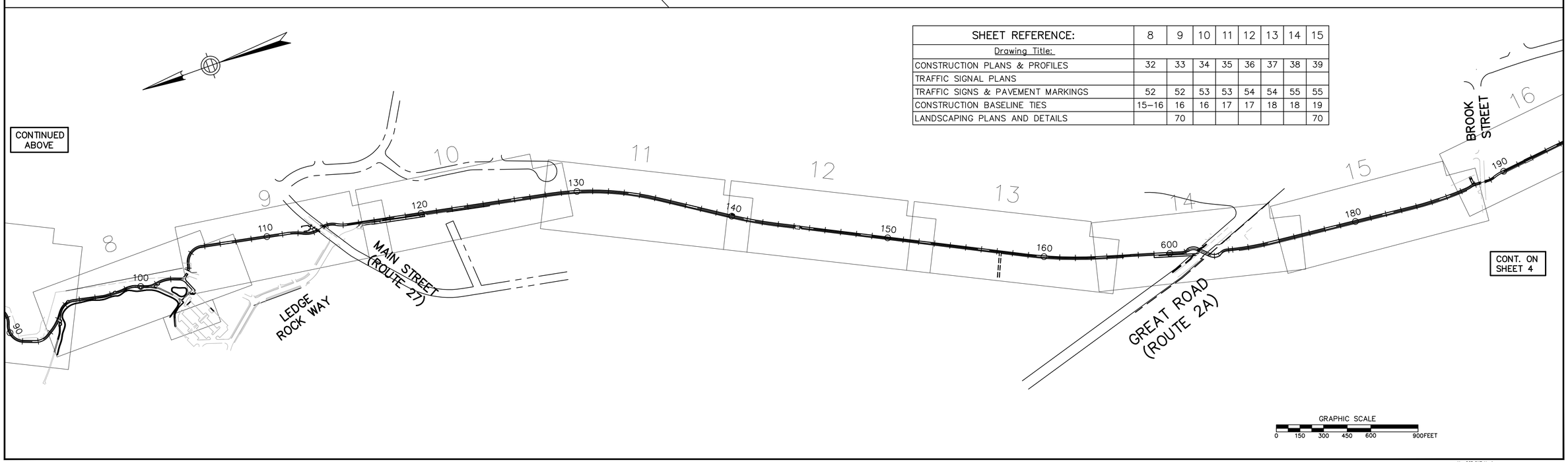
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	3	159
PROJECT FILE NO.	604532		

KEY PLAN & BORING LOCATIONS

SHEET REFERENCE:	1	2	3	4	5	6	7
Drawing Title:	Drawing Number:						
CONSTRUCTION PLANS & PROFILES	24	25	26	27	28	29	30–31
TRAFFIC SIGNAL PLANS	62						
TRAFFIC SIGNS & PAVEMENT MARKINGS	48	48	49	49	50	50	51
CONSTRUCTION BASELINE TIES	12	12–13	13	13–14	14	14–15	15
LANDSCAPING PLANS AND DETAILS	69			69			



SHEET REFERENCE:	8	9	10	11	12	13	14	15
Drawing Title:								
CONSTRUCTION PLANS & PROFILES	32	33	34	35	36	37	38	39
TRAFFIC SIGNAL PLANS								
TRAFFIC SIGNS & PAVEMENT MARKINGS	52	52	53	53	54	54	55	55
CONSTRUCTION BASELINE TIES	15–16	16	16	17	17	18	18	19
LANDSCAPING PLANS AND DETAILS		70						70



10031_2A_KEY.DWG 25-Feb-2014

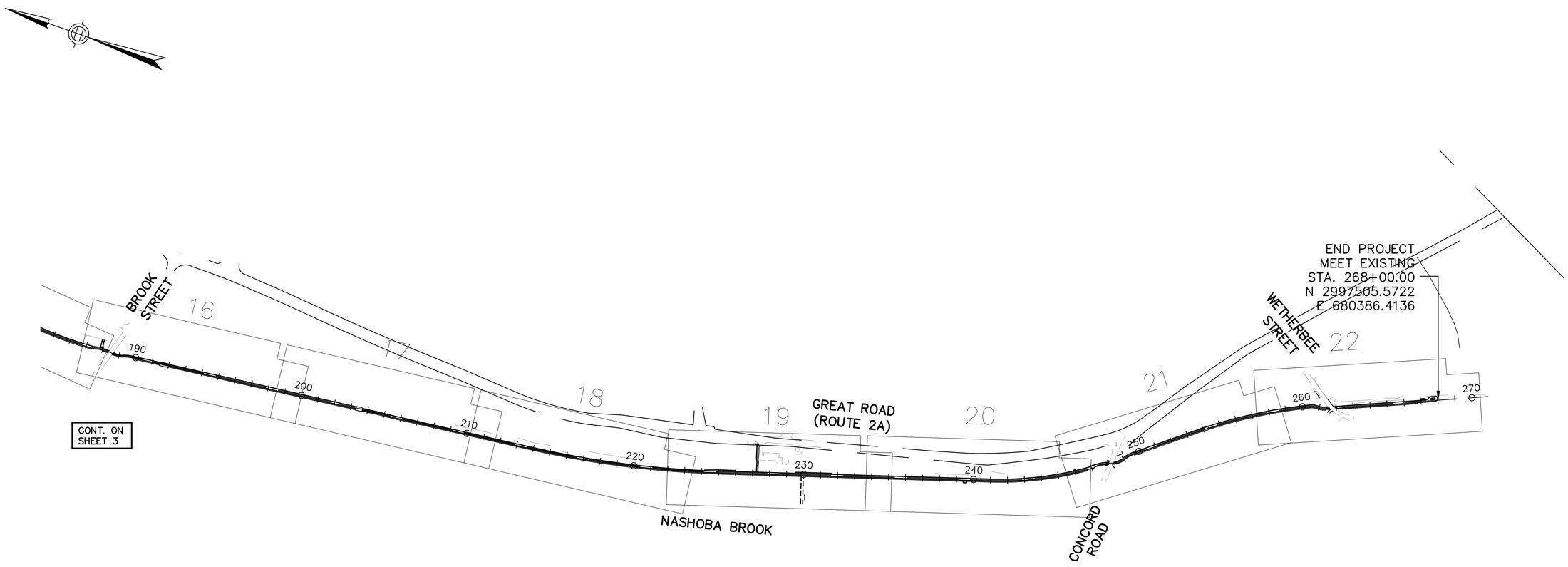
MassDOT DWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	4	159
PROJECT FILE NO.	604532		

KEY PLAN & BORING LOCATIONS

10031_2A_KEY.DWG 25-Feb-2014

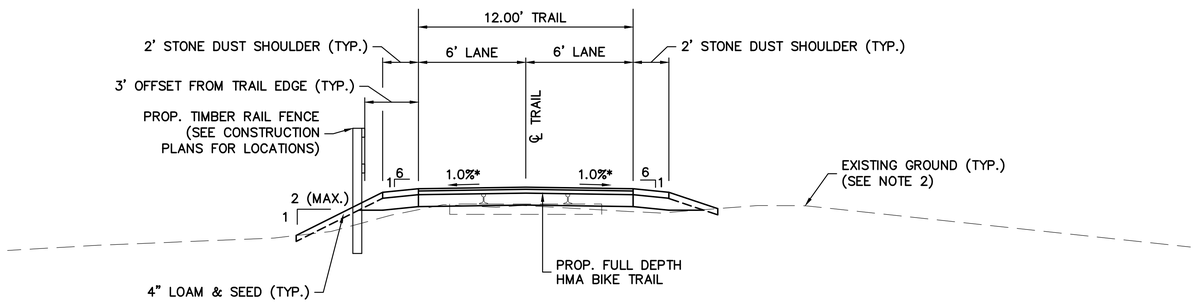


SHEET REFERENCE:	16	17	18	19	20	21	22
Drawing Title							
CONSTRUCTION PLANS & PROFILES	40	41	42	43	44	45	46
TRAFFIC SIGNAL PLANS							
TRAFFIC SIGNS & PAVEMENT MARKINGS	56	56	57	57	58	58	59
CONSTRUCTION BASELINE TIES	19	20	20	21	21	22	22–23
LANDSCAPING PLANS AND DETAILS					71	71	71

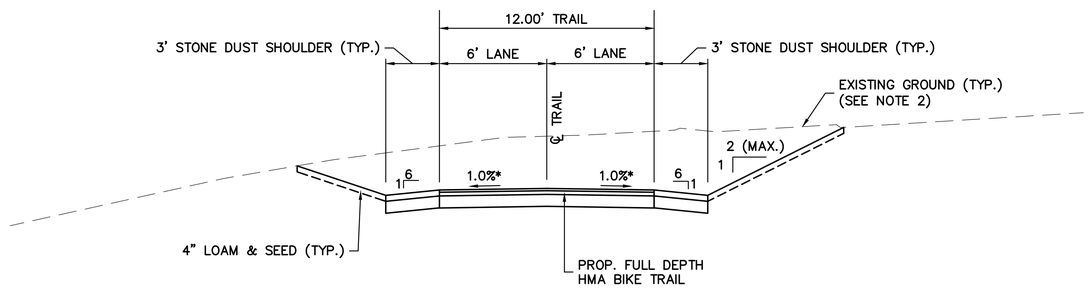
GRAPHIC SCALE
0 150 300 450 600 900FEET

MassDOT CWT Version:

10031_2A_TYP.DWG 25-Feb-2014



FILL SECTION



CUT SECTION

* – 0.5% CONSTRUCTION TOLERANCE

TYPICAL SECTION – 12' WIDE TRAIL

SCALE 1" = 4'
STA. 12+80 – STA. 46+95
STA. 47+50 – STA. 56+05
STA. 56+25 – STA. 65+45
STA. 65+75 – STA. 67+95
STA. 68+15 – STA. 103+55
STA. 103+95 – STA. 113+25
STA. 113+75 – STA. 120+25
(SEE NOTE 1)

NOTES

1. THE SECTIONS OF PROPOSED ROADWAY NOT COVERED IN THE RANGE OF STATIONS ASSOCIATED WITH THE TYPICAL SECTIONS ARE EITHER IN TRANSITION OR ARE LOCATED AT INTERSECTIONS AND THEREFORE HAVE NOT BEEN SHOWN. REFER TO CROSS SECTION SHEETS FOR MORE DETAILS.

2. CONTRACTOR SHALL REMOVE EXISTING ORGANIC MATERIAL THAT IS UNSUITABLE FOR REUSE AND DISPOSE OF OUTSIDE OF THE PROJECT LIMITS. IT IS ASSUMED THAT ALL OTHER EXCAVATED SUITABLE MATERIAL WILL REMAIN WITHIN THE PROJECT LIMITS. SEE SPECIAL PROVISIONS FOR DETAILS.

PAVEMENT NOTES

FULL DEPTH HOT MIX ASPHALT BIKE TRAIL

SURFACE COURSE: 1 1/2" SUPERPAVE SURFACE COURSE – 12.5 (SSC–12.5) (ITEM 455.23.)

INTERMEDIATE COURSE: 2 1/2" SUPERPAVE INTERMEDIATE COURSE – 19.0 (SIC–19.0) (ITEM 455.32)

FOUNDATION: 2" – 8" GRAVEL BORROW (M1.03.0 TYPE B) (ITEM 151.) (SEE NOTE BELOW)
24" SPECIAL BORROW (SEE NOTE BELOW)

NOTE: SUBBASE SHALL BE A MINIMUM OF 2" GRAVEL BORROW FOR LEVELING OVER RAILROAD BALLAST. SUBBASE SHALL BE 8" GRAVEL BORROW OVER 24" MINIMUM SPECIAL BORROW AT FILL SECTIONS IN AREAS OF WETLANDS AND OTHER UNSUITABLE MATERIAL IN ACCORDANCE WITH SECTION 150 AND 170 OF THE STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.

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) (ITEM 455.23)
1–3/4" SUPERPAVE INTERMEDIATE COURSE – 12.5 (SIC–12.5) (ITEM 455.32)

BASE COURSE: 3–1/2" SUPERPAVE BASE COURSE – 37.5 (SBC–37.5) (ITEM 455.42)

SUBBASE: 4" DENSE GRADED CRUSHED STONE (ITEM 402.) OVER
8" GRAVEL BORROW (M1.03.0 TYPE B) (ITEM 151.) (OR TO DEPTH OF EXISTING GRAVEL SUBBASE, WHICHEVER IS GREATER)

SOFT TRAIL AND STONE DUST SHOULDER

SURFACE: 4" STONE DUST (ITEM 704.2) OVER WEED CONTROL FABRIC

FOUNDATION: 2" – 8" GRAVEL BORROW (M1.03.0 TYPE B) (ITEM 151.)

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) (ITEM 151.)

CEMENT CONCRETE SPLITTER ISLANDS:

SURFACE COURSE: 4" STAMPED CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610) (ITEM 701.3)

SUBBASE: 8" GRAVEL BORROW (M1.03.0 TYPE B) (ITEM 151.)

FULL DEPTH WIDENING LESS THAN 4 FEET

SURFACE: 1–3/4" SUPERPAVE SURFACE COURSE – 12.5 (SSC–12.5) (ITEM 455.23)
1–3/4" SUPERPAVE INTERMEDIATE COURSE – 12.5 (SIC–12.5) (ITEM 455.32)

BASE: 6" HIGH–EARLY–STRENGTH CEMENT CONCRETE BASE COURSE (ITEM 431.1)

SUBBASE: 8" GRAVEL BORROW (M1.03.0 TYPE B) (ITEM 151.)

HOT MIX ASPHALT WALKS

SURFACE: 1 1/4" SUPERPAVE SURFACE COURSE – 12.5 (SSC–12.5) (ITEM 455.23)
1 1/4" SUPERPAVE INTERMEDIATE COURSE – 12.5 (SIC–12.5) (ITEM 455.32)

SUBBASE: 8" GRAVEL BORROW (M1.03.0 TYPE B OR EXISTING GRAVEL BORROW TO REMAIN) (ITEM 151.)

HOT MIX ASPHALT PARKING LOTS & DRIVEWAYS

SURFACE COURSE: 1 1/2" SUPERPAVE SURFACE COURSE 12.5 (SSC–12.5) (ITEM 703)

INTERMEDIATE COURSE: 2" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC–12.5) (ITEM 703.)

FOUNDATION: 8" GRAVEL BORROW (M1.03.0 TYPE B OR EXISTING GRAVEL BORROW TO REMAIN) (ITEM 151.)

GRAVEL PARKING LOTS & DRIVEWAYS

FOUNDATION: 8" GRAVEL BORROW (M1.03.0 TYPE B) (ITEM 151.)

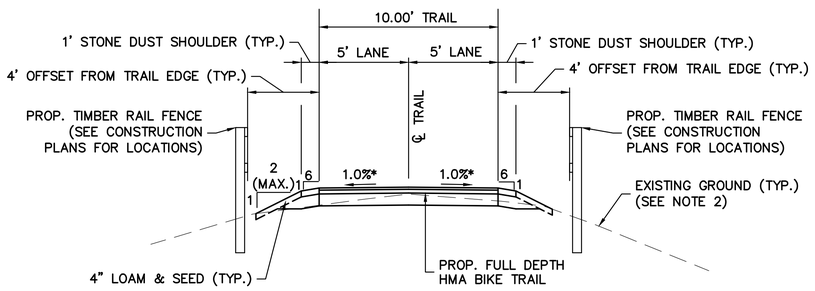
MassDOT DWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

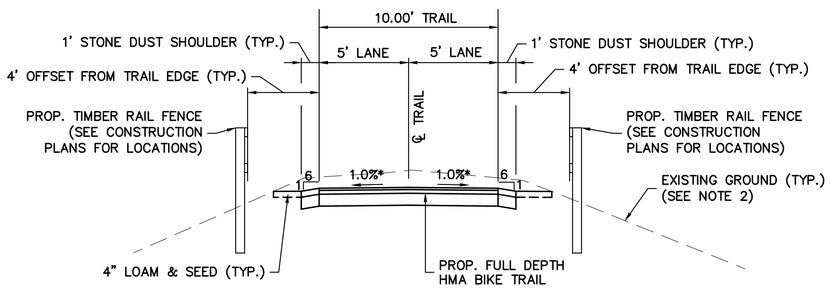
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	10a	159
PROJECT FILE NO.	604532		

TYPICAL SECTIONS

10031_2A_TYP.DWG 27-Feb-2014



FILL SECTION

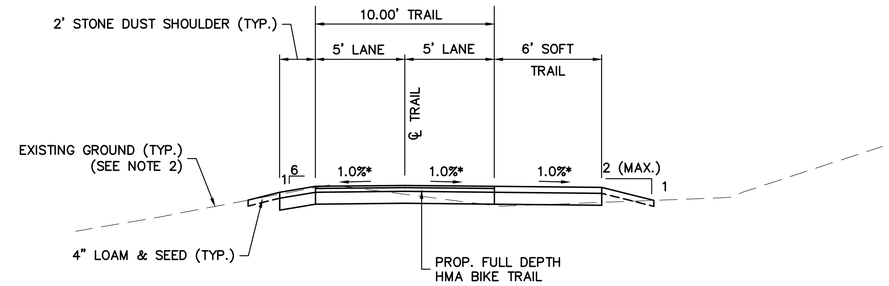


CUT SECTION

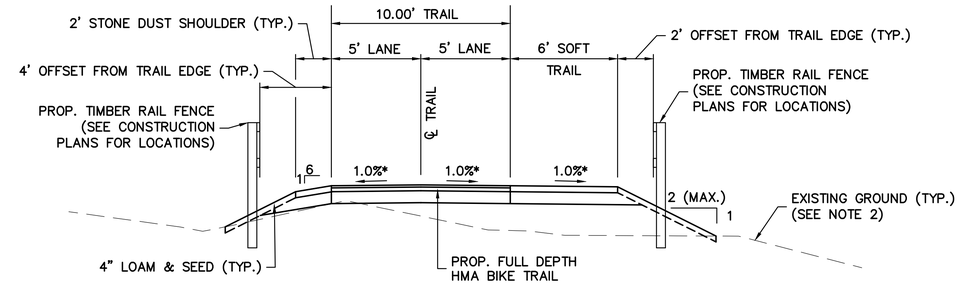
* – 0.5% CONSTRUCTION TOLERANCE

TYPICAL SECTION – 10' WIDE TRAIL

SCALE 1" = 4'
STA. 56+25 – STA. 67+80
(SEE NOTE 1)



WITHOUT FENCE



WITH FENCE

TYPICAL SECTION – 10' WIDE TRAIL WITH SOFT TRAIL

SCALE 1" = 4'
STA. 144+40 – STA. 165+50
STA. 188+85 – STA. 195+00
STA. 203+65 – STA. 225+00
(SEE NOTE 1)

* – 0.5% CONSTRUCTION TOLERANCE

NOTES

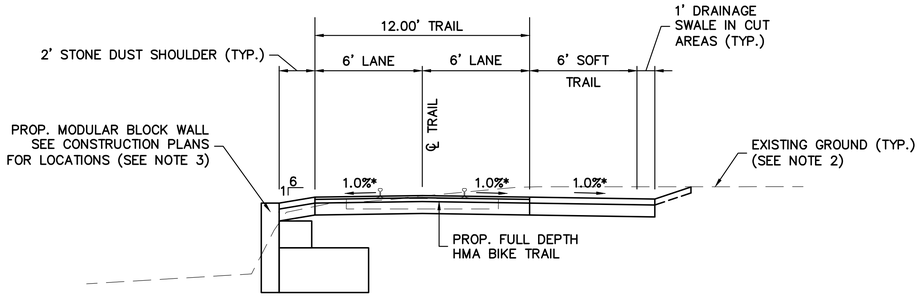
1. THE SECTIONS OF PROPOSED ROADWAY NOT COVERED IN THE RANGE OF STATIONS ASSOCIATED WITH THE TYPICAL SECTIONS ARE EITHER IN TRANSITION OR ARE LOCATED AT INTERSECTIONS AND THEREFORE HAVE NOT BEEN SHOWN. REFER TO CROSS SECTION SHEETS FOR MORE DETAILS.

2. CONTRACTOR SHALL REMOVE EXISTING ORGANIC MATERIAL (ABOVE RAILROAD BALLAST) THAT IS UNSUITABLE FOR REUSE AND DISPOSE OF OUTSIDE OF THE PROJECT LIMITS. IT IS ASSUMED THAT ALL OTHER EXCAVATED SUITABLE MATERIAL WILL REMAIN WITHIN THE PROJECT LIMITS. SEE SPECIAL PROVISIONS FOR DETAILS.

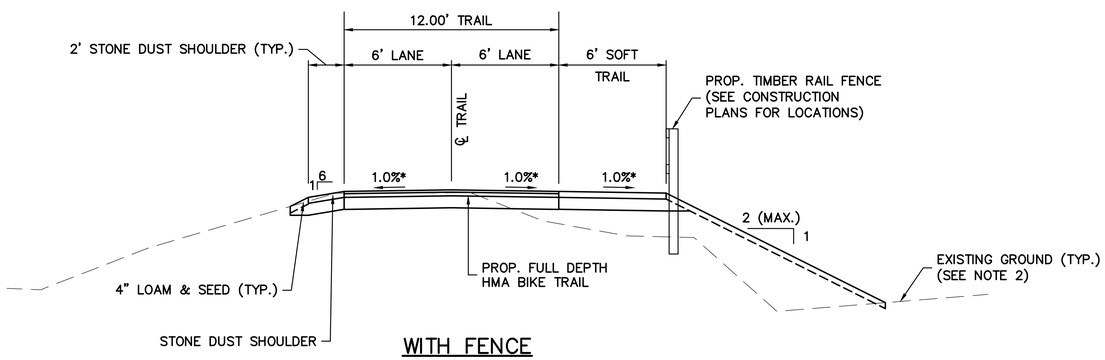
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	11	159
PROJECT FILE NO.	604532		

TYPICAL SECTIONS



WITHOUT FENCE

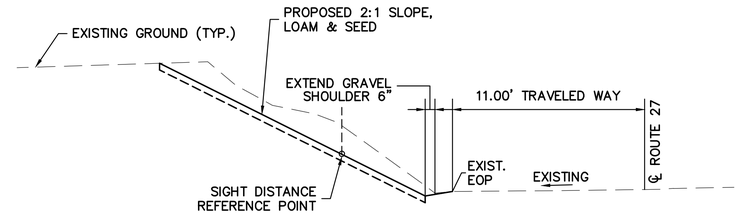


WITH FENCE

TYPICAL SECTION – 12' WIDE TRAIL
WITH SOFT TRAIL

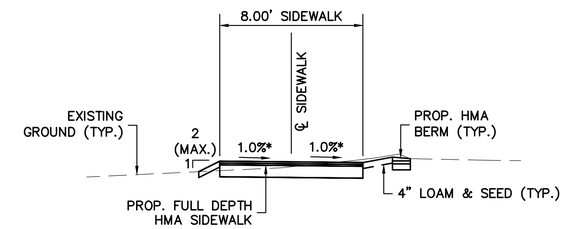
SCALE 1" = 4'
STA. 120+25 – STA. 144+05
STA. 144+45 – STA. 165+20
STA. 172+40 – STA. 188+30
STA. 188+65 – STA. 191+45
STA. 192+10 – STA. 203+25
STA. 203+75 – STA. 248+00
STA. 248+40 – STA. 253+85
STA. 254+35 – STA. 261+45
STA. 261+95 – STA. 267+92
(SEE NOTE 1)

* – 0.5% CONSTRUCTION TOLERANCE



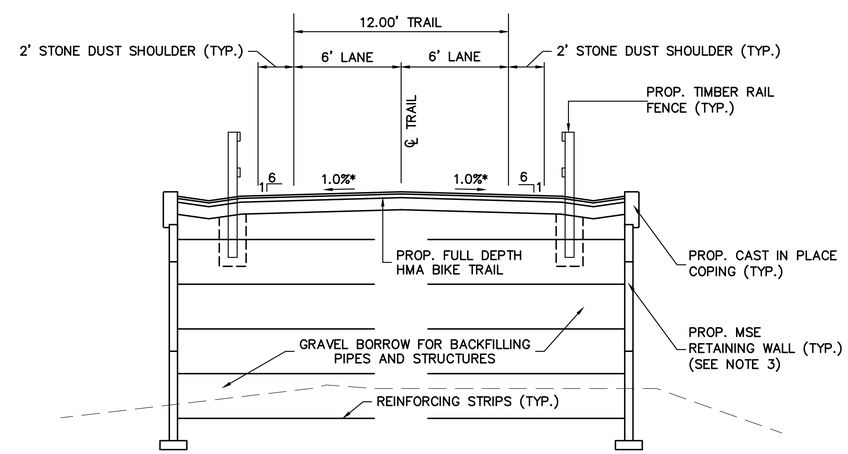
TYPICAL SECTION – ROUTE 27
SLOPE RECONSTRUCTION FOR SIGHT DISTANCE

SCALE 1" = 4'
STA. 310+51 – STA. 311+45



TYPICAL SECTION – SIDEWALK NEAR
STATION 227+26.25 (POWERS GALLERY)

SCALE 1" = 4'
STA. 50+77 – STA. 51+67



TYPICAL SECTION – 12' WIDE TRAIL

SCALE 1" = 4'
STA. 165+65 – STA. 169+55
STA. 170+91 – STA. 171+90

NOTES

1. THE SECTIONS OF PROPOSED ROADWAY NOT COVERED IN THE RANGE OF STATIONS ASSOCIATED WITH THE TYPICAL SECTIONS ARE EITHER IN TRANSITION OR ARE LOCATED AT INTERSECTIONS AND THEREFORE HAVE NOT BEEN SHOWN. REFER TO CROSS SECTION SHEETS FOR MORE DETAILS.

2. CONTRACTOR SHALL REMOVE EXISTING ORGANIC MATERIAL THAT IS UNSUITABLE FOR REUSE AND DISPOSE OF OUTSIDE OF THE PROJECT LIMITS. IT IS ASSUMED THAT ALL OTHER EXCAVATED SUITABLE MATERIAL WILL REMAIN WITHIN THE PROJECT LIMITS. SEE SPECIAL PROVISIONS FOR DETAILS.

3. WALL IS SHOWN FOR INFORMATIONAL PURPOSES ONLY. ACTUAL DESIGN IS TO BE PROVIDED BY THE CONTRACTOR.

10031_2A_TYP.DWG 25-Feb-2014
MassDOT DWT Version:

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

SEE SHEET 66

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

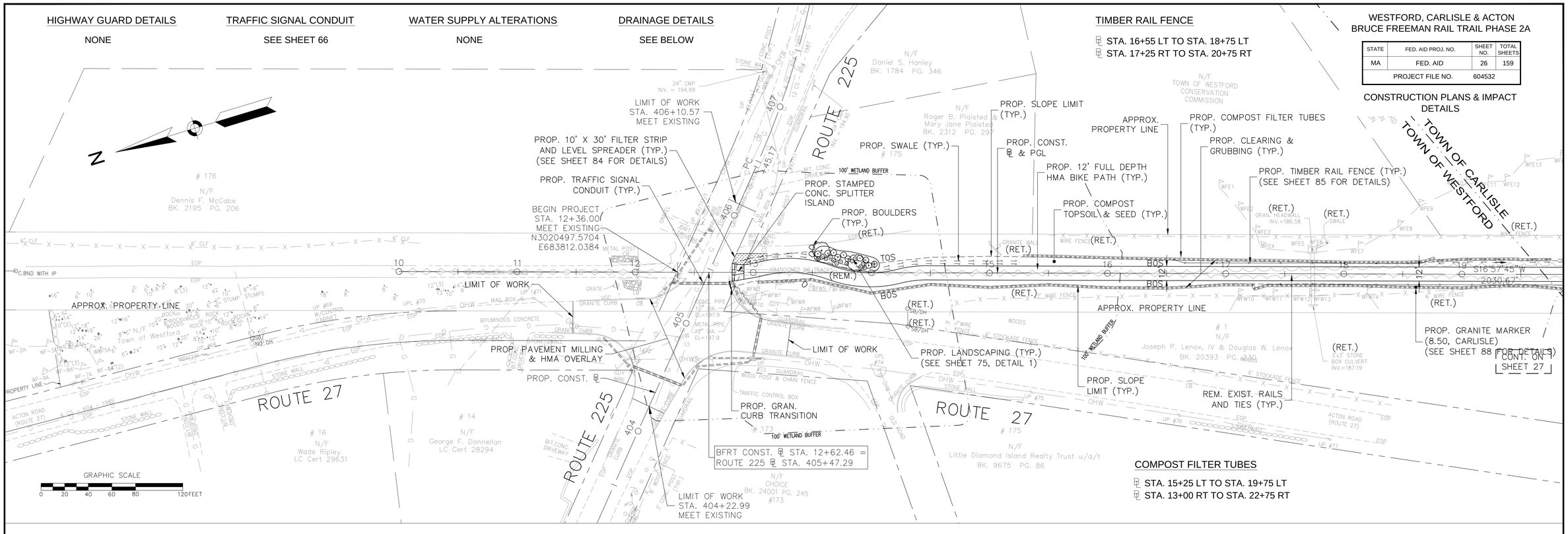
TIMBER RAIL FENCE

STA. 16+55 LT TO STA. 18+75 LT
STA. 17+25 RT TO STA. 20+75 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	26	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



COMPOST FILTER TUBES

STA. 15+25 LT TO STA. 19+75 LT
STA. 13+00 RT TO STA. 22+75 RT

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:54 PM

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	27	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:54 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

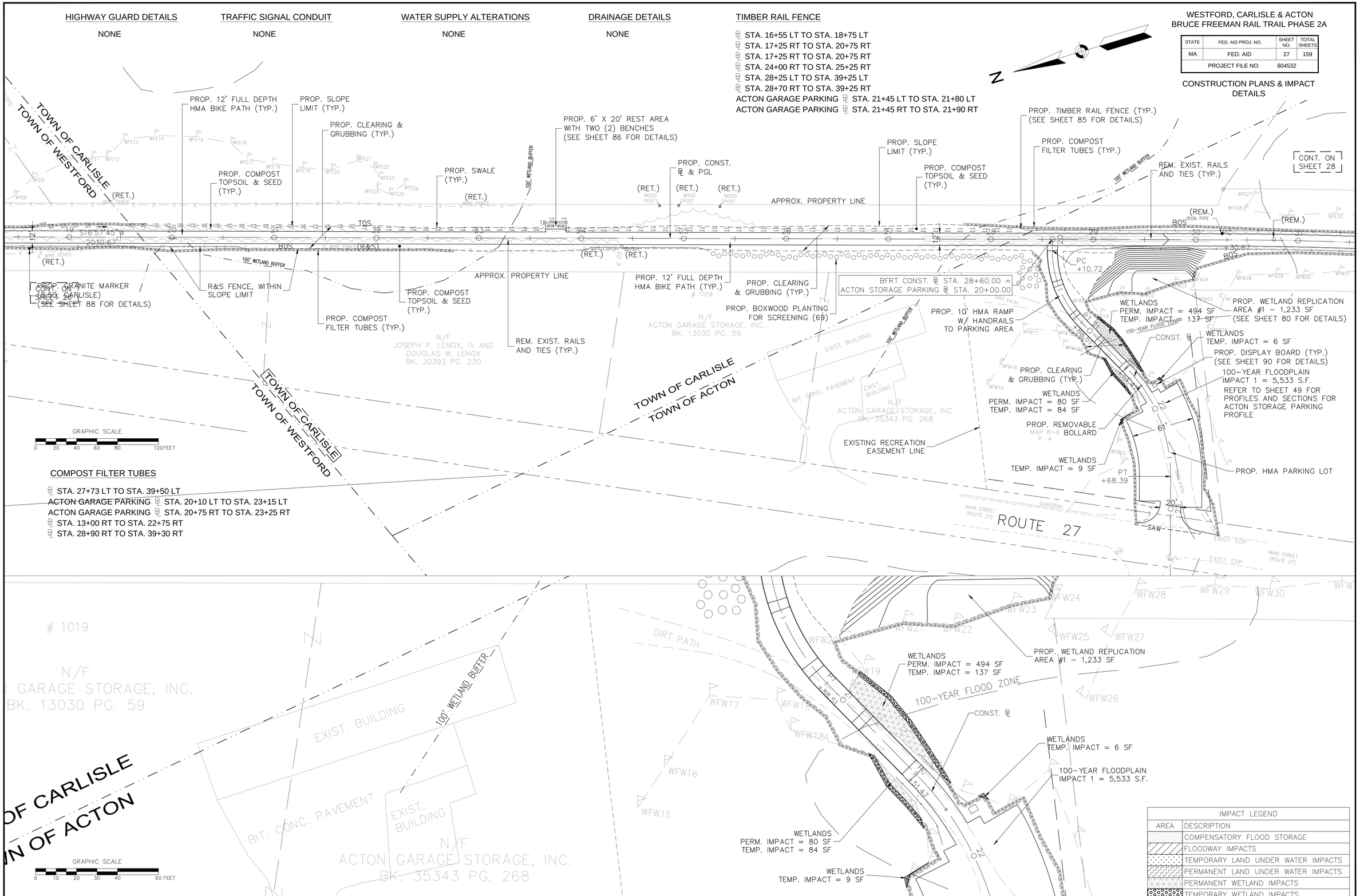
NONE

DRAINAGE DETAILS

NONE

TIMBER RAIL FENCE

- ℄ STA. 16+55 LT TO STA. 18+75 LT
- ℄ STA. 17+25 RT TO STA. 20+75 RT
- ℄ STA. 17+25 RT TO STA. 20+75 RT
- ℄ STA. 24+00 RT TO STA. 25+25 RT
- ℄ STA. 28+25 LT TO STA. 39+25 LT
- ℄ STA. 28+70 RT TO STA. 39+25 RT
- ACTON GARAGE PARKING ℄ STA. 21+45 LT TO STA. 21+80 LT
- ACTON GARAGE PARKING ℄ STA. 21+45 RT TO STA. 21+90 RT



COMPOST FILTER TUBES

- ℄ STA. 27+73 LT TO STA. 39+50 LT
- ACTON GARAGE PARKING ℄ STA. 20+10 LT TO STA. 23+15 LT
- ACTON GARAGE PARKING ℄ STA. 20+75 RT TO STA. 23+25 RT
- ℄ STA. 13+00 RT TO STA. 22+75 RT
- ℄ STA. 28+90 RT TO STA. 39+30 RT

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

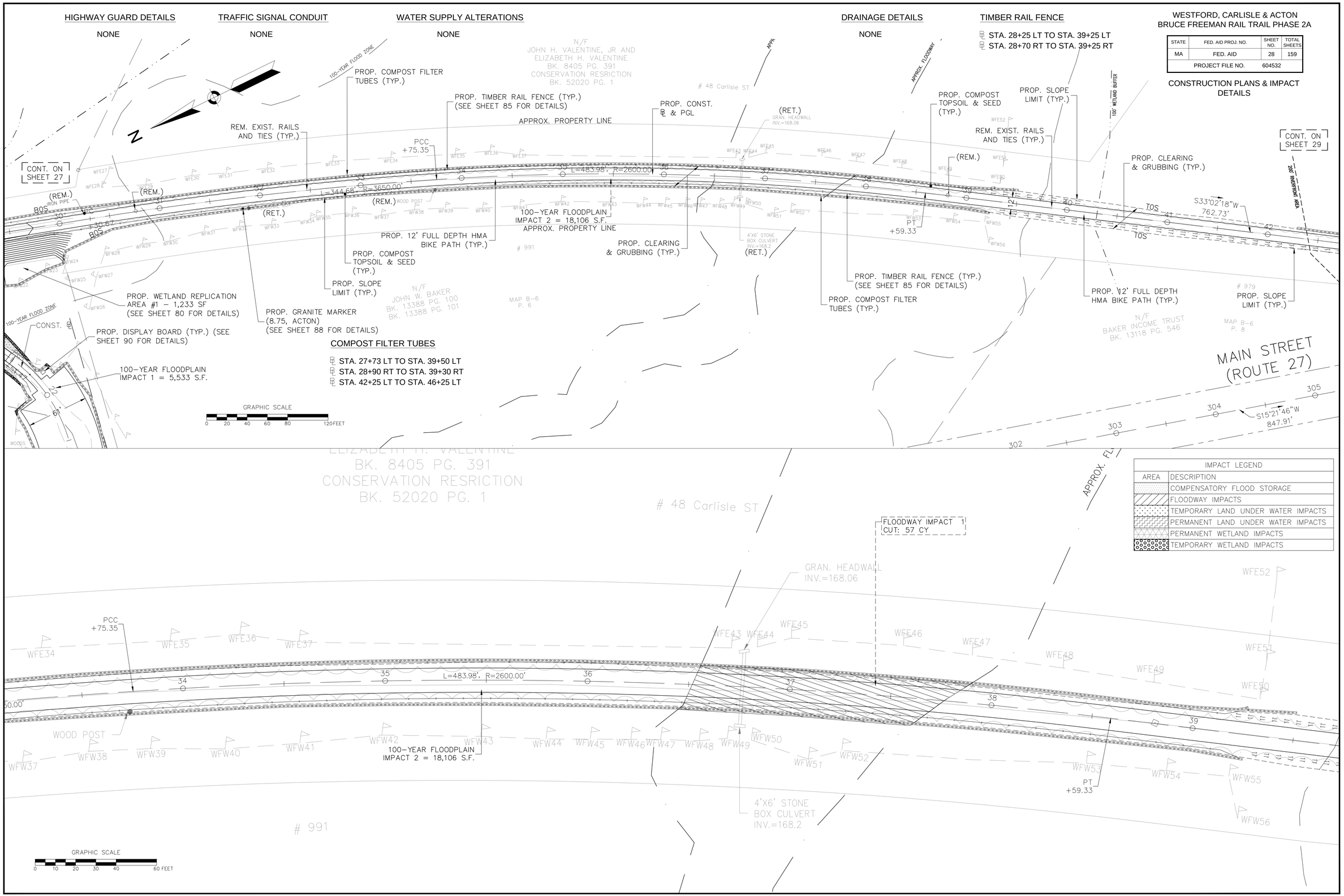
TIMBER RAIL FENCE

STA. 28+25 LT TO STA. 39+25 LT
STA. 28+70 RT TO STA. 39+25 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	28	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



COMPOST FILTER TUBES

STA. 27+73 LT TO STA. 39+50 LT
STA. 28+90 RT TO STA. 39+30 RT
STA. 42+25 LT TO STA. 46+25 LT

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:55 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

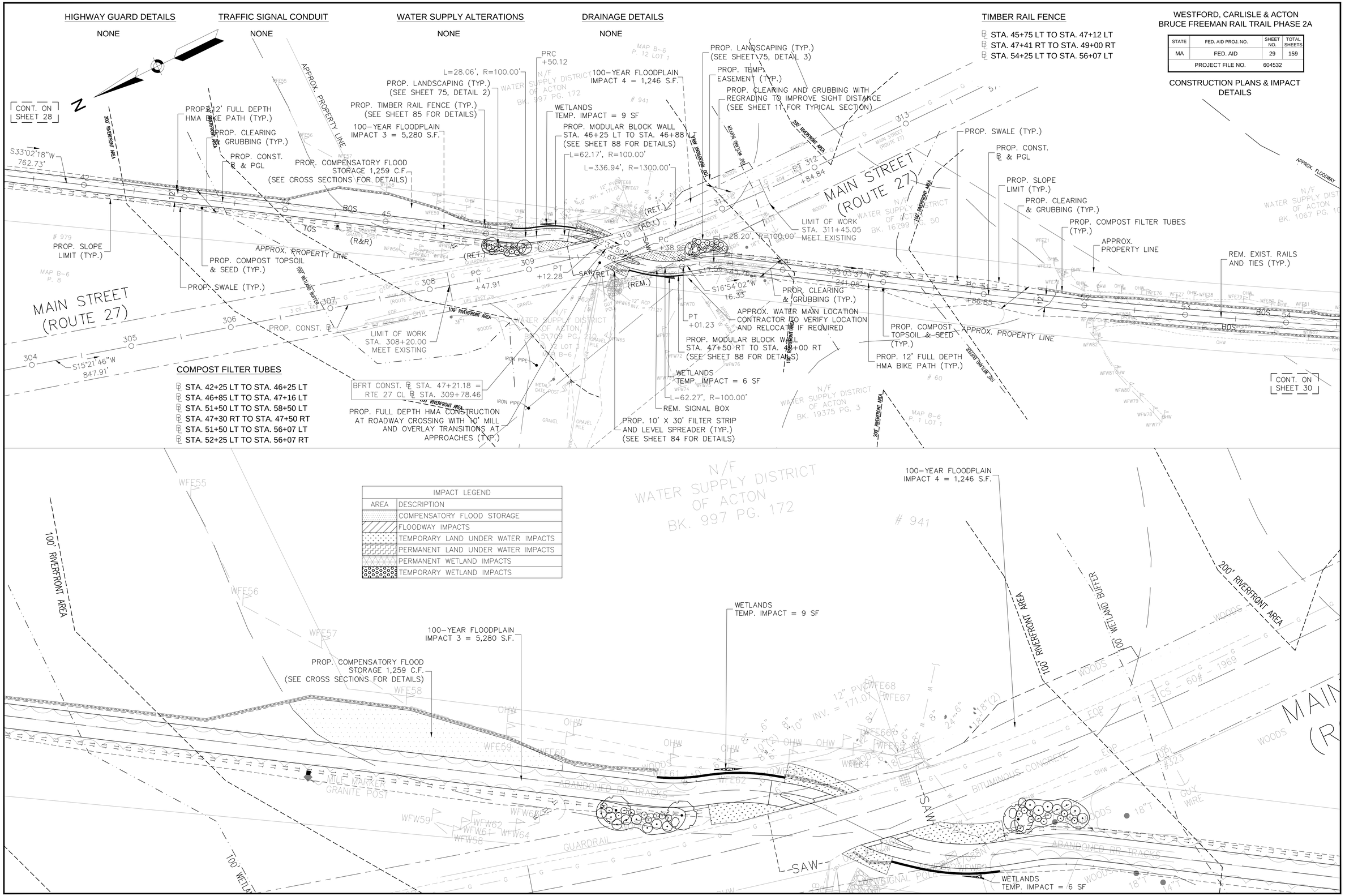
TIMBER RAIL FENCE

- STA. 45+75 LT TO STA. 47+12 LT
- STA. 47+41 RT TO STA. 49+00 RT
- STA. 54+25 LT TO STA. 56+07 LT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	29	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



COMPOST FILTER TUBES

- STA. 42+25 LT TO STA. 46+25 LT
- STA. 46+85 LT TO STA. 47+16 LT
- STA. 51+50 LT TO STA. 58+50 LT
- STA. 47+30 RT TO STA. 47+50 RT
- STA. 51+50 LT TO STA. 56+07 LT
- STA. 52+25 LT TO STA. 56+07 RT

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:55 PM

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	30	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS

HIGHWAY GUARD DETAILS

- STA. 62+00 LT - ITEM 627.1
- STA. 62+00 LT TO STA. 63+00 LT - ITEM 603.7
- STA. 63+00 LT - ITEM 627.1

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

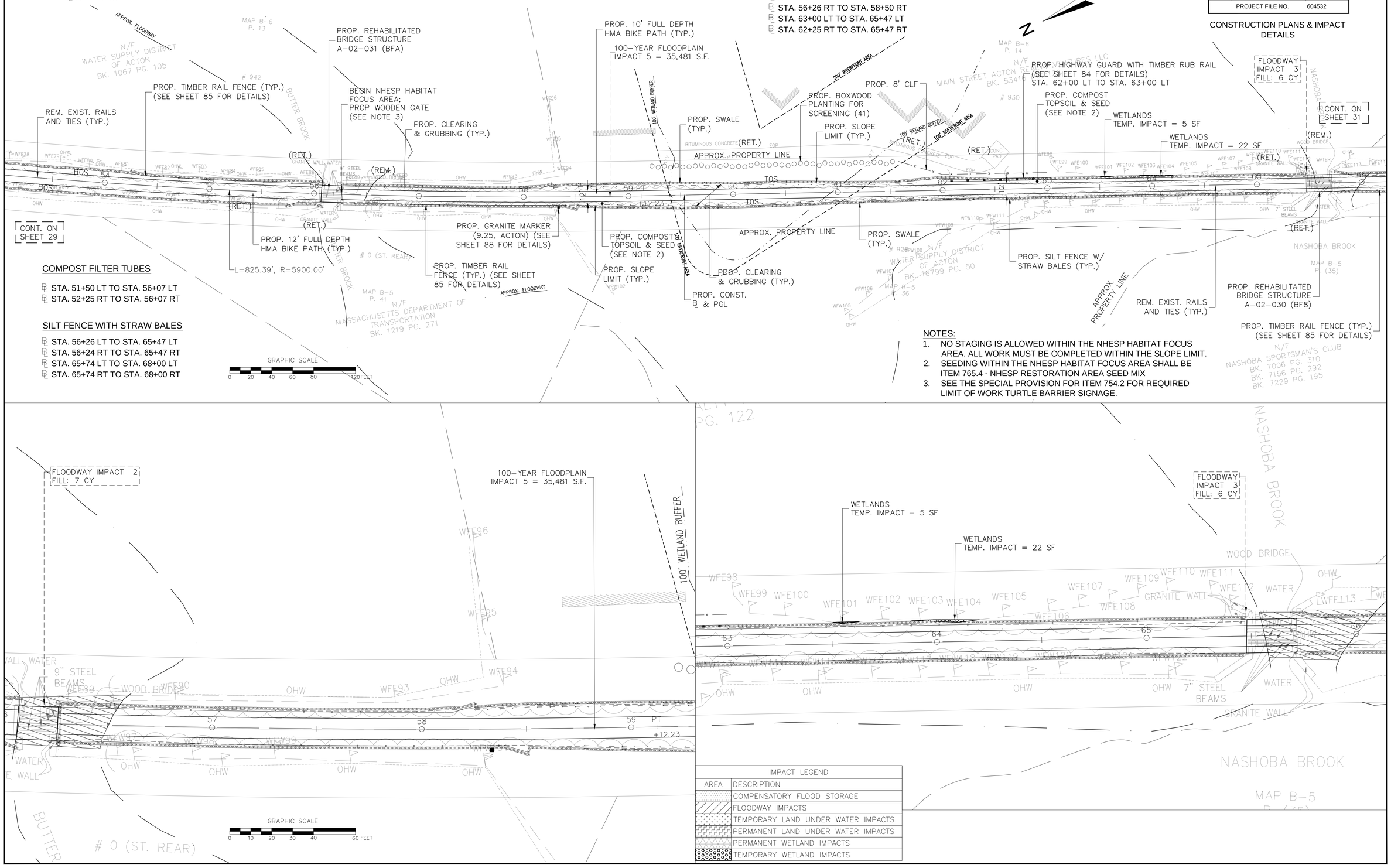
NONE

DRAINAGE DETAILS

NONE

TIMBER RAIL FENCE

- STA. 54+25 LT TO STA. 56+07 LT
- STA. 55+75 RT TO STA. 56+07 RT
- STA. 56+26 LT TO STA. 58+25 LT
- STA. 56+26 RT TO STA. 58+50 RT
- STA. 63+00 LT TO STA. 65+47 LT
- STA. 62+25 RT TO STA. 65+47 RT



COMPOST FILTER TUBES

- STA. 51+50 LT TO STA. 56+07 LT
- STA. 52+25 RT TO STA. 56+07 RT

SILT FENCE WITH STRAW BALES

- STA. 56+26 LT TO STA. 65+47 LT
- STA. 56+24 RT TO STA. 65+47 RT
- STA. 65+74 LT TO STA. 68+00 LT
- STA. 65+74 RT TO STA. 68+00 RT

NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:55 PM

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	31	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

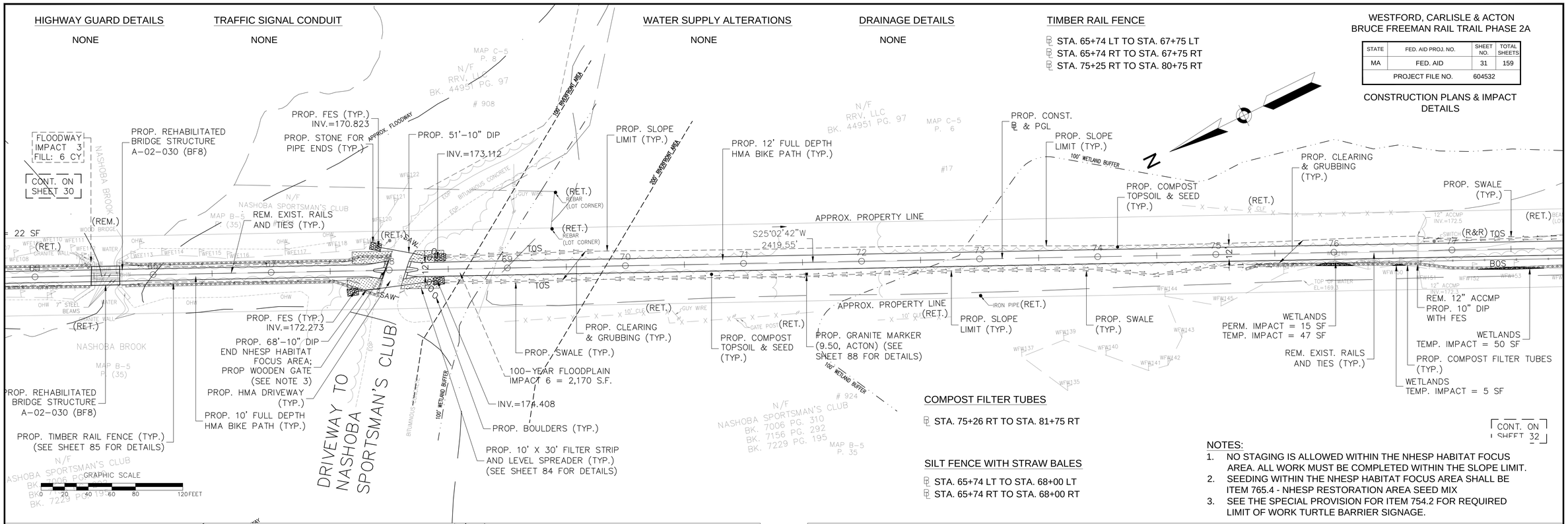
NONE

DRAINAGE DETAILS

NONE

TIMBER RAIL FENCE

- STA. 65+74 LT TO STA. 67+75 LT
- STA. 65+74 RT TO STA. 67+75 RT
- STA. 75+25 RT TO STA. 80+75 RT



COMPOST FILTER TUBES

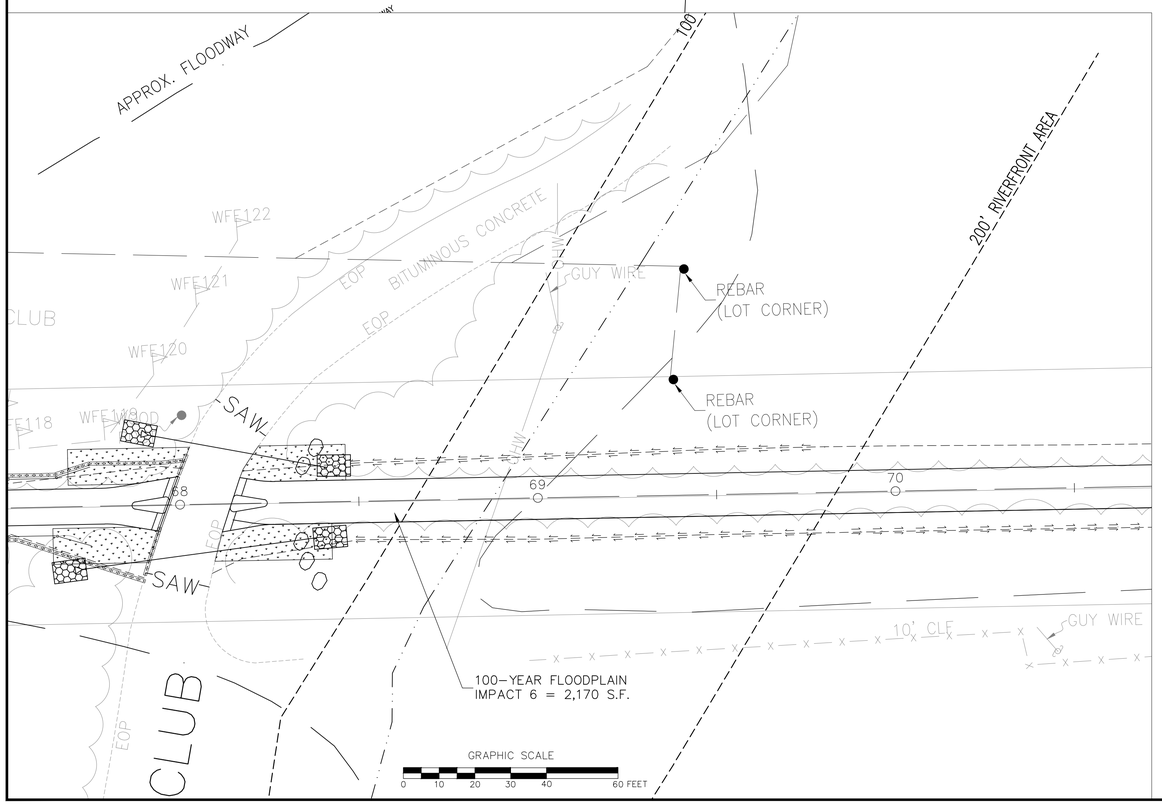
- STA. 75+26 RT TO STA. 81+75 RT

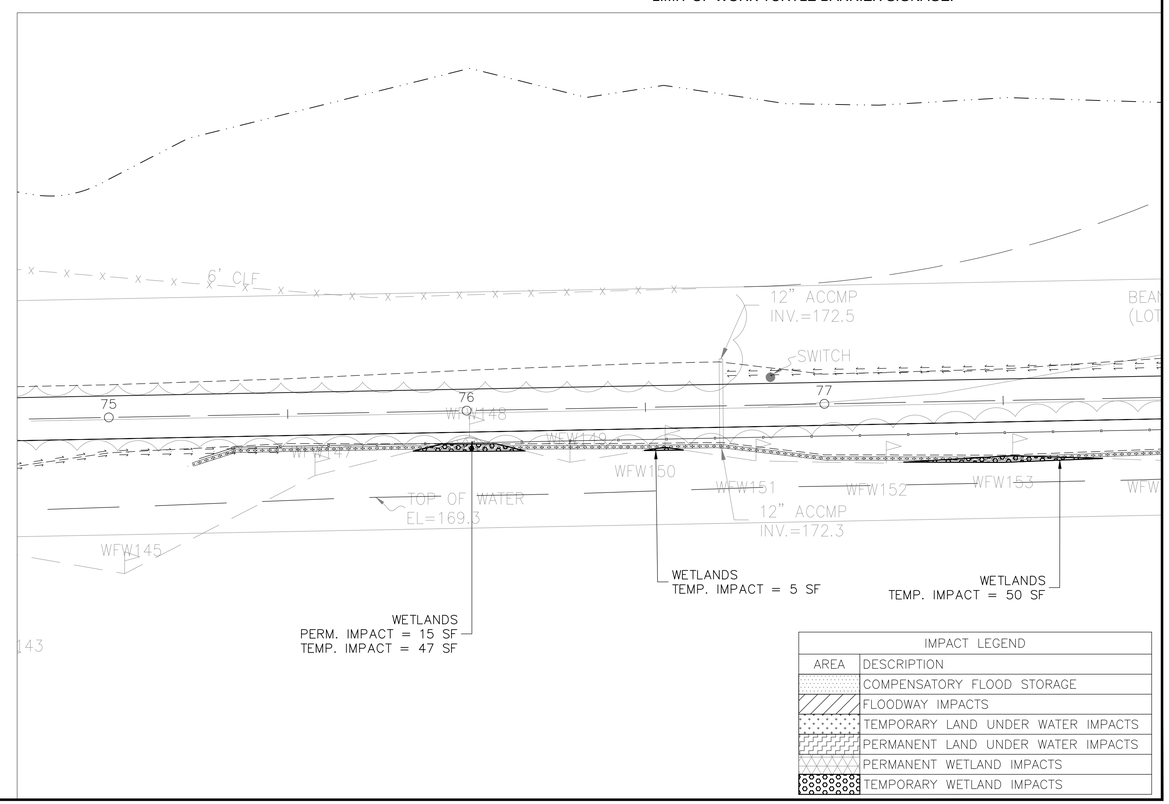
SILT FENCE WITH STRAW BALES

- STA. 65+74 LT TO STA. 68+00 LT
- STA. 65+74 RT TO STA. 68+00 RT

NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.





IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:56 PM

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	32	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:56 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

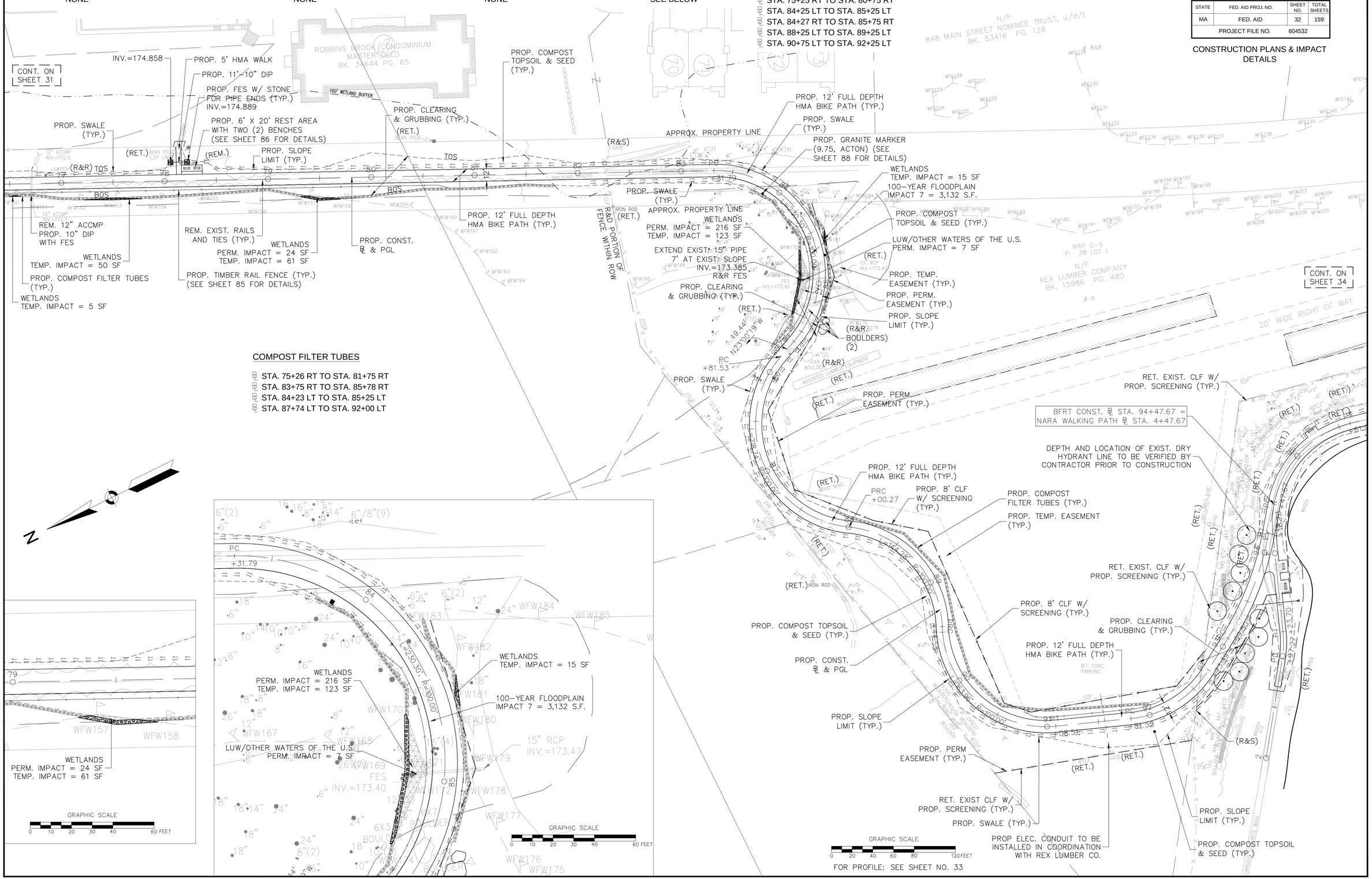
SEE BELOW

TIMBER RAIL FENCE

- ℄ STA. 75+25 RT TO STA. 80+75 RT
- ℄ STA. 84+25 LT TO STA. 85+25 LT
- ℄ STA. 84+27 RT TO STA. 85+75 RT
- ℄ STA. 88+25 LT TO STA. 89+25 LT
- ℄ STA. 90+75 LT TO STA. 92+25 LT

COMPOST FILTER TUBES

- ℄ STA. 75+26 RT TO STA. 81+75 RT
- ℄ STA. 83+75 RT TO STA. 85+78 RT
- ℄ STA. 84+23 LT TO STA. 85+25 LT
- ℄ STA. 87+74 LT TO STA. 92+00 LT



WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	33	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

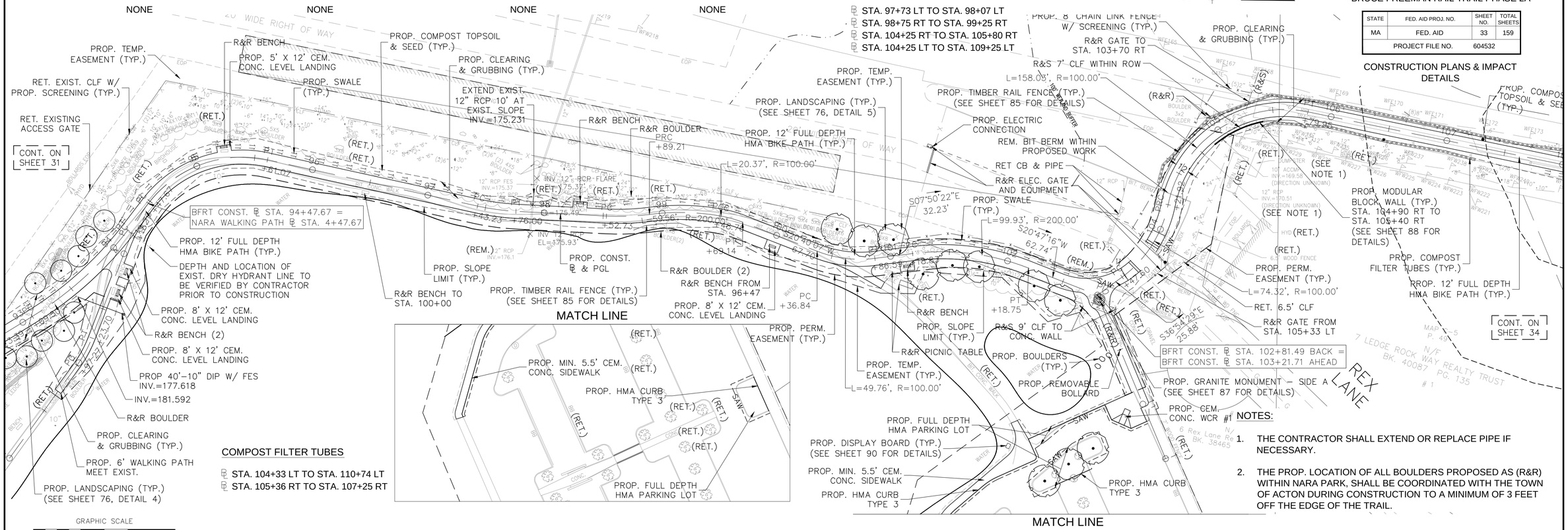
NONE

DRAINAGE DETAILS

NONE

TIMBER RAIL FENCE

- STA. 97+73 LT TO STA. 98+07 LT
- STA. 98+75 RT TO STA. 99+25 RT
- STA. 104+25 RT TO STA. 105+80 RT
- STA. 104+25 LT TO STA. 109+25 LT



COMPOST FILTER TUBES

- STA. 104+33 LT TO STA. 110+74 LT
- STA. 105+36 RT TO STA. 107+25 RT

GRAPHIC SCALE

0 20 40 60 80 120 FEET

NOTES:

1. THE CONTRACTOR SHALL EXTEND OR REPLACE PIPE IF NECESSARY.
2. THE PROP. LOCATION OF ALL BOULDERS PROPOSED AS (R&R) WITHIN NARA PARK, SHALL BE COORDINATED WITH THE TOWN OF ACTON DURING CONSTRUCTION TO A MINIMUM OF 3 FEET OFF THE EDGE OF THE TRAIL.

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:56 PM

HIGHWAY GUARD DETAILS

- STA. 116+29 RT - ITEM 627.1
- STA. 116+29 RT TO STA. 120+21RT - ITEM 603.7

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
NONE

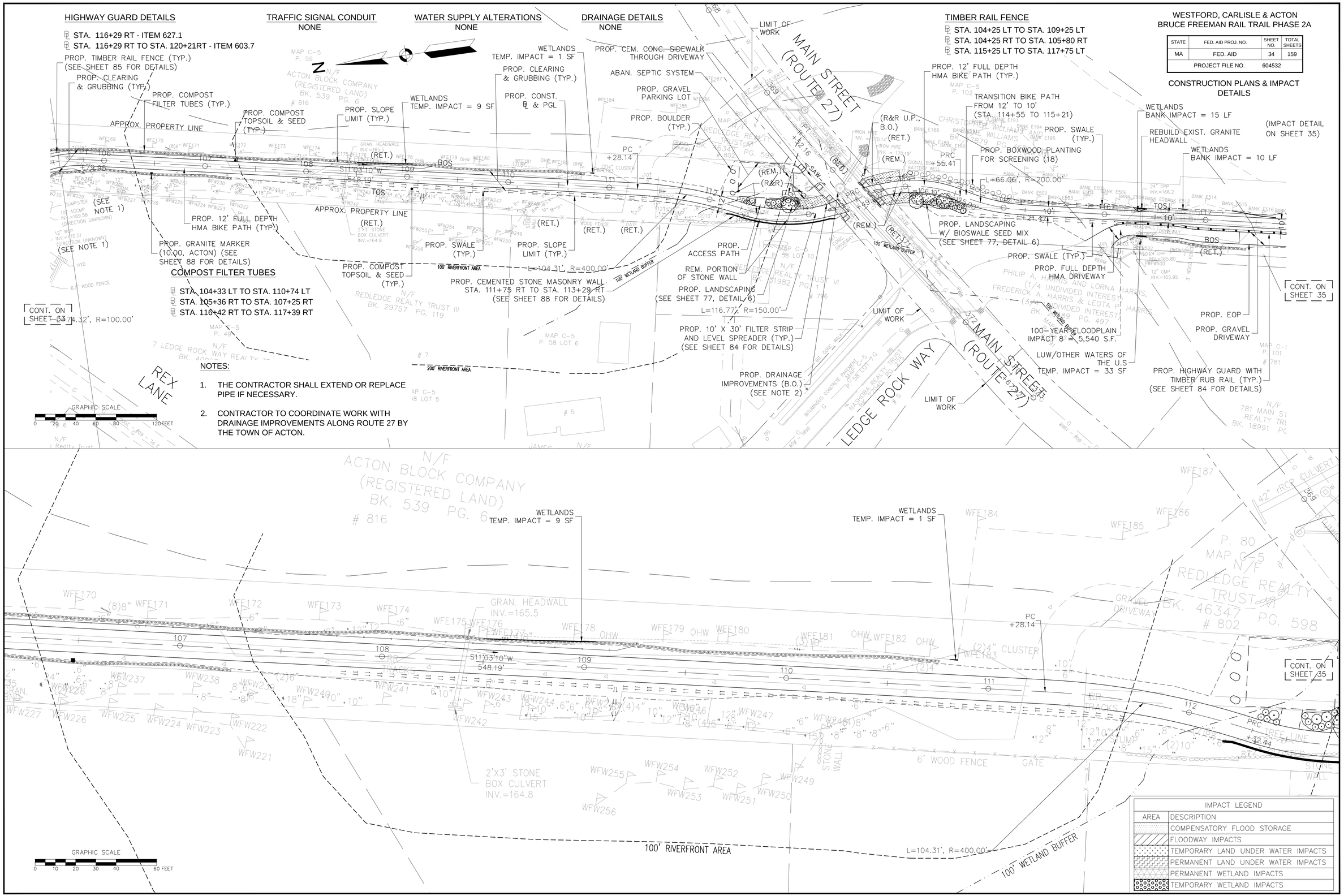
TIMBER RAIL FENCE

- STA. 104+25 LT TO STA. 109+25 LT
- STA. 104+25 RT TO STA. 105+80 RT
- STA. 115+25 LT TO STA. 117+75 LT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	34	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



COMPOST FILTER TUBES

- STA. 104+33 LT TO STA. 110+74 LT
- STA. 105+36 RT TO STA. 107+25 RT
- STA. 116+42 RT TO STA. 117+39 RT

NOTES:

1. THE CONTRACTOR SHALL EXTEND OR REPLACE PIPE IF NECESSARY.
2. CONTRACTOR TO COORDINATE WORK WITH DRAINAGE IMPROVEMENTS ALONG ROUTE 27 BY THE TOWN OF ACTON.

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:57 PM

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	35	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS

HIGHWAY GUARD DETAILS

STA. 116+29 RT TO STA. 120+21RT - ITEM 603.7
STA. 120+21 RT - ITEM 627.1

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

HIGHWAY GUARD WITH TIMBER RAIL BACK

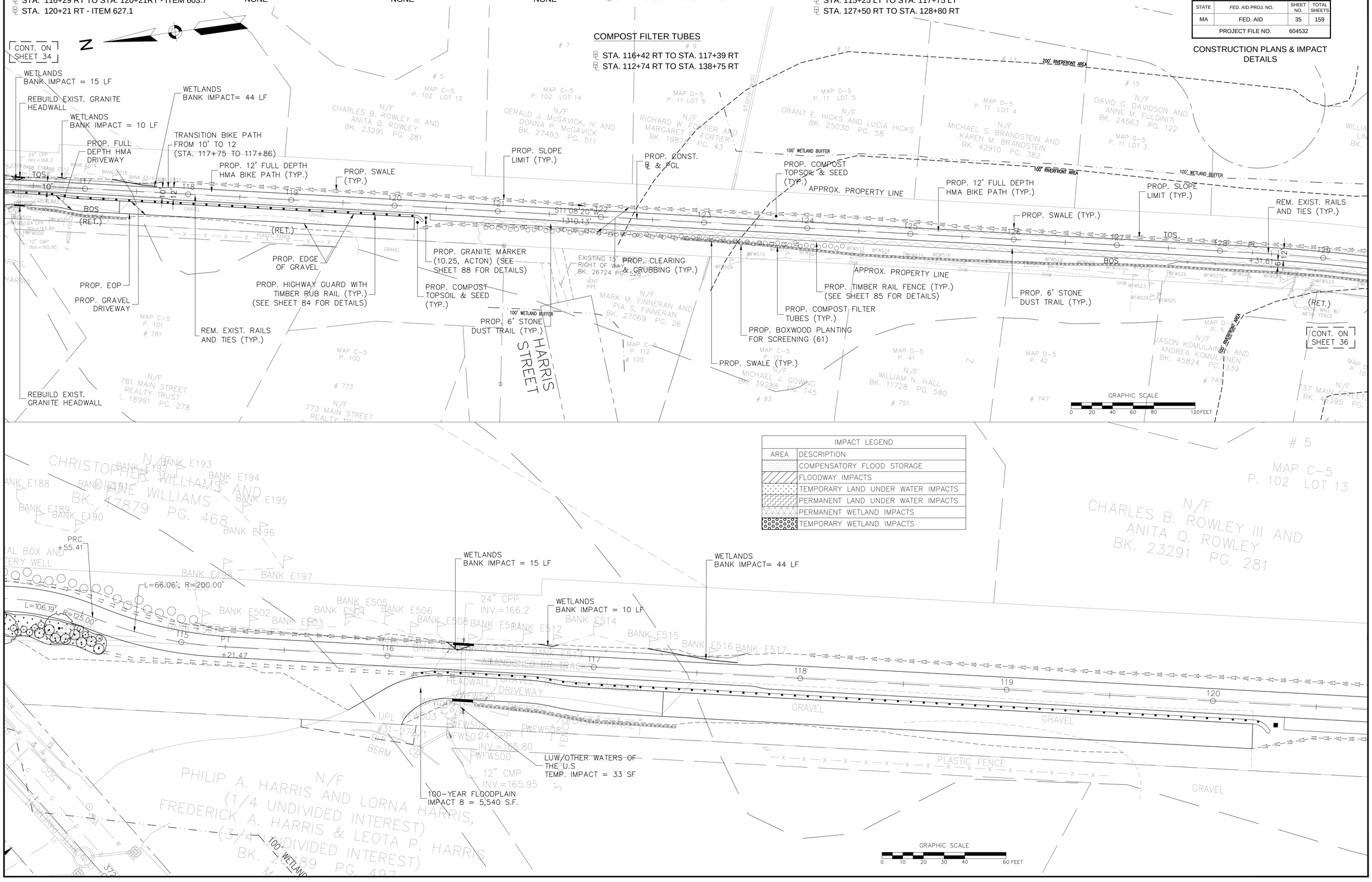
STA. 116+30 RT TO STA. 120+20 RT

TIMBER RAIL FENCE

STA. 115+25 LT TO STA. 117+75 LT
STA. 127+50 RT TO STA. 128+80 RT

COMPOST FILTER TUBES

STA. 116+42 RT TO STA. 117+39 RT
STA. 112+74 RT TO STA. 138+75 RT



IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:57 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

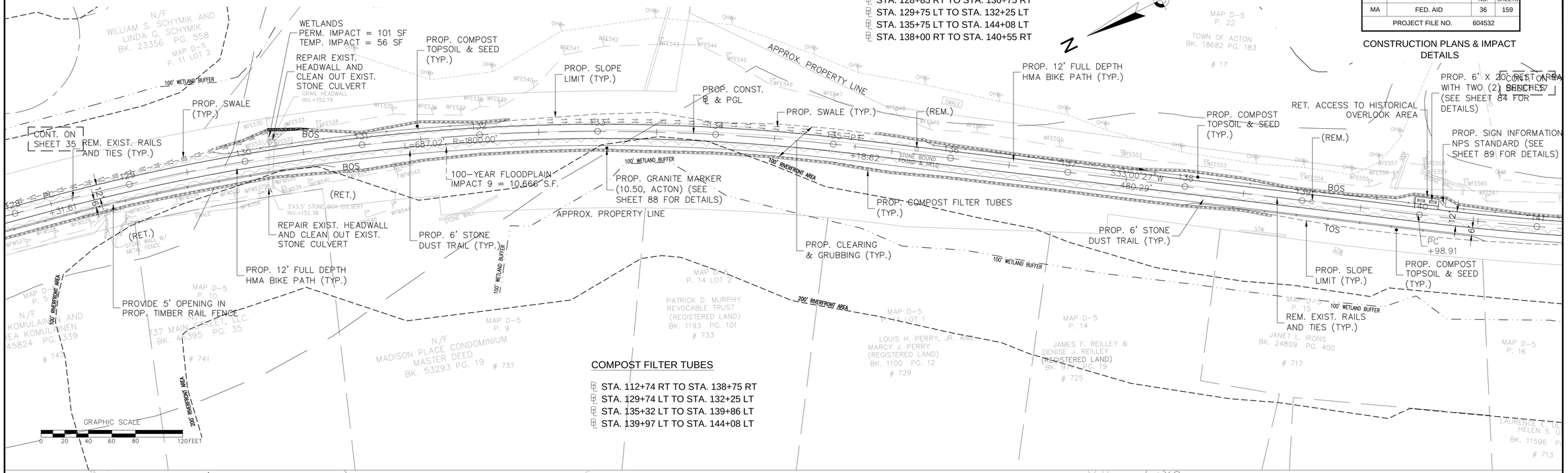
TIMBER RAIL FENCE

- STA. 127+50 RT TO STA. 128+80 RT
- STA. 128+85 RT TO STA. 130+75 RT
- STA. 129+75 LT TO STA. 132+25 LT
- STA. 135+75 LT TO STA. 144+08 LT
- STA. 138+00 RT TO STA. 140+55 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

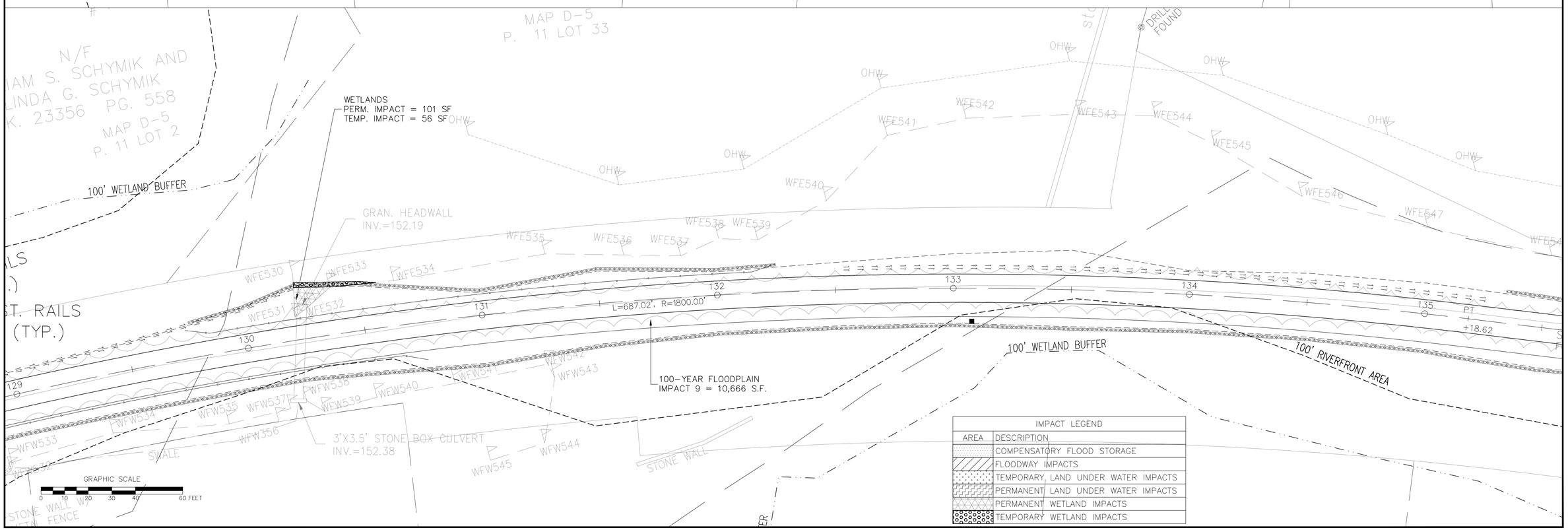
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	36	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



COMPOST FILTER TUBES

- STA. 112+74 RT TO STA. 138+75 RT
- STA. 129+74 LT TO STA. 132+25 LT
- STA. 135+32 LT TO STA. 139+86 LT
- STA. 139+97 LT TO STA. 144+08 LT



IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:57 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

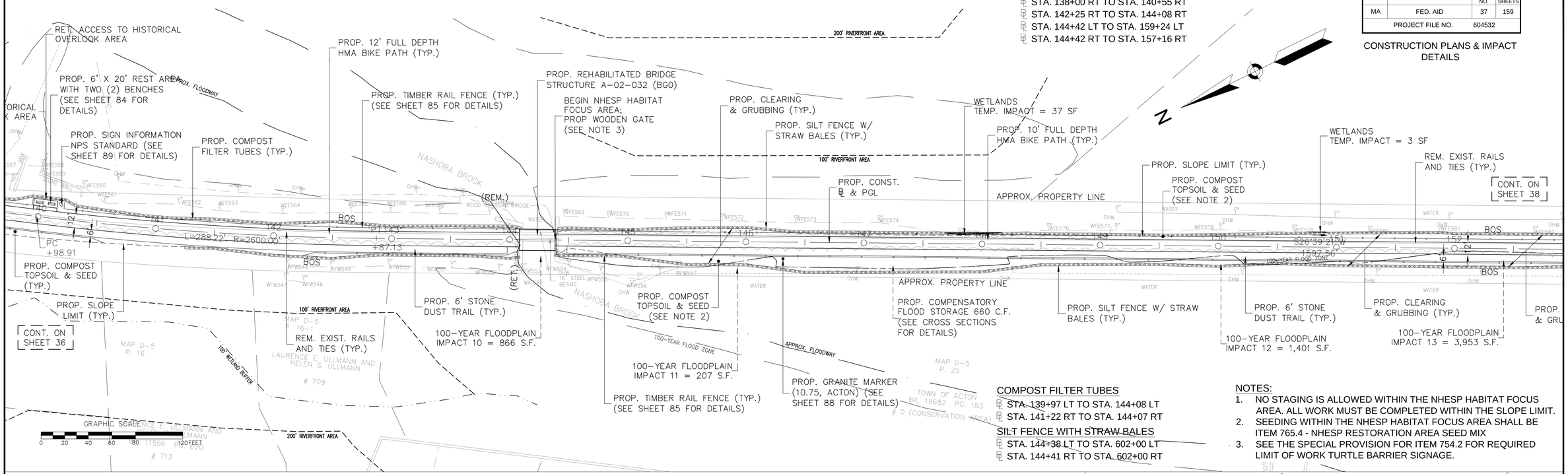
TIMBER RAIL FENCE

- STA. 135+75 LT TO STA. 144+08 LT
- STA. 138+00 RT TO STA. 140+55 RT
- STA. 142+25 RT TO STA. 144+08 RT
- STA. 144+42 LT TO STA. 159+24 LT
- STA. 144+42 RT TO STA. 157+16 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	37	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



COMPOST FILTER TUBES

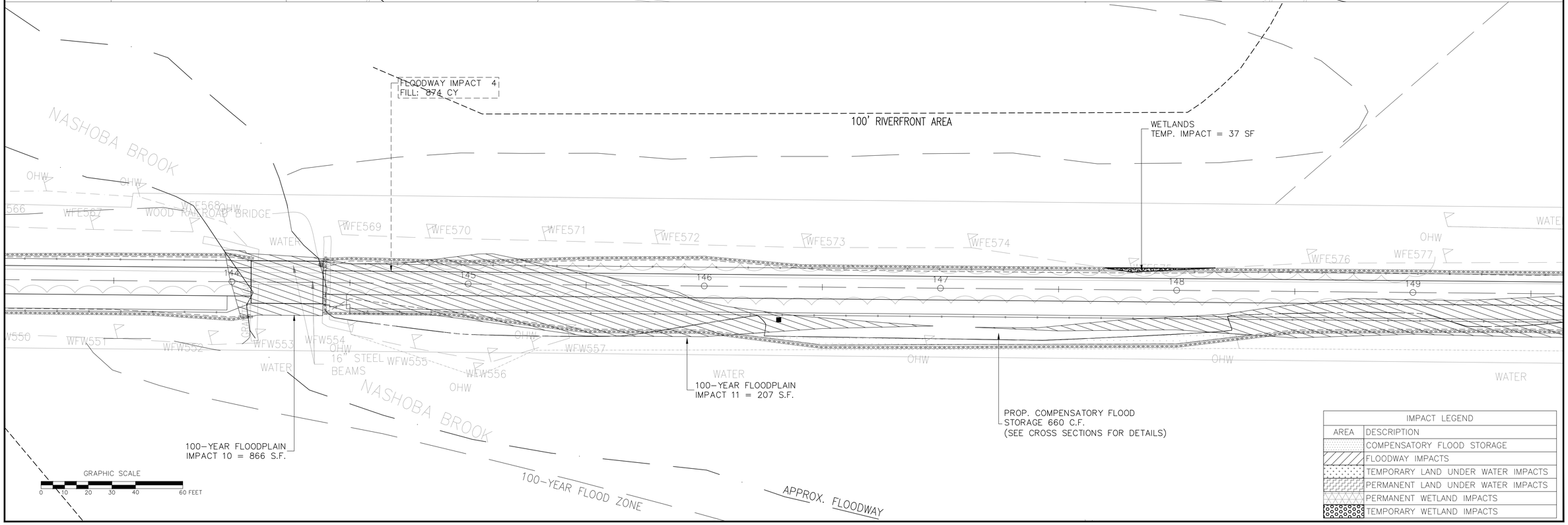
- STA. 139+97 LT TO STA. 144+08 LT
- STA. 141+22 RT TO STA. 144+07 RT

SILT FENCE WITH STRAW BALES

- STA. 144+38 LT TO STA. 602+00 LT
- STA. 144+41 RT TO STA. 602+00 RT

NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.



IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:57 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

TIMBER RAIL FENCE

- STA. 135+75 LT TO STA. 144+08 LT
- STA. 142+25 RT TO STA. 144+08 RT
- STA. 144+42 LT TO STA. 159+24 LT
- STA. 144+42 RT TO STA. 157+16 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

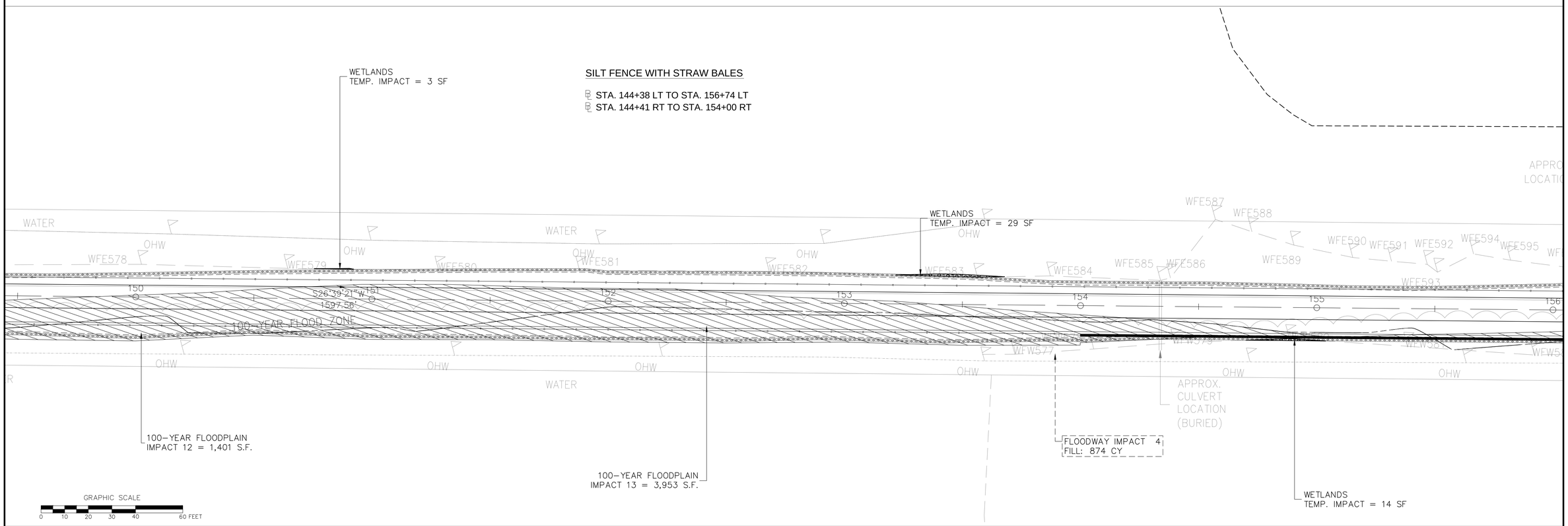
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	37a	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:58 PM

SILT FENCE WITH STRAW BALES

- STA. 144+38 LT TO STA. 156+74 LT
- STA. 144+41 RT TO STA. 154+00 RT



IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

TIMBER RAIL FENCE

- STA. 144+42 LT TO STA. 159+24 LT
- STA. 144+42 RT TO STA. 157+16 RT
- STA. 157+28 RT TO STA. 159+75 RT

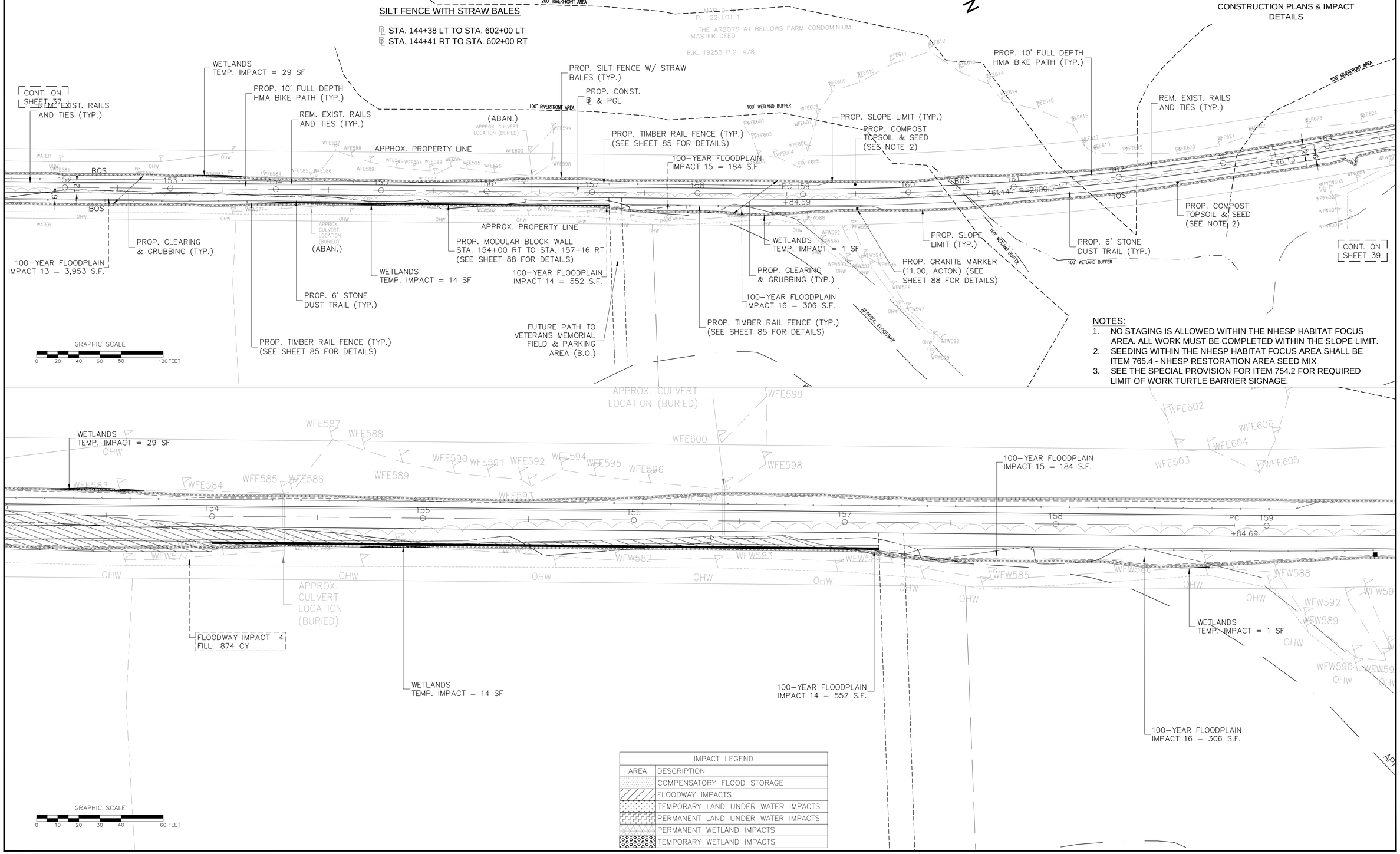
SILT FENCE WITH STRAW BALES

- STA. 144+38 LT TO STA. 602+00 LT
- STA. 144+41 RT TO STA. 602+00 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	38	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:58 PM

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	SEE BELOW	NONE

TIMBER RAIL FENCE

- STA. 164+75 LT TO STA. 601+24 LT
- STA. 164+75 RT TO STA. 167+00 RT
- STA. 167+30 RT TO STA. 601+23 RT
- STA. 603+30 LT TO STA. 175+25 LT
- STA. 603+30 RT TO STA. 175+25 RT

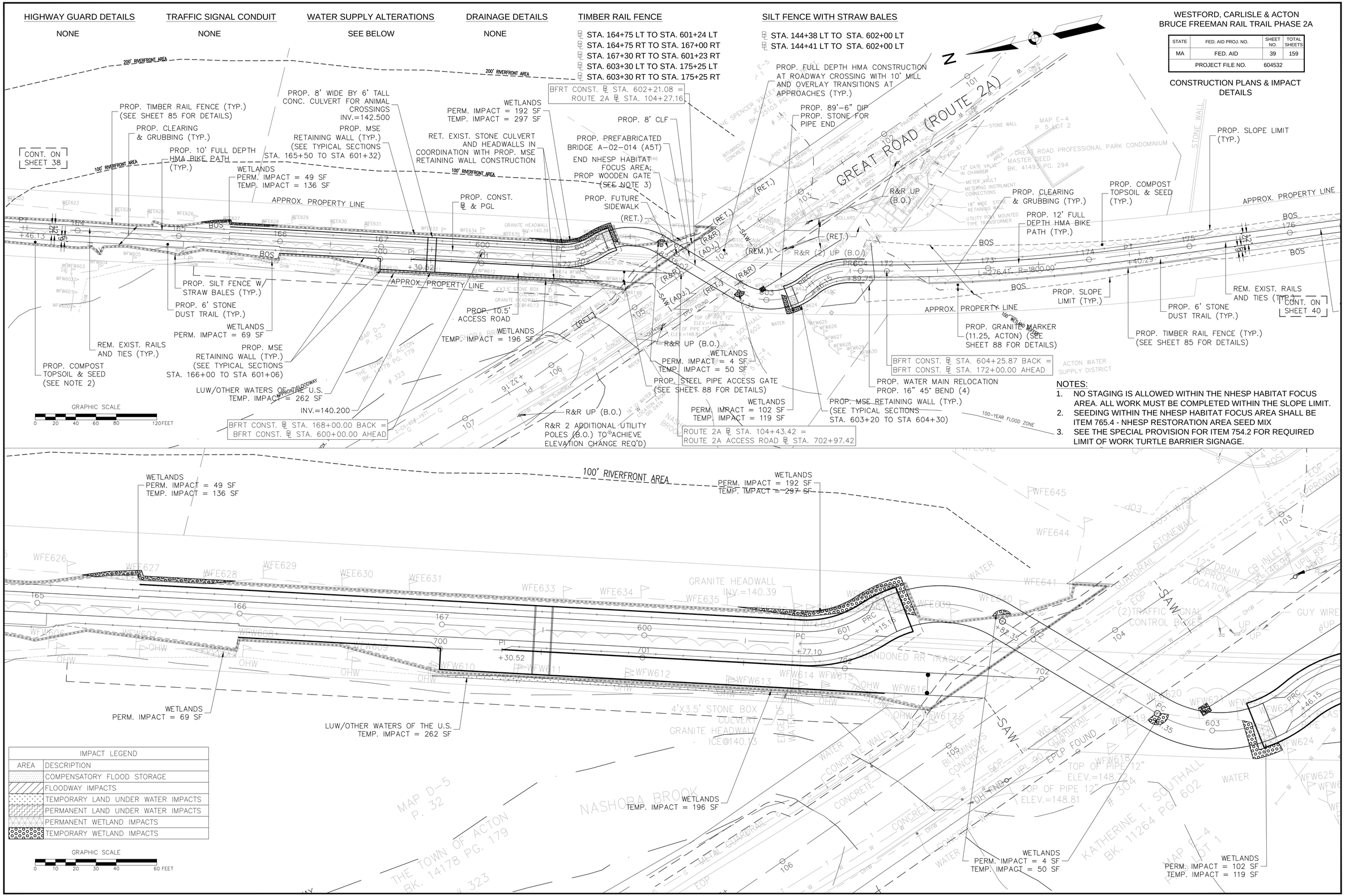
SILT FENCE WITH STRAW BALES

- STA. 144+38 LT TO STA. 602+00 LT
- STA. 144+41 LT TO STA. 602+00 LT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	39	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

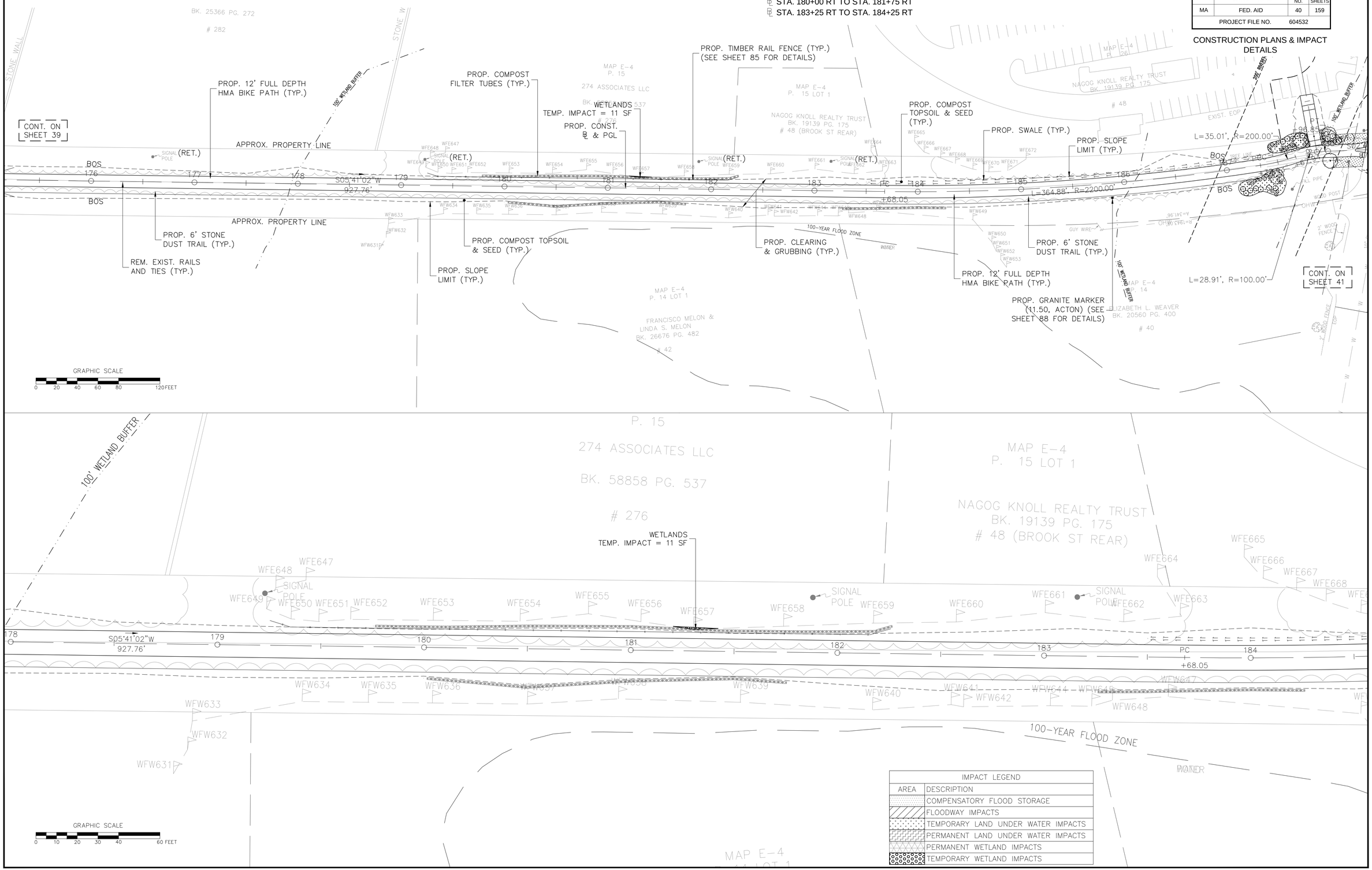
10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:58 PM

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	TIMBER RAIL FENCE	COMPOST FILTER TUBES
NONE	NONE	NONE	NONE	STA. 179+25 LT TO STA. 182+25 LT	STA. 179+75 LT TO STA. 182+25 LT STA. 180+00 RT TO STA. 181+75 RT STA. 183+25 RT TO STA. 184+25 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	40	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:58 PM

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	NONE

TIMBER RAIL FENCE

- STA. 188+75 RT TO STA. 191+47 RT
- STA. 190+25 LT TO STA. 191+47 LT
- STA. 192+00 RT TO STA. 192+10 RT
- STA. 192+00 LT TO STA. 194+70 LT
- STA. 194+75 LT TO STA. 203+29 LT

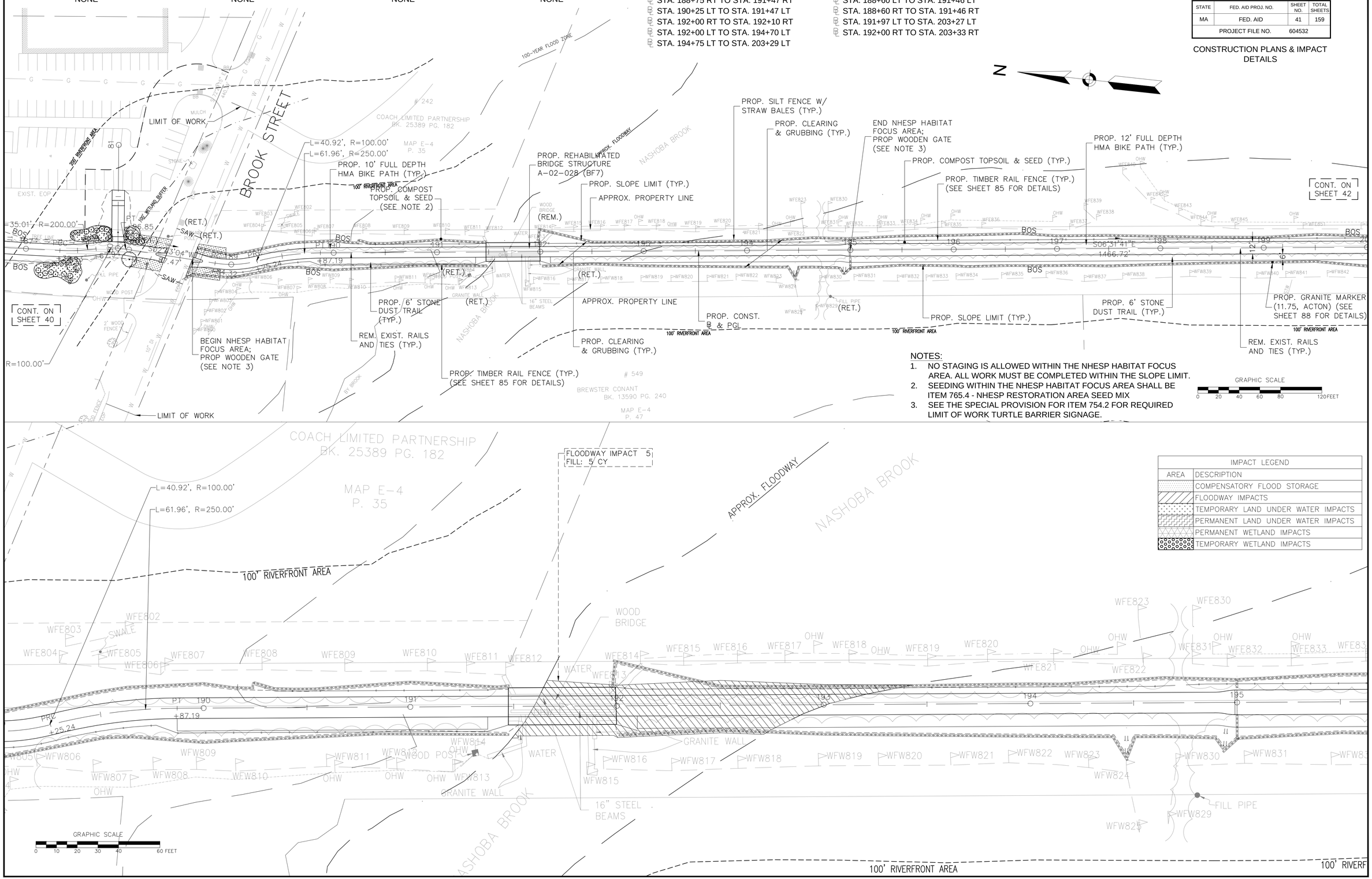
SILT FENCE WITH STRAW BALES

- STA. 188+60 LT TO STA. 191+46 LT
- STA. 188+60 RT TO STA. 191+46 RT
- STA. 191+97 LT TO STA. 203+27 LT
- STA. 192+00 RT TO STA. 203+33 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	41	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

GRAPHIC SCALE
0 20 40 60 80 120FEET

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:59 PM

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	NONE

TIMBER RAIL FENCE

- STA. 192+00 LT TO STA. 203+29 LT
- STA. 201+25 RT TO STA. 203+29 RT
- STA. 203+68 RT TO STA. 207+75 RT
- STA. 203+68 LT TO STA. 207+75 LT

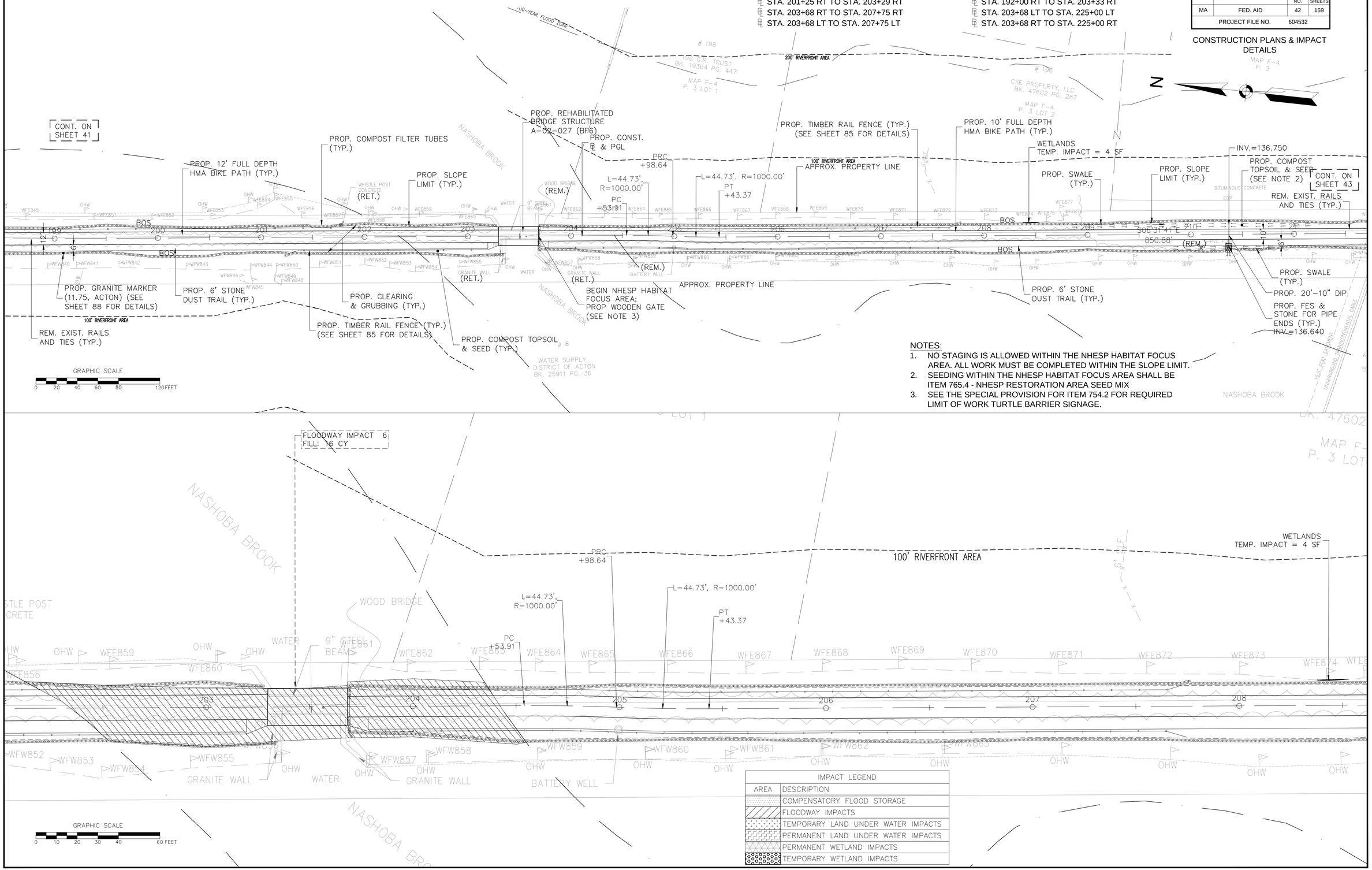
SILT FENCE WITH STRAW BALES

- STA. 191+97 LT TO STA. 203+27 LT
- STA. 192+00 RT TO STA. 203+33 RT
- STA. 203+68 LT TO STA. 225+00 LT
- STA. 203+68 RT TO STA. 225+00 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	42	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:59 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

SILT FENCE WITH STRAW BALES

STA. 203+68 LT TO STA. 225+00 LT
STA. 203+68 RT TO STA. 225+00 RT

DRAINAGE DETAILS

NONE

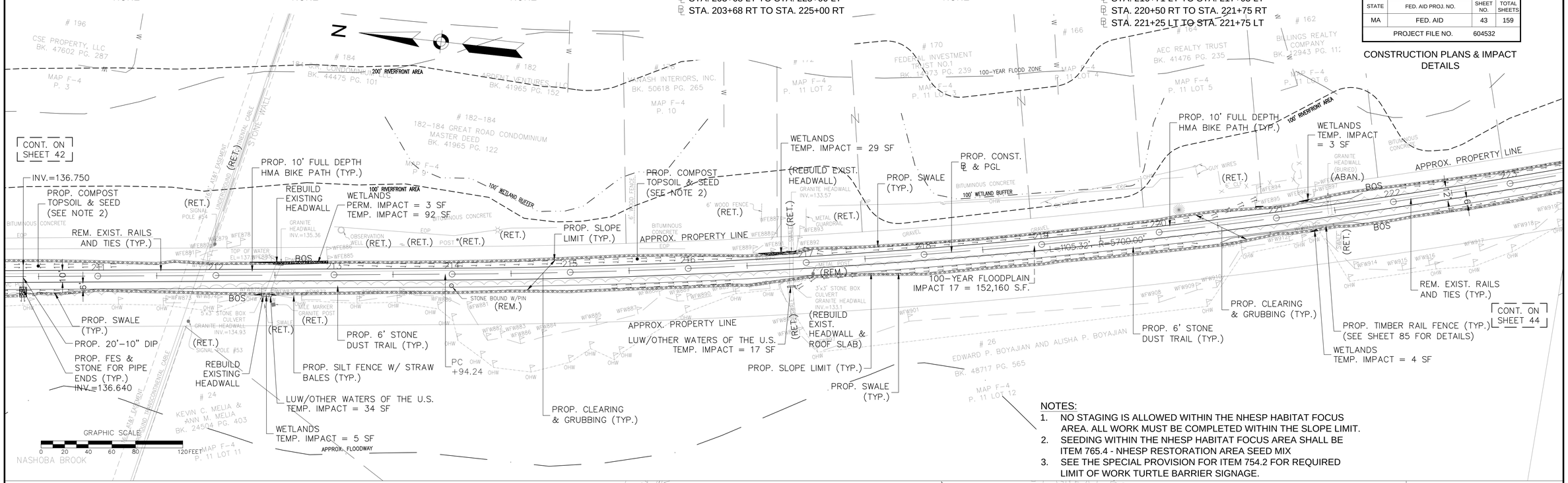
TIMBER RAIL FENCE

STA. 216+71 LT TO STA. 217+05 LT
STA. 220+50 RT TO STA. 221+75 RT
STA. 221+25 LT TO STA. 221+75 LT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	43	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:59 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

TIMBER RAIL FENCE

- STA. 192+00 LT TO STA. 203+29 LT
- STA. 201+25 RT TO STA. 203+29 RT
- STA. 203+68 RT TO STA. 207+75 RT
- STA. 203+68 LT TO STA. 207+75 LT

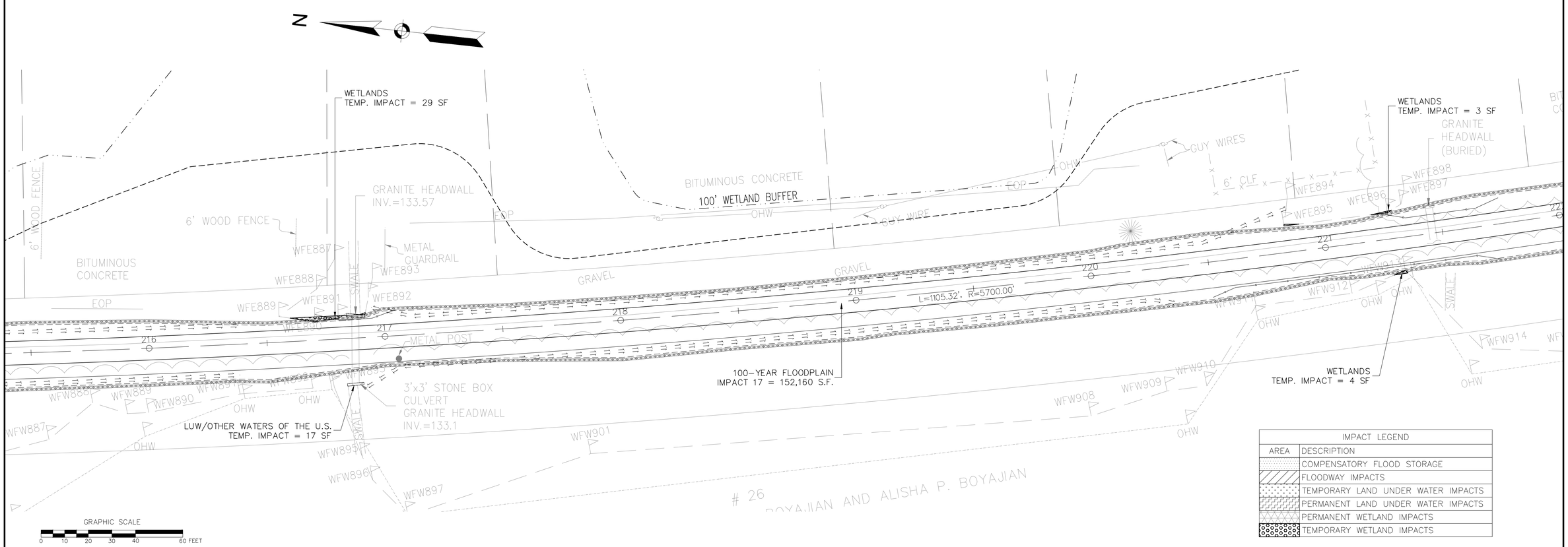
SILT FENCE WITH STRAW BALES

- STA. 203+68 LT TO STA. 225+00 LT
- STA. 203+68 RT TO STA. 225+00 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	43a	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 1:59 PM

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS	TIMBER RAIL FENCE
NONE	NONE	NONE	SEE BELOW	℄ STA. 226+00 LT TO STA. 227+22 LT

SILT FENCE AND STRAW BALES

℄ STA. 203+68 LT TO STA. 225+00 LT
℄ STA. 203+68 RT TO STA. 225+00 RT

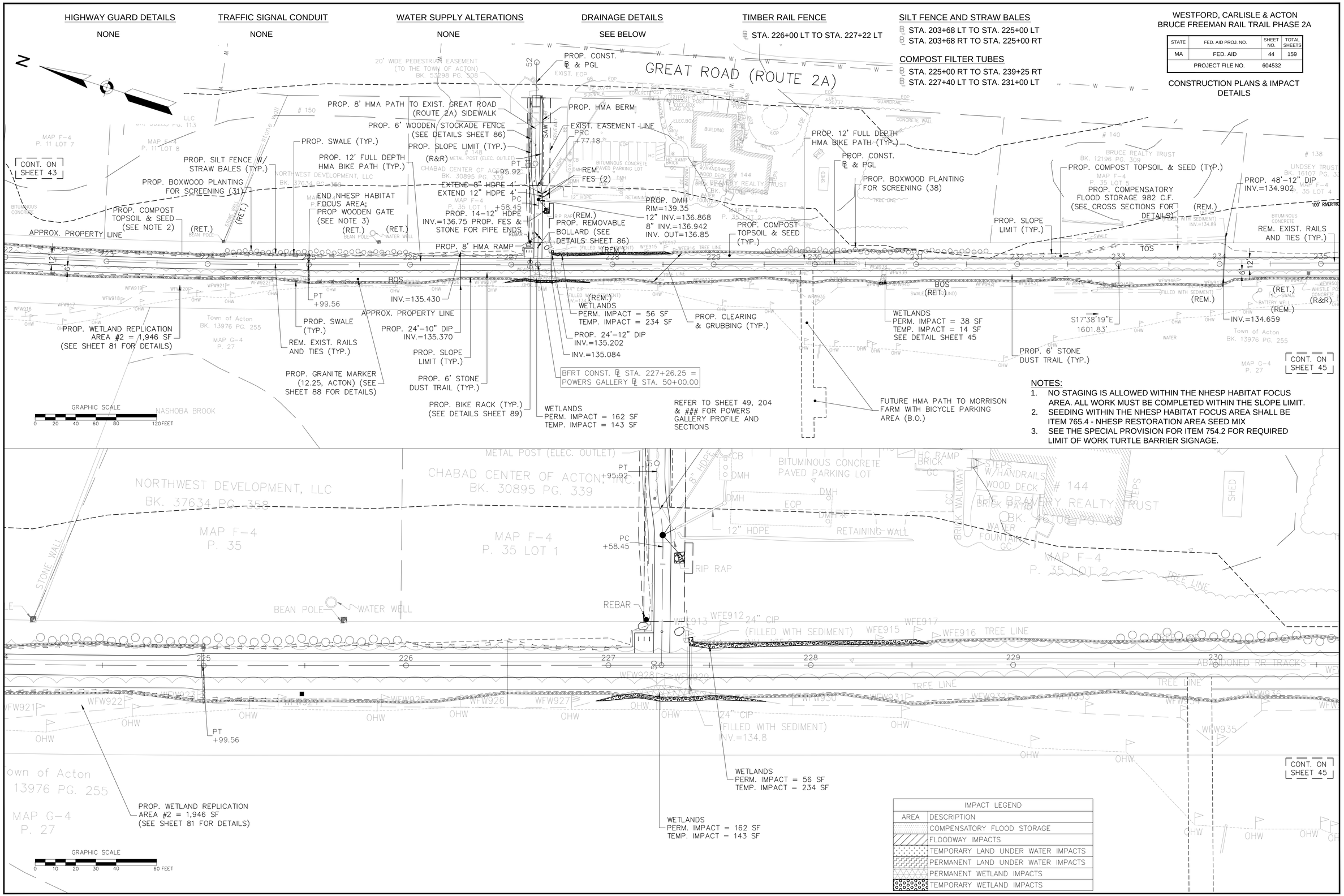
COMPOST FILTER TUBES

℄ STA. 225+00 RT TO STA. 239+25 RT
℄ STA. 227+40 LT TO STA. 231+00 LT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	44	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



NOTES:

1. NO STAGING IS ALLOWED WITHIN THE NHESP HABITAT FOCUS AREA. ALL WORK MUST BE COMPLETED WITHIN THE SLOPE LIMIT.
2. SEEDING WITHIN THE NHESP HABITAT FOCUS AREA SHALL BE ITEM 765.4 - NHESP RESTORATION AREA SEED MIX
3. SEE THE SPECIAL PROVISION FOR ITEM 754.2 FOR REQUIRED LIMIT OF WORK TURTLE BARRIER SIGNAGE.

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 2:00 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE BELOW

TIMBER RAIL FENCE

- STA. 236+52 LT TO STA. 236+86 LT
- STA. 237+25 RT TO STA. 238+75 RT
- STA. 243+00 LT TO STA. 244+00 LT
- STA. 244+25 RT TO STA. 244+75 RT
- STA. 244+25 LT TO STA. 244+75 LT

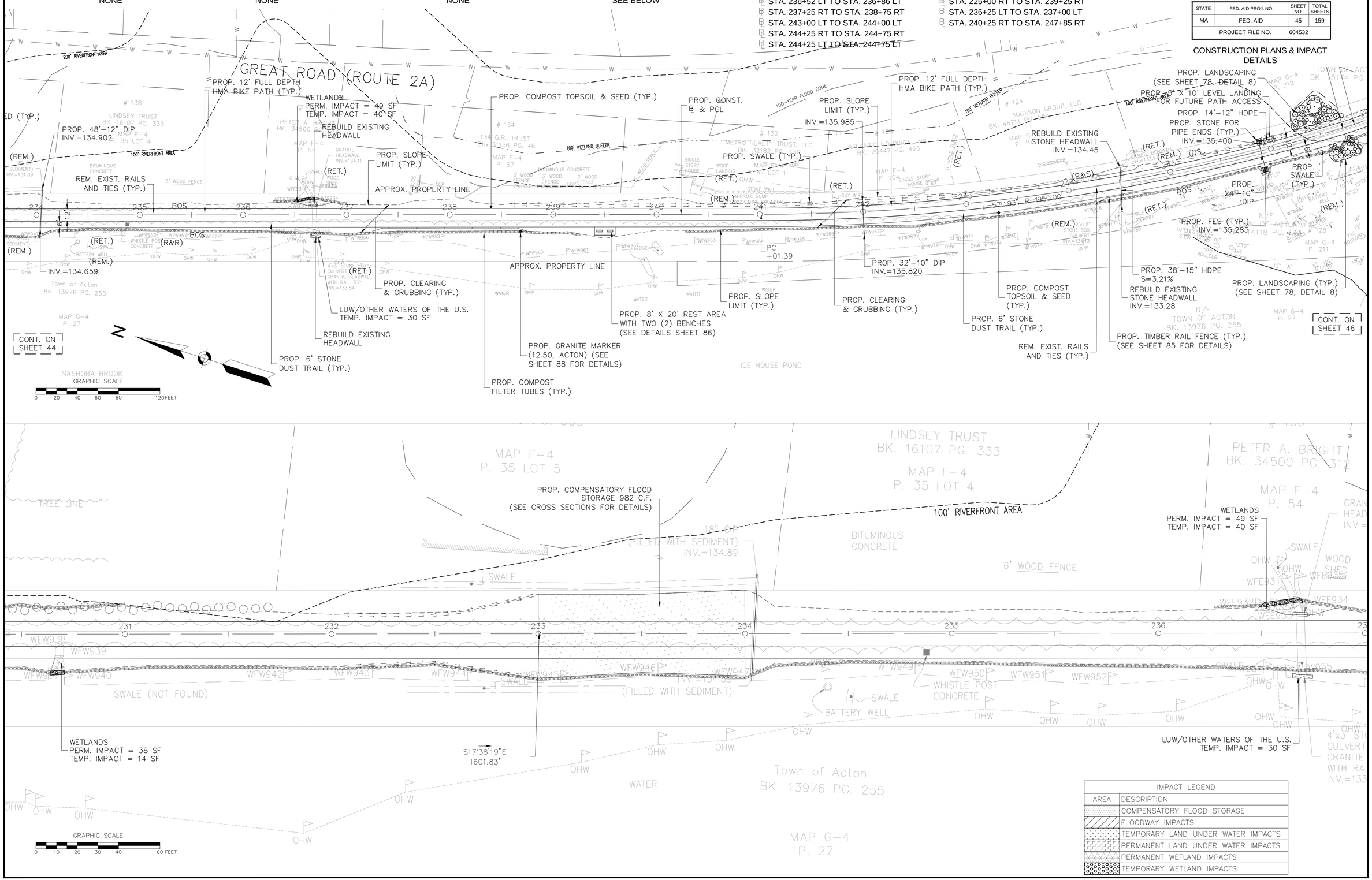
COMPOST FILTER TUBES

- STA. 225+00 RT TO STA. 239+25 RT
- STA. 236+25 LT TO STA. 237+00 LT
- STA. 240+25 RT TO STA. 247+85 RT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	45	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 2:00 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

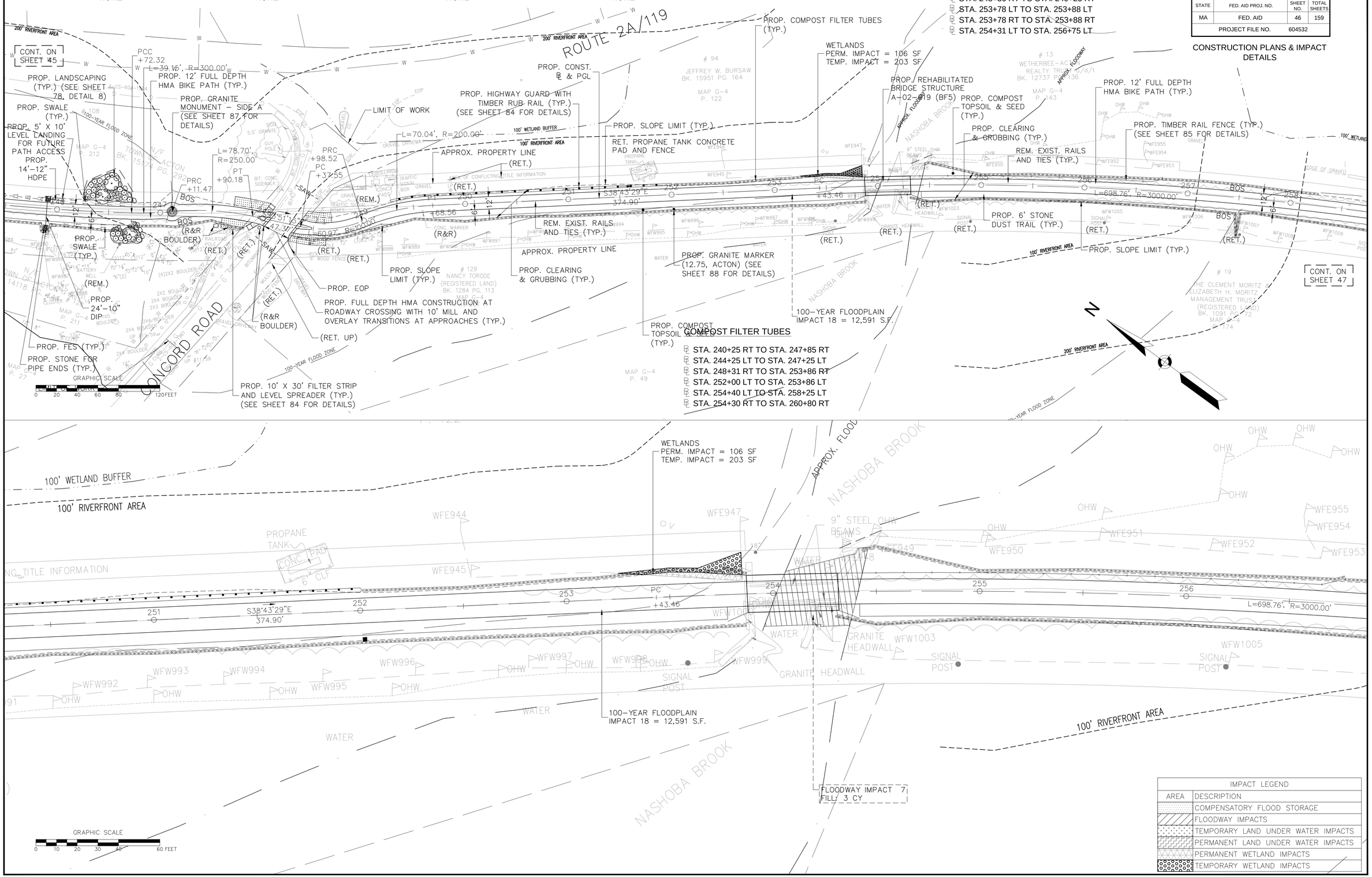
TIMBER RAIL FENCE

- STA. 248+36 RT TO STA. 249+25 RT
- STA. 253+78 LT TO STA. 253+88 LT
- STA. 253+78 RT TO STA. 253+88 RT
- STA. 254+31 LT TO STA. 256+75 LT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	46	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



COMPOST FILTER TUBES

- STA. 240+25 RT TO STA. 247+85 RT
- STA. 244+25 LT TO STA. 247+25 LT
- STA. 248+31 RT TO STA. 253+86 RT
- STA. 252+00 LT TO STA. 253+86 LT
- STA. 254+40 LT TO STA. 258+25 LT
- STA. 254+30 RT TO STA. 260+80 RT

IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 2:00 PM

HIGHWAY GUARD DETAILS

- STA. 262+25 LT - ITEM 627.1
- STA. 262+25 LT TO STA. 266+78 LT - ITEM 603.7
- STA. 266+78 LT - ITEM 627.1

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

TIMBER RAIL FENCE

NONE

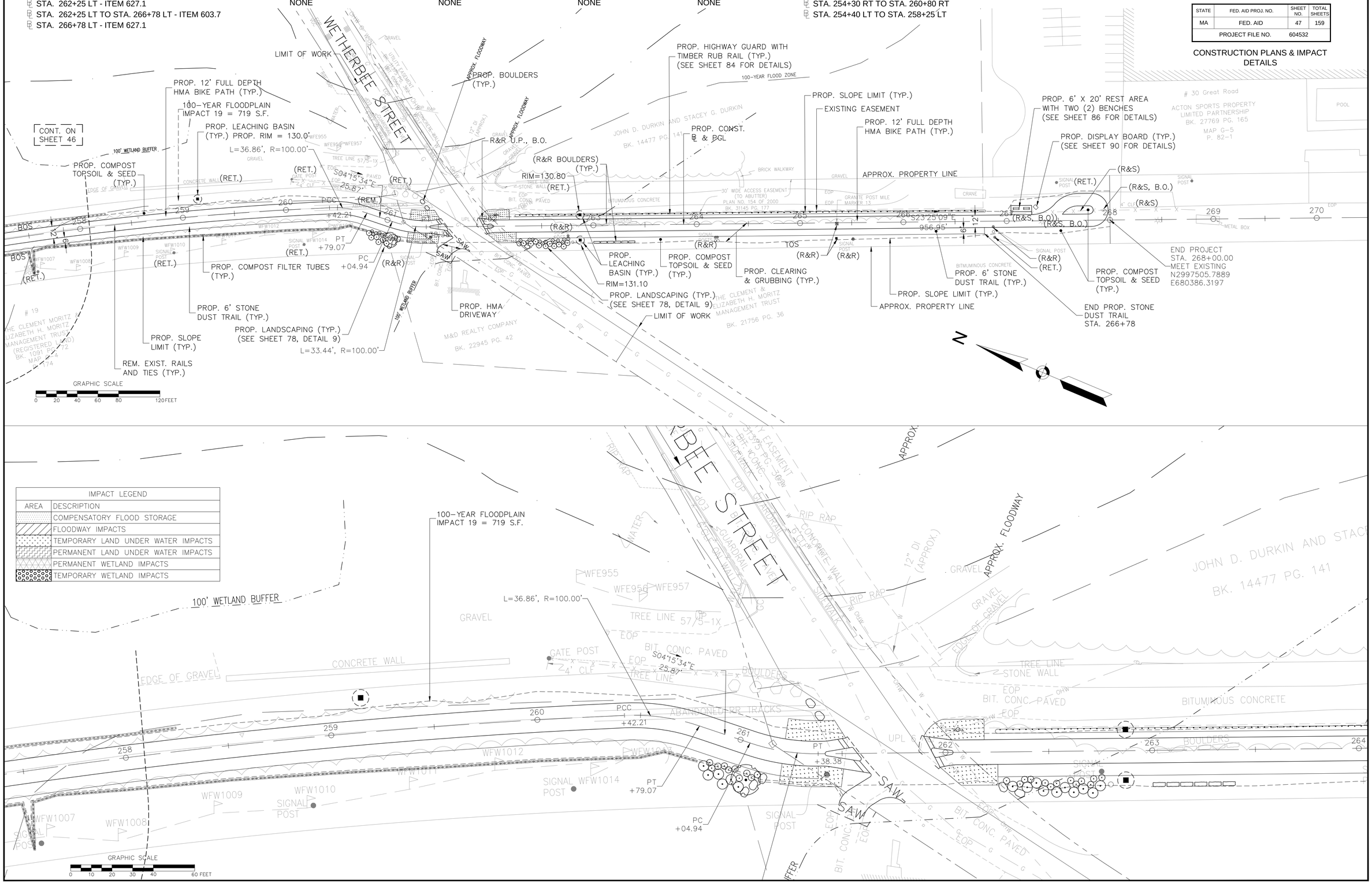
COMPOST FILTER TUBES

- STA. 254+30 RT TO STA. 260+80 RT
- STA. 254+40 LT TO STA. 258+25 LT

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	47	159
PROJECT FILE NO.	604532		

CONSTRUCTION PLANS & IMPACT DETAILS



IMPACT LEGEND	
AREA	DESCRIPTION
	COMPENSATORY FLOOD STORAGE
	FLOODWAY IMPACTS
	TEMPORARY LAND UNDER WATER IMPACTS
	PERMANENT LAND UNDER WATER IMPACTS
	PERMANENT WETLAND IMPACTS
	TEMPORARY WETLAND IMPACTS

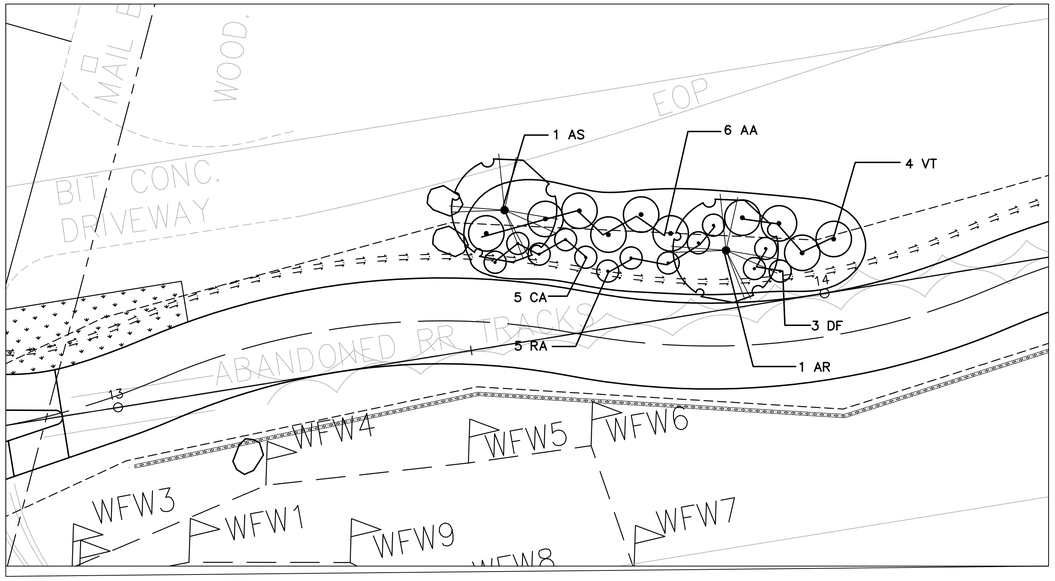
10031_2A_CO_ENF.DWG Plotted on 18-Mar-2014 2:00 PM

BRUCE FREEMAN RAIL TRAIL PHASE 2A
WESTFORD, CARLISLE & ACTON

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED: AID	75	158
PROJECT FILE NO.	604532		

LANDSCAPING PLANS AND DETAILS

10031_2A_LS.DWG 11-Mar-2014



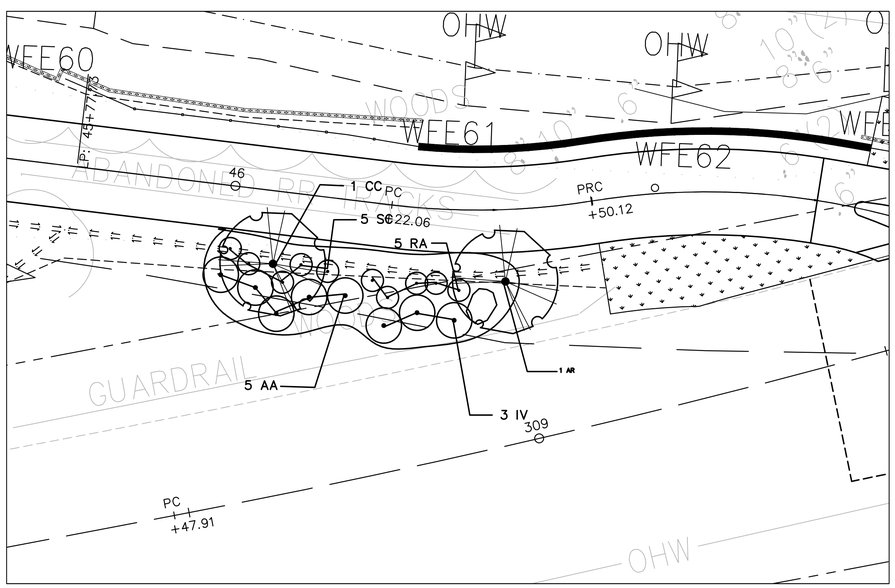
LANDSCAPING DETAIL 1

SCALE: 1" = 10'

PLANT LIST				
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	4	VIBURNUM TRILOBUM	CRANBERRY BUSH – AMERICAN	3' – 4 HT
CA	9	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	24"–30" HT
IVM	1	ILEX VERTICILLATA	WINTERBERRY – MALE	24"–30" HT
IVF	2	ILEX VERTICILLATA	WINTERBERRY – FEMALE	24"–30" HT
SC	5	SYMPHORICARPOS XCHENAULTI	CORALBERRY SHRUB – CHENAULT	24"–30" HT
DF	3	FOTHERGILLA GARDENII	FOTHERGILLA – DWARF	18" – 24"
RA	12	RHUS AROMATICA 'GROW LOW'	GROW LOW FRAGRANT SUMAC	18" – 24"
AA	18	ARONIA ARBUTIFOLIA 'BRILLIANTISSIMA'	BRILLIANTISSIMA CHOKEBERRY	18" – 24"
TREES				
CC	1	CERCIS CANADENSIS	EASTERN REDBUD	8'–10' MULTI–STEM
AR	2	ACER RUBRA 'OCTOBER GLORY'	RED MAPLE	3"–3.5" cal
AS	2	AMELANCHIER 'ROBIN HILL'	ROBIN HILL SERVICEBERRY	3"–3.5" cal

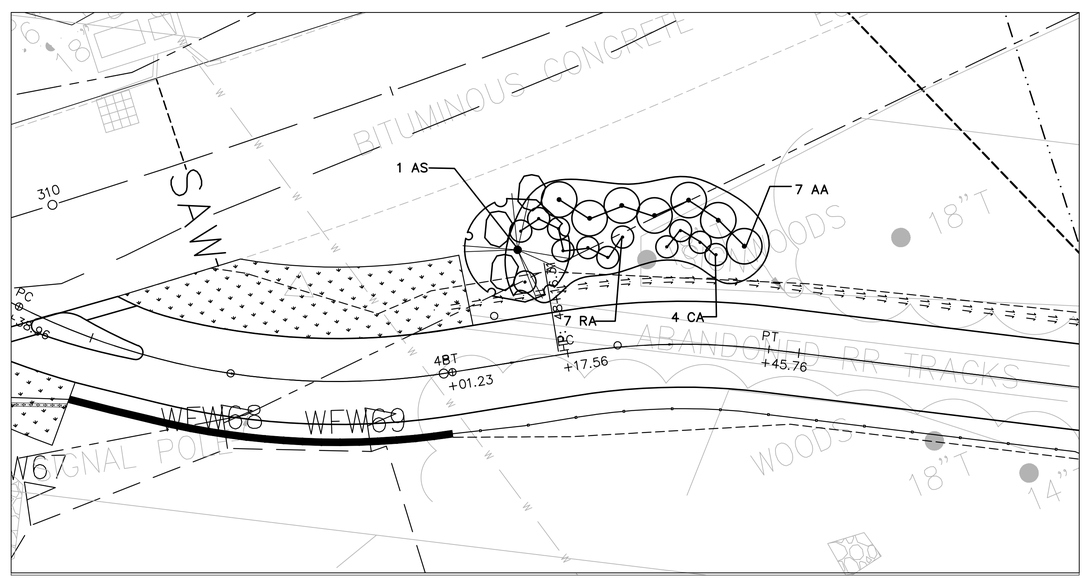
NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.



LANDSCAPING DETAIL 2

SCALE: 1" = 10'



LANDSCAPING DETAIL 3

SCALE: 1" = 10'

MassDOT DWT Version:

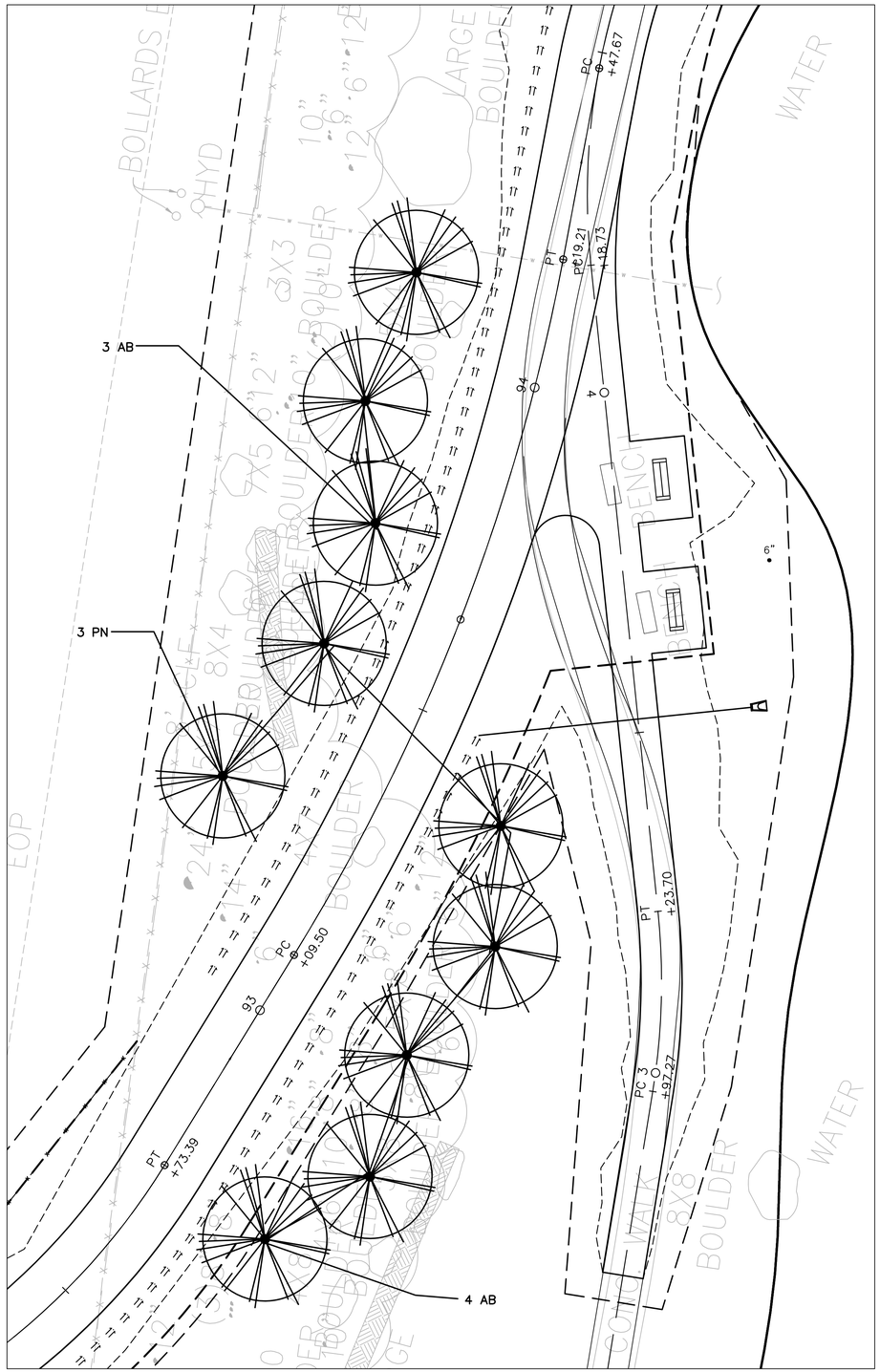
BRUCE FREEMAN RAIL TRAIL PHASE 2A
WESTFORD, CARLISLE & ACTON

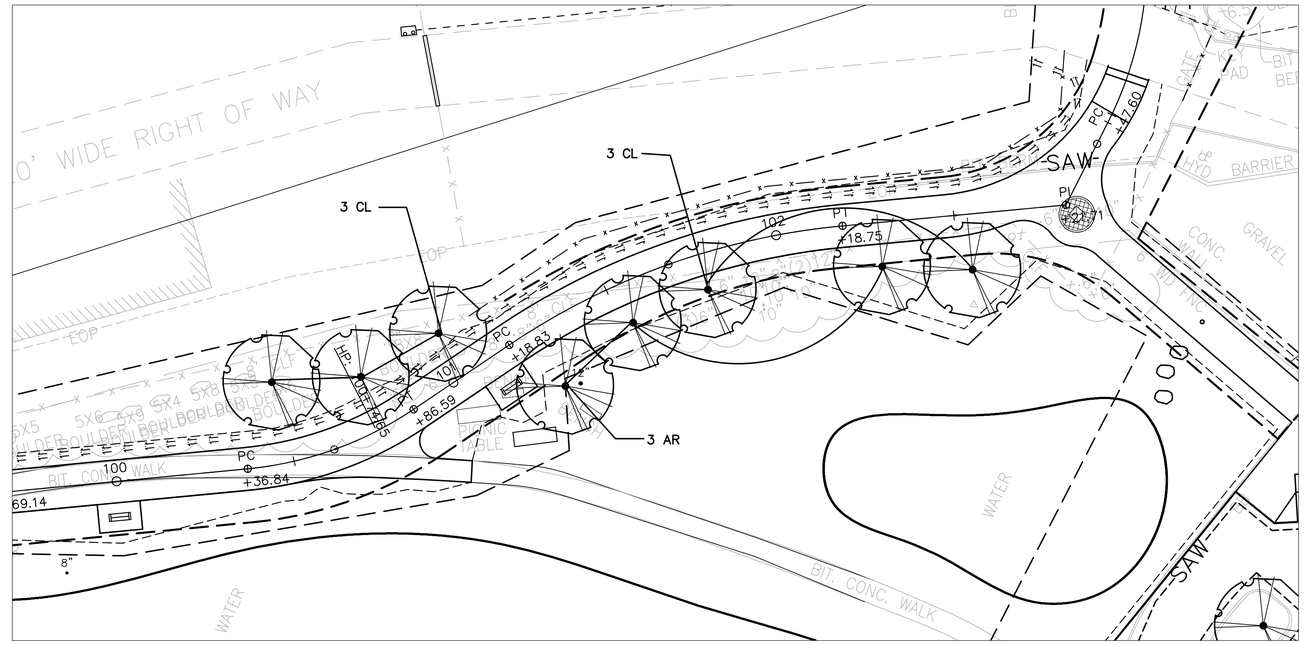
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	76	158
PROJECT FILE NO.	604532		

LANDSCAPING PLANS AND DETAILS

LANDSCAPING DETAIL 4

SCALE: 1" = 10'





LANDSCAPING DETAIL 5

SCALE: 1" = 20'

PLANT LIST				
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
TREES				
CL	6	CLADRASTIS LUTEA	YELLOWWOOD	3"–3.5" cal
AR	3	ACER RUBRA 'OCTOBER GLORY'	RED MAPLE	3"–3.5" cal
PN	3	PINUS STROBUS	EASTERN WHITE PINE	8'–10' HT
AB	7	ABIES BALSAMEA PHANEROLEPIS	CANAAN FIR	8'–10' HT

GRAPHIC SCALE
0 5 10 15 20 30 FEET

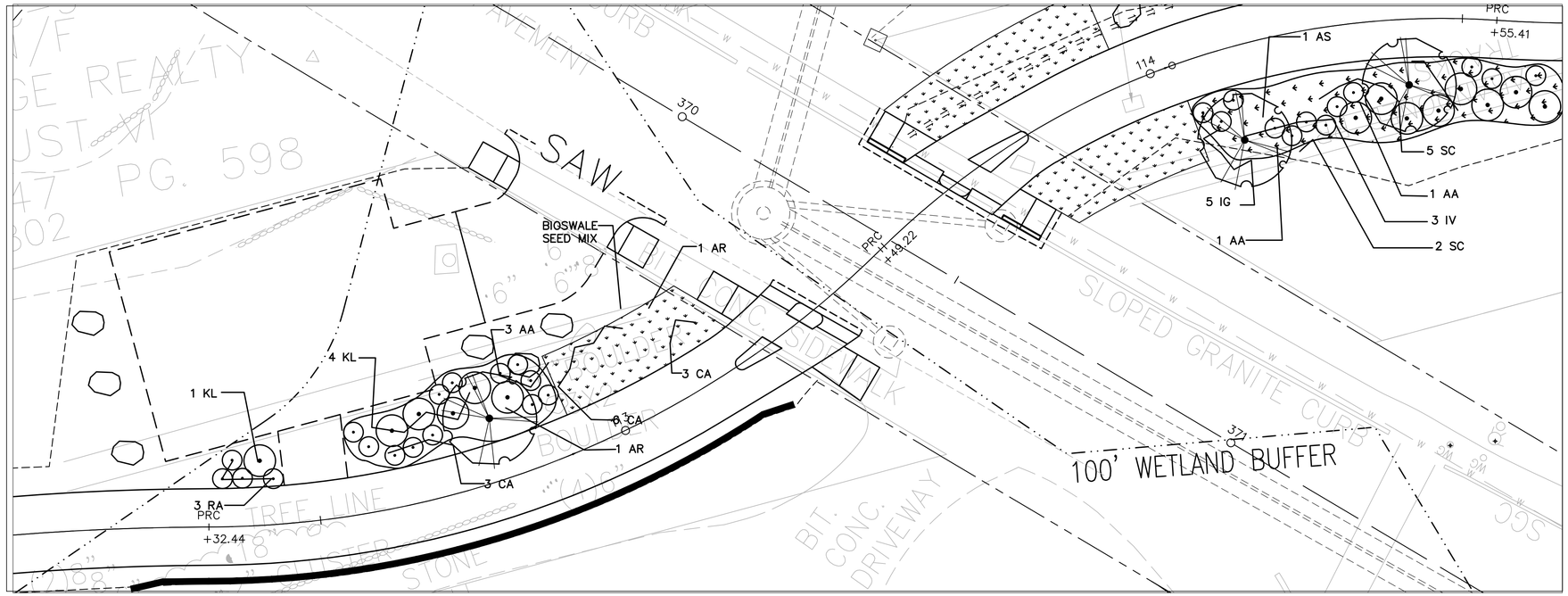
MassDOT DWT Version:

BRUCE FREEMAN RAIL TRAIL PHASE 2A
WESTFORD, CARLISLE & ACTON

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	77	158
PROJECT FILE NO.	604532		

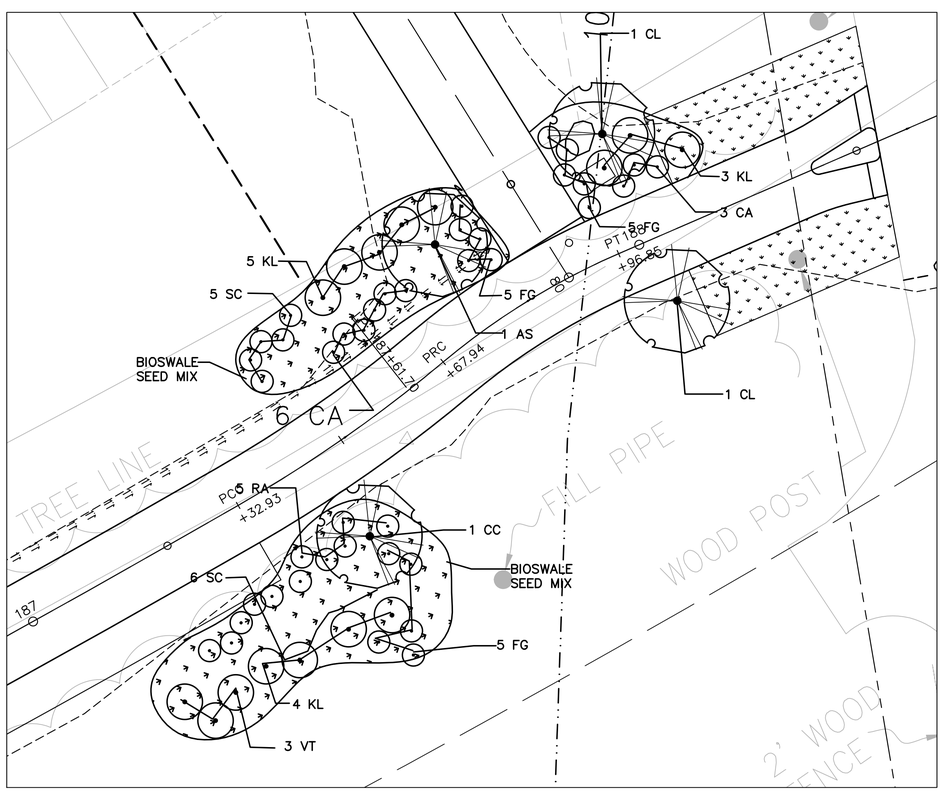
LANDSCAPING PLANS AND DETAILS

10031_2A_LS.DWG 11-Mar-2014



LANDSCAPING DETAIL 6

SCALE: 1" = 10'



LANDSCAPING DETAIL 7

SCALE: 1" = 10'

BIOSWALE SEED MIX

VIRGINIA WILD RYE, (ELYMUS VIRGINICUS)
CREEPING RED FESCUE, (FESTUCA RUBRA)
LITTLE BLUESTEM,(SCHIZACHYRIUM SCOPARIUM)
BIG BLUESTEM, (ANDROPOGON GERARDII)
FOX SEDGE, (CAREX VULPINOIDEA)
SWITCH GRASS, (PANICUM VIRGATUM)
ROUGH BENTGRASS, (AGROSTIS SCABRA)
NEW ENGLAND ASTER, (ASTER NOVAE–ANGLIAE)
BONESET, (EUPATORIUM PERFOLIATUM)
GRASS LEAVED GOLDENROD, (EUTHAMIA GRAMINIFOLIA)
GREEN BULRUSH, (SCIRPUS ATROVIRENS)
BLUE VERVAIN, (VERBENA HASTATA)
SOFT RUSH, (JUNCUS EFFUSUS)
WOOL GRASS, (SCIRPUS CYPERINUS)

NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.

PLANT LIST

SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	3	VIBURNUM TRILOBUM	CRANBERRY BUSH – AMERICAN	2 – 3 FEET
CA	15	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	2 – 3 FEET
KL	17	KLAMIA LATIFOLIA	MOUNTAIN IAUREL	24 – 30 INCH
IVF	3	ILEX VERTICILLATA	WINTERBERRY – FEMALE	24 – 30 INCH
IG	5	ILEX GLABRA 'COMPACTA'	INKBERRY – COMPACT	24 – 30 INCH
SC	13	SYMPHORICARPOS XCHENAULTI	CORALBERRY SHRUB – CHENAULT	2 – 3 FEET
FG	15	FOTHERGILLA GARDENII	FOTHERGILLA – DWARF	18 – 24 INCH
RA	12	RHUS AROMATICA 'GROW LOW'	GROW LOW FRAGRANT SUMAC	18 – 24 INCH
AA	5	ARONIA ARBUTIFOLIA 'BRILLIANTISSIMA'	BRILLIANTISSIMA CHOKEBERRY	18 – 24 INCH
TREES				
CC	1	CERCIS CANADENSIS	EASTERN REDBUD	8'–10' MULTI–STEM
AR	2	ACER RUBRA 'OCTOBER GLORY'	RED MAPLE	3"–3.5" cal
AS	1	AMELANCHIER 'ROBIN HILL'	ROBIN HILL SERVICEBERRY	3"–3.5" cal
CL	2	CLADRASTIS LUTEA	YELLOWWOOD	3"–3.5" cal

MassDOT DWT Version:

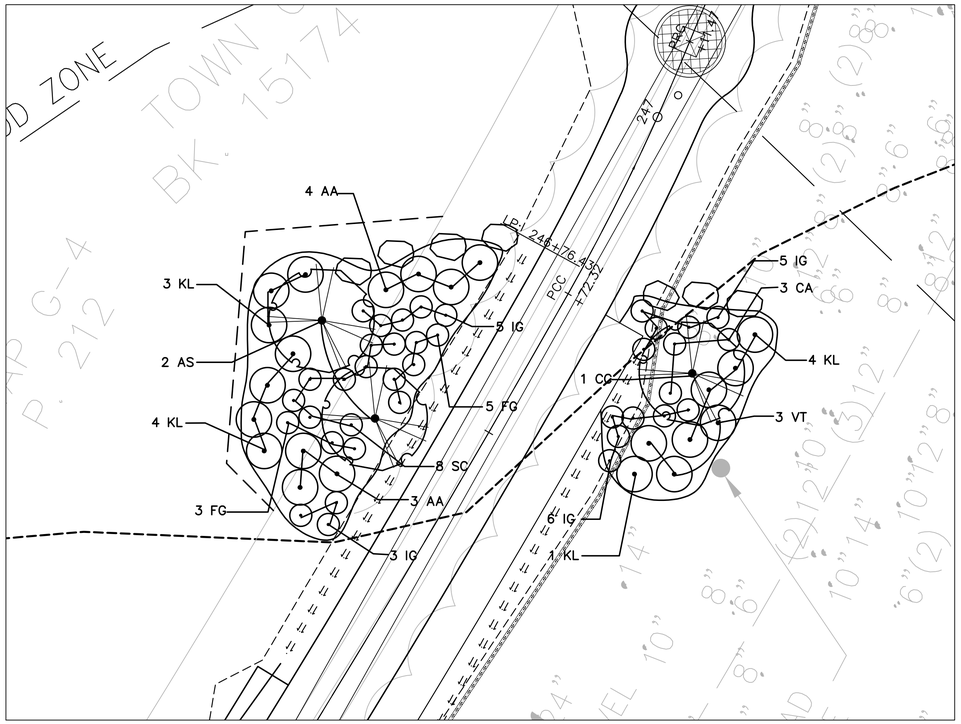
BRUCE FREEMAN RAIL TRAIL PHASE 2A
WESTFORD, CARLISLE & ACTON

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	78	158
PROJECT FILE NO.	604532		

LANDSCAPING PLANS AND DETAILS

NOTES:

1. LOCATIONS FOR PROPOSED TREES ARE APPROXIMATE ONLY. THE TOWN ENGINEER (OR OTHER TOWN REPRESENTATIVE DESIGNATED BY THE TOWN ENGINEER) SHALL APPROVE FINAL LOCATION OF TREES IN THE FIELD IN COORDINATION WITH THE ENGINEER.



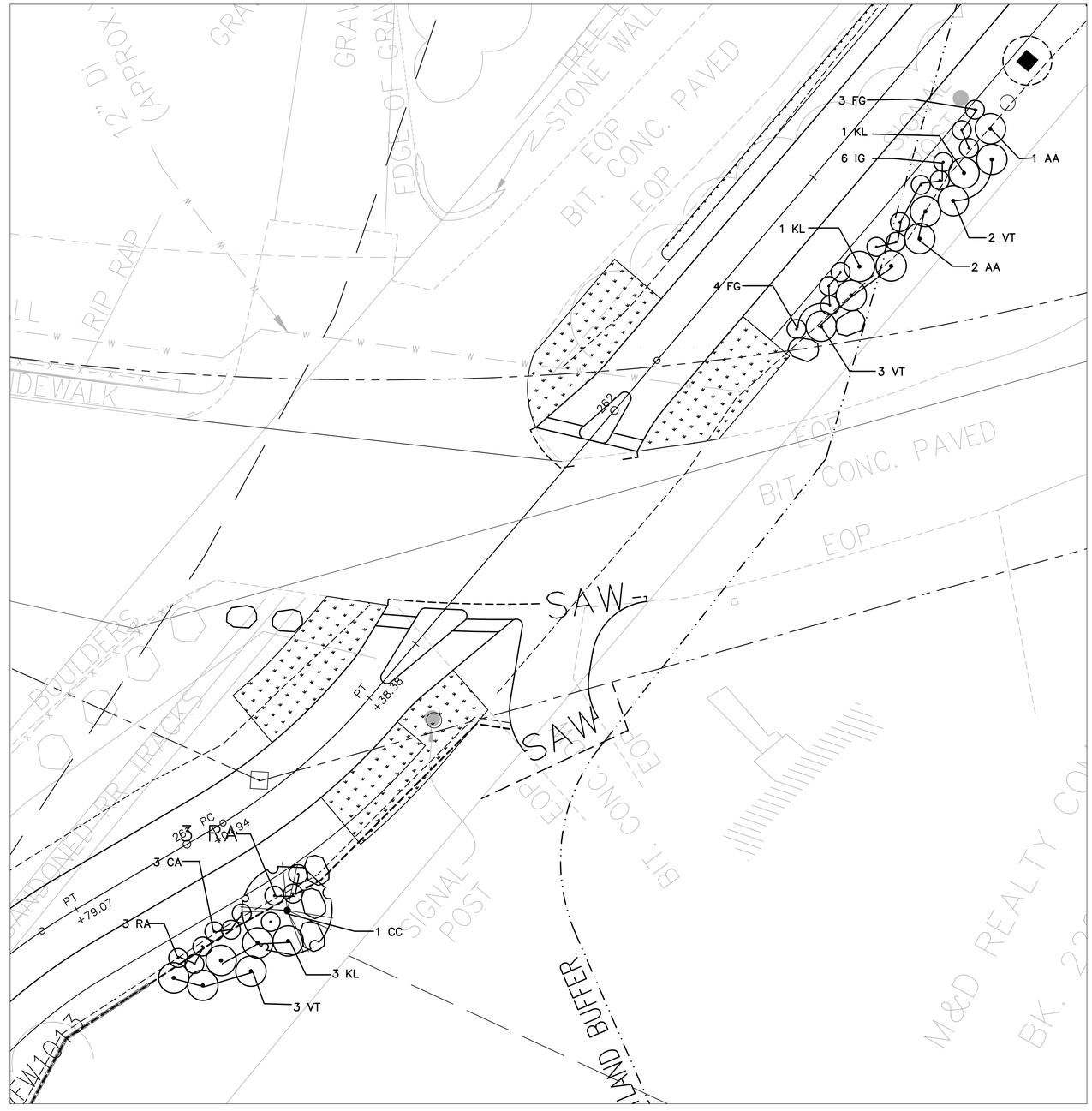
LANDSCAPING DETAIL 8

SCALE: 1" = 10'

PLANT LIST				
SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SIZE
SHRUBS				
VT	11	VIBURNUM TRILOBUM	CRANBERRY BUSH – AMERICAN	2 – 3 FEET
CA	6	CLETHRA ALNIFOLIA	SUMMERSWEET SHRUB	2 – 3 FEET
KL	17	KLAMIA LATIFOLIA	MOUNTAIN IAUREL	24 – 30 INCH
IG	25	ILEX GLABRA 'COMPACTA'	INKBERRY – COMPACT	24 – 30 INCH
SC	8	SYMPHORICARPOS XCHENAULTI	CORALBERRY SHRUB – CHENAULT	2 – 3 FEET
FG	15	FOTHERGILLA GARDENII	FOTHERGILLA – DWARF	18 – 24 INCH
RA	6	RHUS AROMATICA 'GROW LOW'	GROW LOW FRAGRANT SUMAC	18 – 24 INCH
AA	10	ARONIA ARBUTIFOLIA 'BRILLIANTISSIMA'	BRILLIANTISSIMA CHOKEBERRY	18 – 24 INCH
TREES				
CC	3	CERCIS CANADENSIS	EASTERN REDBUD	8'–10' MULTI–STEM

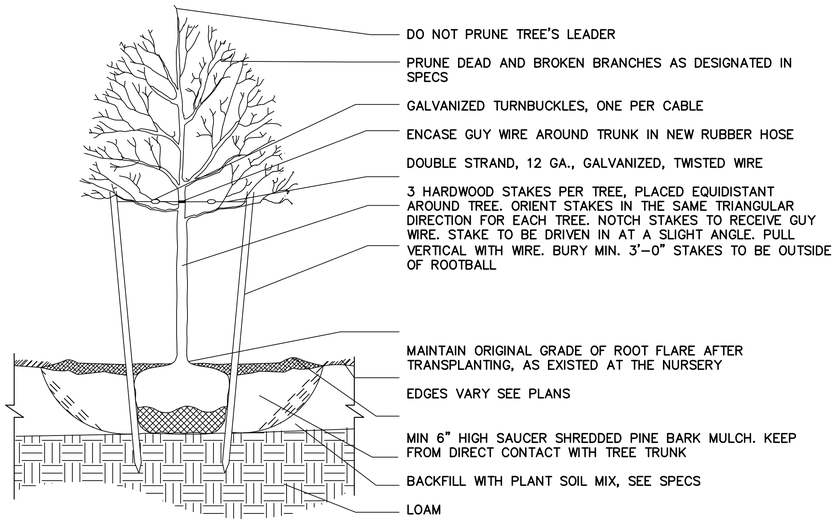
LANDSCAPING DETAIL 9

SCALE: 1" = 10'

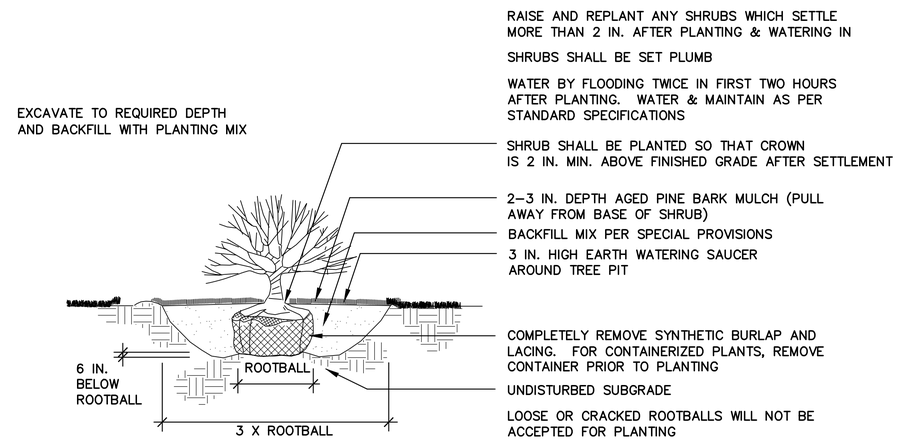


10031_2A_LS.DWG 11-Mar-2014

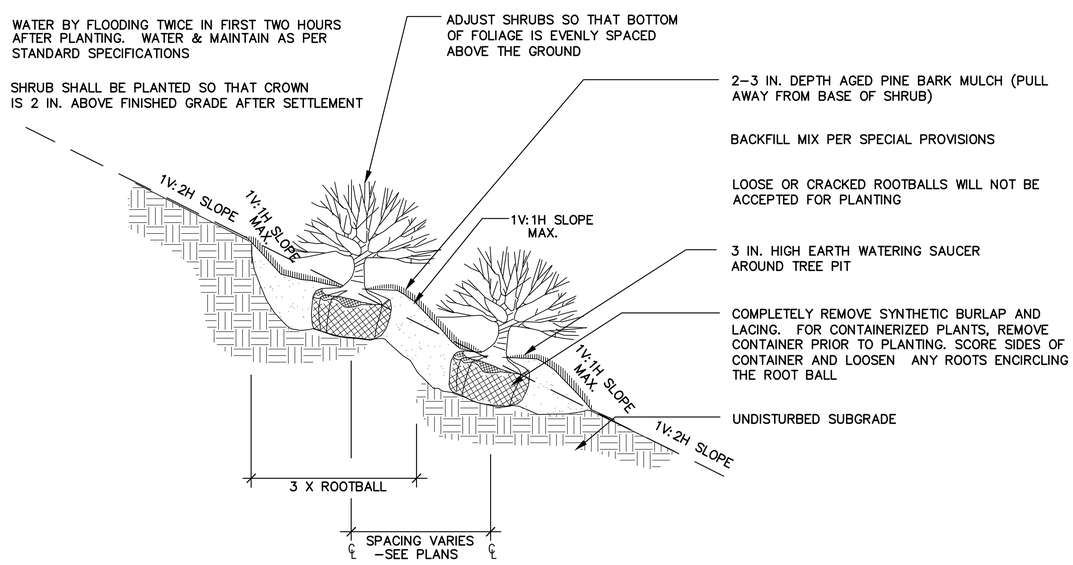
MassDOT DWT Version:



TREE
NOT TO SCALE



SHRUB PLANTING
NOT TO SCALE

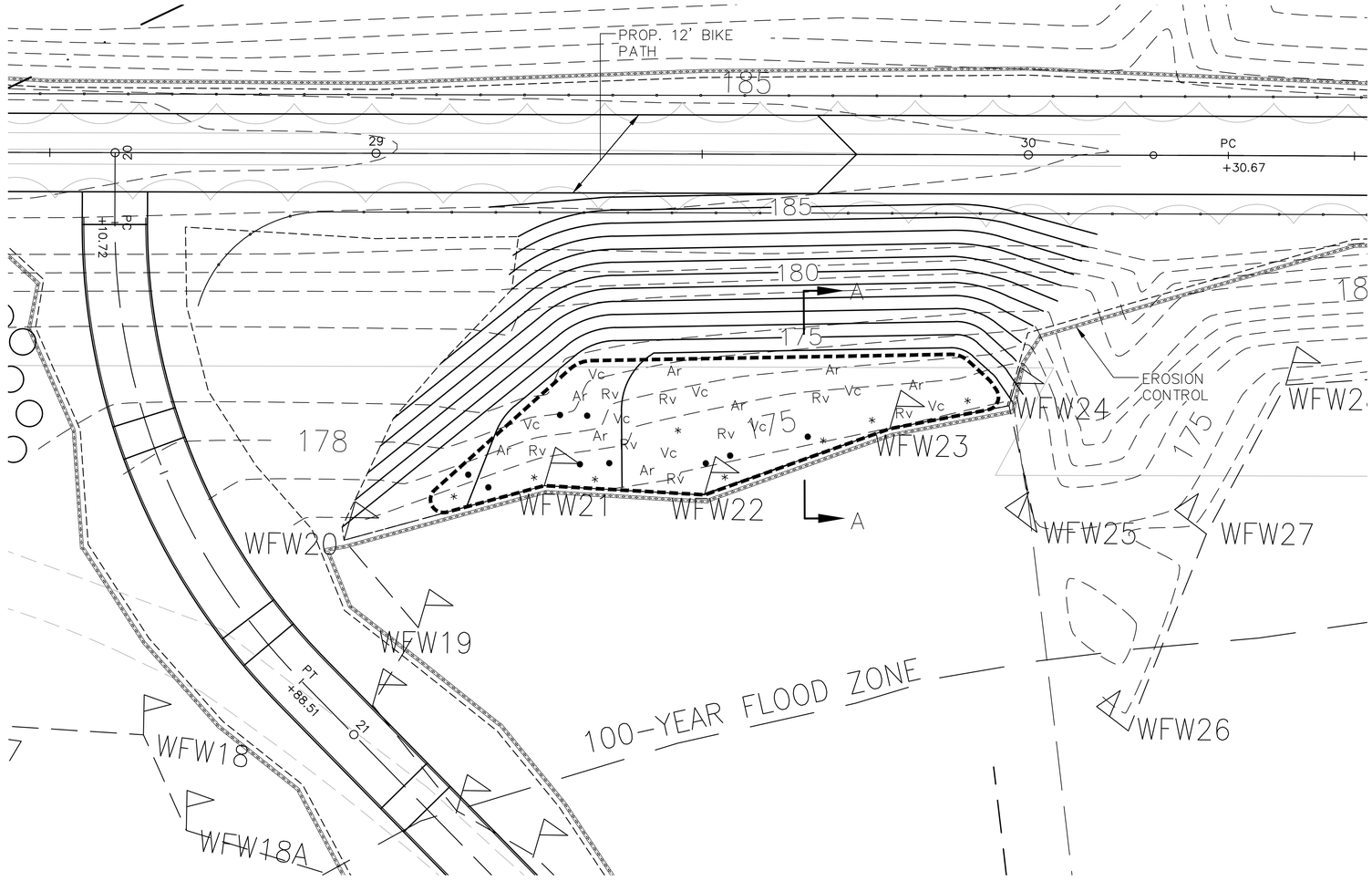


CONTAINERIZED SHRUB PLANTING (SLOPE)
NOT TO SCALE

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

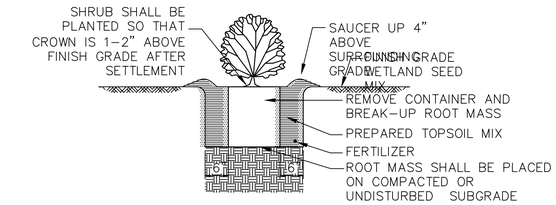
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	80	158
PROJECT FILE NO. 604532			

WETLAND REPLICATION PLANS



10 0 10 20
SCALE 1" = 10'

PLANTING PLAN



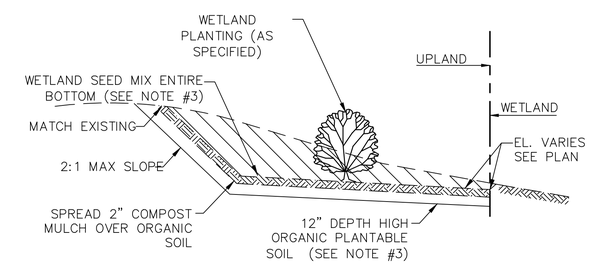
1.) PREPARED TOPSOIL MIX SHALL CONSIST OF HIGH ORGANIC SOIL WITH NO LESS THAN 10% ORGANIC MATTER.

2.) ALL PLANTS SHALL BE FLOODED WITH WATER TWICE WITHIN THE FIRST TWENTY–FOUR HOUR PERIOD AFTER PLANTING.

SHRUB PLANTING DETAIL
NOT TO SCALE

PLANTING NOTES

	DIAMETER	DEPTH
SHRUBS B&B	BALL + 1'–0" MIN	BALL DEPTH
CONTAINER GROWN MATERIAL	CONT. DIA. + 1'–0" MIN	CONT. DEPTH



SECTION A–A OF
WETLAND REPLICATION AREA
N.T.S.

PLANTING SPECIFICATIONS

SYMBOL	SCIENTIFIC NAME	COMMON NAME	QTY
Ar	ACER RUBRUM	RED MAPLE	8
Vc	VACCCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	8
Rv	RHODODENDRON VISCOSUM	SWAMP AZALEA	8
•	OSMUNDA CINNAMOMEA	CINNAMON FERN	9
*	ONOCLEA SENSIBILIS	SENSITIVE FERN	9

WETLAND SEED MIX

SCIENTIFIC NAME	COMMON NAME	%
CAREX VULPINOIDEA	FOX SEDGE	25
ELYMUS VIRGINICUS	VIRGINIA WILDRYE	25
CAREX LUPULINA	HOP SEDGE	12
CAREX COMOSA	BRISTLY SEDGE	6
VERBENA HASTATA	BLUE VERVAIN	6
JUNCUS EFFUSUS	SOFT RUSH	6
ASTER NOVAE–ANGLIAE	NEW ENGLAND ASTER	4
SCIRPUS ATROVIRENS	GREEN BULRUSH	4
SCIRPUS CYPERINUS	WOOLGRASS	4
EUPATORIUM PERFOLIATUM	BONESET	2
EUPATORIUM MACULATUM	SPOTTED JOE PYE WEED	2
EUTHAMIA GRAMINIFOLIA (SOLIDAGO G)	GRASSLEAF GOLDENROD	2
GLYCERIA GRANDIS	AMERICAN MANNA GRASS	2
	TOTAL	100

NOTES:

1. FOR LOCATION , SEE CONSTRUCTION PLANS
2. FOR WETLAND SECTIONS A–A, SEE THIS DWG.
3. MITIGATION AREA SHALL BE TREATED WITH TWELVE (12") INCHES OF HIGH ORGANIC GRANULAR TOPSOIL, 2" COMPOST TOPSOIL AND SEEDED WITH A MANUFACTURED WETLAND SEED MIX APPLIED AT A RATE OF 0.5 LB./1,000 S.F.

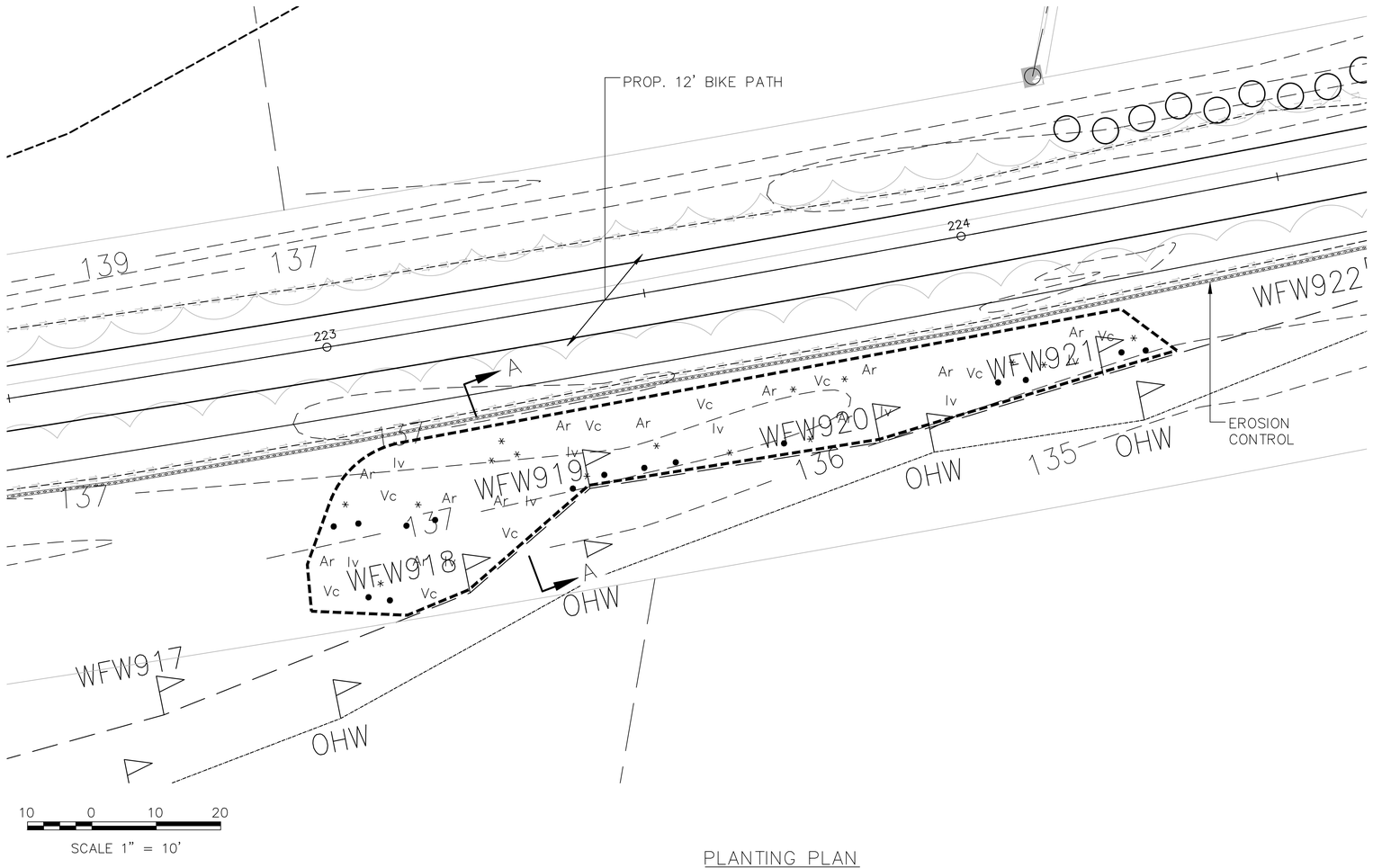
0 20 50 100
SCALE: 1" = 20'

10031_2A_WET.DWG Plotted on 11–Mar–2014 6:23 PM

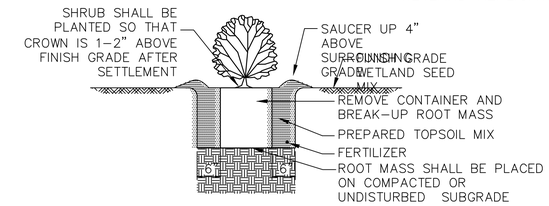
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	81	158
PROJECT FILE NO. 604532			

WETLAND REPLICATION PLANS



PLANTING PLAN



1.) PREPARED TOPSOIL MIX SHALL CONSIST OF HIGH ORGANIC SOIL WITH NO LESS THAN 10% ORGANIC MATTER.

2.) ALL PLANTS SHALL BE FLOODED WITH WATER TWICE WITHIN THE FIRST TWENTY–FOUR HOUR PERIOD AFTER PLANTING.

SHRUB PLANTING DETAIL
NOT TO SCALE

PLANTING NOTES

	DIAMETER	DEPTH
SHRUBS B&B	BALL + 1'–0" MIN	BALL DEPTH
CONTAINER GROWN MATERIAL	CONT. DIA. + 1'–0" MIN	CONT. DEPTH

PLANTING SPECIFICATIONS

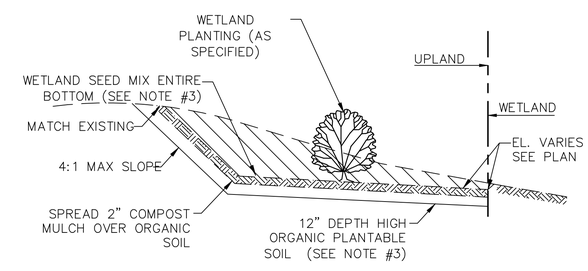
SYMBOL	SCIENTIFIC NAME	COMMON NAME	QTY
Ar	ACER RUBRUM	RED MAPLE	12
Vc	VACCCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	9
Iv	ILEX VERTICILLATA	WINTERBERRY	9
•	OSMUNDA CINNAMOMEA	CINNAMON FERN	15
*	OSMUNDA REGALIS	ROYAL FERN	15

WETLAND SEED MIX

SCIENTIFIC NAME	COMMON NAME	%
CAREX VULPINOIDEA	FOX SEDGE	25
ELYMUS VIRGINICUS	VIRGINIA WILDRYE	25
CAREX LUPULINA	HOP SEDGE	12
CAREX COMOSA	BRISTLY SEDGE	6
VERBENA HASTATA	BLUE VERVAIN	6
JUNCUS EFFUSUS	SOFT RUSH	6
ASTER NOVAE–ANGLIAE	NEW ENGLAND ASTER	4
SCIRPUS ATROVIRENS	GREEN BULRUSH	4
SCIRPUS CYPERINUS	WOOLGRASS	4
EUPATORIUM PERFOLIATUM	BONESET	2
EUPATORIUM MACULATUM	SPOTTED JOE PYE WEED	2
EUTHAMIA GRAMINIFOLIA (SOLIDAGO G)	GRASSLEAF GOLDENROD	2
GLYCERIA GRANDIS	AMERICAN MANNA GRASS	2
	TOTAL	100

NOTES:

1. FOR LOCATION , SEE CONSTRUCTION PLANS
2. FOR WETLAND SECTIONS A–A, SEE THIS DWG.
3. MITIGATION AREA SHALL BE TREATED WITH TWELVE (12") INCHES OF HIGH ORGANIC GRANULAR TOPSOIL, 2" COMPOST TOPSOIL AND SEEDED WITH A MANUFACTURED WETLAND SEED MIX APPLIED AT A RATE OF 0.5 LB./1,000 S.F.



SECTION A–A OF
WETLAND REPLICATION AREA
N.T.S.

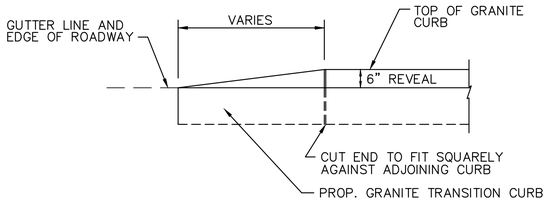
0 20 50 100
SCALE: 1" = 20'

10031_2A_WET.DWG Plotted on 11–Mar–2014 6:23 PM

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

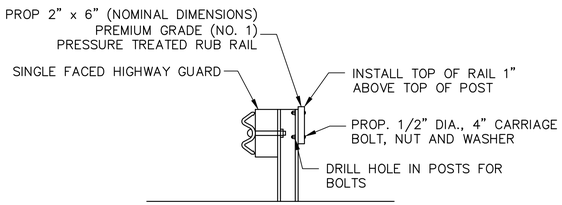
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	74	159
PROJECT FILE NO.	604532		

CONSTRUCTION DETAILS



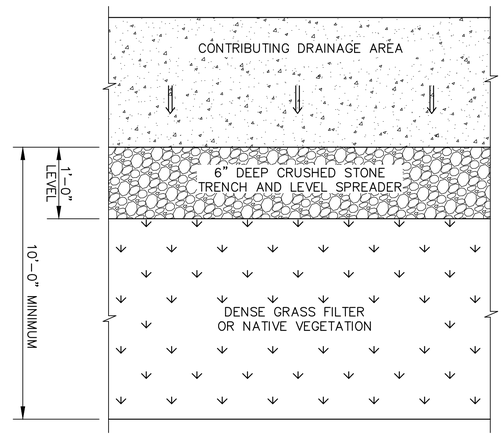
TRANSITION CURB DETAIL

(ITEM 509.)
TO BE USED AT ALL LOCATIONS WHERE
VERTICAL GRANITE CURB ENDS

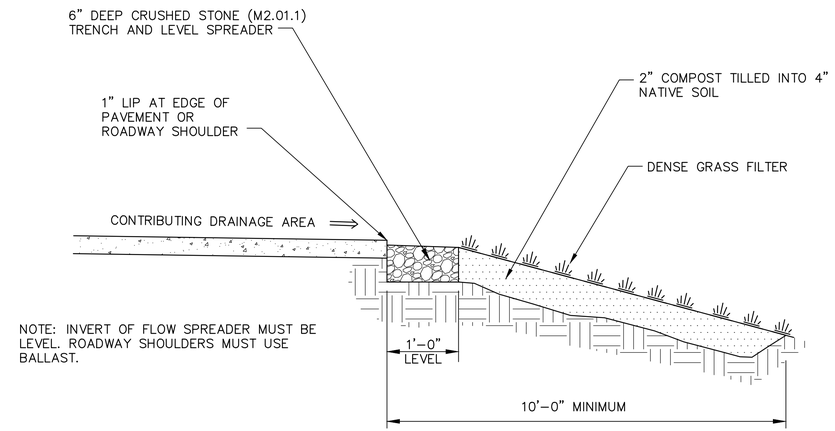


HIGHWAY GUARD W/TIMBER RUB RAIL

N.T.S.



PLAN

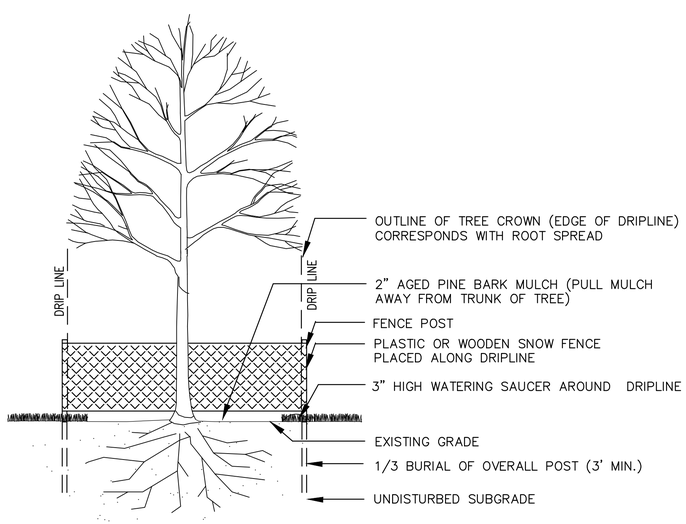


NOTE: INVERT OF FLOW SPREADER MUST BE LEVEL. ROADWAY SHOULDERS MUST USE BALLAST.

SECTION

FILTER STRIP DETAILS

N.T.S.



TREE PROTECTION

N.T.S.

CONSTRUCTION OF FILTER STRIP

SOIL AMENDMENT

1. 2" (MINIMUM) OF STABLE AND MATURE COMPOST SHALL BE PROVIDED FOR THE ENTIRE FILTER STRIP TREATMENT AREA TO AMEND THE TOPSOIL UNLESS THE SOIL ALREADY HAS AN ORGANIC CONTENT OF 5% OR GREATER. THE COMPOST MUST BE TILLED INTO THE UNDERLYING NATIVE SOIL TO A DEPTH OF 4" TO PREVENT WASHING OUT THE COMPOST AND AVOID CREATING A DEFINED LAYER OF DIFFERENT SOIL TYPES THAT CAN PREVENT DOWNWARD PERCOLATION OF WATER.
   a. COMPOST SHALL BE PER THE STANDARD SPECIFICATIONS

CONSTRUCTION CONSIDERATIONS

1. PROVIDE EROSION CONTROL BEFORE CONSTRUCTION–PHASE SEDIMENT ENTERS THE FILTER STRIP. COMPOST BERMS MAY BE USED FOR EROSION CONTROL DURING CONSTRUCTION OF THE FILTER STRIPS. FILTER STRIPS ARE DESIGNED TO HANDLE ONLY MODEST SEDIMENT LOADS WITHOUT FREQUENT MAINTENANCE.
2. FILTER STRIP MUST BE PROTECTED DURING CONSTRUCTION. IF CONSTRUCTION SEDIMENTS IMPACT FILTER STRIP, CONTRACTOR SHALL RECONSTRUCT FILTER STRIP AND RE–ESTABLISH VEGETATION OF THE STRIP TO THE SATISFACTION OF THE ENGINEER.
3. RUNOFF SHALL BE DIVERTED AROUND A FILTER STRIP UNTIL THE GRASS IS ESTABLISHED PER SPECIFICATIONS.

MAINTENANCE DURING CONSTRUCTION

1. IRRIGATION SHALL BE PROVIDED AS NECESSARY IN THE MONTHS FOLLOWING INITIAL FILTER STRIP CONSTRUCTION TO PREVENT THE FILTER STRIP GRASS FROM WILTING OR DYING.
2. IF WEEDS GROW TO A HEIGHT OF 12", THE CONTRACTOR SHALL MOW FOR WEED CONTROL.
3. THE CONTRACTOR SHALL MAINTAIN THE FILTER STRIP AT A HEIGHT OF 4" – 6" UNTIL ACCEPTANCE.

PLANTING REQUIREMENTS

1. GRASS SHALL BE ESTABLISHED THROUGHOUT THE ENTIRE TREATMENT AREA OF THE FILTER STRIP AS SPECIFIED IN THE SPECIAL PROVISIONS.
2. THE FOLLOWING PERMANENT EROSION–CONTROL GRASS SEED MIX SHALL BE APPLIED AT A RATE OF 25 LBS/AC IN FILTER STRIPS (PERCENTAGES ARE BY WEIGHT):
   - 20% BIG BLUESTEM
   - 15% CREEPING RED FESCUE
   - 10% LITTLE BLUESTEM
   - 10% CANADA WILD RYE
   - 10% VIRGINIA WILD RYE
   - 7% SWITCH GRASS
   - 7% PARTRIDGE PEA
   - 7% SHOWY TICK TREFOIL
   - 7% FRINGED BROME GRASS
   - 7% DEER TONGUE
3. ALTERNATE SEED MIX AND EROSION CONTROL MEASURES MAY BE USED IF RECOMMENDED BY THE EROSION CONTROL SPECIALIST AND APPROVED BY THE ENGINEER.
4. SEED MAY BE APPLIED BY HYDROSEEDING OR BROADCAST APPLICATION.
5. SEEDING PERIOD SHALL BE SPRING (MID–MARCH TO JUNE) OR FALL (LATE SEPTEMBER TO OCTOBER). IF SEED IS APPLIED IN THE SPRING OR SUMMER, PROVIDE IRRIGATION AS NECESSARY TO ENSURE GRASS SURVIVAL.

10031_2A_CD.DWG 25-Feb-2014

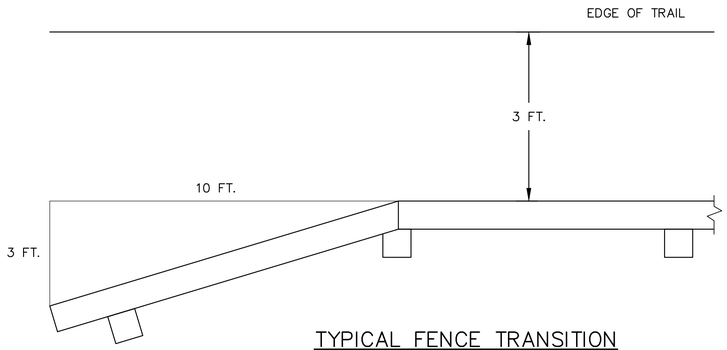
MassDOT DWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

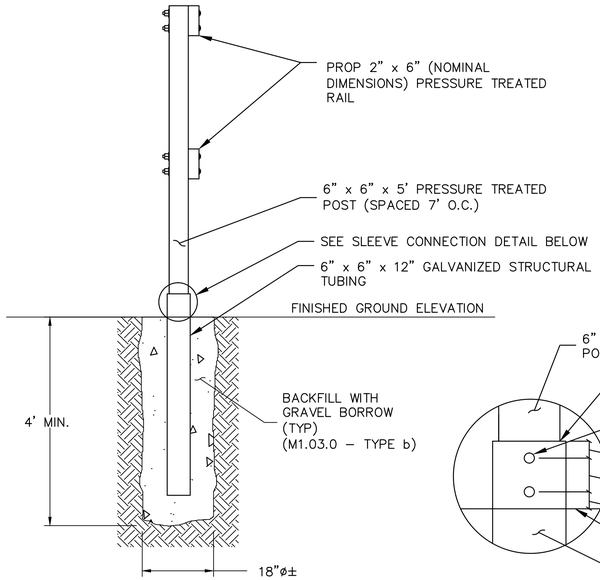
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	75	159
PROJECT FILE NO.	604532		

CONSTRUCTION DETAILS

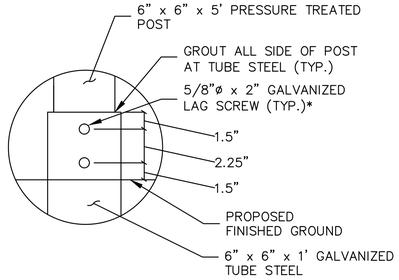
10031_2A_CD.DWG 25-Feb-2014



TYPICAL FENCE TRANSITION
AT FENCE APROACHES
N.T.S.

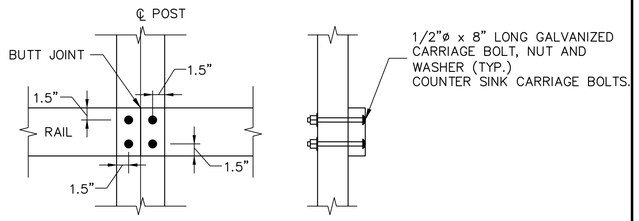


TIMBER RAIL FENCE
TUBE STEEL SLEEVE
N.T.S.
FOR USE IN SATURATED LOCATIONS

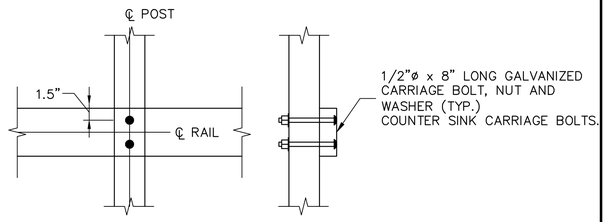


*SAME SCREWS OPPOSITE SIDE.

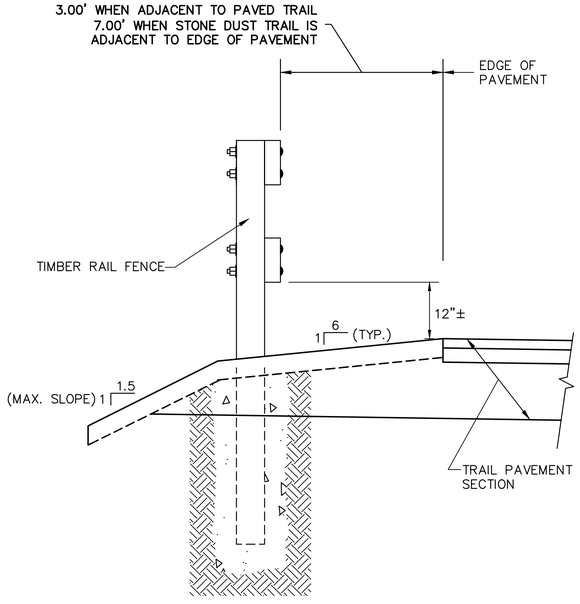
SLEEVE CONNECTION DETAIL
N.T.S.



ELEVATION SECTION
BUTT JOINT CONNECTION
N.T.S.



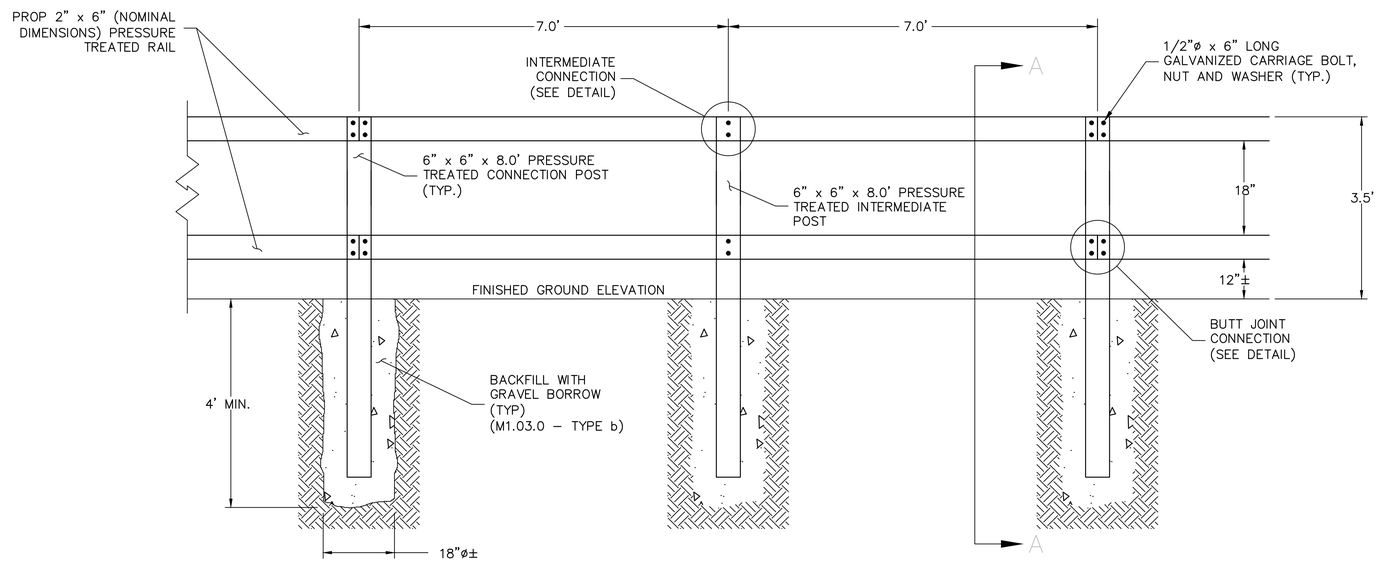
ELEVATION SECTION
INTERMEDIATE CONNECTION
N.T.S.



SECTION A–A

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

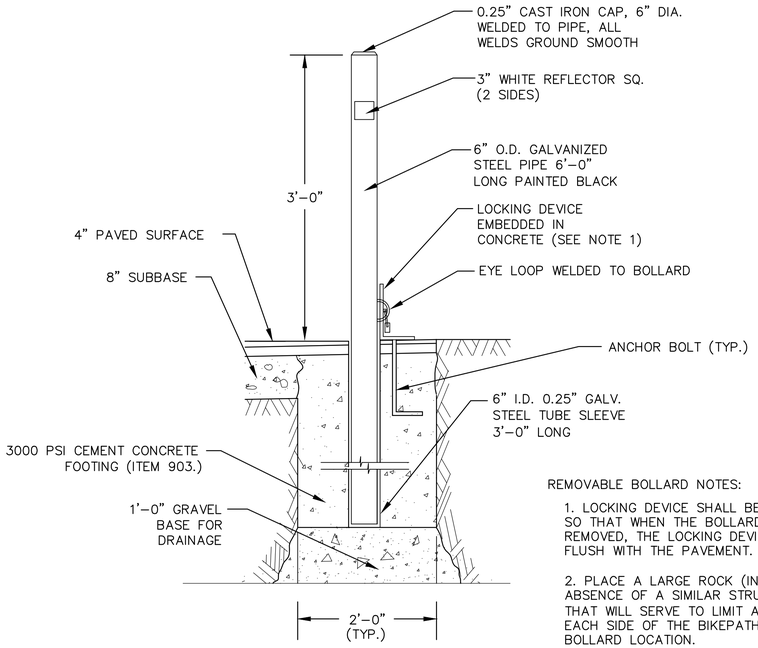
NOTE:
FOR RADII LESS THAN 165', USE CONNECTION POSTS SET AT 7.0' O.C. AND SHORTEN RAILS ACCORDINGLY.

MassDOT CWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	76	159
PROJECT FILE NO.	604532		

CONSTRUCTION DETAILS



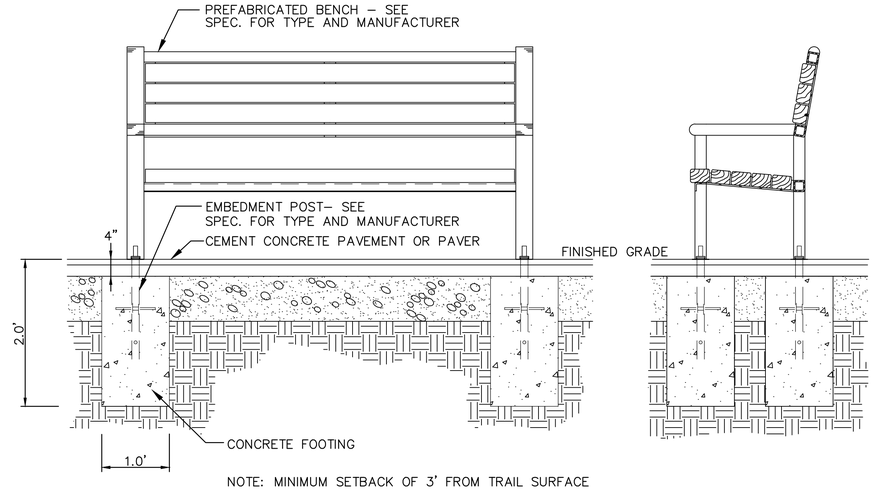
REMOVABLE BOLLARD NOTES:

1. LOCKING DEVICE SHALL BE HINGED SO THAT WHEN THE BOLLARD IS REMOVED, THE LOCKING DEVICE IS FLUSH WITH THE PAVEMENT.

2. PLACE A LARGE ROCK (IN THE ABSENCE OF A SIMILAR STRUCTURE THAT WILL SERVE TO LIMIT ACCESS) ON EACH SIDE OF THE BIKEPATH AT THE BOLLARD LOCATION.

REMOVABLE BOLLARD

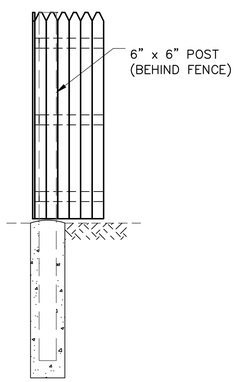
N.T.S.
SEE PLANS FOR LOCATIONS



NOTE: MINIMUM SETBACK OF 3' FROM TRAIL SURFACE

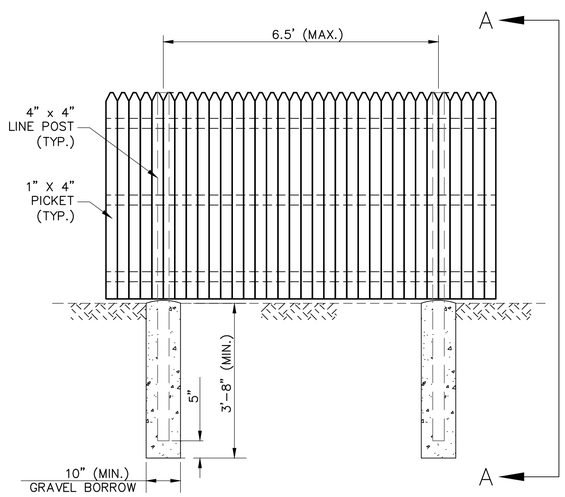
BENCH

N.T.S.



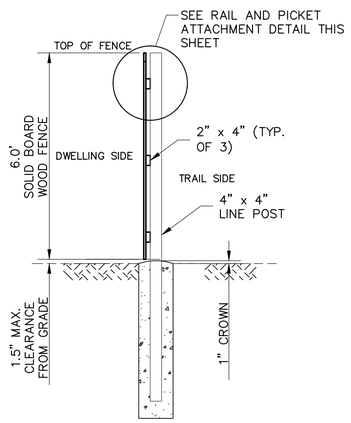
CORNER POST

SCALE: N.T.S.



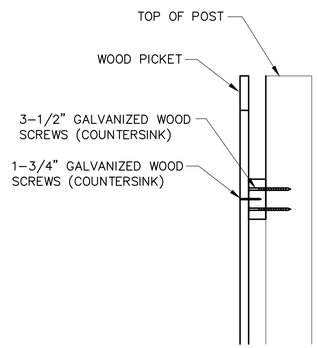
ELEVATION

SCALE: N.T.S.



SECTION A–A

SCALE: N.T.S.



RAIL AND PICKET ATTACHMENT DETAIL

SCALE: N.T.S.

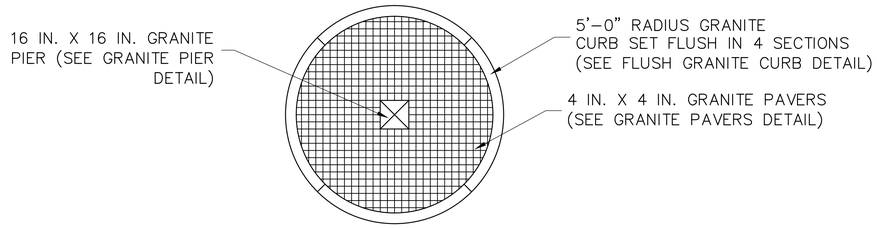
TYPICAL STOCKADE FENCING

1. ALL WOOD FENCE POSTS AND RAILS TO BE NO. 2 PINE PRESSURE TREATED LUMBER.
2. PICKETS TO BE 1" THICK CEDAR. CORNER AND GATE POSTS TO BE 6" X 6" NO. 2 PINE PRESSURE TREATED LUMBER.
3. LINE POSTS TO BE 4" X 4" NO. 2 PINE PRESSURE TREATED LUMBER.
4. ALL HARDWARE TO BE HOT DIP GALVANIZED.
5. PICKETS SHALL ALWAYS FACE DWELLINGS.

10031_2A_CD.DWG 25-Feb-2014

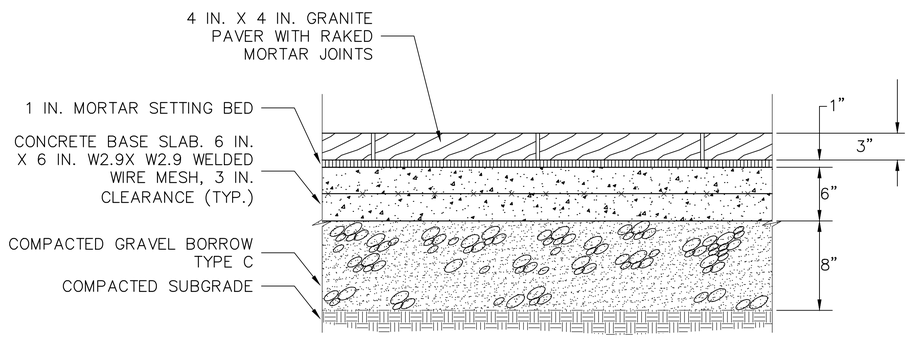
MassDOT CWT Version:

10031_2A_CD.DWG 25-Feb-2014



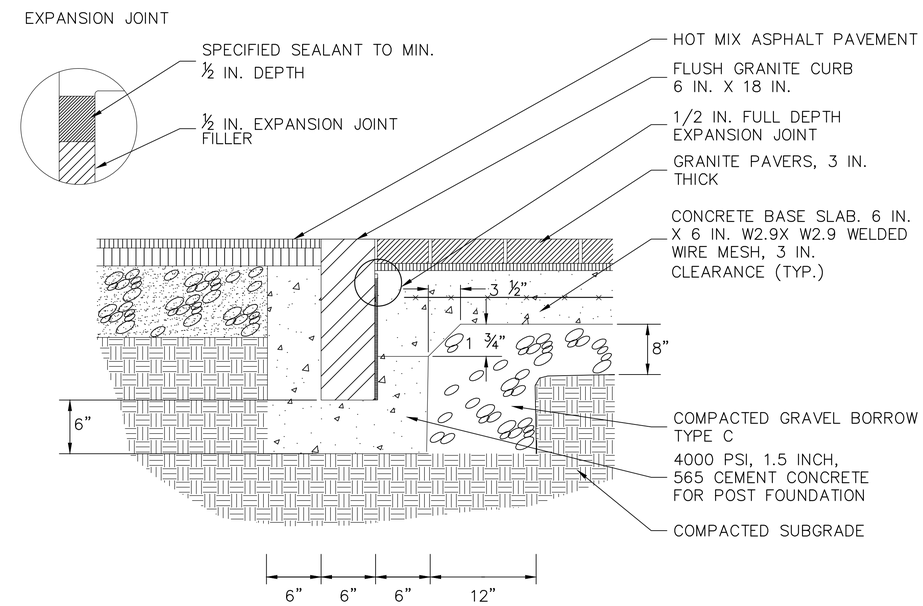
GRANITE PIER IN GRANITE CIRCLE

(PROP. AT STA. 103+21.71 & 247+11.24)
N.T.S.



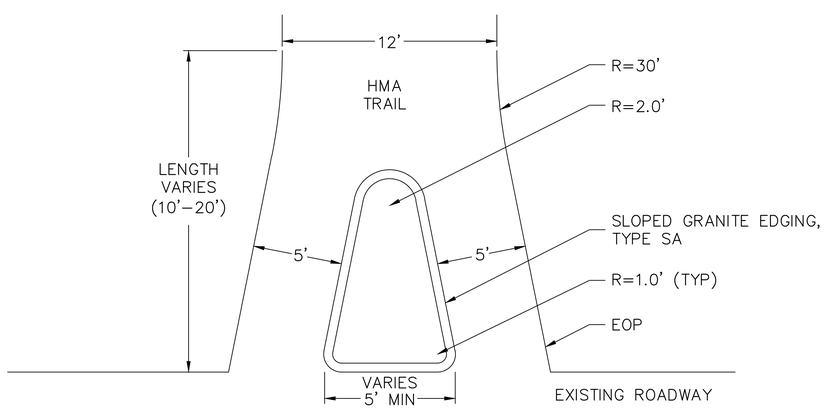
GRANITE PAVERS

N.T.S.



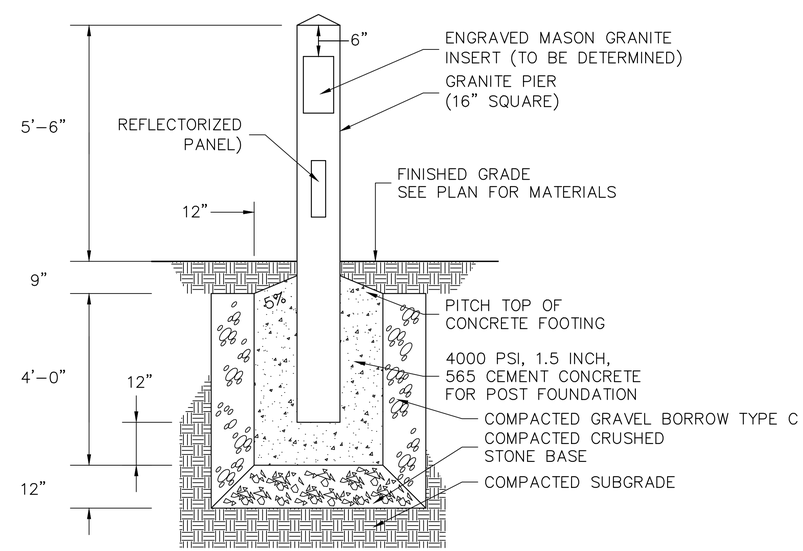
FLUSH GRANITE CURB

N.T.S.



STAMPED CONC. SPLITTER ISLAND

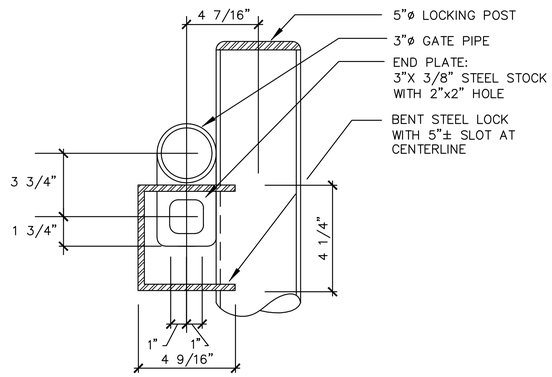
NTS



GRANITE PIER

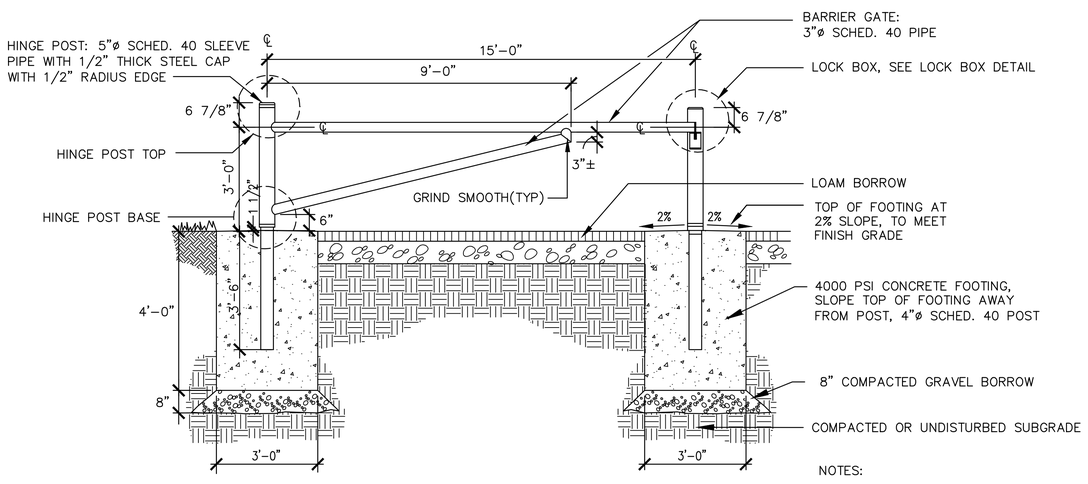
N.T.S.

10031_2A_CD.DWG 25-Feb-2014



LOCK BOX DETAIL

N.T.S.

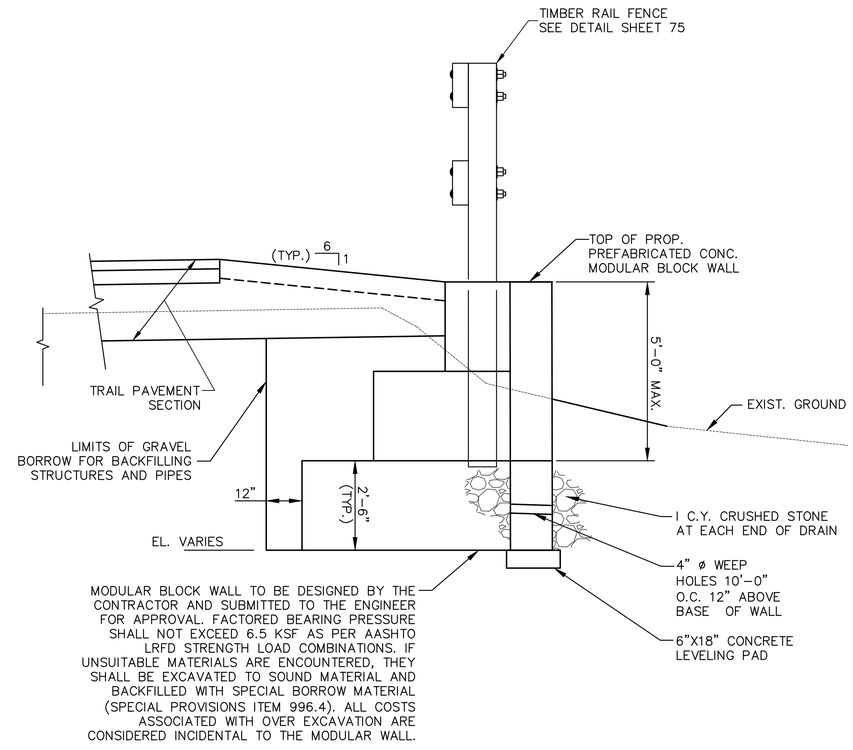


STEEL PIPE ACCESS GATE

N.T.S.

NOTES:

1. ALL STEEL SHALL BE GALVANIZED INSIDE AND OUT.
2. PROVIDE 1/2"ø WEEP HOLES AT WELDED CONNECTIONS (3 PLACES).
3. INSTALL BRASS BUSHINGS AFTER GALVANIZING.



MODULAR BLOCK WALL SECTION

NOT TO SCALE

MassDOT DWT Version:

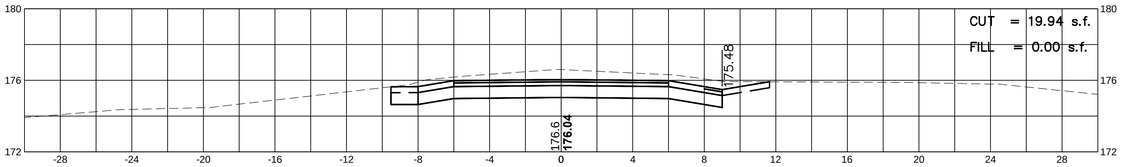
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	89	158
PROJECT FILE NO.	604532		

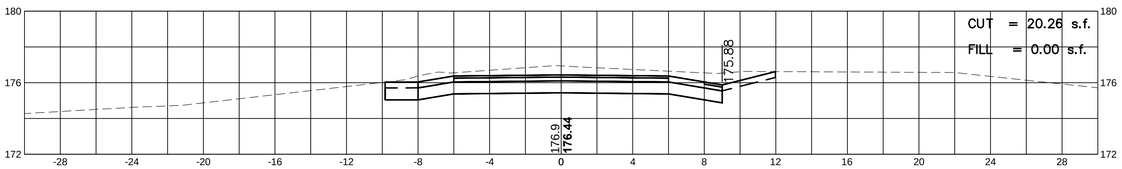
CROSS SECTIONS

10031_2A_XS.DWG 11-Mar-2014

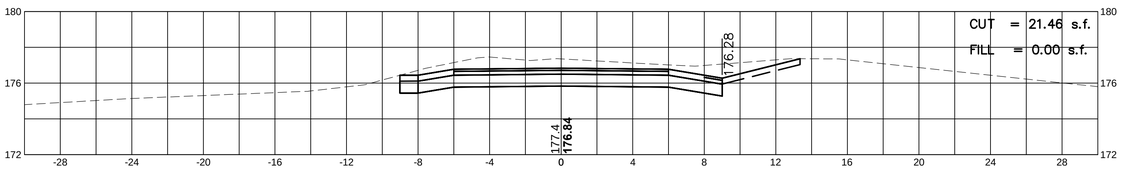
42+00



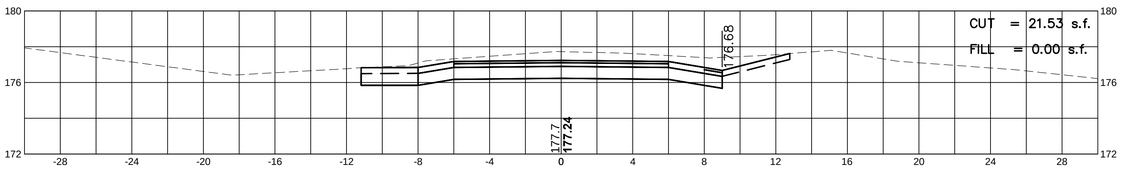
41+50



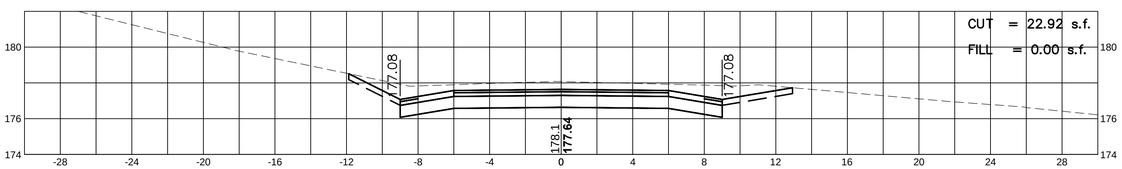
41+00



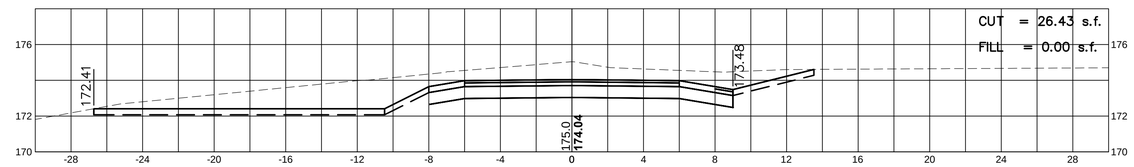
40+50



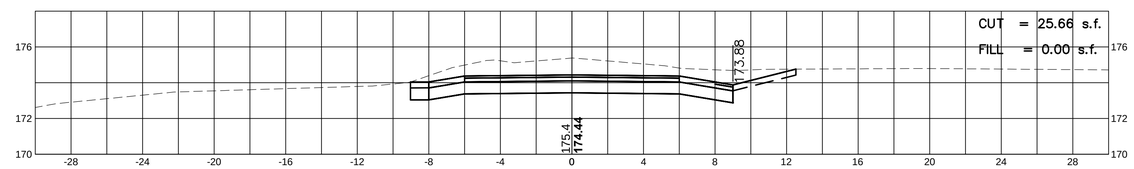
40+00



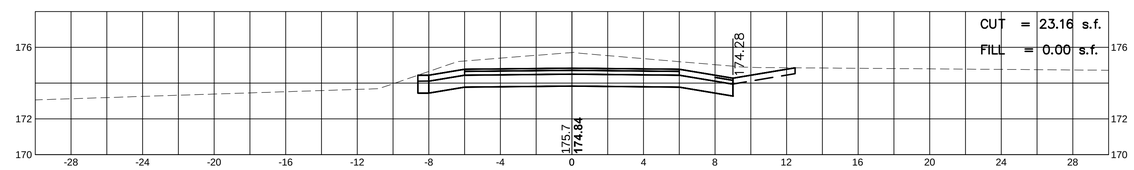
44+50



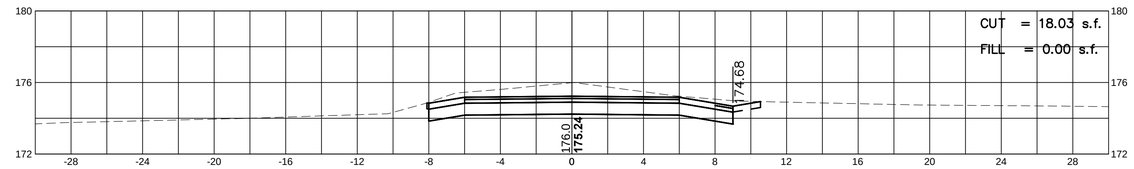
44+00



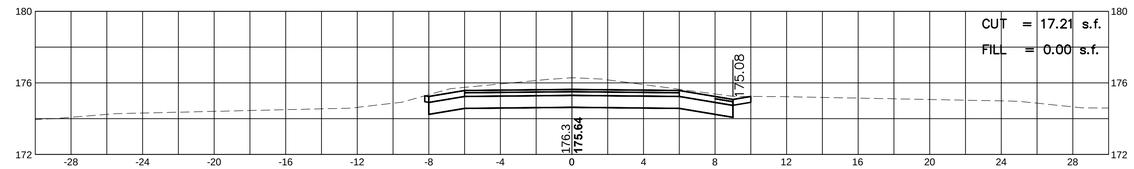
43+50



43+00



42+50



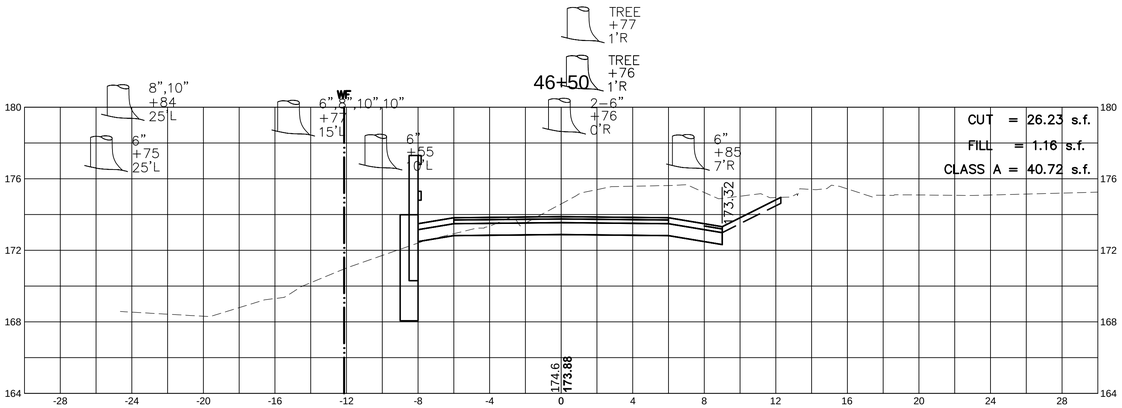
MassDOT CWT Version:

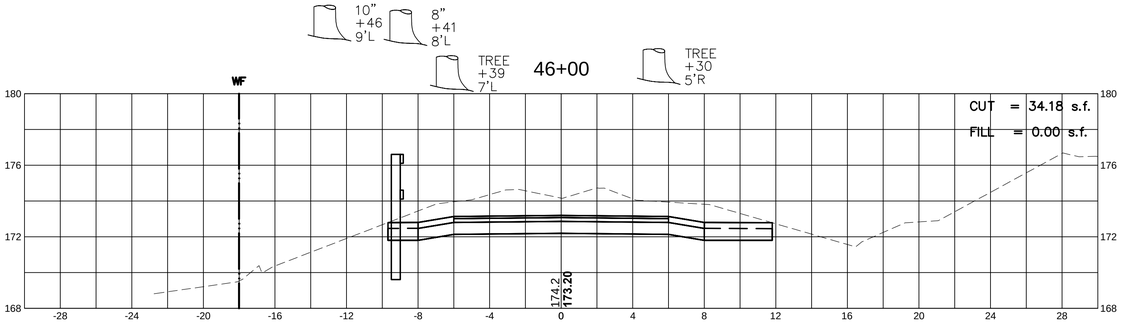
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

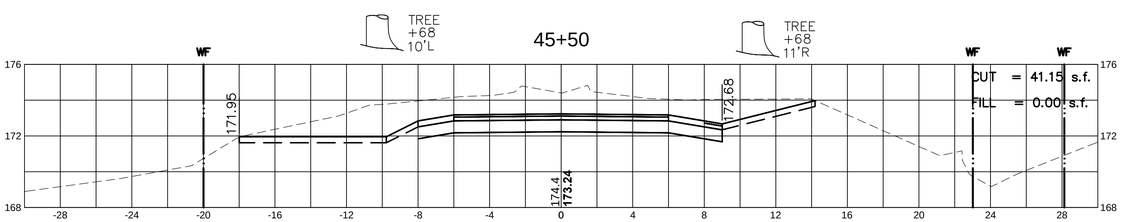
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	90	158
PROJECT FILE NO.	604532		

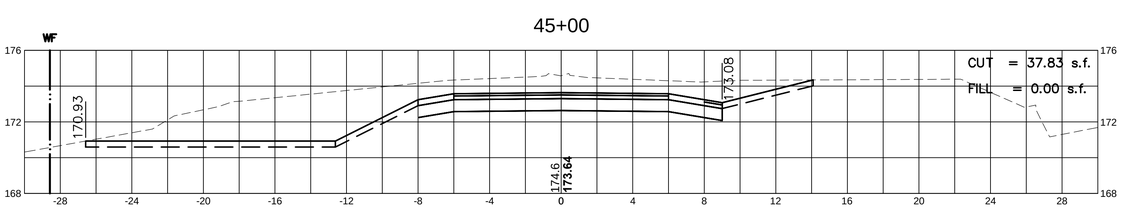
CROSS SECTIONS

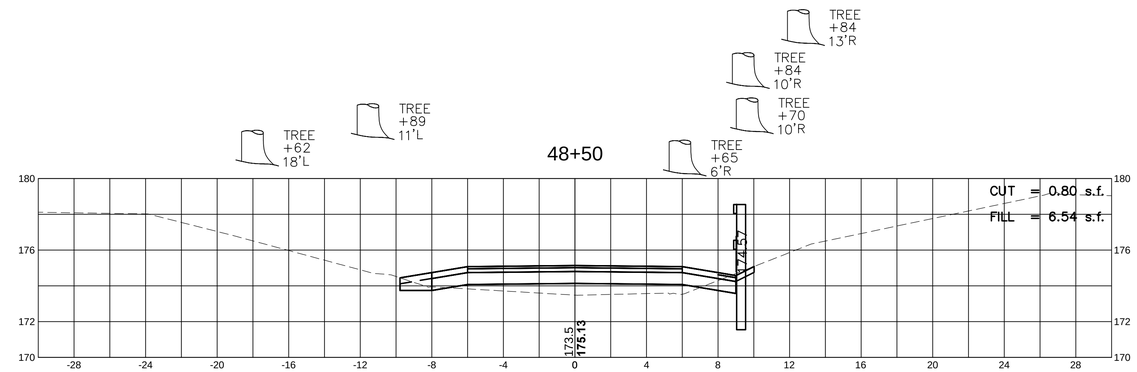
10031_2A_XS.DWG 11-Mar-2014

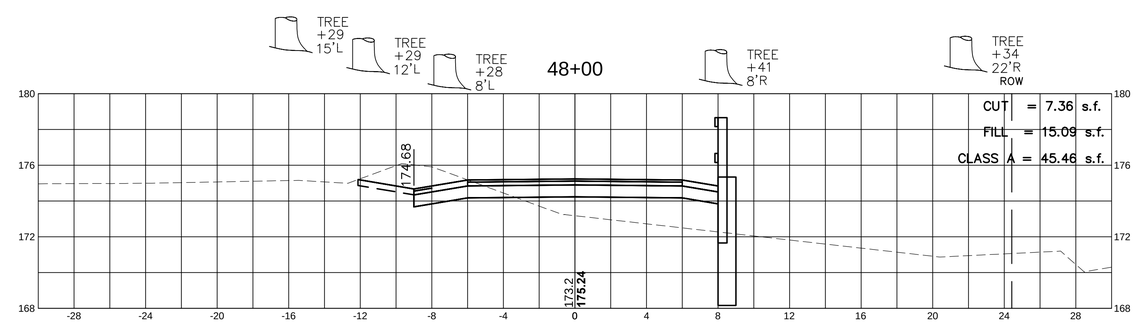


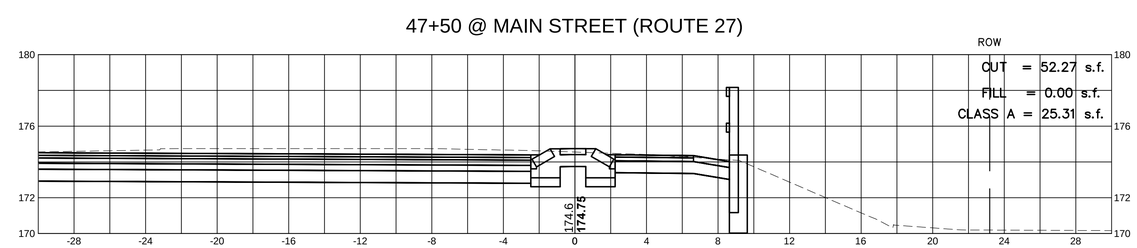


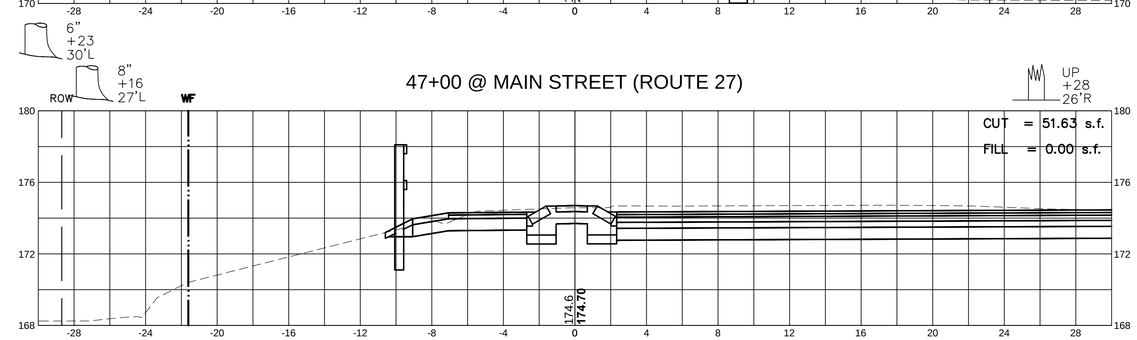












MassDOT DWT Version:

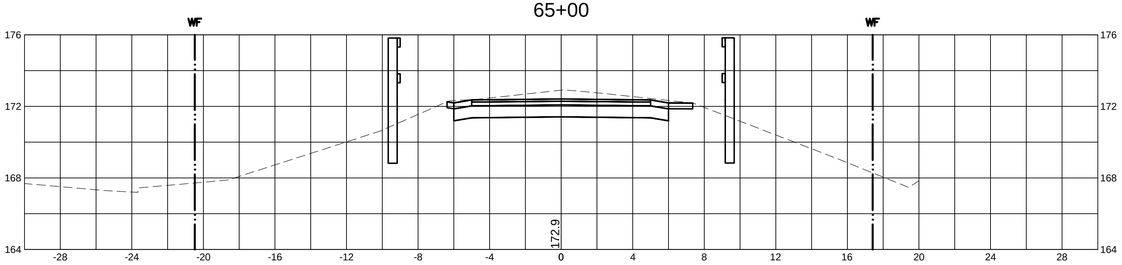
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	96	159
PROJECT FILE NO.	604532		

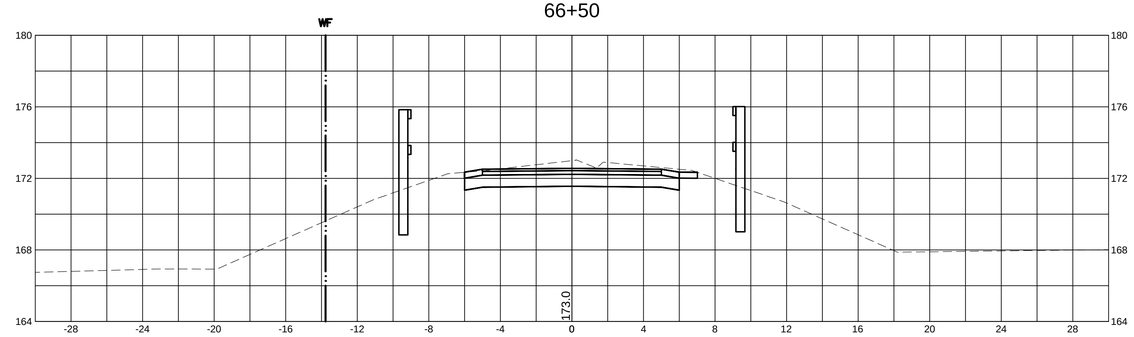
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

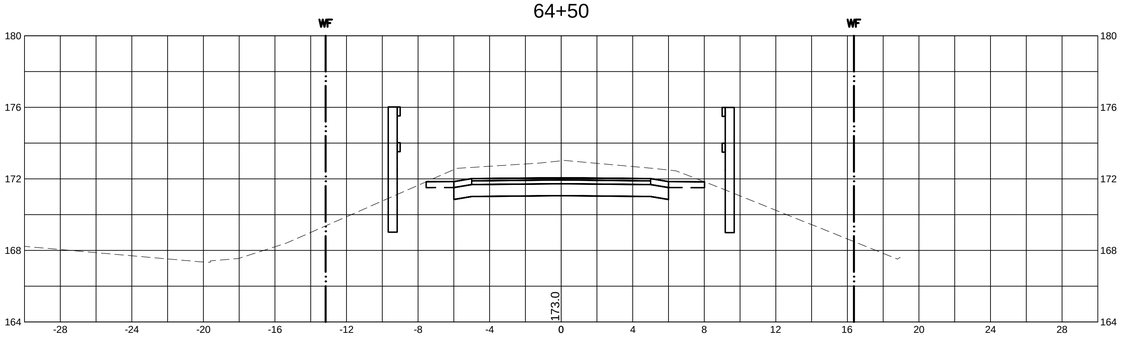
65+00



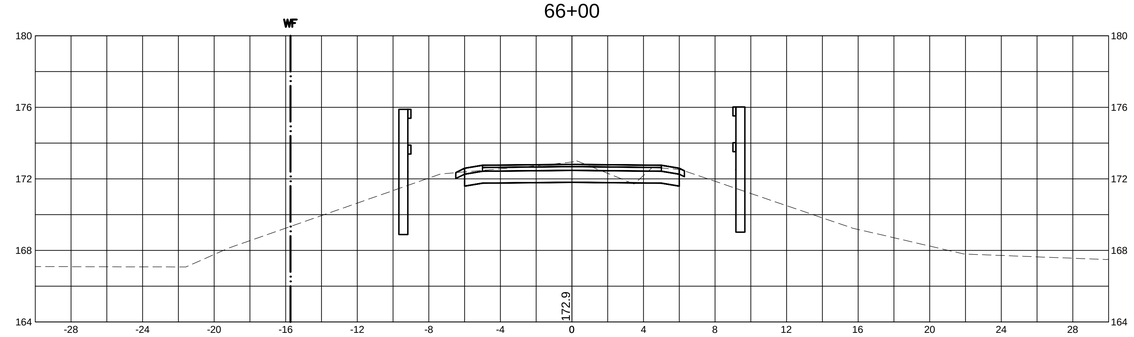
66+50



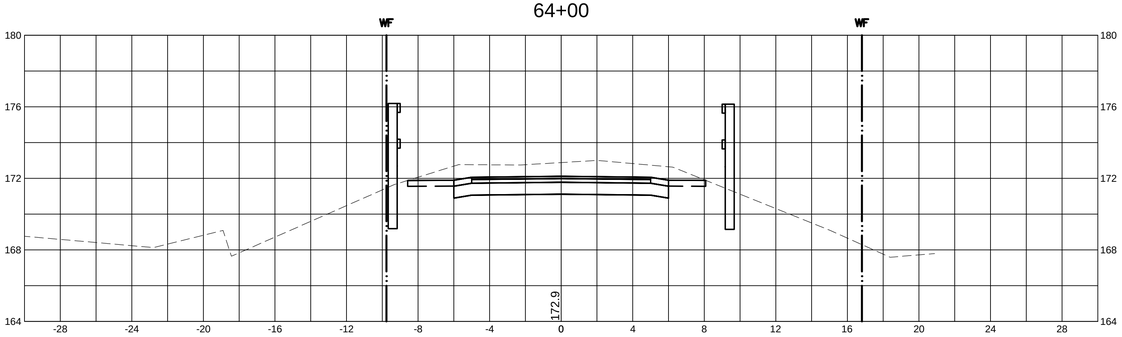
64+50



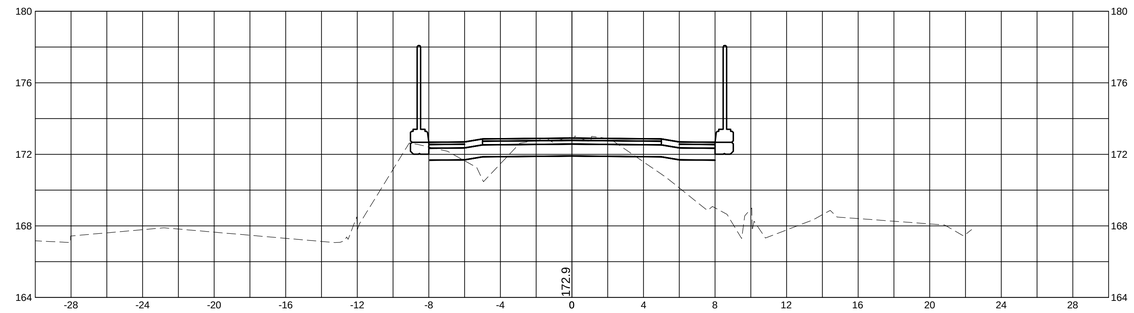
66+00



64+00



65+50 @ BRIDGE STRUCTURE 9.83 (NO. 5)



MassDOT DWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

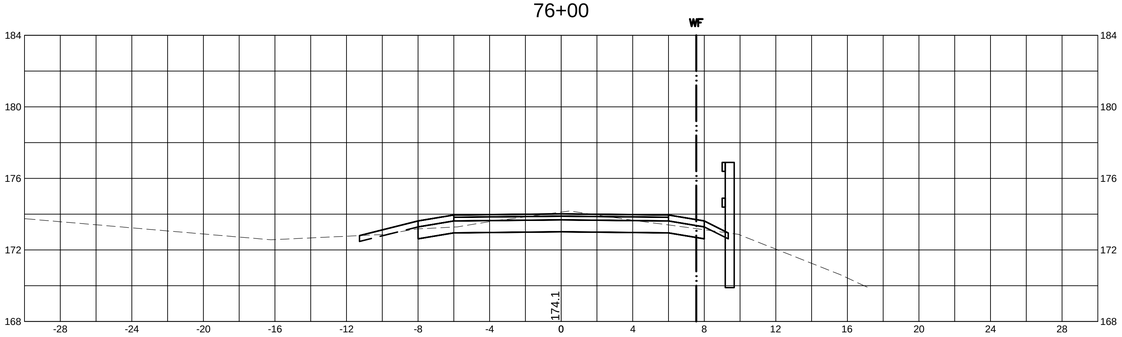
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	99	159
PROJECT FILE NO.	604532		

CROSS SECTIONS

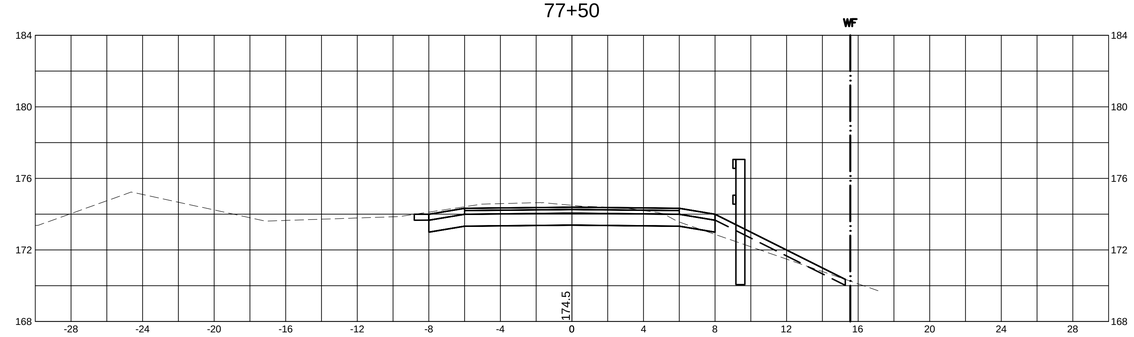
25-Feb-2014

10031_2A_XS.DWG

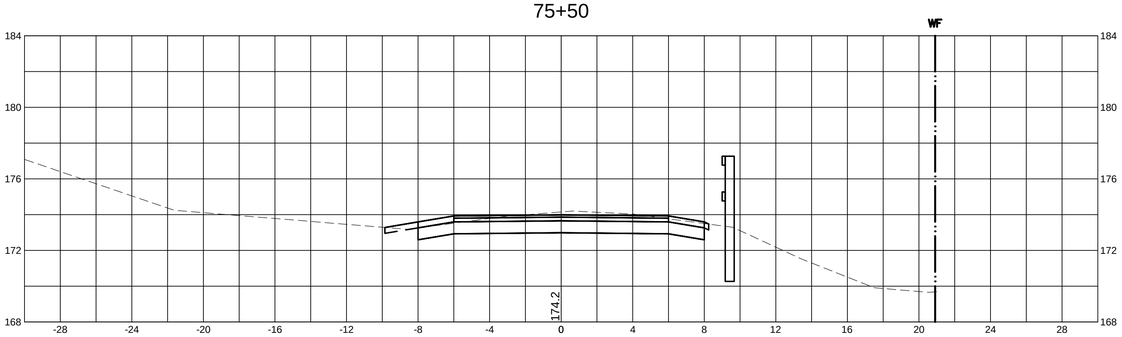
76+00



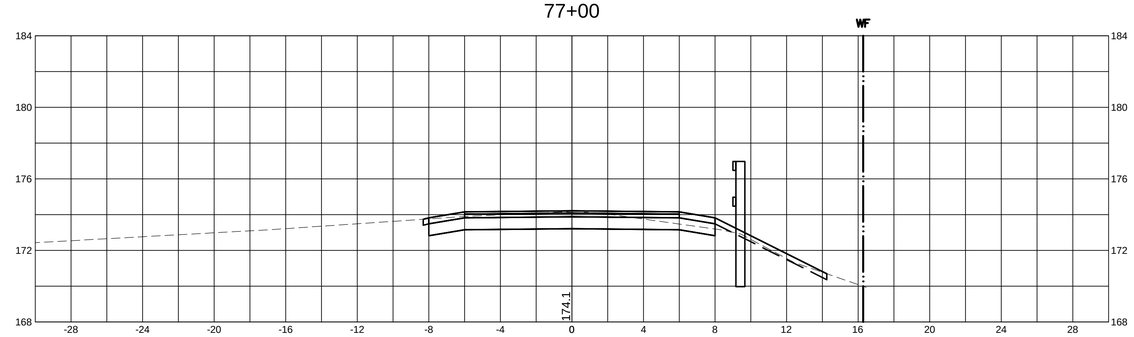
77+50



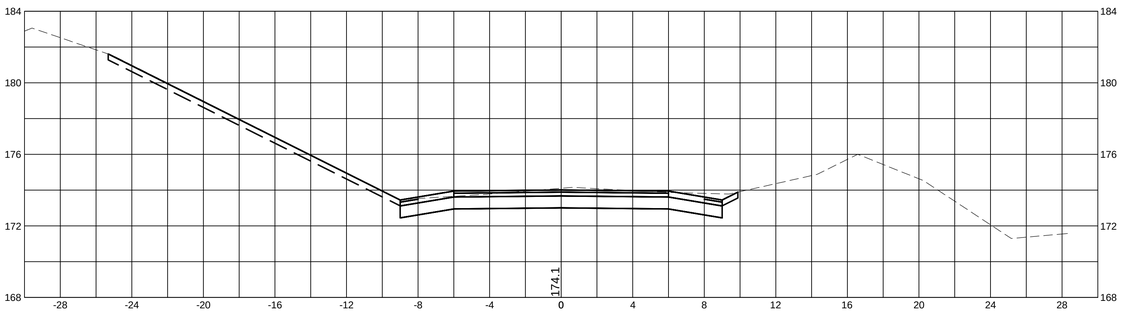
75+50



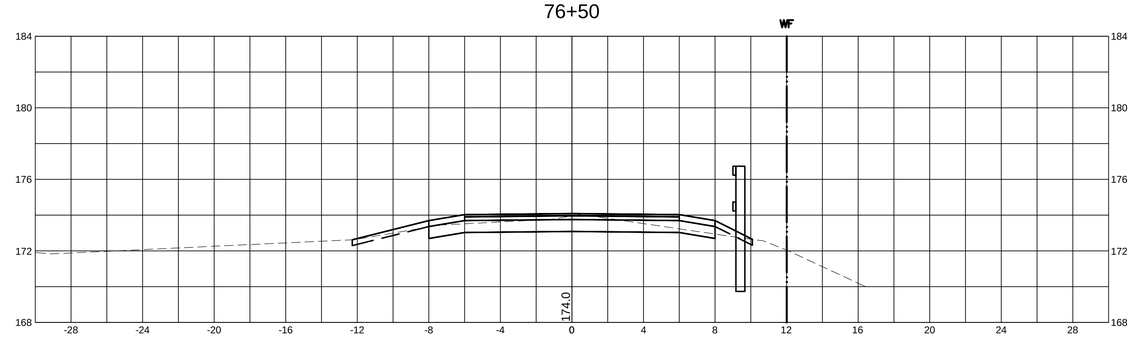
77+00



75+00



76+50



MassDOT DWT Version:

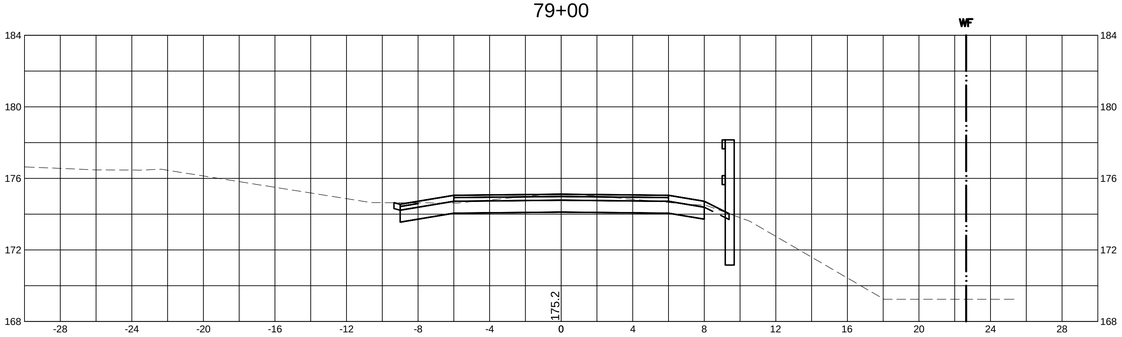
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	100	159
PROJECT FILE NO.	604532		

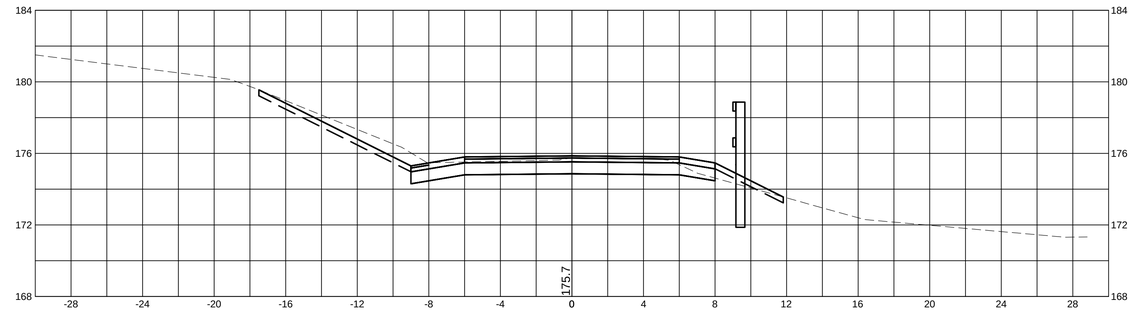
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

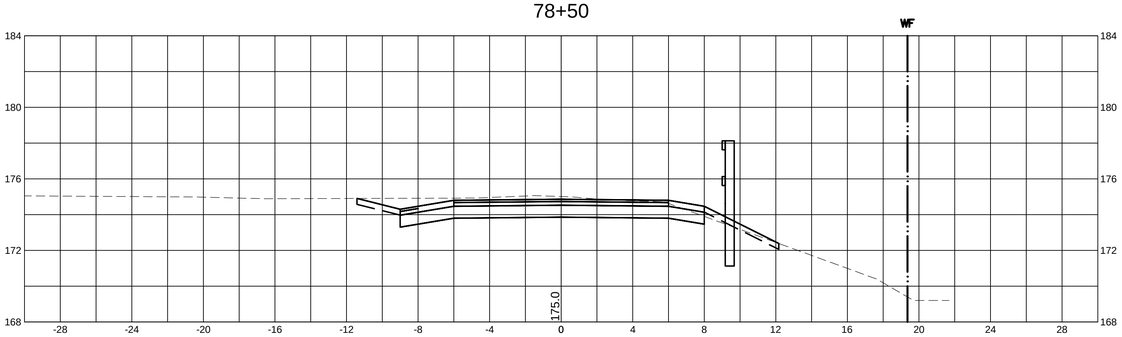
79+00



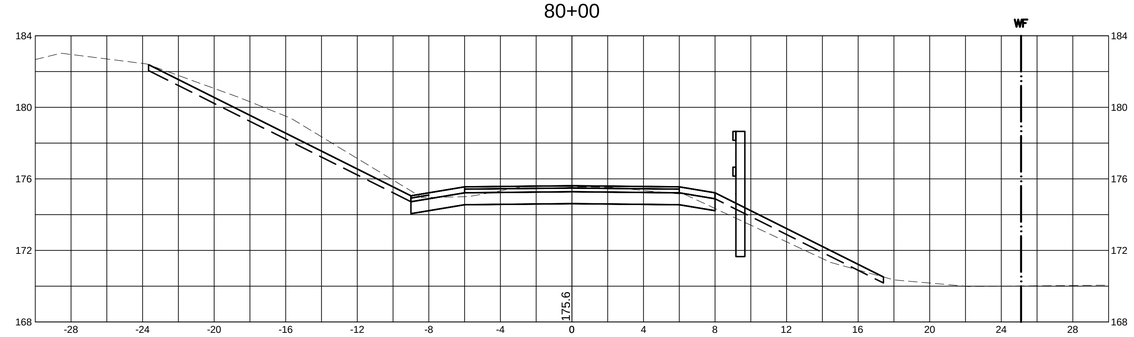
80+50



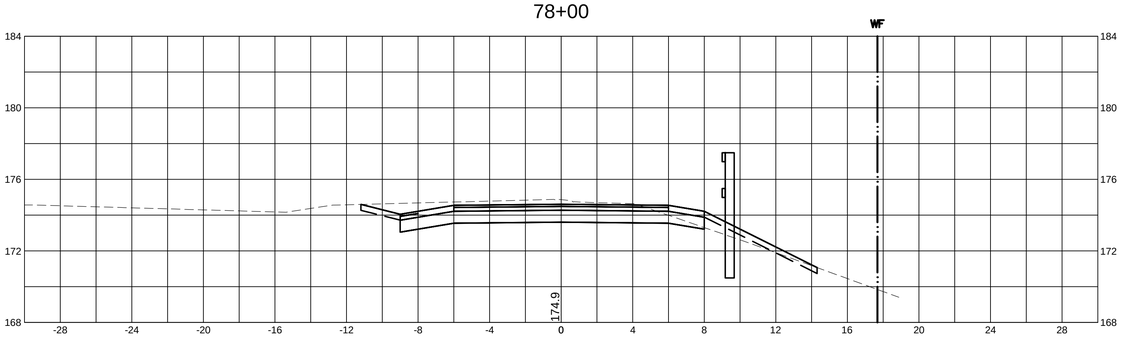
78+50



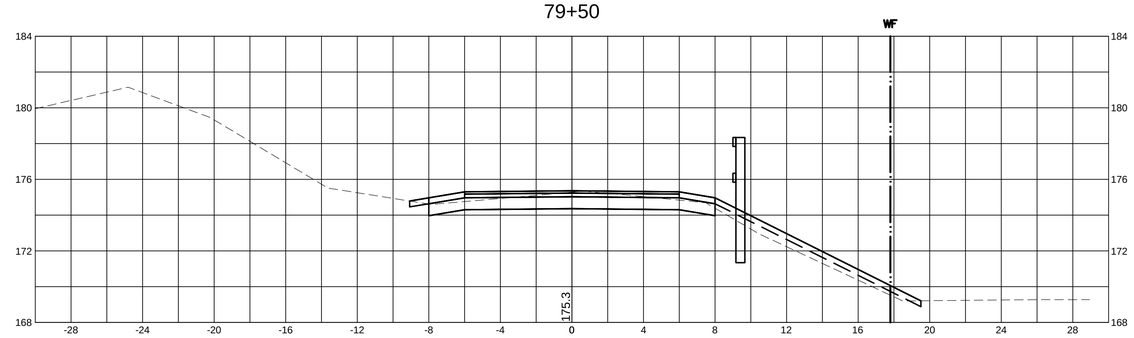
80+00



78+00



79+50



MassDOT DWT Version:

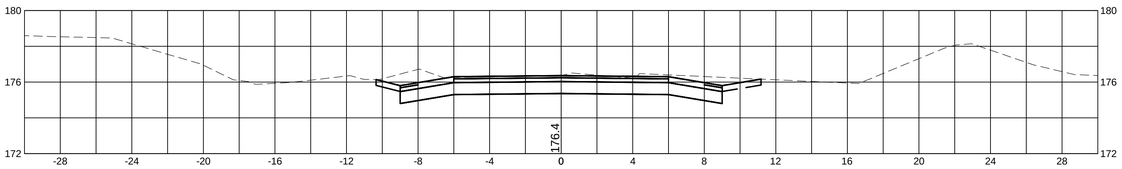
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	101	159
PROJECT FILE NO.	604532		

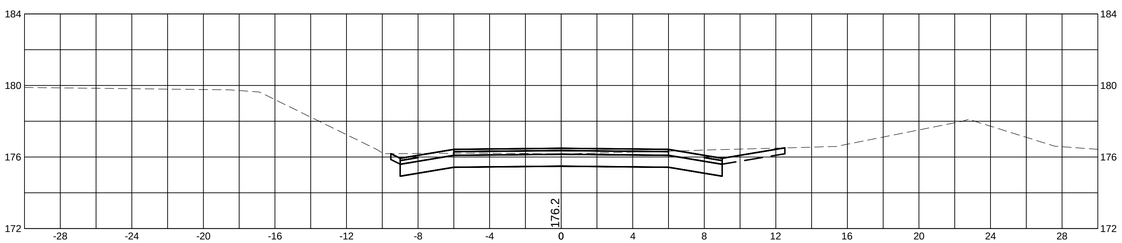
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

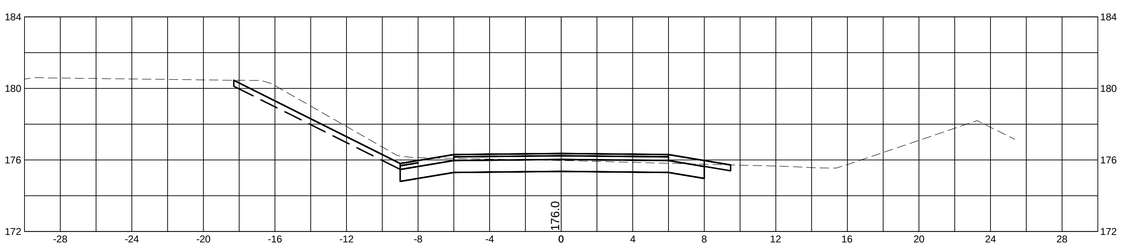
82+50



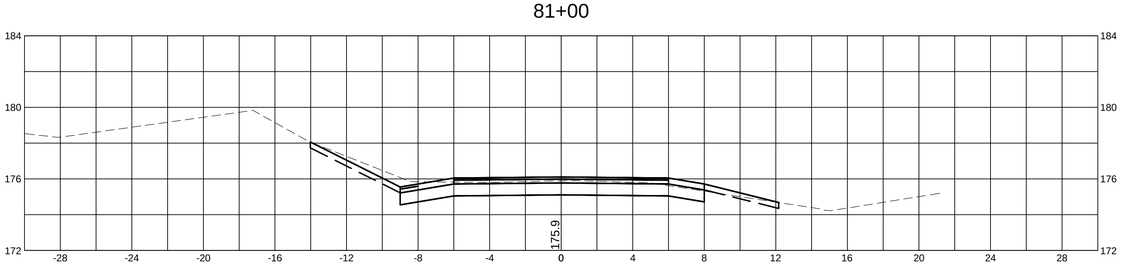
82+00



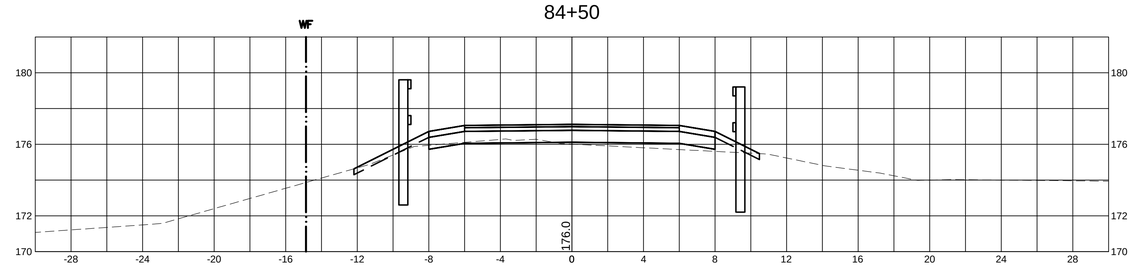
81+50



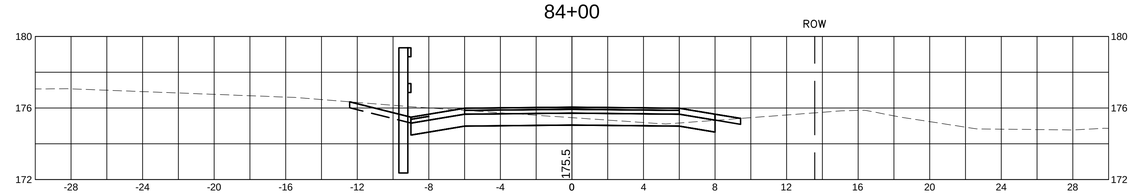
81+00



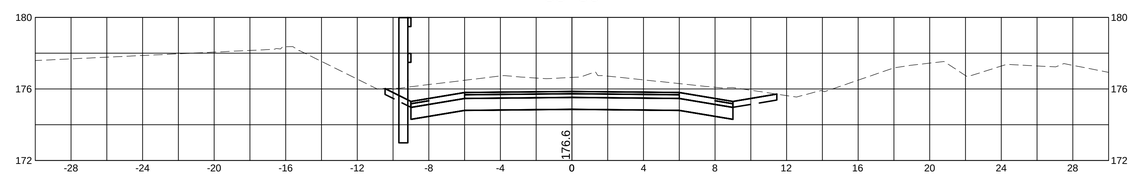
84+50



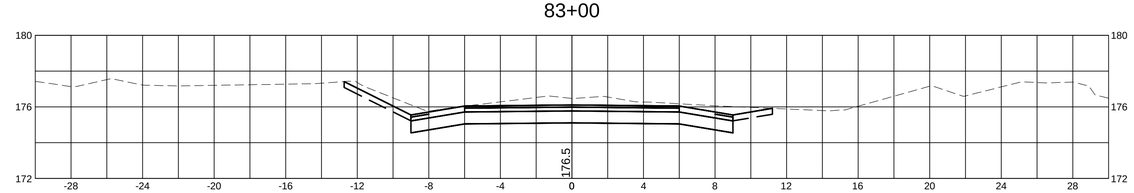
84+00



83+50



83+00



MassDOT DWT Version:

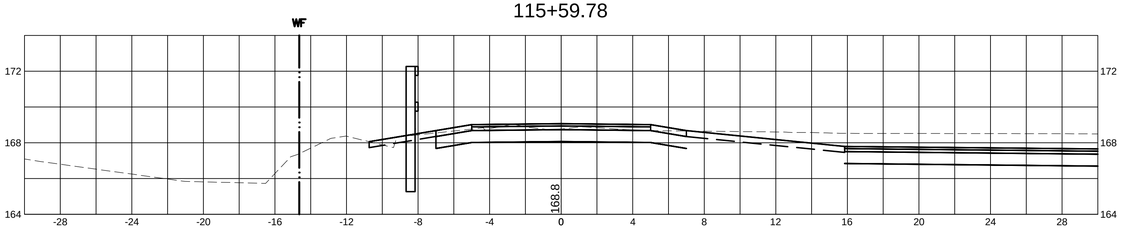
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	110	159
PROJECT FILE NO.	604532		

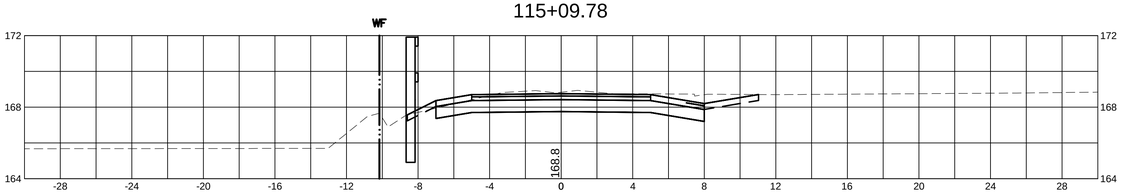
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

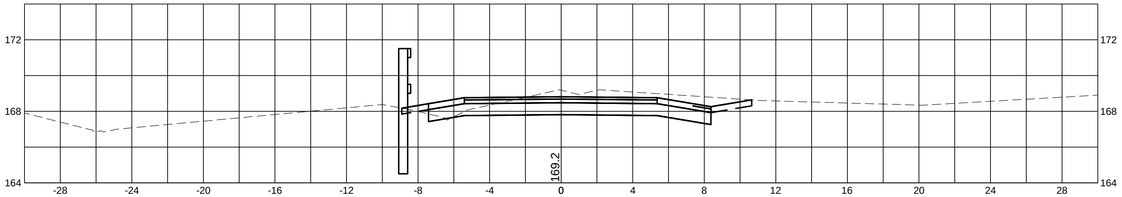
115+59.78



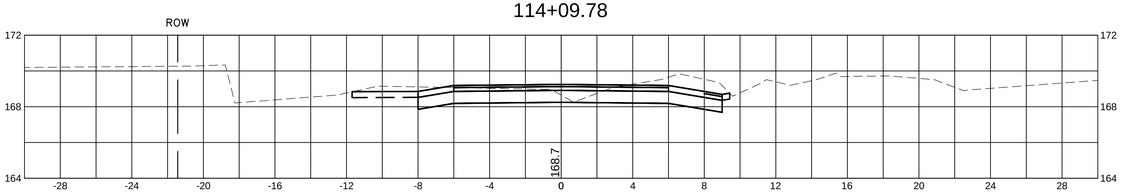
115+09.78



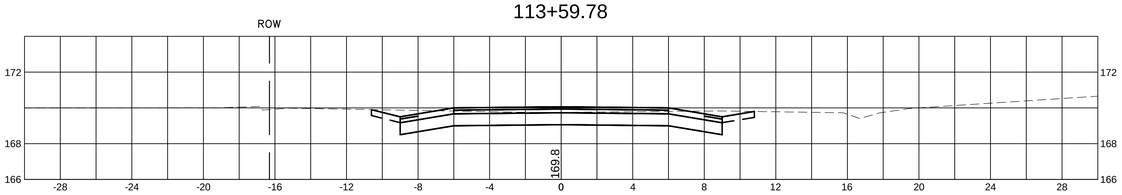
114+59.78



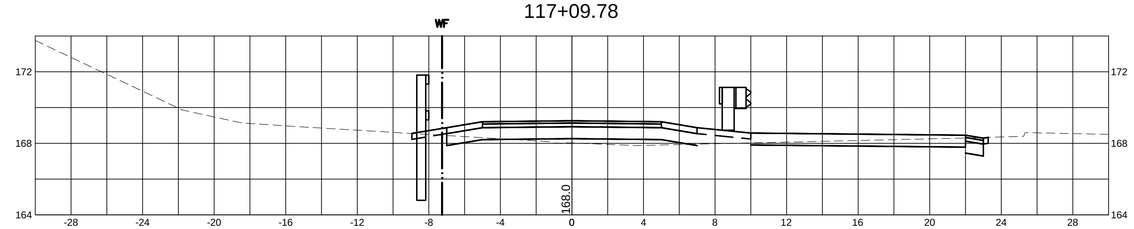
114+09.78



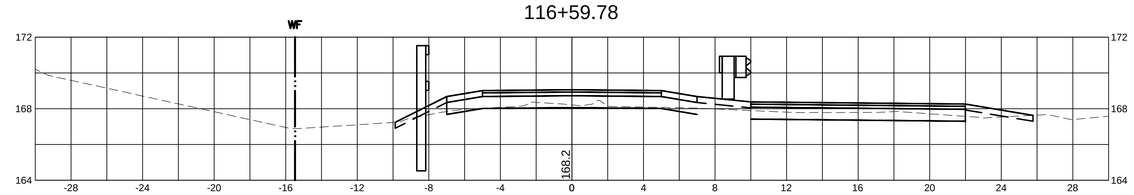
113+59.78



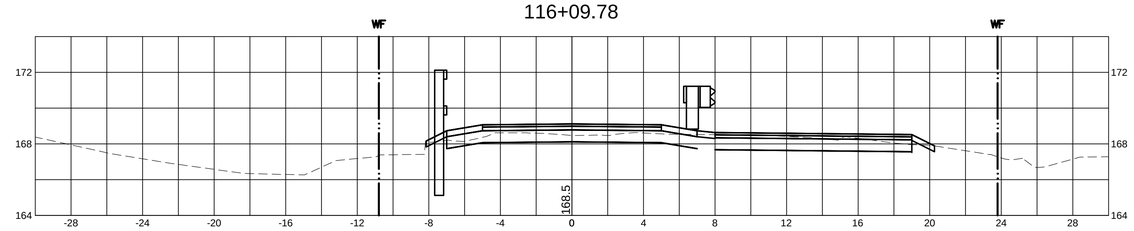
117+09.78



116+59.78



116+09.78



MassDOT DWT Version:

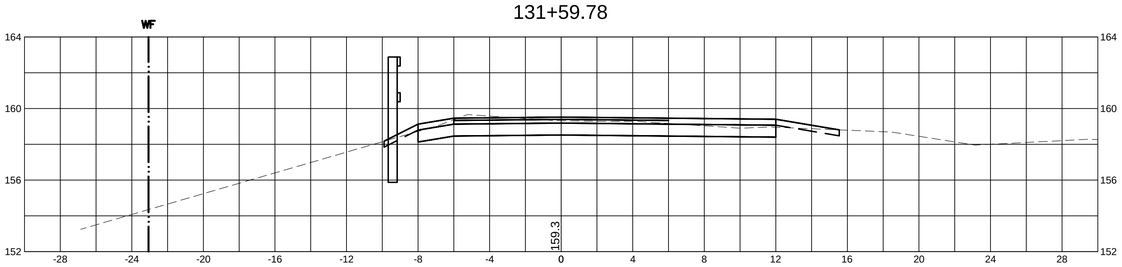
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	115	159
PROJECT FILE NO.	604532		

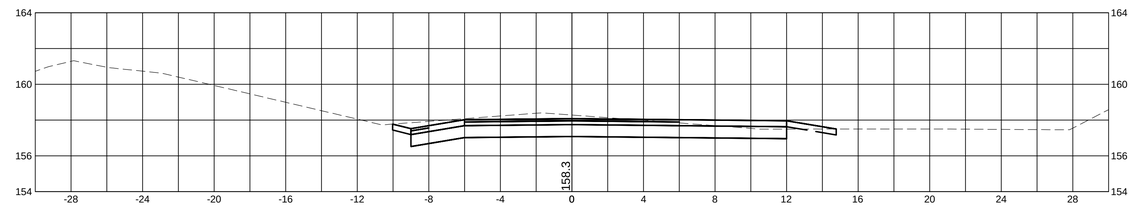
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

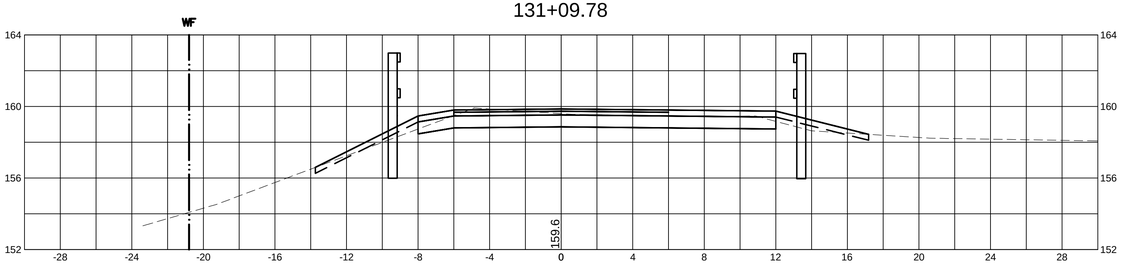
131+59.78



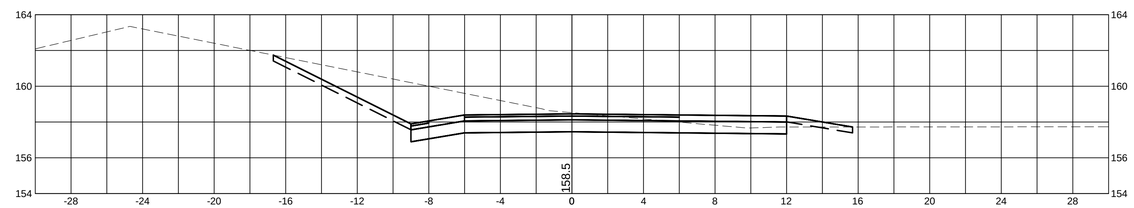
133+59.78



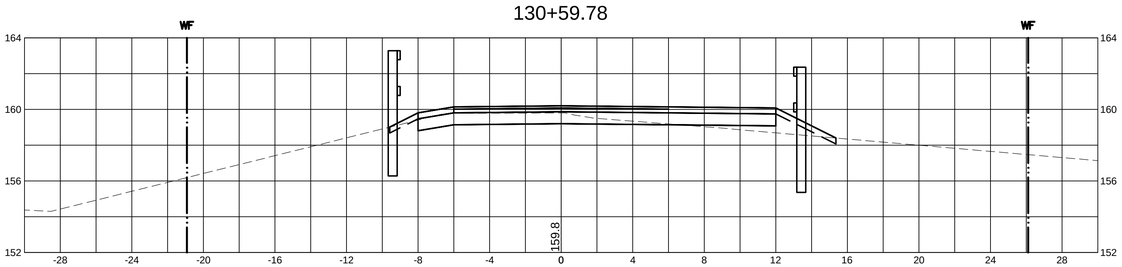
131+09.78



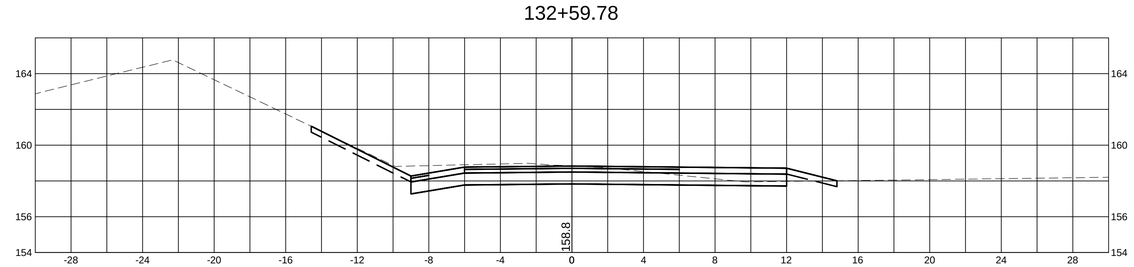
133+09.78



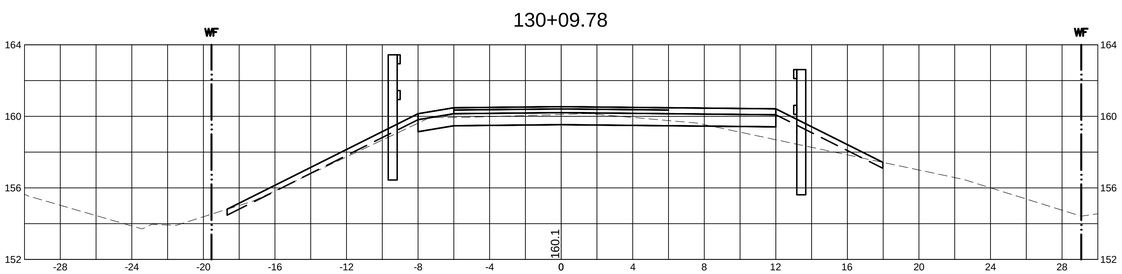
130+59.78



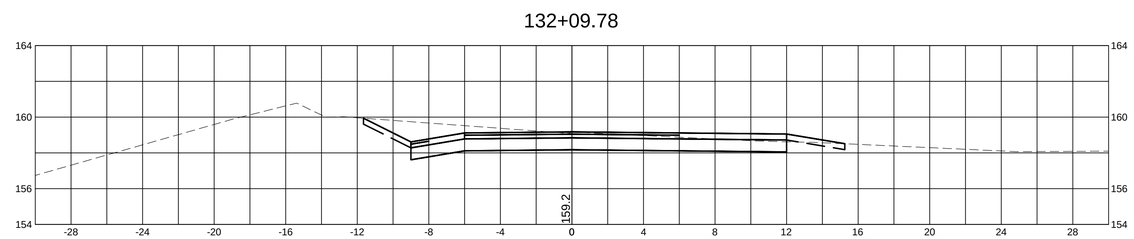
132+59.78



130+09.78



132+09.78



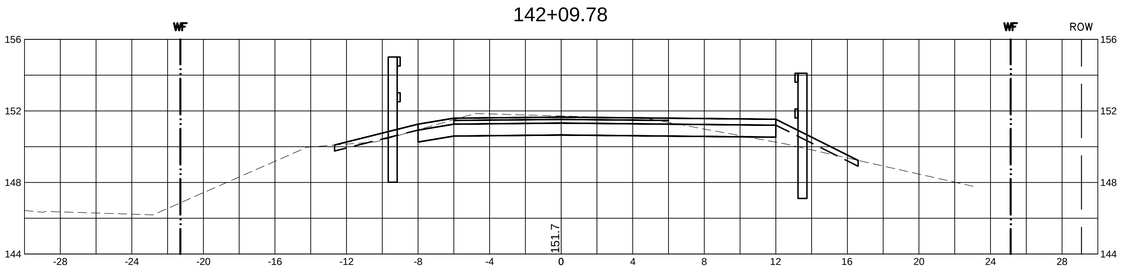
MassDOT DWT Version:

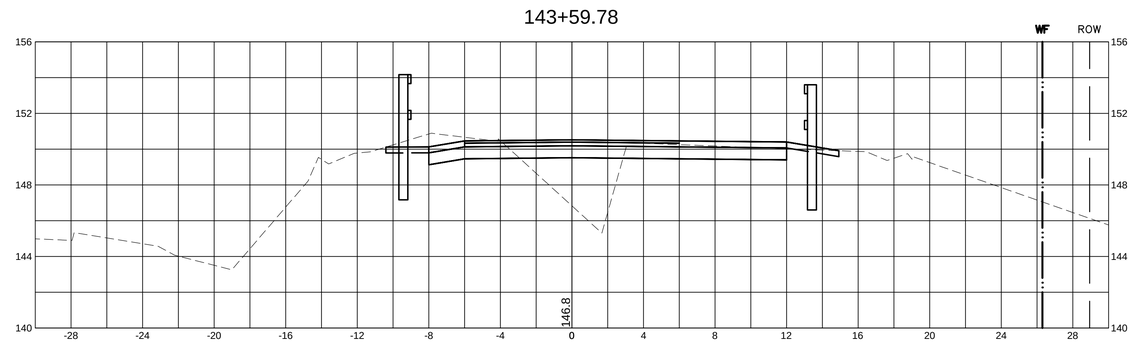
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

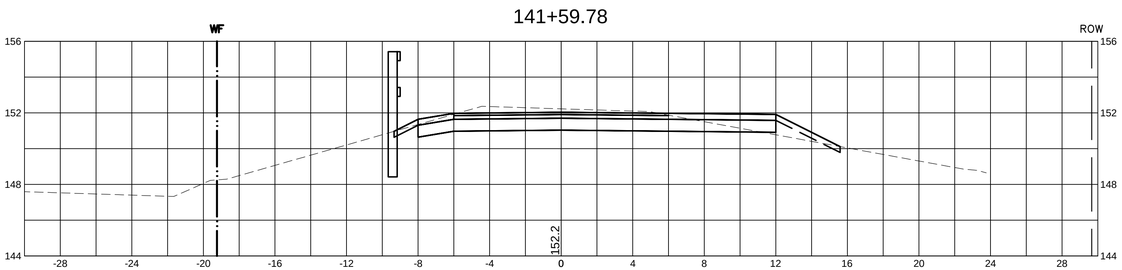
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	118	159
PROJECT FILE NO.	604532		

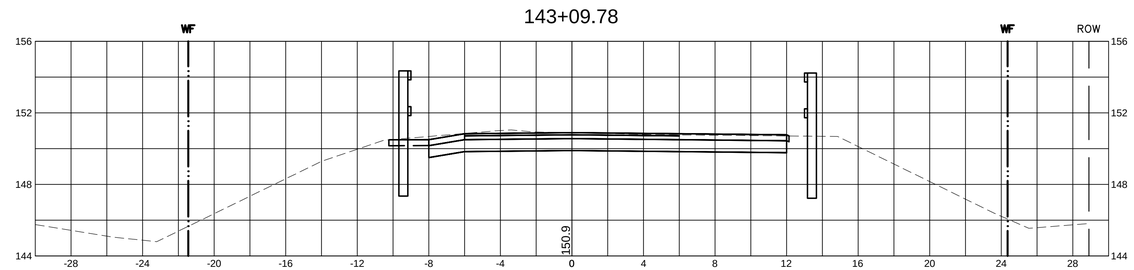
CROSS SECTIONS

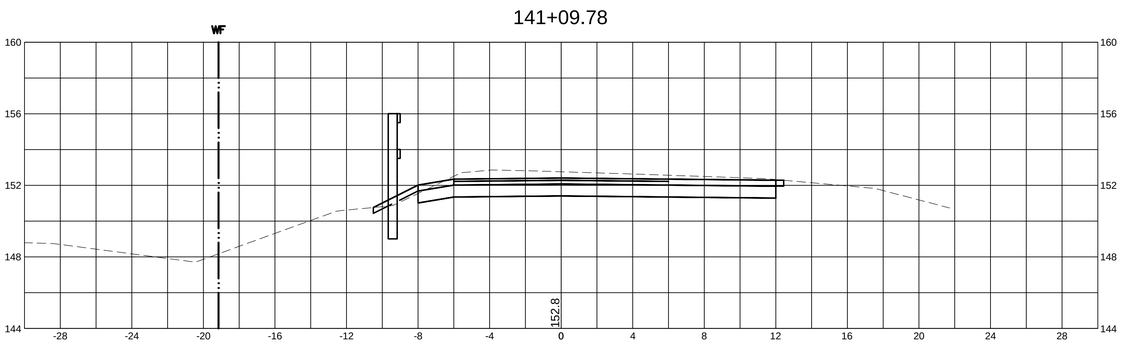
10031_2A_XS.DWG 25-Feb-2014

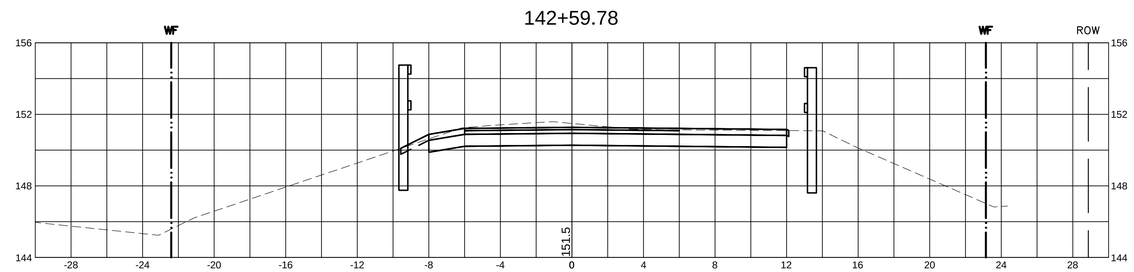












MassDOT CWT Version:

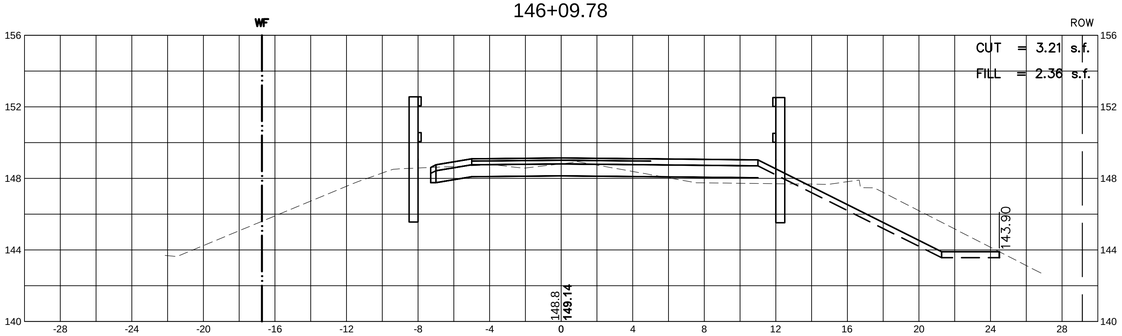
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	118	158
PROJECT FILE NO.	604532		

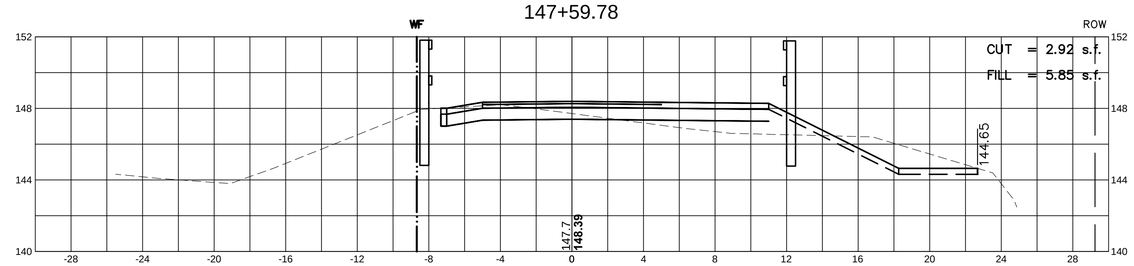
CROSS SECTIONS

10031_2A_XS.DWG 11-Mar-2014

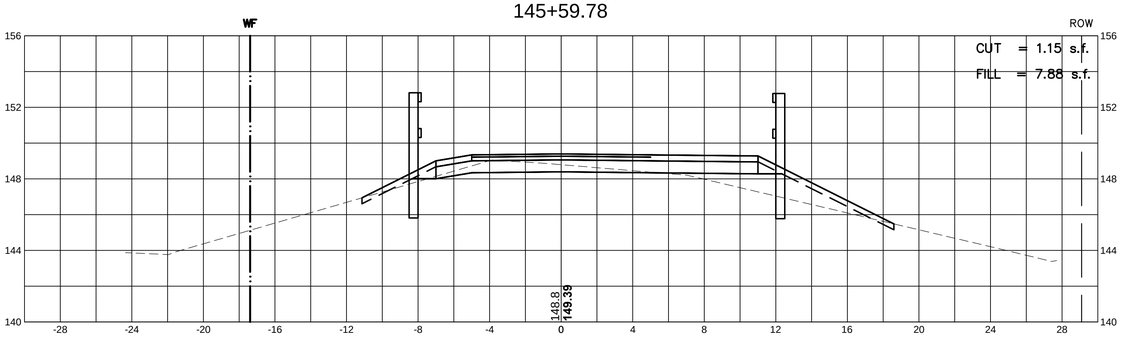
146+09.78



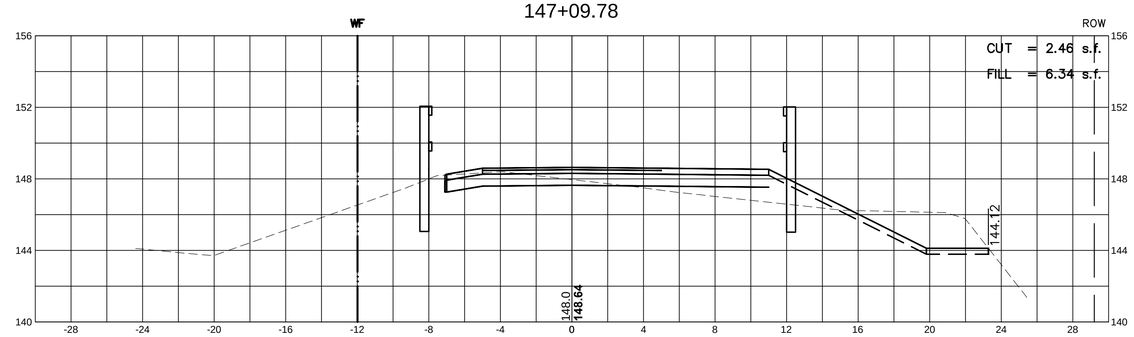
147+59.78



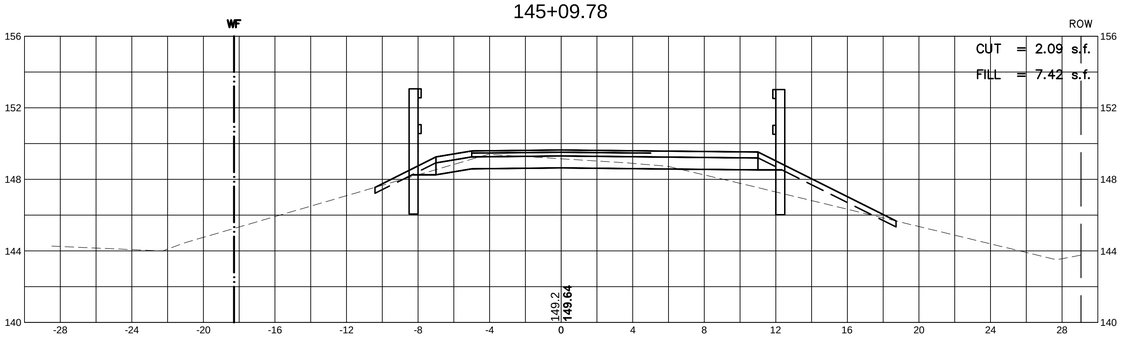
145+59.78



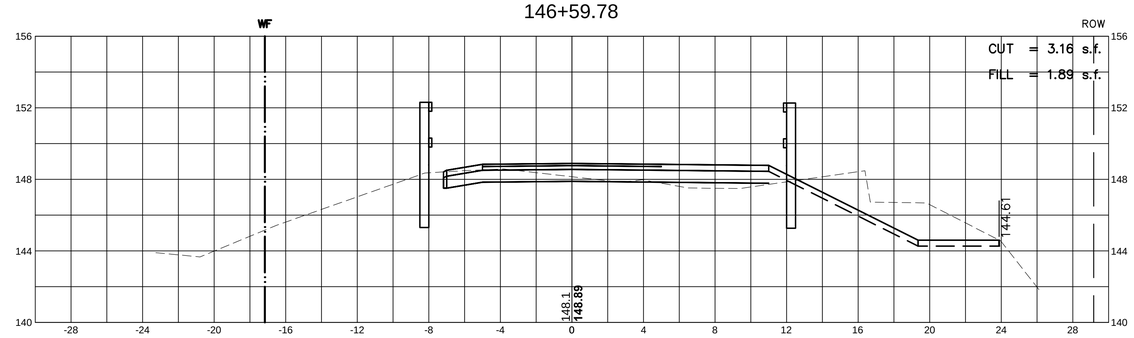
147+09.78



145+09.78



146+59.78



MassDOT DWT Version:

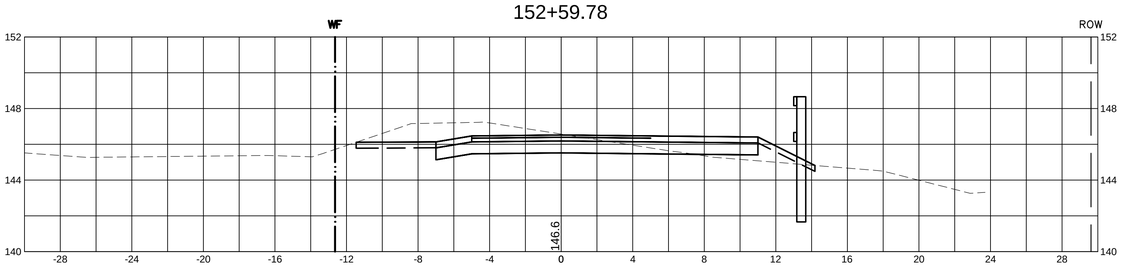
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	121	159
PROJECT FILE NO.	604532		

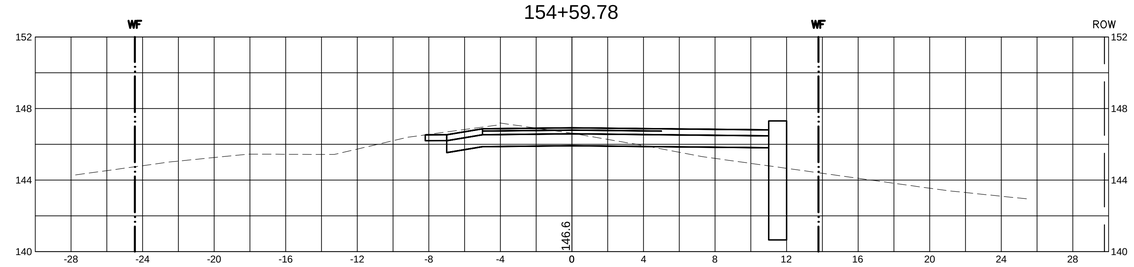
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

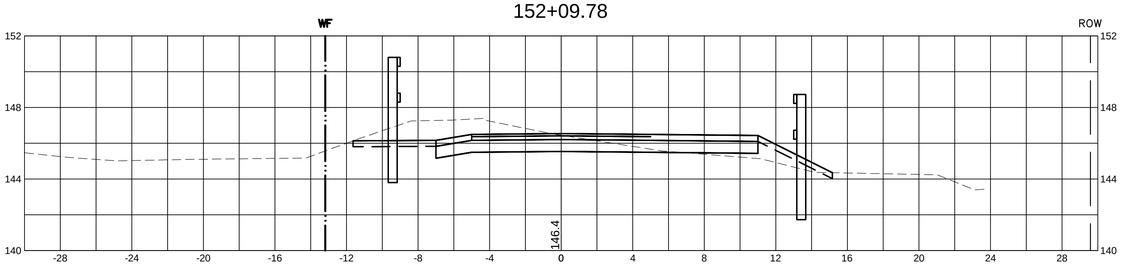
152+59.78



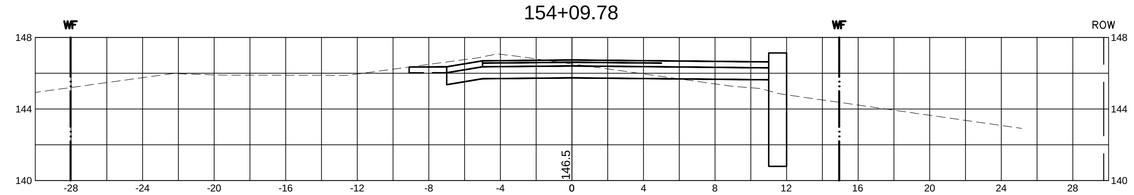
154+59.78



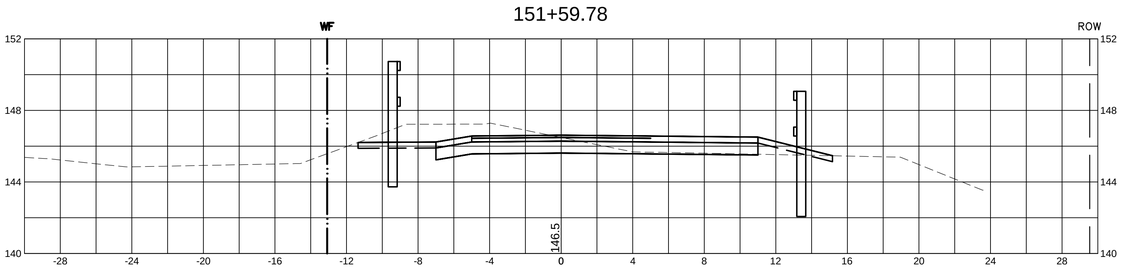
152+09.78



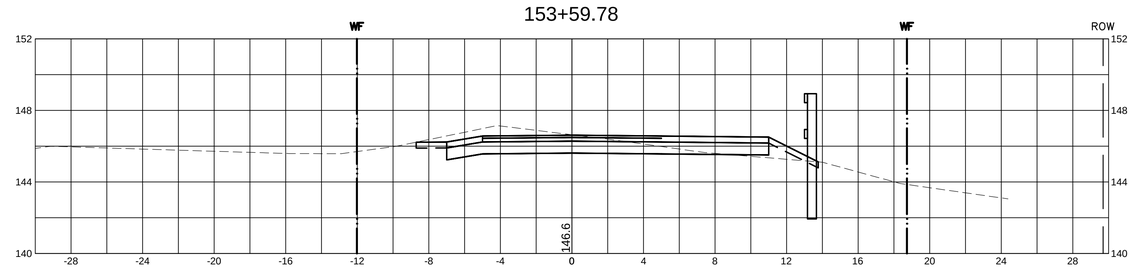
154+09.78



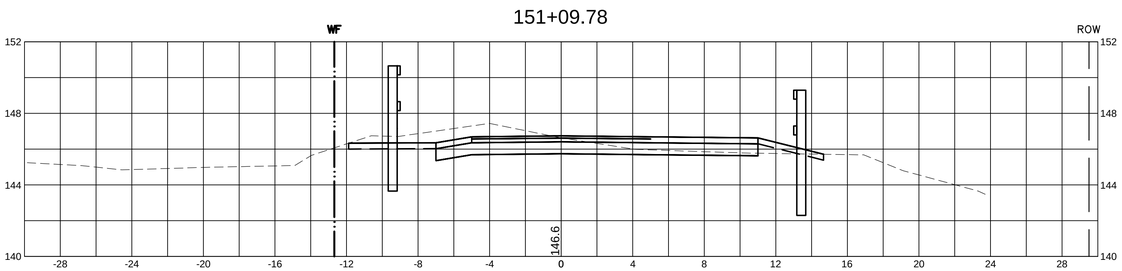
151+59.78



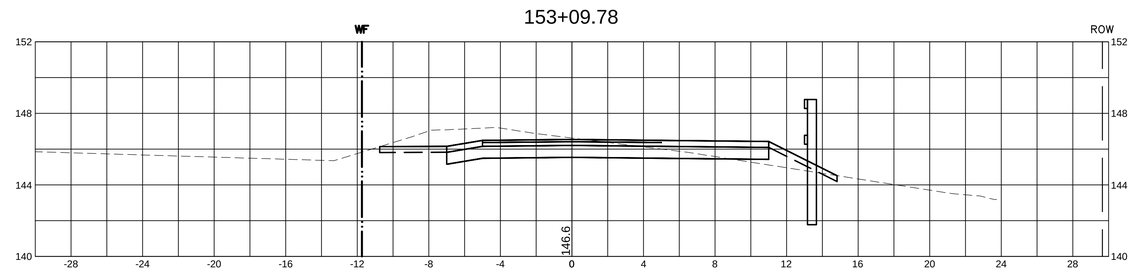
153+59.78



151+09.78



153+09.78



MassDOT DWT Version:

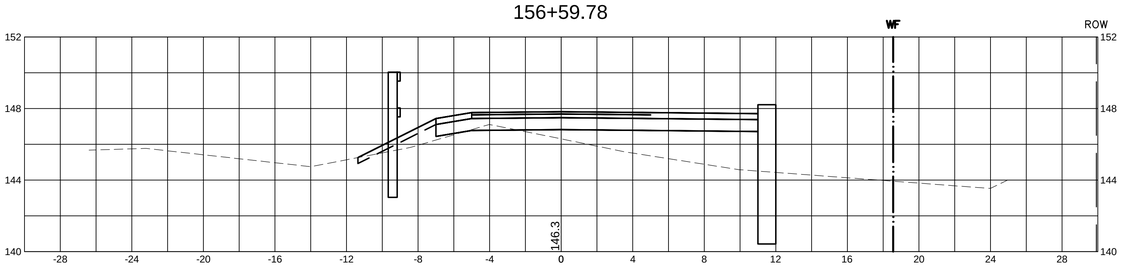
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	122	159
PROJECT FILE NO.	604532		

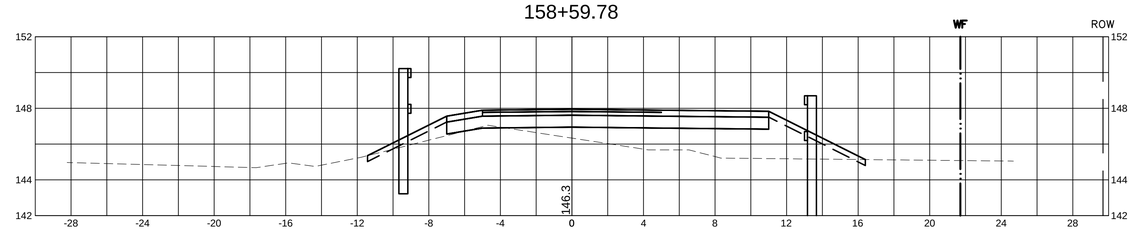
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

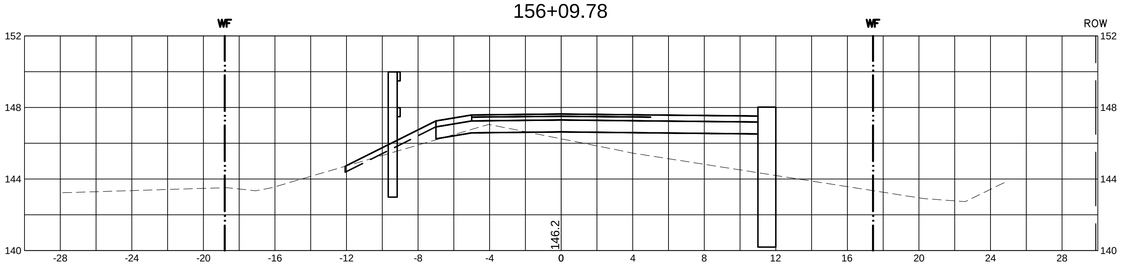
156+59.78



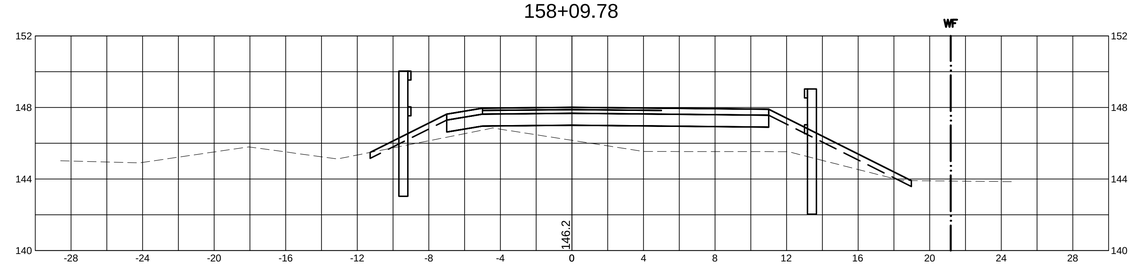
158+59.78



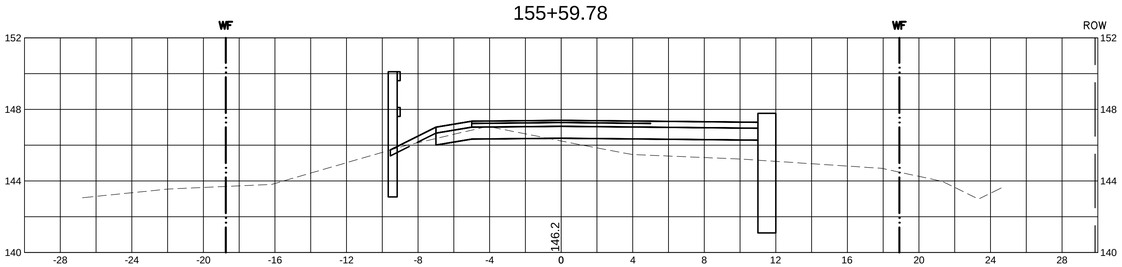
156+09.78



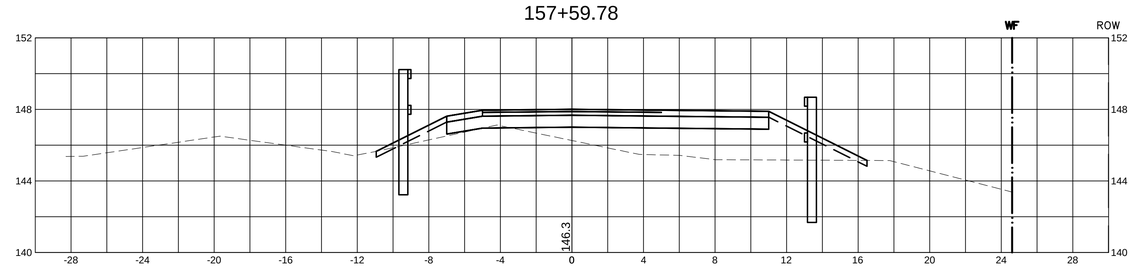
158+09.78



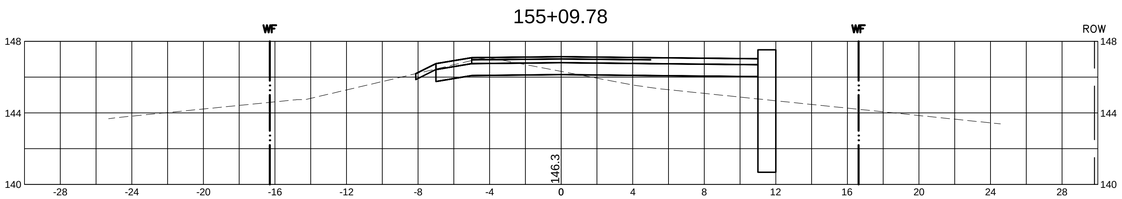
155+59.78



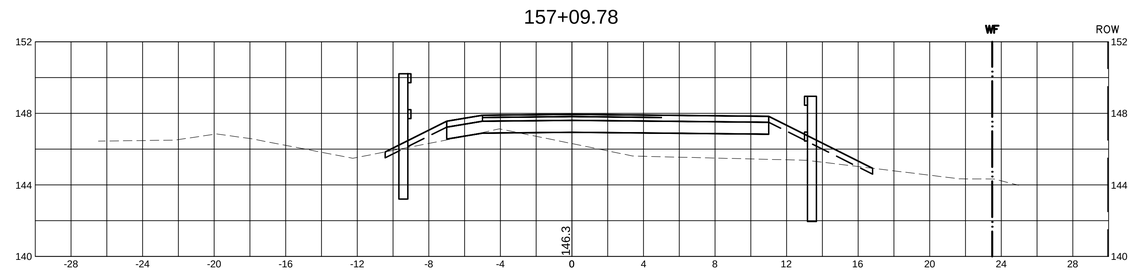
157+59.78



155+09.78



157+09.78



MassDOT DWT Version:

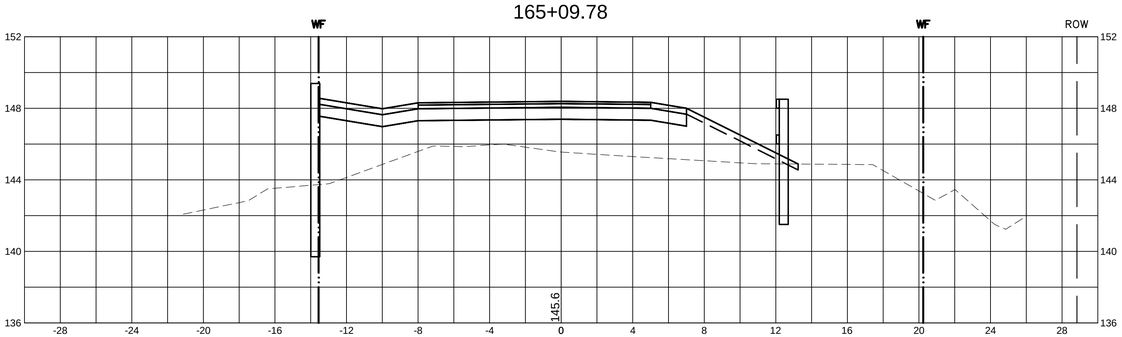
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	124	159
PROJECT FILE NO.	604532		

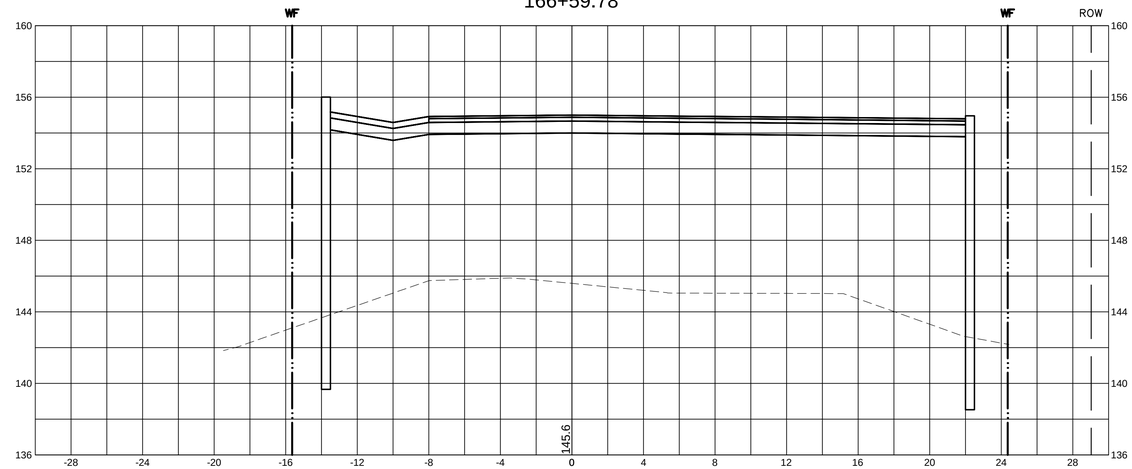
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

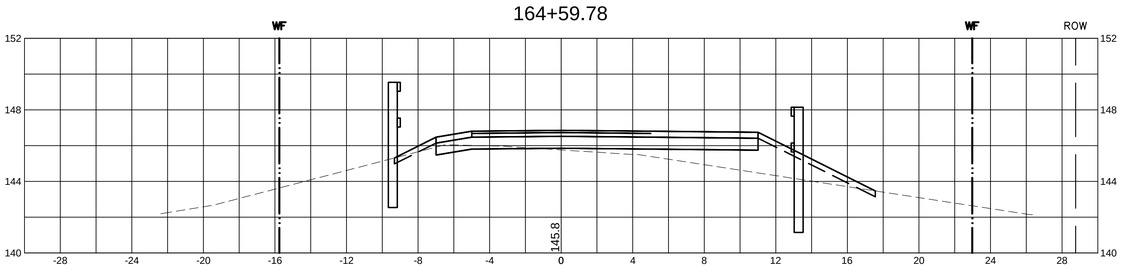
165+09.78



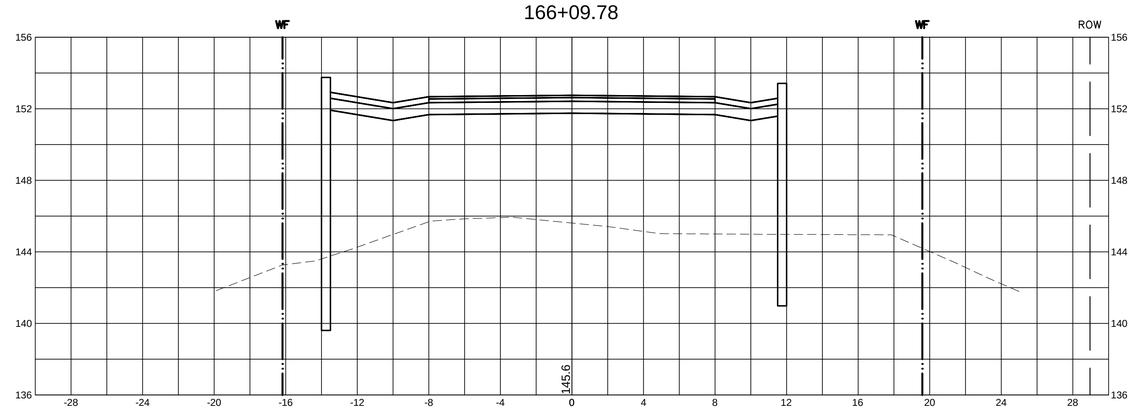
166+59.78



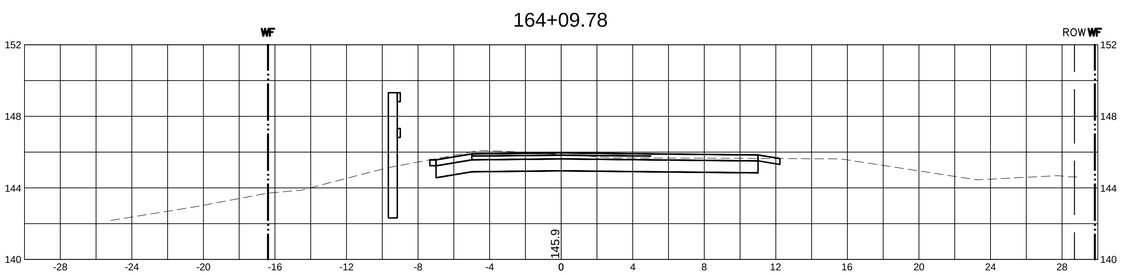
164+59.78



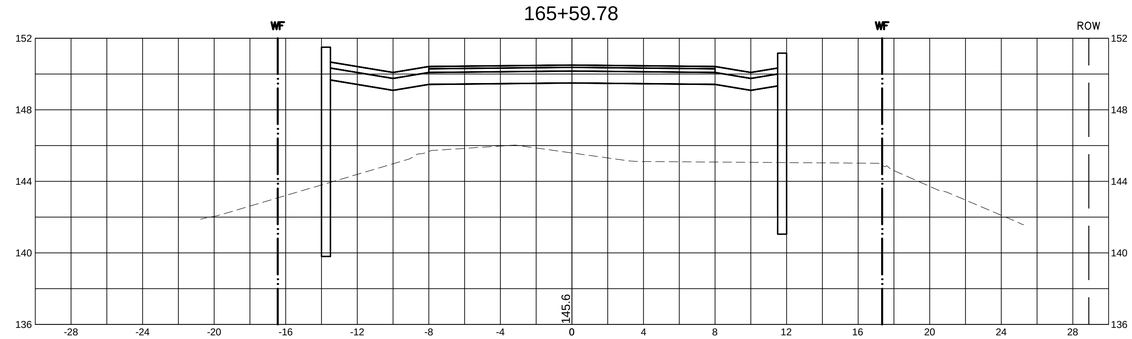
166+09.78



164+09.78



165+59.78



MassDOT DWT Version:

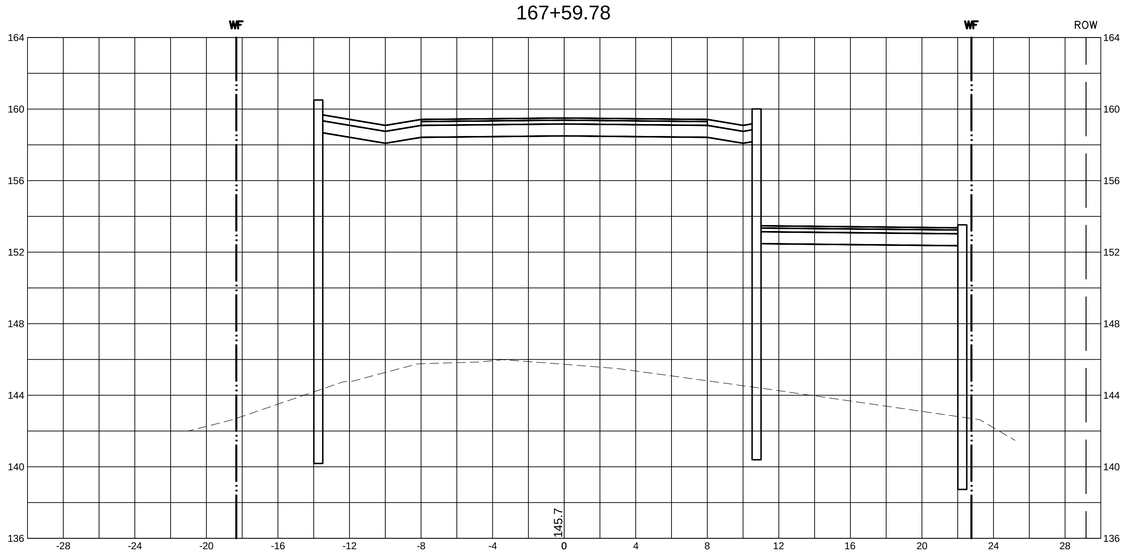
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	125	159
PROJECT FILE NO.	604532		

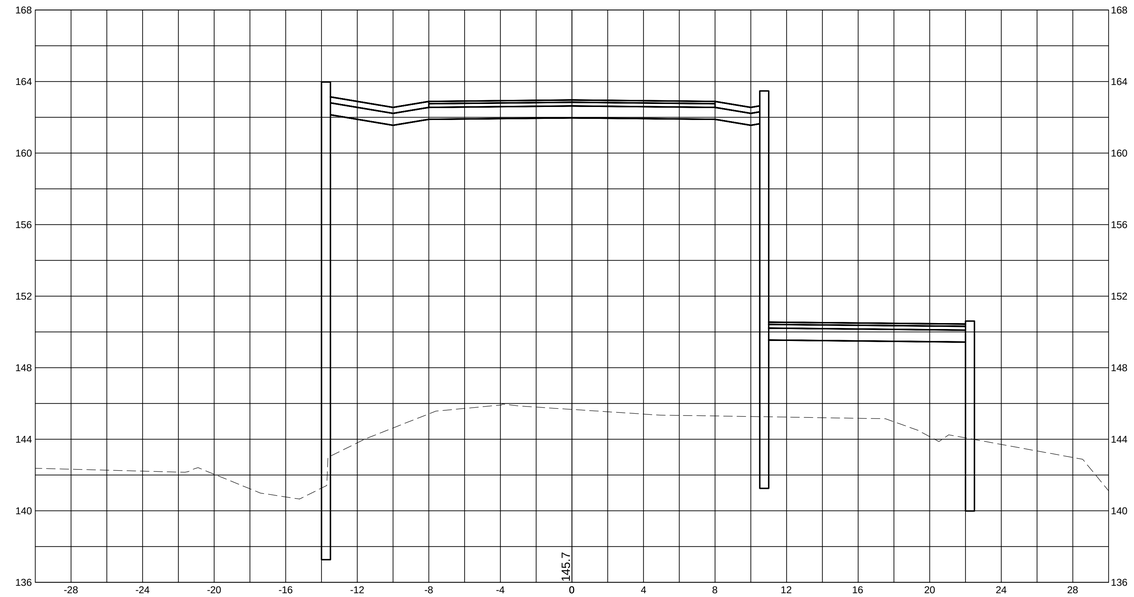
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

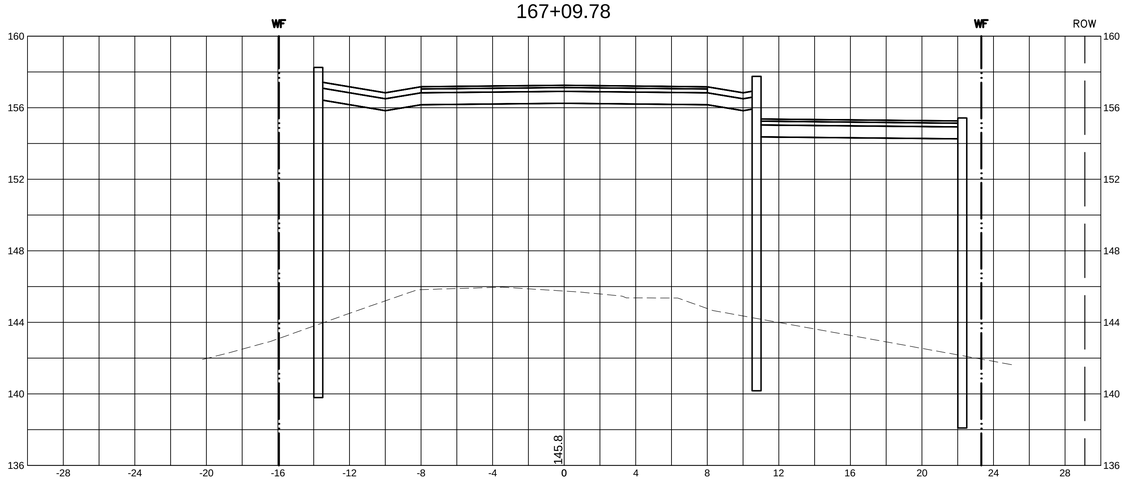
167+59.78



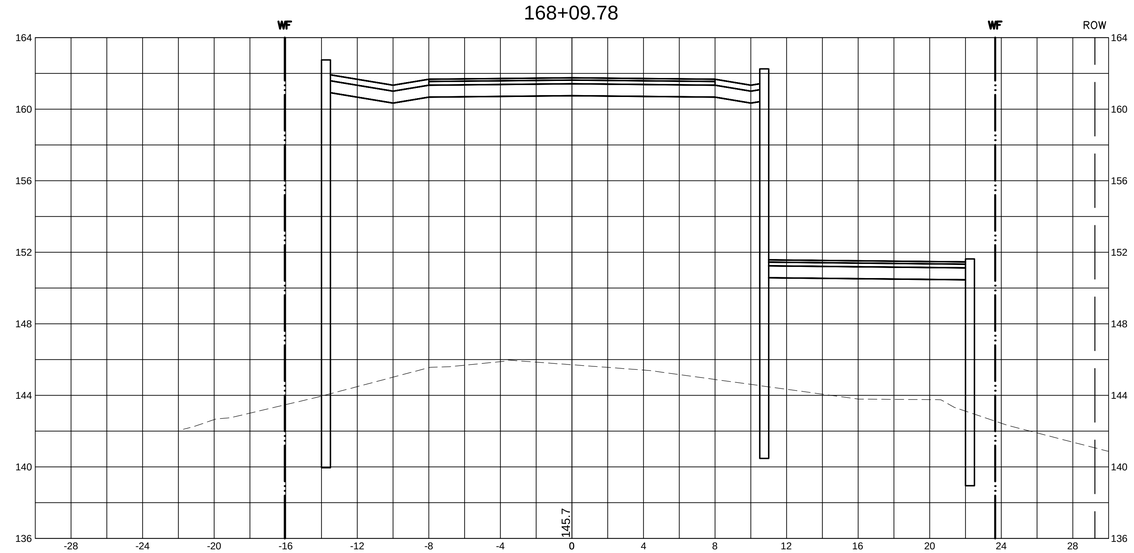
168+36.78



167+09.78



168+09.78



MassDOT DWT Version:

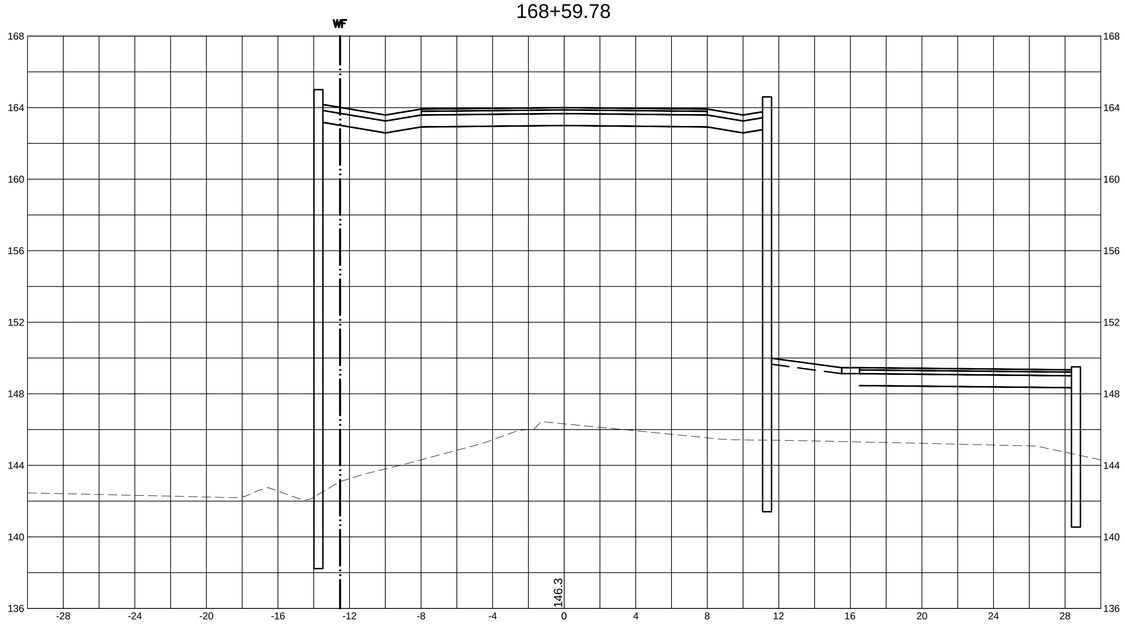
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	126	159
PROJECT FILE NO.	604532		

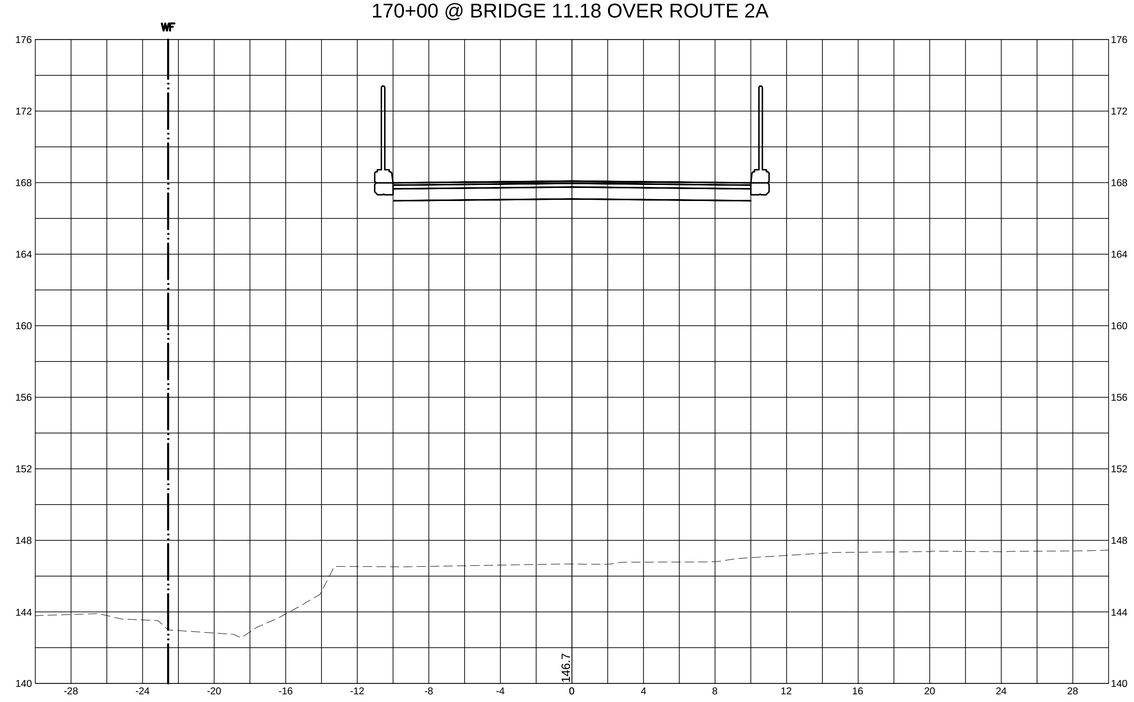
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

168+59.78



170+00 @ BRIDGE 11.18 OVER ROUTE 2A



MassDOT DWT Version:

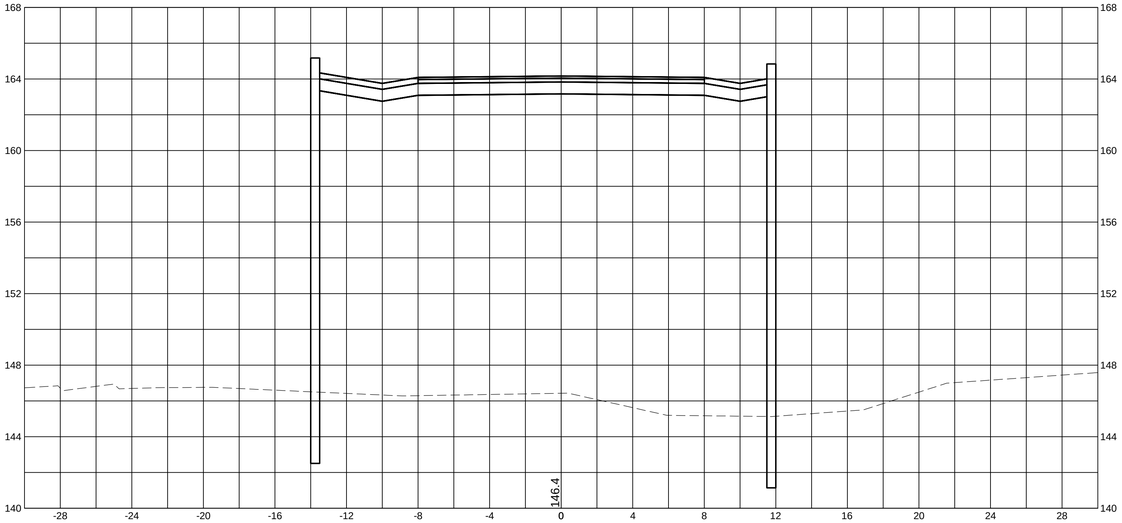
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	127	159
PROJECT FILE NO.	604532		

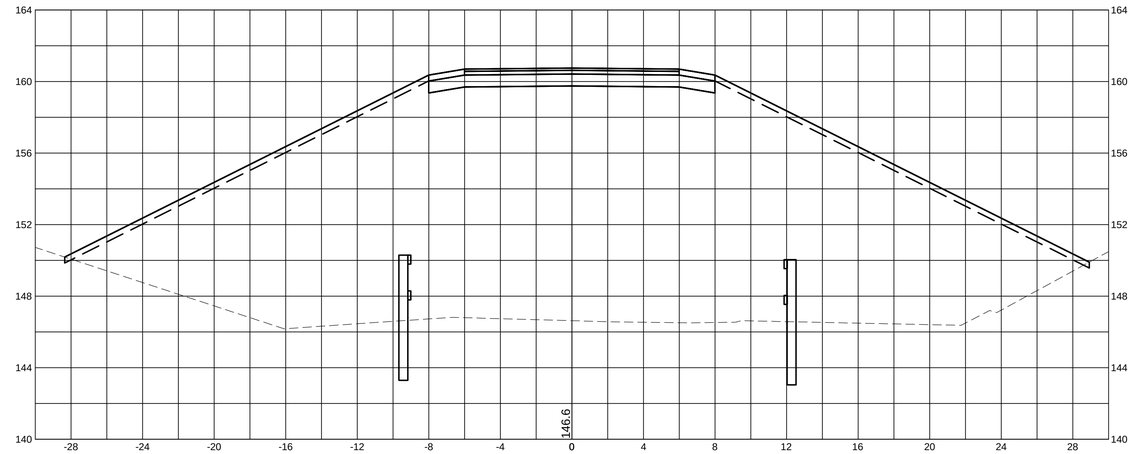
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

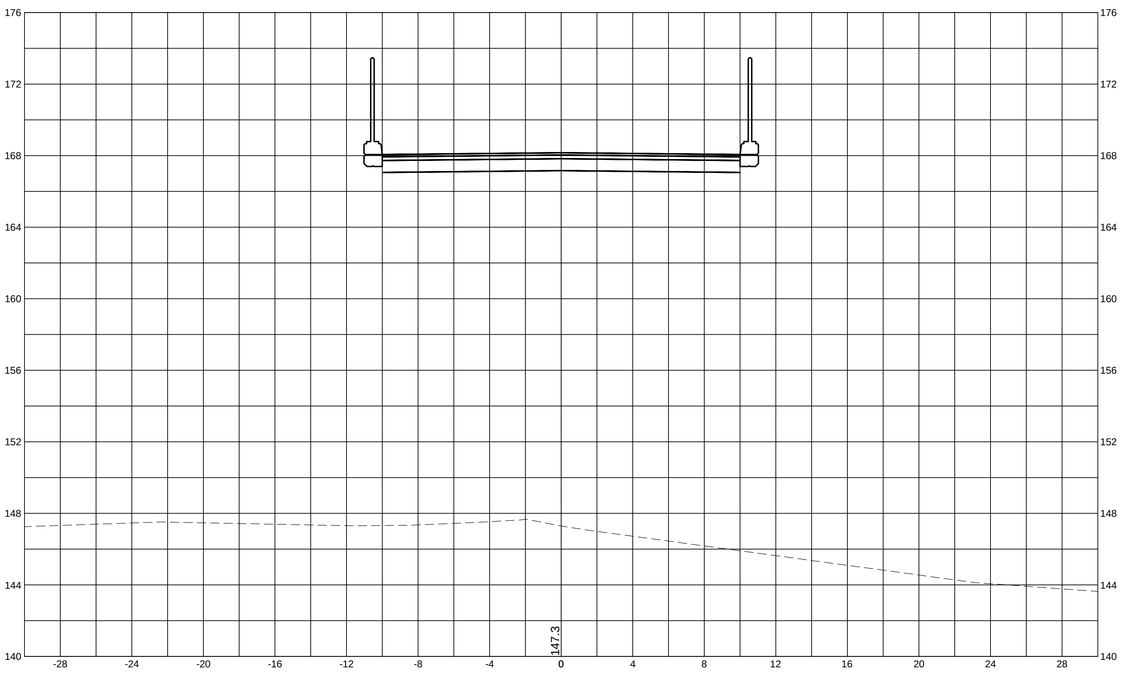
171+09.78



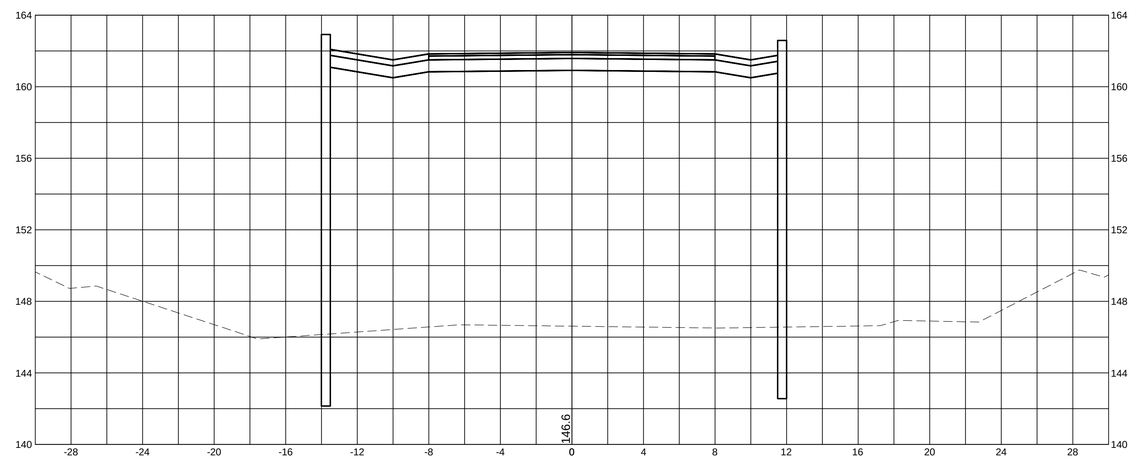
172+00



170+50 @ BRIDGE 11.18 OVER ROUTE 2A



171+59.78



MassDOT DWT Version:

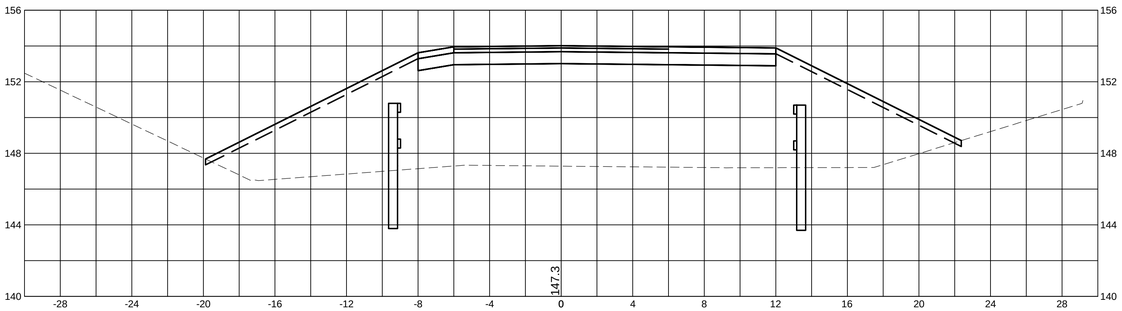
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	128	159
PROJECT FILE NO.	604532		

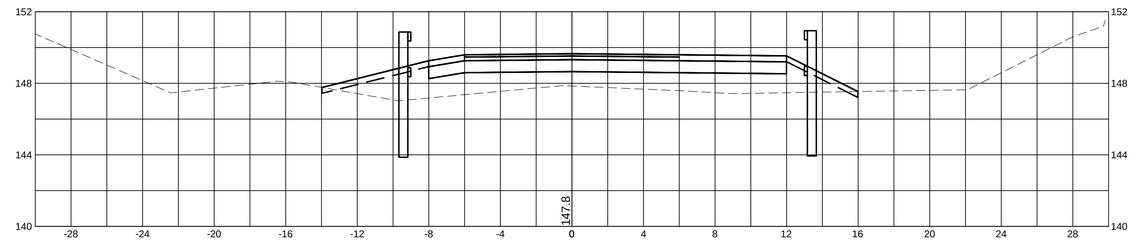
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

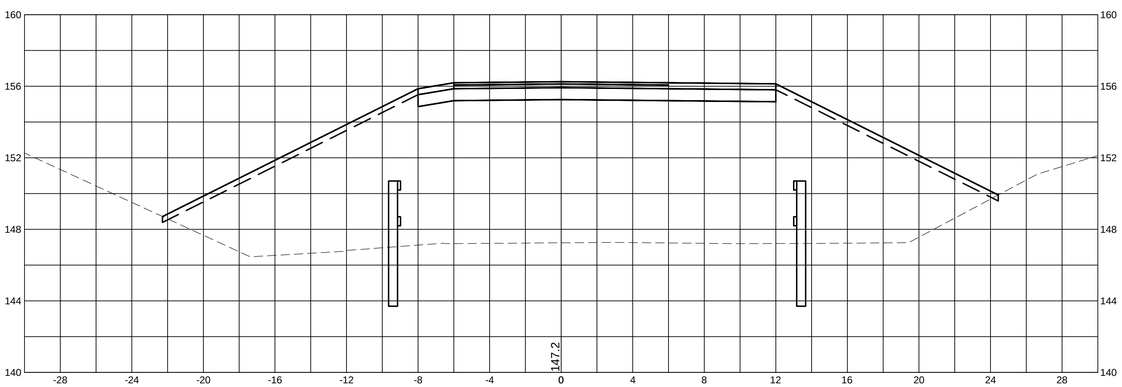
173+50



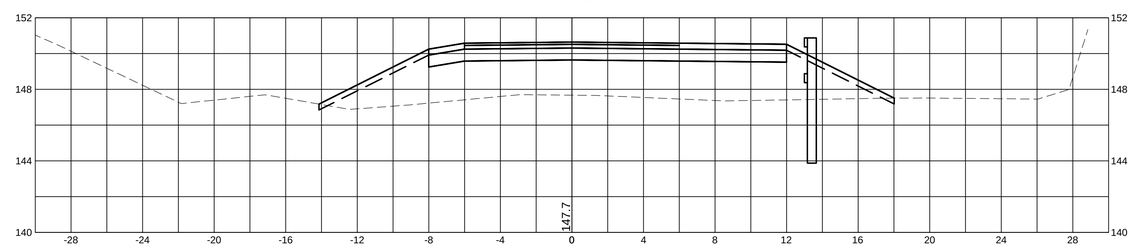
175+00



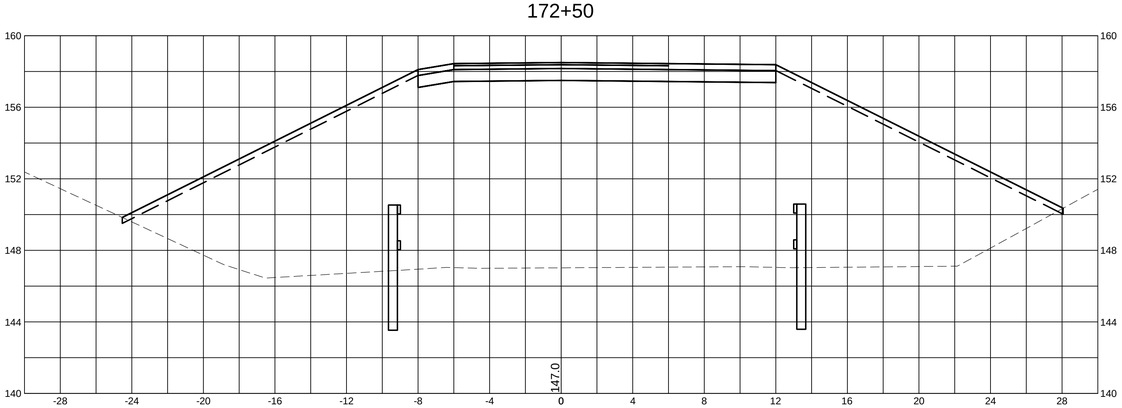
173+00



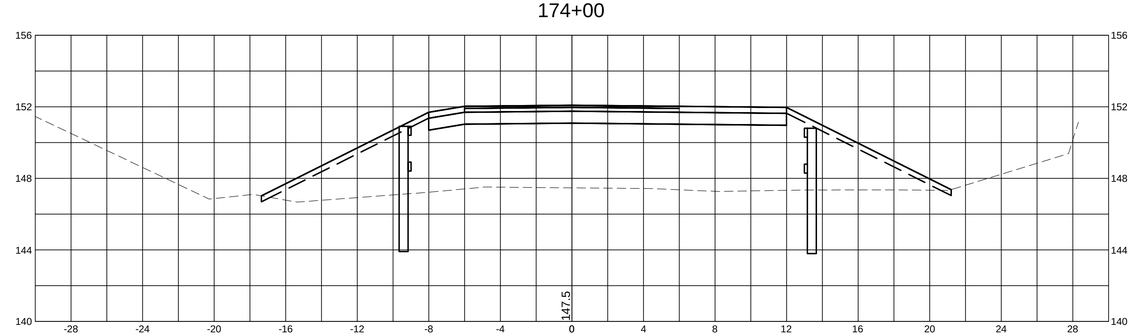
174+50



172+50



174+00



MassDOT DWT Version:

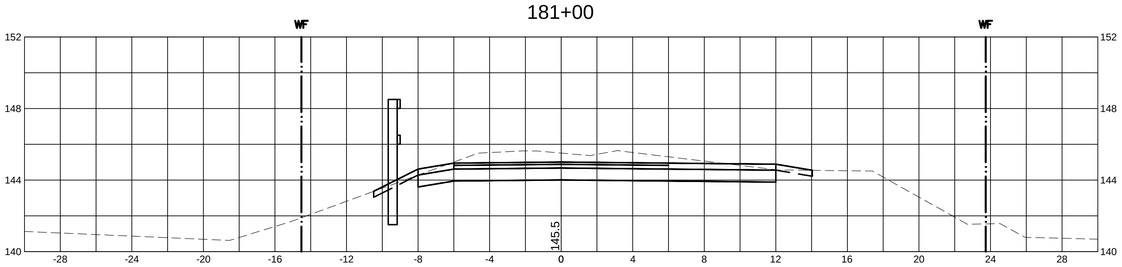
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	130	159
PROJECT FILE NO.	604532		

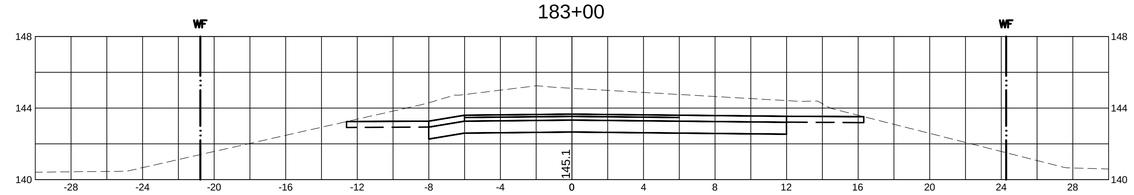
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

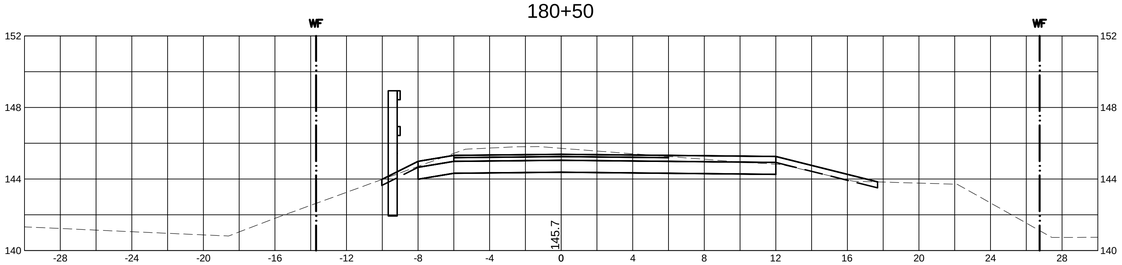
181+00



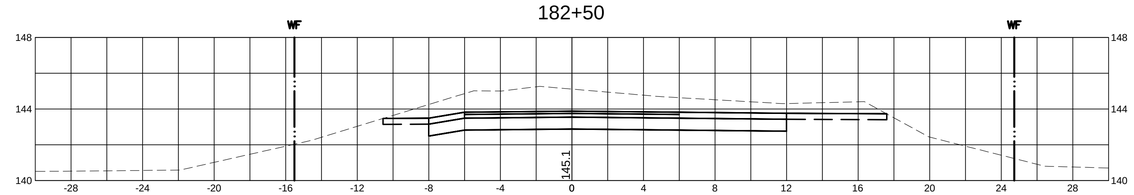
183+00



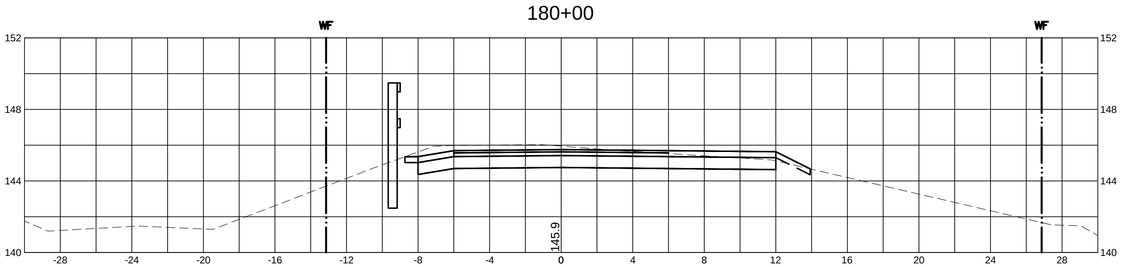
180+50



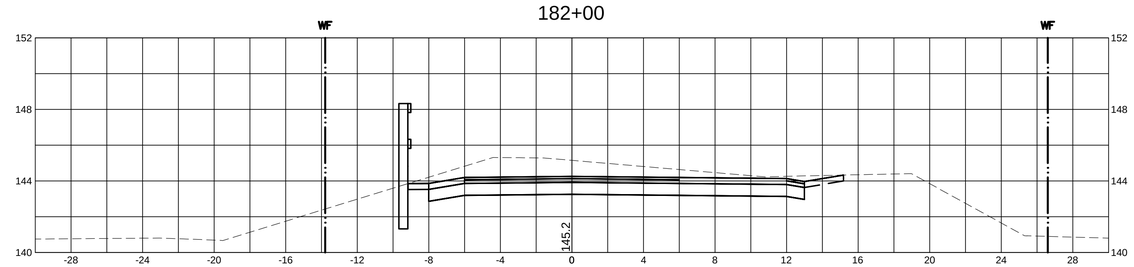
182+50



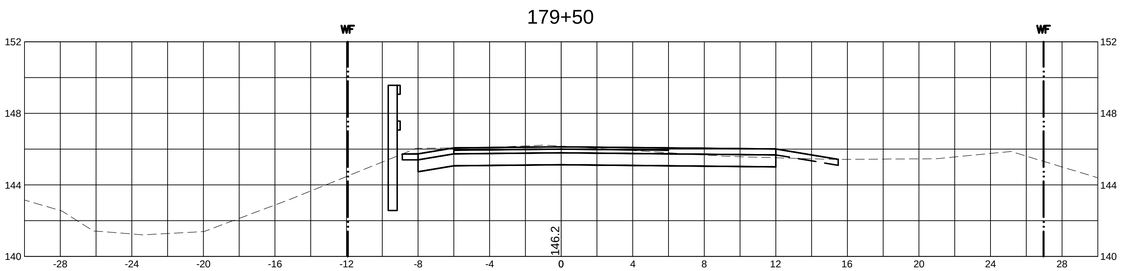
180+00



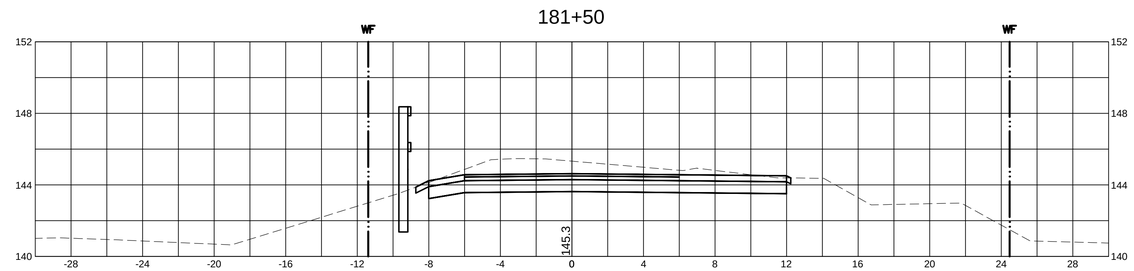
182+00



179+50



181+50



MassDOT DWT Version:

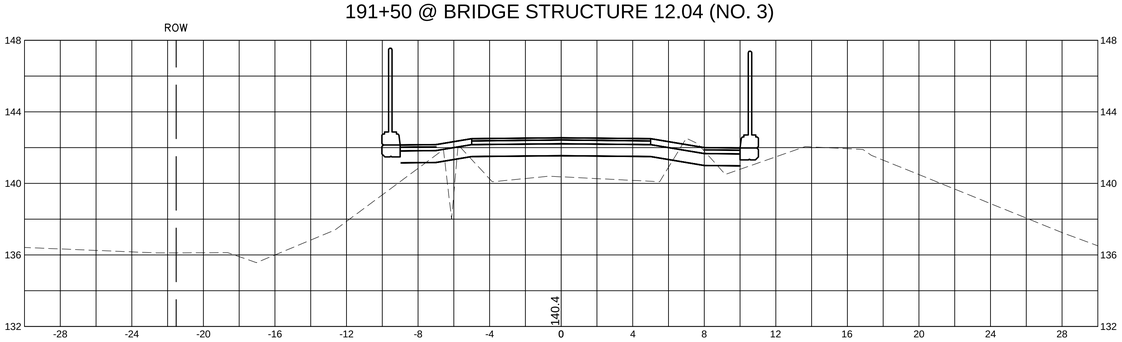
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	133	159
PROJECT FILE NO.	604532		

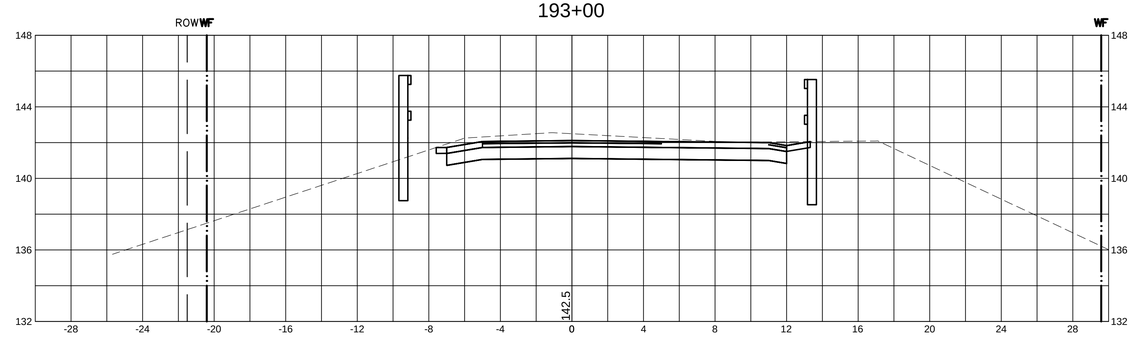
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

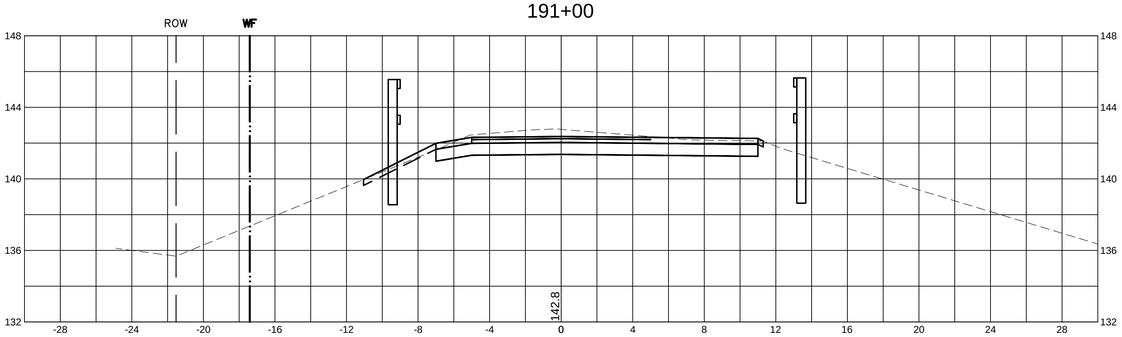
191+50 @ BRIDGE STRUCTURE 12.04 (NO. 3)



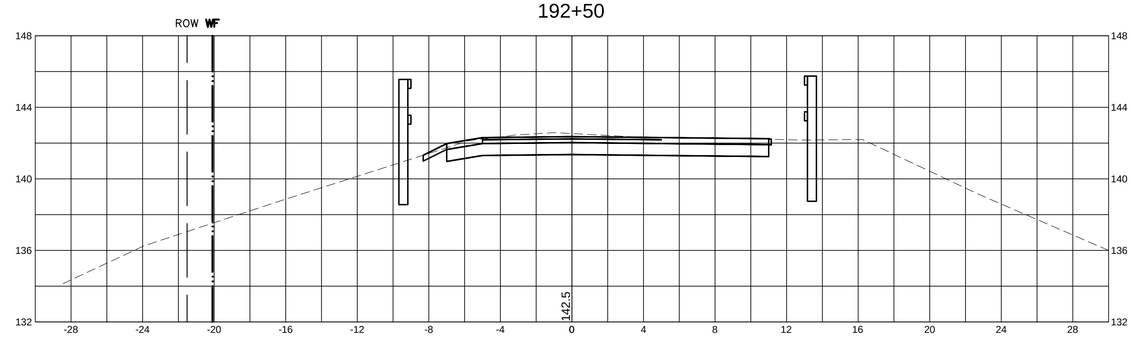
193+00



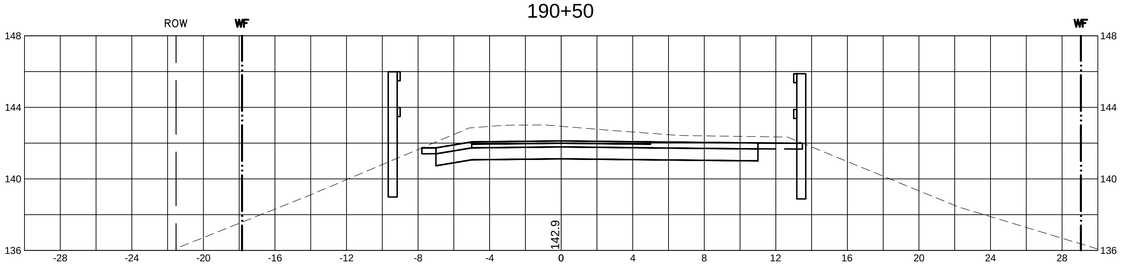
191+00



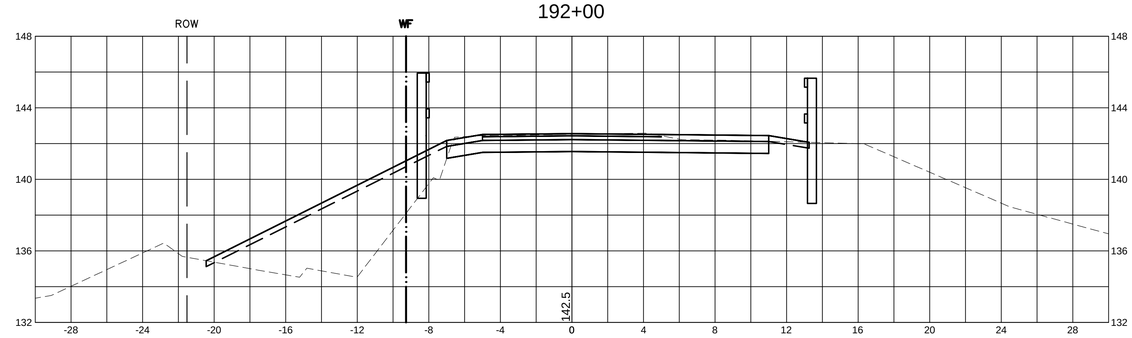
192+50



190+50



192+00



MassDOT DWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

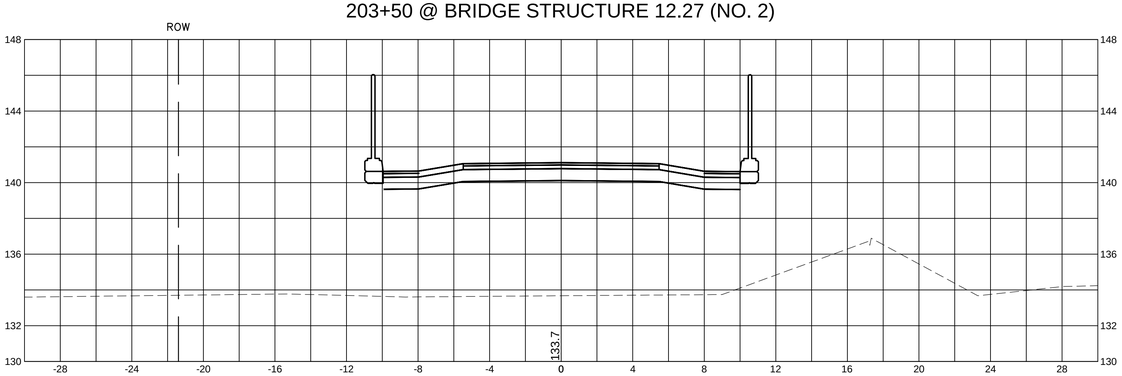
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	137	159
PROJECT FILE NO.	604532		

CROSS SECTIONS

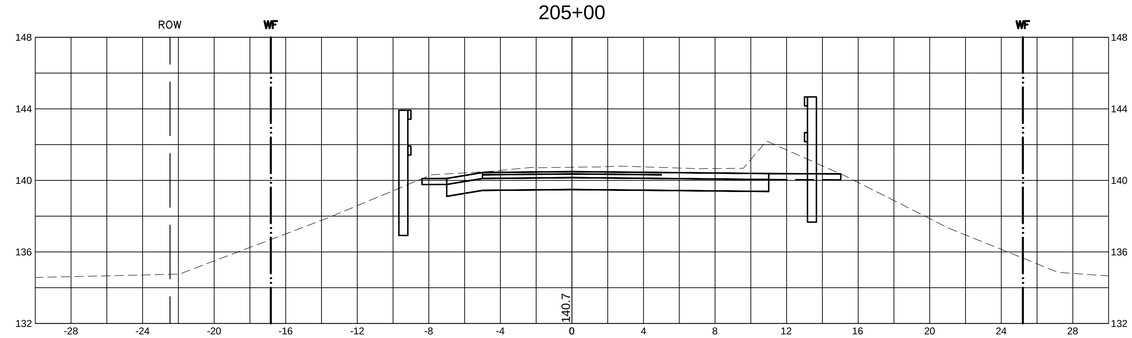
25-Feb-2014

10031_2A_XS.DWG

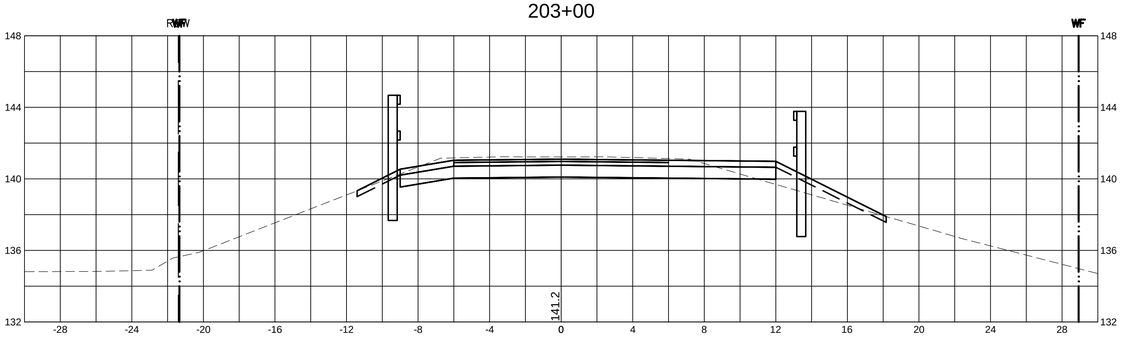
203+50 @ BRIDGE STRUCTURE 12.27 (NO. 2)



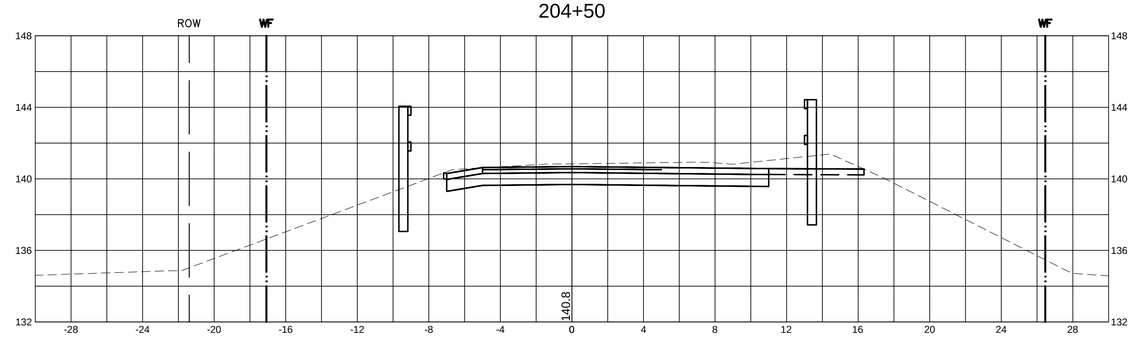
205+00



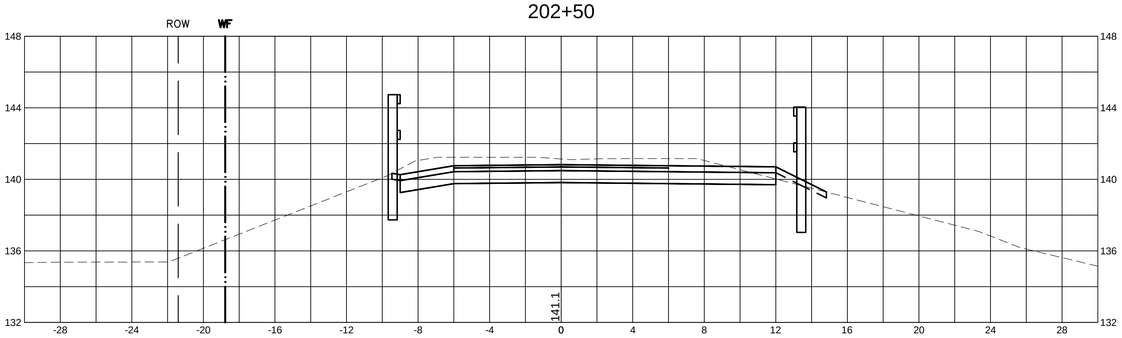
203+00



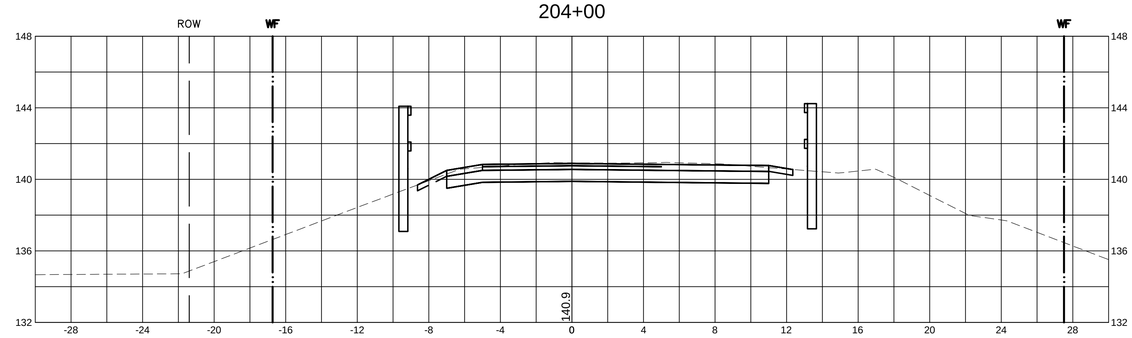
204+50



202+50



204+00



MassDOT DWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

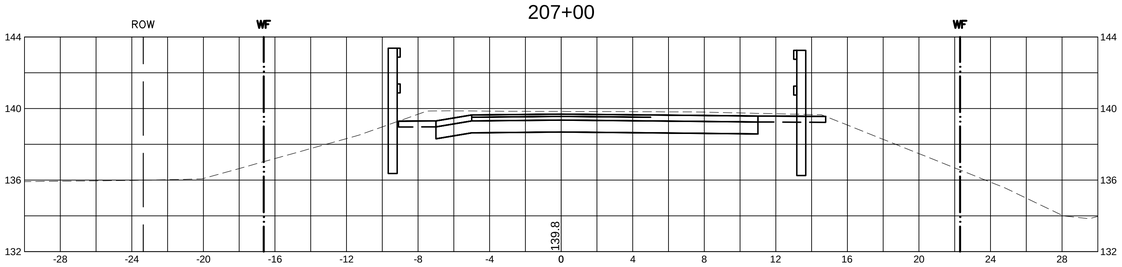
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	138	159
PROJECT FILE NO.	604532		

CROSS SECTIONS

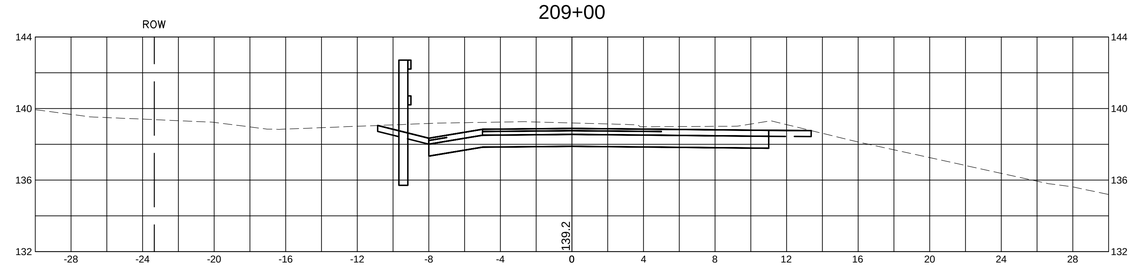
25-Feb-2014

10031_2A_XS.DWG

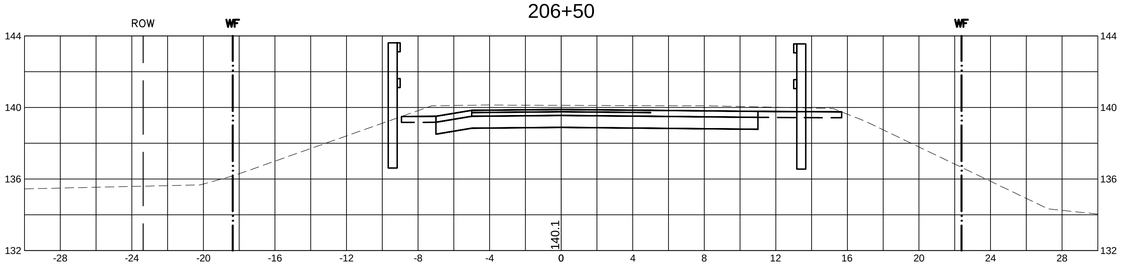
207+00



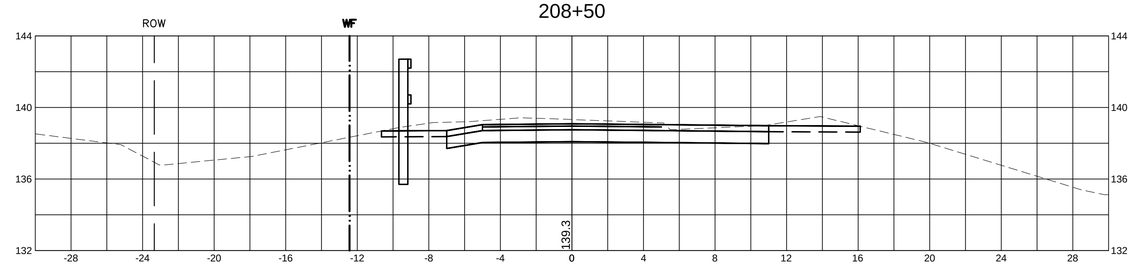
209+00



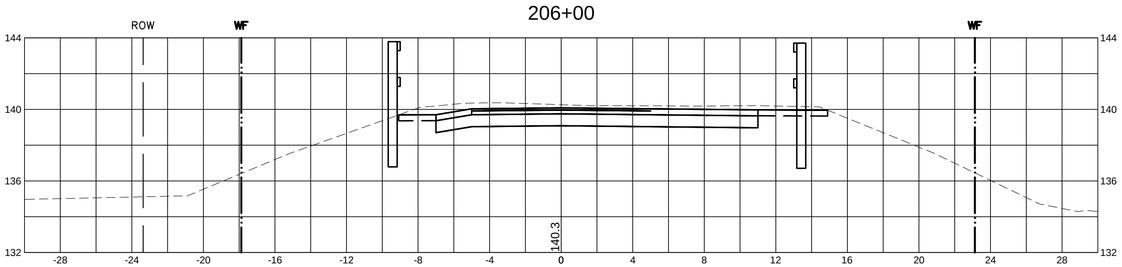
206+50



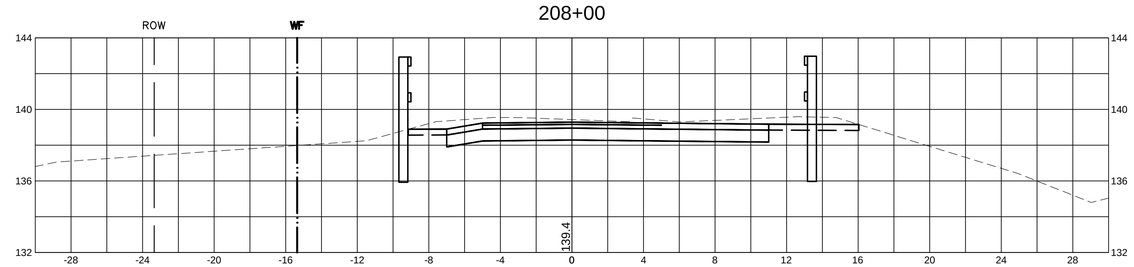
208+50



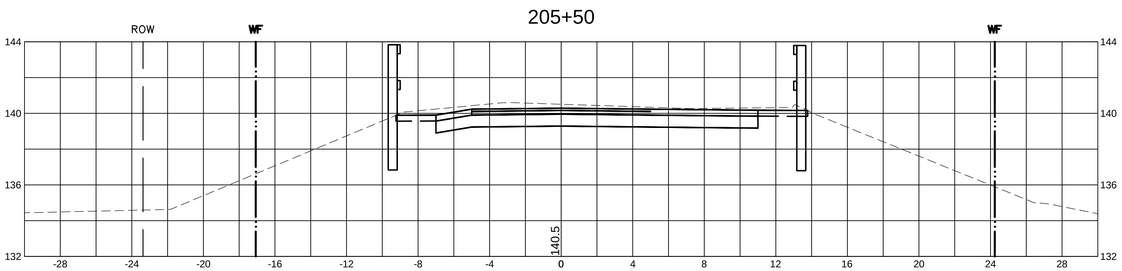
206+00



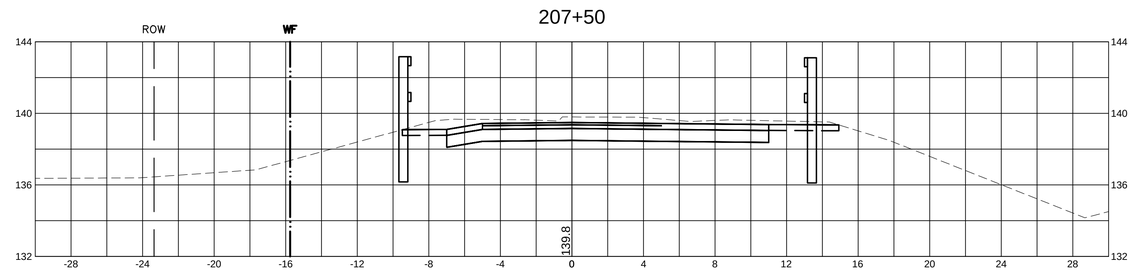
208+00



205+50



207+50



MassDOT DWT Version:

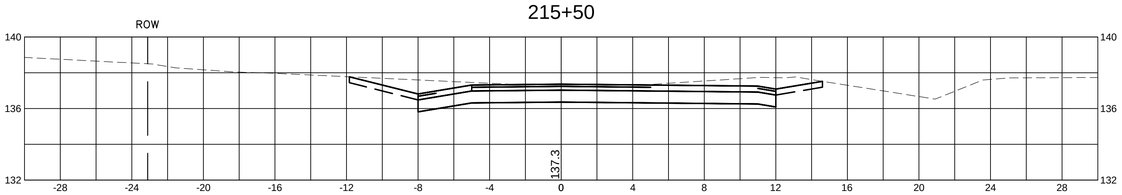
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	140	159
PROJECT FILE NO.	604532		

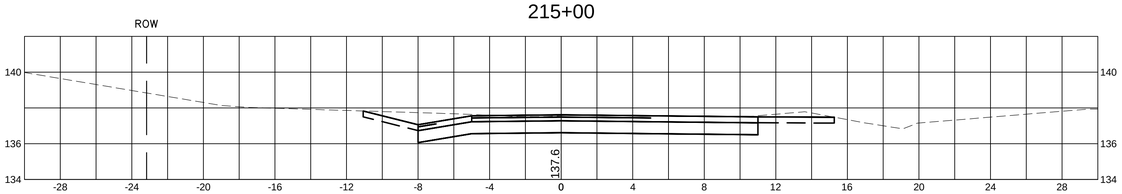
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

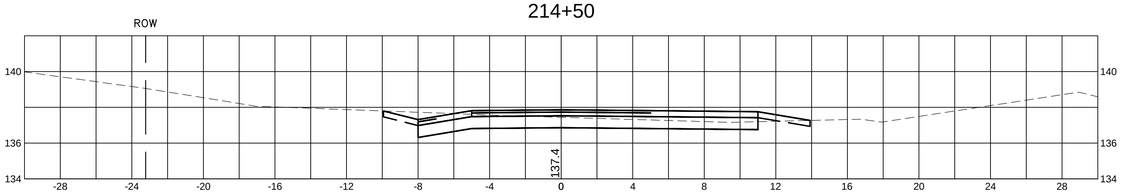
215+50



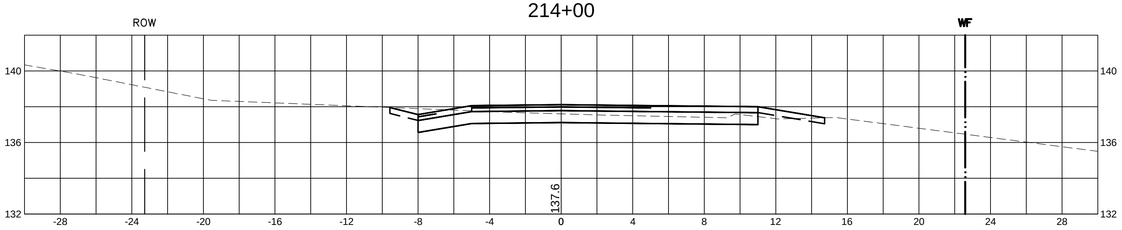
215+00



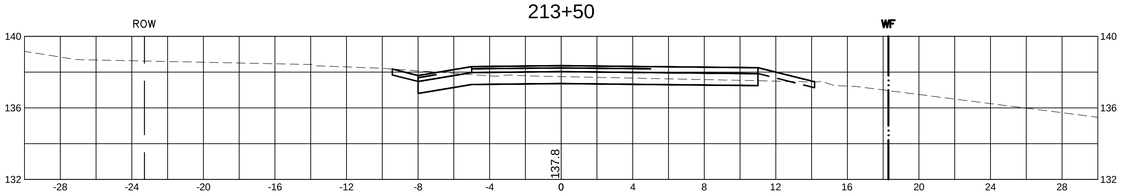
214+50



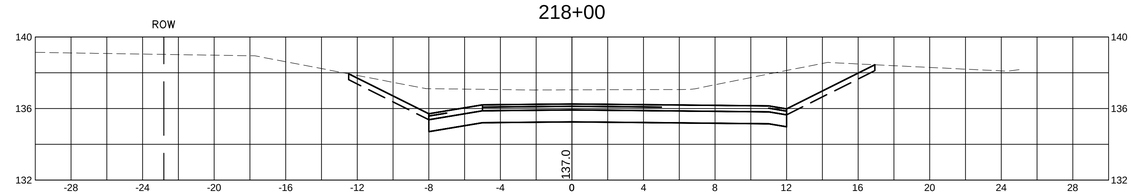
214+00



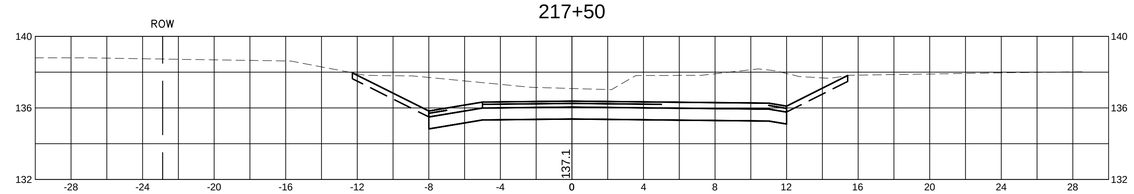
213+50



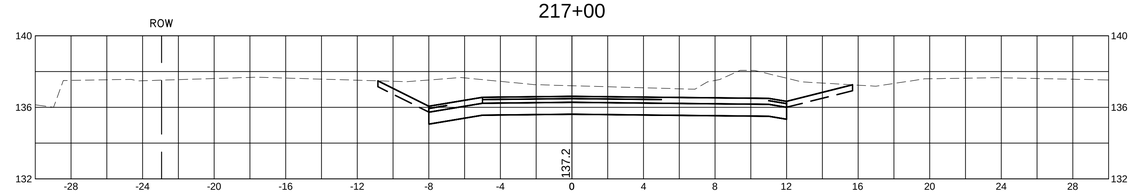
218+00



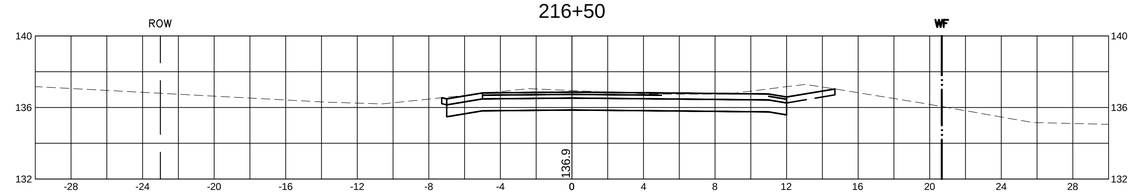
217+50



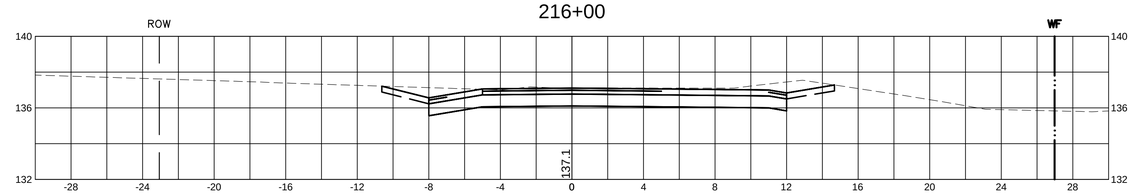
217+00



216+50



216+00



MassDOT DWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

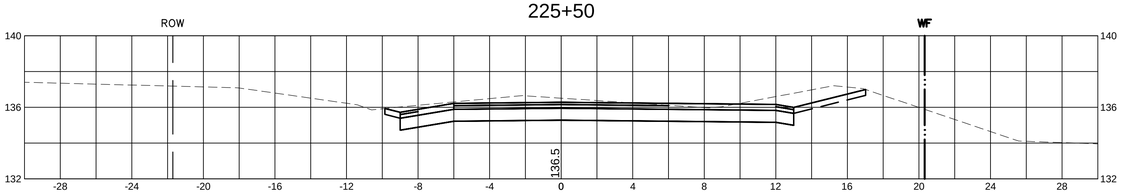
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	142	159
PROJECT FILE NO.	604532		

CROSS SECTIONS

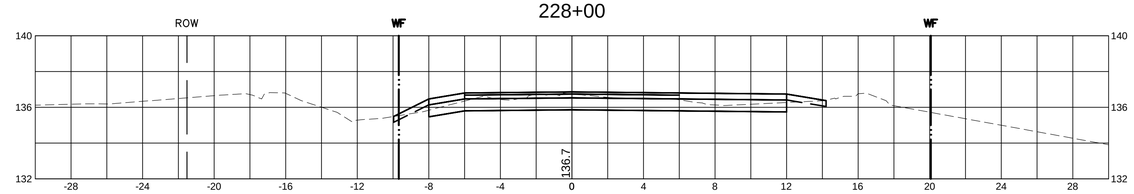
25-Feb-2014

10031_2A_XS.DWG

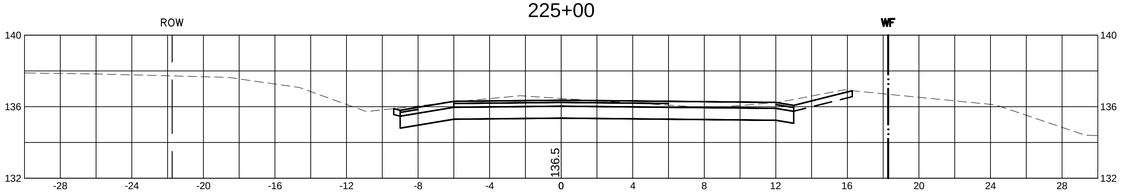
225+50



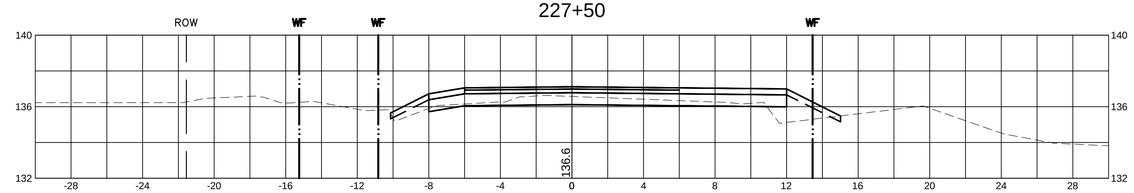
228+00



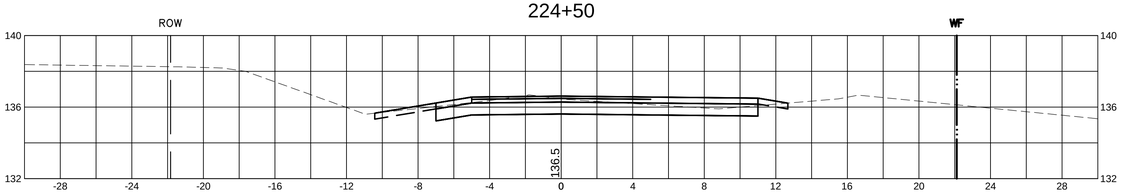
225+00



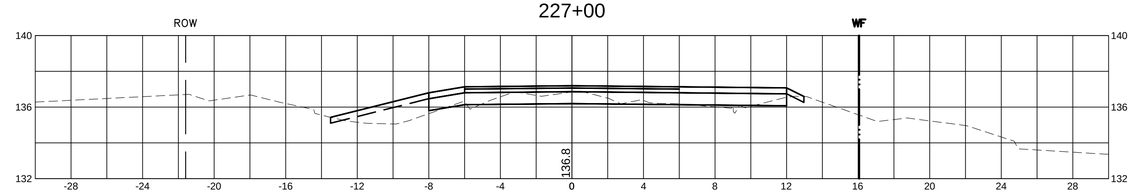
227+50



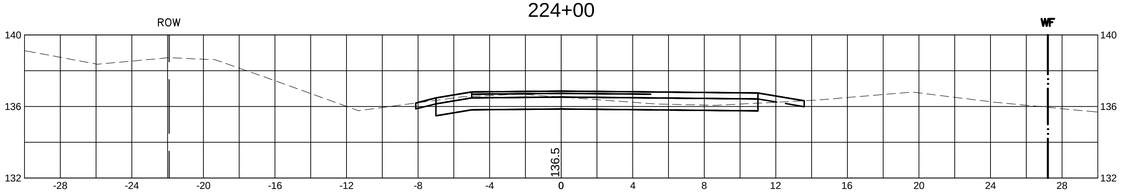
224+50



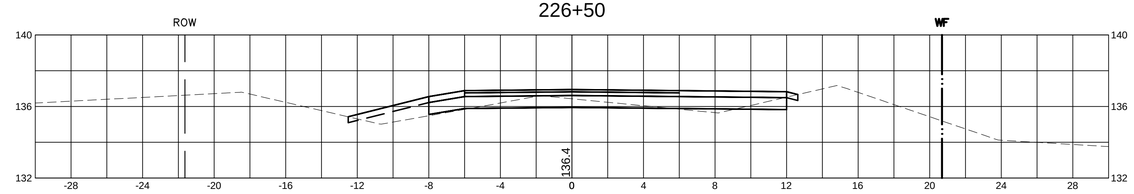
227+00



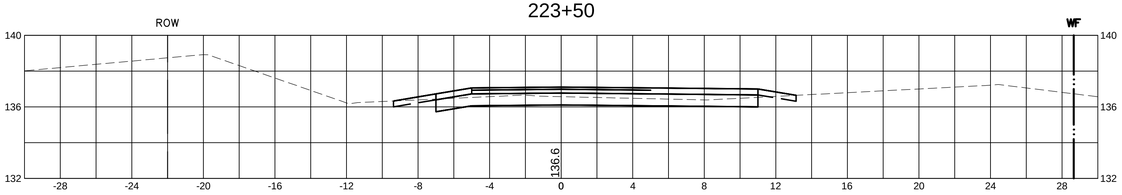
224+00



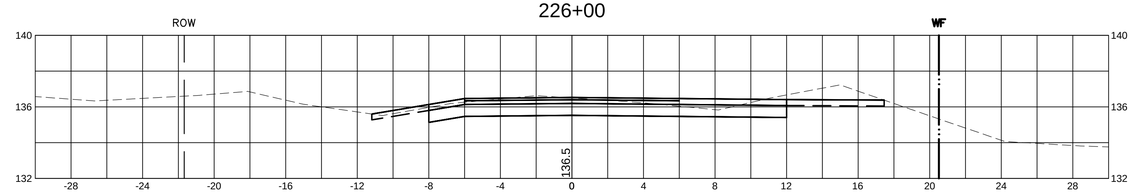
226+50



223+50



226+00



MassDOT CWT Version:

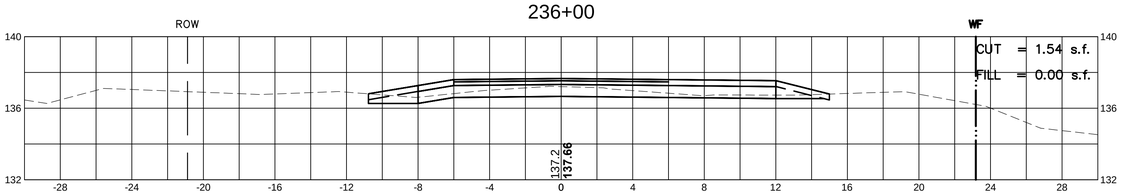
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	144	158
PROJECT FILE NO.	604532		

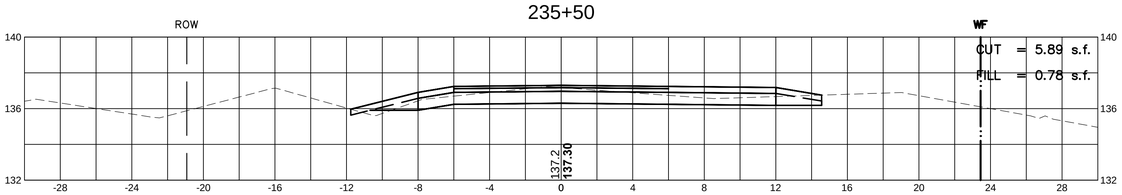
CROSS SECTIONS

10031_2A_XS.DWG 11-Mar-2014

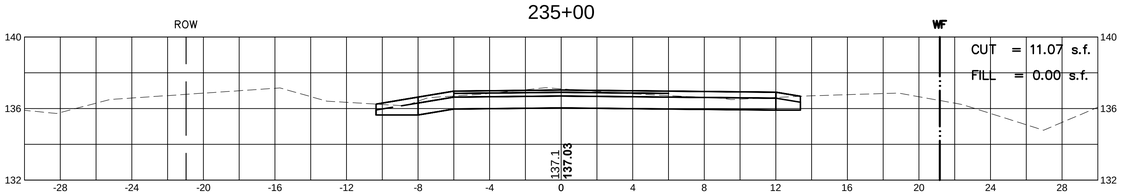
236+00



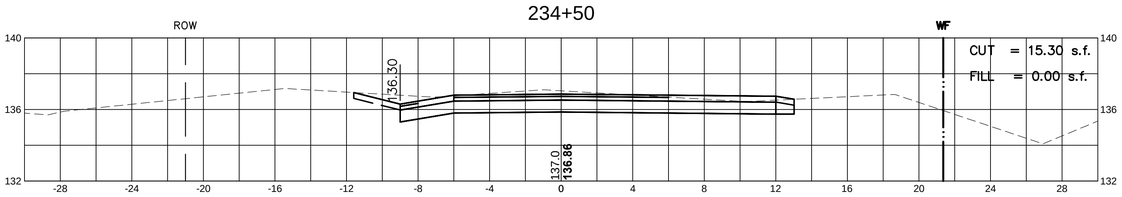
235+50



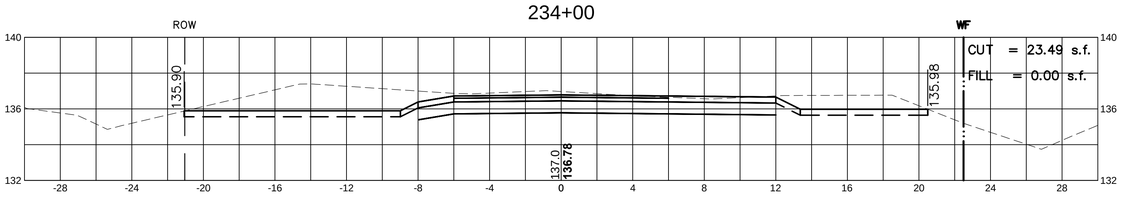
235+00



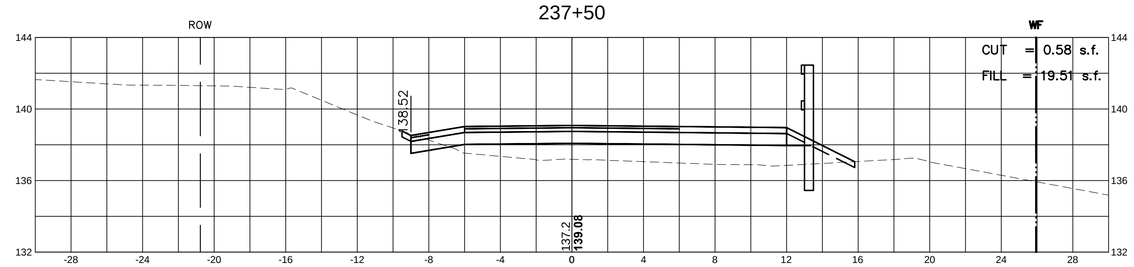
234+50



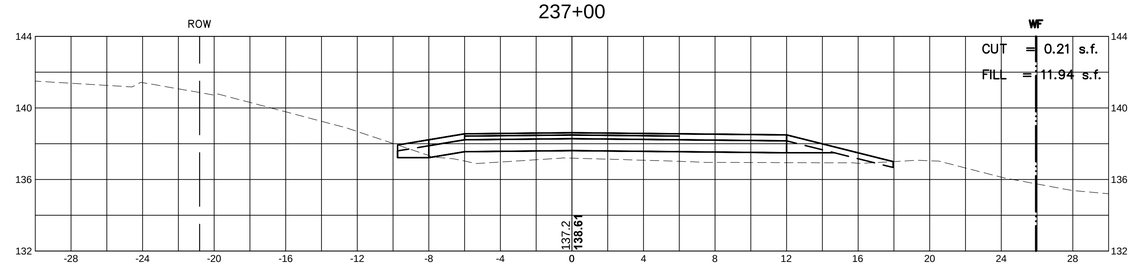
234+00



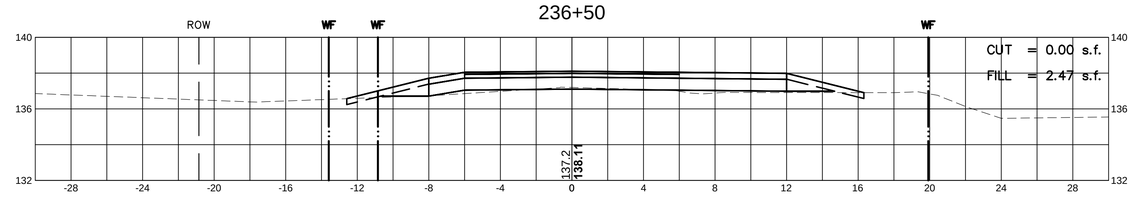
237+50



237+00



236+50



MassDOT CWT Version:

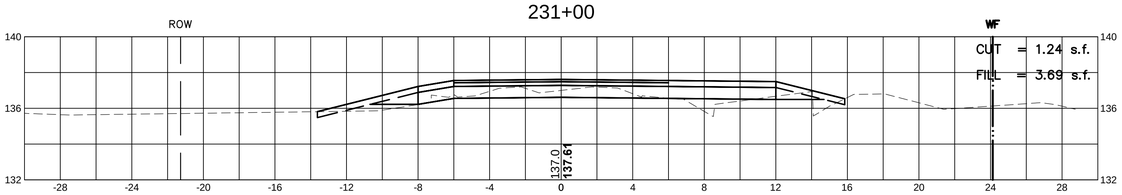
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	143	158
PROJECT FILE NO.	604532		

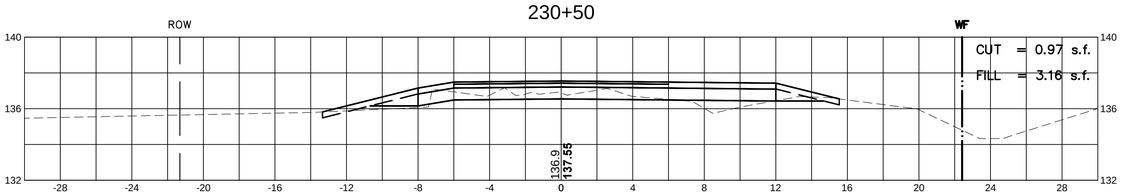
CROSS SECTIONS

10031_2A_XS.DWG 11-Mar-2014

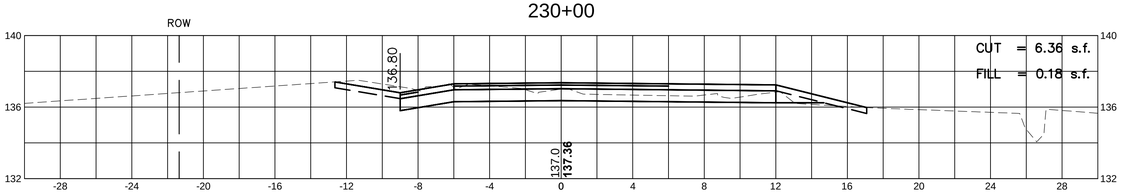
231+00



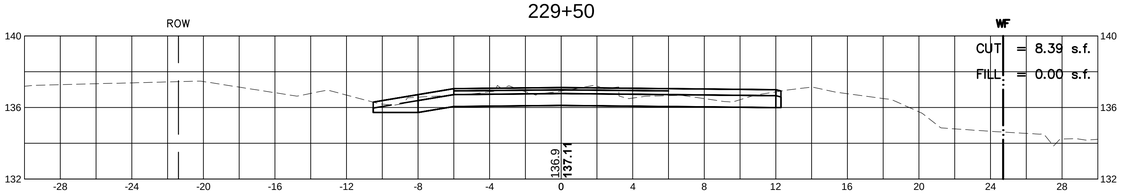
230+50



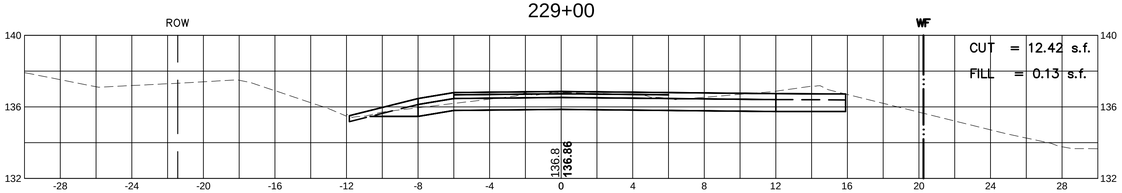
230+00



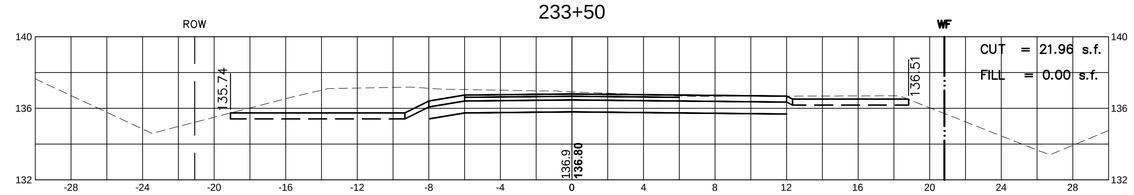
229+50



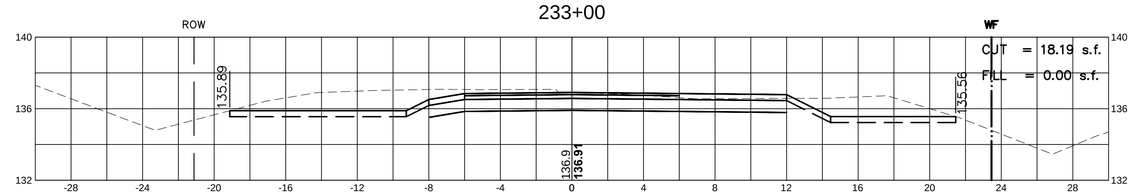
229+00



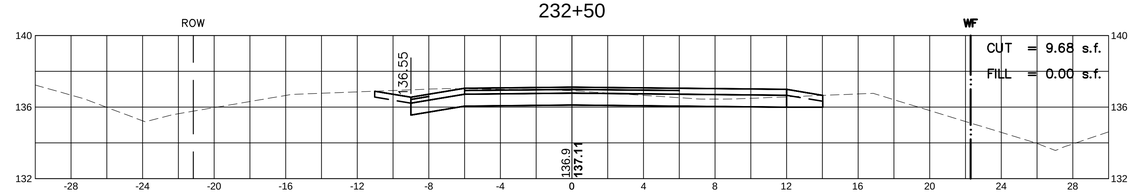
233+50



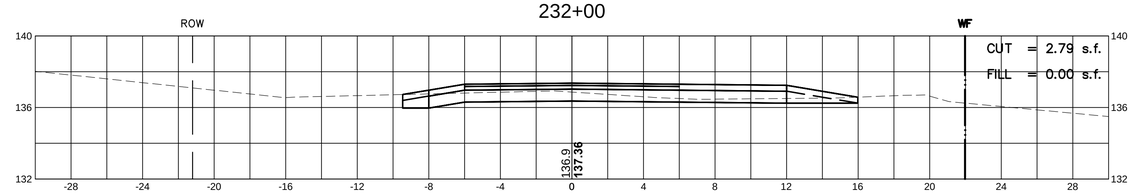
233+00



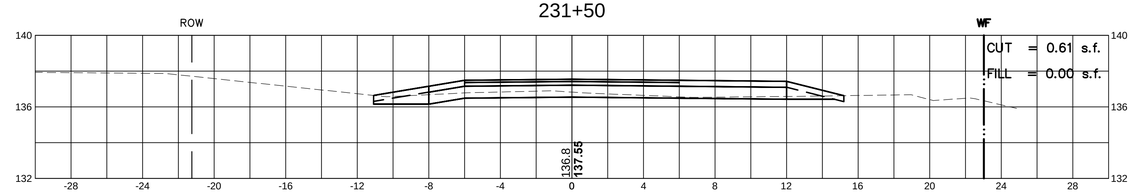
232+50



232+00



231+50



MassDOT CWT Version:

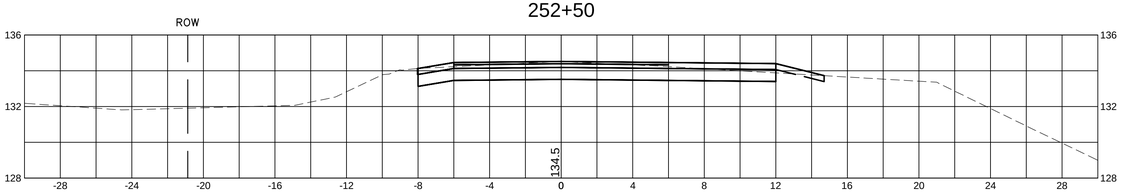
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	148	159
PROJECT FILE NO.	604532		

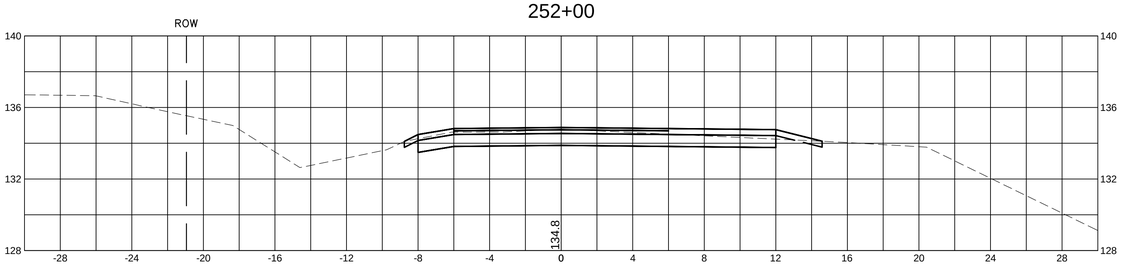
CROSS SECTIONS

10031_2A_XS.DWG 25-Feb-2014

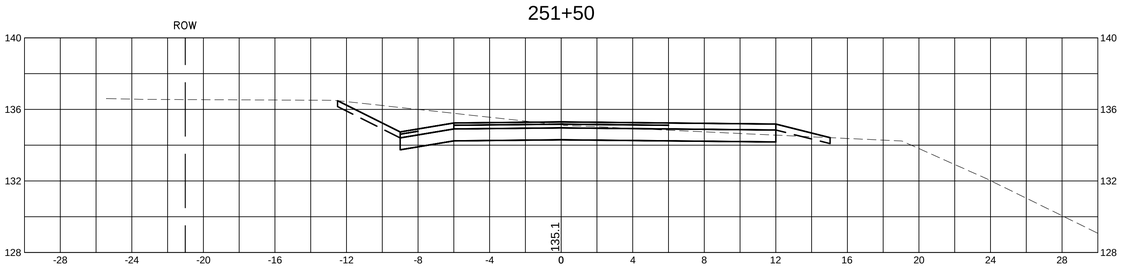
252+50



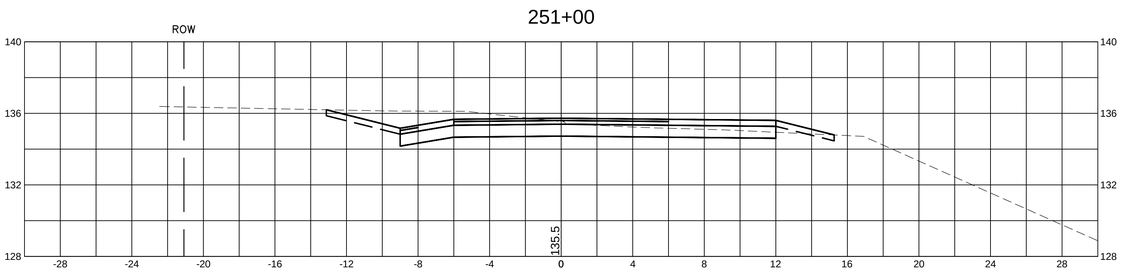
252+00



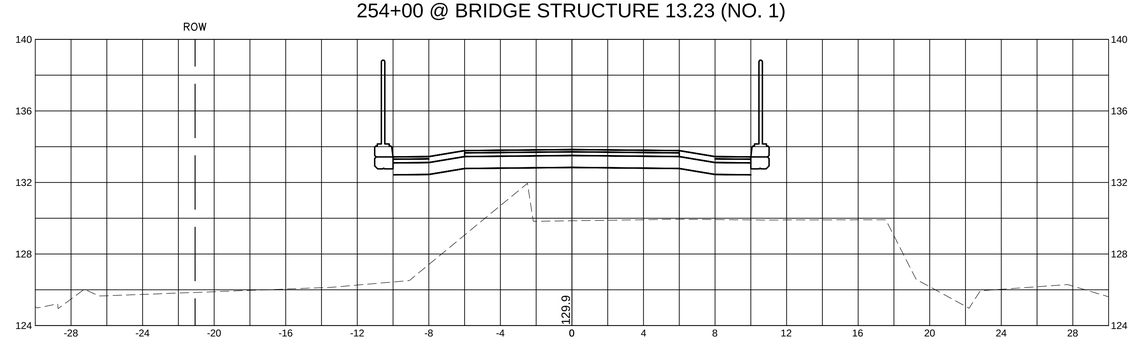
251+50



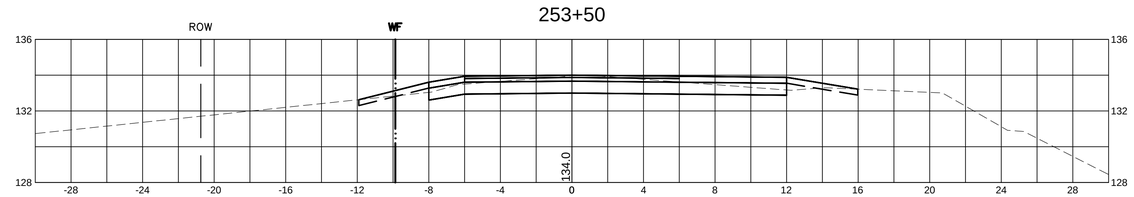
251+00



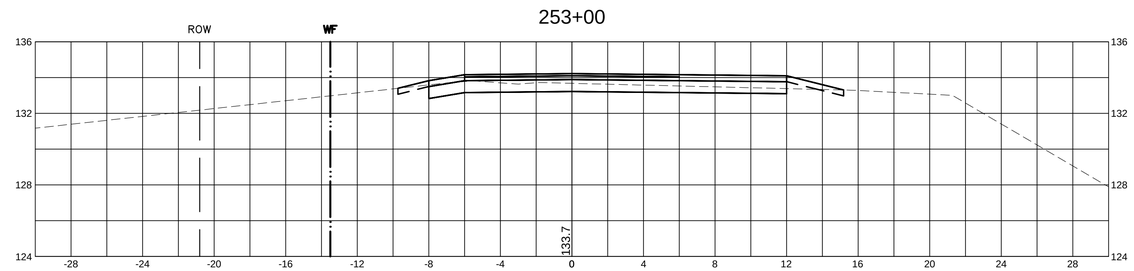
254+00 @ BRIDGE STRUCTURE 13.23 (NO. 1)



253+50



253+00



MassDOT DWT Version:

WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

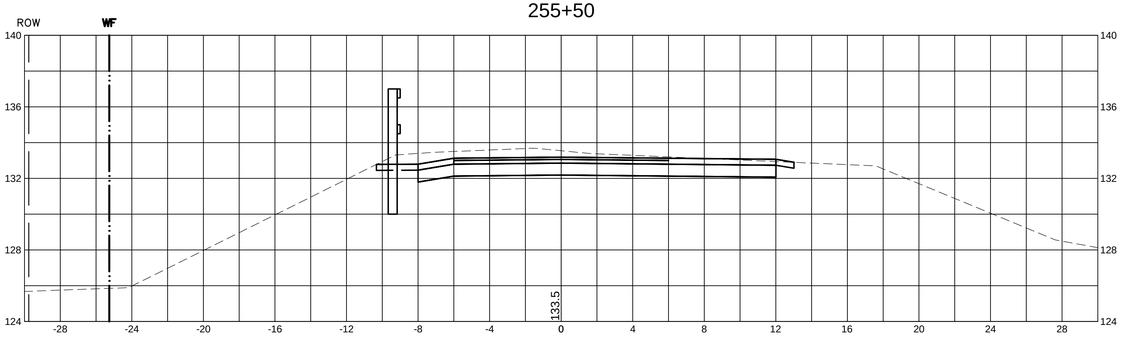
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	149	159
PROJECT FILE NO.	604532		

CROSS SECTIONS

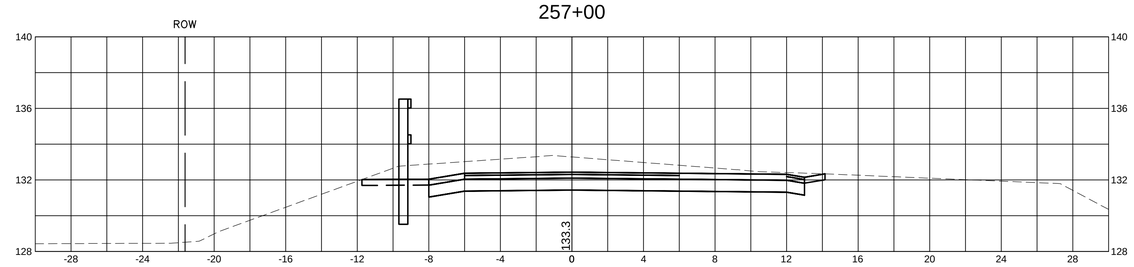
25-Feb-2014

10031_2A_XS.DWG

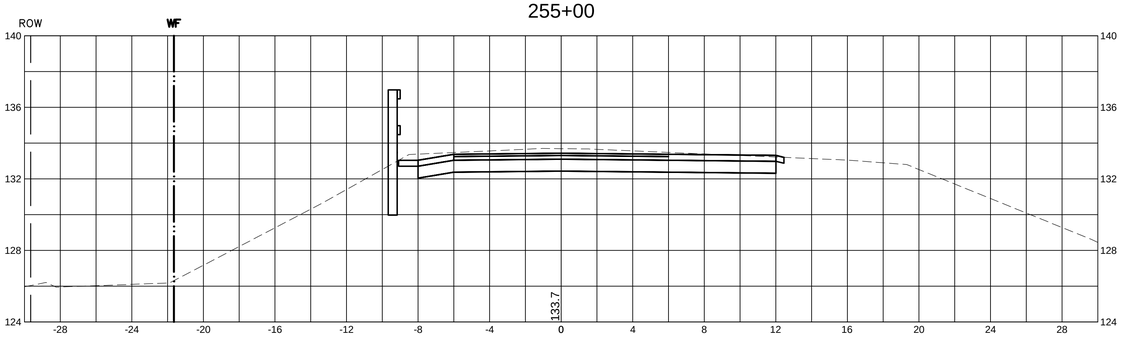
255+50



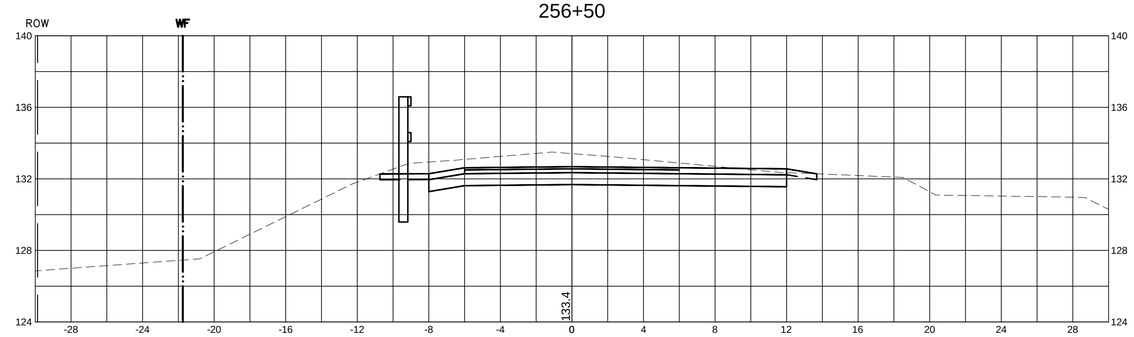
257+00



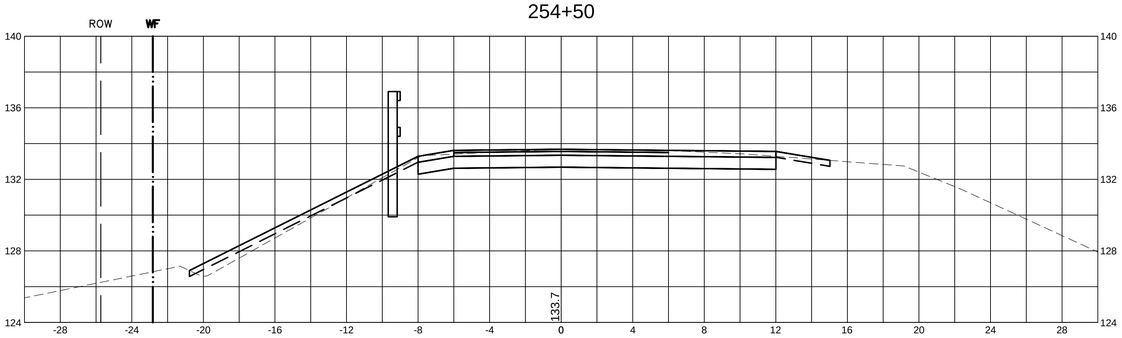
255+00



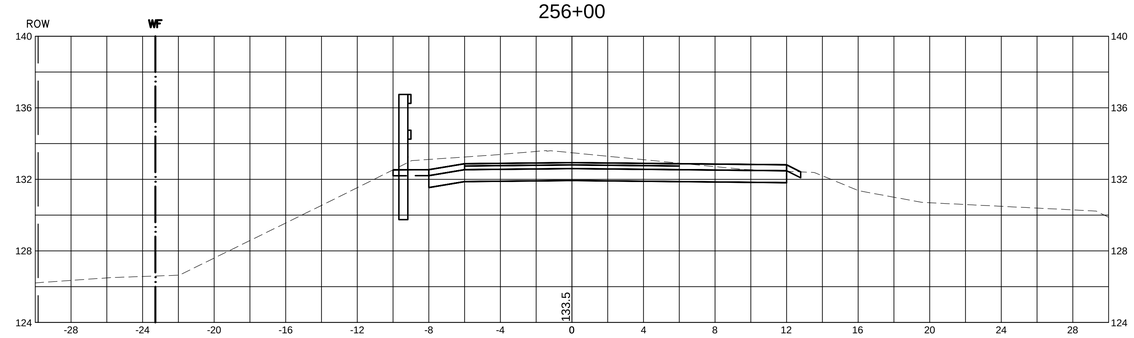
256+50



254+50



256+00



MassDOT DWT Version:

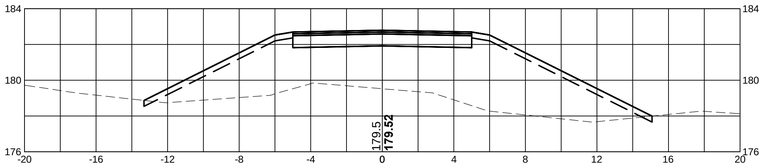
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	155	159
PROJECT FILE NO.	604532		

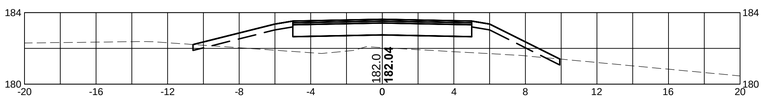
CROSS SECTIONS
ACTON GARAGE PARKING LOT

10031_2A_XS.DWG 25-Feb-2014

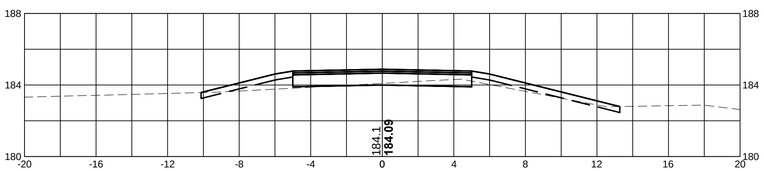
20+55



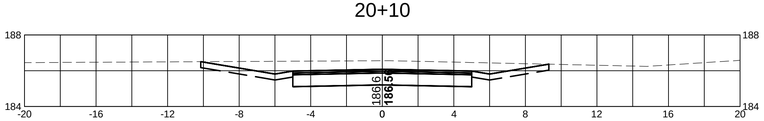
20+40



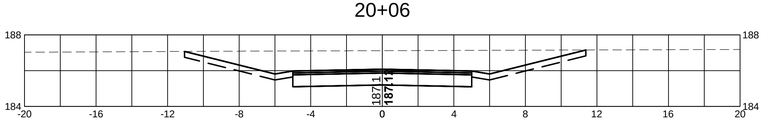
20+25



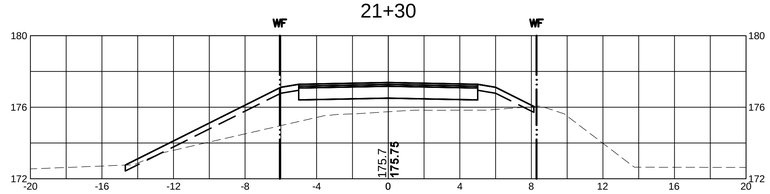
20+10



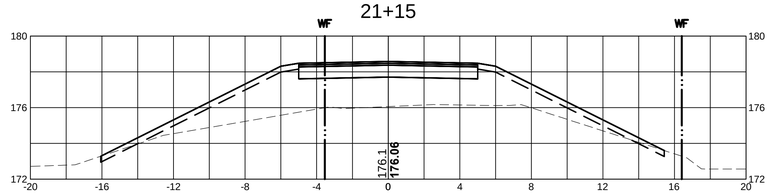
20+06



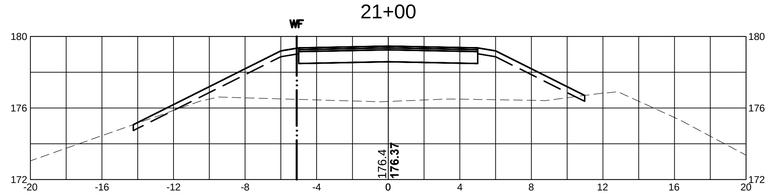
21+30



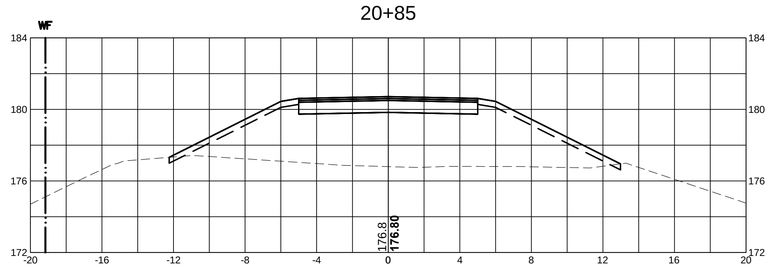
21+15



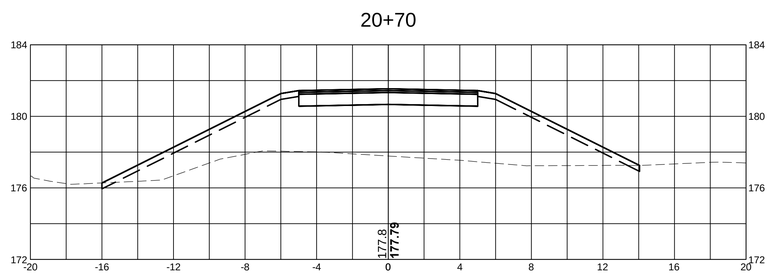
21+00



20+85



20+70



MassDOT DWT Version:

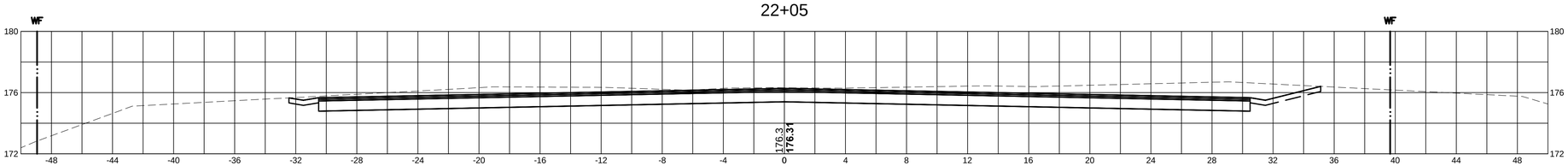
WESTFORD, CARLISLE & ACTON
BRUCE FREEMAN RAIL TRAIL PHASE 2A

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	FED. AID	156	159
PROJECT FILE NO.	604532		

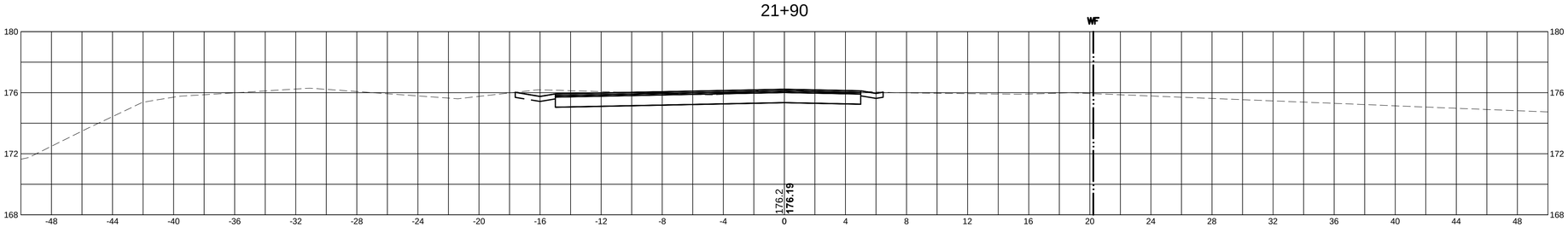
CROSS SECTIONS
ACTON GARAGE PARKING LOT

10031_2A_XS.DWG 25-Feb-2014

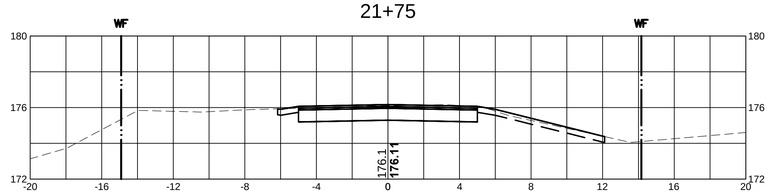
22+05



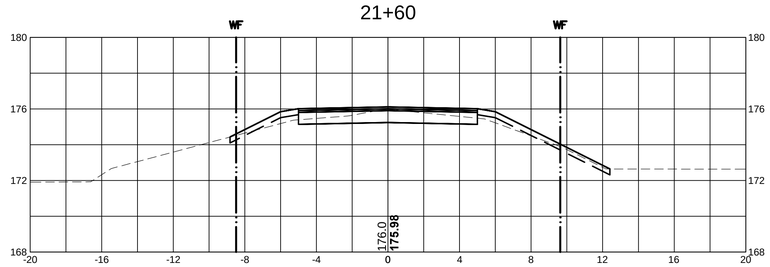
21+90



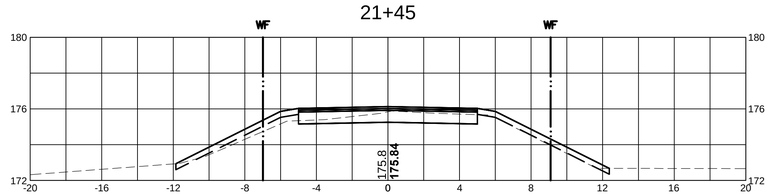
21+75



21+60



21+45



MassDOT DWT Version: