TERRA ENVIRONMENTAL, LLC
PLANNING | CONSULTING | MANAGEMENT | REMEDIATION

STORMWATER POLLUTION PREVENTION PAN

PROJECT:
Construction of the Bruce Freeman Rail Trail Including Signals and Two Bridges (Phase 2D)
In the Towns of:
Concord & Sudbury, Massachusetts
Federal Aid Project Nos. CMQ-033(028)X, STP-033(028)X, TAP-033(028)X

NPDES CGP MAR1004DF

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MassDOT, Highway Division
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Prepared: November 22, 2022

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1.0 PROJECT INTRODUCTION

This Stormwater Pollution Prevention Plan (SWPPP) has been developed by TERRA Environmental, LLC (TERRA) on behalf of A.A. Will Corporation ("A.A. Will" or "the Contractor"). This SWPPP submittal has been prepared in accordance with National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for Massachusetts for work activities to be completed in conjunction with the Construction of the Bruce Freeman Rail Trail Including Signals and Two Bridges, Phase 2D, (the Project) in Concord and Sudbury, MA. The Project Site is identified in **Figure 1**. In addition, this SWPPP was developed in accordance with MassDOT specification section 756 Stormwater Pollution Prevention Plan.

This Stormwater Pollution Prevention Plan is intended to serve as the guideline for managing, controlling, and eliminating erosion and sedimentation caused by stormwater during construction activities performed at the Site. This SWPPP should be used in conjunction with the Massachusetts Department of Environmental Protection (MassDEP) Order of Conditions, the MassDEP Notice of Intent, and the US Army Corps of Engineers Pre-construction Notification. This SWPPP and applicable MassDOT Specifications include requirements/standards for preparation, implementation, and termination of the Storm Water Pollution Prevention Plan required by the National Discharge Elimination System and applicable Construction General Permit. Relevant Project Specifications are provided in **Appendix A.**

1.1 Project Site Information

The Project is owned by the Massachusetts Department of Transportation Highway Division (MassDOT). The Project Site follows the historic railroad right of way located from the industrial park located at 25-33 Union Avenue in Sudbury, extending northerly for approximately 4.5 miles to the Concord and Sudbury town line and extending approximately 0.5 miles northward into Concord. The total area expected to be disturbed is 6.6 acres.

A Site Locus is included as **Figure 1**. A MassDEP Priority Resource Map is provided in **Figure 2**. Per the Priority Resource Map, the Site is located within 500 feet of Protected Open Space, Zone II Wellhead Protection Areas, NHESP Potential Venal Pools, Potentially Productive Medium Yield Aquifers, and Freshwater Wetlands.

The WGS 1984 Latitude/Longitude for the approximate Project center are:

Latitude: 42° 23' 19.1" N
Longitude: -71° 24' 40.28" W

The Project site is not located on Indian country lands, or on a property of religious or cultural significance to an Indian Tribe.

1.2 Project Scope of Work

The Project consists of the construction of a 4.5 mile long shared-use recreational trail for non-motorized use. The proposed work also includes new trail parking areas, two bridge crossings, drainage and culverts,

and the construction of a wetland replication area. The following paragraphs provide a general description of each construction activity.

Shared-Use Recreational Trail: Existing railroad ties and rails will be removed a 10-foot-wide paved asphalt surface will be installed. The trail has crushed ravel shoulders varying between 1 and 3-foot wide, narrowing where necessary to reduce vegetated wetland impacts. The trail includes 17 rest areas, constructed as pervious surfaced pads directly adjacent to the trail. The rest areas range in size from 6 by 10-foot pads to an 8 by 55-foot pad.

Shared-Use Path Connections and Parking: Trail deviations from the existing inactive rail right-of-way (ROW) include the following connections to land owned by the Town of Sudbury:

- A 250-foot long and 10-ft-wide shared use path connecting the existing Parkinson Parcel recreational area parking lot.
- A 750-foot long and 8-foot-wide shared use path connecting the existing Davis Field recreational area parking lot.
- A new 32-space parking area at the ROW crossing with Morse Rd will be connected to the trail by a 54-foot long and 10-foot-wide shared use path.

Bridge Renovations: Bridge crossing renovations will be completed at the Hop Brook and Pantry Brook crossings. The existing abutments at the Hop Brook bridge will be repaired, cleaned, and retained, and the superstructure will be replaced by new steel girders and a timber deck. The collapsed portions of the granite block abutments at the Pantry Brook bridge will be removed, and the lower portions of the abutments will be repaired and retained. A new precast cement bridge structure with a wood deck will be installed on the retained abutments.

Drainage and Culverts: Existing drainage patterns will be retained. Stormwater runoff will flow to new crushed gravel shoulders and new grass swales formed parallel to the trail. Of the 18 existing culverts, 6 will be cleaned of debris, 3 will be replaced, 2 will be repaired, and 1 will be abandoned in place.

Wetland Replication Area: A wetland replication area will be constructed on a parcel owned by the Town of Sudbury located adjacent to the railroad ROW. The wetland replication area is 2,240 square feet.

The Project plans to stockpile material within the project limits, outside of the ROW and environmentally sensitive areas. Although not anticipated, if larger stockpiles are required, they will be staged at 50 Morse Road, Sudbury, MA.

1.3 Construction Sequence

The following intended construction sequence of major activities is summarized below:

- Observance of pre-construction activities as defined in the Order of Conditions
- Establishment of contractor access and laydown areas
- Removal of vegetation within the limit of work as needed for access and proposed work
- Erosion and sedimentation control installation

- Preparation of the existing rail bed for proposed work including rail and tie removal and grading to proposed limits for proposed trail bed
- Wetland replication area construction
- Construction of new parking area
- Work on culverts and drainage improvements
- Monitoring of erosion and sedimentation controls
- Bridge reconstruction work
- Construction of connecting shared-use paths to The Parkinson Parcel and Davis Field
- Final grading and paving of the shared-use path
- Planting of proposed native species trees within the rail ROW corridor
- Intersection safety improvements at at-grade road crossings
- Intersection reconstruction work at Hudson Rd and Peakham Rd
- Restoration of temporary disturbances to wetland resource areas
- Removal of erosion and sedimentation controls

Construction sequencing and estimated dates of construction activities are described in further detail in **Appendix B.**

2.0 REGULATORY BACKGROUND

This SWPPP has been prepared consistent with the requirements of the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System Dewatering General Permit for Stormwater Discharges from Construction Activities. The Project EPA Approved Notice of Intent (NOI) is provided in **Appendix C**.

Please note that Project activities will disturb greater than 1-acres and therefore is subject to NPDES-Construction General Permit (s) including preparation and submittal of CGP Notice of Intent (NOI).

This SWPPP will serve as a guidance document for contractors, to provide consistent and effective management of stormwater runoff during construction. It is designed to complement Stormwater Pollution Prevention Best Management Practices (BMPs). The NPDES CGP requires that the Permittee(s) carry out activities to ensure that the objectives of the NPDES Permit program for stormwater discharges are achieved. Construction activities that disturb one (1) acre or more are regulated under the NPDES CGP. ***As mentioned above, this project is regulated under the NDPES Permit Program***. The EPA issues NPDES Permits in the State of Massachusetts; the General Permit (MAR120000, effective February 2022) is the appropriate NPDES Permit for coverage of stormwater discharges from this project.

It is the SWPPP Team's understanding that MassDOT has contacted the Massachusetts Historical Commission and the United States Fish and Wildlife Service (USFWS) to confirm Project compliance, per NPDES-CGP requirements.

2.1 Endangered or Threatened Species

The Project is eligible under Criterion E, per Appendix D of the CGP. Section 7 consultation with the United Stated Fish and Wildlife Service (USFWS) and the Massachusetts Fish & Wildlife Natural Heritage and Endangered Species Program (NHESP) is summarized below. Consultations and biological studies conducted are included as **Appendix D.**

Per the USFWS Information for Planning and Consultation (IPaC) webpage, the project area exists within the range of the northern long-eared bat (NLEB), a species designated as Threatened with a Final 4(d) Rule under the Endangered Species Act. The following requirements and considerations exist to protect the bat and its habitat and serves as a notice of potential changes to the regulatory framework for the NLEB during the duration of the project.

On July 7-9, 2020, Stantec Consulting, on behalf of MassDOT Highway Division Environmental Services, conducted a NLEB summer presence/absence survey using acoustic detection methods, in accordance with the 2020 survey guidelines. The survey did not detect NLEB, and as stated within the survey guidelines, the survey is valid for a minimum of five years. Due to the negative survey results, the project is eligible for a May Affect, Not Likely to Adversely Affect (NLAA) determination, without Avoidance and Minimizations Measures, in accordance with the Federal Highway Administration (FHA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA) – Range-wide Programmatic Consultation for Indiana Bat and NLEB.

On 9/27/2021, on behalf of FHWA, the lead federal agency for Section 7 consultation, MassDOT submitted a FHWA, FRA, FTA Programmatic Consultation for Transportation Projects affecting NLEB or Indiana Bat to the USFWS through IPaC and generated a NLAA documentation letter. Therefore, the project has completed Section 7 consultation through the Endangered Species Act. Due to the minimum 5-year validity of the negative presence/absence survey, the Contractor will conduct all activities that could result in stressors to the bats such tree removal/trimming, bridge and/or structure removal/maintenance, lighting, or use of percussives, within 5 years of July 7, 2020.

The project was not submitted to MassWildlife for Mass. Endangered Species Act (MESA) review because the project does not occur within any areas of Priority Habitat for State Protected Rare Species or Estimated Habitats of Rare Wildlife. A letter from MassWildlife submitted during the Massachusetts Environmental Policy Act Office (MEPA) review states the opinion of NHESP reviewers concluding that the project is not within Priority Habitat is included in **Appendix D**. The Priority Habitat areas just outside of the project area are shown on **Figure 3.**

2.2 Historic Property Screening Process

The Project runs through the Sudbury Center Historic District, which is listed in the National Register of Historic Places. MassDOT has reviewed the Massachusetts Statewide Programmatic Agreement for Section 106 of the National Historic Preservation Act of 1966, as amended [36 CFR Part 800.3(a)(2)] and has determined the Project will have no Adverse Effect on properties that are listed in or may be eligible

for listing in the National Register of Historic Places. Correspondence with the State Historic Preservation Office is provided in **Appendix E.**

3.0 DISCHARGE INFORMATION

Stormwater within the Project area ultimately discharges to Hop Brook and Pantry Brook

Point of Discharge ID	Name of Receiving Water	Is the Receiving Water Impaired? (CWA 303(d) list)	If yes, list pollutants causing impairment
001	Hop Brook (MA82A-05)	Yes	Algae, Turbidity, E. coli, Benthic Macroinvertebrates, Dissolved Oxygen, Total Phosphorus, Nutrient/eutrophication Biological Indicators, Water Chestnut
002	Pantry Brook (MA82A-19)	Yes	Fecal Coliform

*Note: No points of Discharge have TMDLs completed or have been designated Tier 2, Tier 2.5, or Tier 3 water.

The Project will not discharge stormwater into a Municipal Separate Storm Sewer System (MS4). There are waters of the United States within 50 feet of the Project's earth disturbances.

3.1 Authorized Non-Stormwater Discharges

All authorized non-stormwater discharges are identified in the Table below:

Authorized Non-Stormwater Discharge	Will or May Occur on Site?
Discharges from emergency fire-fighting activities	☒ Yes ☐ No
Fire hydrant flushing	☒ Yes ☐ No
Landscape irrigation	☒ Yes ☐ No
Water used to wash vehicles and equipment	☒ Yes ☐ No
Water used to control dust	☒ Yes ☐ No
Potable water including uncontaminated water line flushing	☒ Yes ☐ No
External building washdown (soaps/solvents are not used and external surfaces do not contain hazardous substances)	☐ Yes ☒ No
Pavement wash waters	☒ Yes ☐ No
Uncontaminated air conditioning or compressor condensate	☐ Yes ☒ No
Uncontaminated, non-turbid discharges of ground water or spring water	☐ Yes ☒ No
Foundation or footing drains	☐ Yes ☒ No
Uncontaminated construction dewatering water	☒ Yes ☐ No

4.0 NPDES CGP REQUIREMENTS

The overall objectives of SWPPP are to mitigate erosion and sediment pollution from site runoff, to prevent and contain accidental leaks, spillage, etc. from materials storage areas, and to prevent improper waste disposal. To maintain the effectiveness of construction site stormwater control, BMPs will be employed. This plan outlines the responsibilities of A.A. Will and other involved parties to implement the control measures required during construction for the Project. The SWPPP does not authorize post construction discharges that originate from the Site after construction activities have been completed and the project has achieved final stabilization.

This SWPPP has been prepared to meet the 2022 NPDES CGP SWPPP requirements.

4.1 General Construction Activities

The Site work and other construction activities associated with this Project will be conducted in accordance with the project Contract Specifications and all federal, state, and local requirements. The proposed work will be conducted within the Work Zone as shown on **Figure 4**. Disturbance of soil and conditions outside of the Limits of Work are not expected. The excavation areas within the project area boundary are where the major structural erosion and siltation control measures will be located. Areas within the project area boundary may be disturbed as required, as long as the conditions of the SWPPP are properly maintained per the conditions of the General Permit including any Order of Conditions, Project specific Specification Sections, and Erosion and Sedimentation Control Drawings provided in **Figure 4**. These documents have been issued and/or specifically developed as guidance documents for A.A. Will and their subcontractors, to provide consistent and effective management of stormwater runoff during construction.

A.A. Will, and their designated subcontractors, will be required to implement the necessary measures to control soil erosion resulting from demolition/construction operations, prevent the flow of sediment from the demolition/construction site, and contain demolition/construction materials (including excavation and backfill) within the protected working area to prevent damage or adverse effects to all existing stormwaters catch basins at and bordering the Site.

4.2 SWPPP Team

The SWPPP Team will consist of two primary controllers, the MassDOT who has operational control over the construction plans and specifications, and A.A. Will who has day-to-day operational control over the SWPPP.

Their roles are defined below:

1. The MassDOT has control over construction plans and specifications, including the ability to make modifications to those plans and specifications.
2. A.A. Will has day-to-day operational control of those activities necessary to ensure compliance with a SWPPP for the Site or other permit conditions

These controllers are identified in the following sections.

4.2.1 Control over Construction Plans and Specifications

MassDOT Operators:

Resident Engineer:	Adam Nabulsi
Phone:	617-413-8073
Email:	adam.nabulsi@dot.state.ma.us
Address:	10 Park Plaza Boston, MA

Responsibilities:

1. Develop the project plans and specifications for the entire project site, through their prime consultant
2. Implement modifications to the plans and specifications for the project, as required
3. Notify all other project Controllers that may be impacted of any changes to the plans or specifications made
4. Identify A.A. Will with day-to-day operational control of the activities necessary to ensure compliance with the SWPPP and other Permit Conditions

4.2.2 Day-to-Day Operational Control over SWPPP and Permit Compliance

General Contractor (A.A. Will) Project Team:

Project Manager:	Mike Rennie
Phone:	617-592-4903
Email:	mrennie@aawill.com
Address:	145 Island Street Stoughton, MA

Project Foreman:	Craig Ireland
Phone:	781-706-0966
Email:	cireland@aawill.com
Address:	145 Island Street Stoughton, MA

Responsibilities:

1. Ensure that the SWPPP for the project site meets minimum requirements of project Specifications, and all other applicable conditions
2. Day-to-day operational control of the implementation of SWPPP, except as otherwise noted in the plan

3. At A.A. Will's discretion, subcontractors may be designated per contract specifications and plans. A.A. Will and TERRA will perform monitoring activities related to the NPDES-CGP as outlined in this SWPPP and is considered a "qualified person." A "qualified person" defined by EPA NPDES-CGP is a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.
4. SWPPP Qualified personnel will be trained to understand the following if related to the scope of their job duties (e.g., only personnel responsible for conducting inspections need to understand how to conduct inspections):
    - The location of all stormwater controls on the Site required by this permit, and how they are to be maintained;
    - The proper procedures to follow with respect to the permit's pollution prevention requirements; and
    - When and how to conduct inspections, record applicable findings, and take corrective actions.

4.3 Designated SWPPP Team Responsibilities

1. Prepare a SWPPP to prevent stormwater pollution and to control stormwater runoff.
2. Obtain the signatures required by the various certifications included in the SWPPP.
3. Review the requirements and determine eligibility for coverage under the General Permit and retain documentation (e.g., Endangered Species Act compliance).
4. Complete SWPPP Worksheet for Construction Activities.
5. Submit a NOI to the EPA at least 14 days prior to the initiation of construction activity covered by the General Permit (MAR120000) and post the NOI on the construction site premises per the CGP.
6. Post a notice of permit coverage at a safe, publicly accessible location, visible from the public road (i.e., the main construction site entrance) including:
    a. The NPDES permit tracking number for the project
    b. The name and telephone number of the local contact person
    c. The URL to access this SWPPP
    d. The following statement "If you observe indicators of stormwater pollutants in the discharge or in the receiving water, contact the EPA through the following website: https://echo.epa.gov/report-environmental-violations"
7. Identify in the SWPPP any authorized non-stormwater discharges that are combined with stormwater discharges and implement a system of controls to provide appropriate pollution prevention measures to these components of the discharge.
8. At the MassDOT's direction, allow access to the EPA and MassDEP staff to the construction site and to this SWPPP for inspections
9. Implement the stormwater pollution prevention controls for construction activities as depicted on the construction plans provided in the Project Contract and SWPPP

10. Ensure the erosion and sediment controls identified within the Project specifications and Contract, and SWPPP are maintained and routinely inspected and prepare and maintain inspection reports for Project's duration.
11. Amend SWPPP and complete Corrective Action Worksheet, see **Appendix F** for a copy of a Corrective Action Worksheet.
12. SWPPP Amendments will be kept in **Appendix G** of this SWPPP.
13. Maintain records of construction activities.
14. Update/prepare revisions to the SWPPP to accurately reflect site changes, control measure changes, or in response to a Reportable Quantity (RQ) release (as referenced, 40 CFR 110, 40 CFR 117 and 40 CFR 302, and 310 CMR 40).
15. Notify the Engineer and MassDOT who will be responsible for notifying the National Response Center in Washington, D.C. by calling (800) 424-8802 as soon as knowledge of a discharge equal to or greater than the RQ or standard for oil or a hazardous substance is obtained. A notification may also be required to MassDEP.
16. Modify the SWPPP within 14 days of knowledge of the release of an RQ.
17. Insert into the SWPPP, within 14 days of a release of an RQ, a description of the release of oil or hazardous substance, the circumstances leading up to the release and the date of the release.
18. Submit to the EPA a written description of the release of an RQ, an estimate of the amount of the release, the date of the release, the circumstances leading up to the release, and the steps that will be taken in response to the release.
19. After final stabilization of the construction site, submit a Notice of Termination (NOT) to the EPA.
20. Retain this SWPPP and all construction records for a period of at least three years following final stabilization and the filing of a NOT. A copy of the SWPPP and all pertinent records shall be maintained at the construction site during the duration of construction activity.

4.4 SWPPP Amendments

An amendment of the SWPPP will be required whenever there is a significant change in construction specifications or operations, which may affect the discharge of pollutants to surface waters or groundwater.

SWPPP Amendments deemed to be major must be documented by the form provided in **Appendix G.** Space has been provided to document the specific amendment and must describe the purpose of the amendment, the party responsible for the amendment, and their contact information. As each amendment is documented, the applicable site erosion control plan and/or water pollution control plan figure(s) shall be revised showing pertinent information as it relates to the amendment. Amendments shall be dated and directly attached to this SWPPP.

5.0 STORMWATER MANAGEMENT CONTROLS

This section of this SWPPP provides a description of appropriate controls and measures that will be implemented during the construction activities to be performed at the Site. This plan utilizes controls and

measures to the degree that is practicable and in conjunction with the objectives of the goals of the construction activities.

It is A.A. Will's responsibility to incorporate the specifics of this plan into practice and to apply the principles of erosion and sedimentation control in runoff emanating from the construction site.

The principles of erosion and sedimentation control are:

- Fit the activity to the topography and soils
- Retain or accommodate runoff
- Minimize the disturbed area and duration of exposure
- Stabilize disturbed areas immediately
- Retain sediment
- Do not encroach upon areas outside the protected working area

Sediment is assumed to be the principal pollutant that will be generated from the Project during construction. The stormwater pollution prevention measures described in this plan are designed primarily to minimize the impacts from the pollutant.

The following sections describe sediment and erosion controls to be used during the construction process, the permanent stormwater management practices to be employed at the Site, and other control practices to be used to minimize stormwater pollution.

In addition to the conditions established under the EPA's Construction General Permit (CGP), it is A.A. Will's and subcontractors' responsibility to conduct work in full compliance with this SWPPP.

5.1 Project Selected Sedimentation and Erosion Controls

The Engineer recommends that in order to minimize erosion, A.A. Will shall preserve the natural vegetation of the Project Area, and locations adjacent to and outside the work as indicated. All earthwork, grading, moving of equipment, and other operations likely to cause disturbed soil conditions, erosion, siltation, and racking of sediments shall be planned and performed in a sequence as to avoid or reduce pollution in adjacent areas.

Stormwater Pollution Prevention Principles – Construction Phase

1. Protect existing vegetation wherever possible.
2. Minimize the area of disturbance and time disturbed areas are not stabilized.
3. Install mitigation devices as early as possible in the sequence.
4. Maintain siltation control devices in proper condition.

Selected Erosion Control Measures – Construction Phase

- Temporary Stabilization and Seeding
- Permanent Seeding
- Pavement Sweeping

- Dust Control
- Erosion Control Barriers
- Stabilized Construction Exits
- Catch Basin Inlet Protection

Appendix H provides additional BMPs.

5.2 Natural Buffers or Equivalent Sediment Controls

Project receiving waters are located within 50-feet of planned earth disturbances and a natural 50-feet undisturbed natural buffer cannot be maintained. In compliance with Appendix F of the CGP, the Project will maintain and maintain an undisturbed natural buffer of less than 50 feet that is supplemented by an additional erosion and sediment control system that achieved the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. Since the site limits are constrained by the ROW, the CGP Appendix F buffer exemption for linear construction sites applies.

5.3 Perimeter Controls

A sediment control barrier will be installed to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent up gradient water or water off road surfaces from flowing into a work zone. Sediment control barriers will be syncopated at sensitive wildlife crossings such as certified eligible or potential vernal pools. Sediment control barrier construction details are provided as **Figure 5.**

Twelve-inch diameter compost filter tubes will be the primary sedimentation control barrier. For areas of disturbance with minimal slope and length, the engineer may approve entrenched straw bales or entrenched straw tubes/wattles.

Additional barriers adding depth or height will be used at specific locations of concentrated flow such as gully points, steep slopes, or identified failure points in the sediment capture line.

Compost filter Tube: Compost filter tubes will be a minimum of 12 inches in diameter and placed using stakes to ensure stability against water flows. Compost filter tubes will be tamped, but not trenched, to ensure adequate contact with soil.

Compost material inside the filter tube will consist of peat borrow that will conform to the following specifications:

- Organic content of greater than 25%
- pH of 4.0-7.0
- Water absorbing capacity of greater than 250%
- Soluble salt index of less than 100%
- No manure, bio-solids, construction debris, or kiln dried wood
- Material will pass through 2-inch sieve

The outer tube fabric will be a knitted mesh with 1/8-3/8" openings and made of 100% biodegradable material such as hemp, cotton, or jute.

Straw Bales: Straw bales will be a minimum size of 12 by 16 by 36 inches and will be placed in a single row, with the ends of adjacent bales tightly abutting. The bales will be trenched, backfilled, and staked. Backfill of soil will conform to the ground level on the downhill side and will be built up to 4 inches on the uphill side of the barrier.

Straw Wattles: Straw wattles will be a minimum of 12 inches in diameter. Straw wattles will be trenched in 3 inches deep and staked, and sufficiently secured to prevent water from flowing under the wattle. The straw filling will be encased in durable netting and will have a density of 3 lb./foot.

Stakes: Stakes for anchoring Compost Filter Tubes, Straw Wattles, and Straw Bales will be a minimum of 1 by 1inch diameter by 4-feet hardwood stakes. When used with Silt Fence, stakes for Compost Filter Tubes will be driven 12-inches into the ground, and stakes for Straw Bales will be driven 16-inches into the ground.

The installed sediment control barrier will be inspected daily and restored as necessary to it's approved, newly installed condition as necessary. Accumulations of debris and/or silt will be removed and properly disposed of as necessary. Accumulations will not exceed 4-inches above the original ground elevation.

5.4 Silt Sack Inlet Protection

Silt sacks will be used where inserted into existing catch basins to prevent siltation of the existing drainage system. Silt sacks will be installed under catch basin grating castings. Silt sacks will be ACF Environmental High Flow or equivalent. All silt sack seams will be double stitched. Regular flow silt sacks will have a permeability of 40-gal./min./sq. ft. and high flow silt sacks will have a permeability of 200-gal./min./sq. ft.

- Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth.
- The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and disposed of accumulated debris as required. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately.
- When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure.
- The silt and sediment from the silt sack shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.
- All curb openings shall be blocked to prevent stormwater from bypassing the device.
- All debris accumulated in silt sacks shall be handled and disposed of as specified in Section 227 of the Standard Specifications.

. Silt sack construction details are included in **Figure 5.**

5.5 Matting for Erosion Control

This work consists of constructing temporary installations to control erosion, enhance vegetation establishment, and survivability on slopes, channels, and includes installing rolled erosion control products according to Section 767.7 of Project Specifications.

The matting will consist of a temporary degradable rolled erosion control product composed of processed natural fibers mechanically or structurally bound together to form a continuous matrix to provide erosion control and facilitate vegetation establishment. Staples or Stakes used to secure the matting will be manufactured from a biodegradable material.

The installation of Rolled Erosion Control Products (RECPs) will be conducted according to Project Specification 767.7 and manufacturer's instructions. The general procedures to be followed are as follows:

- Prepare a stable and firm soil surface free of rocks and other obstructions.
- Apply soil amendments as necessary to prepare seedbed.
- Place compost, water, and seed in accordance with manufacturer, or special provision requirements.
- Ensure the product maintains contact with the soil surface over the entirety of the installation.
- Do not stretch or allow material to bridge over surface inconsistencies. Staple/stake RECPs to soil such that each staple/stake is flush with underlying soil. Install anchor trenches, seams and terminal ends as specified.
- Install RECPs after application of seed, compost, mulches (if necessary) and other necessary soil amendments
- For the upslope anchor of RECPs, one of the methods detailed below will be utilized.
    - Install the RECPs 3 to 4 ft. beyond the shoulder of the slope onto flat final grade. Secure roll end with a single row of stakes/staples on 1 ft. centers.
    - Excavate a 12 in. by 12 in. anchor trench. Extend the upslope terminal end of the RECPs 3 ft. past the anchor trench. Use stakes or staples to fasten the product into the bottom of the anchor trench on 1 ft. centers. Backfill the trench and compact the soil into the anchor trench. Apply seed and any necessary soil amendments to the compacted soil and cover with remaining 1 ft. terminal end of the RECPs. Fold product over compacted soil in anchor trench to overlap downslope material. Secure terminal end of RECPs with a single row of stakes or staples on 1 ft. centers.
- For seaming of RECPs, one of the methods detailed below will be utilized.
    - Adjacent seams - Overlap edges of adjacent RECPs by 4 in. or by abutting products as defined by manufacturer. Use a sufficient number of stakes or staples to prevent seam or abutted rolls from separating.
    - Consecutive rolls. Shingle and overlap consecutive rolls 2 to 6 in. in the direction of flow. Secure staples through seam at 1 ft intervals.
- For all terminal ends of RECPs Staples Terminal Ends, one of the methods detailed below will be utilized.

  - Install the RECPs 3 ft. beyond the end of the channel and secure end with a single row of stakes/staples on 1 ft. centers. Stakes/staples for securing RECPS to the soil are typically 6 in. long but may be up to 12in log at terminal ends per manufacturer specifications.
  - Anchor trench - Excavate a 12 in. by 12 in. anchor trench. Extend the terminal end of the RECPs 3 ft. past the anchor trench. Use stakes or staples to fasten the product into the bottom of the anchor trench on 1 ft. centers. Backfill the trench and compact the soil into the anchor trench. Apply seed and any necessary soil amendments to the compacted soil and cover with remaining 1 ft. terminal end of the RECPs. Secure terminal end of RECPs with a single row of stakes or staples on 1 ft. centers.
  - For Check Slots, a stake/staple check slot along the terminal end of the RECPs will be constructed by installing two rows of staggered stakes/staples 4 in. apart on 4 in. centers.
- Ensure sufficient staples to resist uplift from hydraulics, wind, mowers, and foot traffic. Use stake/staple patterns as directed in this special provision or densities as recommended by the manufacturer if manufacturer recommendations exceed.
- Repair any damaged areas immediately by restoring soil to finished grade, re-applying soil amendments and seed, and replacing the RECPs.

Matting for erosion control construction details are included in **Figure 5.**

5.6 Additional BMPs

As needed, additional BMPs may be required to comply with the NPDES-CGP and this SWPPP including the installation and maintenance of additional silt fence, berms, ditches, sedimentation basins, construction exits, fiber mats, catch basin filters, straw, netting, gravel, trenches, mulches, grasses, slope drains, and other approved erosion control devices or methods needed to protect any areas on or off-site in accordance with the SWPPP. As required, this will be developed by A.A. Will as required by the EPA or it's locally designated agency and approved by the Project Engineer.

Appendix H includes alternative BMPs to be implemented at A.A. Will's discretion to comply with NPDES-CGP.

6.0 INSPECTION AND MAINTENANCE

Regular inspection(s) of BMPs and Erosion and Sediment Control (ESC) Measures will be performed once a week and within 24 hours of the occurrence of a storm event that produces 0.25-inches or more of rain, or within 24 hours of a snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period. Storm event information such as rainfall will be obtained from the Laurence G Hanscom Field Weather Station (KBED), located approximately 10 miles away in Bedford, MA. Inspections may include, but are not limited to, seeded areas, straw bales, and storm drain drop inlet protection measures. Runoff will leave the road box through existing catch basins. Catch basins will be protected with filter inserts to block silt. Inspections will be delegated to TERRA Environmental under the signed authority of A.A. Will. TERRA persons authorized to conduct inspections are as follows:

Qualified Individuals:

Name:	Jesse Vaughan
Title:	Project Manager
Phone:	774-293-0852
Email:	jvaughan@terra-env.com
Name:	Eric Spada
Title:	Environmental Scientist II
Phone:	201-787-0345
Email:	espada@terra-env.com
Project Manager:	Mike Rennie
Phone:	617-592-4903
Email:	mrennie@aawill.com
Address:	145 Island Street Stoughton, MA

The qualifications of the above-named individuals and a signed authorization by A.A. Will is provided in **Appendix I**.

Maintenance of BMPs and erosion and sediment control (ESC) measures can be categorized into two groups, (1) expected routine maintenance and (2) non-routine maintenance. Routine maintenance activities are performed on a regular basis to keep the BMP/ESC in good working order and aesthetically pleasing. In addition, routine inspection and maintenance will assist in preventing potential nuisance situations (odors, mosquitoes, weeds, etc.), reduce the need for repair maintenance, and reduce the chance of polluting stormwater runoff by finding and correcting problems before the next rain. Non-routine maintenance will occur as a result of an intense precipitation event. Required maintenance for this occurrence will be completed immediately.

A.A. Will's representative will complete NPDES SWPPP inspections as indicated. Inspection forms will provide information detailing routine and non-routine maintenance required or performed over the last period. See **Appendix J** for copies of the SWPPP Operator Inspection Form.

Inspections: A.A. Will's representative shall make a visual inspection of all sedimentation control devices once per week and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to off-site areas A.A. Will shall promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly. Maintain inventory on site of filter socks, straw bales and repair kits.

Maintenance:

1. Remove accumulated sediment once it builds up to one-half (1/2) of the height of the filter sock, waddle, straw bales, and filter boxes. Removed accumulated sediment once it builds up to one-third (1/3) of the height of silt fencing.
2. Replace damaged fabric, or patch with a two foot (2') minimum overlap.

In the event that changes, additions, or modifications to the SWPPP become necessary they will be submitted for approval. Upon approval, they will be distributed for inclusion in **Appendix G** of this SWPPP.

Post-construction stormwater management measures will be installed during construction. These measures include a structured stormwater drainage system with catch basins equipped with sumps to reduce sediment loads prior to discharge.

7.0 TEMPORARY AND FINAL STABILIZATION

Once the Site has been fully stabilized against erosion the filter media can be dispersed on site. Dispose of silt and waste materials in proper manner. Re-grade all areas disturbed during this process and stabilize against erosion with surfacing materials and erosion control devices as directed by the Engineer until vegetation has sufficiently developed. Any areas of exposed soil or stockpiles that will remain inactive for more than 14 days will be covered with a layer of straw mulch hydro mulch or bonded fiber matrix. The mulch may be anchored with a tacking coat (non-tar) applied by hydroseeding. Steeper slopes (greater than 10 percent) will be covered with a bonded fiber matrix according to the recommendations provided by the manufacturer.

If conditions allow, a temporary vegetative cover will be established on areas of exposed soils (including stockpiles) that remain un-stabilized for a period of more than 60 days. The seeded surfaces will be covered with a layer of straw mulch, hydro mulch or bonded fiber matrix. The seed mix shall include a blend of rapid germinating grasses, typically annual grasses, that are indigenous to eastern Massachusetts.

Upon completion of final grading, any areas not covered by pavement, other forms of stabilization, or other methods of landscaping will be seeded with an approved wetland seed mix comprising of species native to Massachusetts. The mix will be applied at a rate specified by the producer and will be covered with mulch or bonded fiber matrix as described above.

All fertilizer, herbicides, pesticides, and other additives shall comply with Project specifications as well applicable State and Federal Laws.

8.0 DEWATERED GROUNDWATER MANAGEMENT

For this construction project, A.A. Will is responsible for managing stormwater and groundwater in accordance with applicable contract specifications sections, the NPDES-CGP discharge limits and reporting

criteria, the MassDEP Order of Conditions, the MassDEP Notice of Intent, and the US Army Corps of Engineers Pre-construction Notification

The work to be performed includes all pumping, sandbagging, earth, and other measures, inclusive of optional sheeting if deemed practical, necessary for sufficient water control to accomplish headwall and culvert installation, repairs, repointing, and rebuilding of the stone masonry abutments and wingwalls. Water pollution prevention including sediment control and flood prevention of the excavated areas at the structure for demolition, reconstruction, and riprap placement necessary to complete the bridge superstructure replacement.

8.1 Dewatering Construction Methods

All work will be performed during the low flow season, and the design submittals consider a minimum 10-year flood elevation for the cross-section in each stage of construction. The 10-year flood elevation that is indicated on the Plans is based on the particular cross-section shown for each stage of construction.

All dewatering and related earthwork will be conducted in such a manner as to prevent siltation or contamination of the waterway. All temporary support of excavation that protrudes into the soil that supports the bridge structure will be left in place. The pumping discharge will not be allowed to enter directly into Hop Brook or Pantry Brook. The water from the work areas will be pumped through a sediment sock dewatering bag situated on top of the ROW. After leaving the sediment sock dewatering bag the dewatering water will be allowed to recharge through the ROW ballast and any runoff will be intercepted by in place sediment and erosion controls.

Pumping will be conducted in a manner which will not adversely affect the work within the excavation. The Contractor will provide and maintain ample pumps, pipes and other devices to promptly and continually remove and dispose of water from the excavation areas. The Engineer has the right to order the Contractor to stop all excavation operations when in his judgment the Contractor's water control operations are failing to produce adequate results or are posing a threat to the environment.

9.0 SITE ACCESS CONTROL

The Site includes active roadways with access controlled by traffic officer(s), drums, cones, and signs. The Site will be monitored to ensure proper signage in place. BMPs will be undertaken to minimize sediment/soil-tracking control at the entrances and exits of the Project Site to paved roadways or nearby catch basins.

9.1 Covered trucks

A.A. Will's designated subcontractors will remove debris/soil from sideboards and will direct all transporters to cover the trailers contents prior to making site deliveries and hauling material off the construction site.

9.2 Street Sweeping

As needed, paved areas will be maintained in a dirt and dust-free state. Streets will be swept clean as needed with water. A.A. Will will clean project area catch basins following completion of construction activities.

9.3 Catch Basin Cleaning

Catch basins that are affected by the construction activities sediments will be inspected and cleaned as necessary.

9.4 Dust Control

The dust control program includes provisions to minimize the generation of dust during dry and windy conditions. When necessary, larger areas of exposed soil will be wetted to prevent wind borne transport of fine-grained sediment. Sufficient water shall be applied to wet the upper 0.5 inches of soil. The water will be applied as a fine spray to prevent erosion. A water truck will be kept on the property (or at a nearby location) to facilitate this practice.

The adjacent approaching roads in the vicinity of the proposed work site shall be swept as needed during construction. The sweeping program will remove sediment and other contaminants directly from paved surfaces before their release into stormwater runoff. Pavement sweeping has been demonstrated to be an effective initial treatment for reducing pollutant loading into stormwater. A street sweeper shall be kept at the site or at a nearby location to facilitate this practice. Once construction has been completed, pavement sweeping at the Project Site will occur as required under the Operation and Maintenance Plan.

Stone anti-tracking pads will be installed at each access point to the work area to prevent the offsite transport of sediment by construction vehicles. Additional dust suppression practices are:

1. Leave existing pavement and/or ground covering in place until the last possible moment prior to final earth excavation for purposes of dust control.
2. Water shall be properly applied as required and/or where directed by the Engineer and distributed uniformly at the rate required or ordered. Method and equipment used to distribute the material shall be satisfactory to the Engineer.
3. A.A. Will is responsible for keeping dust suppression. Sprinkle or treat, with dust suppressors, the soil at the Site, and other areas disturbed by construction operations.
4. Stop all earthwork when, as determined by the Engineer, dust control procedures have not proved effective in controlling dust. Resumption of work may only begin when site conditions have improved, or constructions procedures are modified to the satisfaction of the Engineer.

10.0 SPILL PREVENTION AND RESPONSE

10.1 Goals

Minimize the potential for contaminants to enter or run off the Site during construction activities. Fuel oil, diesel fuel, gasoline in trucks and equipment, and other equipment related fluids must be properly stored. Additional fluids or dry bulk materials, such as, cleaning and adhesive chemicals, paints, concrete,

asphalt, or other hazardous materials to be used on the Project Site will be stored on-site in accordance with applicable federal, state, and local regulatory requirements. A.A. Will will establish secure storage areas that collect any spillage to meet requirements of local fire department regarding the storage of flammable materials.

10.2 General Requirements

The Construction Manager has completed and detailed in this Plan a proactive approach to all of the best management practices, erosion and sedimentation controls, mitigation measures, and monitoring activities for this Project.

A.A. Will will actively maintain and manage the Site activities with the procedures outlined in this Plan. In the event of petroleum or other deleterious substance spill, action will be taken by A.A. Will to contain and remove the spill. A.A. Will will comply with the relevant section(s) of the Oil Pollution Prevention Act, including 40 CFR 112.7, General requirements for Spill Prevention, Control and Countermeasure Plans.

10.3 Responsibility

All project personnel share the responsibility for the initial control and reporting of the oil and other substance spill, especially the personnel that first discover the spill. The Site Health and Safety Officer will be responsible for determining the necessary safety equipment and for establishing safety practices to be followed by the subcontractors during the clean-up operations. All personnel will be trained in the use of and location of this equipment, prior to the commencement of the construction.

The goal of the Project Team is to provide effective, efficient, and coordinated action to minimize or mitigate damages to the environment and public health and welfare from oil, or other substance discharges, conforming to applicable federal, state, and local regulations and other provisions and restrictions. A TERRA representative on-site will be qualified by OSHA training requirements (29 CFR 1910.120) and will have the responsibility and authority for supervising the cleanup of spills and releases occurring during the project. If A.A. Will's Safety Manager determines that the cleanup operations are beyond the capacity of A.A. Will, assistance shall be requested from the Project's Emergency Response Contractor.

If needed, A.A. Will will retain an Emergency Response Contractor (ERC) for this project to respond to any Emergency Spill Operations. The ERC will employ its Corporate Health and Safety Plan and Spill Response Plan and will not be submitted/reviewed/approved by A.A. Will or the Project. The ERC's plan(s) will be developed for their own use and will be developed in accordance with standard industry procedures and local, state, and federal regulations and policies. The ERC's plans will be referenced when a spill or release is discovered, and the control of the spill or release is beyond the scope of the SWPPP. The ERC will comply with A.A. Will's Health and Safety Plan when working on the Project Site. A.A. Will's Health and Safety Manager or its designee will brief the ERC about site specific construction related concerns when working on the property. The ERC will be solely responsible for its own Health and Safety.

Spill containment and reporting procedures will become effective immediately upon observance and

indication of a spill or discharge of oil or other substances on the project.

Reportable observations are:

1. Any leaks or spills
2. Any soils which are discolored or have an odor
3. Any discharge of oil or other similar substances from drain pipes

The MassDOT's Resident Engineer will be informed immediately of all substantial spills, releases, or other substance discharges. All telephone numbers for the Emergency Response agencies will be posted on site. A.A. Will or its subcontractor(s) will implement control and countermeasures immediately and complete Spill Status Report provided in **Appendix K** of this SWPPP.

10.4 Fuel/Oil Storage

A.A. Will will not store any diesel fuel on-site. Best efforts will be made to minimize the storage of oil and hazardous materials at the project Site.

10.5 Fuel and Oil Delivery Trucks

The equipment superintendent, or their designee, will monitor all truck unloading procedures to verify all hoses are tight and do not leak, and if necessary, tighten, adjust, or replace them to prevent a release of any kind. In the event of a major spill, alert and initial report procedures will be implemented, and an emergency response contractor will be called in to perform the cleanup.

10.6 Equipment

Motorized equipment that requires fuel and oil to operate will be inspected prior to the start of each work shift by the operator (in the field) to ensure there is no leakage of oil, fuel, or other material. Trucks will be inspected prior to use for potential leaks or drips. If a leak is found, repairs will be made immediately, and spillage will be cleaned up manually using absorbent material. Vehicles that are found to be leaking will be immediately taken out of service until repairs can be made.

10.7 Drum Storage

Petroleum liquids and other substances stored in drums will be kept in a drum container that consists of a drum rack and drip containment pan that is capable of containing 110% of the OHM should the drum rupture. Drum storage, if any, will be located in a secure area within the Project limits away from environmental areas of concern.

10.8 Lubrication /Oil Maintenance

Replacement lubrication will be directly deposited from the lubrication truck to the equipment lubrication reservoir. No other container system will be used to transport oil to the equipment. Mobile equipment will be serviced off site or in the lay-down area. Equipment that cannot be moved will be serviced in the field. A.A. Will will place absorbent pads below the service area prior to initiating service activities in the field. Waste disposal will be completed by A.A. Will or by a waste disposal firm. Miscellaneous lubricants for operating equipment will be limited to daily quantities.

10.9 Used Oil

Used oil will not be managed or stored on-site.

10.10 Special Oil Spill Equipment

Sorbent Pads and Booms

Sorbent pads will be available to absorb oil and petroleum compounds. The sorbent booms will be used to contain and absorb spills or releases by placing the booms in a continuous fashion around the spill. The pads and booms will be used to absorb oil spills or leaks by placing them on the oil and giving them adequate time to absorb it. The sorbent pads and booms will be stored in equipment box located in the maintenance area. The pads and booms float and are water repellent, so they can absorb oil on water. Saturated or contaminated pads will be placed in an appropriate container and stored within the maintenance area. A certified waste disposal firm will dispose of the approved containers.

Sorbent Compound

The compound is used for contaminants spilled on decks or hard surfaces. In most cases it can be applied directly to spills, but it can be used to form a dike around large spills to prevent further migration.

11.0 SAFETY PRECAUTIONS IN THE EVENT OF A SPILL

Surface terrain, direction and velocity of the prevailing wind, and proximity to possible ignition sources shall be observed by the Construction Manager's Project Superintendent, or their designee; and, if necessary, a roadblock will be set up immediately.

Trucks, hand tools, and equipment should not be moved into the spill area until the proper precautions have been taken. When equipment is moved into the spill area, it shall be removed as soon as its task is completed. Only personnel vital to the cleanup effort will be allowed in the spill area. No ignitable materials (matches, lighter, smoking materials) will be allowed into the spill area.

In the event of an oil spill or release, protect surface drains and catch basins from spilled material to prevent release to Surface Water. If there is a release to a storm water system, MassDEP will be notified.

11.1 Emergency Procedures

Minor Spill (< 10 GALLONS or MCP Reportable Quantity)

All efforts will be made to contain the spill by erecting an earthen berm or barrier. The area will be remediated in accordance with all applicable federal, state, and local regulations.

Large Spill (≥ 10 GALLONS or MCP Reportable Quantity)

The spill will be contained to the smallest area possible using booms, berms, or other effective barriers. A.A. Will's Project Manager, MassDOT's Resident Engineer, and the Massachusetts Department of Environmental Protection will be notified immediately (i.e., within two hours).

The LSP or their designee, or the Project Manager will notify the following agencies depending on the nature of the response with MassDOT Approval:

- A.A. Will Project Representative(s)
- Emergency Response Contractor(s)
- State Police
- Fire Department

12.0 EMERGENCY AND PROJECT CONTACTS

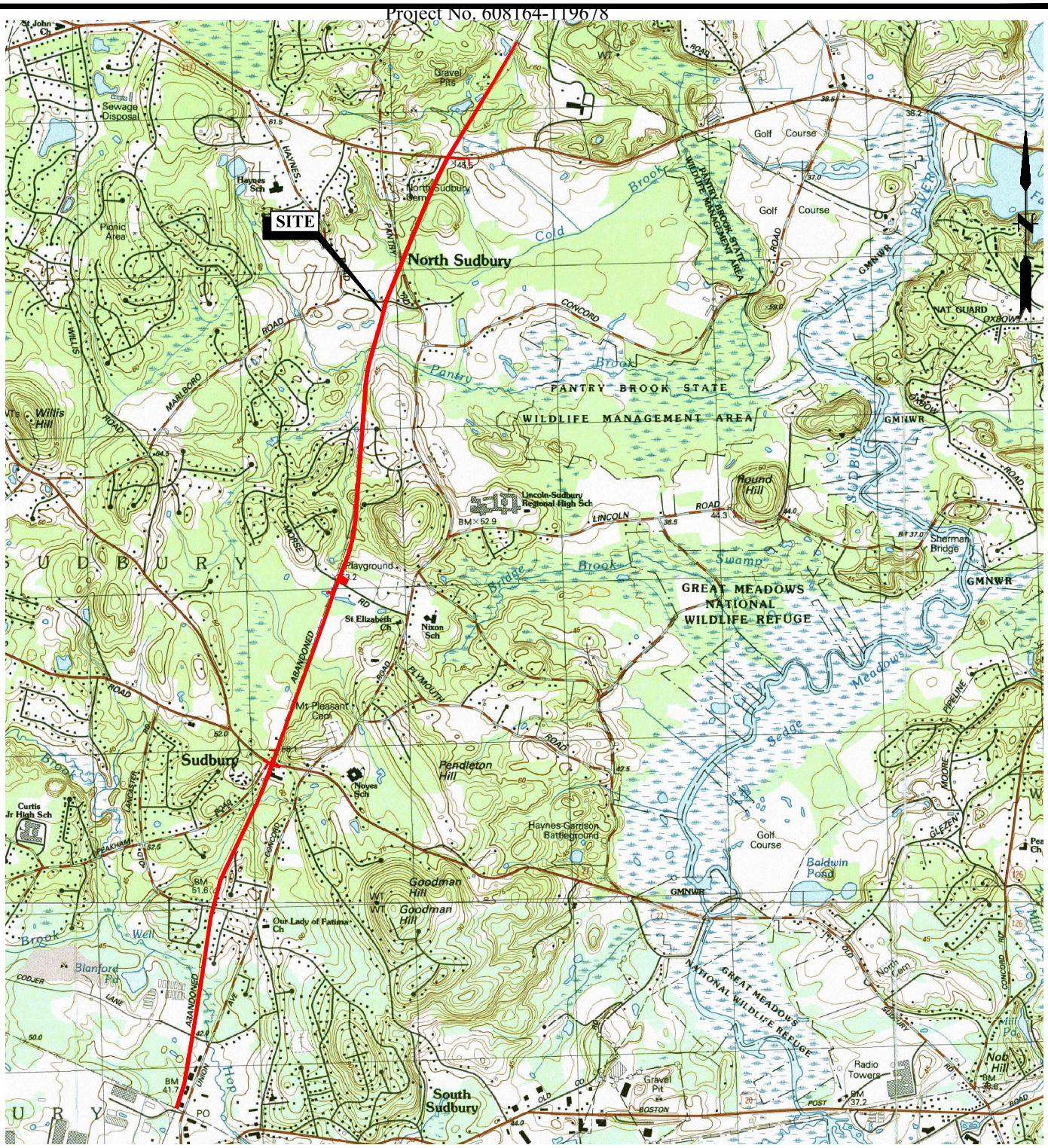
Department / Project Contact	Phone Numbers
Sudbury Fire/Police Department	911
MA Department of Environmental Protection / Emergency Response/Northeast Region	(888) 304-1133 / (978) 694-3200
MassDOT – Resident Engineer, Adam Nabulsi	617-413-8073
A.A. Will – Project Manager, Mike Rennie	(617) 592-4903
TERRA Environmental – Project Manager, Jesse Vaughan	(774) 293-0852

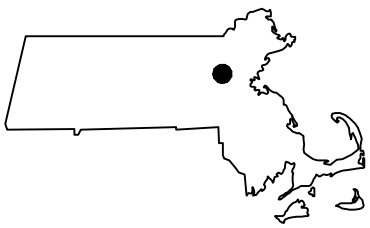
13.0 NPDES SWPPP PERMIT – RECORDS RETENTION / COVERAGE TERMINATION

A.A. Will and MassDOT will maintain all SWPPP records including the inspection forms for three (3) years. The three (3) year timetable begins on the date when the Notice of Termination (NOT) is submitted.

The NPDES SWPPP Permit for this Project will be terminated once final stabilization has been achieved on all portions of the Project. At that time, A.A. Will and MassDOT will each submit a Notice of Termination (NOT) within 30-days of the condition being achieved.

Figure 1 Project Site Locus





MAP REFERENCE

THIS MAP WAS PREPARED FROM THE FOLLOWING USGS TOPOGRAPHIC QUADRANGLE IMAGES: q209898, q209902, q209906, q209910, q213898, q213902, q213906 AND q213910.
QUADRANGLE IMAGES WERE PREPARED FROM MASS GIS DATA RECEIVED FROM OLIVER GIS ON 04/16/2021.
ORIGINAL MAP UNITS IN METERS.

SCALE:	
HORZ.:	1" = 3000'
VERT.:	
DATUM:	
HORZ.:	
VERT.:	

0 1500 3000
GRAPHIC SCALE

FUSS & O'NEILL
1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
www.fando.com

TOWN OF SUDBURY

SITE LOCATION MAP

BRUCE FREEMAN RAIL TRAIL

SUDBURY, MASSACHUSETTS

PROJ. No.:	20200785.A10
DATE:	10/27/2021

FIG.1

Figure 2 MassDEP Priority Resource Map

MassDEP Online Map Viewer

Priority Resource Map

MassDEP Online Map Viewer

MassDEP

Massachusetts Department of Environmental Protection

Map Legend

- Community Groundwater Well
- Community Surface Water Intake
- Emergency Surface Water Intake
- Non-Community Groundwater Well
- NHESP Certified Vernal Pool
- NHESP Potential Vernal Pool
- School
- Hospital
- Long Term Care Residence
- Prison
- Pipeline
- Powerline
- MBTA Blue Line
- MBTA Green Line
- MBTA Orange Line
- MBTA Red Line
- Active Rail Lines
- Major Highway - Limited Access
- Major Road - Not Limited Access
- Local Street or Road
- Town and State Boundary
- DEP Region Boundary
- 15 Meter Contour Interval
- 3 Meter Contour Interval
- Perennial Stream or Shoreline
- Intermittent Stream
- Intermittent Shoreline
- Manmade Shoreline
- Ditch or Canal
- Aqueduct
- Dam
- Channel in Water
- Open Water
- Public Water Supply Reservoir
- Tidal Flat
- Inundated Area
- Fresh Water Wetland
- Cranberry Bog
- Salt Water Wetland
- NHESP Estimated Habitat of Rare Wildlife
- Surface Water Supply Watershed Boundary
- Public Water Supply Protection Area (Zone A)
- Interim Wellhead Protection Area (IWPA)
- Approved Wellhead Protection Area (Zone II)
- Solid Waste Landfill
- Areas of Critical Environmental Concern
- EPA Designated Sole Source Aquifer
- Protected Open Space
- Non-Potential Drinking Water Source Area: High Yield
- Non-Potential Drinking Water Source Area: Medium Yield
- Potentially Productive High Yield Aquifer
- Potentially Productive Medium Yield Aquifer

Overview | Map Layers | Legend | Map Help | Contact | Query Results

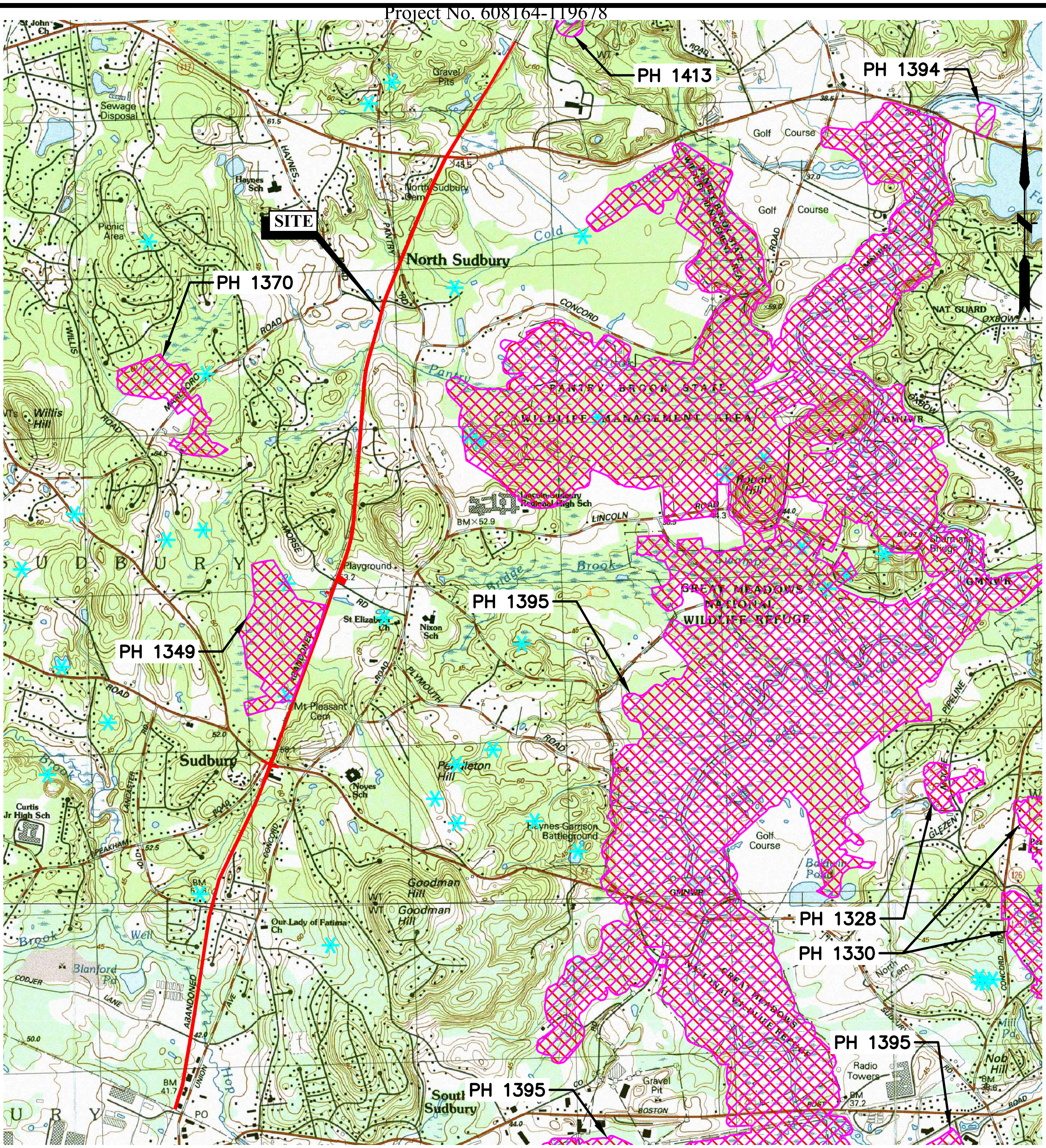
PROJECT:	**Bruce Freeman Trail** **Sudbury & Concord, MA**
TITLE:	**MassDEP Priority Resource Map**
DRAWN BY:	JV
CHECKED BY:	EG
DATE:	August 18, 2022

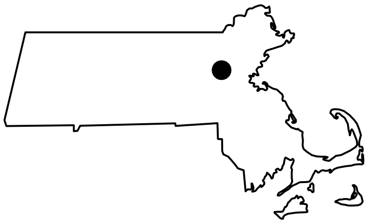
FIGURE 2

159 Haven Street, 2nd Floor
Reading, MA 01867
781-944-6851

TERRA ENVIRONMENTAL, LLC
PLANNING | CONSULTING | MANAGEMENT | REMEDIATION

Figure 3 NHESP Priority Habitats





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ORIGINAL MAP UNITS IN METERS.

LEGEND

- NHESP MA PRIORITY HABITATS FOR STATE-PROTECTED RARE SPECIES
- NHESP MA ESTIMATED HABITATS OF RARE WILDLIFE
- NHESP MA CERTIFIED VERNAL POOL

SCALE:	
HORZ.: 1" = 3000'	
VERT.:	
DATUM:	
HORZ.:	
VERT.:	
GRAPHIC SCALE: 0 – 1500 – 3000	

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TOWN OF SUDBURY

NHESP MAP

BRUCE FREEMAN RAIL TRAIL

SUDBURY MASSACHUSETTS

PROJ. No.: 20200785.A10
DATE: 10/27/2021

FIG.2

File Path: J:\DWG\P2020\0785\A10\20200785A10_PERM01.dwg Layout: FIG.2 Plotted: Wed, October 27, 2021 - 2:45 PM User: akeegan
Plotter: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 CTB File: FO.STB
MS VIEW: LAYER STATE:

Figure 4 Project Construction Plans

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) 103+55 RT TO STA. 104+25 RT
TIMBER FENCE (THREE-RAIL) 104+80 LT TO STA. 107+15 LT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

NOTES:

1. REMOVAL AND HANDLING OF EXISTING RAILS, COMPONENTS AND OTHER MATERIALS WITHIN THE PROJECT LIMIT SHALL BE PAID UNDER THE CORRESPONDING ITEMS:
   - 129.5* TRACK EXCAVATION
   - 129.7* HANDLING AND TRANSPORTATION OF RAIL COMPONENTS
   - 129.71* HANDLING AND TRANSPORTATION OF OTHER TRACK MATERIALS
2. SEE TYPICAL SECTIONS FOR FORMATION OF SHARED USE PATH SHOULDERS AND MATERIAL SPECIFICATIONS.
3. ALL EXISTING STRUCTURES WITHIN CURB RAMP AREAS SHALL BE ADJUSTED TO BE FLUSH WITH CURB RAMP SURFACE.
4. PRIOR TO ANY CLEARING, GRUBBING, OR TREE TRIMMING, THE CONTRACTOR SHALL STAKEOUT OUT THE CLEARING LIMITS AS SHOWN ON THE CONSTRUCTION PLANS. THE CONTRACTOR SHALL THEN PERFORM A SITE WALK WITH MASSDOT DISTRICT 3 PROJECTS OFFICE, RESIDENT ENGINEER, MASSDOT LANDSCAPE ARCHITECT, AND TOWN OF SUDBURY TO CONFIRM THESE CLEARING LIMITS.
5. ALL TREES WITHIN SLOPE LIMITS/CLEARING LIMITS SHALL BE REMOVED UNLESS OTHERWISE NOTED ON PLANS. PAYMENT FOR TREE REMOVALS THE SLOPE LIMITS SHALL BE PAID FOR UNDER CLEARING & GRUBBING ITEM PER STANDARD SPECIFICATIONS.
6. NO CLEARING OUTSIDE OF THE SLOPE LIMITS SHALL OCCUR FOR CONTRACTOR CONVENIENCE WITHOUT PRIOR AUTHORIZATION FROM THE TOWN OF SUDBURY AND THE RESIDENT ENGINEER. THE CONTRACTOR SHALL ONLY BE PAID FOR CLEARING AND GRUBBING FROM SLOPE LIMIT TO SLOPE LIMIT AS SHOWN ON PLANS.
7. PROPOSED PLANTINGS MAY REQUIRE FIELD ADJUSTMENT DUE TO FINAL FIELD CONDITIONS. MASSDOT LANDSCAPE ARCHITECT AND/OR TOWN OF SUDBURY SHALL APPROVE ALL LOCATIONS PRIOR TO PLANTING.
8. ANY GRANITE ABUTMENT BLOCKS NOT BEING MODIFIED OR LEFT IN PLACE AS PART OF THE BRIDGE REPLACEMENT (SEE BRIDGE PLANS) SHALL BE REMOVED AND STACKED AT THE SUDBURY DPW YARD. THE CONTRACTOR SHALL ALSO TAKE TWENTY OF THE GRANITE BLOCKS AND REMOVE AND RESET AS FOLLOWS: THREE BLOCKS TO BE RESET AS BENCHES AT APPROX. STA. 101+22 LT. TEN BLOCKS TO BE RESET AS BENCHES AT APPROX. STA. 216+77 RT. APPROX. FIVE BLOCKS TO BE RESET AS A HISTORIC INTERPRETATION AT APPROX. STA. 260+89 RT. TWO BLOCKS TO RESET AS BENCHES AT APPROX 1107+69 RT. PAYMENT FOR R&R GRANITE ABUTMENT BLOCKS SHALL BE MADE UNDER ITEM 707.4

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL #

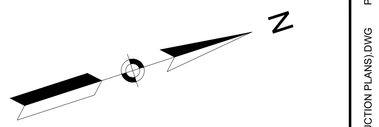
PLANT QUANTITY AND SPECIES

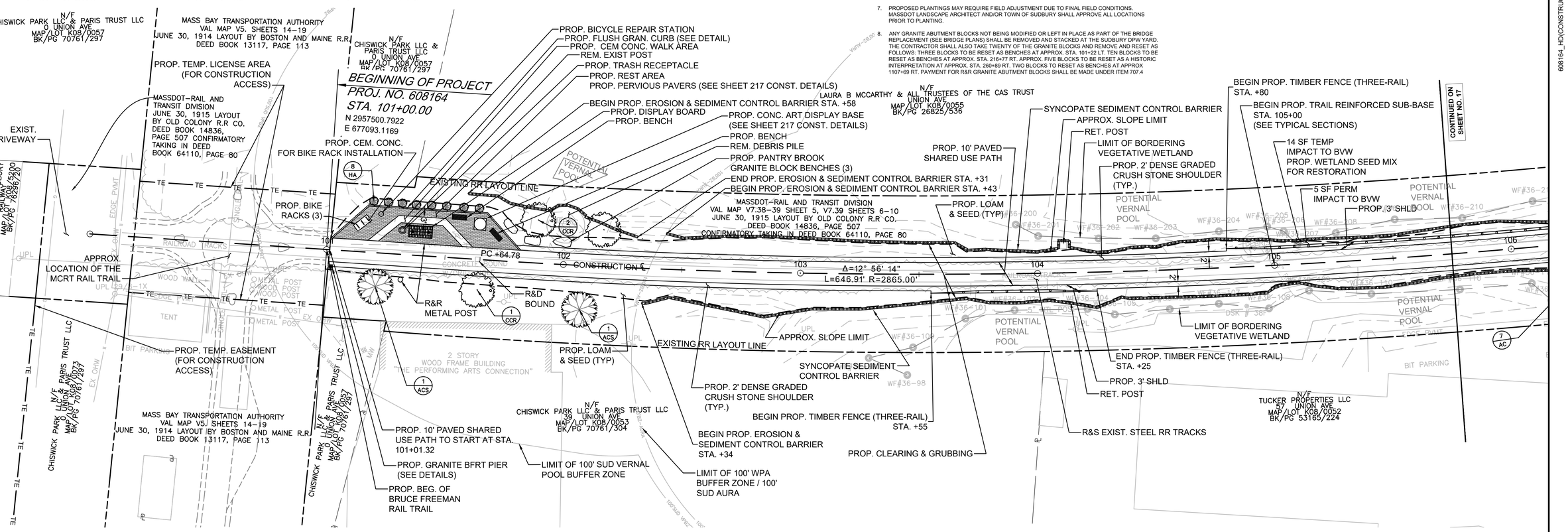
X#
X
XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	16	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS





0 20 50 100

SCALE: 1" = 20'

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	3	2–3" CAL.
ACS	AMELANCHIER CANADENSIS	CANADIAN SERVICEBERRY	2	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRANGEA	8	3 GAL.

PROJECT SUMMARY PLANT LIST IN SUDBURY

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
JV	JUNIPERUS VIRGINIANA	EASTERN RED CEDAR	25	4–5' HT.
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	286	3 GAL.
IG	ILEX GLABRA	INKBERRY	246	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	52	4–5' HT.
AC	ABIES CONCOLOR	WHITE FIR	62	5–6' HT.
	EROSION CONTROL MIX			
SS	CAREX PENNSYLVANIA	PENNSYLVANIA SEDGE	248	PLUG
CS	CORNUS SERICEA. & SALIX SSP	DOGWOOD AND WILLOW	23	1 GAL.
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	45	2–3" CAL.
ACS	AMELANCHIER CANADENSIS	CANADIAN SERVICEBERRY	19	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRANGEA	79	3 GAL.

PROJECT SUMMARY PLANT LIST IN SUDBURY (continued)

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	SHADE TREES			
AS	ACER SACCHARUM	SUGAR MAPLE	1	2–3" CAL.
TA	TILIA AMERICANA	AMERICAN LINDEN	1	2–3" CAL.
QR	QUERCUS RUBRA	NORTHERN RED OAK	2	2–3" CAL.
BN	BETULA NIGRA	RIVER BIRCH	2	2–2.5" CAL.
	NATIVE VEGETATION PLUGS			
PV	PANICUM VIRGATUM	SWITCHGRASS	13	PLUG
SL	SPIREA LATIFOLIA	MEADOWSWEET	11	PLUG
AT	ASCLEPIAS TUBEROSA	BUTTERFLY WEED	11	PLUG
AL	ASTER LAEVIS	SMOOTH ASTER	12	PLUG
CP	COMPTONIA PEREGRINA	SWEET FERN	12	PLUG
	SEED MIX			
	SEEDING	per manufacturer	8,640 SQ.FT	
	WOODLAND EDGE SHADE MIX	15lb/acre	203,130 SQ.FT	
	MID–HEIGHT POLLINATOR MIX	20lb/acre	2,500 SQ.FT	
	WETLAND/BASIN MIX	20lb/acre	47,610 SQ.FT	

SEED MIX NOTES:

1. THE DEFAULT SEED MIX FOR THIS PROJECT IS THE WOODLAND EDGE SEED MIX UNLESS OTHERWISE SPECIFIED ON THE PLANS.
2. THE WETLAND/BASIN SEED MIX IS FOR USE IN PROP. GRASS SWALES, INFILTRATION BASINS, WETLAND RESTORATION, AND WETLAND REPLICATION AREAS.
3. THE MID-HEIGHT POLLINATOR MIS IS FOR USE AT THE DESIGNATED PLANTING AREA SOUTH OF HUDSON RD WHERE NATIVE PLANTINGS WILL REPLACE INVASIVE SPECIES.
4. THE ITEM 765 SEEDING IS FOR USE AT HIGH TRAFFIC ROAD SIDES ALONG THE HUDSON RD/PEAKHAM RD/TI-SALES DRIVEWAY INTERSECTION AREA.

FOR PROFILE SEE SHEET NO. 48

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
JV	JUNIPERUS VIRGINIANA	EASTERN RED CEDAR	11	4–5' HT.
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	35	3 GAL.
IG	ILEX GLABRA	INKBERRY	29	3 GAL.
AC	ABIES CONCOLOR	WHITE FIR	7	5–6' HT.

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 104+80 LT TO STA. 107+15 LT
TIMBER FENCE (THREE-RAIL) STA. 108+88 RT TO STA. 109+30 RT
TIMBER FENCE (THREE-RAIL) STA. 109+00 LT TO STA. 109+85 LT

LEGEND:

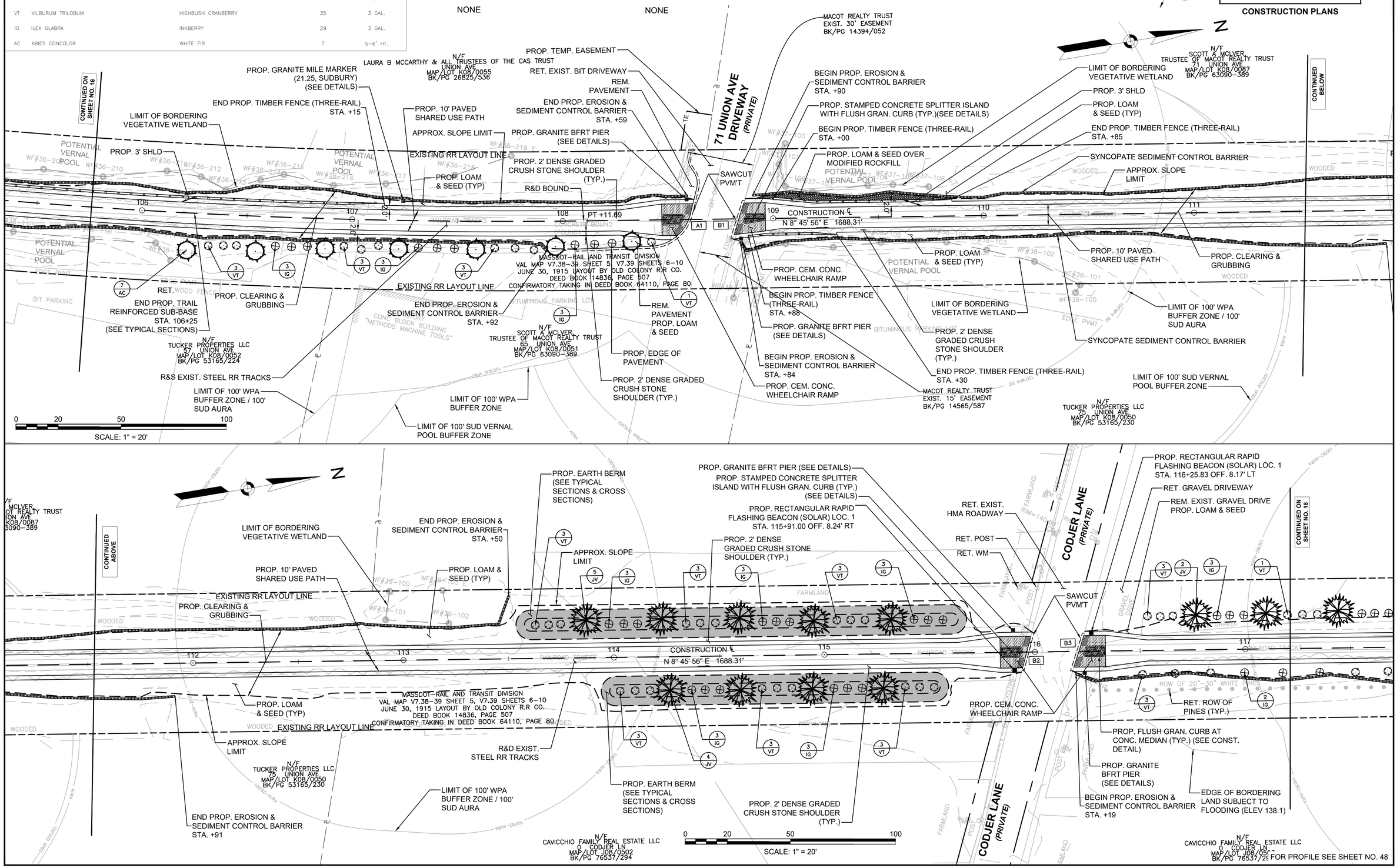
PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	17	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS



FOR PROFILE SEE SHEET NO. 48

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 119+75 LT TO STA. 132+25 LT
TIMBER FENCE (THREE-RAIL) STA. 119+75 RT TO STA. 130+75 RT

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
JV	JUNIPERUS VIRGINIANA	EASTERN RED CEDAR	6	4–5' HT.
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	37	3 GAL.
IG	ILEX GLABRA	INKBERRY	34	3 GAL.
	EROSION CONTROL MIX			
SS	CAREX PENNSYLVANIA	PENNSYLVANIA SEDGE	130	PLUG
CS	CORNUS SERICEA. & SALIX SSP	DOGWOOD AND WILLOW	5	1 GAL.

LEGEND:

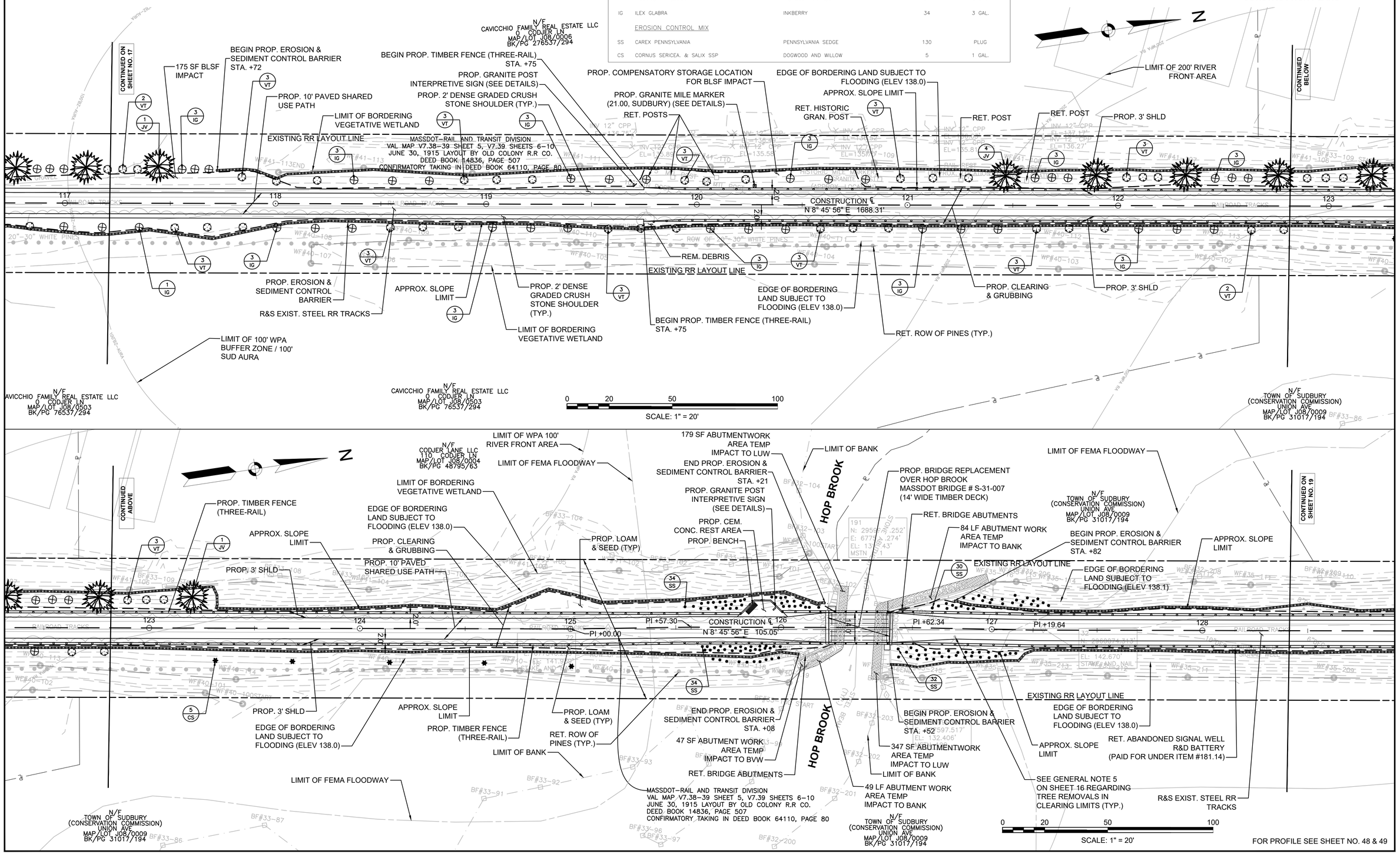
PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	18	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS



FOR PROFILE SEE SHEET NO. 48 & 49

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 8:49 AM

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 119+75 LT TO STA. 132+25 LT
TIMBER FENCE (THREE-RAIL) STA. 119+75 RT TO STA. 130+75 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	21	3 GAL.
IG	ILEX GLABRA	INKBERRY	15	3 GAL.
AC	ABIES CONCOLOR	WHITE FIR	17	5-6' HT.

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

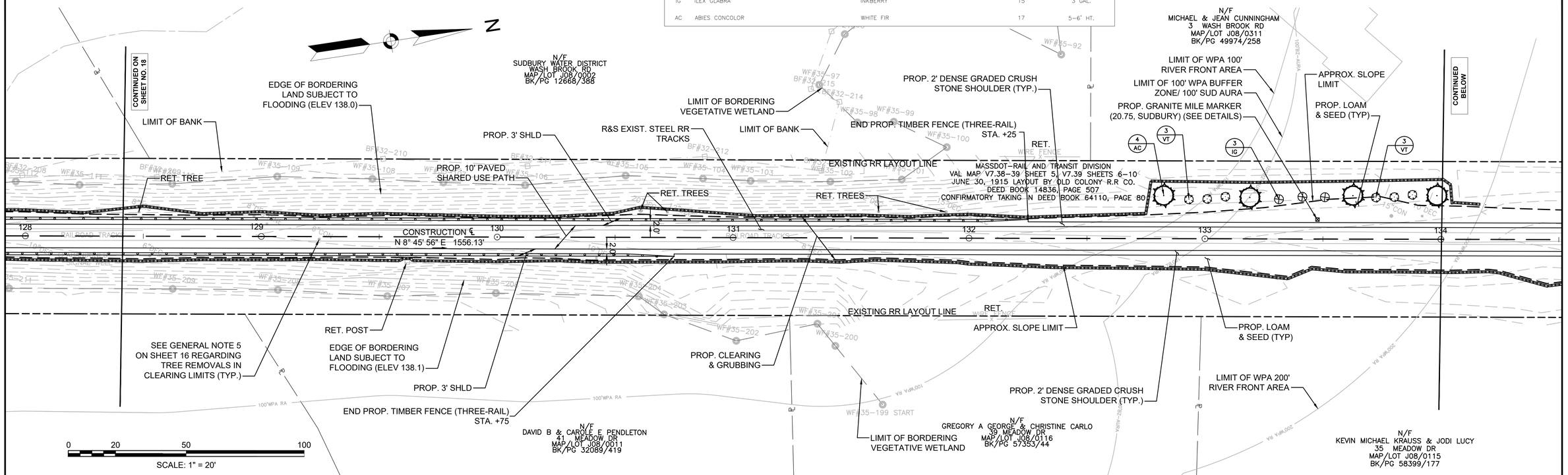
PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	19	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

Plotted on 27-Jun-2022 8:50 AM
608164_HD\CONSTRUCTION PLANS\.DWG



FOR PROFILE SEE SHEET NO. 49

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	20	319
PROJECT FILE NO.	608164		

SUDBURY
BRUCE FREEMAN RAIL TRAIL
CONSTRUCTION PLANS

FENCING DETAILS
NONE

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	27	3 GAL.
IG	ILEX GLABRA	INKBERRY	24	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	10	4-5' HT.
AC	ABIES CONCOLOR	WHITE FIR	8	5-6' HT.
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	8	2-3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRANGEA	6	3 GAL.

LEGEND:
PROPOSED WHEELCHAIR RAMP DETAIL # — X#
PLANT QUANTITY AND SPECIES — X / XX

CONTINUED ON SHEET NO. 19
CONTINUED ON SHEET NO. 21
OLD LANCASTER ROAD (PUBLIC)
1971 TOWN LAYOUT
CONSTRUCTION ℄
N 8° 45' 56" E 1556.13'
140
141
142
143
144
145
PC +73.77
EXISTING RR LAYOUT LINE
RET. TREE
POTENTIAL VERNAL POOL
LIMIT OF BORDERING VEGETATIVE WETLAND
PROP. 10' PAVED SHARED USE PATH
R&S EXIST. STEEL RR TRACKS
LIMIT OF 100' SUD VERNAL POOL BUFFER ZONE
LIMIT OF 100' SUD AURA
APPROX. SLOPE LIMIT
PROP. LOAM & SEED (TYP)
PROP. CEM. CONC. WHEELCHAIR RAMP
PROP. STAMPED CONCRETE SPLITTER ISLAND WITH FLUSH GRAN. CURB (TYP.) (SEE CONST. DETAILS)
PROP. GRANITE BFRT PIER (SEE CONST. DETAILS)
PROP. FLUSH GRAN. CURB AT CONC. MEDIAN (TYP.) (SEE CONST. DETAIL)
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +77
SAWCUT PVM'T
PROP. RECTANGULAR RAPID FLASHING BEACON (SOLAR) LOC. 2 STA. 143+08.85 OFF. 6.02' LT
PROP. HMA WALK
PROP. BIKE RACK
PROP. CEM. CONC. REST AREA (236 SF)
PROP. BENCH
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. MODIFIED ROCK FOR SWALE END (10'X4') (PAID UNDER ITEM #986)
PROP. CLEARING & GRUBBING
SEE GENERAL NOTE 5 ON SHEET 16 REGARDING TREE REMOVALS IN CLEARING LIMITS (TYP.)
LIMIT OF 100' BUFFER ZONE TO BVW
RET. CABINET R&D BATTERY (PAID FOR UNDER ITEM #181.14)
PROP. RECTANGULAR RAPID FLASHING BEACON (SOLAR) LOC. 2 STA. 142+75.50 OFF. 6.01' RT
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +74
BEGIN PROP. GRASSED SWALE STA. +50
PROP. MODIFIED ROCK FOR PIPE END (5'X5') (PAID UNDER ITEM #986)
MATCH EXIST. HMA WALK
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +00
PROP. SWALE WIDTH VARIES 1' TO 8' (SEE CROSS SECTIONS)
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
N/F ADRIAN G & MELINDA J DAVIES 14 GERRY DR MAP/LOT J08/0307 BK/PG 38355/267
N/F CHERYL JONES 233 OLD LANCASTER RD MAP/LOT J08/0301 BK/PG 33438/39
N/F CHONG M & WAI-WAI CHO 236 OLD LANCASTER RD MAP/LOT H08/0011 BK/PG 45903/51
N/F MARK J LANZA & MARY ELIZABETH LOUSA 11 MEADOW DR MAP/LOT J08/0111 BK/PG 45671/478
N/F MICHAEL W KREBS & BARBARA P 223 OLD LANCASTER RD MAP/LOT J08/0101 BK/PG 13427/420
N/F MARCELLO C SANTANA 226 OLD LANCASTER RD MAP/LOT H08/0045 BK/PG 75814/51
N/F JOSHUA R & VICTORIA A BARIBEAU 219 OLD LANCASTER RD MAP/LOT J08/0102 BK/PG 55651/169
N/F MATTHEW P & KENDRA H DOYON 220 OLD LANCASTER RD MAP/LOT J08/0012 BK/PG 71208/253
0 20 50 100
SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 49

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 8:51 AM

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	21	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

608164_HD\CONSTRUCTION PLANS\.DWG Plotted on 27-Jun-2022 8:52 AM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

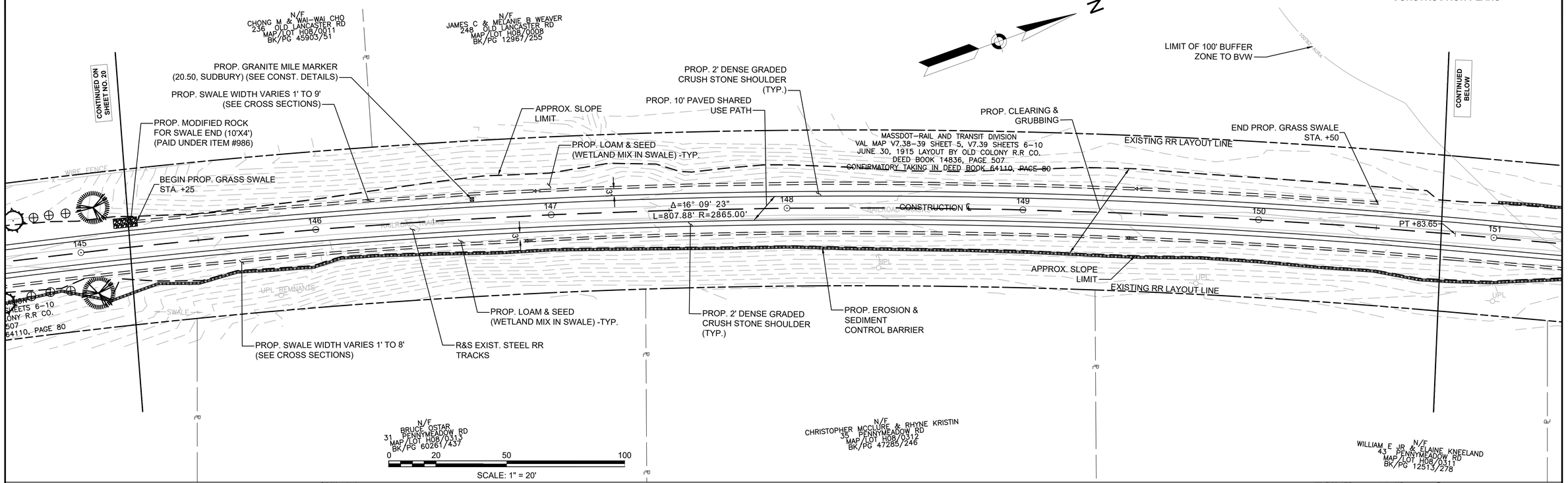
NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE



FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 159+25 LT TO STA. 162+90 LT
TIMBER FENCE (THREE-RAIL) STA. 158+25 RT TO STA. 161+25 RT
TIMBER FENCE (THREE-RAIL) STA. 166+75 RT TO STA. 167+50 RT
TIMBER FENCE (THREE-RAIL) STA. 166+75 RT TO STA. 167+50 RT

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

SHEET 180

TRAFFIC SIGNAL CONDUIT

NONE

DRAINAGE DETAILS

SHEET 180

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	EROSION CONTROL MIX			
SS	CAREX PENNSYLVANIA	PENNSYLVANIA SEDGE	7	PLUG
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	2	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRANGEA	2	5 GAL.

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

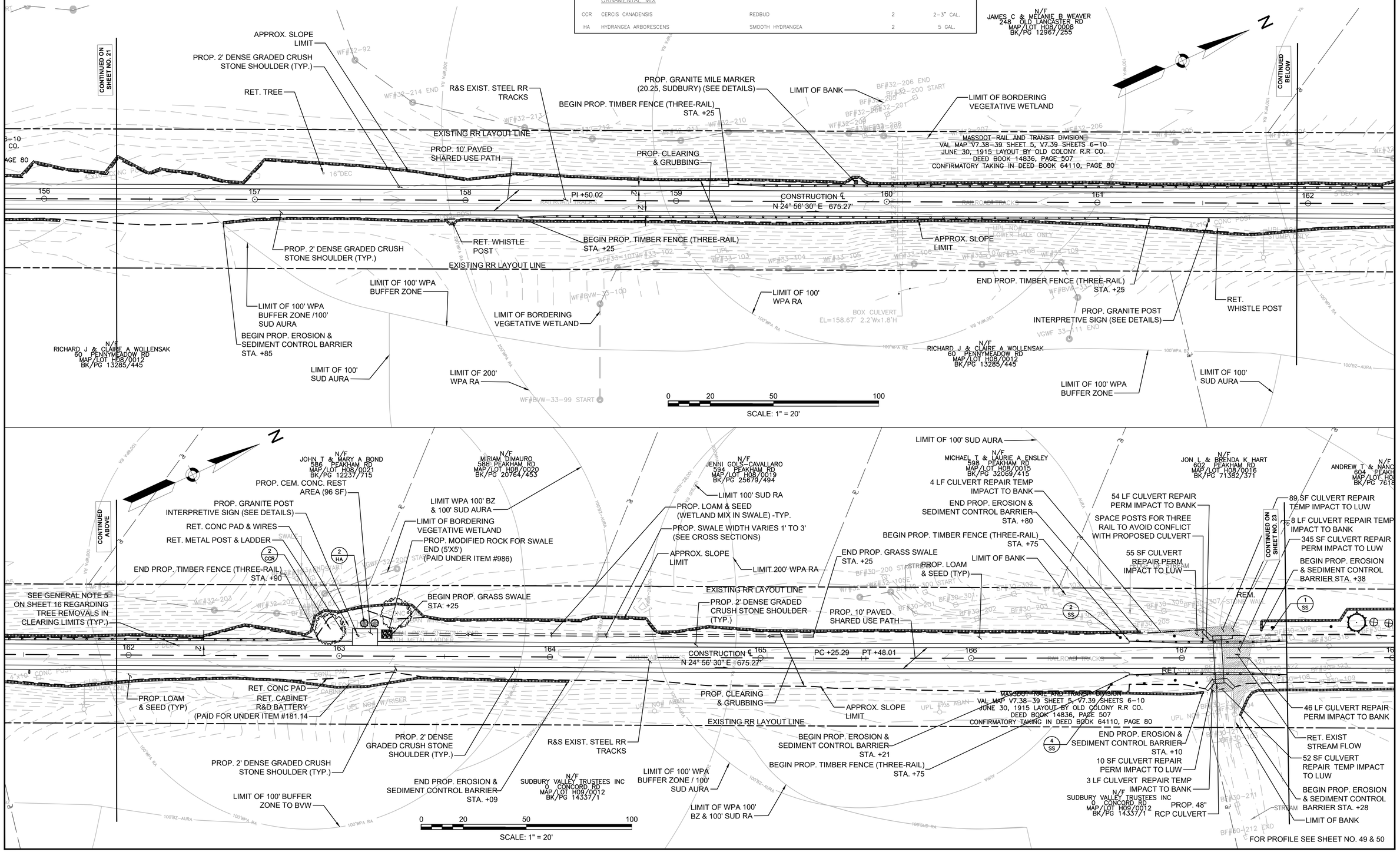
SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	22	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

Plotted on 27-Jun-2022 8:53 AM

608164_HD(CONSTRUCTION PLANS).DWG



FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 166+75 RT TO STA. 167+50 RT
TIMBER FENCE (THREE-RAIL) STA. 166+75 LT TO STA. 167+50 LT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	3	3 GAL.
IG	ILEX GLABRA	INKBERRY	6	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	2	4–5' HT.
AC	ABIES CONCOLOR	WHITE FIR	2	5–6' HT.
	EROSION CONTROL MIX			
SS	CAREX PENNSYLVANIA	PENNSYLVANIA SEDGE	1	PLUG

LEGEND:

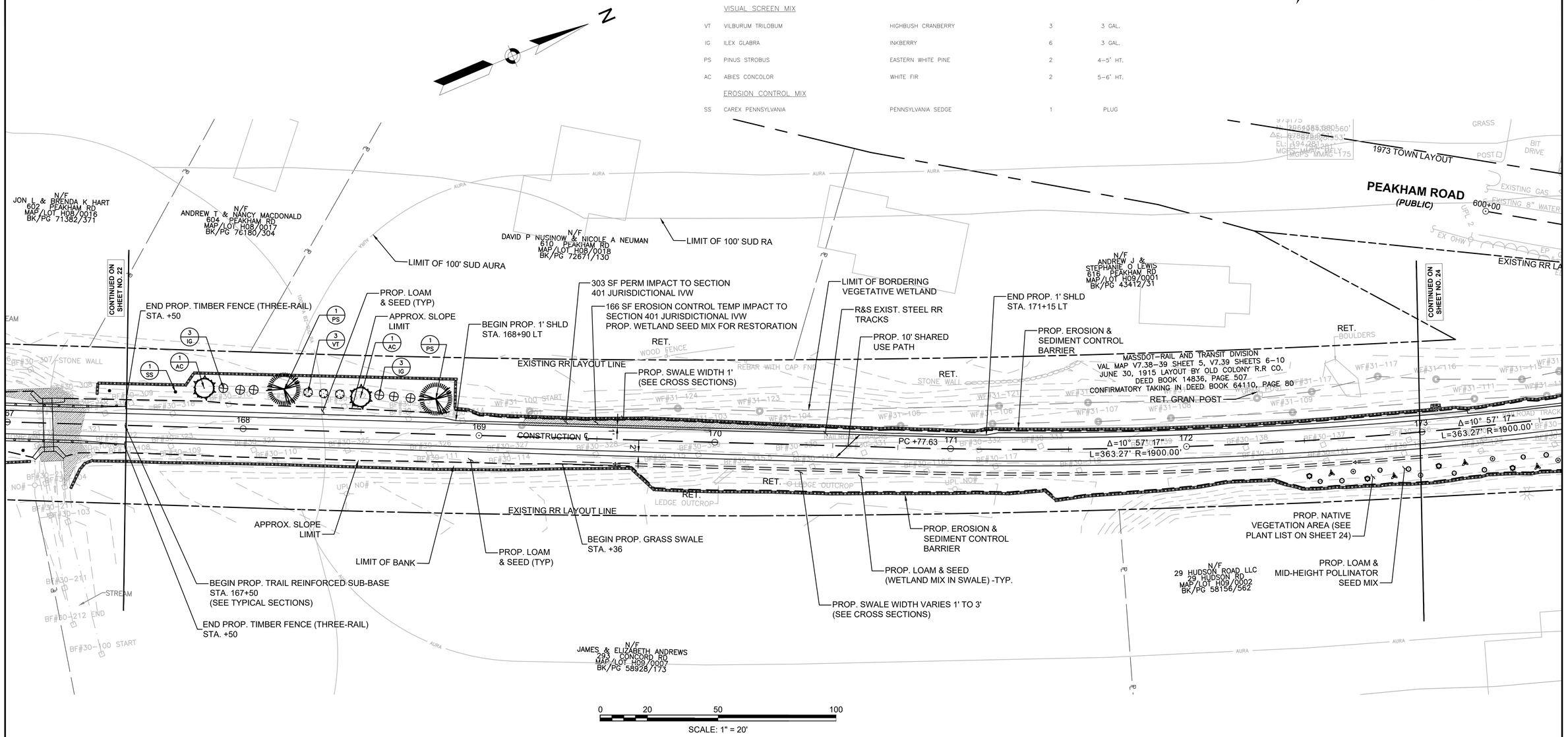
PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	23	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS



FOR PROFILE SEE SHEET NO. 51

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 8:53 AM

CONFORMS TO Addendum No. 2, August 30, 2022

FENCING DETAILS	HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	SEE SHEET 162	SEE SHEET 182	SEE SHEET 182

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	24	319

PROJECT FILE NO. 608164

CONSTRUCTION PLANS

LIMIT OF WORK
STA 504+26.44
N2964724.5314
E678875.4345
LIMIT OF WORK
STA 600+65.46
N2964510.9945
E678926.2831
LIMIT OF WORK
STA 500+28.85
N2964552.0831
E679227.4914
PEAKHAM ROAD
(PUBLIC)
HUDSON ROAD (RTE 27)
(PUBLIC)
TRUSTEE OF LINDA LOUISE MURI
623 PEAKHAM RD
MAP/LOT H09/0056
BK/PG 66273/460
NICHOLAS A TRITOS & ROANNA M LONDON
46 HUDSON RD
MAP/LOT G08/0013
BK/PG 45390/280
TOWN OF SUDBURY(TREASURER)
HUDSON RD
MAP/LOT G09/0200
BK/PG 13189/604
LAWRENCE W TIGHE,
THE HUDSN ROAD TRUST #2
40 HUDSON RD
MAP/LOT G09/0001
BK/PG 33228/333
PENN CENTRAL TRANSPORTATION CO
HUDSON RD
MAP/LOT G09/0012
BK/PG 7074/339
PORTSIDE DEVELOPMENT CORP
FORMERLY
PENN CENTRAL TRANSPORTATION CO
CASE NO. 82476
MATTHEW S & MOLLY F GILMARTIN
30 HUDSON RD
MAP/LOT H09/0068
BK/PG 42175/386
TOWN OF SUDBURY & BOARD OF SELECT BOARD
(TOWN CENTER LAND)
HUDSON RD
MAP/LOT G09/0004
BK/PG 77156/463 & 77156/472
29 HUDSON ROAD LLC
29 HUDSON RD
MAP/LOT H09/0002
BK/PG 58156/562
MASSDOT-RAIL AND TRANSIT DIVISION
VAL MAP V7.38-39 SHEET 5, V7.39 SHEETS 6-10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
RET. EXISTING SECONDARY STEEL RAIL SIDING. CONTRACTOR TO RE-USE/RE-PURPOSE EXISTING BALLAST FROM BFRT AND PLACE AROUND EXISTING RAIL. CONTRACTOR MAY MIX BALLAST WITH PROCESSED GRAVEL AS NEEDED. INTENT IS TO REPLICATE HISTORIC RAIL BALLAST. (APPROX. STA 176+16 TO 181+50)
LIMIT OF 100' BUFFER ZONE TO BVW/ 100' SUD AURA
STA 502+69.89 HUDSON RD ALIGN =
STA 602+13.49 PEAKHAM CL
N 2964636.5520 E 679004.6687
END PROP. GRAN. CURB - TYPE SB TRANSITION TO EXISTING GROUND
PROP. FULL DEPTH BOX WIDENING
R&D ROW OF BOULDERS (INCLUDED IN ITEM #120)
SAWCUT PVM'T MEET EXIST WALK
PROP. TEMPORARY EASEMENT
BEGIN PROP. GRAN. EDGING - TYPE SB
PROP. HMA WALK
PROP. CEM. CONC. WHEELCHAIR RAMP
SAWCUT PVM'T MEET EXIST WALK
END PROP. GRAN. EDGING TYPE SB
PROP. FULL DEPTH PVM'T RECONSTRUCTION
PROP. PVM'T MILL & OVERLAY
LIMIT OF 100' SUD AURA
PROP. FULL DEPTH BOX WIDENING
BEGIN PROP. GRAN. EDGING - TYPE SB
BEGIN PROP. GRAN EDGING - TYPE SB
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +64
BEGIN PROP. SHLD 1' STA. 173+30 LT
EXISTING RR LAYOUT LINE
PROP. HYDRATION STATION
PROP. TRASH RECEPTACLE
PROP. DISPLAY BOARD
PROP. GRANITE MILE MARKER (20.00, SUDBURY) (SEE DETAILS)
PROP. BENCH
PROP. FLUSH GRAN. CURB (SEE DETAIL)
PROP. BIKE RACKS (2)
PROP. REST AREA (481 SF)
PROP. PERVIOUS PAVERS
PROP. LOAM & SEED (TYP.)
PROP. NON-MOTORIZED TRAFFIC COUNTING STATION (SEE SPECIAL PROVISIONS)
END PROP. GRAN EDGING - TYPE SB
REM. EXIST. ISLAND
SAWCUT PVM'T
PROP. LOAM & SEED (ITEM 765)
APPROX. SLOPE LIMIT
PROP. EDGE OF PVM'T
RET. MB
PROP. PVM'T MILL & OVERLAY
RET. BOULDER
RET. CCB
RET. SIGN
RET. F.P.
RET. ROW OF BOULDERS
R&D EXIST. PVM'T
RET. EXIST. EDGE OF PVM'T
EXISTING RR LAYOUT LINE
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. LOAM & SEED (TYP.)
REM. BOULDER
PROP. 10' PAVED SHARED USE PATH
RET. TREE
PROP. FLUSH GRAN. CURB AT CONC. MEDIAN (TYP.) (SEE CONST. DETAIL)
R&S EXIST. STEEL RR TRACKS
PROP. CLEARING & GRUBBING
SEE GENERAL NOTE 5 ON SHEET 16 REGARDING TREE REMOVALS IN CLEARING LIMITS (TYP.)
APPROX. SLOPE LIMIT
PROP. STAMPED CONCRETE SPLITTER ISLAND WITH FLUSH GRAN. CURB (TYP.) (SEE DETAILS)
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. CEM. CONC. WHEELCHAIR RAMP
PROP. GRANITE BFRT PIER (SEE DETAILS)
RET. SWALE
RET. GRAN. EDGING
PROP. PVM'T MILL& OVERLAY
RET. MB
RET. TREES
RET. GRAN. EDGING
PROP. NATIVE VEGETATION AREA (SEE PLANT LIST)
PROP. 1' SHLD
END PROP. SHLD 1' STA. 173+85 LT
EXISTING RR LAYOUT LINE
PROP. LOAM & MID-HEIGHT POLLINATOR SEED MIX
PROP. CEM CONC. WALK AREA
END PROP. GRASS SWALE STA. +07
PROP. GRANITE BFRT PIER (SEE DETAILS)
END PROP. TRAIL REINFORCED SUB-BASE STA. 174+00 (SEE TYPICAL SECTIONS)
REM. EXIST BIT WALK
PROP. CEM. CONC. WHEELCHAIR RAMP
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +65
PROP. HMA WALK
SAWCUT PVM'T MATCH EXIST. WALK
END GRAN. EDGING
R&R GRAN. EDGING
PROP. LIMIT OF WORK
PROP. HMA DRIVEWAY
LIMIT OF 100' SUD AURA
LIMIT OF 100' SUD RA
BEGIN GRAN. EDGING
APPROX. SLOPE LIMIT
PROP. TEMPORARY EASEMENT
PROP. LOAM & SEED (ITEM 765)
R&R GRAN. EDGING
PROP. FULL DEPTH PVM'T RECONSTRUCTION
RET. STONE MASONRY WALL
SAWCUT PVM'T
END GRAN. EDGING
LIMIT 200' SUD RA
1941 COUNTY LAYOUT
1973 TOWN LAYOUT
CONSTRUCTION ℄
PRC +40.91
PT +57.72
PC +51.95
PRC +98.76
Δ=10° 57' 17"
L=363.27' R=1900.00'
L=98.36' R=1050.00'
PT +97.11
PT +74.28
PC +02.01
PT +86.91
PC +00.08
PT +68.84
PC +45.35
PC +11.19
PT +34.93
PT +76.60
602+13.49
0 20 50 100
SCALE: 1" = 20'

CONTINUED ON SHEET NO. 23

CONTINUED ON SHEET NO. 25

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	5	2-3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRANGEA	4	3 GAL.
	NATIVE VEGETATION			
PV	PANICUM VIRGATUM	SWITCHGRASS	13	PLUG
SL	SPIREA LATIFOLIA	MEADOWSWEET	11	PLUG
AT	ASCLEPIAS TUBEROSA	BUTTERFLY WEED	11	PLUG
AL	ASTER LAEVIS	SMOOTH ASTER	12	PLUG
CP	COMPTONIA PEREGRINA	SWEET FERN	12	PLUG

FOR PROFILE SEE SHEET NO. 51

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 186+50 RT TO STA. 190+90 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	3	2–3" CAL.
ACS	AMELANCHIER CANADENSIS	CANADIAN SERVICEBERRY	2	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRANGEA	3	3 GAL.

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	25	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

N/F
LAWRENCE W TIGHE, TRUSTEE OF THE HUDSON RD TRUST #1
36 HUDSON RD
MAP/LOT G09/0002
BK/PG 30663/361

LIMIT OF 100' BUFFER ZONE TO BVW/ 100' SUD AURA

APPROX. SLOPE LIMIT

EXIST. PARKING LOT & RETAINING WALL TO REMAIN

RET. DERAIL MECHANISM

RET. EXISTING SECONDARY STEEL RAIL SIDING. CONTRACTOR TO RE-USE/RE-PURPOSE EXISTING BALLAST FROM BFRT AND PLACE AROUND EXISTING RAIL. CONTRACTOR MAY MIX BALLAST WITH PROCESSED GRAVEL AS NEEDED. INTENT IS TO REPLICATE HISTORIC RAIL BALLAST. (APPROX. STA 176+16 TO 181+50)

PROP. NPS INTERPRETIVE SIGN (SEE DETAILS)

PROP. CEM. CONC. REST AREA (224 SF)

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

PROP. BIKE RACK

SEE GENERAL NOTE 5 ON SHEET 16 REGARDING TREE REMOVALS IN CLEARING LIMITS (TYP.)

CONTINUED ON SHEET NO. 24

EXISTING RR LAYOUT LINE

PROP. 10' PAVED SHARED USE PATH

HAYES DERAIL MECHANISM (APPROX. LOCATION)

LEVER OF DERAIL MECHANISM (APPROX. LOCATION)

RAILROAD TRACKS (APPROX. LOCATION)

CONSTRUCTION ℄
N 19° 48' 11" E 770.84'

PI +22.94

PI +37.53

PROP. LOAM & SEED (TYP)

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

APPROX. SLOPE LIMIT

R&S EXIST. STEEL RR TRACKS

MASSDOT–RAIL AND TRANSIT DIVISION
VAL MAP V7.38–39 SHEET 5, V7.39 SHEETS 6–10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80

N/F
TOWN OF SUDBURY & BOARD OF SELECT BOARD
(TOWN CENTER LAND)
HUDSON RD
MAP/LOT G09/0004
BK/PG 77156/463 & 77156/472

N/F
MATTHEW S & MOLLY F GILMARTIN
30 HUDSON RD
MAP/LOT H09/0068
BK/PG 42175/386

SCALE: 1" = 20'

N/F
TOWN OF SUDBURY(TREASURER)
HUDSON RD
MAP/LOT G09/0200
BK/PG 13189/604

PROP. CLEARING & GRUBBING

CONTINUED ON SHEET NO. 43

PROP. BENCH

PROP. BIKE RACK

PROP. CEM. CONC. REST AREA (238 SF)

PROP. CEM. CONC. PAD & BASE FOR FUTURE ART INSTALLATION

PROP. GRANITE MILE MARKER (19.75, SUDBURY) (SEE DETAILS)

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

APPROX. SLOPE LIMIT

LIMIT OF 100' BUFFER ZONE TO SUDBURY VERNAL POOL

PROP. LOAM & SEED (TYP)

RET. WHISTLE POST

PROP. GRANITE POST INTERPRETIVE SIGN (SEE DETAILS)

PROP. CLEARING & GRUBBING

CONTINUED ON SHEET NO. 26

PT +90.89

L=56.24'
Δ=45°

S 70° 11' 49" E 70.57'

1003461.46

CONSTRUCTION ℄
N 19° 48' 11" E 770.84'

PI +08.37

N 20° 48' 11" E 114.60'

PI +22.97

R&D BOUND

R&S EXIST. STEEL RR TRACKS

PROP. LOAM & SEED (TYP)

SYNCOPATE SEDIMENT CONTROL BARRIER

PROP. LOAM & SEED (TYP)

EXISTING RR LAYOUT LINE

BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +50

APPROX. SLOPE LIMIT

BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +69

PROP. 3' SHLD

POTENTIAL VERNAL POOL
ISOLATED WETLAND
(SURVEYED BY OTHERS)

WF#36–4

WF#36–6

WF#36–7

LIMIT OF BORDERING VEGETATIVE WETLAND

CONTINUED ABOVE

STA 184+50.00 PR–BFRT =
STA 1003+61.46 PARKINSON LOT ACCESS PATH
N 2965478.2038 E 679349.5819

N/F
TOWN OF SUDBURY & BOARD OF SELECT BOARD
(TOWN CENTER LAND)
PETERS WAY EXT
MAP/LOT G09/0100
BK/PG 77152/566

SCALE: 1" = 20'

N/F
TOWN OF SUDB
BOARD OF SELEC
(TOWN CENTER
PETERS WAY
MAP/LOT G09/
BK/PG 77152

FOR PROFILE SEE SHEET NO. 51

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 8:56 AM

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 186+50 RT TO STA. 190+90 RT
TIMBER FENCE (THREE-RAIL) STA. 190+15 LT TO STA. 190+90 LT
TIMBER FENCE (THREE-RAIL) STA. 196+75 RT TO STA. 198+70 RT
TIMBER FENCE (THREE-RAIL) STA. 196+75 LT TO STA. 199+15 LT

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	ORNAMENTAL MIX			
ACS	AMELANCHIER CANADENSIS	CANADIAN SERVICEBERRY	2	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRANGEA	4	3 GAL.

LEGEND:

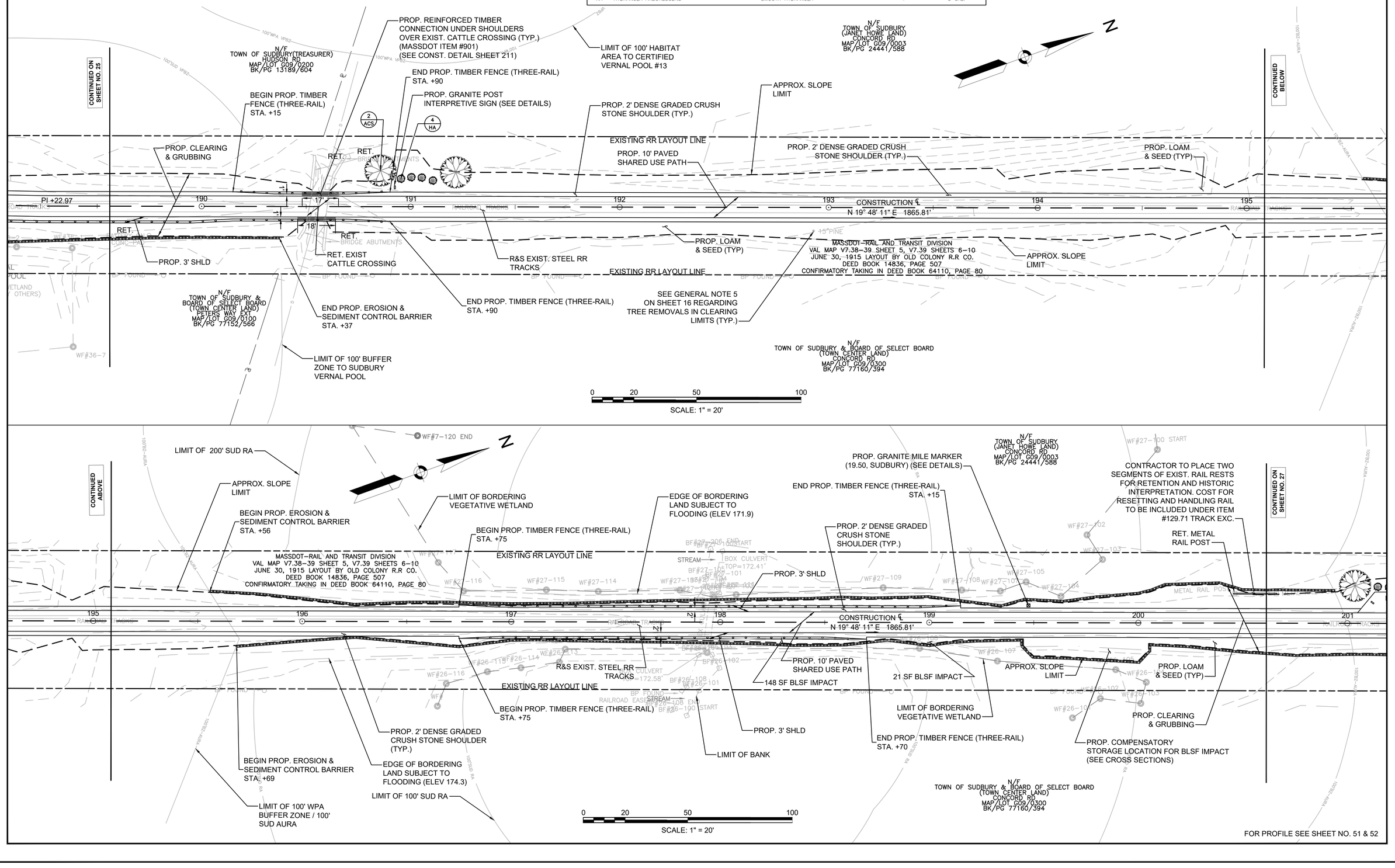
PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	26	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS



FOR PROFILE SEE SHEET NO. 51 & 52

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 8:57 AM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	ORNAMENTAL MIX			
ACS	AMELANCHIER CANADENSIS	CANADIAN SERVICEBERRY	2	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRANGEA	5	3 GAL.

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # X#

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	27	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 8:58 AM

START

CONTINUED ON SHEET NO. 26

RET. METAL RAIL POST

END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +94

PROP. GRANITE POST INTERPRETIVE SIGN (SEE DETAILS)

PROP. BENCH

PROP. BIKE RACK

PROP. CEM. CONC. REST AREA (333 SF)

PROP. CEM. CONC. PAD & BASE FOR FUTURE ART INSTALLATION

2 ACS

5 HA

APPROX. SLOPE LIMIT

N/F
TOWN OF SUDBURY
(JANET HOWE LAND)
CONCORD RD
MAP/LOT G09/0003
BK/PG 24441/588

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

EXISTING RR LAYOUT LINE

PROP. 10' PAVED SHARED USE PATH

PROP. LOAM & SEED (TYP)

CONTINUED BELOW

METAL RAIL POST

201 202 203 204 205 206

RAILROAD TRACKS

CONSTRUCTION ℄
N 19° 48' 11" E 1865.81'

CONC. POST

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

MASSDOT–RAIL AND TRANSIT DIVISION
VAL MAP V7.38–39 SHEET 5, V7.39 SHEETS 6–10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80

240 SF BLSF IMPACT

END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +46

EDGE OF BORDERING LAND SUBJECT TO FLOODING (ELEV 174.3)

RET. CONC. POST

PROP. CLEARING & GRUBBING

R&S EXIST. STEEL RR TRACKS

APPROX. SLOPE LIMIT

LIMIT OF 100' WPA BUFFER ZONE / 100' SUD AURA

N/F
TOWN OF SUDBURY & BOARD OF SELECT BOARD
(TOWN CENTER LAND)
CONCORD RD
MAP/LOT G09/0300
BK/PG 77160/394

0 20 50 100
SCALE: 1" = 20'

N/F
JAMES C & SUSAN M RICHARDS
44 CODMAN DR
MAP/LOT G09/0807
BK/PG 24467/551

LIMIT OF 100' BUFFER TO VERNAL POOL

N/F
TOWN OF SUDBURY
(CONSERVATION)
WAKE ROBIN RD
MAP/LOT F09/0001
BK/PG 12501/703

POTENTIAL VERNAL POOL

CONTINUED ABOVE

BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +93

LIMIT OF 100' WPA BUFFER ZONE / 100' AURA

SEE GENERAL NOTE 5 ON SHEET 16 REGARDING TREE REMOVALS IN CLEARING LIMITS (TYP.)

SYNCOPATE SEDIMENT CONTROL BARRIER

BEGIN PROP. TRAIL REINFORCED SUB-BASE STA. 210+00 (SEE TYPICAL SECTIONS)

LIMIT OF BORDERING VEGETATIVE WETLAND

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

182
N: 2967982.909'
E: 680252.270'
EL: 171.730'
MSTN 182

CONTINUED ON SHEET NO. 28

EXISTING RR LAYOUT LINE

PROP. 10' PAVED SHARED USE PATH

PROP. CLEARING & GRUBBING

APPROX. SLOPE LIMIT

206 207 208 209 210 211 212

RAILROAD TRACKS

PT +49.64

PC +88.78

CONSTRUCTION ℄
N 18° 55' 52" E 139.23'

PT +49.97

PI +81.68

CONCRETE BOUND

APPROX. SLOPE LIMIT

PROP. LOAM & SEED (TYP)

PC +88.86

EXISTING RR LAYOUT LINE

SYNCOPATE SEDIMENT CONTROL BARRIER

MASSDOT–RAIL AND TRANSIT DIVISION
VAL MAP V7.38–39 SHEET 5, V7.39 SHEETS 6–10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80

BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +98

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

ELIGIBLE VERNAL POOL

R&S EXIST. STEEL RR TRACKS

ELIGIBLE VERNAL POOL

R&D BOUND

ELIGIBLE VERNAL POOL

LIMIT OF BORDERING VEGETATIVE WETLAND

LIMIT OF 100' BUFFER TO VERNAL POOL

0 20 50 100
SCALE: 1" = 20'

N/F
JAMES C & SUSAN M RICHARDS
44 CODMAN DR
MAP/LOT G09/0807
BK/PG 24467/551

N/F
WILLIAM P MCMAHON JR
& DINA M MCMAHON–DESORBO
42 CODMAN DR
MAP/LOT G09/0808
BK/PG 61407/511

N/F
CAROL A SHEDD
51 MORSE RD
MAP/LOT F09/0003
BK/PG 37232/274

FOR PROFILE SEE SHEET NO. 52

Plotted on 14-Sep-2022 11:28 AM
608164_HD(CONSTRUCTION PLANS).DWG

NOTES:

1. PROP. MILLING MULCH TO BE PLACED UNDER GUARDRAIL (SEE TYPICAL SECTIONS & MASSDOT STD. SPEC. ITEM 769.)
2. CONTRACTOR SHALL GRADE FUTURE RESTROOM AREA LEVEL AND PLACE LOAM & SEED.
3. CONTRACTOR SHALL GRADE FUTURE PAVILION AREA LEVEL AND PLACE LOAM & SEED.

TRAFFIC SIGNAL CONDUIT

NONE

FENCING DETAILS

TIMBER FENCE (THREE-RAIL)
STA. 216+25 RT TO STA. 216+53 RT
TIMBER FENCE (THREE-RAIL)
STA. 216+89 RT TO STA. 217+00 RT

WATER SUPPLY ALTERATIONS

SHEET 186

DRAINAGE DETAILS

SHEET 186

HIGHWAY GUARD DETAILS

TIMBER GUARDRAIL STA. 216+09 RT TO STA. 216+53 RT
TIMBER GUARDRAIL STA. 216+68 RT TO STA. 217+64 RT
TIMBER GUARDRAIL STA. 216+01 RT TO STA. 216+52 RT
TIMBER GUARDRAIL STA. 216+68 RT TO STA. 217+64 RT

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL #

PLANT QUANTITY AND SPECIES

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	28	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +89
LIMIT OF 100' WPA BZ / 100' SUD AURA
APPROX. SLOPE LIMIT
WETLAND REPLICATION AREA (SEE WETLAND REPLICATION PLAN SHEET 207)
PROP. TEMP. EASEMENT
N/F TOWN OF SUDBURY & BOARD OF SELECTMEN (BROADACRE FARM HOUSE) 82 MORSE RD MAP/LOT F09/0002 BK/PG 72906/476
LIMIT OF 100' WPA BZ / 100' SUD RA
POTENTIAL VERNAL POND
CONTINUED ON SHEET NO. 27
R&D WOOD FENCE
PROP. LOAM & SEED (WOODLAND EDGE SEED MIX)
PROP. GRANITE MILE MARKER (19.25, SUDBURY) (SEE DETAILS)
LIMIT OF BORDERING VEGETATIVE WETLAND
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +02
PROP. LOAM & SEED (TYP)
TEMP. ACCESS ROUTE
MASSDOT-RAIL AND TRANSIT DIVISION VAL MAP V7.38-39 SHEET 5, V7.39 SHEETS 6-10 JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO. DEED BOOK 14836, PAGE 507 CONFIRMATORY TAKING IN DEED BOOK 84110, PAGE 80
EXISTING RR LAYOUT LINE
APPROX. SLOPE LIMIT
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. 10' PAVED SHARED USE PATH
CONSTRUCTION ℄
N 19° 49' 56" E 542.87'
N 19° 25' 59" E 171.87'
ELIGIBLE VERNAL POOL
LIMIT OF BANK
RET. WOOD FENCE
APPROX. SLOPE LIMIT
R&S EXIST. STEEL RR TRACKS
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
END PROP. TRAIL REINFORCED SUB-BASE STA. 215+48 (SEE TYPICAL SECTIONS)
PROP. LOAM & SEED (TYP)
SAWCUT & MEET EXIST
RET. TREE
EXISTING RR LAYOUT LINE
RET. WOOD FENCE
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +55
PROP. RECTANGULAR RAPID FLASHING BEACON (SOLAR) LOC. 3 STA. 215+66.97 OFF. 8.95' RT
GRANITE BFRT PIER (SEE DETAILS)
RET. EXIST. WALK
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +93
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +88
PROP. TREE PROTECTION (TYP.)
SAWCUT PVM'T
PROP. LOAM & SEED (TYP)
BEGIN PROP. TIMBER GUARDRAIL WITH RUB RAIL
END PROP. TIMBER FENCE (THREE-RAIL) STA. +54
END PROP. TIMBER GUARDRAIL WITH RUB RAIL
PROP. PERM. PVM'T PATCH
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +66
PROP. BFRT ENTRANCE SIGN (SEE DETAILS)
BEGIN PROP. TIMBER GUARDRAIL WITH RUB RAIL
PROP. TREE TRIMMING ALONG MORSE ROAD (APPROX. 80 LINEAR FEET)
PROP. PERM. EASEMENT
N/F CAROL A SHEDD 51 MORSE RD MAP/LOT F09/0003 BK/PG 37232/274
WF#24-100S
LIMIT OF 100' WPA BZ / 100' SUD RA
LIMIT OF 100' SUD RA
LIMIT OF 100' WPA BZ / 100' AURA
MORSE ROAD (PUBLIC)
1830 TOWN LAYOUT
RET. EXIST. HMA ROADWAY
PROP. RECTANGULAR RAPID FLASHING BEACON (SOLAR) LOC. 3 STA. 215+98.43 OFF. 8.33' LT
PROP. CEM. CONC. WHEELCHAIR RAMP
PROP. LOAM & SEED (TYP)
SAWCUT & MATCH EXIST.
PROP. 5' HMA WALK
PROP. CEM. CONC. WHEELCHAIR RAMP
GRANITE BFRT PIER (SEE DETAILS)
RET. STONE BOUND (FOUND)
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. CLEARING & GRUBBING
SAWCUT PVM'T
EXISTING RR LAYOUT LINE
6 LF PERM IMPACT TO BANK
PROP. LOAM & SEED (TYP.)
6 LF TEMP IMPACT TO BANK
35 SF TEMP IMPACT TO LUW
7 LF TEMP IMPACT TO BANK
EXISTING RR LAYOUT LINE
16 SF PERM IMPACT TO LUW
REM. WOOD HEADWALL
RET. EXIST. GRAVEL WALK
END PROP. HMA SHARED-USE PATH MATCH EXIST.
6 LF PERM IMPACT TO BANK
3 SF PERM IMPACT TO LUW
N/F TOWN OF SUDBURY & BOARD OF SELECTMEN (BROADACRE FARM HOUSE) 82 MORSE RD MAP/LOT F09/0002 BK/PG 72906/476
PROP. REST AREA (856 SF)
PROP. PERVIOUS PAVERS (SEE SHEET 217 CONST. DETAILS)
CONTINUED ON SHEET NO. 29
PROP. DISPLAY BOARD & RAIL TRAL INFORMATION
BEGIN PROP. CEMENTED STONE MASONRY WALL STA. +74
END PROP. TIMBER FENCE (THREE-RAIL) STA. +00
6 LF TEMP IMPACT TO BANK
PROP. TRASH RECEPTACLE
PROP. FLUSH GRAN. CURB (SEE DETAIL)
PROP. BIKE RACKS (3)
PROP. CEM. CONC. FOR BIKE RACK INSTALLATION
PROP. BENCH
PROP. FLUSH GRAN. CURB (SEE DETAIL)
PROP. CEM. CONC. WALK AREA
42 SF TEMP IMPACT TO LUW
8 LF TEMP IMPACT TO BANK
PROP. LOAM & SEED (TYP)
PROP. LOAM & SEED (WETLAND MIX) FOR BASINS
PROP. CLEARING & GRUBBING
END PROP. TIMBER GUARDRAIL WITH RUB RAIL
PROP. WOOD LIGHT POLE (SEE UTILITY PLANS)
PROP. CEM. CONC. WHEELCHAIR RAMP
PROP. 10' PAVED SHARED USE ACCESS PATH
BROADACRES FARM PARKING LOT
PROP. HMA PARKING LOT
BEGIN PROP. TIMBER GUARDRAIL WITH RUB RAIL
REM. TREES
PROP. CLEARING & GRUBBING
R&R PANTRY BROOK GRANITE ABUTMENT BLOCKS (x10)
BEGIN PROP. TIMBER GUARDRAIL WITH RUB RAIL
APPROX. SLOPE LIMIT
RET.
PROP. LOAM & SEED (TYP)
PROP. FLUSH GRAN. CURB (SEE DETAIL)
FUTURE PRE-ENGINEERED RESTROOM (SEE NOTE 2)
PROP. BENCH
PROP. TRASH RECEPTACLE
PROP. PERVIOUS PAVERS (480 SF)
PROP. NPS INTERPRETIVE SIGN (SEE DETAILS)
END PROP. TIMBER GUARDRAIL WITH RUB RAIL
PROP. BIKE RACKS (3)
PROP. HYDRATION STATION
FUTURE HMA PATH CONNECTION
PROP. TEMP. EASEMENT
PROP. CEM. CONC. WHEELCHAIR RAMP
PROP. LOAM & SEED (TYP.)
FUTURE PRE-ENGINEERED PAVILION (SEE NOTE 3)
END PROP. TIMBER GUARDRAIL WITH RUB RAIL
LIMIT OF 100' BUFFER ZONE TO BVW
PROP. PICNIC TABLES (3)
PROP. PERVIOUS PAVERS (SEE SHEET 217 CONST. DETAILS)
FOR PROFILE SEE SHEET NO. 52 & 53
N/F TOWN OF SUDBURY(BROADACRE FARM) MORSE RD MAP/LOT F09/0004 BK/PG 71910/379
PROP. CEM. CONCRETE PAD & BASE FOR ART DISPLAY
PROP. FLUSH GRAN. CURB (SEE DETAIL)

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	5	2–3" CAL.
ACS	AMELANCHIER	CANADENSIS	1	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRAGEA	15	3 GAL.
	SHADE TREES			
TA	TILIA AMERICANA	AMERICAN LINDEN	1	2–3" CAL.
QR	QUERCUS RUBRA	NORTHERN RED OAK	2	2–3" CAL.
BN	BETULA NIGRA	RIVER BIRCH	2	2–2.5" CAL.

0 20 50 100
SCALE: 1" = 20'

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 222+25 LT TO STA. 231+73 LT
TIMBER FENCE (THREE-RAIL) STA. 224+23 RT TO STA. 228+73 RT

HIGHWAY GUARD DETAILS

NONE

WATER SUPPLY ALTERATIONS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	ORNAMENTAL MIX			
ACS	AMELANCHIER	CANADENSIS	1	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRAGEA	2	3 GAL.
	SHADE TREES			
AS	ACER SACCHARUM	SUGAR MAPLE	1	2–3" CAL.

TRAFFIC SIGNAL CONDUIT

NONE

DRAINAGE DETAILS

NONE

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL #

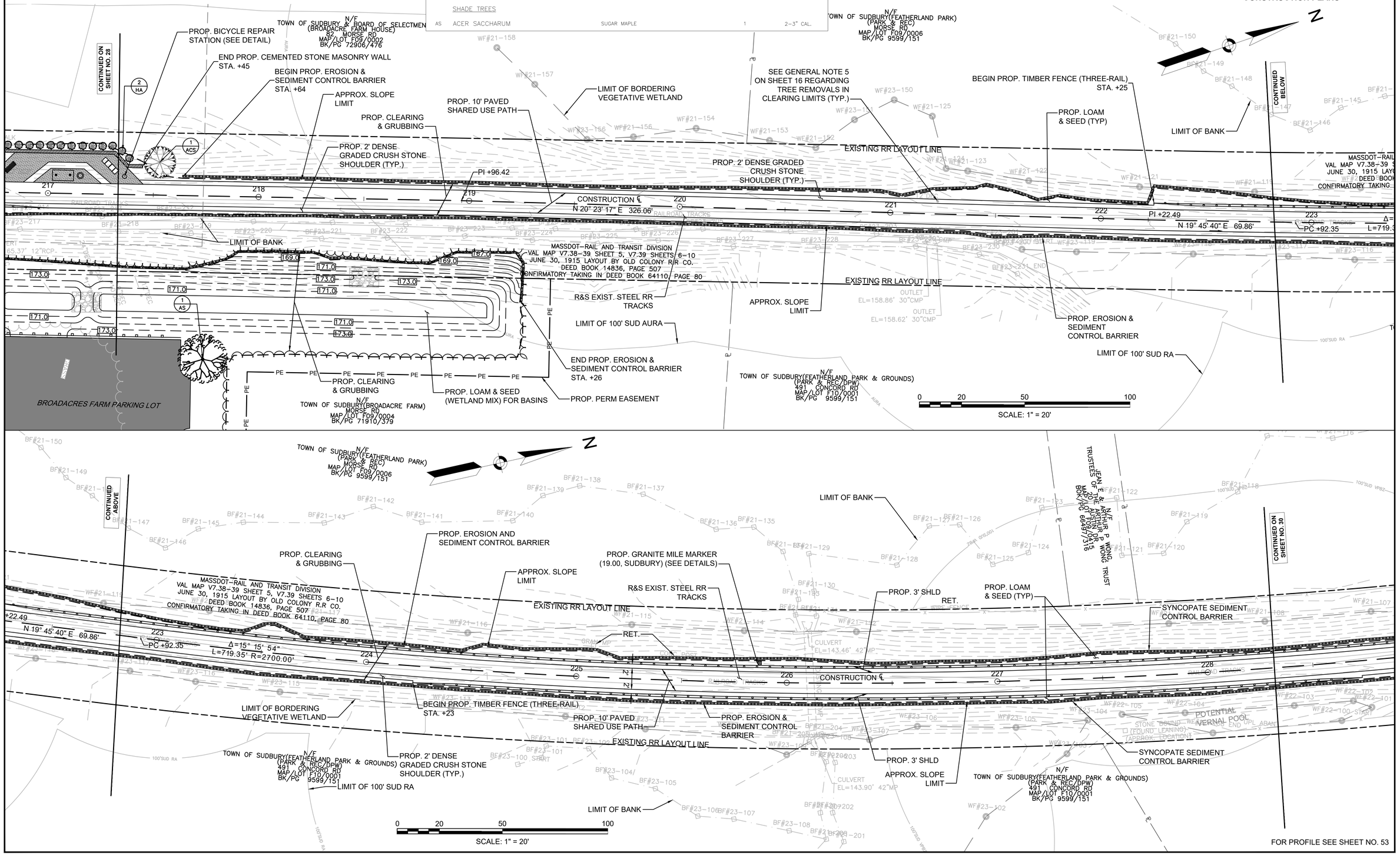
PLANT QUANTITY AND SPECIES

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	29	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

Plotted on 27-Jun-2022 9:00 AM
608164_HD\CONSTRUCTION PLANS\.DWG



FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 222+25 LT TO STA. 231+73 LT
TIMBER FENCE (THREE-RAIL) STA. 224+23 RT TO STA. 228+73 RT
TIMBER FENCE (THREE-RAIL) STA. 236+90 LT TO STA. 243+45 LT
TIMBER FENCE (THREE-RAIL) STA. 236+90 RT TO STA. 241+73 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

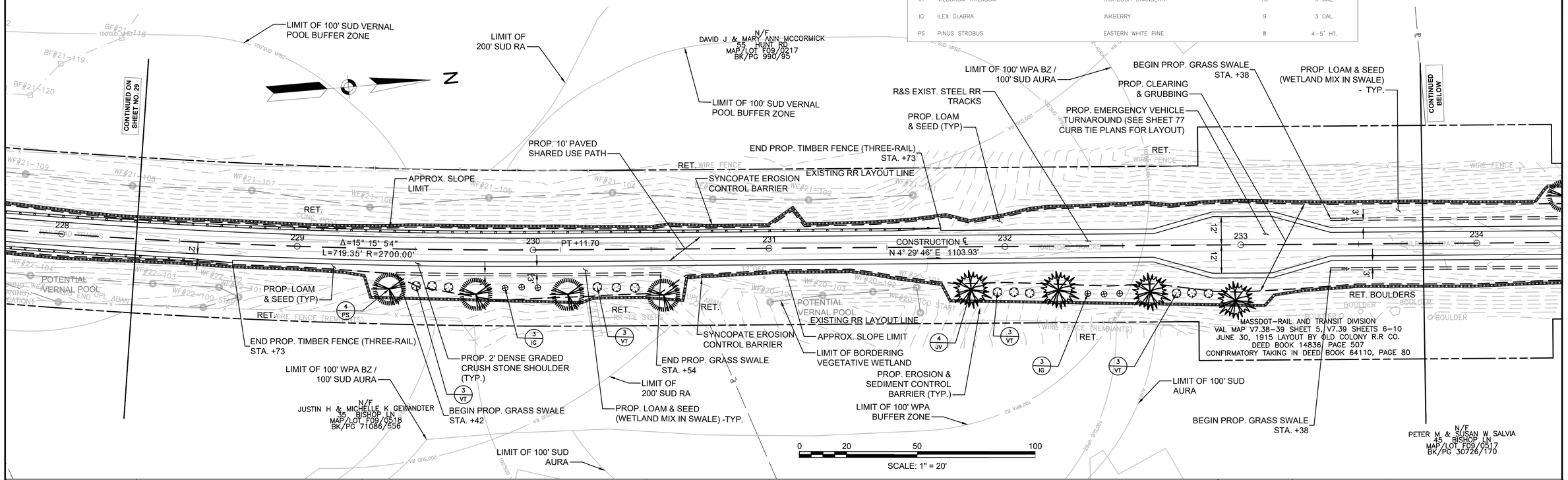
PLANT LIST

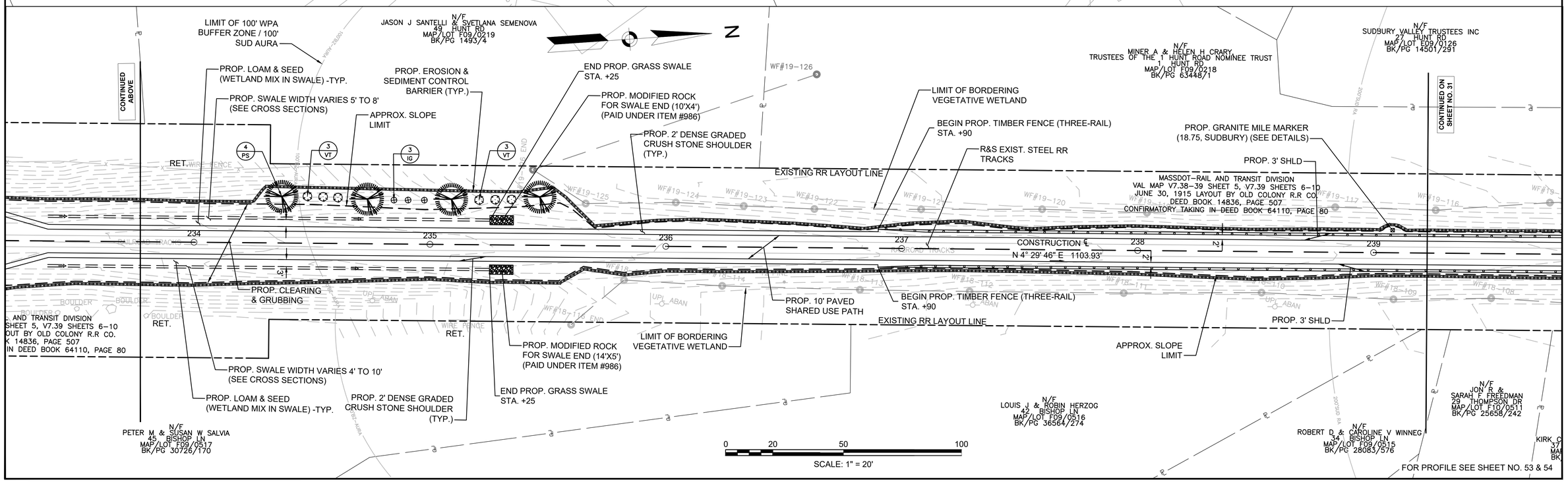
KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
JV	JUNIPERUS VIRGINIANA	EASTERN RED CEDAR	4	4–5' HT.
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	18	3 GAL.
IG	ILEX GLABRA	INKBERRY	9	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	8	4–5' HT.

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	30	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS





608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 9:02 AM

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 236+90 LT TO STA. 243+45 LT
TIMBER FENCE (THREE-RAIL) STA. 236+90 RT TO STA. 241+73 RT
TIMBER FENCE (THREE-RAIL) STA. 245+75 LT TO STA. 248+30 LT
TIMBER FENCE (THREE-RAIL) STA. 245+75 RT TO STA. 248+30 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	28	3 GAL.
IG	ILEX GLABRA	INKBERRY	22	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	10	4–5' HT.
AC	ABIES CONCOLOR	WHITE FIR	6	5–6' HT.
	ORNAMENTAL MIX			
ACS	AMELANCHIER	CANADENSIS	2	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRAGEA	4	3 GAL.

LEGEND:

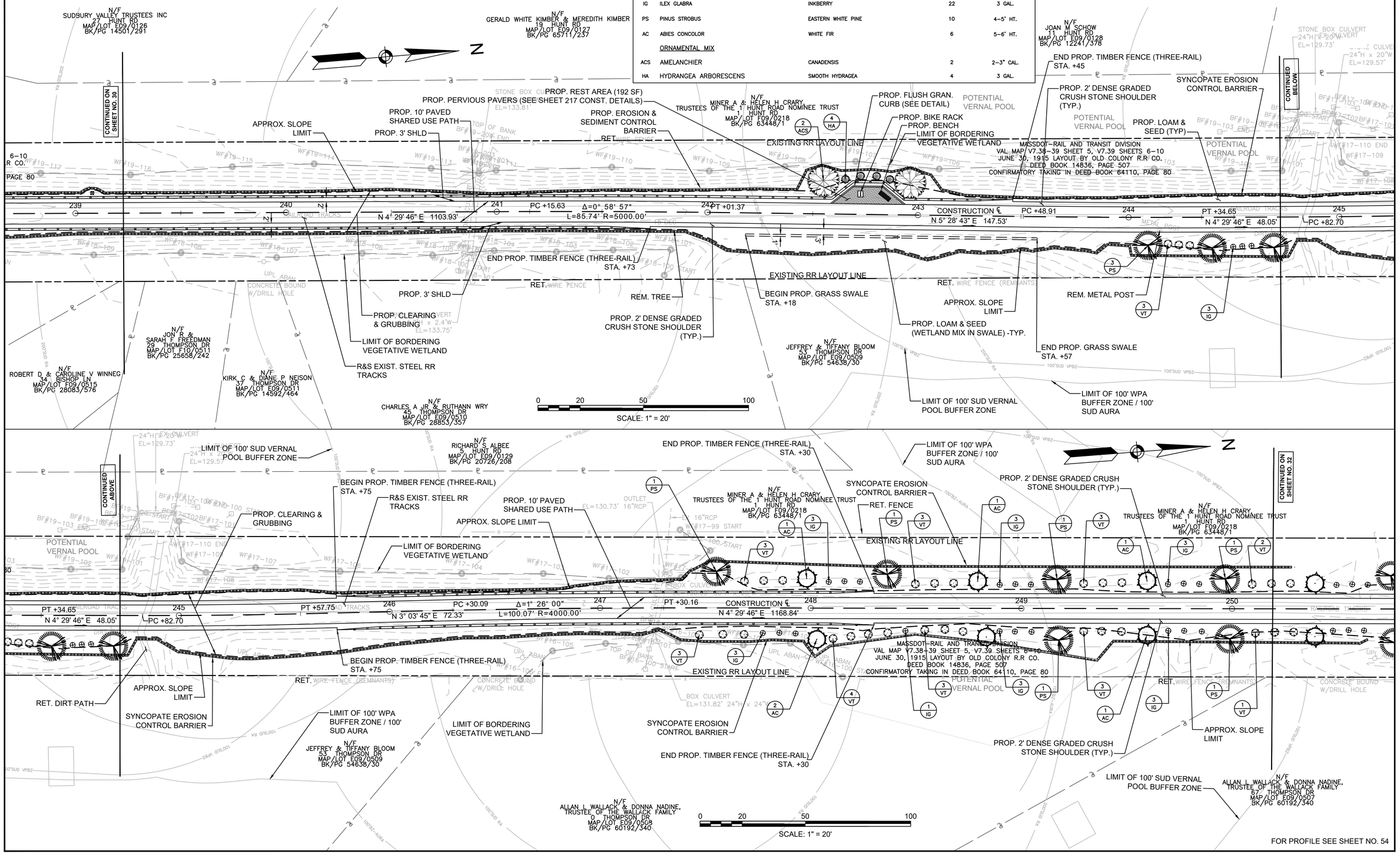
PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	31	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS



CONFORMS TO Addendum No. 2, August 30, 2022

FENCING DETAILS
TIMBER FENCE (THREE-RAIL) STA. 258+22 RT TO STA. 258+72 RT
TIMBER FENCE (THREE-RAIL) STA. 258+22 LT TO STA. 258+72 LT

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SHEET 190

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	29	3 GAL.
IG	ILEX GLABRA	INKBERRY	27	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	2	4-5' HT.
AC	ABIES CONCOLOR	WHITE FIR	2	5-6' HT.

LEGEND:
PROPOSED WHEELCHAIR RAMP DETAIL # — X#
PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	32	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 14-Sep-2022 11:30 AM

N/F MINER A & HELEN H CRARY TRUSTEES OF THE 1 HUNT ROAD NOMINEE TRUST 1 HUNT RD MAP/LOT F09/0218 BK/PG 63448/1
N/F WEST PANTRY BROOK FARM LIMITED PARTNERSHIP 667 CONCORD RD MAP/LOT E10/0200 BK/PG 49200/410
CONTINUED ON SHEET NO. 31
CONTINUED BELOW
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +27
APPROX. SLOPE LIMIT
RET. FENCE
PROP. EMERGENCY VEHICLE TURNAROUND (SEE SHEET 79 CURB TIE PLANS FOR LAYOUT)
PROP. GRANITE MILE MARKER (18.50, SUDBURY) (SEE DETAILS)
PROP. 10' PAVED SHARED USE PATH
BEGIN PROP. GRASS SWALE STA. +73
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
LIMIT OF 200' RIVER FRONT AREA
PROP. SWALE WIDTH VARIES 5' TO 8' (SEE CROSS SECTIONS)
PROP. LOAM & SEED (WETLAND MIX IN SWALE) -TYP.
END PROP. GRASS SWALE STA. +10
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +32
PROP. CLEARING & GRUBBING
PROP. LOAM & SEED (TYP)
EXISTING RR LAYOUT LINE
MASSDOT-RAIL AND TRANSIT DIVISION VAL MAP V7.38-39 SHEET 5, V7.39 SHEETS 6-10 JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO. DEED BOOK 14836, PAGE 507 CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
CONSTRUCTION ℄ N 4° 29' 46" E 1168.84'
250 251 252 253 254 255 256
12' 12'
RET.
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
R&S EXIST. STEEL RR TRACKS
RET. TREE
BEGIN PROP. GRASS SWALE STA. +73
PROP. LOAM & SEED (TYP)
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +65
PROP. LOAM & SEED (WETLAND MIX IN SWALE) -TYP.
APPROX. SLOPE LIMIT
RET. METAL POST
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
PROP. SWALE WIDTH VARIES 5' TO 11' (SEE CROSS SECTIONS)
N/F ALLAN L WALLACK & DONNA NADINE, TRUSTEE OF THE WALLACK FAMILY 67 THOMPSON DR MAP/LOT E09/0507 BK/PG 60192/340
0 20 50 100
SCALE: 1" = 20'

LIMIT OF BORDERING VEGETATIVE WETLAND
APPROX. SLOPE LIMIT
R&S EXIST. STEEL RR TRACKS
PROP. CLEARING & GRUBBING
CONTINUED ABOVE
PROP. MODIFIED ROCK FOR PIPE END (5'X5') (PAID UNDER ITEM #986)
SEE GENERAL NOTE 5 ON SHEET 16 REGARDING TREE REMOVALS IN CLEARING LIMITS (TYP.)
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +44
RET. EXIST CATTLE CROSSING
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +22
PROP. 10' PAVED SHARED USE PATH
EXISTING RR LAYOUT LINE
MASSDOT-RAIL AND TRANSIT DIVISION VAL MAP V7.38-39 SHEET 5, V7.39 SHEETS 6-10 JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO. DEED BOOK 14836, PAGE 507 CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
N/F WEST PANTRY BROOK FARM LIMITED PARTNERSHIP 667 CONCORD RD MAP/LOT E10/0200 BK/PG 49200/410
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +52
END PROP. TIMBER FENCE (THREE-RAIL) STA. +72
PROP. REST AREA (81 SF) PROP. PERVIOUS PAVERS (SEE SHEET 217 CONST. DETAILS)
PROP. NPS INTERPRETIVE SIGN (SEE DETAILS)
PROP. FLUSH GRAN. CURB (SEE DETAIL)
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
LIMIT OF BORDERING VEGETATIVE WETLAND
CONTINUED ON SHEET NO. 33
CONSTRUCTION ℄ N 4° 29' 46" E 1168.84'
256 257 258 259 260 261
15' 15'
PC +99.00
Δ=11° 56' 05" L=562.41' R=2700.00'
RET.
END PROP. TIMBER FENCE (THREE-RAIL) STA. +72
EXISTING RR LAYOUT LINE
PROP. LOAM & SEED (WETLAND MIX IN SWALE) -TYP.
END PROP. GRASS SWALE STA. +44
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. REINFORCED TIMBER CONNECTION UNDER SHOULDERS OVER EXIST. CATTLE CROSSING (TYP.) (MASSDOT ITEM #901.) (SEE CONST. DETAIL SHEET 211)
APPROX. SLOPE LIMIT
R&R PANTRY BROOK GRANITE ABUTMENT BLOCKS (x5) (SEE CONSTRUCTION DETAIL)
PROP. GRANITE POST INTERPRETIVE SIGN
LIMIT OF 200' RIVER FRONT AREA
PROP. SWALE WIDTH VARIES 5' TO 11' (SEE CROSS SECTIONS)
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +22
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
0 20 50 100
SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 54 & 55

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	3	3 GAL.
IG	ILEX GLABRA	INKBERRY	3	3 GAL.
AC	ABIES CONCOLOR	WHITE FIR	5	5–6' HT.
	EROSION CONTROL MIX			
SS	CAREX PENNSYLVANIA	PENNSYLVANIA SEDGE	86	PLUG

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 262+25 LT TO STA. 266+25 LT
TIMBER FENCE (THREE-RAIL) STA. 264+00 RT TO STA. 268+75 RT
TIMBER FENCE (THREE-RAIL) STA. 269+52 LT TO STA. 270+02 LT
TIMBER FENCE (THREE-RAIL) STA. 269+52 RT TO STA. 270+02 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

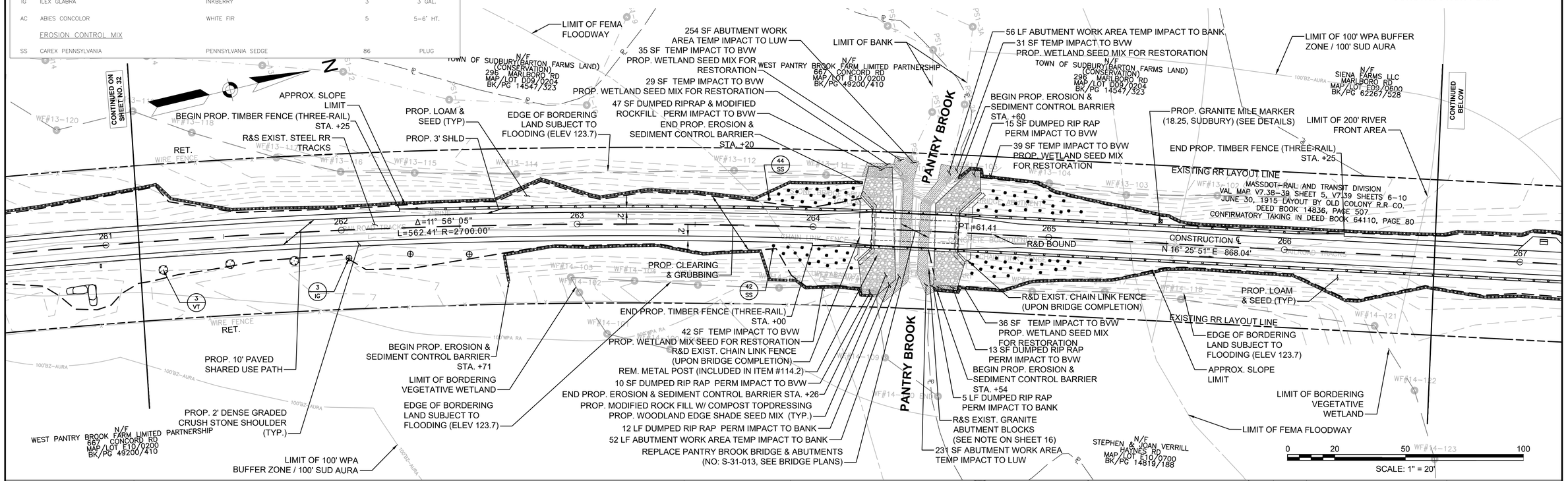
PLANT QUANTITY AND SPECIES — X / XX

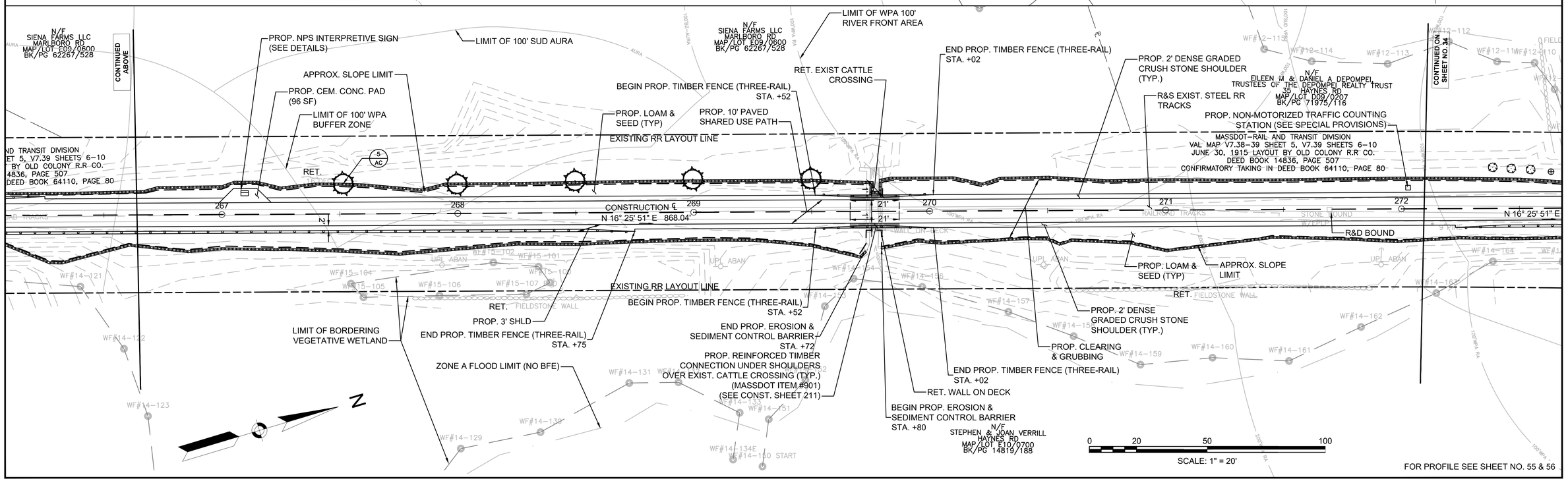
SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	33	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 9:06 AM





FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 272+23 RT TO STA. 273+73 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	21	3 GAL.
IG	ILEX GLABRA	INKBERRY	15	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	1	4–5' HT.
AC	ABIES CONCOLOR	WHITE FIR	1	5–6' HT.
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	6	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRAGEA	4	3 GAL.

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	34	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

N

0 20 50 100

SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 55 & 56

FENCING DETAILS

NONE

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	35	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

608164_HD\CONSTRUCTION PLANS\.DWG Plotted on 27-Jun-2022 9:08 AM

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	7	3 GAL.
IG	ILEX GLABRA	INKBERRY	4	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	8	4–5' HT.
AC	ABIES CONCOLOR	WHITE FIR	5	5–6' HT.

N

N/F
RICHARD J & MICHELLE R VROMAN
34 HAYNES RD
MAP/LOT D10/0024
BK/PG 42291/471

N/F
THOMAS JAY JR & SHERRI ANN LOWERY
38 HAYNES RD
MAP/LOT D09/0024
BK/PG 75057/516

N/F
A SCHOOL FOR SPCL LRNG INC
98 HAYNES RD
MAP/LOT D09/0400
BK/PG 12741/409

CONTINUED ON SHEET NO. 34

CONTINUED ON SHEET NO. 36

LIMIT OF 100' BUFFER ZONE TO BVW

PROP. GRANITE MILE MARKER (18.00, SUDBURY) (SEE DETAILS)

BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +46

LIMIT OF WPA 200' BZ / 100' SUD RA

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

PROP. LOAM & SEED (TYP)

RET. POST

RET. TREE

RET. EXISTING RR LAYOUT LINE

AREA OF SCATTERED ROCKS AND LEDGE OUTCROPS

276PC +03.01
Δ=10° 15' 47"
L=44.78' R=250.00'
PRC +47.79

277 PT +92.57

278 279 280 281 282

CONSTRUCTION ℄
N 20° 58' 33" E 621.40'

MASSDOT–RAIL AND TRANSIT DIVISION
VAL MAP V7.38–39 SHEET 5, V7.39 SHEETS 6–10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80

EXISTING RR LAYOUT LINE

RET. WOOD POSTS

4–WOOD POSTS

5–WOOD POSTS

RET. WOOD POST

PROP. EROSION & SEDIMENT CONTROL BARRIER

PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)

LIMIT OF BORDERING VEGETATIVE WETLAND

APPROX. SLOPE LIMIT

R&S EXIST. STEEL RR TRACKS

PROP. CLEARING & GRUBBING

END PROP. TRAIL REINFORCED SUB-BASE STA. 280+50 (SEE TYPICAL SECTIONS)

LIMIT OF 100' SUD VERNAL POOL BUFFER ZONE

LIMIT OF 100' WPA BUFFER ZONE / 100' AURA

N/F
ARTHUR J & MARGARET A RICHARD
31 HAYNES RD
MAP/LOT D10/0001
BK/PG 24653/464

N/F
CHRISTOPHER G & ALISON M BOLAND
24 HAYNES RD
MAP/LOT D10/0101

EXISTING OVERHEAD WIRE

EXISTING 8"WATER

EDGE PVMT

WOODED

WOOD STOCKADE FENCE

48"DEC

18"CPP

0 20 50 100

SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. ## AND ##

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 283+73 LT TO STA. 284+28 LT
TIMBER FENCE (THREE-RAIL) STA. 284+65 RT TO STA. 290+25 RT

HIGHWAY GUARD DETAILS

STEEL W-BEAM GUARDRAIL (TL-2) W/ WOOD POST STA. 284+28 LT TO STA. 284+46 LT
STEEL W-BEAM GUARDRAIL (TL-2) W/ WOOD POST STA. 284+75 LT TO STA. 285+18 LT
STEEL W-BEAM GUARDRAIL (TL-2) W/ WOOD POST STA. 284+51 RT TO STA. 284+63 RT

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	3	2-3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRAGEA	4	3 GAL.

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	36	319
PROJECT FILE NO. 608164			

CONSTRUCTION PLANS

N
LIMIT OF BANK
N/F A SCHOOL FOR SPCL LRNG INC 9B HAYNES RD MAP/LOT D09/0400 BK/PG 12741/409
END PROP. CEMENTED STONE MASONRY WALL STA. +27
BEGIN PROP. STEEL W-BEAM GUARDRAIL, TL-2 W/ WOOD POST
END PROP. TIMBER FENCE (THREE-RAIL) STA. +28 PROP. TRAILING ANCHORAGE TO ABUT STEEL W-BEAM GUARDRAIL
BEGIN PROP. CEMENTED STONE MASONRY WALL STA. +85
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +73
BEGIN PROP. STEEL W-BEAM GUARDRAIL, TL-2 W/ WOOD POST PROP. TANGENT END TREATMENT
END PROP. STEEL W-BEAM GUARDRAIL, TL-2 W/ WOOD POST BEGIN PROP. TRANSITION TO NCHRP 350 GUARDRAIL
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +43
R&D EXIST. GUARDRAIL
PROP. GRANITE BFRT PIER (SEE DETAILS)
N/F RAMI ALWAN & JENNIE M BRANNEN PANTRY RD MAP/LOT D10/0013 BK/PG 69023/195
ZONE A FLOOD LIMIT (NO BFE)
LIMIT OF WPA 100' BZ / 100' SUD RA
RET. EXIST HMA ROADWAY
END PROP. TRANSITION TO NCHRP 350 GUARDRAIL
END PROP. STEEL W-BEAM GUARDRAIL, TL-2 W/ WOOD POST PROP. TRAILING ANCHORAGE
CONTINUED ON SHEET NO. 35
APPROX. SLOPE LIMIT
LIMIT OF BORDERING VEGETATIVE WETLAND
PROP. 10' PAVED SHARED USE PATH
SYNCOPATE EROSION CONTROL BARRIER
PROP. CLEARING & GRUBBING
PANTRY ROAD (PUBLIC)
EXISTING TOWN LO
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +19
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
SEE GENERAL NOTE 5 ON SHEET 16 REGARDING TREE REMOVALS IN CLEARING LIMITS (TYP.)
CONTINUED ON SHEET NO. 37
ELIGIBLE VERNAL POOL
PROP. CEM. CONC. REST AREA (242 SF)
EXISTING RR LAYOUT LINE
PROP. BIKE RACK
PROP. BENCH
RET. EXIST. GUARDRAIL
282
283
284
285
286
287
PC +13.96 Δ=7° 45' 30" L=67.70' R=500.00'
N 20° 58' 33" E 621.40'
PC +11.95
PT +81.67
+33.81
+58.09
F1
F2
PC +21.54
PT +81.22
PT +66.76
CONSTRUCTION ℄
N 20° 59' 52" E 516.76'
SYNCOPATE EROSION CONTROL BARRIER
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
EXISTING RR LAYOUT LINE
PROP. LIMIT OF TREE TRIMMING
LIMIT OF BORDERING VEGETATIVE WETLAND
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +56
RET. EXIST. GUARDRAIL
PROP. CEM. CONC. WHEELCHAIR RAMP
R&D EXIST. GUARDRAIL
APPROX. SLOPE LIMIT
MASSDOT-RAIL AND TRANSIT DIVISION VAL MAP V7.38-39 SHEET 5, V7.39 SHEETS 6-10 JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO. DEED BOOK 14836, PAGE 507 CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
END PROP. CEMENTED STONE MASONRY WALL STA. +22
R&D EXIST. GUARDRAIL
R&S EXIST. STEEL RR TRACKS
LIMIT OF BORDERING VEGETATIVE WETLAND
PROP. RECTANGULAR RAPID FLASHING BEACON (SOLAR) LOC. 5 STA. 284+71.30 OFF. 6.00' LT
R&D EXIST. GUARDRAIL
PROP. CEM. CONC. WHEELCHAIR RAMP
PROP. GRANITE BFRT PIER (SEE DETAILS)
N/F MEGHAN E GODER & DANIEL E REISER 76 PANTRY RD MAP/LOT D10/0400 BK/PG 71149/479
END PROP. STEEL W-BEAM GUARDRAIL, TL-2 W/ WOOD POST PROP. TRAILING ANCHORAGE STA. +63
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +65
BEGIN PROP. CEMENTED STONE MASONRY WALL STA. +65
ZONE A FLOOD LIMIT (NO BFE)
N/F ARTHUR J & MARGARET A RICHARD 31 HAYNES RD MAP/LOT D10/0001 BK/PG 24653/464
PANTRY ROAD (PUBLIC)
EXISTING TOWN LO
PROP. RECTANGULAR RAPID FLASHING BEACON (SOLAR) LOC. 5 STA. 284+23.37 OFF. 6.03' RT
LIMIT OF WPA 100' BZ / 100' SUD RA
LIMIT OF BANK
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +51
BEGIN PROP. STEEL W-BEAM GUARDRAIL, TL-2 W/ WOOD POST PROP. TANGENT END TREATMENT
N/F PAUL J II & JOANNE H MARCOUX 70 PANTRY RD MAP/LOT D10/0401 BK/PG 43235/309
LIMIT OF 200' SUD RA
0 20 50 100
SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 55 & 56

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 9:09 AM

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 284+68 RT TO STA. 288+00 RT
TIMBER FENCE (THREE-RAIL) STA. 284+65 RT TO STA. 290+25 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # X#

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	37	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 9:10 AM

N

N/F
STEPHEN CHRISTOPHER NASH & TARA A NASH
108 PANTRY RD
MAP/LOT D10/0503
BK/PG 69023/236

CONTINUED ON SHEET NO. 36

LIMIT OF BORDERING VEGETATIVE WETLAND
ELIGIBLE VERNAL POOL
SYNCOPATE EROSION CONTROL BARRIER
PROP. 10' PAVED SHARED USE PATH
ELIGIBLE VERNAL POOL
RET.
WIRE FENCE
EXISTING RR LAYOUT LINE
STONE BOX CULVERT EL=134.77' 2.7'H x 2.3'W
PROP. LOAM & SEED (TYP)
LIMIT OF BANK
STREAM
PROP. EROSION & SEDIMENT CONTROL BARRIER
MASSDOT–RAIL AND TRANSIT DIVISION
VAL MAP V7.38–39 SHEET 5, V7.39 SHEETS 6–10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
LIMIT OF WPA 100' BZ / 100' SUD RA
BEGIN PROP. TRAIL REINFORCED SUB-BASE STA. 292+00 (SEE TYPICAL SECTIONS)
PROP. GRANITE MILE MARKER (17.75, SUDBURY) (SEE DETAILS)
BEGIN PROP. 1' SHLD STA. 291+25
APPROX. SLOPE LIMIT
CONTINUED BELOW
STEPHEN CHRIST… 10… MAP… BK/…

287 288 289 290 291 292 293
CONSTRUCTION ℄
N 20° 59' 52" E 516.76'
PI +83.52
N 21° 59' 52" E 114.40'
PI +97.92
N 20° 59' 53" E 507.83'

PROP. CLEARING & GRUBBING
CONTRACTOR TO LEAVE A 5" WIDE GAP IN FENCE AT LOCATION OF EXISTING FOOT PATH FROM CONSERVATION LAND. EXACT LOCATION TO BE DETERMINED IN FIELD DURING CONSTRUCTION
SYNCOPATE EROSION CONTROL BARRIER
APPROX. SLOPE LIMIT
RET.
WIRE FENCE (REMNANTS)
LIMIT OF BORDERING VEGETATIVE WETLAND
PROP. 3' SHLD
PROP. EROSION & SEDIMENT CONTROL BARRIERS
RET.
STONE BOX CULVERT EL=134.27' 3'H x 2'W
END PROP. TIMBER FENCE (THREE-RAIL) STA. +25
N/F
TOWN OF SUDBURY (CONSERVATION)
PANTRY RD
MAP/LOT D10/0022
BK/PG 13482/555
R&S EXIST. STEEL RR TRACKS
BEGIN PROP. 1' SHLD STA. 291+25
PROP. LOAM & SEED (TYP)
LIMIT OF BORDERING VEGETATIVE WETLAND
WF#7-215 END

0 20 50 100
SCALE: 1" = 20'

N

N/F
STEPHEN CHRISTOPHER NASH & TARA A NASH
108 PANTRY RD
MAP/LOT D10/0503
BK/PG 69023/236

CONTINUED ABOVE

APPROX. SLOPE LIMIT
88 SF EROSION CONTROL TEMP IMPACT TO BVW
PROP. LOAM & SEED (TYP)
LIMIT OF BORDERING VEGETATIVE WETLAND
272 SF EROSION CONTROL TEMP IMPACT TO BVW
190 SF LOAM & SEED PERM IMPACT TO BVW
PROP. 10' PAVED SHARED USE PATH
PROP. CLEARING & GRUBBING
EXISTING RR LAYOUT LINE
MASSDOT–RAIL AND TRANSIT DIVISION
VAL MAP V7.38–39 SHEET 5, V7.39 SHEETS 6–10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
PROP. EROSION & SEDIMENT CONTROL BARRIER
R&D BOUND
PROP. 1' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
POTENTIAL VERNAL POOL
CONTINUED ON SHEET NO. 38

293 294 295 296 297 298
CONSTRUCTION ℄
N 20° 59' 53" E 507.83'
PC +05.75
Δ=8° 52' 40"
L=887.84' R=5730.00'

503 SF EROSION CONTROL TEMP IMPACT TO BVW
LIMIT OF BORDERING VEGETATIVE WETLAND
PROP. 1' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
RET.
RUSTED FENCE POST
PROP. LOAM & SEED (TYP)
725 SF HMA PAVEMENT, GRAVEL SHOULDER, LOAM & SEED PERM IMPACT TO BVW
POTENTIAL VERNAL POOL
EXISTING RR LAYOUT LINE
R&S EXIST. STEEL RR TRACKS
LIMIT OF BORDERING VEGETATIVE WETLAND
2 SF LOAM & SEED PERM IMPACT TO BVW
APPROX. SLOPE LIMIT
8 SF EROSION CONTROL TEMP IMPACT TO BVW
FENCE POST REMNANTS
WF#7-215 END

N/F
TARA ILLIANO & RICHARD MAGAZU
122 PANTRY RD
MAP/LOT D10/0502
BK/PG 59281/548

N/F
MARY F. BROCHU,TRUSTEE
OF THE REALITY REALTY TRUST
WINDMILL DR
MAP/LOT C10/0006
BK/PG 16775/585

N/F
TOWN OF SUDBURY (CONSERVATION)
PANTRY RD
MAP/LOT D10/0022
BK/PG 13482/555

N/F
TOWN OF SUDBURY (CONSERVATION)
211 NORTH RD
MAP/LOT D10/0300
BK/PG 12726/603

0 20 50 100
SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 56

FENCING DETAILS

NONE

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE SHEET 196

LEGEND:

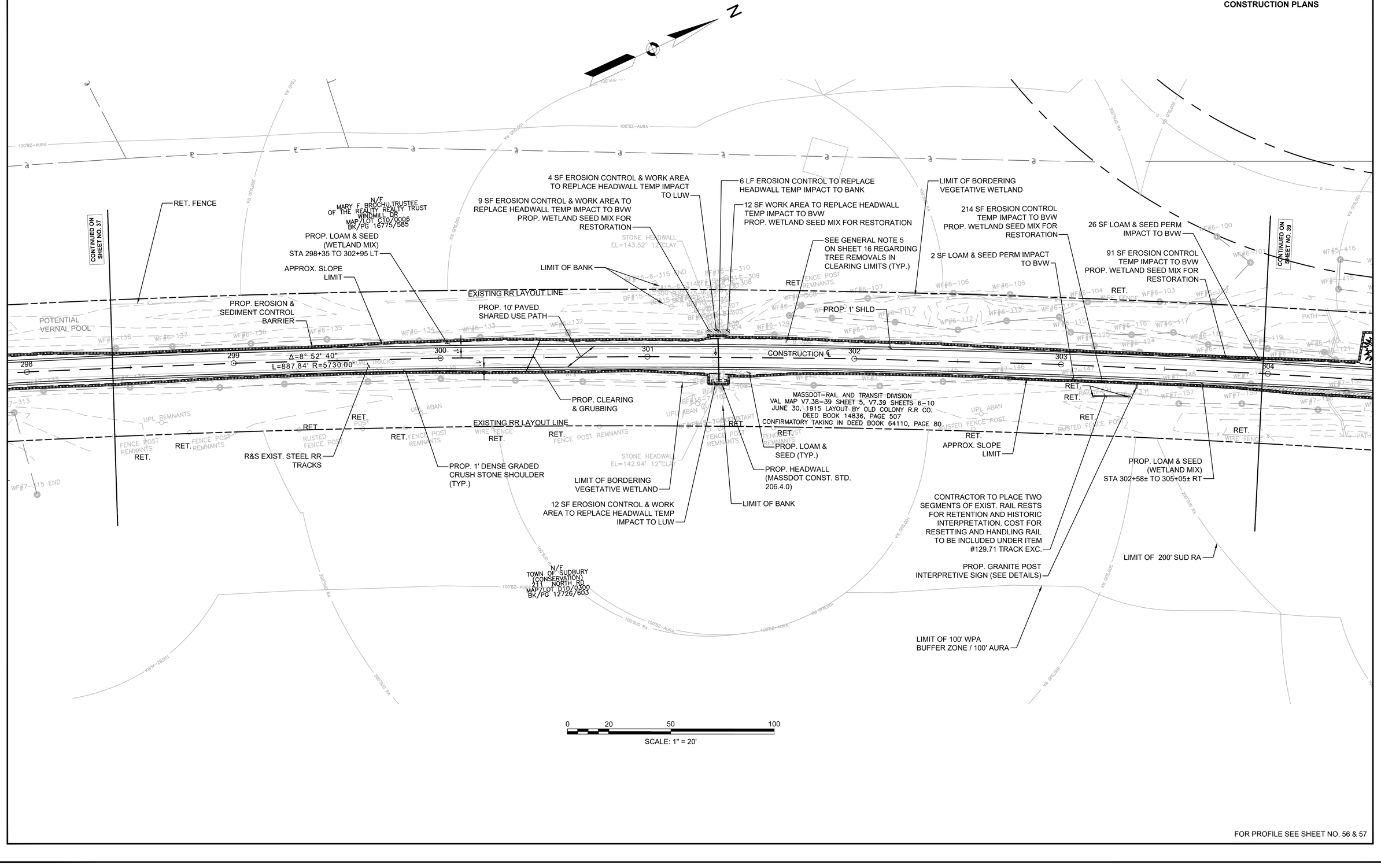
PROPOSED WHEELCHAIR RAMP DETAIL # X#

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	38	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

608164_HD\CONSTRUCTION PLANS\.DWG Plotted on 27-Jun-2022 9:11 AM



FOR PROFILE SEE SHEET NO. 56 & 57

CONFORMS TO Addendum No. 2, August 30, 2022

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 308+79 LT TO STA. 309+79 LT
TIMBER FENCE (THREE-RAIL) STA. 308+16 RT TO STA. 315+79 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

SEE SHEET 167

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE SHEET 197

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	39	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

Plotted on 14-Sep-2022 11:32 AM

608164_HD(CONSTRUCTION PLANS).DWG

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
JV	JUNIPERUS VIRGINIANA	EASTERN RED CEDAR	4	4–5' HT.
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	6	3 GAL.
IG	ILEX GLABRA	INKBERRY	3	3 GAL.
	ORNAMENTAL MIX			
ACS	AMELANCHIER	CANADENSIS	1	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRAGEA	4	3 GAL.

LIMIT OF 200' BUFFER ZONE / 100' SUD RA
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
LIMIT OF 100' SUD RA
25 SF EROSION CONTROL & WORK AREA TO REPLACE HEADWALL TEMP IMPACT TO BVW PROP. WETLAND SEED MIX FOR RESTORATION
15 LF WORK AREA TO REPLACE HEADWALL TEMP IMPACT TO BANK
N/F BRADFORD J. POPE 10 WINDMILL DR MAP/LOT C10/0201 BK/PG 46785/241
29 SF WORK AREA AND EROSION CONTROL TO REPLACE HEADWALL TEMP IMPACT TO LUW
8 SF REPLACE HEADWALL PERM IMPACT TO LUW
13 SF EROSION CONTROL & WORK AREA TEMP IMPACT TO BVW PROP. WETLAND SEED MIX FOR RESTORATION
EXISTING TOWN LO
WINDMILL DRIVE (PUBLIC)
91 SF EROSION CONTROL TEMP IMPACT TO BVW PROP. WETLAND MIX FOR RESTORATION
26 SF LOAM & SEED PERM IMPACT TO BVW
PROP. GRANITE MILE MARKER (17.50, SUDBURY) (SEE DETAILS)
LIMIT OF BANK
LIMIT OF BORDERING VEGETATIVE WETLAND
PROP. 10' PAVED SHARED USE PATH
PROP. LOAM & SEED (TYP)
PROP. LOAM & SEED (TYP.)
APPROX. SLOPE LIMIT
EXISTING RR LAYOUT LINE
CONTINUED ON SHEET NO. 38
CONSTRUCTION ℄
PCC +93.59
PCC +38.07
PRC
R&S EXIST. STEEL RR TRACKS
PROP. LOAM & SEED (TYP.)
RET. END PROP 1' SHLD BEGIN PROP. 2' SHLD
END PROP. TRAIL REINFORCED SUB-BASE STA. 304+50 (SEE TYPICAL SECTIONS)
214 SF EROSION CONTROL TEMP IMPACT TO BVW PROP. WETLAND SEED MIX FOR RESTORATION
155 SF GRAVEL SHOULDER, LOAM & SEED PERM IMPACT TO BVW
PROP. EROSION & SEDIMENT CONTROL BARRIERS
LIMIT OF 100' BUFFER ZONE / 100' SUD RA
LIMIT OF 100' SUD RA
8 SF REPLACE HEADWALL PERM IMPACT TO LUW
22 SF WORK AREA & EROSION CONTROL TO REPLACE HEADWALL TEMP IMPACT TO LUW
9 LF WORK AREA & EROSION CONTROL TEMP IMPACT TO BANK
4 SF LOAM & SEED PERM IMPACT TO LUW
6 LF LOAM & SEED PERM IMPACT TO BANK
3 LF WORK AREA & EROSION CONTROL TEMP IMPACT TO BANK
LIMIT OF BORDERING VEGETATIVE WETLAND
N/F TOWN OF SUDBURY (CONSERVATION) CONCORD RD MAP/LOT D10/0018 BK/PG 12754/314
LIMIT OF BANK
NORTH ROAD (RTE 117) (PUBLIC)
1925 COUNTY LAYOUT
N/F DOREEN SCALZI 220 NORTH RD MAP/LOT C10/0015 BK/PG 63763/338
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +13
PROP. FLUSH GRAN. CURB (SEE DETAIL)
PROP. DISPLAY BOARD
PROP. BENCH
PROP. BIKE RACK
PROP. REST AREA (387 SF) PROP. PERVIOUS PAVERS (SEE DETAILS)
SAWCUT & MEET EXIST
PROP. HMA WALK
LIMIT OF 100' SUD RA
PROP. FLUSH GRAN. CURB AT CONC. MEDIAN (TYP.) (SEE CONST. DETAIL)
GRANITE BFRT PIER (SEE DETAILS)
LIMIT OF BORDERING VEGETATIVE WETLAND
LIMIT OF 100' BUFFER ZONE / 100' SUD RA
STA 307+39.71 PR-BFRT = STA 1100+00.00 DAVIS FIELD ACCESS PATH N 2977185.1210 E 682684.8290
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +71
PROP. HYBRID ACTIVATED WALK BEACON (HAWK SIGNAL)
PROP. STAMPED CONCRETE SPLITTER ISLAND WITH FLUSH GRAN. CURB (TYP.) (SEE DETAILS)
PROP. CEM. CONC. WHEELCHAIR RAMP
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +79
PROP. CLEARING & GRUBBING
PROP. 3' SHLD
N/F JOHN C & DORIS NORMAN NORTH RD MAP/LOT C10/0013 BK/PG 13793/342
CONTINUED ON SHEET NO. 40
POTENTIAL VERNAL POOL
EXISTING RR LAYOUT LINE
N 32° 25' 44" E 1901.85'
PT +14.74
PROP. 3' SHLD
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +16
LIMIT OF BORDERING VEGETATIVE WETLAND
GRANITE BFRT PIER (SEE DETAILS)
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +88
N/F FAIRVIEW DEVELOPMENT CORP NORTH RD MAP/LOT C10/0009 BK/PG 11659/136
PROP. CEM. CONC. WHEELCHAIR RAMP
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +38
PROP. PERM. EASEMENT
RET. EXIST HMA ROADWAY
PROP. HMA DRIVEWAY
CONTINUED ON SHEET NO. 44
PROP. 8' HMA SHARED USE PATH
REM. BIT APRON
LIMIT OF BANK
1976 COUNTY LAYOUT ALT.
N/F TOWN OF SUDBURY (CONSERVATION) CONCORD RD MAP/LOT D10/0018 BK/PG 12754/314
SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 57

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	40	319
PROJECT FILE NO.	608164		

SUDBURY
BRUCE FREEMAN RAIL TRAIL

CONSTRUCTION PLANS

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FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 308+79 LT TO STA. 309+79 LT
TIMBER FENCE (THREE-RAIL) STA. 313+29 LT TO STA. 316+29 LT
TIMBER FENCE (THREE-RAIL) STA. 308+16 RT TO STA. 315+79 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	9	3 GAL.
IG	ILEX GLABRA	INKBERRY	9	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	4	4-5' HT.
AC	ABIES CONCOLOR	WHITE FIR	3	5-6' HT.
	EROSION CONTROL MIX			
SS	CAREX PENNSYLVANIA	PENNSYLVANIA SEDGE	24	PLUG
CS	CORNUS SERICEA, & SALIX SSP	DOGWOOD AND WILLOW	18	1 GAL.
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	3	2-3" CAL.


JOHN C & DORIS NORMAN
NORTH RD
MAP/LOT C10/0013
BK/PG 13793/342
CONTINUED ON SHEET NO. 39
SYNCOPATE EROSION CONTROL BARRIER
END PROP. TIMBER FENCE (THREE-RAIL) STA. +79
APPROX. SLOPE LIMIT
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. LOAM & SEED (TYP)
LIMIT OF BORDERING VEGETATIVE WETLAND
PROP. CLEARING & GRUBBING
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
PROP. EROSION & SEDIMENT CONTROL BARRIER
PROP. 10' PAVED SHARED USE PATH
LIMIT OF 100' SUD RA
EDGE OF BORDERING LAND SUBJECT TO FLOODING (ELEV 140.7)
POTENTIAL VERNAL POOL
EDGE OF WATER
MASSDOT-RAIL AND TRANSIT DIVISION
VAL MAP V7.38-39 SHEET 5, V7.39 SHEETS 6-10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
EXISTING RR LAYOUT LINE
RET. WIRE FENCE
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +29
LIMIT OF BANK
CULVERT (UNDER WATER)
LIMIT OF BORDERING VEGETATIVE WETLAND
PROP. 3' SHLD
WIRE FENCE
JOHN C & DORIS NORMAN
NORTH RD
MAP/LOT C10/0012
BK/PG 13793/342
CONTINUED BELOW
310
311
312
313
314
315
CONSTRUCTION ℄
N 32° 25' 44" E 1901.85'
RAILROAD TRACKS
APPROX. SLOPE LIMIT
R&S EXIST. STEEL RR TRACKS
CULVERT (CRUSHED & BURIED)
PROP. 3' SHLD
EXISTING RR LAYOUT LINE
SEE GENERAL NOTE 5 ON SHEET 16 REGARDING TREE REMOVALS IN CLEARING LIMITS (TYP.)
PROP. EROSION & SEDIMENT CONTROL BARRIER
APPROX. SLOPE LIMIT
SYNCOPATE EROSION CONTROL BARRIER
PROP. TIMBER FENCE (THREE-RAIL)
LIMIT OF 200' RIVER FRONT AREA
LIMIT OF BORDERING VEGETATIVE WETLAND
EDGE OF BORDERING LAND SUBJECT TO FLOODING (ELEV 139.1)
LIMIT OF 200' SUD RA
PROP. LOAM & SEED (TYP.)
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
LIMIT OF 100' WPA RIVER FRONT AREA
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
INV 24" RCP
EL=134.29' 24"RCP
EL=134.49' 24"RCP
FAIRVIEW DEVELOPMENT CORP
NORTH RD
MAP/LOT C10/0009
BK/PG 11659/136
N/F
FAIRVIEW DEVELOPMENT CORP
NORTH RD
MAP/LOT C10/0009
BK/PG 11659/136
0 20 50 100
SCALE: 1" = 20'


LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
LIMIT OF 200' WPA RIVER FRONT AREA
N/F
JOHN C & DORIS NORMAN
NORTH RD
MAP/LOT C10/0012
BK/PG 13793/342
CONTINUED ABOVE
END PROP. TIMBER FENCE (THREE-RAIL) STA. +29
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +03
APPROX. SLOPE LIMIT
PROP. LOAM & SEED (TYP.)
PROP. 3' SHLD
WIRE FENCE
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. 10' PAVED SHARED USE PATH
PROP. GRANITE MILE MARKER (17.25, SUDBURY) (SEE DETAILS)
EXISTING RR LAYOUT LINE
N/F
FAIRVIEW DEVELOPMENT CORP
NORTH RD
MAP/LOT C10/0401
BK/PG 9512/83
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +65
PROP. CEM. CONC. WHEELCHAIR RAMP
FAIRVIEW FARMS DRIVEWAY (PRIVATE)
N/F
FAIRVIEW DEVELOPMENT CORP
NORTH RD
MAP/LOT C10/0401
BK/PG 9512/83
CONTINUED ON SHEET NO. 41
315
316
317
318
319
320
321
CONSTRUCTION ℄
N 32° 25' 44" E 1901.85'
RAILROAD TRACKS
H3
H4
RET.
RET. TREES
R&S EXIST. STEEL RR TRACKS
SAWCUT PVM'T
MASSDOT-RAIL AND TRANSIT DIVISION
VAL MAP V7.38-39 SHEET 5, V7.39 SHEETS 6-10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
EXISTING RR LAYOUT LINE
PROP. LOAM & SEED (TYP)
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. CLEARING & GRUBBING
END PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +00
RET. TREE
APPROX. SLOPE LIMIT
PROP. CLEARING & GRUBBING
PROP. 14' PAVED SHARED USE PATH HMA SECTION AT DRIVEWAY
LIMIT OF 200' RIVER FRONT AREA
END PROP. TIMBER FENCE (THREE-RAIL) STA. +79
N/F
FAIRVIEW DEVELOPMENT CORP
NORTH RD
MAP/LOT C10/0009
BK/PG 11659/136
0 20 50 100
SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 57

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 321+25 LT TO STA. 324+79 LT
TIMBER FENCE (THREE-RAIL) STA. 321+25 RT TO STA. 322+00 RT
TIMBER FENCE (THREE-RAIL) STA. 322+79 RT TO STA. 329+79 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	31	3 GAL.
IG	ILEX GLABRA	INKBERRY	35	3 GAL.
PS	PINUS STROBUS	EASTERN WHITE PINE	7	4–5' HT.
AC	ABIES CONCOLOR	WHITE FIR	6	5–6' HT.
	ORNAMENTAL MIX			
ACS	AMELANCHIER	CANADENSIS	2	2–3" CAL.

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	41	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

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N/F
FAIRVIEW DEVELOPMENT CORP
0 NORTH RD
MAP/LOT C10/0401
BK/PG 9512/83

FAIRVIEW FARMS DRIVEWAY (PRIVATE)

CONTINUED ON SHEET NO. 40

PROP. LOAM & SEED (TYP)
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +25
PROP. REINFORCED TIMBER CONNECTION UNDER SHOULDERS OVER EXIST. CATTLE CROSSING (TYP.) (MASSDOT ITEM #901) (SEE CONST. DETAIL SHEET 211)
RET. EXIST CATTLE CROSSING
SYNCOPATE EROSION CONTROL BARRIER PROP. 3' SHLD
APPROX. SLOPE LIMIT
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
END PROP. TIMBER FENCE (THREE-RAIL) STA. +79
RET. EXIST. WALL
RET. EXIST. FENCE
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
EXISTING RR LAYOUT LINE
MASSDOT–RAIL AND TRANSIT DIVISION
VAL MAP V7.38–39 SHEET 5, V7.39 SHEETS 6–10
JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO.
DEED BOOK 14836, PAGE 507
CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
CONSTRUCTION ℄
N 32° 25' 44" E 1901.85'
PROP. 3' SHLD
PROP. 10' PAVED SHARED USE PATH
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +25
BEGIN PROP. TIMBER FENCE (THREE-RAIL) STA. +79
APPROX. SLOPE LIMIT
R&S EXIST. STEEL RR TRACKS
PROP. CLEARING & GRUBBING
PROP. 3' SHLD
SYNCOPATE EROSION CONTROL BARRIER
END PROP. TIMBER FENCE (THREE-RAIL) STA. +00
SEE GENERAL NOTE 5 ON SHEET 16 REGARDING TREE REMOVALS IN CLEARING LIMITS (TYP.)
LIMIT OF BORDERING VEGETATIVE WETLAND
BEGIN PROP. EROSION & SEDIMENT CONTROL BARRIER STA. +95
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
LIMIT OF 100' SUD VERNAL POOL BUFFER ZONE
POTENTIAL VERNAL POOL
N/F
TOWN OF SUDBURY(FROST FARM HOUSE)
148 NORTH RD
MAP/LOT C11/0301
BK/PG 21736/272

0 20 50 100
SCALE: 1" = 20'

N/F
FAIRVIEW DEVELOPMENT CORP
206 NORTH RD
MAP/LOT C10/0400
BK/PG 45910/223

CONTINUED BELOW

CONTINUED ABOVE

LIMIT OF 100' BUFFER ZONE TO BVW
PROP. CLEARING & GRUBBING
APPROX. SLOPE LIMIT
PROP. 10' PAVED SHARED USE PATH
PROP. EROSION & SEDIMENT CONTROL BARRIER
LIMIT OF 100' WPA BUFFER ZONE / 100' AURA
N/F
BRUCE D & JEFFREY F MAURER
0 NORTH RD
MAP/LOT C10/0402
BK/PG 45910/223
PROP. LOAM & SEED (TYP)
RET. EXIST. GRANITE MILE MARKER
PROP. GRANITE MILE MARKER (17.00, SUDBURY) (SEE DETAILS)
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
EXISTING RR LAYOUT LINE
PC +16.59
Δ=3° 03' 32"
L=305.92' R=5730.00'
PT +22.51
CONSTRUCTION ℄
N 29° 22' 11" E 576.21'
RET.
PROP. LOAM & SEED (TYP)
PROP. EROSION & SEDIMENT CONTROL BARRIER
PROP. 3' SHLD
APPROX. SLOPE LIMIT
END PROP. TIMBER FENCE (THREE-RAIL) STA. +79
R&S EXIST. STEEL RR TRACKS
LIMIT OF BANK
LIMIT OF BORDERING VEGETATIVE WETLAND
N/F
TOWN OF SUDBURY(FROST FARM HOUSE)
148 NORTH RD
MAP/LOT C11/0301
BK/PG 21736/272

0 20 50 100
SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 57 & 58

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 332+16 LT TO STA. 333+11 LT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	VISUAL SCREEN MIX			
VT	VILBURUM TRILOBUM	HIGHBUSH CRANBERRY	11	3 GAL.
IGI	ILEX GLABRA	INKBERRY	11	3 GAL.
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	2	2–3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRAGEA	5	3 GAL.

LEGEND:

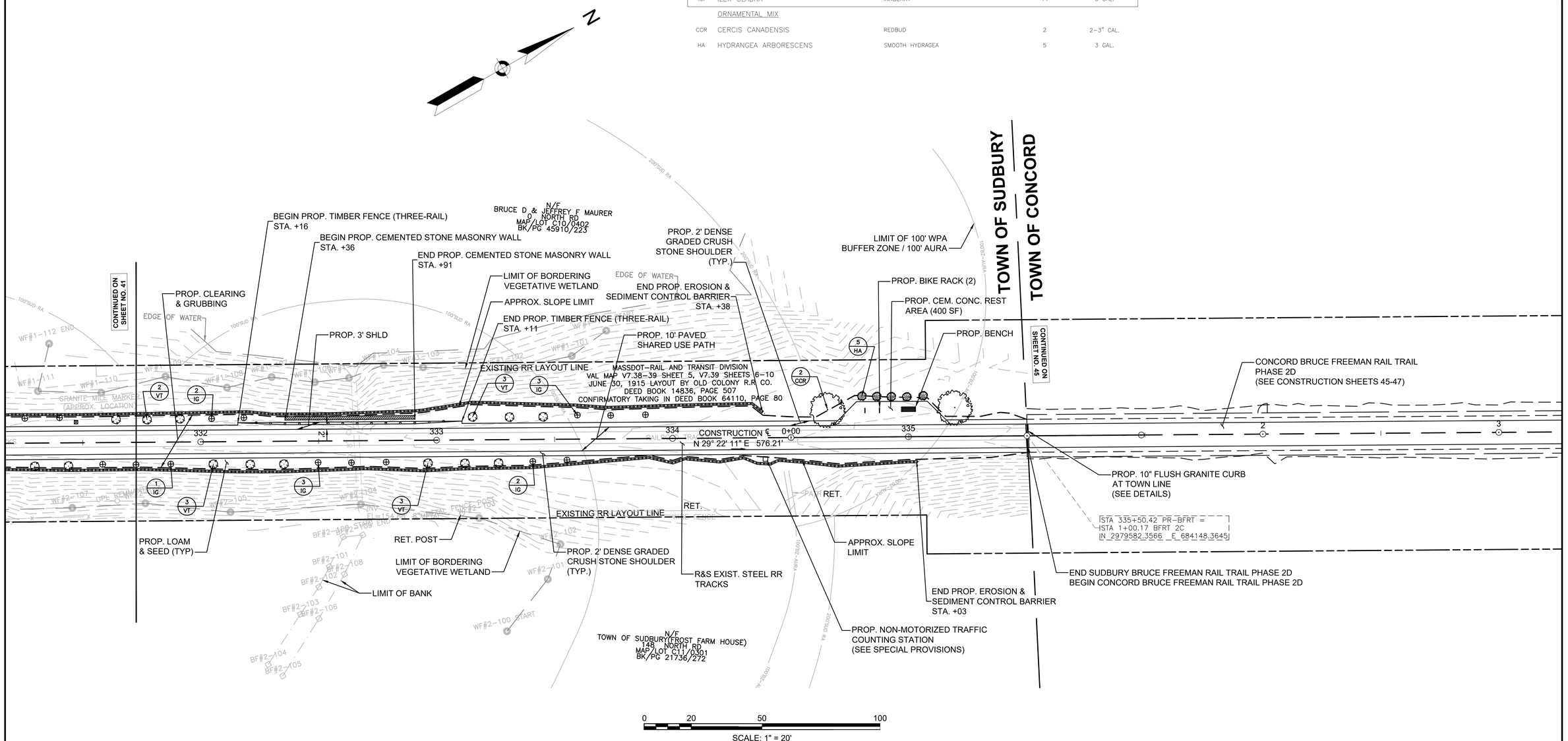
PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	42	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS



FOR PROFILE SEE SHEET NO. 58

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 9:16 AM

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

PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
	ORNAMENTAL MIX			
CCR	CERCIS CANADENSIS	REDBUD	5	2-3" CAL.
ACS	AMELANCHIER	CANADENSIS	4	2-3" CAL.
HA	HYDRANGEA ARBORESCENS	SMOOTH HYDRAGEA	5	3 GAL.

LEGEND:

PROPOSED WHEELCHAIR RAMP DETAIL # — X#

PLANT QUANTITY AND SPECIES — X / XX

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	43	319
	PROJECT FILE NO. 608164		

CONSTRUCTION PLANS

Plotted on 27-Jun-2022 9:17 AM

608164_HD(CONSTRUCTION PLANS).DWG

N
N/F TOWN OF SUDBURY 0 HUDSON RD G09-0200 BOOK 13189 PAGE 604
N/F TOWN OF SUDBURY(TREASURER) HUDSON RD MAP/LOT G09/0200 BK/PG 13189/604
PROP. 10' PAVED SHARED USE ACCESS PATH
PROP. CLEARING & GRUBBING
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
PROP. TEMP. EASEMENT (TYP.)
APPROX. SLOPE LIMIT
PROP. PERM. EASEMENT (TYP.)
PROP. BENCH
PROP. BIKE RACKS (2)
PROP. TRASH RECEPTACLE
PROP. DISPLAY BOARD
PROP. CEM. CONC. REST AREA (369 SF)
RET.
RET. EXIST. STONE WALL
RET. EXIST. TREELINE
RET. TREE
R&S EXIST. SWING GATE (PAID FOR UNDER ITEM #107.19)
PROP. CEM. CONC. WHEELCHAIR RAMP
LIMIT OF WORK STA 1000+80.00 N2965545.8566 E679116.8229
PARKINSON'S LOT
CONSTRUCTION ℄ Δ=114° 20' 20" L=139.69' R=70.00'
PC +94.96
REM. TREE
RET. EXIST. TREELINE
RET. EXIST. STONE WALL
APPROX. SLOPE LIMIT
PROP. BOULDER BARRIER (4)
REM. EXIST. GRAVEL
RET. GRAVEL PARKING
PROP. LOAM & SEED (TYP.)
PRC +34.65
Δ=45° 57' 29" L=56.24' R=70.12'
PT +90.89
S 70° 11' 49" E 70.57'
1003+61.46
N 41° 30' 12" E 94.96'
1000+00
1001
1002
1003
CONTINUED ON SHEET NO. 25
RET.
PROP. 2' DENSE GRADED CRUSH STONE SHOULDER (TYP.)
N/F LAWRENCE W TIGHE, TRUSTEE OF THE HUDSON RD TRUST #1 36 HUDSON RD MAP/LOT G09/0002 BK/PG 30663/361
MASSDOT-RAIL AND TRANSIT DIVISION VAL MAP V7.38-39 SHEET 5, V7.39 SHEETS 6-10 JUNE 30, 1915 LAYOUT BY OLD COLONY R.R CO. DEED BOOK 14836, PAGE 507 CONFIRMATORY TAKING IN DEED BOOK 64110, PAGE 80
N 19° 48' 11" E
RAILROAD TRACKS
CONCRETE BOUND DRILL HOLE
CHAIN LINK FENCE
180 N: 2965314.484' E: 679269.290' EL: 185.384' MSTN 180
183
184
185
186
0 20 50 100
SCALE: 1" = 20'

FOR PROFILE SEE SHEET NO. 59

FENCING DETAILS	HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
TIMBER FENCE (THREE-RAIL) STA. 1102+10 RT TO STA. 1103+20 RT	STEEL W-BEAM (TL-2) W/WOOD POST & RUB RAIL STA. 1100+51 LT TO STA. 1105+84 LT TIMBER GUARDRAIL W/ RUB RAIL STA. 1106+00 LT TO STA. 1107+27 LT	NONE	SEE SHEET 202	SEE SHEET 202

LEGEND:

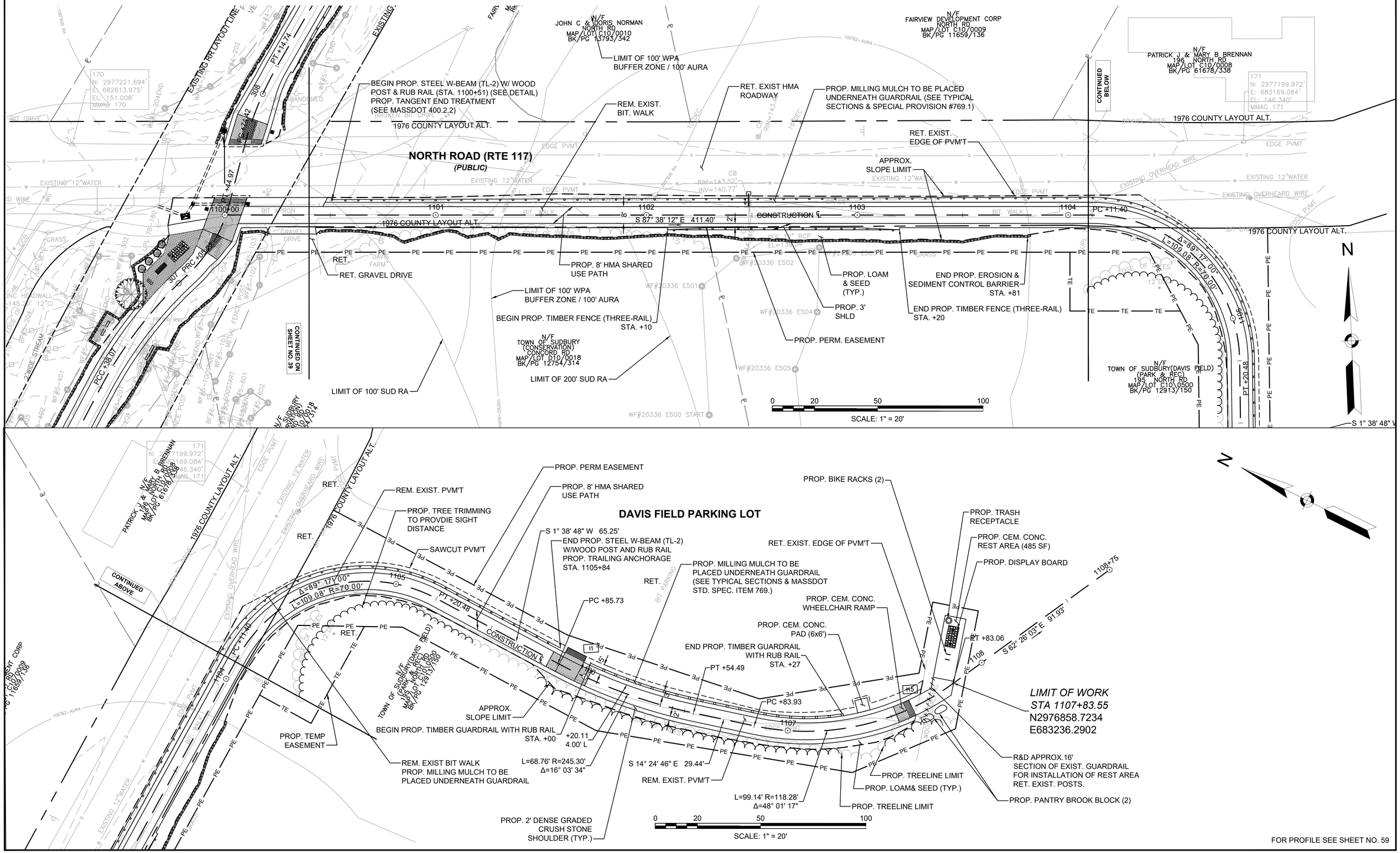
PROPOSED WHEELCHAIR RAMP DETAIL # X#

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	44	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

608164_HD(CONSTRUCTION PLANS).DWG Plotted on 27-Jun-2022 9:17 AM



FOR PROFILE SEE SHEET NO. 59

FENCING DETAILS
NONE

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

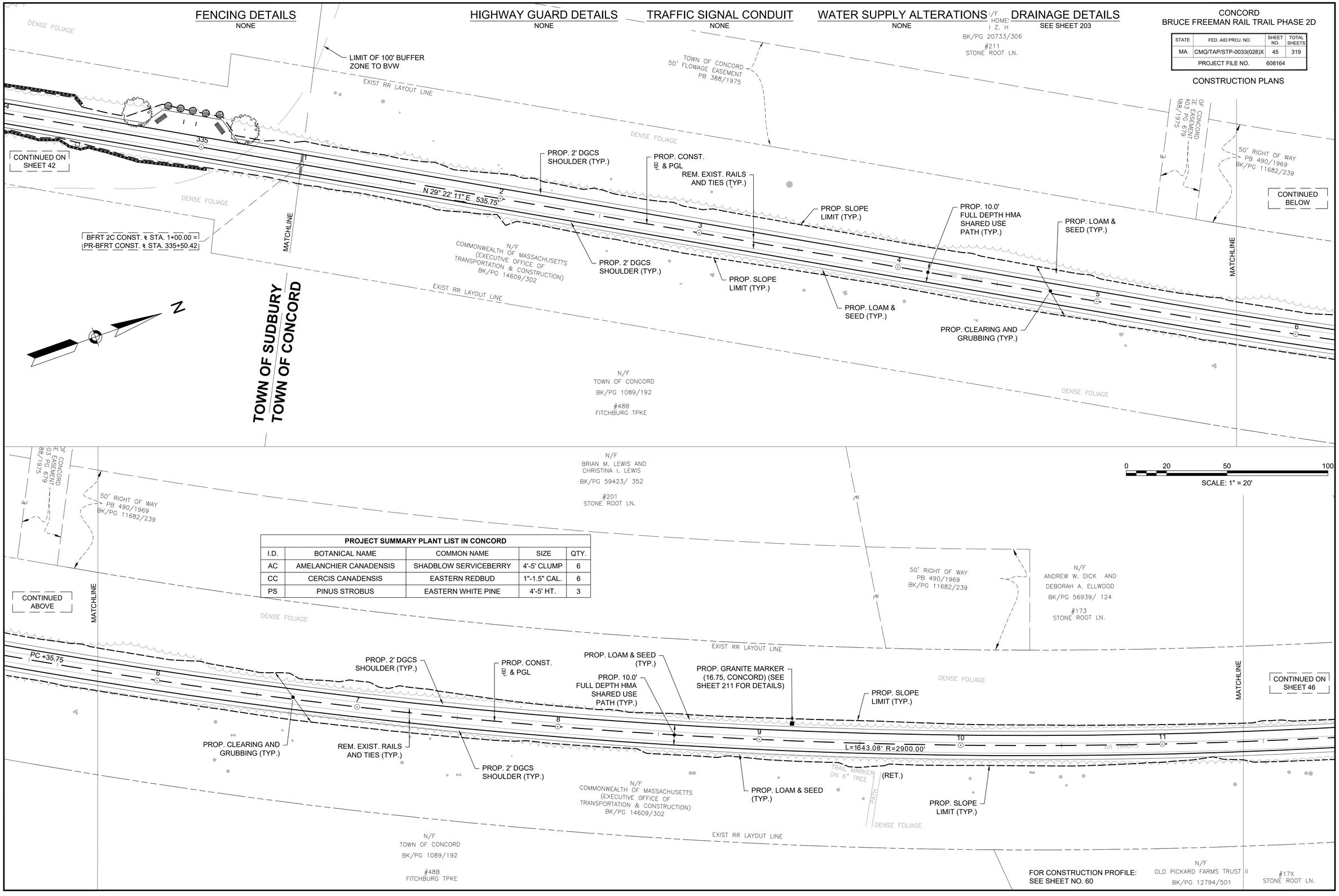
DRAINAGE DETAILS
SEE SHEET 203

CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2D

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	45	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

605189_HD(CO).DWG Plotted on 22-Jun-2022 1:48 PM



PROJECT SUMMARY PLANT LIST IN CONCORD				
I.D.	BOTANICAL NAME	COMMON NAME	SIZE	QTY.
AC	AMELANCHIER CANADENSIS	SHADBLOW SERVICEBERRY	4'-5' CLUMP	6
CC	CERCIS CANADENSIS	EASTERN REDBUD	1"-1.5" CAL.	6
PS	PINUS STROBUS	EASTERN WHITE PINE	4'-5' HT.	3

FOR CONSTRUCTION PROFILE: SEE SHEET NO. 60

FENCING DETAILS

TIMBER FENCE (THREE-RAIL) STA. 13+35 RT TO STA. 17+50 RT
TIMBER FENCE (THREE-RAIL) STA. 20+50 RT TO STA. 22+45 RT

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

SEE SHEET 204 AND

CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2D

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	46	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

605189_HD(CO).DWG Plotted on 22-Jun-2022 1:49 PM

N/F
OLD PICKARD FARMS TRUST II
BK/PG 12794/501
#16A
STONE ROOT LN.

N/F
THOMAS D. FURMAN JR.
AND SUSAN A. W. FURMAN
BK/PG 19409/40
#153
STONE ROOT LN.

N/F
KENNETH C. ZURBRIGG
AND LINDA E. ZURBRIGG
BK/PG 40158/ 421
#137
STONE ROOT LN.

N/F
SUSAN HILL
BK/PG 43886/198
#109
STONE ROOT LN.

APPROX. LIMIT OF 100' BUFFER ZONE TO BANK
EXIST RR LAYOUT LINE
PROP. LOAM & SEED (TYP.)
PROP. CONST. ℄ & PGL
PROP. BANK BUFFER ZONE IMPACT 50' - 100' = 7,965 SF
DENSE FOLIAGE
PROP. CLEARING AND GRUBBING (TYP.)
PROP. SLOPE LIMIT (TYP.)
REM. EXIST. RAILS AND TIES (TYP.)
PROP. 10.0' FULL DEPTH HMA SHARED USE PATH (TYP.)
CONTINUED ON SHEET 45
MATCHLINE
PROP. 2' DGCS SHOULDER (TYP.)
L=1643.08' R=2900.00'
PROP. SWALE (TYP.)
3 AC
PROP. 2' DGCS SHOULDER (TYP.)
PROP. SLOPE LIMIT (TYP.)
PROP. INTERPRETIVE SIGN (SEE SHEET 213 FOR DETAILS)
PROP. PERVIOUS PAVERS (SEE SHEET 217 FOR DETAILS)
RR TRACKS
PATH
3 CC
PROP. TIMBER FENCE (THREE-RAIL) (STA. 13+35 RT TO STA. 17+50 RT) (SEE SHEET 212 FOR DETAILS)
N/F
COMMONWEALTH OF MASSACHUSETTS
(EXECUTIVE OFFICE OF TRANSPORTATION & CONSTRUCTION)
BK/PG 14609/302
PROP. BANK BUFFER ZONE IMPACT TEMP. 25' - 50' = 228 SF
PROP. SEDIMENT CONTROL BARRIER (TYP.)
PROP. LOAM & SEED (TYP.)
CONTINUED BELOW
MATCHLINE
N/F
DAVID KADISON AND
CHRISTINE NUGENT
BK/PG 17554/283
#7A
WHITE AVE.
WF#1-103
WF#1-104
WF#1-105
WF#1-106
WF#1-102
WF#1-101
WF#1-100
WETLAND NO. 1
(BANK)
LIMIT OF BANK
EDGE OF POND OBSCURED APPROX LOCATION
WHITE POND
EXIST RR LAYOUT LINE

NOTES:
1.) PLANT LOCATIONS ARE SCHEMATIC. PRIOR TO PLANTING, LOCATION OF ALL PLANT MATERIAL SHALL BE STAKED IN THE FIELD AND APPROVED BY THE RESIDENT ENGINEER IN COORDINATION WITH MASSDOT LANDSCAPE DESIGN SECTION AND THE TOWN OF CONCORD DIVISION OF NATURAL RESOURCES DIRECTOR.

PLANT LIST (SEE NOTE 1)

I.D.	BOTANICAL NAME	COMMON NAME	SIZE	NOTES	QTY.
AC	AMELANCHIER CANADENSIS	SHADBLOW SERVICEBERRY	4'-5' CLUMP	B&B	6
CC	CERCIS CANADENSIS	EASTERN REDBUD	1"-1.5" CAL.	#10 CONT.	3
PS	PINUS STROBUS	EASTERN WHITE PINE	4'-5' HT.	B&B	3

SCALE: 1" = 20'

N/F
OLD PICKARD FARMS TRUST II
BK/PG 12794/501
#17X
STONE ROOT LN.

N/F
GREGORY J. MUELLER
AND AMY E. MUELLER
BK/PG 50209/138
#95
STONE ROOT LN.

N/F
CHRISTOPHER W. JONES AND
JENNIFER A. FENTON-JONES
BK/PG 52779/402
#83
STONE ROOT LN.

N/F
JOSHUA I. GALPER AND
NIRMALI D. GALPER
BK/PG 49661/458
#65
STONE ROOT LN.

APPROX. LIMIT OF 100' BUFFER ZONE TO BANK
LIMIT OF 100' BUFFER TO CERTIFIED VERNAL POOL
PROP. GRANITE MARKER (16.50, CONCORD) (SEE SHEET 211 FOR DETAILS)
PROP. CERTIFIED VERNAL POOL BUFFER ZONE IMPACT: 50' - 100' = 1,659 SF
PROP. CERTIFIED VERNAL POOL BUFFER ZONE IMPACT: 25' - 50' = 2,131 SF
PROP. 2' DGCS SHOULDER (TYP.)
PROP. CLEARING AND GRUBBING (TYP.)
PROP. 10.0' FULL DEPTH HMA SHARED USE PATH (TYP.)
PROP. LOAM & SEED (TYP.)
PROP. SLOPE LIMIT (TYP.)
3 AC
PROP. CONST. ℄ & PGL
CONTINUED ABOVE
MATCHLINE
CONTINUED ON SHEET 47
L=1643.08' R=2900.00'
PROP. TIMBER FENCE (THREE-RAIL) (STA. 13+35 RT TO STA. 17+50 RT) (SEE SHEET 212 FOR DETAILS)
3 PS
PROP. 2' DGCS SHOULDER (TYP.)
PROP. SLOPE LIMIT (TYP.)
REM. EXIST. RAILS AND TIES (TYP.)
N/F
COMMONWEALTH OF MASSACHUSETTS
(EXECUTIVE OFFICE OF TRANSPORTATION & CONSTRUCTION)
BK/PG 14609/302
PROP. SWALE
PT +78.84
PROP. TIMBER FENCE (THREE-RAIL) (STA. 20+50 RT TO STA. 22+45 RT) (SEE SHEET 212 FOR DETAILS)
PROP. CERTIFIED VERNAL POOL BUFFER ZONE IMPACT: 0' - 25' = 110 SF
20' MIN. DIST. TO CVP
PROP. SEDIMENT CONTROL BARRIER (TYP.)
PROP. INTERPRETIVE SIGN (SEE SHEET 213 FOR DETAILS)
PROP. PERVIOUS PAVERS (SEE SHEET 217 FOR DETAILS)
RR TRACKS
PATH
GRAVEL PATH
DENSE FOLIAGE
EXIST RR LAYOUT LINE
WF#2-103
WF#2-102
WF#2-100
WF#3-101
WETLAND NO. 2
LIMIT OF CERTIFIED VERNAL POOL (CVP)
PROP. CERTIFIED VERNAL POOL BUFFER ZONE IMPACT: 50' - 100' = 2,280 SF
N/F
DAVID KADISON AND
CHRISTINE NUGENT
BK/PG 17554/283
#7A
WHITE AVE.
WF#1-105
WF#1-106
WF#1-107
N/F
KENNETH C. MILLER AND
DORCAS MILLER
BK/PG 25487/522
#75
WHITE AVE.
N/F
DAVID KADISON AND
CHRISTINE L. NUGENT
BK/PG 17554/ 283
#70
WHITE AVE.
N/F
DAVID D. BRANTLEY
BK/PG 54782/239
#60
WHITE AVE.
N/F
KEITH A. BERGMAN AND
MARGARET CARROLL-BERGMAN
BK/PG 56772/169
#56
WHITE AVE.
N/F
ARMAND PORAZZO, JR
BK/PG 27029/461
#7Y
MITCHELL RD.
N/F
GREGG BENSON WINN AND
ELIZABETH WINN
BK/PG 63741/86
#68
MITCHELL RD.

FOR CONSTRUCTION PROFILE:
SEE SHEET NO. 61

FENCING DETAILS
NONE

HIGHWAY GUARD DETAILS
NONE

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
SEE SHEET 205

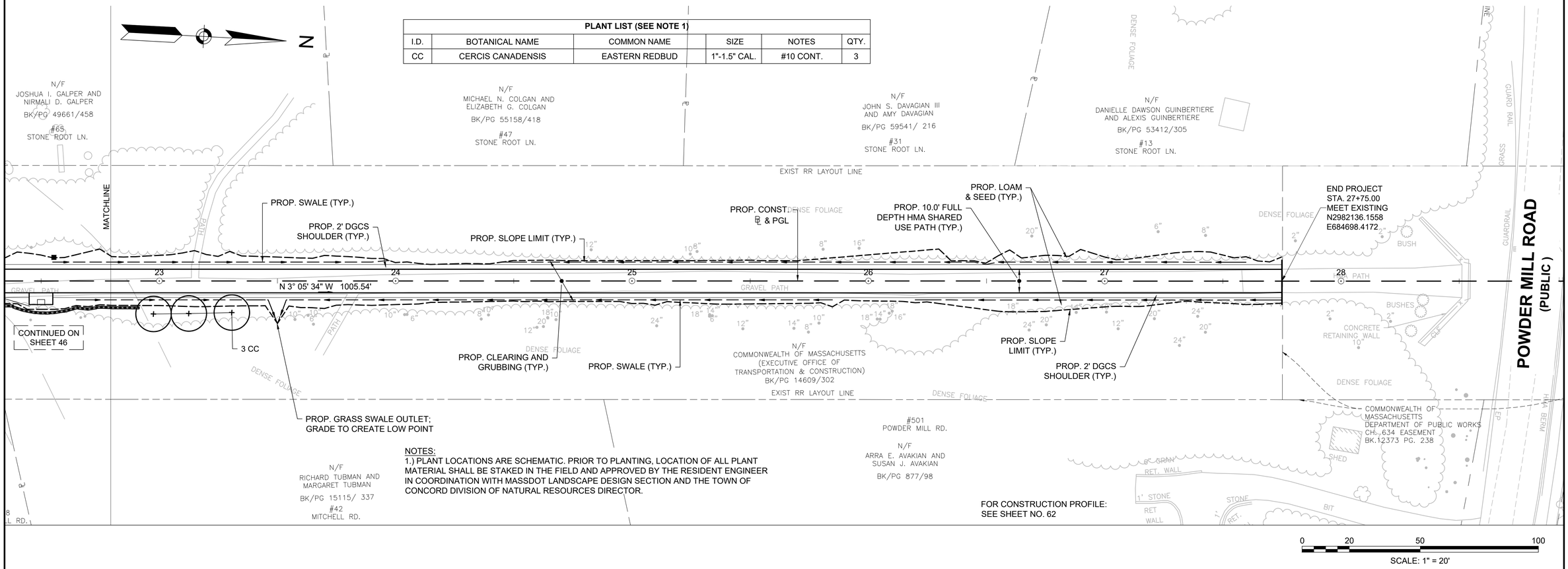
CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2D

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	47	319
PROJECT FILE NO.	608164		

CONSTRUCTION PLANS

605189_HD(CO).DWG Plotted on 22-Jun-2022 1:49 PM

PLANT LIST (SEE NOTE 1)					
I.D.	BOTANICAL NAME	COMMON NAME	SIZE	NOTES	QTY.
CC	CERCIS CANADENSIS	EASTERN REDBUD	1"-1.5" CAL.	#10 CONT.	3



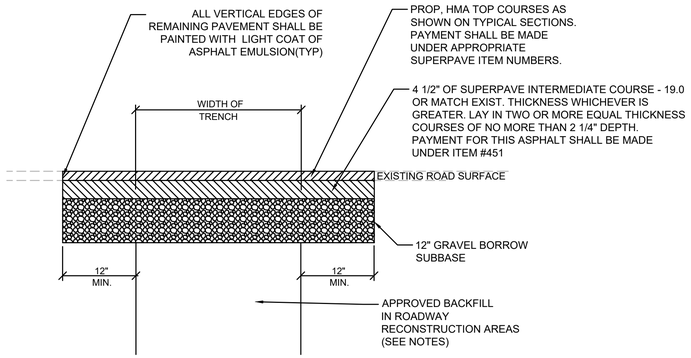
NOTES:
1.) PLANT LOCATIONS ARE SCHEMATIC. PRIOR TO PLANTING, LOCATION OF ALL PLANT MATERIAL SHALL BE STAKED IN THE FIELD AND APPROVED BY THE RESIDENT ENGINEER IN COORDINATION WITH MASSDOT LANDSCAPE DESIGN SECTION AND THE TOWN OF CONCORD DIVISION OF NATURAL RESOURCES DIRECTOR.

FOR CONSTRUCTION PROFILE:
SEE SHEET NO. 62

Figure 5 Erosion and Sediment Control Construction Details

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/TAP/STP-0033(028)X	209	319
PROJECT FILE NO.	608164		

CONSTRUCTION DETAILS



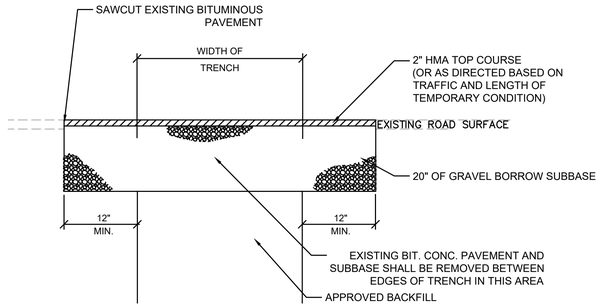
NOTES:
OVERLAY AREAS:THE TRENCH SHALL BE REPAIRED TO THE TOP OF THE BASE COURSE. THE TOP COURSES SHALL BE PLACED WITH OVERLAY OF THE ROADWAY

ROADWAY TRENCHING OUTSIDE OF FULL DEPTH AND OVERLAY: THE TRENCH SHALL BE REPAIRED WITH TOP COURSES INSTALLED WITH THE BASE COURSE.

CONTROLLED DENSITY FILL MAY BE USED IN LIEU OF APPROVED BACKFILL IN PAVEMENT MILLING AND OVERLAY AREAS. **USE OF CONTROLLED DENSITY FILL TO BACKFILL TRENCHES SHALL BE APPROVED BY THE TOWN OF SUDBURY PRIOR TO PLACEMENT.**

PERMANENT ASHPALT SHALL BE PAID FOR UNDER ITEM #451.

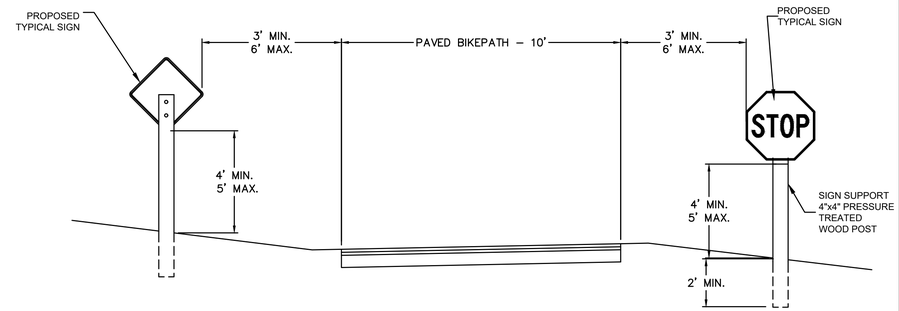
7 PERMANENT PAVEMENT TRENCH REPAIR IN ROADWAYS
SCALE: N.T.S.



NOTES:
THE TEMPORARY PAVEMENT TRENCH REPAIR SHALL BE USED DURING THE TIME BETWEEN COMPLETION OF THE UTILITY CONSTRUCTION AND CONSTRUCTION OF THE PROPOSED ROADWAY PAVEMENT STRUCTURE OR PERMANENT PAVEMENT TRENCH REPAIR.

TEMPORARY ASPHALT SHALL BE PAID FOR UNDER ITEM #472

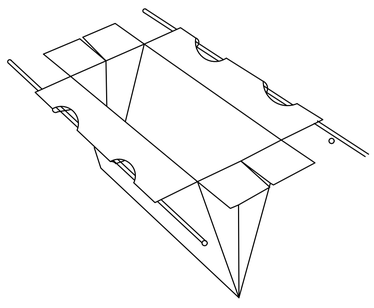
8 TEMPORARY PAVEMENT TRENCH REPAIR
SCALE: N.T.S.



9 SHARED–USE PATH TYPICAL SIGN PLACEMENT
SCALE: N.T.S.

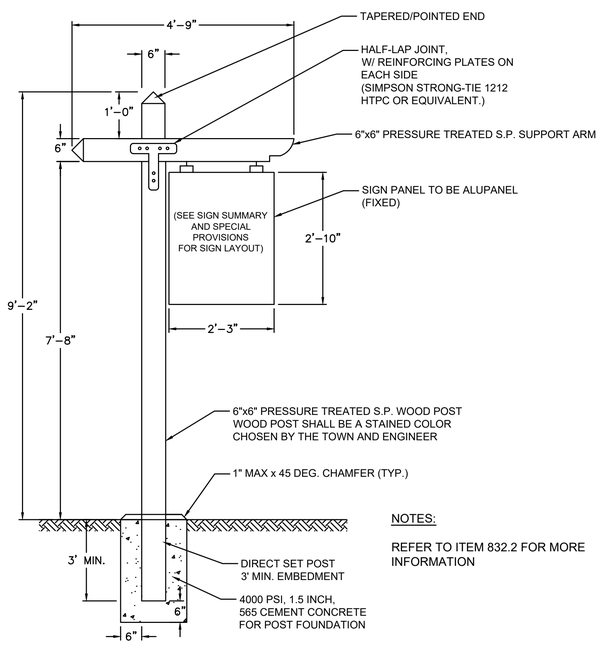
NOTES:
1. ALL HARDWARE SHALL BE GALVANIZED.

2. WOOD POSTS SHALL BE PAID FOR UNDER ITEM 847.11*.



NOTES:
1. SIZED TO FIT ANY SIZE OR SHAPE CATCH BASIN.
2. ALL SEAMS DOUBLE STITCHED.
3. PERMEABILITY - REGULAR FLOW SILTSACK - 40 gal./min./sq. ft.
   HI - FLOW SILTSACK - 200 gal./min./sq. ft.

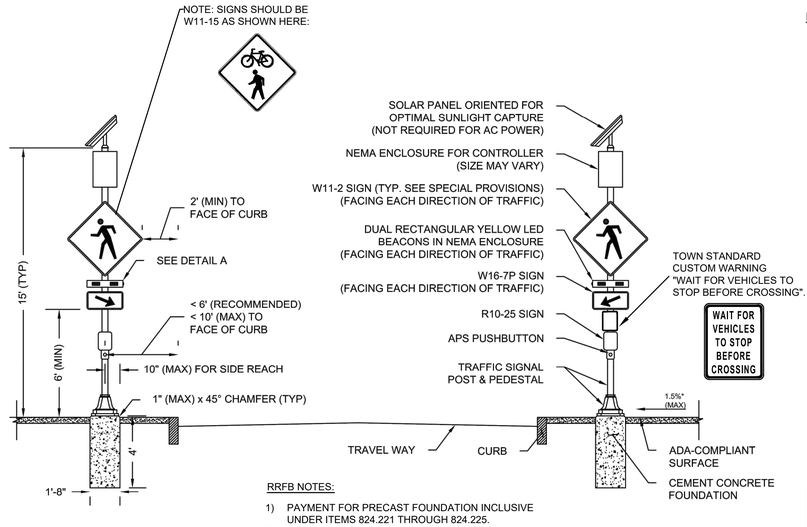
10 CATCH BASIN SILT SACK
SCALE: N.T.S.



NOTES:

REFER TO ITEM 832.2 FOR MORE INFORMATION

11 WAYFINDING SIGNS TYPE DS
SCALE: N.T.S.



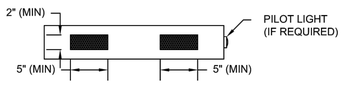
RRFB NOTES:
1) PAYMENT FOR PRECAST FOUNDATION INCLUSIVE UNDER ITEMS 824.221 THROUGH 824.225.
2) ALL POSTS, BRACKETS, AND HARDWARE SHALL BE FACTORY GLOSS BLACK.

NOTES:
1. CROSSWALK AND ADA-COMPLIANT RAMPS NOT SHOWN. SEE PLANS FOR LOCATIONS.
2. REFER TO THE SPECIAL PROVISIONS FOR SIGN DIMENSIONS.
3. ALL CONDUIT, PULL BOXES, SERVICE CONNECTIONS, AND EQUIPMENT GROUNDING REQUIRED FOR AC POWER IS NOT SHOWN IN THIS DETAIL AND SHALL BE PAID FOR SEPARATELY UNDER THEIR RESPECTIVE PAY ITEMS.
4. ACCESS TO ALL PEDESTRIAN ACTUATED CONTROLS SHALL BE ADA/AAB COMPLIANT.
5. *0.5% CONSTRUCTION TOLERANCE FOR CROSS-SLOPE.

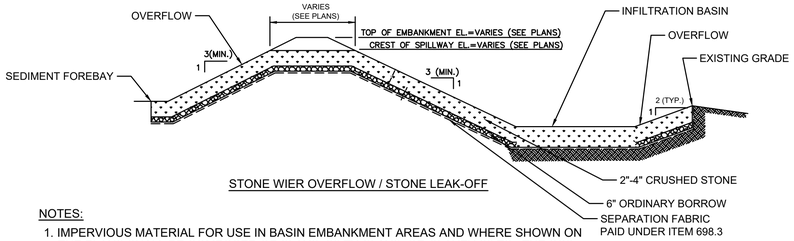
MAJOR ITEMS LIST

2	CEMENT CONCRETE FOUNDATIONS PER 812.30.1
2	15' TRAFFIC SIGNAL POSTS & PEDESTALS
2	APS PUSHBUTTON SYSTEMS
4	DUAL RECTANGULAR YELLOW LED BEACONS IN NEMA ENCLOSURES
2	R10-25 SIGNS
4	W11-2 SIGNS
2	W16-7PR SIGNS
2	W16-7PL SIGNS
2	SOLAR PANEL SYSTEMS (NOT REQUIRED FOR AC POWER)
2	NEMA ENCLOSURES FOR ALL COMPONENTS NEEDED TO MEET FUNCTIONAL REQUIREMENTS PER SPECIAL PROVISIONS
2	BATTERY SYSTEMS (NOT REQUIRED FOR AC POWER)
2	TOWN STANDARD CUSTOM WARNING SIGNS PLUS ALL MOUNTING AND SUPPORTING HARDWARE AND WIRING NECESSARY TO COMPLETE A WORKING SYSTEM.

DETAIL A: DUAL YELLOW BEACON



12 RECTANGULAR RAPID FLASHING BEACON (RRFB)
SCALE: N.T.S.



STONE WIER OVERFLOW / STONE LEAK-OFF

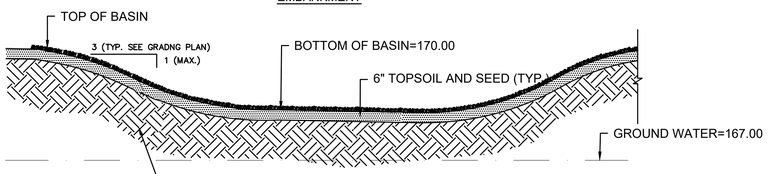
NOTES:

1. IMPERVIOUS MATERIAL FOR USE IN BASIN EMBANKMENT AREAS AND WHERE SHOWN ON THE PLANS SHALL BE COMPOSED OF CLAYS, SILTY CLAYS, OR CLAYEY SILTS. THE SOIL SHALL BE FREE OF RUBBISH, ICE, VEGETATIVE MATTER, LOAM, OR OTHER DEBRIS AND HAVE THE FOLLOWING GRADATION AS DEFINED BY A STANDARD SIEVE TEST (ASTM D422):

MIN. PERCENT PASSING (BY WT.)	SEIVE SIZE
100	3.5"
80-100	3/4"
40-90	No. 4
30-85	No. 40
25-75	No. 200

2. PERVIOUS BACKFILL MATERIAL FOR USE IN FILL AREAS ASSOCIATED WITH BASIN EMBANKMENTS SHALL BE COMPOSED OF ORDINARY BORROW MATERIAL (ITEM 150.) OR EXCAVATED MATERIAL FROM THE SITE DEEMED RE-USEABLE BY THE ENGINEER. SATISFACTORY ON-SITE MATERIAL SHALL HAVE SOIL CLASSIFICATION GROUPS OF GW, GP, GM, SW, SP, AND SM ACCORDING TO ASTM D 2487, OR A COMBINATION OF THESE GROUPS AND SHALL BE FREE OF ROCK OR GRAVEL LARGER THAN 3 INCHES (75 MM) IN ANY DIMENSION, DEBRIS, WASTE, FROZEN MATERIALS, VEGETATION, AND OTHER DELETERIOUS MATTER.

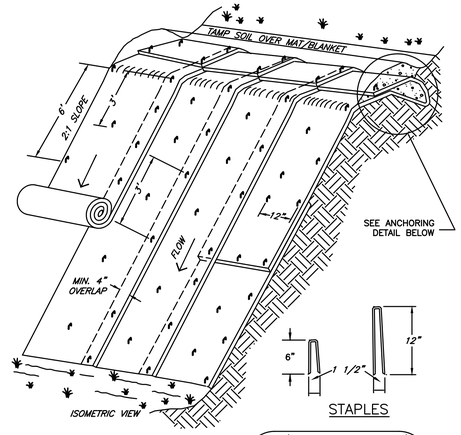
EMBANKMENT



SECTION

13 INFILTRATION BASIN

SCALE: N.T.S.



TYPICAL SLOPE SOIL STABLIZATION

ANCHORING DETAIL

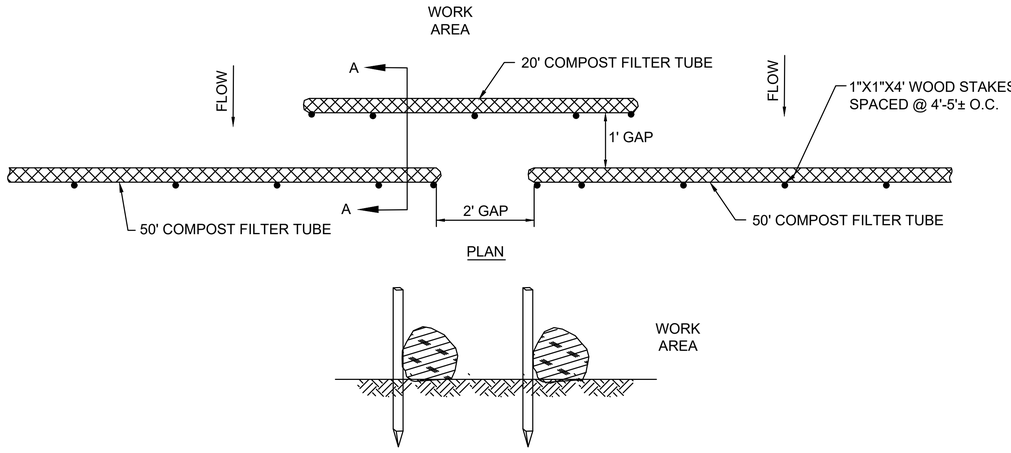
NOTES:

1. MATTING FOR EROSION CONTROL MUST BE MADE FROM 100% BIODEGRADEABLE MATERIAL.

2. STAPLES OR STAKES MAY BE USED TO SECURE THE MATTING. THE STAPLES OR STAKES MUST BE MADE FROM A 100% BIODEGRADEABLE MATERIAL.

14 MATTING FOR EROSION CONTROL

SCALE: N.T.S.

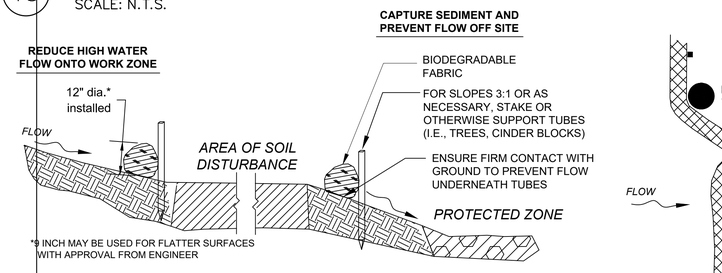


NOTES:

1. SYNCOPATED COMPOST FILTER TUBES SHALL BE USED WHEN BORDERING VERNAL POOLS AS SHOWN ON THE PLANS.

15 SYNCOPATED SEDIMENT CONTROL BARRIER

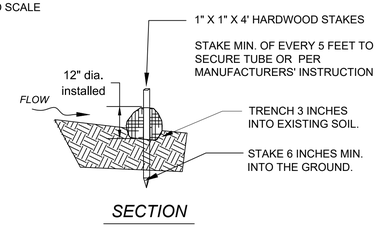
SCALE: N.T.S.



SECTION

SEDIMENT BARRIER - COMPOST FILTER TUBES

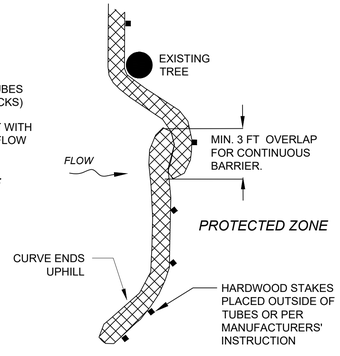
NOT TO SCALE



SECTION

12 INCH STRAW WATTLE

NOT TO SCALE



PLACE TUBE ALONG CONTOURS AND PERPENDICULAR TO FLOW.

PLACE AS CLOSE TO LIMIT OF SOIL DISTURBANCE AS POSSIBLE

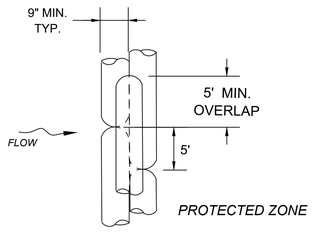
ADJUST LOCATION AS REQUIRED FOR OPTIMUM EFFECTIVENESS. DO NOT INSTALL IN WATERWAYS.

PLACE STAKES AS NEEDED TO SECURE TUBES IN PLACE.

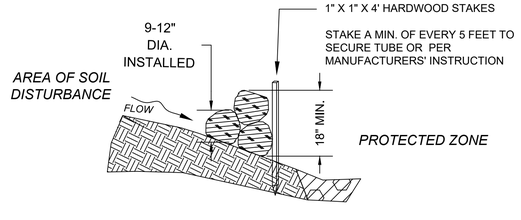
PLAN VIEW

COMPOST FILTER TUBE

NOT TO SCALE



PLAN VIEW



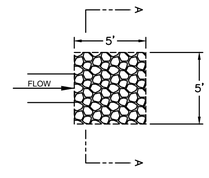
SECTION

COMPOST FILTER TUBE BERM (SLOPES 2:1 OR STEEPER)

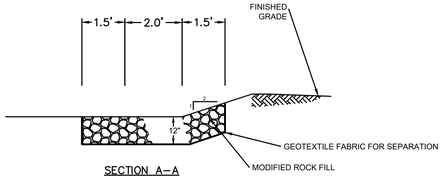
NOT TO SCALE

16 SEDIMENT BARRIERS – COMPOST FILTER TUBES

SCALE: N.T.S.



PLAN



SECTION A–A

17 MODIFIED ROCK FOR SWALE ENDS (5'X5')

SCALE: N.T.S.

Appendix A Relevant Project Specifications

ITEM 756. NPDES STORM WATER POLLUTION PREVENTION PLAN LUMP SUM

GENERAL

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA)..

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. The Contractor shall be fully responsible for compliance with the most recently issued CGP and any subsequent revisions. Should a fine or penalty be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity which disturbs land, including clearing and grubbing). There is a fourteen (14) day review period commencing from the date on which EPA enters the Notice into their database. Based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

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

ITEM 756. (Continued)
The CGP also requires the preparation and implementation of a SWPPP in accordance with the afore-mentioned statutes and regulations. The Plan will include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. The contractor shall prepare the SWPPP and update it as necessary. The Contractor shall submit the Plan to the Engineer for approval at least four (4) weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means necessary to comply with applicable conditions of said permits.
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It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, regulations, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

Included in the CGP conditions is the requirement for inspection of all erosion controls and site conditions on a weekly basis as well as after each incidence of rainfall exceeding 0.25 inches in twenty-four hours. For multi-day storms, EPA requires that an inspection must be performed during or after the first day of the event and after the end of the event. The CGP requires that inspections be performed by a qualified individual as outlined in the CGP. MassDOT requires proof of completion of a 4 hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The inspector's qualifications shall be submitted to the Engineer for approval prior to beginning any work. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

ITEM 756. (Continued)

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions necessary to comply with the provisions of the CGP. The Standard Specifications require adequate erosion control for the duration of the Contract. All control measures must be properly selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer adequate, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. Contractor must maintain all control measures and other protective measures in effective operating condition and shall consider replacement of erosion controls for each construction season.

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, and preparation of monthly reports. In addition, any erosion controls beyond those specified in bid items which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization ("immediately", i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etc. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer's Final Estimate. The permittee shall use EPA's website to prepare and submit the NOT.

Compensation

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

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

ITEM 697.1 **SILT SACK** **EACH**

Work under this item shall conform to the relevant provisions of Sections 227 and 670 of the Standard Specifications and the following:

The work under this item includes the furnishing, installation, maintenance, and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; The BMP Store (800)-644-9223; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained existing catch basins and drop inlets within the project limits and as required by the Resident Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as directed by the Engineer.

Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric will become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and disposed of accumulated debris as required. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department.

When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractors expense. The silt and sediment from the silt sack shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

All curb openings shall be blocked to prevent stormwater from bypassing the device.
All debris accumulated in silt sacks shall be handled and disposed of as specified in Section 227 of the Standard Specifications Massachusetts Department of Transportation Highway Division

COMPENSATION

Silt sacks will be measured and paid at the Contract unit price per each, complete in place, which price shall include all labor, materials, equipment, and incidental costs required to complete the work. No separate payment will be made for removal and disposal of the sediment from the insert, but all costs in connection therewith shall be included in the Contract unit price bid.

ITEM 751.72 COMPOST BLANKET ..... SQUARE YARD

The work under this Item shall conform to the relevant provisions of Subsection 751 and M1.06.0 Organic Soil Additives of the Standard Specifications and the following:

Work shall consist of furnishing and pneumatically applying compost as a thin mulch blanket (1/2-1 inch depth) over prepared soil to provide temporary soil stabilization and organic matter for plant growth.

SUBMITTALS AND MATERIALS

No materials shall be delivered until the required submittals have been approved by the Engineer. Delivered materials shall match the approved samples. Approval of test results does not constitute final acceptance.

Contractor shall submit to the Engineer samples and certified test results no sooner than 60 days prior to application of compost. Vender certification that material delivered meets the test results shall be submitted if requested.

Compost may be a blended product of compost and fine wood chips. No kiln-dried wood, construction debris or ground palette is allowed. Material shall meet the following criteria:

- Organic matter content shall be minimum 30 percent (dry weight basis)
- Moisture content shall be 30-60 percent (wet weight basis)
- Bulk Density <1000 lb/cy
- pH shall be 5.5-7.5
- Conductivity shall be a maximum of 4 mmhos
- Stability test shall produce a maximum of 8mg CO2-C/gram of organic material per day
- Particle size shall not exceed ¾ inch
- Compost may be a blended product of compost and fine wood chips.

Compost testing shall be by a laboratory approved by the US Compost Council using the Testing Method for the Examination of Compost and Composting (TMECC) protocols.

The Engineer shall approve the Contractor's equipment for application.

CONSTRUCTION METHODS

Application of compost material shall not begin until the Engineer has approved the site and soil conditions. Soil preparation shall be as specified under the applicable item for soil placement or for seeding. The Contractor shall notify the Engineer when areas are ready for inspection and application of compost.

ITEM 751.7 (Continued)

Compost blanket shall be pneumatically applied (blown on) to a minimum depth of one half to one inch. Where shown on the plans or when directed by the Engineer depth may be increased to provide berms for sediment control or to otherwise prevent slope erosion.

When compost blanket is proposed with seeding, seed shall be broadcast and shall occur in conjunction with compost blanket, as specified under the relevant item for seeding.

When compost blanket is proposed for areas with planting, compost (and seed if applicable) shall be applied after planting. If compost and seed occur prior to planting, areas shall be regraded and compost and seed reapplied to the satisfaction of the Engineer and at the Contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 751.7 will be measured and paid for at the Contract unit price per Square Yard which price shall include all labor, materials, equipment, and all incidental costs required to complete the work of pneumatically applying compost.

Surface preparation of substrate receiving compost blanket shall be compensated under the applicable item for placement of loam, sand, ordinary borrow, wetland soil, topsoil rehandled and spread, tilled existing soil, or other specified substrate.

Seeding will be compensated for under the appropriate seeding items.

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this item shall conform to the relevant provisions of Sections 751 and 767 of the Standard Specifications and Section 670 of the Standard Supplemental Specifications and shall include the furnishing and placement of a sediment control barrier. Sediment Control Barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent up gradient water or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes are intended to be the primary sedimentation control barrier.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods;

- Straw tubes/wattles which shall be trenched
- Straw bales which shall be trenched

Additional barriers (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

Where specified or required by permits, silt fence shall be used in addition to compost filter tubes or straw bales and shall be incidental to the item.

MATERIALS AND CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans to ensure that the placement will provide maximum effectiveness.

Barriers shall be staked, trenched and/or wedged as specified herein and shall be securely in contact with existing soil such that there is no flow beneath the barrier.

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be a knitted mesh with 1/8 - 3/8” openings and made of 100% biodegradable materials (i.e., cotton, hemp or jute).

Compost filter tubes shall be a minimum of 12 inches in diameter installed. Tubes shall be placed,

filled, and staked in place as required to ensure stability against water flows. All tubes shall be tamped, but not trenched, to ensure good contact with soil.

Where reinforcement is necessary, additional tubes shall be installed as shown on the plans.

Straw Bales

Straw bales shall conform to the requirements of Section M6.04.3 of the Standard Specifications and the following:

Bales should be a minimum size of 12 x 16 x 36 inches and shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.

The bales shall be trenched and backfilled. The trench shall be excavated the width of the bale and the length of the proposed barrier to a depth of 4 inches. After the bales are staked the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier.

Straw Wattle

Straw wattle shall be a minimum of 12 inches in diameter. Straw filling shall conform to the requirements of Section M6.04.3, shall be encased in durable netting, and shall have a density of 3 lb/foot.

Straw wattle shall be trenched in 3 inches deep and staked according to the plans. The wattles shall be sufficiently secure on the upstream side to prevent water flowing underneath the wattle.

Stakes

Stakes for anchoring Compost Filter Tubes, Straw Wattles, and Straw Bales shall be as shown on the plans and shall be a minimum of 1x1 inch diameter x 4 feet hardwood stakes.

When used with Silt Fence, stakes for Compost Filter Tubes shall be driven 12 inches into the ground, Stakes for Straw Bales shall be driven 16 inches into the ground.

Stakes of other material of equivalent strength may be used if approved by the Engineer.

MAINTENANCE

Maintenance of Sediment Control Barriers shall be per Section 670.40 of the Standard Supplemental Specifications or per the Stormwater Pollution Prevention Plan (SWPPP).

The contractor shall inspect the sediment barrier after each rain event and as specified in relevant permits to ensure that they are working effectively and as intended. Contractor shall be responsible for ensuring that an effective barrier is in place for all phases of the contract.

Barriers that decompose naturally due to weatherization over time such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost

within the fabric tube is sufficiently intact and continues to provide water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed when construction work is complete and when site conditions are sufficiently stable to prevent surface erosion and after receiving permission to do so from the Engineer.

For all instances, all nonbiodegradable material, including photo-biodegradable fabric, plastic netting, nylon twine, and silt fence, shall be removed and disposed off-site by the Contractor regardless of site context.

For naturalized areas, biodegradable, natural fabric, and material may be left in place to decompose on-site. Compost filter tubes may be left as they are with stakes removed. Straw bales shall be broken down and spread evenly. All nylon or nonbiodegradable twine shall be removed along with silt fence. Wooden stakes may be left on site, placed neatly and discretely.

In urban, residential, and other locations where aesthetics is a concern, the following shall apply:

- Filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (similar to a soil amendment or mulch). Not more than a 2-inch depth shall be left on soil substrate.
- Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with a seed mix matching adjacent grasses (i.e., lawn or native grass mix).
- Silt fence, stakes, and other debris shall be removed and disposed off-site. Site shall look neat and clean upon completion.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

Silt fence, when used in conjunction with compost filter tubes or straw bales, will be incidental to this item.

Additional barrier, such as double or triple stacking of compost filter tubes, if requested by Engineer shall be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

ITEM 767.7 MATTING FOR EROSION CONTROL SQUARE YARD

The work under these items shall conform to the relevant provisions of Section 120, 170, 280, and 767 of the Standard Specifications and the following:

This work consists of constructing temporary installations to control erosion, enhance vegetation establishment, and survivability on slopes, channels, and includes installing rolled erosion control products.

Matting for Erosion Control

Furnish a temporary rolled erosion control product with the necessary longevity and performance properties to effectively control erosion and assist in the establishment of vegetation under the anticipated immediate site conditions.

MATERIALS

Matting for Erosion Control - Erosion Control Blanket

A temporary degradable rolled erosion control product composed of processed natural fibers mechanically or structurally bound together to form a continuous matrix to provide erosion control and facilitate vegetation establishment.

Erosion Control Blankets & Open Weave Textiles – An erosion control blanket composed of processed slow degrading natural fibers mechanically bound together between two slow degrading natural fiber nettings to form a continuous matrix or an open weave textile composed of processed slow degrading natural or yarns or twines woven into a continuous matrix.

Maximum Gradient = 1:1 (H:V)
C Factor >/= 0.25 @ 1:1
Minimum Tensile Strength = 100 lbs/ft (1.45 kN/m)

Staples or Stakes shall be manufactured from a biodegradable material.

ITEM 767.7 (Continued)

METHOD OF CONSTRUCTION

Installation Guide for Rolled Erosion Control Products (RECPs) Including Mulch Control Erosion Control Blankets (ECBs), and Turf Reinforcement Mats (TRMs) This document is intended to provide general guidelines for the installation of RECPs and does not supersede manufacture's guidelines. The following sections summarize the general, accepted procedures for installation of RECPs and provide basic guidance for slope and channel installations. Detailed design/installation information should be obtained from the manufacturer.

General Procedure.

Prepare a stable and firm soil surface free of rocks and other obstructions. Apply soil amendments as necessary to prepare seedbed. Place compost, water, and seed in accordance with manufacturer, or special provision requirements. Typically, RECPs are unrolled parallel to the primary direction of flow. Ensure the product maintains intimate contact with the soil surface over the entirety of the installation. Do not stretch or allow material to bridge over surface inconsistencies. Staple/stake RECPs to soil such that each staple/stake is flush with underlying soil. Install anchor trenches, seams and terminal ends as specified.

Install RECPs after application of seed, compost, mulches (if necessary) and other necessary soil amendments, unless soil in-filling of the TRM is required. For TRMs if soil in-filling, install TRM, apply seed, and other soil amendments lightly brush or rake 0.3 to 0.7 in. of topsoil into TRM matrix to fill the product thickness. If in-filling with a hydraulically-applied matrix or medium is required; install TRM, then install hydraulically-applied matrix or medium at the manufacturer's suggested application rate.

Anchor Trenches, Seams and Terminal Ends

Upslope Anchor – utilize one of the methods detailed below for initial anchoring of RECPs Staples. Install the RECPs 3 to 4 ft. beyond the shoulder of the slope onto flat final grade. Secure roll end with a single row of stakes/staples on 1 ft. centers.

Anchor trench.

Excavate a 12 in. by 12 in. anchor trench. Extend the upslope terminal end of the RECPs 3 ft. past the anchor trench. Use stakes or staples to fasten the product into the bottom of the anchor trench on 1 ft. centers. Backfill the trench and compact the soil into the anchor trench. Apply seed and any necessary soil amendments to the compacted soil and cover with remaining 1 ft. terminal end of the RECPs. Fold product over compacted soil in anchor trench to overlap downslope material. Secure terminal end of RECPs with a single row of stakes or staples on 1 ft. centers.

ITEM 767.7 (Continued)

Seams

Utilize one of the methods detailed below for seaming of RECPs

Adjacent seams. Overlap edges of adjacent RECPs by 4 in. or by abutting products as defined by manufacturer. Use a sufficient number of stakes or staples to prevent seam or abutted rolls from separating.

Consecutive rolls. Shingle and overlap consecutive rolls 2 to 6 in. in the direction of flow. Secure staples through seam at 1 ft intervals.

Terminal Ends

Utilize one of the methods detailed below for all terminal ends of RECPs Staples. Install the RECPs 3 ft. beyond the end of the channel and secure end with a single row of stakes/staples on 1 ft. centers. Stakes/staples for securing RECPS to the soil are typically 6 in. long, but may be up to 12in log at terminal ends per manufacturer specifications.

Anchor trench. Excavate a 12 in. by 12 in. anchor trench. Extend the terminal end of the RECPs 3 ft. past the anchor trench. Use stakes or staples to fasten the product into the bottom of the anchor trench on 1 ft. centers. Backfill the trench and compact the soil into the anchor trench. Apply seed and any necessary soil amendments to the compacted soil and cover with remaining 1 ft. terminal end of the RECPs. Secure terminal end of RECPs with a single row of stakes or staples on 1 ft. centers.

Check Slot

Construct a stake/staple check slot along the terminal end of the RECPs by installing two rows of staggered stakes/staples 4 in. apart on 4 in. centers.

Erosion Control Blanket (Matting for Erosion Control) Installations

At the top of slope, anchor the RECPs according to the method detailed above. Securely fasten all RECPs to the soil by installing stakes/staples within the body of the blanket. Use stake/staple patterns and densities as recommended by the manufacturer. For adjacent and consecutive rolls of RECPs follow seaming instructions detailed above. The terminal end of the RECPs installation must be anchored using the methods detailed above.

Turf Reinforcement Mat (Jute Mesh Waterway and Geotextile Fabric for Permanent Erosion Control) Installations

Construct an anchor trench at the beginning of the channel across its entire width according to above. Follow the manufacturer's installation guidelines in constructing additional anchor trenches or stake/staple check slots at intervals along the channel reach and at the terminal end of the channel, according to the above respectively. Unroll RECPs down the center of the channel in the

primary water flow direction. Securely fasten all RECPs to the soil by installing stakes/staples at a minimum rate of 1.7/yd^2. Significantly higher anchor rates and longer stakes/staples may be necessary in sandy, loose, or wet soils and in severe applications. For adjacent and consecutive rolls of RECPs follow seaming instructions detailed above. All terminal ends of the RECPs must be anchored using the methods detailed in above.

Ensure sufficient staples to resist uplift from hydraulics, wind, mowers, and foot traffic. Use stake/staple patterns as directed in this special provision or densities as recommended by the manufacturer if manufacturer recommendations exceed.

Repair any damaged areas immediately by restoring soil to finished grade, re-applying soil amendments and seed, and replacing the RECPs.

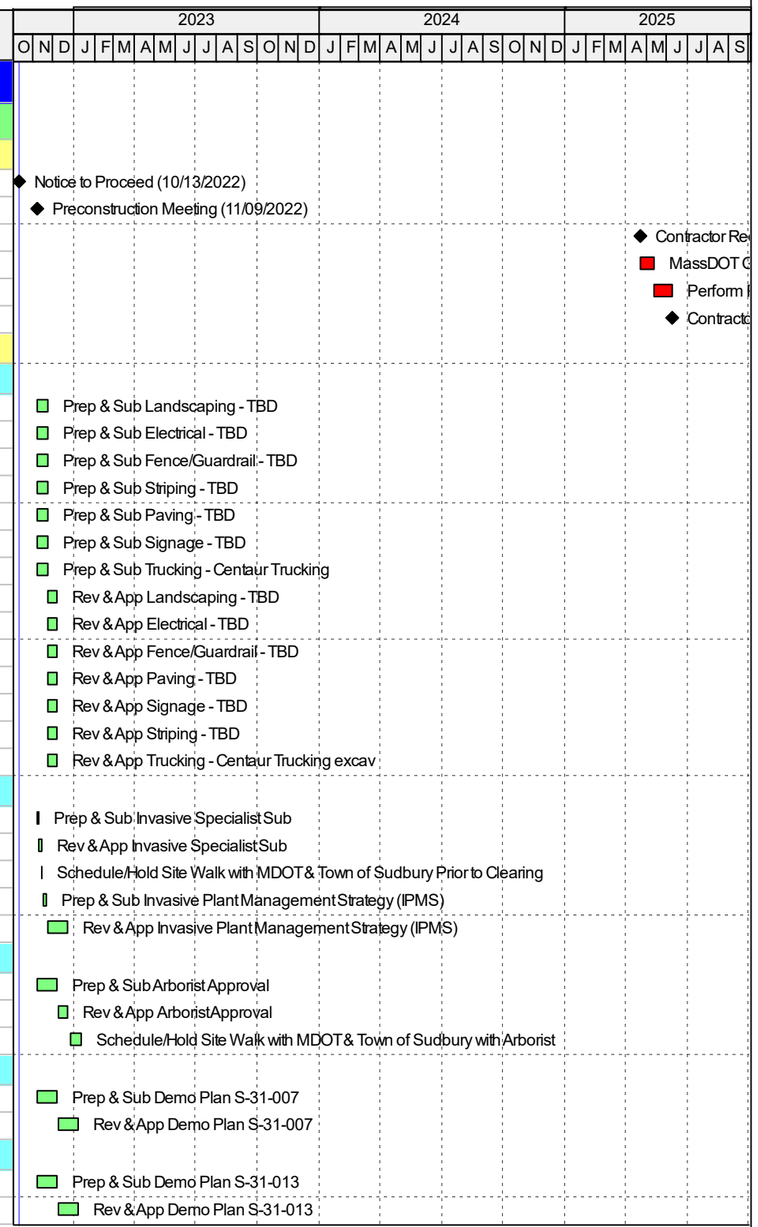
METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Matting for Erosion Control will be measured, complete in place, by the square yard.

Jute Mesh (Waterways) and Matting for Erosion Control will be paid for at the contract unit price per square yard which price shall include all labor, materials, equipment, and incidental costs required to complete the work. No separate payment will be made for fabric, compost, fertilizer, or staples/stakes, but all costs in connection therewith shall be included in the Contract unit price bid. Loam and seeding will be paid for separately under loam borrow and seeding items.

Appendix B Construction Schedule and Sequence

Activity ID	Activity Name	Calendar	Orig Dur	Start	Finish	Late Start	Late Finish	Total Float
C119678-BL00	**BL00: DD 10-13-22 Sudbury to Concord: Bikepath Construction (Bruce Freeman Trail) BASELINE FIN**							
C119678-BL00.SC	**AA WILL C#119678**							
C119678-BL00.SC.10	**Milestones**							
A1000	Notice to Proceed (10/13/2022)	7D	0	13-Oct-22		14-Oct-22		1
A1001	Preconstruction Meeting (11/09/2022)	7D	0	09-Nov-22		10-Nov-22		1
A1002	Contractor Request Substantial Completion	7D	0		22-Apr-25		22-Apr-25	0
A1003	MassDOT Generate Punchlist	7D	21	23-Apr-25	13-May-25	23-Apr-25	13-May-25	0
A1004	Perform Punchlist	5D W/WS	17	14-May-25	09-Jun-25	14-May-25	09-Jun-25	0
A1005	Contractor Field Completion (06/09/2025)	7D	0		09-Jun-25*		09-Jun-25	0
C119678-BL00.SC.30	**Submittals**							
C119678-BL00.SC.30.01	**SUBCONSTRACTOR APPROVALS**							
A3012	Prep & Sub Landscaping - TBD	7D	15	09-Nov-22	23-Nov-22	24-Feb-23	10-Mar-23	107
A3013	Prep & Sub Electrical - TBD	7D	15	09-Nov-22	23-Nov-22	05-Aug-23	19-Aug-23	269
A3014	Prep & Sub Fence/Guardrail - TBD	7D	15	09-Nov-22	23-Nov-22	25-Sep-23	09-Oct-23	320
A3015	Prep & Sub Striping - TBD	7D	15	09-Nov-22	23-Nov-22	26-Aug-24	09-Sep-24	656
A3016	Prep & Sub Paving - TBD	7D	15	09-Nov-22	23-Nov-22	27-Jun-23	11-Jul-23	230
A3017	Prep & Sub Signage - TBD	7D	15	09-Nov-22	23-Nov-22	26-Jan-24	09-Feb-24	443
A3018	Prep & Sub Trucking - Centaur Trucking	7D	15	09-Nov-22	23-Nov-22	14-Mar-23	28-Mar-23	125
A3050	Rev & App Landscaping - TBD	7D	15	24-Nov-22	08-Dec-22	11-Mar-23	25-Mar-23	107
A3051	Rev & App Electrical - TBD	7D	15	24-Nov-22	08-Dec-22	20-Aug-23	03-Sep-23	269
A3052	Rev & App Fence/Guardrail - TBD	7D	15	24-Nov-22	08-Dec-22	10-Oct-23	24-Oct-23	320
A3053	Rev & App Paving - TBD	7D	15	24-Nov-22	08-Dec-22	12-Jul-23	26-Jul-23	230
A3054	Rev & App Signage - TBD	7D	15	24-Nov-22	08-Dec-22	10-Feb-24	24-Feb-24	443
A3055	Rev & App Striping - TBD	7D	15	24-Nov-22	08-Dec-22	10-Sep-24	24-Sep-24	656
A3056	Rev & App Trucking - Centaur Trucking excav	7D	15	24-Nov-22	08-Dec-22	29-Mar-23	12-Apr-23	125
C119678-BL00.SC.30.03	**CONTROL OF INVASIVE PLANTS EXISTING ON SITE (102.32)**							
A3001	Prep & Sub Invasive Specialist Sub	7D	1	09-Nov-22	09-Nov-22	24-Jan-23	24-Jan-23	76
A3044	Rev & App Invasive Specialist Sub	7D	5	10-Nov-22	14-Nov-22	25-Jan-23	29-Jan-23	76
A3045	Schedule/Hold Site Walk with MDOT & Town of Sudbury Prior to Clearing	5D NO WS	1	15-Nov-22	15-Nov-22	30-Jan-23	30-Jan-23	48
A3046	Prep & Sub Invasive Plant Management Strategy (IPMS)	7D	7	16-Nov-22	22-Nov-22	31-Jan-23	06-Feb-23	76
A3048	Rev & App Invasive Plant Management Strategy (IPMS)	7D	30	23-Nov-22	22-Dec-22	07-Feb-23	08-Mar-23	76
C119678-BL00.SC.30.04	**TREE PROTECTION ARMORING & PRUNING (102.511)**							
A3002	Prep & Sub Arborist Approval	7D	30	09-Nov-22	08-Dec-22	15-Jun-24	14-Jul-24	584
A3059	Rev & App Arborist Approval	7D	15	09-Dec-22	23-Dec-22	15-Jul-24	29-Jul-24	584
A3097	Schedule/Hold Site Walk with MDOT & Town of Sudbury with Arborist	5D NO WS	12	27-Dec-22	12-Jan-23	30-Jul-24	14-Aug-24	393
C119678-BL00.SC.30.05	**DEMOLITION OF SUPERSTRUCTURE OF BRIDGE S-31-007 (114.1)**							
A3000	Prep & Sub Demo Plan S-31-007	7D	30	09-Nov-22	08-Dec-22	10-Jun-23	09-Jul-23	213
A3058	Rev & App Demo Plan S-31-007	7D	30	09-Dec-22	07-Jan-23	10-Jul-23	08-Aug-23	213
C119678-BL00.SC.30.06	**DEMOLITION OF SUPERSTRUCTURE OF BRIDGE S-31-013 (114.2)**							
A3004	Prep & Sub Demo Plan S-31-013	7D	30	09-Nov-22	08-Dec-22	11-May-23	09-Jun-23	183
A3060	Rev & App Demo Plan S-31-013	7D	30	09-Dec-22	07-Jan-23	10-Jun-23	09-Jul-23	183



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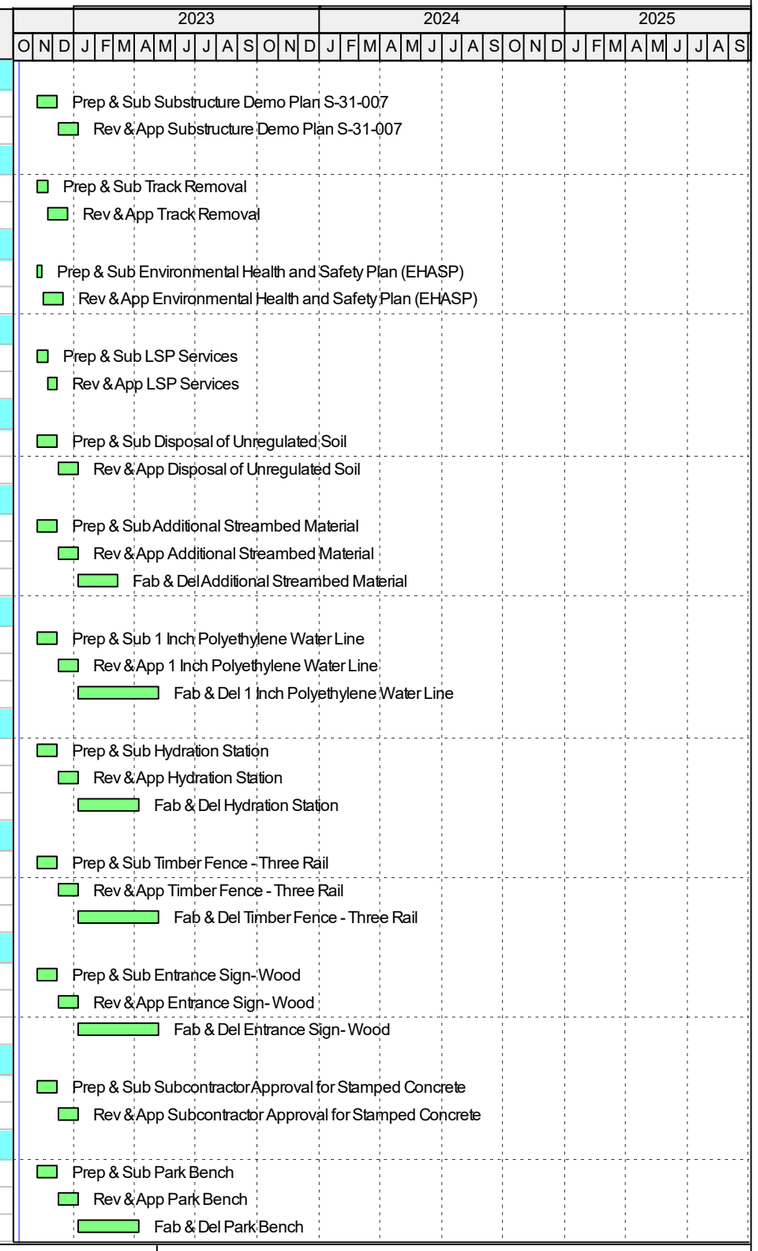
C119678-BL00.SC.30.07 REINFORCED CONCRETE EXCAVATION (127.1)								
A3005	Prep & Sub Substructure Demo Plan S-31-007	7D	30	09-Nov-22	08-Dec-22	15-Jun-23	14-Jul-23	218
A3061	Rev & App Substructure Demo Plan S-31-007	7D	30	09-Dec-22	07-Jan-23	15-Jul-23	13-Aug-23	218
C119678-BL00.SC.30.08 TRACK EXCAVATION (129.5)								
A3007	Prep & Sub Track Removal	7D	15	09-Nov-22	23-Nov-22	25-Dec-22	08-Jan-23	46
A3049	Rev & App Track Removal	7D	30	24-Nov-22	23-Dec-22	09-Jan-23	07-Feb-23	46
C119678-BL00.SC.30.09 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM (180.01)								
A3003	Prep & Sub Environmental Health and Safety Plan (EHASP)	7D	7	09-Nov-22	15-Nov-22	07-Mar-23	13-Mar-23	118
A3047	Rev & App Environmental Health and Safety Plan (EHASP)	7D	30	16-Nov-22	15-Dec-22	14-Mar-23	12-Apr-23	118
C119678-BL00.SC.30.10 LICENSED SITE PROFESSIONAL SERVICES (180.03)								
A3029	Prep & Sub LSP Services	7D	15	09-Nov-22	23-Nov-22	14-Mar-23	28-Mar-23	125
A3057	Rev & App LSP Services	7D	15	24-Nov-22	08-Dec-22	29-Mar-23	12-Apr-23	125
C119678-BL00.SC.30.11 DISPOSAL OF UNREGULATED SOIL (181.11 to 181.14)								
A3030	Prep & Sub Disposal of Unregulated Soil	7D	30	09-Nov-22	08-Dec-22	12-Feb-23	13-Mar-23	95
A3077	Rev & App Disposal of Unregulated Soil	7D	30	09-Dec-22	07-Jan-23	14-Mar-23	12-Apr-23	95
C119678-BL00.SC.30.12 TRAPEZOIDAL AQUATIC EXCLUSIONARY FENCING (227.5)								
A3006	Prep & Sub Additional Streambed Material	7D	30	09-Nov-22	08-Dec-22	20-Feb-23	21-Mar-23	103
A3062	Rev & App Additional Streambed Material	7D	30	09-Dec-22	07-Jan-23	22-Mar-23	20-Apr-23	103
A3098	Fab & Del Additional Streambed Material	7D	60	08-Jan-23	08-Mar-23	21-Apr-23	19-Jun-23	103
C119678-BL00.SC.30.13 1 INCH POLYETHYLENE WATER LINE (336.101)								
A3011	Prep & Sub 1 Inch Polyethylene Water Line	7D	30	09-Nov-22	08-Dec-22	23-Mar-24	21-Apr-24	500
A3066	Rev & App 1 Inch Polyethylene Water Line	7D	30	09-Dec-22	07-Jan-23	22-Apr-24	21-May-24	500
A3101	Fab & Del 1 Inch Polyethylene Water Line	7D	120	08-Jan-23	07-May-23	22-May-24	18-Sep-24	500
C119678-BL00.SC.30.14 HYDRATION STATION (377.)								
A3008	Prep & Sub Hydration Station	7D	30	09-Nov-22	08-Dec-22	18-Jun-23	17-Jul-23	221
A3063	Rev & App Hydration Station	7D	30	09-Dec-22	07-Jan-23	18-Jul-23	16-Aug-23	221
A3099	Fab & Del Hydration Station	7D	90	08-Jan-23	07-Apr-23	17-Aug-23	14-Nov-23	221
C119678-BL00.SC.30.15 TIMBER FENCE - THREE RAIL (655.02)								
A3009	Prep & Sub Timber Fence - Three Rail	7D	30	09-Nov-22	08-Dec-22	28-Apr-23	27-May-23	170
A3064	Rev & App Timber Fence - Three Rail	7D	30	09-Dec-22	07-Jan-23	28-May-23	26-Jun-23	170
A3100	Fab & Del Timber Fence - Three Rail	7D	120	08-Jan-23	07-May-23	27-Jun-23	24-Oct-23	170
C119678-BL00.SC.30.16 ENTRANCE SIGN - WOOD (665.04)								
A3043	Prep & Sub Entrance Sign- Wood	7D	30	09-Nov-22	08-Dec-22	25-Feb-24	25-Mar-24	473
A3096	Rev & App Entrance Sign- Wood	7D	30	09-Dec-22	07-Jan-23	26-Mar-24	24-Apr-24	473
A3127	Fab & Del Entrance Sign- Wood	7D	120	08-Jan-23	07-May-23	25-Apr-24	22-Aug-24	473
C119678-BL00.SC.30.17 STAMPED & COLORED CONCRETE - COLONIAL RED (701.992)								
A3010	Prep & Sub Subcontractor Approval for Stamped Concrete	7D	30	09-Nov-22	08-Dec-22	06-Apr-24	05-May-24	514
A3065	Rev & App Subcontractor Approval for Stamped Concrete	7D	30	09-Dec-22	07-Jan-23	06-May-24	04-Jun-24	514
C119678-BL00.SC.30.18 PARK BENCH (707.1)								
A3033	Prep & Sub Park Bench	7D	30	09-Nov-22	08-Dec-22	21-Apr-23	20-May-23	163
A3084	Rev & App Park Bench	7D	30	09-Dec-22	07-Jan-23	21-May-23	19-Jun-23	163
A3112	Fab & Del Park Bench	7D	90	08-Jan-23	07-Apr-23	20-Jun-23	17-Sep-23	163



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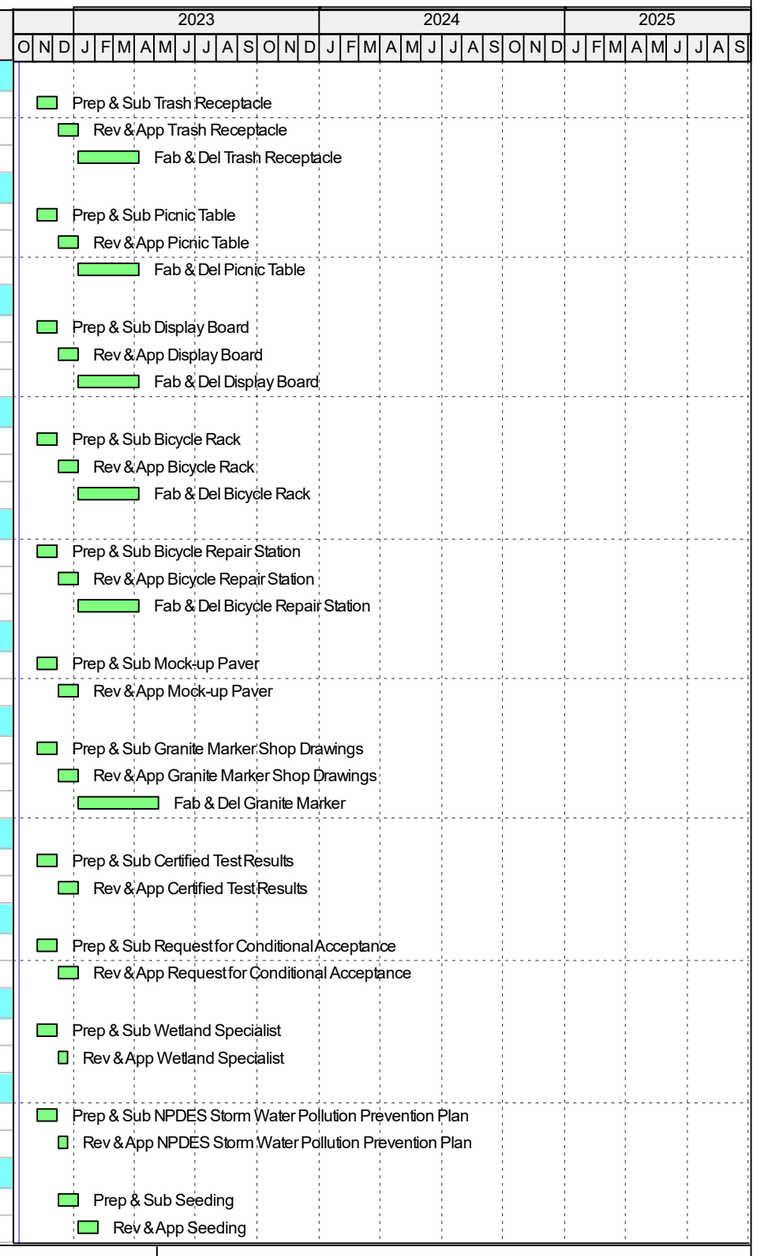
C119678-BL00.SC.30.19 TRASH RECEPTACLE (707.2)								
A3034	Prep & Sub Trash Receptacle	7D	30	09-Nov-22	08-Dec-22	18-Jun-23	17-Jul-23	221
A3085	Rev & App Trash Receptacle	7D	30	09-Dec-22	07-Jan-23	18-Jul-23	16-Aug-23	221
A3113	Fab & Del Trash Receptacle	7D	90	08-Jan-23	07-Apr-23	17-Aug-23	14-Nov-23	221
C119678-BL00.SC.30.20 PICNIC TABLE (707.6)								
A3021	Prep & Sub Picnic Table	7D	30	09-Nov-22	08-Dec-22	18-Jun-23	17-Jul-23	221
A3069	Rev & App Picnic Table	7D	30	09-Dec-22	07-Jan-23	18-Jul-23	16-Aug-23	221
A3104	Fab & Del Picnic Table	7D	90	08-Jan-23	07-Apr-23	17-Aug-23	14-Nov-23	221
C119678-BL00.SC.30.21 DISPLAY BOARD (707.7)								
A3022	Prep & Sub Display Board	7D	30	09-Nov-22	08-Dec-22	26-Mar-24	24-Apr-24	503
A3070	Rev & App Display Board	7D	30	09-Dec-22	07-Jan-23	25-Apr-24	24-May-24	503
A3105	Fab & Del Display Board	7D	90	08-Jan-23	07-Apr-23	25-May-24	22-Aug-24	503
C119678-BL00.SC.30.22 BICYCLE RACK (707.9)								
A3023	Prep & Sub Bicycle Rack	7D	30	09-Nov-22	08-Dec-22	21-Apr-23	20-May-23	163
A3071	Rev & App Bicycle Rack	7D	30	09-Dec-22	07-Jan-23	21-May-23	19-Jun-23	163
A3106	Fab & Del Bicycle Rack	7D	90	08-Jan-23	07-Apr-23	20-Jun-23	17-Sep-23	163
C119678-BL00.SC.30.23 BICYCLE REPAIR STATION (707.91)								
A3024	Prep & Sub Bicycle Repair Station	7D	30	09-Nov-22	08-Dec-22	18-Jun-23	17-Jul-23	221
A3072	Rev & App Bicycle Repair Station	7D	30	09-Dec-22	07-Jan-23	18-Jul-23	16-Aug-23	221
A3107	Fab & Del Bicycle Repair Station	7D	90	08-Jan-23	07-Apr-23	17-Aug-23	14-Nov-23	221
C119678-BL00.SC.30.24 PERVIOUS CEMENT CONCRETE PAVER (708.35)								
A3025	Prep & Sub Mock-up Paver	7D	30	09-Nov-22	08-Dec-22	29-Apr-24	28-May-24	537
A3073	Rev & App Mock-up Paver	7D	30	09-Dec-22	07-Jan-23	29-May-24	27-Jun-24	537
C119678-BL00.SC.30.25 GRANITE TOWN LINE MARKER (710.)								
A3040	Prep & Sub Granite Marker Shop Drawings	7D	30	09-Nov-22	08-Dec-22	22-Mar-23	20-Apr-23	133
A3091	Rev & App Granite Marker Shop Drawings	7D	30	09-Dec-22	07-Jan-23	21-Apr-23	20-May-23	133
A3124	Fab & Del Granite Marker	7D	120	08-Jan-23	07-May-23	21-May-23	17-Sep-23	133
C119678-BL00.SC.30.26 COMPOST BLANKET (751.72)								
A3027	Prep & Sub Certified Test Results	7D	30	09-Nov-22	08-Dec-22	22-Sep-23	21-Oct-23	317
A3075	Rev & App Certified Test Results	7D	30	09-Dec-22	07-Jan-23	22-Oct-23	20-Nov-23	317
C119678-BL00.SC.30.27 INLAND WETLAND REPLICATION AREA (755.35)								
A3028	Prep & Sub Request for Conditional Acceptance	7D	30	09-Nov-22	08-Dec-22	26-Feb-23	27-Mar-23	109
A3076	Rev & App Request for Conditional Acceptance	7D	30	09-Dec-22	07-Jan-23	28-Mar-23	26-Apr-23	109
C119678-BL00.SC.30.28 WETLAND SPECIALIST (755.75)								
A3041	Prep & Sub Wetland Specialist	7D	30	09-Nov-22	08-Dec-22	13-Mar-23	11-Apr-23	124
A3092	Rev & App Wetland Specialist	7D	15	09-Dec-22	23-Dec-22	12-Apr-23	26-Apr-23	124
C119678-BL00.SC.30.29 NPDES STORM WATER POLLUTION PREVENTION PLAN (756.)								
A3042	Prep & Sub NPDES Storm Water Pollution Prevention Plan	7D	30	09-Nov-22	08-Dec-22	24-Jan-23	22-Feb-23	76
A3093	Rev & App NPDES Storm Water Pollution Prevention Plan	7D	14	09-Dec-22	22-Dec-22	23-Feb-23	08-Mar-23	76
C119678-BL00.SC.30.30 SEEDING (765.)								
A3078	Prep & Sub Seeding	7D	30	09-Dec-22	07-Jan-23	26-Mar-23	24-Apr-23	107
A3108	Rev & App Seeding	7D	30	08-Jan-23	06-Feb-23	25-Apr-23	24-May-23	107



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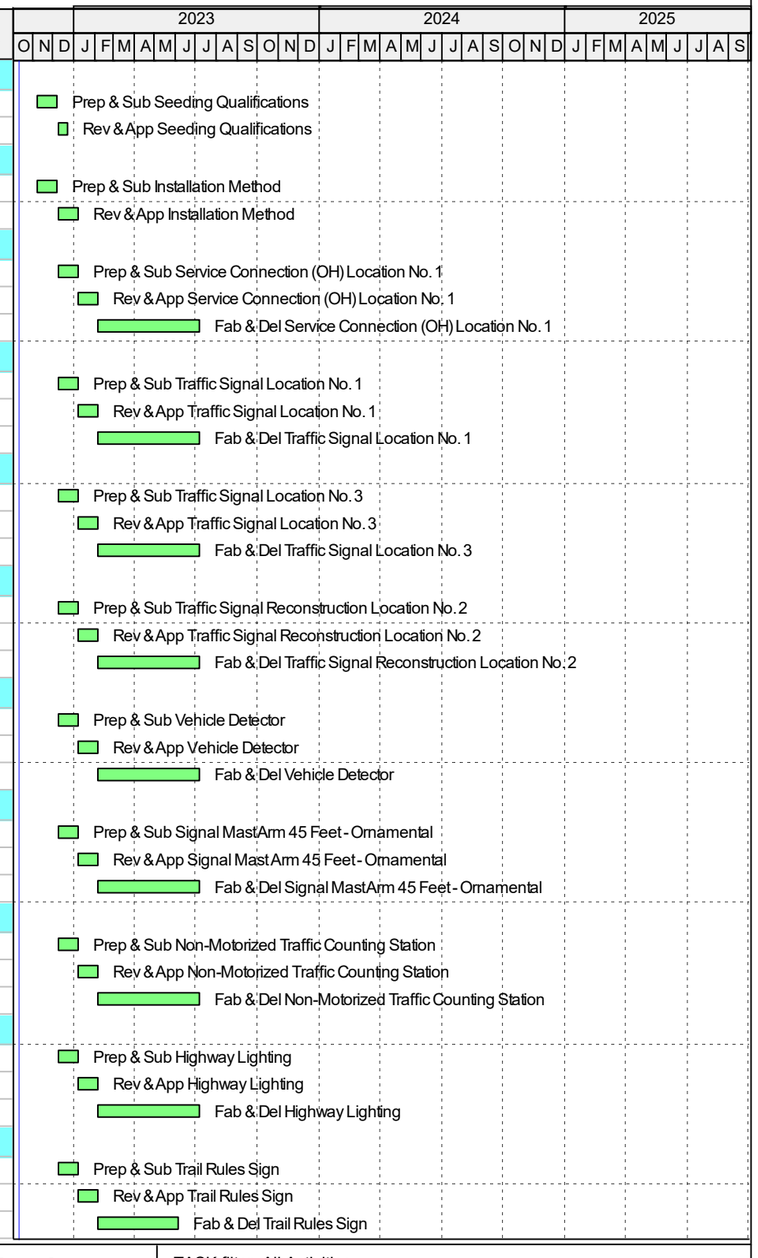
C119678-BL00.SC.30.31 NATIVE SEED AND ESTABLISHMENT (765.635)								
A3031	Prep & Sub Seeding Qualifications	7D	30	09-Nov-22	08-Dec-22	10-Apr-23	09-May-23	152
A3079	Rev & App Seeding Qualifications	7D	15	09-Dec-22	23-Dec-22	10-May-23	24-May-23	152
C119678-BL00.SC.30.32 COMPOSTED MULCH OVER MODIFIED ROCK (767.78)								
A3032	Prep & Sub Installation Method	7D	30	09-Nov-22	08-Dec-22	22-Sep-23	21-Oct-23	317
A3080	Rev & App Installation Method	7D	30	09-Dec-22	07-Jan-23	22-Oct-23	20-Nov-23	317
C119678-BL00.SC.30.33 SERVICE CONNECTION (OVERHEAD) - LOCATION NO. 1 (813.801)								
A3081	Prep & Sub Service Connection (OH) Location No. 1	7D	30	09-Dec-22	07-Jan-23	29-Dec-23	27-Jan-24	385
A3109	Rev & App Service Connection (OH) Location No. 1	7D	30	08-Jan-23	06-Feb-23	28-Jan-24	26-Feb-24	385
A3128	Fab & Del Service Connection (OH) Location No. 1	7D	150	07-Feb-23	06-Jul-23	27-Feb-24	25-Jul-24	385
C119678-BL00.SC.30.34 TRAFFIC SIGNAL LOCATION NO.1 (815.1)								
A3082	Prep & Sub Traffic Signal Location No. 1	7D	30	09-Dec-22	07-Jan-23	27-Sep-23	26-Oct-23	292
A3110	Rev & App Traffic Signal Location No. 1	7D	30	08-Jan-23	06-Feb-23	27-Oct-23	25-Nov-23	292
A3129	Fab & Del Traffic Signal Location No. 1	7D	150	07-Feb-23	06-Jul-23	26-Nov-23	23-Apr-24	292
C119678-BL00.SC.30.35 TRAFFIC SIGNAL LOCATION NO.3 (815.3)								
A3083	Prep & Sub Traffic Signal Location No. 3	7D	30	09-Dec-22	07-Jan-23	10-Jan-24	08-Feb-24	397
A3111	Rev & App Traffic Signal Location No. 3	7D	30	08-Jan-23	06-Feb-23	09-Feb-24	09-Mar-24	397
A3130	Fab & Del Traffic Signal Location No. 3	7D	150	07-Feb-23	06-Jul-23	10-Mar-24	06-Aug-24	397
C119678-BL00.SC.30.36 TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 2 (816.2)								
A3094	Prep & Sub Traffic Signal Reconstruction Location No. 2	7D	30	09-Dec-22	07-Jan-23	03-Jan-24	01-Feb-24	390
A3125	Rev & App Traffic Signal Reconstruction Location No. 2	7D	30	08-Jan-23	06-Feb-23	02-Feb-24	02-Mar-24	390
A3137	Fab & Del Traffic Signal Reconstruction Location No. 2	7D	150	07-Feb-23	06-Jul-23	03-Mar-24	30-Jul-24	390
C119678-BL00.SC.30.37 TRAFFIC SIGNAL (815.)								
A3095	Prep & Sub Vehicle Detector	7D	30	09-Dec-22	07-Jan-23	25-Dec-23	23-Jan-24	381
A3126	Rev & App Vehicle Detector	7D	30	08-Jan-23	06-Feb-23	24-Jan-24	22-Feb-24	381
A3138	Fab & Del Vehicle Detector	7D	150	07-Feb-23	06-Jul-23	23-Feb-24	21-Jul-24	381
C119678-BL00.SC.30.38 SIGNAL MAST ARM 45 FEET - ORNAMENTAL (817.8)								
A3086	Prep & Sub Signal MastArm 45 Feet - Ornamental	7D	30	09-Dec-22	07-Jan-23	04-Sep-23	03-Oct-23	269
A3114	Rev & App Signal Mast Arm 45 Feet - Ornamental	7D	30	08-Jan-23	06-Feb-23	04-Oct-23	02-Nov-23	269
A3131	Fab & Del Signal MastArm 45 Feet - Ornamental	7D	150	07-Feb-23	06-Jul-23	03-Nov-23	31-Mar-24	269
C119678-BL00.SC.30.39 NON-MOTORIZED TRAFFIC COUNTING STATION (819.95)								
A3087	Prep & Sub Non-Motorized Traffic Counting Station	7D	30	09-Dec-22	07-Jan-23	25-Dec-23	23-Jan-24	381
A3115	Rev & App Non-Motorized Traffic Counting Station	7D	30	08-Jan-23	06-Feb-23	24-Jan-24	22-Feb-24	381
A3132	Fab & Del Non-Motorized Traffic Counting Station	7D	150	07-Feb-23	06-Jul-23	23-Feb-24	21-Jul-24	381
C119678-BL00.SC.30.40 HIGHWAY LIGHTING (823.72)								
A3088	Prep & Sub Highway Lighting	7D	30	09-Dec-22	07-Jan-23	08-Apr-24	07-May-24	486
A3116	Rev & App Highway Lighting	7D	30	08-Jan-23	06-Feb-23	08-May-24	06-Jun-24	486
A3133	Fab & Del Highway Lighting	7D	150	07-Feb-23	06-Jul-23	07-Jun-24	03-Nov-24	486
C119678-BL00.SC.30.41 TRAIL RULES SIGN (832.1)								
A3089	Prep & Sub Trail Rules Sign	7D	30	09-Dec-22	07-Jan-23	25-Feb-24	25-Mar-24	443
A3117	Rev & App Trail Rules Sign	7D	30	08-Jan-23	06-Feb-23	26-Mar-24	24-Apr-24	443
A3134	Fab & Del Trail Rules Sign	7D	120	07-Feb-23	06-Jun-23	25-Apr-24	22-Aug-24	443



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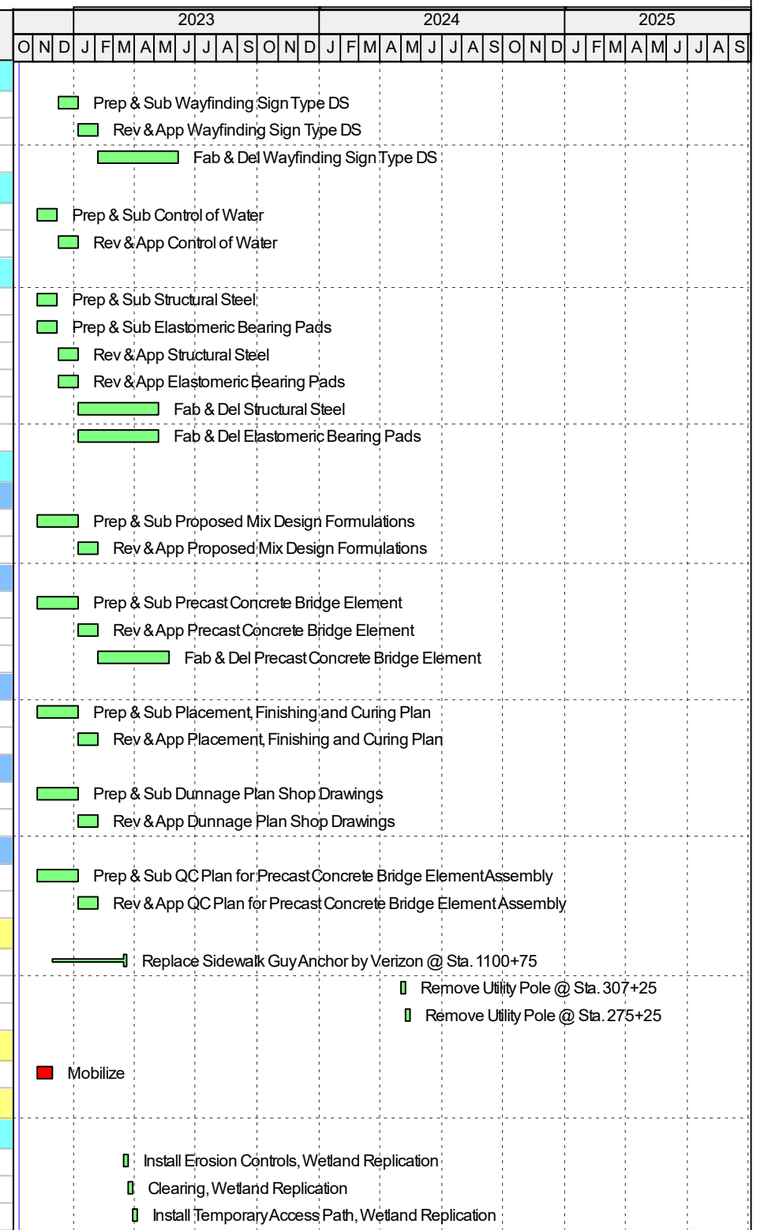
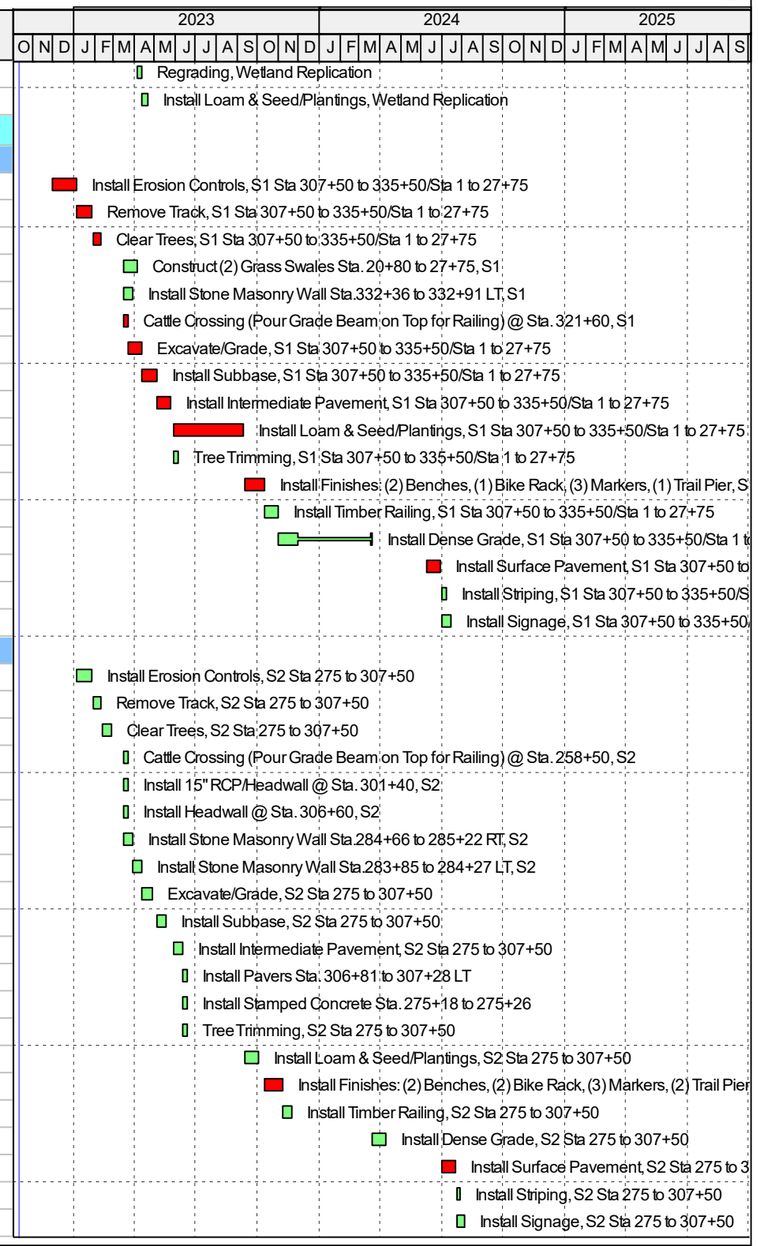
C119678-BL00.SC.30.42 WAYFINDING SIGN TYPE DS (832.2)								
A3090	Prep & Sub Wayfinding Sign Type DS	7D	30	09-Dec-22	07-Jan-23	25-Feb-24	25-Mar-24	443
A3118	Rev & App Wayfinding Sign Type DS	7D	30	08-Jan-23	06-Feb-23	26-Mar-24	24-Apr-24	443
A3135	Fab & Del Wayfinding Sign Type DS	7D	120	07-Feb-23	06-Jun-23	25-Apr-24	22-Aug-24	443
C119678-BL00.SC.30.43 CONTROL OF WATER (991.)								
A3026	Prep & Sub Control of Water	7D	30	09-Nov-22	08-Dec-22	25-May-23	23-Jun-23	197
A3074	Rev & App Control of Water	7D	30	09-Dec-22	07-Jan-23	24-Jun-23	23-Jul-23	197
C119678-BL00.SC.30.44 BRIDGE SUPERSTRUCTURE, BRIDGE NO. S-31-007 (995.)								
A3019	Prep & Sub Structural Steel	7D	30	09-Nov-22	08-Dec-22	03-Jun-23	02-Jul-23	206
A3020	Prep & Sub Elastomeric Bearing Pads	7D	30	09-Nov-22	08-Dec-22	03-Jun-23	02-Jul-23	206
A3067	Rev & App Structural Steel	7D	30	09-Dec-22	07-Jan-23	03-Jul-23	01-Aug-23	206
A3068	Rev & App Elastomeric Bearing Pads	7D	30	09-Dec-22	07-Jan-23	03-Jul-23	01-Aug-23	206
A3102	Fab & Del Structural Steel	7D	120	08-Jan-23	07-May-23	02-Aug-23	29-Nov-23	206
A3103	Fab & Del Elastomeric Bearing Pads	7D	120	08-Jan-23	07-May-23	02-Aug-23	29-Nov-23	206
C119678-BL00.SC.30.45 BRIDGE STRUCTURE, BRIDGE NO. S-31-013 (995.01)								
C119678-BL00.SC.30.45.01 Proposed Mix Design Formulations								
A3035	Prep & Sub Proposed Mix Design Formulations	7D	60	09-Nov-22	07-Jan-23	19-Jan-23	19-Mar-23	71
A3119	Rev & App Proposed Mix Design Formulations	7D	30	08-Jan-23	06-Feb-23	20-Mar-23	18-Apr-23	71
C119678-BL00.SC.30.45.02 Precast Concrete Bridge Element								
A3038	Prep & Sub Precast Concrete Bridge Element	7D	60	09-Nov-22	07-Jan-23	19-Jan-23	19-Mar-23	71
A3122	Rev & App Precast Concrete Bridge Element	7D	30	08-Jan-23	06-Feb-23	20-Mar-23	18-Apr-23	71
A3136	Fab & Del Precast Concrete Bridge Element	7D	105	07-Feb-23	22-May-23	19-Apr-23	01-Aug-23	71
C119678-BL00.SC.30.45.03 Placement, Finishing and Curing Plan								
A3039	Prep & Sub Placement, Finishing and Curing Plan	7D	60	09-Nov-22	07-Jan-23	19-Jan-23	19-Mar-23	71
A3123	Rev & App Placement, Finishing and Curing Plan	7D	30	08-Jan-23	06-Feb-23	20-Mar-23	18-Apr-23	71
C119678-BL00.SC.30.45.04 Dunnage Plan Shop Drawings								
A3036	Prep & Sub Dunnage Plan Shop Drawings	7D	60	09-Nov-22	07-Jan-23	19-Jan-23	19-Mar-23	71
A3120	Rev & App Dunnage Plan Shop Drawings	7D	30	08-Jan-23	06-Feb-23	20-Mar-23	18-Apr-23	71
C119678-BL00.SC.30.45.05 Quality Control Plan for Precast Concrete Bridge Element Assembly								
A3037	Prep & Sub QC Plan for Precast Concrete Bridge ElementAssembly	7D	60	09-Nov-22	07-Jan-23	04-May-23	02-Jul-23	176
A3121	Rev & App QC Plan for Precast Concrete Bridge Element Assembly	7D	30	08-Jan-23	06-Feb-23	03-Jul-23	01-Aug-23	176
C119678-BL00.SC.40 Utilities								
A4000	Replace Sidewalk Guy Anchor by Verizon @ Sta. 1100+75	5D W/WS	5	30-Nov-22	21-Mar-23	08-Aug-24	14-Aug-24	275
A4001	Remove Utility Pole @ Sta. 307+25	5D W/WS	5	02-May-24	08-May-24	21-Jun-24	27-Jun-24	34
A4002	Remove Utility Pole @ Sta. 275+25	5D W/WS	5	09-May-24	15-May-24	28-Jun-24	05-Jul-24	34
C119678-BL00.SC.50 Construction Start Up								
A5000	Mobilize	5D W/WS	12	09-Nov-22	29-Nov-22	10-Nov-22	30-Nov-22	1
C119678-BL00.SC.60 Construction								
C119678-BL00.SC.60.07 Wetland Replication								
A6019	Install Erosion Controls, Wetland Replication	5D W/WS	5	16-Mar-23	22-Mar-23	27-Apr-23	03-May-23	29
A6022	Clearing, Wetland Replication	5D W/WS	5	23-Mar-23	29-Mar-23	04-May-23	10-May-23	29
A6025	Install Temporary Access Path, Wetland Replication	5D W/WS	5	30-Mar-23	05-Apr-23	11-May-23	17-May-23	29



Activity ID	Activity Name	Calendar	Orig Dur	Start	Finish	Late Start	Late Finish	Total Float
A6028	Regrading, Wetland Replication	5D W/WS	5	06-Apr-23	12-Apr-23	18-May-23	24-May-23	29
A6036	Install Loam & Seed/Plantings, Wetland Replication	PLANTING	5	13-Apr-23	20-Apr-23	25-May-23	16-Aug-23	29
C119678-BL00.SC.60.01 Bikepath								
C119678-BL00.SC.60.01.1 S1 North limit (Powder Mill Rd) to Rt. 117 Sta 307+50 to 335+50/Sta 1 to 27+75 = 5475'								
A6000	Install Erosion Controls, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D NO WS	25	30-Nov-22	05-Jan-23	09-Dec-22	17-Jan-23	7
A6001	Remove Track, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D NO WS	15	06-Jan-23	27-Jan-23	08-Feb-23	01-Mar-23	22
A6006	Clear Trees, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D NO WS	10	30-Jan-23	10-Feb-23	09-Mar-23	22-Mar-23	27
A6012	Construct (2) Grass Swales Sta. 20+80 to 27+75, S1	5D W/WS	15	16-Mar-23	05-Apr-23	14-Jun-23	05-Jul-23	61
A6013	Install Stone Masonry Wall Sta.332+36 to 332+91 LT, S1	5D W/WS	10	16-Mar-23	29-Mar-23	21-Jun-23	05-Jul-23	66
A6014	Cattle Crossing (Pour Grade Beam on Top for Railing) @ Sta. 321+60, S1	5D W/WS	5	16-Mar-23	22-Mar-23	06-Apr-23	12-Apr-23	15
A6021	Excavate/Grade, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D W/WS	15	23-Mar-23	12-Apr-23	13-Apr-23	04-May-23	15
A6034	Install Subbase, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D W/WS	15	13-Apr-23	04-May-23	06-Jul-23	26-Jul-23	56
A6041	Install Intermediate Pavement, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	PAVING	15	05-May-23	25-May-23	27-Jul-23	16-Aug-23	56
A6050	Install Loam & Seed/Plantings, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	PLANTING	20	30-May-23	11-Sep-23	17-Aug-23	15-Sep-23	4
A6051	Tree Trimming, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D W/WS	5	30-May-23	05-Jun-23	11-Sep-23	15-Sep-23	71
A6131	Install Finishes: (2) Benches, (1) Bike Rack, (3) Markers, (1) Trail Pier, S1 Sta 307+50 to 335+50/Sta 1 to 27	5D W/WS	20	12-Sep-23	11-Oct-23	18-Sep-23	17-Oct-23	4
A6157	Install Timber Railing, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D W/WS	15	12-Oct-23	01-Nov-23	25-Oct-23	14-Nov-23	9
A6167	Install Dense Grade, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D W/WS	20	02-Nov-23	19-Mar-24	15-Nov-23	01-Apr-24	9
A6218	Install Surface Pavement, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	PAVING	15	10-Jun-24	28-Jun-24	14-Jun-24	05-Jul-24	4
A6226	Install Striping, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	PAVING	5	01-Jul-24	08-Jul-24	25-Sep-24	01-Oct-24	59
A6227	Install Signage, S1 Sta 307+50 to 335+50/Sta 1 to 27+75	5D W/WS	10	01-Jul-24	15-Jul-24	23-Aug-24	09-Sep-24	38
C119678-BL00.SC.60.01.2 S2 Rt. 117 to Haynes Rd Sta 275 to 307+50 = 3250'								
A6002	Install Erosion Controls, S2 Sta 275 to 307+50	5D NO WS	15	06-Jan-23	27-Jan-23	18-Jan-23	07-Feb-23	7
A6007	Remove Track, S2 Sta 275 to 307+50	5D NO WS	10	30-Jan-23	10-Feb-23	02-Mar-23	15-Mar-23	22
A6009	Clear Trees, S2 Sta 275 to 307+50	5D NO WS	10	13-Feb-23	27-Feb-23	23-Mar-23	05-Apr-23	27
A6015	Cattle Crossing (Pour Grade Beam on Top for Railing) @ Sta. 258+50, S2	5D W/WS	5	16-Mar-23	22-Mar-23	28-Apr-23	04-May-23	30
A6016	Install 15" RCP/Headwall @ Sta. 301+40, S2	5D W/WS	5	16-Mar-23	22-Mar-23	28-Apr-23	04-May-23	30
A6017	Install Headwall @ Sta. 306+60, S2	5D W/WS	5	16-Mar-23	22-Mar-23	28-Apr-23	04-May-23	30
A6018	Install Stone Masonry Wall Sta.284+66 to 285+22 RT, S2	5D W/WS	10	16-Mar-23	29-Mar-23	13-Jul-23	26-Jul-23	81
A6024	Install Stone Masonry Wall Sta.283+85 to 284+27 LT, S2	5D W/WS	10	30-Mar-23	12-Apr-23	27-Jul-23	09-Aug-23	81
A6035	Excavate/Grade, S2 Sta 275 to 307+50	5D W/WS	10	13-Apr-23	27-Apr-23	05-May-23	18-May-23	15
A6042	Install Subbase, S2 Sta 275 to 307+50	5D W/WS	10	05-May-23	18-May-23	10-Aug-23	23-Aug-23	66
A6052	Install Intermediate Pavement, S2 Sta 275 to 307+50	PAVING	10	30-May-23	12-Jun-23	31-Aug-23	15-Sep-23	66
A6062	Install Pavers Sta. 306+81 to 307+28 LT	5D W/WS	5	13-Jun-23	19-Jun-23	28-Jun-24	05-Jul-24	186
A6063	Install Stamped Concrete Sta. 275+18 to 275+26	5D W/WS	5	13-Jun-23	19-Jun-23	28-Jun-24	05-Jul-24	186
A6064	Tree Trimming, S2 Sta 275 to 307+50	5D W/WS	5	13-Jun-23	19-Jun-23	11-Oct-23	17-Oct-23	81
A6132	Install Loam & Seed/Plantings, S2 Sta 275 to 307+50	PLANTING	15	12-Sep-23	02-Oct-23	25-Sep-23	17-Oct-23	9
A6158	Install Finishes: (2) Benches, (2) Bike Rack, (3) Markers, (2) Trail Pier, S2 Sta 275 to 307+50	5D W/WS	20	12-Oct-23	08-Nov-23	18-Oct-23	14-Nov-23	4
A6170	Install Timber Railing, S2 Sta 275 to 307+50	5D W/WS	8	09-Nov-23	20-Nov-23	21-Mar-24	01-Apr-24	16
A6178	Install Dense Grade, S2 Sta 275 to 307+50	5D W/WS	15	20-Mar-24	09-Apr-24	02-Apr-24	23-Apr-24	9
A6228	Install Surface Pavement, S2 Sta 275 to 307+50	PAVING	15	01-Jul-24	22-Jul-24	08-Jul-24	26-Jul-24	4
A6233	Install Striping, S2 Sta 275 to 307+50	PAVING	5	23-Jul-24	29-Jul-24	02-Oct-24	08-Oct-24	49
A6234	Install Signage, S2 Sta 275 to 307+50	5D W/WS	10	23-Jul-24	05-Aug-24	10-Sep-24	23-Sep-24	33

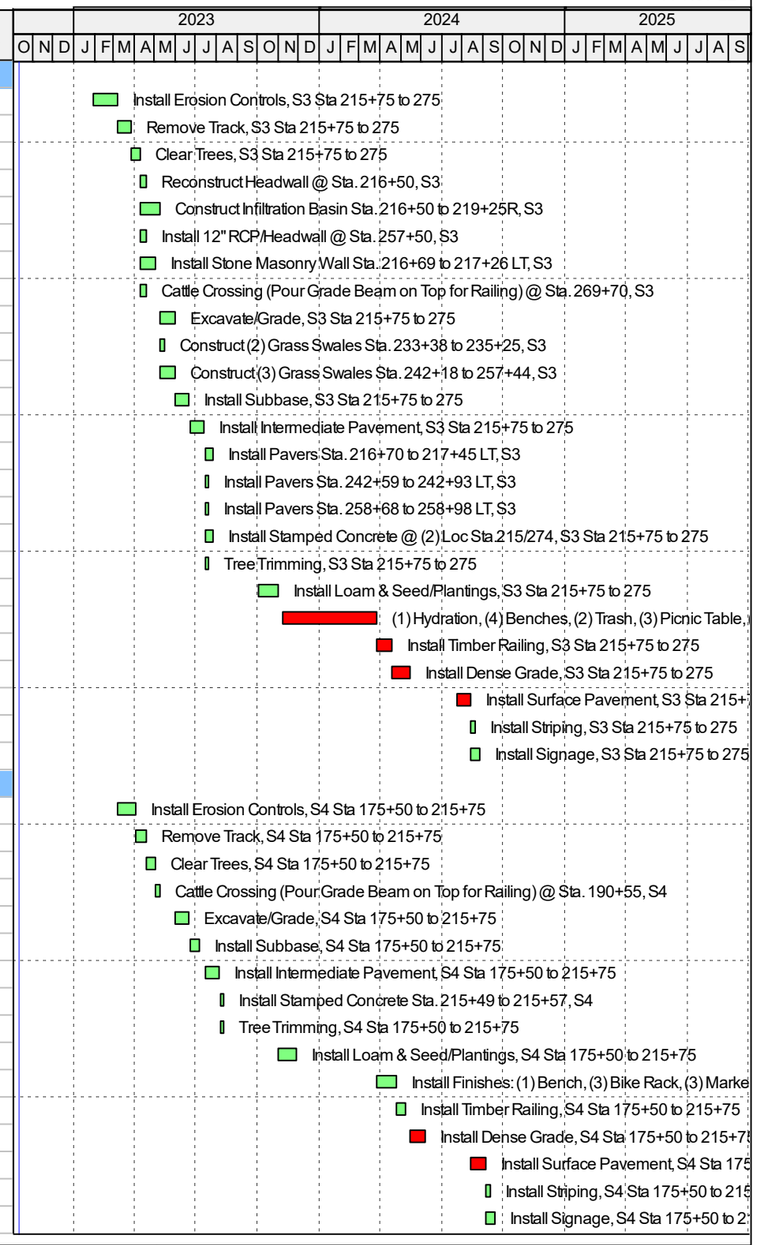


Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone

Sudbury to Concord: Construction of the Bruce Freeman Rail Trail Including Signals & 2 Bridges (Phase 2D)
MassDOT Contract # 119678
A. A. WILL
BASELINE SCHEDULE: 13-Oct-22

TASK filter: All Activities
Data Date:13-Oct-22 and Run Date: 11-Nov-22

Activity ID	Activity Name	Calendar	Orig Dur	Start	Finish	Late Start	Late Finish	Total Float
C119678-BL00.SC.60.01.3 S3 Haynes Rd to Morse Rd Sta 215+75 to 275 = 5925'								
A6008	Install Erosion Controls, S3 Sta 215+75 to 275	5D NO WS	25	30-Jan-23	06-Mar-23	08-Feb-23	15-Mar-23	7
A6010	Remove Track, S3 Sta 215+75 to 275	5D NO WS	15	07-Mar-23	27-Mar-23	16-Mar-23	05-Apr-23	7
A6023	Clear Trees, S3 Sta 215+75 to 275	5D W/WS	10	28-Mar-23	10-Apr-23	06-Apr-23	20-Apr-23	7
A6029	Reconstruct Headwall @ Sta. 216+50, S3	5D W/WS	5	11-Apr-23	18-Apr-23	12-May-23	18-May-23	22
A6030	Construct Infiltration Basin Sta. 216+50 to 219+25R, S3	5D W/WS	20	11-Apr-23	09-May-23	21-Apr-23	18-May-23	7
A6031	Install 12" RCP/Headwall @ Sta. 257+50, S3	5D W/WS	5	11-Apr-23	18-Apr-23	12-May-23	18-May-23	22
A6032	Install Stone Masonry Wall Sta. 216+69 to 217+26 LT, S3	5D W/WS	15	11-Apr-23	02-May-23	03-Aug-23	23-Aug-23	78
A6033	Cattle Crossing (Pour Grade Beam on Top for Railing) @ Sta. 269+70, S3	5D W/WS	5	11-Apr-23	18-Apr-23	12-May-23	18-May-23	22
A6043	Excavate/Grade, S3 Sta 215+75 to 275	5D W/WS	15	10-May-23	01-Jun-23	19-May-23	12-Jun-23	7
A6044	Construct (2) Grass Swales Sta. 233+38 to 235+25, S3	5D W/WS	5	10-May-23	16-May-23	17-Aug-23	23-Aug-23	68
A6045	Construct (3) Grass Swales Sta. 242+18 to 257+44, S3	5D W/WS	15	10-May-23	01-Jun-23	03-Aug-23	23-Aug-23	58
A6054	Install Subbase, S3 Sta 215+75 to 275	5D W/WS	15	02-Jun-23	22-Jun-23	24-Aug-23	15-Sep-23	58
A6071	Install Intermediate Pavement, S3 Sta 215+75 to 275	PAVING	15	23-Jun-23	14-Jul-23	18-Sep-23	10-Oct-23	58
A6089	Install Pavers Sta. 216+70 to 217+45 LT, S3	5D W/WS	10	17-Jul-23	28-Jul-23	15-Jul-24	26-Jul-24	173
A6090	Install Pavers Sta. 242+59 to 242+93 LT, S3	5D W/WS	5	17-Jul-23	21-Jul-23	22-Jul-24	26-Jul-24	178
A6091	Install Pavers Sta. 258+68 to 258+98 LT, S3	5D W/WS	5	17-Jul-23	21-Jul-23	22-Jul-24	26-Jul-24	178
A6092	Install Stamped Concrete @ (2) Loc Sta.215/274, S3 Sta 215+75 to 275	5D W/WS	10	17-Jul-23	28-Jul-23	15-Jul-24	26-Jul-24	173
A6093	Tree Trimming, S3 Sta 215+75 to 275	5D W/WS	5	17-Jul-23	21-Jul-23	08-Nov-23	14-Nov-23	78
A6152	Install Loam & Seed/Plantings, S3 Sta 215+75 to 275	PLANTING	20	03-Oct-23	01-Nov-23	18-Oct-23	14-Nov-23	9
A6171	(1) Hydration, (4) Benches, (2) Trash, (3) Picnic Table, (3) Bike Rack, (1) Bike Repair, (4) Markers,(2) Trail Pie	5D W/WS	20	09-Nov-23	26-Mar-24	15-Nov-23	01-Apr-24	4
A6182	Install Timber Railing, S3 Sta 215+75 to 275	5D W/WS	15	27-Mar-24	17-Apr-24	02-Apr-24	23-Apr-24	4
A6189	Install Dense Grade, S3 Sta 215+75 to 275	5D W/WS	20	18-Apr-24	15-May-24	24-Apr-24	21-May-24	4
A6235	Install Surface Pavement, S3 Sta 215+75 to 275	PAVING	15	23-Jul-24	12-Aug-24	29-Jul-24	16-Aug-24	4
A6241	Install Striping, S3 Sta 215+75 to 275	PAVING	5	13-Aug-24	19-Aug-24	09-Oct-24	17-Oct-24	39
A6242	Install Signage, S3 Sta 215+75 to 275	5D W/WS	10	13-Aug-24	26-Aug-24	24-Sep-24	07-Oct-24	28
C119678-BL00.SC.60.01.4 S4 Morse Rd to Rt. 27 Sta 175+50 to 215+75 = 4025'								
A6011	Install Erosion Controls, S4 Sta 175+50 to 215+75	5D NO WS	20	07-Mar-23	03-Apr-23	30-Mar-23	27-Apr-23	17
A6026	Remove Track, S4 Sta 175+50 to 215+75	5D W/WS	10	04-Apr-23	18-Apr-23	05-May-23	18-May-23	22
A6037	Clear Trees, S4 Sta 175+50 to 215+75	5D W/WS	10	19-Apr-23	02-May-23	19-May-23	05-Jun-23	22
A6040	Cattle Crossing (Pour Grade Beam on Top for Railing) @ Sta. 190+55, S4	5D W/WS	5	03-May-23	09-May-23	06-Jun-23	12-Jun-23	22
A6055	Excavate/Grade, S4 Sta 175+50 to 215+75	5D W/WS	15	02-Jun-23	22-Jun-23	13-Jun-23	03-Jul-23	7
A6072	Install Subbase, S4 Sta 175+50 to 215+75	5D W/WS	10	23-Jun-23	07-Jul-23	25-Sep-23	10-Oct-23	63
A6094	Install Intermediate Pavement, S4 Sta 175+50 to 215+75	PAVING	15	17-Jul-23	04-Aug-23	11-Oct-23	31-Oct-23	58
A6110	Install Stamped Concrete Sta. 215+49 to 215+57, S4	5D W/WS	5	07-Aug-23	11-Aug-23	12-Aug-24	16-Aug-24	178
A6111	Tree Trimming, S4 Sta 175+50 to 215+75	5D W/WS	5	07-Aug-23	11-Aug-23	02-Apr-24	08-Apr-24	88
A6168	Install Loam & Seed/Plantings, S4 Sta 175+50 to 215+75	PLANTING	15	02-Nov-23	27-Nov-23	15-Nov-23	08-Apr-24	9
A6183	Install Finishes: (1) Bench, (3) Bike Rack, (3) Markers, (2) Trail Piers, S4 Sta 175+50 to 215+75	5D W/WS	20	27-Mar-24	24-Apr-24	09-Apr-24	07-May-24	9
A6191	Install Timber Railing, S4 Sta 175+50 to 215+75	5D W/WS	10	25-Apr-24	08-May-24	08-May-24	21-May-24	9
A6207	Install Dense Grade, S4 Sta 175+50 to 215+75	5D W/WS	15	16-May-24	07-Jun-24	22-May-24	13-Jun-24	4
A6243	Install Surface Pavement, S4 Sta 175+50 to 215+75	PAVING	15	13-Aug-24	04-Sep-24	19-Aug-24	10-Sep-24	4
A6248	Install Striping, S4 Sta 175+50 to 215+75	PAVING	5	05-Sep-24	11-Sep-24	18-Oct-24	24-Oct-24	29
A6249	Install Signage, S4 Sta 175+50 to 215+75	5D W/WS	10	05-Sep-24	18-Sep-24	08-Oct-24	23-Oct-24	23



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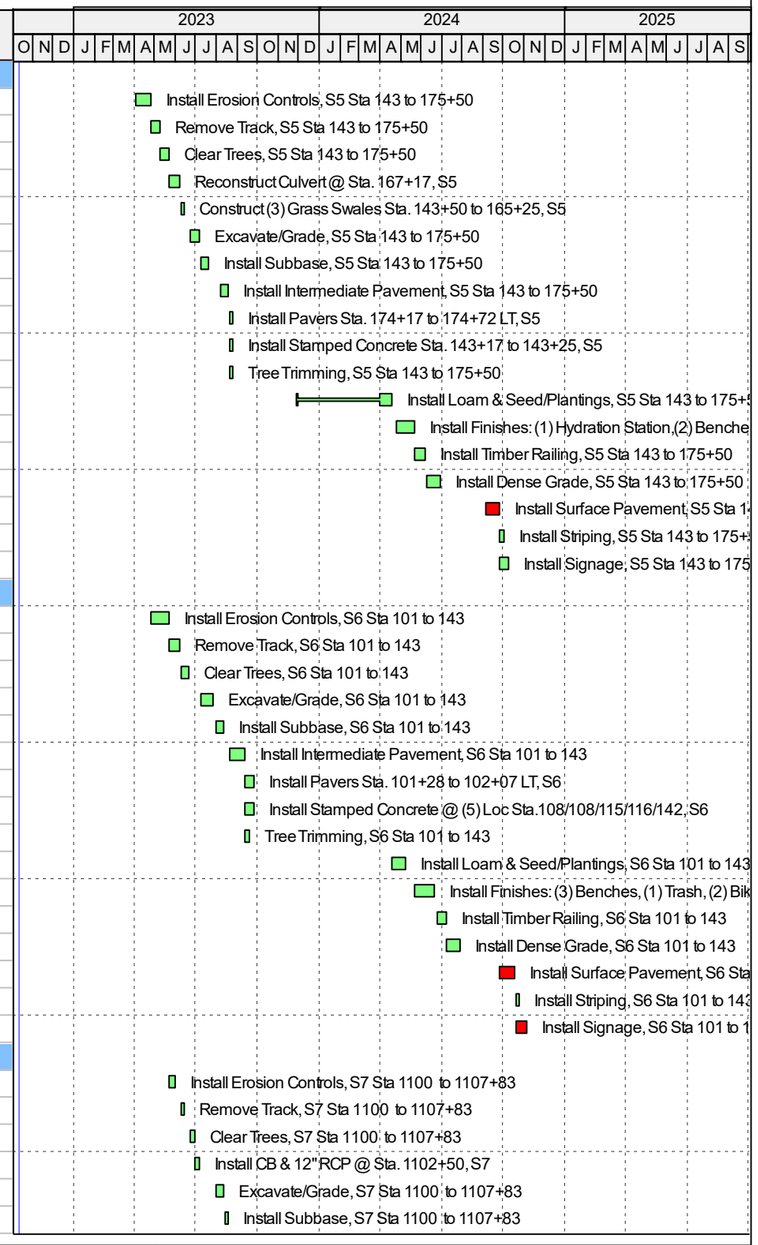
Sudbury to Concord: Construction of the Bruce Freeman Rail Trail Including Signals & 2 Bridges (Phase 2D)
MassDOT Contract # 119678
A. A. WILL
BASELINE SCHEDULE: 13-Oct-22

TASK filter: All Activities
Data Date:13-Oct-22 and Run Date: 11-Nov-22

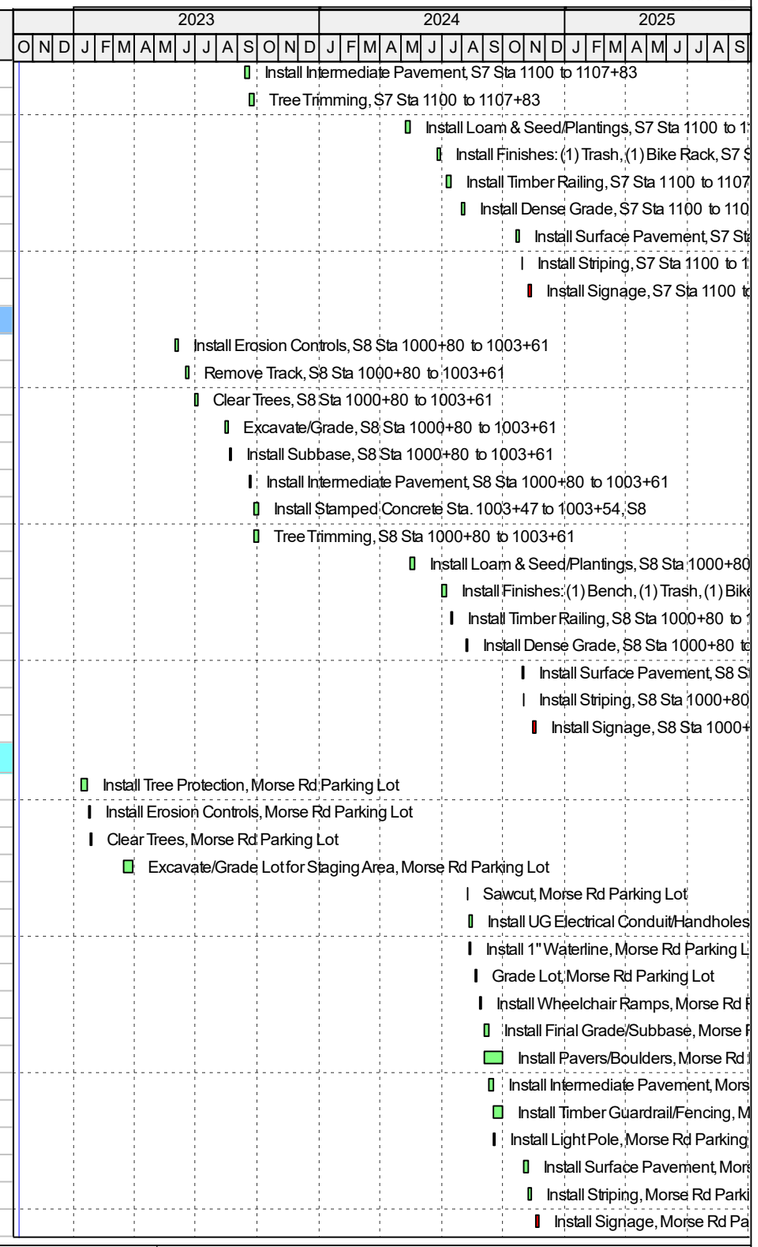
Activity ID	Activity Name	Calendar	Orig Dur	Start	Finish	Late Start	Late Finish	Total Float
C119678-BL00.SC.60.01.5 S5 Rt. 27 to Old Lancaster Rd Sta 143 to 175+50 = 3250'								
A6027	Install Erosion Controls, S5 Sta 143 to 175+50	5D W/WS	15	04-Apr-23	25-Apr-23	28-Apr-23	18-May-23	17
A6038	Remove Track, S5 Sta 143 to 175+50	5D W/WS	10	26-Apr-23	09-May-23	19-May-23	05-Jun-23	17
A6046	Clear Trees, S5 Sta 143 to 175+50	5D W/WS	10	10-May-23	23-May-23	06-Jun-23	19-Jun-23	17
A6047	Reconstruct Culvert @ Sta. 167+17, S5	5D W/WS	10	24-May-23	08-Jun-23	20-Jun-23	03-Jul-23	17
A6059	Construct (3) Grass Swales Sta. 143+50 to 165+25, S5	5D W/WS	5	09-Jun-23	15-Jun-23	11-Oct-23	17-Oct-23	83
A6073	Excavate/Grade, S5 Sta 143 to 175+50	5D W/WS	10	23-Jun-23	07-Jul-23	05-Jul-23	18-Jul-23	7
A6084	Install Subbase, S5 Sta 143 to 175+50	5D W/WS	10	10-Jul-23	21-Jul-23	18-Oct-23	31-Oct-23	68
A6112	Install Intermediate Pavement, S5 Sta 143 to 175+50	PAVING	10	07-Aug-23	18-Aug-23	01-Nov-23	14-Nov-23	58
A6120	Install Pavers Sta. 174+17 to 174+72 LT, S5	5D W/WS	5	21-Aug-23	25-Aug-23	04-Sep-24	10-Sep-24	183
A6121	Install Stamped Concrete Sta. 143+17 to 143+25, S5	5D W/WS	5	21-Aug-23	25-Aug-23	04-Sep-24	10-Sep-24	183
A6122	Tree Trimming, S5 Sta 143 to 175+50	5D W/WS	5	21-Aug-23	25-Aug-23	22-May-24	30-May-24	113
A6175	Install Loam & Seed/Plantings, S5 Sta 143 to 175+50	PLANTING	15	28-Nov-23	17-Apr-24	12-Apr-24	03-May-24	12
A6192	Install Finishes: (1) Hydration Station,(2) Benches, (1) Trash, (1) Bike Rack, (3) Markers, (2) Trail Piers, S5	5D W/WS	20	25-Apr-24	22-May-24	31-May-24	27-Jun-24	24
A6211	Install Timber Railing, S5 Sta 143 to 175+50	5D W/WS	10	23-May-24	07-Jun-24	08-Jul-24	19-Jul-24	29
A6219	Install Dense Grade, S5 Sta 143 to 175+50	5D W/WS	15	10-Jun-24	28-Jun-24	22-Jul-24	09-Aug-24	29
A6250	Install Surface Pavement, S5 Sta 143 to 175+50	PAVING	15	05-Sep-24	25-Sep-24	11-Sep-24	01-Oct-24	4
A6254	Install Striping, S5 Sta 143 to 175+50	PAVING	5	26-Sep-24	02-Oct-24	25-Oct-24	31-Oct-24	19
A6255	Install Signage, S5 Sta 143 to 175+50	5D W/WS	10	26-Sep-24	09-Oct-24	24-Oct-24	06-Nov-24	18
C119678-BL00.SC.60.01.6 S6 Old Lancaster Rd to South limit (Station Rd) Sta 101 to 143 = 4200'								
A6039	Install Erosion Controls, S6 Sta 101 to 143	5D W/WS	20	26-Apr-23	23-May-23	19-May-23	19-Jun-23	17
A6048	Remove Track, S6 Sta 101 to 143	5D W/WS	10	24-May-23	08-Jun-23	20-Jun-23	03-Jul-23	17
A6060	Clear Trees, S6 Sta 101 to 143	5D W/WS	10	09-Jun-23	22-Jun-23	05-Jul-23	18-Jul-23	17
A6085	Excavate/Grade, S6 Sta 101 to 143	5D W/WS	15	10-Jul-23	28-Jul-23	19-Jul-23	08-Aug-23	7
A6102	Install Subbase, S6 Sta 101 to 143	5D W/WS	10	31-Jul-23	11-Aug-23	01-Nov-23	14-Nov-23	63
A6123	Install Intermediate Pavement, S6 Sta 101 to 143	PAVING	15	21-Aug-23	12-Sep-23	15-Nov-23	03-May-24	58
A6135	Install Pavers Sta. 101+28 to 102+07 LT, S6	5D W/WS	10	13-Sep-23	26-Sep-23	18-Sep-24	01-Oct-24	178
A6136	Install Stamped Concrete @ (5) Loc Sta.108/108/115/116/142, S6	5D W/WS	10	13-Sep-23	26-Sep-23	18-Sep-24	01-Oct-24	178
A6137	Tree Trimming, S6 Sta 101 to 143	5D W/WS	5	13-Sep-23	19-Sep-23	21-Jun-24	27-Jun-24	118
A6190	Install Loam & Seed/Plantings, S6 Sta 101 to 143	PLANTING	15	18-Apr-24	08-May-24	06-May-24	28-May-24	12
A6212	Install Finishes: (3) Benches, (1) Trash, (2) Bike Racks, (1) Bike Repair, (3) Markers, (6) Trail Piers, S6	5D W/WS	20	23-May-24	21-Jun-24	28-Jun-24	26-Jul-24	24
A6224	Install Timber Railing, S6 Sta 101 to 143	5D W/WS	10	24-Jun-24	08-Jul-24	29-Jul-24	09-Aug-24	24
A6230	Install Dense Grade, S6 Sta 101 to 143	5D W/WS	15	09-Jul-24	29-Jul-24	12-Aug-24	03-Sep-24	24
A6256	Install Surface Pavement, S6 Sta 101 to 143	PAVING	15	26-Sep-24	18-Oct-24	02-Oct-24	24-Oct-24	4
A6257	Install Striping, S6 Sta 101 to 143	PAVING	5	21-Oct-24	25-Oct-24	01-Nov-24	07-Nov-24	9
A6258	Install Signage, S6 Sta 101 to 143	5D W/WS	12	21-Oct-24	05-Nov-24	07-Nov-24	22-Nov-24	13
C119678-BL00.SC.60.01.7 S7 Path connection to Davis Field Parking Lot Sta 1100 to 1107+83 = 783'								
A6049	Install Erosion Controls, S7 Sta 1100 to 1107+83	5D W/WS	5	24-May-23	01-Jun-23	29-Mar-24	04-Apr-24	136
A6061	Remove Track, S7 Sta 1100 to 1107+83	5D W/WS	5	09-Jun-23	15-Jun-23	05-Apr-24	11-Apr-24	131
A6074	Clear Trees, S7 Sta 1100 to 1107+83	5D W/WS	5	23-Jun-23	29-Jun-23	12-Apr-24	19-Apr-24	126
A6079	Install CB & 12" RCP @ Sta. 1102+50, S7	5D W/WS	5	30-Jun-23	07-Jul-23	22-Apr-24	26-Apr-24	126
A6103	Excavate/Grade, S7 Sta 1100 to 1107+83	5D W/WS	10	31-Jul-23	11-Aug-23	29-Apr-24	10-May-24	111
A6117	Install Subbase, S7 Sta 1100 to 1107+83	5D W/WS	5	14-Aug-23	18-Aug-23	13-May-24	17-May-24	111



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone

Sudbury to Concord: Construction of the Bruce Freeman Rail Trail Including Signals & 2 Bridges (Phase 2D)
MassDOT Contract # 119678
A. A. WILL
BASELINE SCHEDULE: 13-Oct-22

Activity ID	Activity Name	Calendar	Orig Dur	Start	Finish	Late Start	Late Finish	Total Float
A6138	Install Intermediate Pavement, S7 Sta 1100 to 1107+83	PAVING	5	13-Sep-23	19-Sep-23	20-May-24	28-May-24	68
A6143	Tree Trimming, S7 Sta 1100 to 1107+83	5D W/WS	5	20-Sep-23	26-Sep-23	12-Aug-24	16-Aug-24	148
A6203	Install Loam & Seed/Plantings, S7 Sta 1100 to 1107+83	PLANTING	5	09-May-24	15-May-24	29-May-24	16-Aug-24	12
A6225	Install Finishes: (1) Trash, (1) Bike Rack, S7 Sta 1100 to 1107+83	5D W/WS	5	24-Jun-24	28-Jun-24	19-Aug-24	23-Aug-24	39
A6231	Install Timber Railing, S7 Sta 1100 to 1107+83	5D W/WS	5	09-Jul-24	15-Jul-24	26-Aug-24	03-Sep-24	34
A6236	Install Dense Grade, S7 Sta 1100 to 1107+83	5D W/WS	5	30-Jul-24	05-Aug-24	04-Sep-24	10-Sep-24	24
A6259	Install Surface Pavement, S7 Sta 1100 to 1107+83	PAVING	5	21-Oct-24	25-Oct-24	25-Oct-24	31-Oct-24	4
A6260	Install Striping, S7 Sta 1100 to 1107+83	PAVING	2	28-Oct-24	29-Oct-24	08-Nov-24	11-Nov-24	9
A6264	Install Signage, S7 Sta 1100 to 1107+83	5D W/WS	5	06-Nov-24	12-Nov-24	25-Nov-24	19-Mar-25	13
C119678-BL00.SC.60.01.8	**S8 Path Connection to Parkinson's Lot Sta 1000+80 to 1003+61 = 281'**							
A6056	Install Erosion Controls, S8 Sta 1000+80 to 1003+61	5D W/WS	3	02-Jun-23	06-Jun-23	24-Jul-24	26-Jul-24	210
A6067	Remove Track, S8 Sta 1000+80 to 1003+61	5D W/WS	3	16-Jun-23	20-Jun-23	29-Jul-24	31-Jul-24	203
A6080	Clear Trees, S8 Sta 1000+80 to 1003+61	5D W/WS	3	30-Jun-23	05-Jul-23	01-Aug-24	05-Aug-24	196
A6118	Excavate/Grade, S8 Sta 1000+80 to 1003+61	5D W/WS	5	14-Aug-23	18-Aug-23	06-Aug-24	12-Aug-24	169
A6124	Install Subbase, S8 Sta 1000+80 to 1003+61	5D W/WS	3	21-Aug-23	23-Aug-23	13-Aug-24	15-Aug-24	169
A6144	Install Intermediate Pavement, S8 Sta 1000+80 to 1003+61	PAVING	3	20-Sep-23	22-Sep-23	16-Aug-24	20-Aug-24	124
A6148	Install Stamped Concrete Sta. 1003+47 to 1003+54, S8	5D W/WS	5	27-Sep-23	03-Oct-23	25-Oct-24	31-Oct-24	193
A6149	Tree Trimming, S8 Sta 1000+80 to 1003+61	5D W/WS	5	27-Sep-23	03-Oct-23	21-Aug-24	27-Aug-24	150
A6208	Install Loam & Seed/Plantings, S8 Sta 1000+80 to 1003+61	PLANTING	5	16-May-24	22-May-24	21-Aug-24	27-Aug-24	14
A6229	Install Finishes: (1) Bench, (1) Trash, (1) Bike Rack, S8 Sta 1000+80 to 1003+61	5D W/WS	5	01-Jul-24	08-Jul-24	28-Aug-24	05-Sep-24	41
A6232	Install Timber Railing, S8 Sta 1000+80 to 1003+61	5D W/WS	3	16-Jul-24	18-Jul-24	06-Sep-24	10-Sep-24	36
A6237	Install Dense Grade, S8 Sta 1000+80 to 1003+61	5D W/WS	3	06-Aug-24	08-Aug-24	11-Sep-24	13-Sep-24	24
A6261	Install Surface Pavement, S8 Sta 1000+80 to 1003+61	PAVING	3	28-Oct-24	30-Oct-24	01-Nov-24	05-Nov-24	4
A6262	Install Striping, S8 Sta 1000+80 to 1003+61	PAVING	1	31-Oct-24	31-Oct-24	12-Nov-24	12-Nov-24	8
A6266	Install Signage, S8 Sta 1000+80 to 1003+61	5D W/WS	4	13-Nov-24	18-Nov-24	20-Mar-25	25-Mar-25	13
C119678-BL00.SC.60.08	**Morse Road Parking Lot**							
A6003	Install Tree Protection, Morse Rd Parking Lot	5D NO WS	5	13-Jan-23	20-Jan-23	15-Aug-24	21-Aug-24	393
A6004	Install Erosion Controls, Morse Rd Parking Lot	5D NO WS	3	23-Jan-23	25-Jan-23	22-Aug-24	26-Aug-24	393
A6005	Clear Trees, Morse Rd Parking Lot	5D NO WS	2	26-Jan-23	27-Jan-23	27-Aug-24	28-Aug-24	393
A6020	Excavate/Grade Lot for Staging Area, Morse Rd Parking Lot	5D W/WS	10	16-Mar-23	29-Mar-23	29-Aug-24	13-Sep-24	289
A6238	Sawcut, Morse Rd Parking Lot	5D W/WS	1	09-Aug-24	09-Aug-24	16-Sep-24	16-Sep-24	24
A6239	Install UG Electrical Conduit/Handholes, Morse Rd Parking Lot	5D W/WS	5	12-Aug-24	16-Aug-24	17-Sep-24	23-Sep-24	24
A6240	Install 1" Waterline, Morse Rd Parking Lot	5D W/WS	3	12-Aug-24	14-Aug-24	19-Sep-24	23-Sep-24	26
A6244	Grade Lot, Morse Rd Parking Lot	5D W/WS	5	19-Aug-24	23-Aug-24	24-Sep-24	30-Sep-24	24
A6245	Install Wheelchair Ramps, Morse Rd Parking Lot	5D W/WS	4	26-Aug-24	29-Aug-24	01-Oct-24	04-Oct-24	24
A6246	Install Final Grade/Subbase, Morse Rd Parking Lot	5D W/WS	5	03-Sep-24	09-Sep-24	07-Oct-24	15-Oct-24	24
A6247	Install Pavers/Boulders, Morse Rd Parking Lot	5D W/WS	20	03-Sep-24	30-Sep-24	07-Oct-24	05-Nov-24	24
A6251	Install Intermediate Pavement, Morse Rd Parking Lot	PAVING	5	10-Sep-24	16-Sep-24	16-Oct-24	22-Oct-24	24
A6252	Install Timber Guardrail/Fencing, Morse Rd Parking Lot	5D W/WS	10	17-Sep-24	30-Sep-24	23-Oct-24	05-Nov-24	24
A6253	Install Light Pole, Morse Rd Parking Lot	5D W/WS	2	17-Sep-24	18-Sep-24	04-Nov-24	05-Nov-24	32
A6263	Install Surface Pavement, Morse Rd Parking Lot	PAVING	5	31-Oct-24	06-Nov-24	06-Nov-24	12-Nov-24	4
A6265	Install Striping, Morse Rd Parking Lot	PAVING	3	07-Nov-24	11-Nov-24	13-Nov-24	15-Nov-24	4
A6267	Install Signage, Morse Rd Parking Lot	5D W/WS	4	19-Nov-24	22-Nov-24	26-Mar-25	31-Mar-25	13



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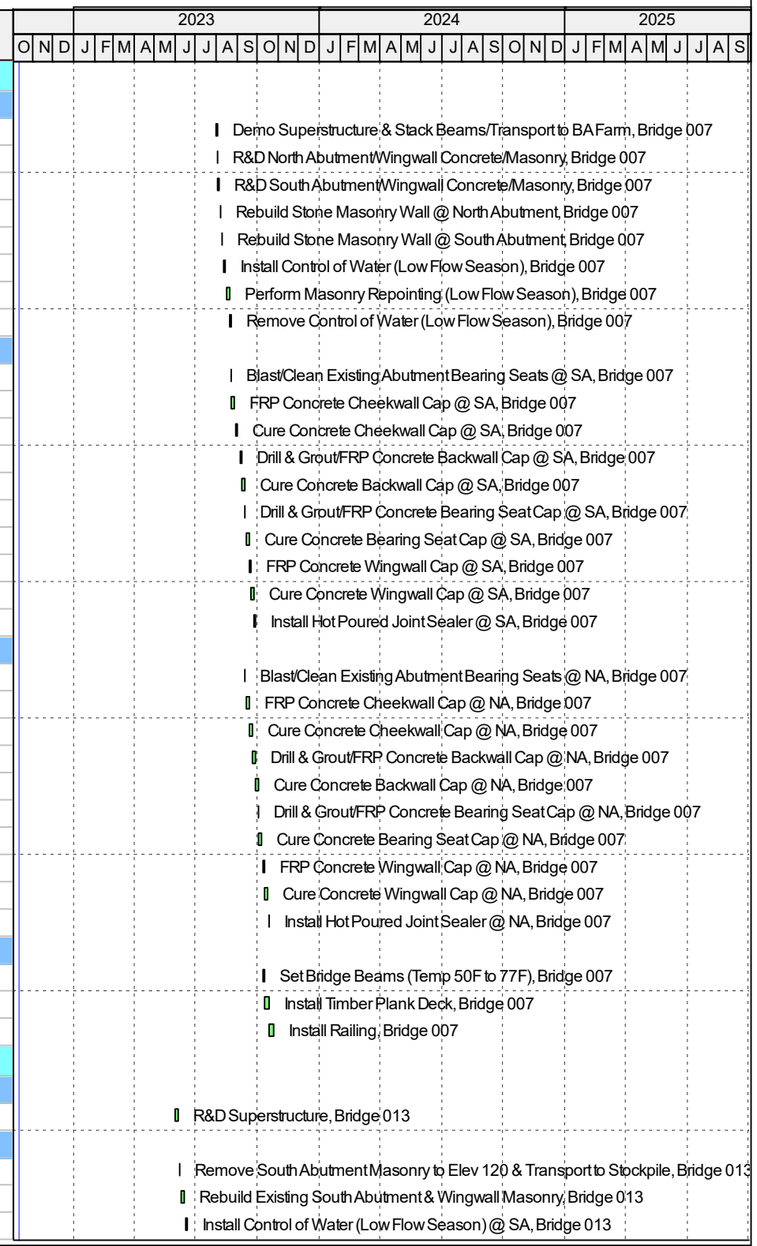
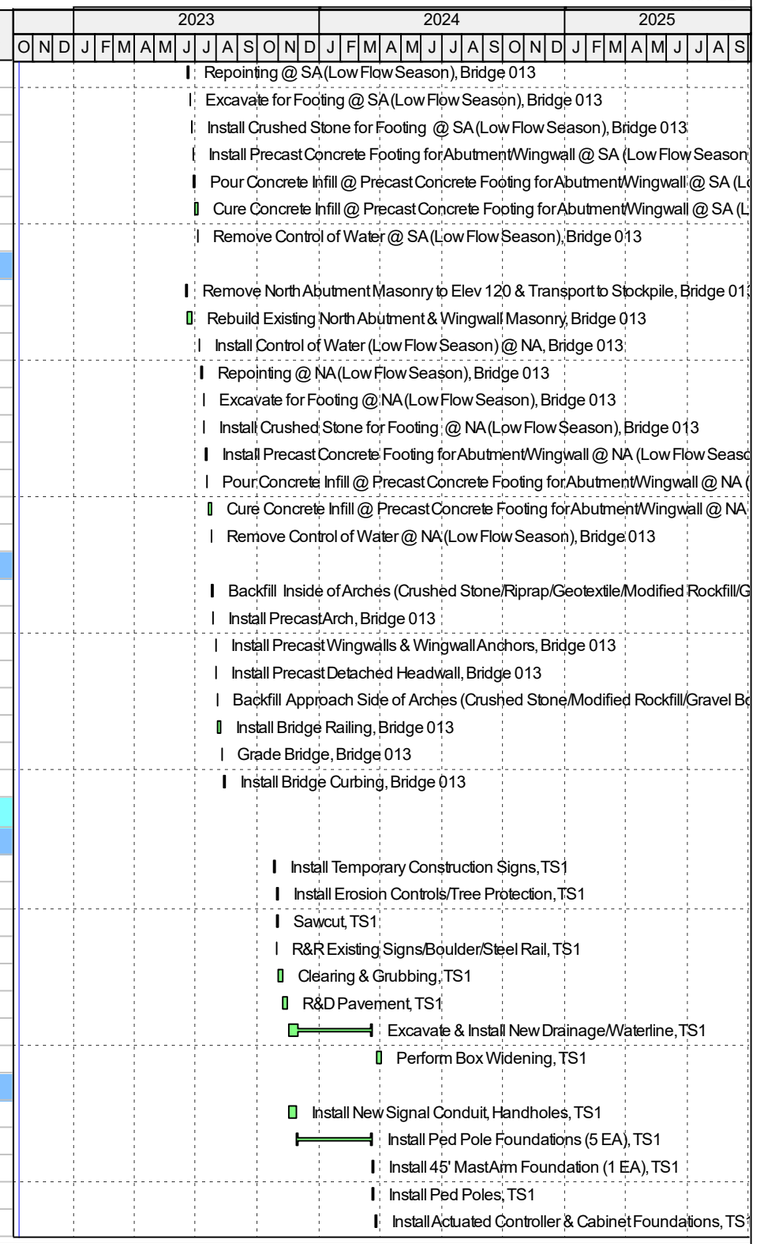
Sudbury to Concord: Construction of the Bruce Freeman Rail Trail Including Signals & 2 Bridges (Phase 2D)
MassDOT Contract # 119678
A. A. WILL
BASELINE SCHEDULE: 13-Oct-22

Activity ID	Activity Name	Calendar	Orig Dur	Start	Finish	Late Start	Late Finish	Total Float
C119678-BL00.SC.60.02 Bridge S-31-007 Over Hop Brook Sta. 126+25 to 126+50								
C119678-BL00.SC.60.02.1 Demo/Substructure Reconstruction								
A6101	Demo Superstructure & Stack Beams/Transport to BA Farm, Bridge 007	5D W/WS	3	31-Jul-23	02-Aug-23	09-Aug-23	11-Aug-23	7
A6107	R&D North Abutment/Wingwall Concrete/Masonry, Bridge 007	5D W/WS	1	03-Aug-23	03-Aug-23	14-Aug-23	14-Aug-23	7
A6108	R&D South Abutment/Wingwall Concrete/Masonry, Bridge 007	5D W/WS	1	04-Aug-23	04-Aug-23	15-Aug-23	15-Aug-23	7
A6109	Rebuild Stone Masonry Wall @ North Abutment, Bridge 007	5D W/WS	2	07-Aug-23	08-Aug-23	16-Aug-23	17-Aug-23	7
A6114	Rebuild Stone Masonry Wall @ South Abutment, Bridge 007	5D W/WS	2	09-Aug-23	10-Aug-23	18-Aug-23	21-Aug-23	7
A6116	Install Control of Water (Low Flow Season), Bridge 007	LOW FLOW	3	11-Aug-23	15-Aug-23	22-Aug-23	24-Aug-23	7
A6119	Perform Masonry Repointing (Low Flow Season), Bridge 007	LOW FLOW	4	16-Aug-23	21-Aug-23	25-Aug-23	30-Aug-23	7
A6125	Remove Control of Water (Low Flow Season), Bridge 007	LOW FLOW	1	22-Aug-23	22-Aug-23	31-Aug-23	31-Aug-23	7
C119678-BL00.SC.60.02.2 South Abutment								
A6126	Blast/Clean Existing Abutment Bearing Seats @ SA, Bridge 007	5D W/WS	1	23-Aug-23	23-Aug-23	16-Oct-23	16-Oct-23	34
A6127	FRP Concrete Cheekwall Cap @ SA, Bridge 007	5D W/WS	3	24-Aug-23	28-Aug-23	17-Oct-23	19-Oct-23	34
A6128	Cure Concrete Cheekwall Cap @ SA, Bridge 007	7D	5	29-Aug-23	02-Sep-23	20-Oct-23	24-Oct-23	52
A6129	Drill & Grout/FRP Concrete Backwall Cap @ SA, Bridge 007	5D W/WS	3	05-Sep-23	07-Sep-23	25-Oct-23	27-Oct-23	34
A6130	Cure Concrete Backwall Cap @ SA, Bridge 007	7D	5	08-Sep-23	12-Sep-23	28-Oct-23	01-Nov-23	50
A6133	Drill & Grout/FRP Concrete Bearing Seat Cap @ SA, Bridge 007	5D W/WS	1	13-Sep-23	13-Sep-23	21-Nov-23	21-Nov-23	47
A6139	Cure Concrete Bearing Seat Cap @ SA, Bridge 007	7D	5	14-Sep-23	18-Sep-23	23-Nov-23	27-Nov-23	70
A6141	FRP Concrete Wingwall Cap @ SA, Bridge 007	5D W/WS	3	19-Sep-23	21-Sep-23	28-Nov-23	30-Nov-23	45
A6145	Cure Concrete Wingwall Cap @ SA, Bridge 007	7D	5	22-Sep-23	26-Sep-23	17-Mar-24	21-Mar-24	177
A6147	Install Hot Poured Joint Sealer @ SA, Bridge 007	5D W/WS	1	27-Sep-23	27-Sep-23	22-Mar-24	22-Mar-24	46
C119678-BL00.SC.60.02.3 North Abutment								
A6134	Blast/Clean Existing Abutment Bearing Seats @ NA, Bridge 007	5D W/WS	1	13-Sep-23	13-Sep-23	02-Nov-23	02-Nov-23	34
A6140	FRP Concrete Cheekwall Cap @ NA, Bridge 007	5D W/WS	3	14-Sep-23	18-Sep-23	03-Nov-23	07-Nov-23	34
A6142	Cure Concrete Cheekwall Cap @ NA, Bridge 007	7D	5	19-Sep-23	23-Sep-23	08-Nov-23	12-Nov-23	50
A6146	Drill & Grout/FRP Concrete Backwall Cap @ NA, Bridge 007	5D W/WS	3	25-Sep-23	27-Sep-23	13-Nov-23	15-Nov-23	33
A6150	Cure Concrete Backwall Cap @ NA, Bridge 007	7D	5	28-Sep-23	02-Oct-23	16-Nov-23	20-Nov-23	49
A6151	Drill & Grout/FRP Concrete Bearing Seat Cap @ NA, Bridge 007	5D W/WS	1	03-Oct-23	03-Oct-23	21-Nov-23	21-Nov-23	33
A6153	Cure Concrete Bearing Seat Cap @ NA, Bridge 007	7D	5	04-Oct-23	08-Oct-23	25-Nov-23	29-Nov-23	52
A6155	FRP Concrete Wingwall Cap @ NA, Bridge 007	5D W/WS	3	10-Oct-23	12-Oct-23	30-Nov-23	19-Mar-24	34
A6159	Cure Concrete Wingwall Cap @ NA, Bridge 007	7D	5	13-Oct-23	17-Oct-23	20-Mar-24	24-Mar-24	159
A6160	Install Hot Poured Joint Sealer @ NA, Bridge 007	5D W/WS	1	18-Oct-23	18-Oct-23	25-Mar-24	25-Mar-24	34
C119678-BL00.SC.60.02.4 Superstructure/Finishes								
A6154	Set Bridge Beams (Temp 50F to 77F), Bridge 007	5D W/WS	2	10-Oct-23	11-Oct-23	30-Nov-23	18-Mar-24	34
A6156	Install Timber Plank Deck, Bridge 007	5D W/WS	5	12-Oct-23	18-Oct-23	19-Mar-24	25-Mar-24	34
A6161	Install Railing, Bridge 007	5D W/WS	4	19-Oct-23	24-Oct-23	26-Mar-24	29-Mar-24	34
C119678-BL00.SC.60.03 Bridge S-31-013 Over Pantry Brook Sta. 264+25 to 264+50								
C119678-BL00.SC.60.03.1 Demolition								
A6053	R&D Superstructure, Bridge 013	5D W/WS	3	02-Jun-23	06-Jun-23	10-Jul-23	12-Jul-23	25
C119678-BL00.SC.60.03.2 South Abutment								
A6057	Remove South Abutment Masonry to Elev 120 & Transport to Stockpile, Bridge 013	5D W/WS	2	07-Jun-23	08-Jun-23	13-Jul-23	14-Jul-23	25
A6058	Rebuild Existing South Abutment & Wingwall Masonry, Bridge 013	5D W/WS	5	09-Jun-23	15-Jun-23	17-Jul-23	21-Jul-23	25
A6065	Install Control of Water (Low Flow Season) @ SA, Bridge 013	LOW FLOW	2	16-Jun-23	19-Jun-23	24-Jul-23	25-Jul-23	25



Activity ID	Activity Name	Calendar	Orig Dur	Start	Finish	Late Start	Late Finish	Total Float
A6068	Repointing @ SA (Low Flow Season), Bridge 013	LOW FLOW	3	20-Jun-23	22-Jun-23	26-Jul-23	28-Jul-23	25
A6070	Excavate for Footing @ SA (Low Flow Season), Bridge 013	LOW FLOW	1	23-Jun-23	23-Jun-23	31-Jul-23	31-Jul-23	25
A6075	Install Crushed Stone for Footing @ SA (Low Flow Season), Bridge 013	LOW FLOW	1	26-Jun-23	26-Jun-23	01-Aug-23	01-Aug-23	25
A6076	Install Precast Concrete Footing for Abutment/Wingwall @ SA (Low Flow Season), Bridge 013	LOW FLOW	2	27-Jun-23	28-Jun-23	02-Aug-23	03-Aug-23	25
A6077	Pour Concrete Infill @ Precast Concrete Footing for Abutment/Wingwall @ SA (Low Flow Season), Bridge	LOW FLOW	1	29-Jun-23	29-Jun-23	04-Aug-23	04-Aug-23	25
A6078	Cure Concrete Infill @ Precast Concrete Footing for Abutment/Wingwall @ SA (Low Flow Season), Bridge	7D	5	30-Jun-23	04-Jul-23	06-Aug-23	10-Aug-23	37
A6081	Remove Control of Water @ SA (Low Flow Season), Bridge 013	LOW FLOW	1	05-Jul-23	05-Jul-23	11-Aug-23	11-Aug-23	27
C119678-BL00.SC.60.03.3 North Abutment								
A6066	Remove North Abutment Masonry to Elev 120 & Transport to Stockpile, Bridge 013	5D W/WS	2	16-Jun-23	19-Jun-23	03-Aug-23	04-Aug-23	33
A6069	Rebuild Existing North Abutment & Wingwall Masonry, Bridge 013	5D W/WS	5	20-Jun-23	26-Jun-23	07-Aug-23	11-Aug-23	33
A6082	Install Control of Water (Low Flow Season) @ NA, Bridge 013	LOW FLOW	2	06-Jul-23	07-Jul-23	14-Aug-23	15-Aug-23	27
A6083	Repointing @ NA (Low Flow Season), Bridge 013	LOW FLOW	3	10-Jul-23	12-Jul-23	16-Aug-23	18-Aug-23	27
A6086	Excavate for Footing @ NA (Low Flow Season), Bridge 013	LOW FLOW	1	13-Jul-23	13-Jul-23	21-Aug-23	21-Aug-23	27
A6087	Install Crushed Stone for Footing @ NA (Low Flow Season), Bridge 013	LOW FLOW	1	14-Jul-23	14-Jul-23	22-Aug-23	22-Aug-23	27
A6088	Install Precast Concrete Footing for Abutment/Wingwall @ NA (Low Flow Season), Bridge 013	LOW FLOW	2	17-Jul-23	18-Jul-23	23-Aug-23	24-Aug-23	27
A6095	Pour Concrete Infill @ Precast Concrete Footing for Abutment/Wingwall @ NA (Low Flow Season), Bridge	LOW FLOW	1	19-Jul-23	19-Jul-23	25-Aug-23	25-Aug-23	27
A6096	Cure Concrete Infill @ Precast Concrete Footing for Abutment/Wingwall @ NA (Low Flow Season), Bridge	7D	5	20-Jul-23	24-Jul-23	26-Aug-23	30-Aug-23	37
A6097	Remove Control of Water @ NA (Low Flow Season), Bridge 013	LOW FLOW	1	25-Jul-23	25-Jul-23	31-Aug-23	31-Aug-23	27
C119678-BL00.SC.60.03.4 Superstructure/Finishes								
A6098	Backfill Inside of Arches (Crushed Stone/Riprap/Geotextile/Modified Rockfill/Gravel Borrow), Bridge 013	5D W/WS	2	26-Jul-23	27-Jul-23	21-Nov-23	27-Nov-23	80
A6099	Install PrecastArch, Bridge 013	5D W/WS	1	28-Jul-23	28-Jul-23	28-Nov-23	28-Nov-23	80
A6100	Install Precast Wingwalls & Wingwall Anchors, Bridge 013	5D W/WS	1	31-Jul-23	31-Jul-23	29-Nov-23	29-Nov-23	80
A6104	Install Precast Detached Headwall, Bridge 013	5D W/WS	1	01-Aug-23	01-Aug-23	30-Nov-23	30-Nov-23	80
A6105	Backfill Approach Side of Arches (Crushed Stone/Modified Rockfill/Gravel Borrow), Bridge 013	5D W/WS	1	02-Aug-23	02-Aug-23	18-Mar-24	18-Mar-24	80
A6106	Install Bridge Railing, Bridge 013	5D W/WS	4	03-Aug-23	08-Aug-23	19-Mar-24	22-Mar-24	80
A6113	Grade Bridge, Bridge 013	5D W/WS	2	09-Aug-23	10-Aug-23	25-Mar-24	26-Mar-24	80
A6115	Install Bridge Curbing, Bridge 013	5D W/WS	3	11-Aug-23	15-Aug-23	27-Mar-24	29-Mar-24	80
C119678-BL00.SC.60.04 Traffic Signal 1: Hudson Rd @ Peckham Rd @ Sta. 175+50								
C119678-BL00.SC.60.04.1 Mobilization								
A6162	Install Temporary Construction Signs, TS1	5D W/WS	3	25-Oct-23	27-Oct-23	01-Apr-24	03-Apr-24	34
A6163	Install Erosion Controls/Tree Protection, TS1	5D W/WS	3	30-Oct-23	01-Nov-23	04-Apr-24	08-Apr-24	34
A6164	Sawcut, TS1	5D W/WS	2	30-Oct-23	31-Oct-23	12-Apr-24	16-Apr-24	40
A6165	R&R Existing Signs/Boulder/Steel Rail, TS1	5D W/WS	1	30-Oct-23	30-Oct-23	21-May-24	21-May-24	66
A6166	Clearing & Grubbing, TS1	5D W/WS	5	02-Nov-23	08-Nov-23	09-Apr-24	16-Apr-24	34
A6169	R&D Pavement, TS1	5D W/WS	5	09-Nov-23	15-Nov-23	17-Apr-24	23-Apr-24	34
A6172	Excavate & Install New Drainage/Waterline, TS1	5D W/WS	10	16-Nov-23	19-Mar-24	01-May-24	14-May-24	39
A6180	Perform Box Widening, TS1	5D W/WS	5	27-Mar-24	02-Apr-24	15-May-24	21-May-24	34
C119678-BL00.SC.60.04.2 Traffic Signal								
A6173	Install New Signal Conduit, Handholes, TS1	5D W/WS	5	16-Nov-23	27-Nov-23	24-Apr-24	30-Apr-24	34
A6174	Install Ped Pole Foundations (5 EA), TS1	5D W/WS	5	28-Nov-23	19-Mar-24	01-May-24	07-May-24	34
A6176	Install 45' MastArm Foundation (1 EA), TS1	5D W/WS	2	20-Mar-24	21-Mar-24	13-May-24	14-May-24	37
A6177	Install Ped Poles, TS1	5D W/WS	3	20-Mar-24	22-Mar-24	08-May-24	10-May-24	34
A6179	Install Actuated Controller & Cabinet Foundations, TS1	5D W/WS	2	25-Mar-24	26-Mar-24	13-May-24	14-May-24	34



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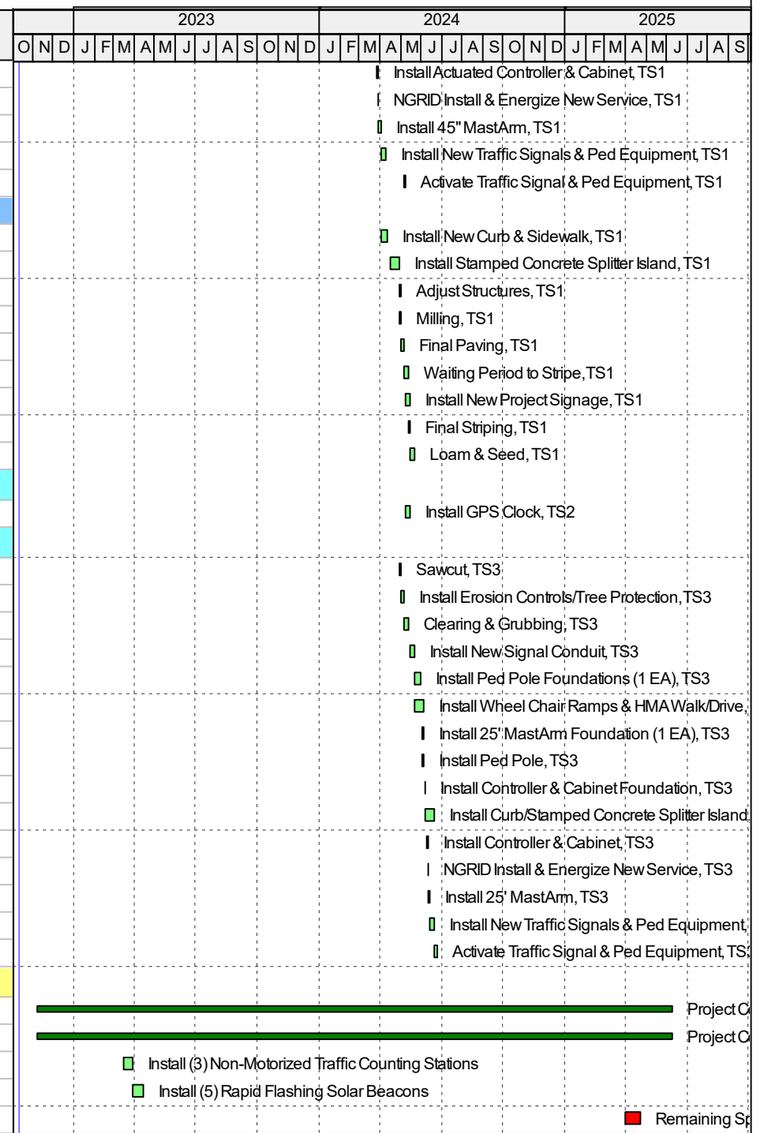
Actual Work
Remaining Work
Critical Remaining Work
Milestone

Sudbury to Concord: Construction of the Bruce Freeman Rail Trail Including Signals & 2 Bridges (Phase 2D)
MassDOT Contract # 119678
A. A. WILL
BASELINE SCHEDULE: 13-Oct-22

TASK filter: All Activities
Data Date:13-Oct-22 and Run Date: 11-Nov-22

Activity ID	Activity Name	Calendar	Orig Dur	Start	Finish	Late Start	Late Finish	Total Float
A6181	Install Actuated Controller & Cabinet, TS1	5D W/WS	2	27-Mar-24	28-Mar-24	16-Jul-24	17-Jul-24	75
A6184	NGRID Install & Energize New Service, TS1	5D W/WS	1	29-Mar-24	29-Mar-24	26-Jul-24	26-Jul-24	81
A6185	Install 45" MastArm, TS1	5D W/WS	2	29-Mar-24	01-Apr-24	18-Jul-24	19-Jul-24	75
A6186	Install New Traffic Signals & Ped Equipment, TS1	5D W/WS	5	02-Apr-24	08-Apr-24	22-Jul-24	26-Jul-24	75
A6199	Activate Traffic Signal & Ped Equipment, TS1	5D W/WS	2	07-May-24	08-May-24	29-Jul-24	30-Jul-24	56
C119678-BL00.SC.60.04.3 Roadway & Sidewalk								
A6187	Install New Curb & Sidewalk, TS1	5D W/WS	8	03-Apr-24	12-Apr-24	22-May-24	04-Jun-24	34
A6188	Install Stamped Concrete Splitter Island, TS1	5D W/WS	10	16-Apr-24	29-Apr-24	05-Jun-24	18-Jun-24	34
A6194	Adjust Structures, TS1	5D W/WS	2	30-Apr-24	01-May-24	22-Jul-24	23-Jul-24	56
A6195	Milling, TS1	5D W/WS	2	30-Apr-24	01-May-24	22-Jul-24	23-Jul-24	56
A6197	Final Paving, TS1	PAVING	3	02-May-24	06-May-24	24-Jul-24	26-Jul-24	56
A6200	Waiting Period to Stripe, TS1	5D W/WS	5	07-May-24	13-May-24	31-Oct-24	06-Nov-24	120
A6202	Install New Project Signage, TS1	5D W/WS	5	09-May-24	15-May-24	04-Nov-24	08-Nov-24	120
A6204	Final Striping, TS1	PAVING	2	14-May-24	15-May-24	07-Nov-24	08-Nov-24	120
A6206	Loam & Seed, TS1	PLANTING	5	16-May-24	22-May-24	11-Nov-24	15-Nov-24	68
C119678-BL00.SC.60.05 Traffic Signal 2: Hudson Rd & Concord Rd @ Sta.								
A6201	Install GPS Clock, TS2	5D W/WS	5	09-May-24	15-May-24	31-Jul-24	06-Aug-24	56
C119678-BL00.SC.60.06 Traffic Signal 3: North Rd @ Sta. 307+50								
A6193	Sawcut, TS3	5D W/WS	2	30-Apr-24	01-May-24	19-Jun-24	20-Jun-24	34
A6196	Install Erosion Controls/Tree Protection, TS3	5D W/WS	3	02-May-24	06-May-24	26-Jul-24	30-Jul-24	58
A6198	Clearing & Grubbing, TS3	5D W/WS	5	07-May-24	13-May-24	31-Jul-24	06-Aug-24	58
A6205	Install New Signal Conduit, TS3	5D W/WS	5	16-May-24	22-May-24	07-Aug-24	13-Aug-24	56
A6209	Install Ped Pole Foundations (1 EA), TS3	5D W/WS	5	23-May-24	31-May-24	14-Aug-24	20-Aug-24	56
A6210	Install Wheel Chair Ramps & HMA Walk/Drive, TS3	5D W/WS	8	23-May-24	05-Jun-24	15-Aug-24	26-Aug-24	57
A6213	Install 25' MastArm Foundation (1 EA), TS3	5D W/WS	2	03-Jun-24	04-Jun-24	28-Aug-24	29-Aug-24	61
A6214	Install Ped Pole, TS3	5D W/WS	3	03-Jun-24	05-Jun-24	21-Aug-24	23-Aug-24	56
A6215	Install Controller & Cabinet Foundation, TS3	5D W/WS	2	06-Jun-24	07-Jun-24	26-Aug-24	27-Aug-24	56
A6216	Install Curb/Stamped Concrete Splitter Island, TS3	5D W/WS	10	06-Jun-24	19-Jun-24	27-Aug-24	11-Sep-24	57
A6217	Install Controller & Cabinet, TS3	5D W/WS	2	10-Jun-24	11-Jun-24	28-Aug-24	29-Aug-24	56
A6220	NGRID Install & Energize New Service, TS3	5D W/WS	1	12-Jun-24	12-Jun-24	11-Sep-24	11-Sep-24	62
A6221	Install 25' MastArm, TS3	5D W/WS	2	12-Jun-24	13-Jun-24	03-Sep-24	04-Sep-24	56
A6222	Install New Traffic Signals & Ped Equipment, TS3	5D W/WS	5	14-Jun-24	20-Jun-24	05-Sep-24	11-Sep-24	56
A6223	Activate Traffic Signal & Ped Equipment, TS3	5D W/WS	2	21-Jun-24	24-Jun-24	12-Sep-24	13-Sep-24	56
C119678-BL00.SC.70 Close Out								
A7000	Project Controls & Maintenance with Winter Shutdown	5D W/WS	420	09-Nov-22	09-Jun-25	10-Nov-22	09-Jun-25	0
A7001	Project Controls & Maintenance without Winter Shutdown	5D NO WS	630	09-Nov-22	09-Jun-25	10-Nov-22	09-Jun-25	0
A7002	Install (3) Non-Motorized Traffic Counting Stations	5D W/WS	10	16-Mar-23	29-Mar-23	18-Jul-23	31-Jul-23	84
A7003	Install (5) Rapid Flashing Solar Beacons	5D W/WS	12	30-Mar-23	14-Apr-23	01-Aug-23	16-Aug-23	84
A7004	Remaining Spring Plantings Project Wide	PLANTING	15	01-Apr-25	22-Apr-25	01-Apr-25	22-Apr-25	0



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone

Sudbury to Concord: Construction of the Bruce Freeman Rail Trail Including Signals & 2 Bridges (Phase 2D)
MassDOT Contract # 119678
A. A. WILL
BASELINE SCHEDULE: 13-Oct-22

TASK filter: All Activities
Data Date:13-Oct-22 and Run Date: 11-Nov-22

Appendix C EPA Approved NOI

Jesse Vaughan

From: no-reply@epacdx.net
Sent: Thursday, December 1, 2022 10:00 AM
Subject: EPA NeT CGP Coverage Status: Active: Bruce Freeman Trail Concord & Sudbury, NPDES ID: MAR1004DF

2022-12-01

Dear NeT User,

Coverage status has changed for a project / site under the CGP.

NPDES ID	Form Type	Coverage Status	Operator	Project/Site Name	EPA Comment
MAR1004DF	NOI	Active	A.A. Will Construction	Bruce Freeman Trail Concord & Sudbury	

Your Notice of Intent (NOI) requesting coverage under EPA's Construction General Permit (CGP) has been accepted and authorization to discharge under the CGP became effective on 12/01/2022 and will expire on 02/16/2027.

Please note that this email does not represent a determination by EPA regarding the validity of the information you provided in your NOI or LEW. Your eligibility for coverage under this permit is based on the validity of the certification you provided. Your electronic signature on the NOI or LEW form certifies that you have read, understood, and are implementing all of the applicable requirements. An important aspect of this certification requires that you have correctly determined whether you are eligible for coverage under this permit.

The CGP requires you to have developed a Stormwater Pollution Prevention Plan (SWPPP) prior to submitting your NOI. The CGP also includes specific requirements for erosion and sediment controls, pollution prevention controls, conducting self-inspections, taking corrective actions, and conducting staff training. You must comply with any state, tribal, or territory-specific requirements in Part 9 (see https://www.epa.gov/npdes/stormwater-discharges-construction-activities#cgp).

A copy of the submission can be found here.

If you have questions about this email or about NeT CGP, please refer to NeT Support or e-mail NPDESereporting@epa.gov for assistance.

This is an automated notification; please do not reply to this email.

NPDES FORM 3510-9		UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON, DC 20460 NOTICE OF INTENT (NOI) FOR THE 2022 NPDES CONSTRUCTION PERMIT	FORM Approved OMB No. 2040-0305

Submission of this Notice of Intent (NOI) constitutes notice that the operator identified in Section III of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section II of this form. Submission of this NOI also constitutes notice that the operator identified in Section III of this form meets the eligibility requirements of Part 1.1 CGP for the project identified in Section IV of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in Part 8 of the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Discharges are not authorized if your NOI is incomplete or inaccurate or if you were never eligible for permit coverage. Refer to the instructions at the end of this form.

Permit Information

NPDES ID: MAR1004DF

State/Territory to which your project/site is discharging: MA

Is your project/site located on federally recognized Indian Country lands? No

Are you requesting coverage under this NOI as a *"Federal Operator"* or a *"Federal Facility"* as defined in Appendix A (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-a-definitions.pdf)? No

Have stormwater discharges from your current construction site been covered previously under an NPDES permit? No

Will you use polymers, flocculants, or other treatment chemicals at your construction site? No

Has a Stormwater Pollution Prevention Plan (SWPPP) been prepared in advance of filling this NOI, as required? Yes

Are you able to demonstrate that you meet one of the criteria listed in Appendix D (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-d-endangered-species-protection.pdf) with respect to protection of threatened or endangered species listed under the Endangered Species Act (ESA) and federally designated critical habitat?

Yes

Have you completed the screening process in Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf) relating to the protection of historic properties? Yes

Indicating "Yes" below, I confirm that I understand that CGP only authorized the allowable stormwater discharges in Part 1.2.1 and the allowable non-stormwater discharges listed in Part 1.2.2. Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to EPA, state or local authorities after issuance of this permit via any means, Including the Notice of Intent (NOI) to be covered by the permit, the Stormwater Pollution Prevention Plan (SWPPP), during an Inspection, etc. If any discharges requiring NPDES permit coverage other than the allowable stormwater and non-stormwater discharges listed in Parts 1.2.1 and 1.2.2 will be discharged, they must be covered under another NPDES permit.

Yes

Operator Information

Operator Information

Operator Name: A.A. Will Construction

Operator Mailing Address:

Address Line 1: 145 Island Street

Address Line 2:

City: Stoughton

ZIP/Postal Code: 02072

State: MA

County or Similar Division: Norfolk

Operator Point of Contact Information

First Name Middle Initial Last Name: Mike Brooks

Title: Project Engineer

Phone: 781-341-4800

Ext.:

Email: mbrooks@aawill.com

NOI Preparer Information

☑ **This NOI is being prepared by someone other than the certifier.**

First Name Middle Initial Last Name: Jesse Vaughan

Organization: TERRA Environmental, LLC

Phone: (774) 293-0852

Ext.:

Email: jvaughan@terra-env.com

Project/Site Information

Project/Site Name: Bruce Freeman Trail Concord & Sudbury

Project/Site Address

Address Line 1: Morse Road

Address Line 2:

City: Sudbury

ZIP/Postal Code: 01776

State: MA

County or Similar Division: Middlesex

Latitude/Longitude: 42.393325°N, 71.41128°W

Latitude/Longitude Data Source: Map

Horizontal Reference Datum: WGS 84

Project Start Date: 11/30/2022

Project End Date: 12/01/2024

Estimated Area to be Disturbed: 6.75

Types of Construction Sites:

- Multi-Use Path - Rail Trail

Will there be demolition of any structure built or renovated before January 1, 1980? No

Will you be discharging dewatering water from your site? No

Was the pre-development land use used for agriculture? No

Are there other operators that are covered under this permit for the same project site? No

Have earth-disturbing activities commenced on your project/site? No

Is your project/site located on federally recognized Indian Country lands? No

Is your project/site located on a property of religious or cultural significance to an Indian tribe? No

Discharge Information

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? No

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? Yes

Are any of the waters of the U.S. to which you discharge designated by the state or tribal authority under its antidegradation policy as a Tier 2 (or Tier 2.5) water (water quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water) or as a Tier 3 water (Outstanding National Resource Water)? See Resources, Tools and Templates (https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates)

No

001: Hop Brook Hop Brook

Latitude/Longitude: 42.384268°N, 71.426083°W

Tier Designation: N/A

Is this receiving water impaired (on the CWA 303(d) list)? Yes

Impaired Pollutants:

- Algae, presence
- Turbidity
- E. coli
- Benthic macroinvert. community
- Dissolved oxygen
- Phosphorus
- Nutrient/Eutrophication

Has a TMDL been completed for this receiving waterbody? No

002: Pantry Brook Pantry Brook

Latitude/Longitude: 42.40646°N, 71.407959°W

Tier Designation: N/A

Is this receiving water impaired (on the CWA 303(d) list)? Yes

Impaired Pollutants:

- Coliform, fecal general

Has a TMDL been completed for this receiving waterbody? No

Stormwater Pollution Prevention Plan (SWPPP)

Will all required personnel, including those conducting inspections at your site, meet the training requirements in Part 6 of this permit? Yes

First Name Middle Initial Last Name: Jesse Vaughan

Title: Project Manager

Phone: 774-293-0852 **Ext.:**

Email: jvaughan@terra-env.com

Endangered Species Protection Worksheet: Criterion E

Determine ESA Eligibility Criterion

Are your discharges and discharge-related activities already addressed in another operator's valid certification of eligibility for your "action area" under the current 2022 CGP? No

Has consultation between you, a Federal Agency, and the USFWS and/or the NMFS under section 7 of the Endangered Species Act (ESA) concluded? Yes

The result of the consultation was:

Option ii. Written concurrence (e.g., letter of concurrence) from the applicable Service(s) with a determination that your site's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. The concurrence letter must have included the effects of your site's discharges and discharge-related activities on all the ESA-listed species and/or designated critical habitat on your species list(s) acquired from USFWS and/or NMFS as part of this worksheet.

The consultation does not warrant reinitiation under 50 CFR §402.16; or, if reinitiation of consultation is required (e.g., due to a new species listing, critical habitat designation, or new information), the federal action agency has reinitiated the consultation and the result of the consultation is consistent with the statements above. Include any reinitiation documentation from the Services or consulting federal agency with your NOI.

True

You are eligible under **Criterion E**.

Identify the federal action agency or agencies involved (i.e. the federal agencies seeking coverage):

USFWS

Identify the Service(s) field or regional offices providing the consultation:

FWHWA, MassWildlife

Identify any tracking numbers associated with the consultation (e.g., IPaC number, ECO number):

NHESP No. 07-23727, EPA No. 16482

Provide the date the consultation was completed: 2021-09-27

Attach correspondence with USFWS and/or NMFS documenting the Biological Opinion, conference opinion (IPaC or ECO tracking number) or concurrence.

Name	Uploaded Date	Size
App X_Wildlife Habitat Evaluation from Army Corps Permit.pdf (attachment/1602632)	11/10/2022	13.97 MB
App X_MassDOT Specs.pdf (attachment/1602633)	11/10/2022	174.17 KB
App X_MassDOT Specs.pdf (attachment/1602634)	11/10/2022	174.17 KB
App X_NLEB from Army Corps Permit.pdf (attachment/1602631)	11/10/2022	13.32 MB
App X_Consultation with Mass DFW from Army Corps Permit.pdf (attachment/1602630)	11/10/2022	1.52 MB

Historic Preservation

Are you installing any stormwater controls as described in Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf) that require subsurface earth disturbances? (Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf), Step 1)

Yes

Have prior surveys or evaluations conducted on the site already determined historic properties do not exist, or that prior disturbances have precluded the existence of historic properties? (Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf), Step 2):

No

Have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties? (Appendix E (https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-e-historic-properties.pdf), Step 3)

Yes

Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Signing an electronic document on behalf of another person is subject to criminal, civil, administrative, or other lawful action.

Certified By: Mike Brooks

Certifier Title: Engineer

Certifier Email: mbrooks@aawill.com

Certified On: 11/17/2022 9:36 AM ET

Appendix D Endangered Species Act

CONTRACTOR/SUBCONTRACTOR CERTIFICATION – CONTRACT COMPLIANCE (Revision 03-23-10)

Pursuant to 23 C.F.R. § 633.101 *et seq.*, the Federal Highway Administration requires each contractor to "insert in each subcontract, except as excluded by law or regulation, the required contract provisions contained in Form FHWA–1273 and further requires their inclusion in any lower tier subcontract that may in turn be made. The required contract provisions of Form FHWA–1273 shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the requirements contained in the provisions of Form FHWA–1273." The prime contractor shall therefore comply with the reporting and certification requirements provided in MassDOT's CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form (DOT-DIST-192) certifying compliance with 23 C.F.R. § 633.101 for each subcontract agreement entered into by the contractor. The contractor shall provide a fully executed original copy of said CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form to MassDOT upon execution of any subcontract agreement. Failure to comply with the reporting and certification requirement of the CONTRACTOR/SUBCONTRACTOR CERTIFICATION Form may result in action against the prequalification status of the prime contractor with MassDOT.

NORTHERN LONG-EARED BAT PROTECTION

Per the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) webpage, the project area exists within the range of the northern long-eared bat, a species designated as Threatened with a Final 4(d) Rule under the Endangered Species Act (ESA; https://www.fws.gov/midwest/endangered/mammals/nleb/). The following requirements and considerations exist to protect the bat and its habitat and serves as a notice of potential changes to the regulatory framework for the northern long-eared during the duration of the project.

On July 7-9, 2020, Stantec Consulting, on behalf of MassDOT Highway Division Environmental Services, conducted a northern long-eared bat summer presence/absence survey using acoustic detection methods, in accordance with the 2020 survey guidelines. The survey did not detect northern long-eared bat, and as stated within the survey guidelines, the survey is valid for a minimum of five years. Due to the negative survey results, the project is eligible for a May Affect, Not Likely to Adversely Affect (NLAA) determination, without Avoidance and Minimizations Measures, in accordance with the Federal Highway Administration, Federal Railroad Administration, and Federal Transit Administration – Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat (https://www.fws.gov/Midwest/Endangered/section7/fhwa/index.html).

On 9/27/2021, on behalf of FHWA, the lead federal agency for Section 7 consultation, MassDOT submitted a FHWA, FRA, FTA Programmatic Consultation for Transportation Projects affecting NLEB or Indiana Bat to the USFWS through IPaC and generated a NLAA documentation letter (see Document USFWS NLAA). Therefore, the project has completed Section 7 consultation through the Endangered Species Act, and no AMMs apply to the project. Due to the minimum 5-year validity of the negative presence/absence survey, it is recommended that the contractor conduct all activities that could result in stressors to the bats such tree removal/trimming, bridge and/or structure removal/maintenance, lighting, or use of percussives, within 5 years of July 7, 2020.

Strysky, Alexander (EEA)

From: Paulson, David (FWE)
Sent: Tuesday, December 7, 2021 8:06 AM
To: Strysky, Alexander (EEA)
Cc: Cheeseman, Melany (FWE)
Subject: Bruce Freeman Rail Trail ENF (16482/07-23727)

December 7, 2021

Kathleen A. Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
Attention: Alex Strysky, MEPA Office
100 Cambridge St.
Boston, Massachusetts 02114

Project Name:	*Bruce Freeman Rail Trail*
Proponent:	*MassDOT and Town of Sudbury*
Location:	*Sudbury*
Document Reviewed:	*Environmental Notification Form*
EEA No.:	16482
NHESP No.:	07-23727

Dear Secretary Theoharides:

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife (the Division) has reviewed the Environmental Notification Form for the proposed Bruce Freeman Rail Trail Project and would like to offer the following comments regarding state-listed rare species and their habitats.

Based on a review of the plan that was provided and the information that is currently contained in our database, the Division has determined that this project, as currently proposed, occurs ***near but not within*** Estimated Habitat of Rare Wildlife or Priority Habitat as indicated in the Massachusetts Natural Heritage Atlas (15th Edition).

The project is not required to be reviewed for compliance with the rare wildlife species section of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.37, 10.59 & 10.58(4)(b)) or the MA Endangered Species Act Regulations (321 CMR 10.18). Any additional work beyond that shown on the submitted plan may require a filing with the Division.

We appreciate the opportunity to comment on this project. If you have any questions about this letter, please contact David Paulson, Senior Endangered Species Review Biologist, at (508) 389-6366 or david.paulson@state.ma.us.

David Paulson
Senior Endangered Species Review Biologist
Massachusetts Division of Fisheries & Wildlife
1 Rabbit Hill Road, Westborough, MA 01581
Temporary Phone: (845)-262-0481 | e: david.paulson@state.ma.us
mass.gov/masswildlife | facebook.com/masswildlife

FUSS & O'NEILL

Attachment G

Wildlife Habitat Evaluation

General Wildlife Habitat Assessment Report

Bruce Freeman Rail Trail
Sudbury, Massachusetts

Wildlife Habitat Assessment Relative to the 25% Design Submittal dated November 2016

April 8, 2020

Prepared for:

Massachusetts Department of Transportation

Prepared by:

Stantec Consulting Services Inc.

Table of Contents

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1.0 INTRODUCTION

On behalf of the Massachusetts Department of Transportation (MassDOT), Stantec Consulting Services Inc. (Stantec) performed a general wildlife habitat assessment for the proposed Bruce Freeman Rail Trial (BFRT; Project) located in Sudbury, Massachusetts, between the driveway to Chiswick Park off Union Avenue north to the Concord town line. The approximately 4.6-mile-long trail is proposed along the former Lowell Secondary Track of the Old Colony Rail Road that operated between Lowell and Framingham, Massachusetts (Figure 1). The right of way (ROW) is presently owned by MassDOT. In light of recent efforts in neighboring towns to rehabilitate the former railroad ROW as a rail trail, the Town of Sudbury (Town) is considering rehabilitation of the ROW in Sudbury to interconnect with trails in adjacent towns (Fay, Spofford, and Thorndike 2006).

The wildlife habitat assessment described herein considered the proposed impacts per 25% Design Submittal dated November 16, 2017, to wetland resource areas subject to the Massachusetts Wetlands Protection Act regulations (310 CMR; WPA) and relative to the guidance of the 2006 *Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands* (Guidance)[1] developed by the Massachusetts Department of Environmental Protection (MassDEP). Stantec Certified Wildlife Biologists (CWB), Daniel Nein and Rodney Kelshaw, performed the wildlife habitat assessment following review and approval of professional qualifications by the Sudbury Conservation Commission.

The assessment included a desktop review of publicly available natural resource data, including Massachusetts Geographic Information Systems (MassGIS), prior to the field survey and a wildlife habitat field assessment conducted October 1–2, 2018. MassDOT Environmental Services staff participated in the field assessment on October 1, 2018.

2.0 METHODOLOGY

Methodology is described below for the data review and field survey associated with the general wildlife habitat assessment at the Project.

2.1 EXISTING DATA REVIEW

Stantec reviewed publicly available natural resource data from MassGIS to evaluate the potential presence or absence of resources and to identify specific areas of potential unique ecological value to target during the field assessment. The MassGIS data review included federal and state wetlands and waterways, open space, aerial photography, Areas of Critical Environmental Concern, Federal Emergency Management Agency (FEMA) flood zones, Coldwater Fisheries Resources, Massachusetts Natural Heritage and Endangered Species data, University of Massachusetts (UMass), and surface and wellhead drinking water supplies. The UMass Conservation Assessment and Prioritization System (CAPS) data for the Town was also reviewed. This wildlife habitat assessment also considered the results

[1] MassDEP. 2006 *Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands* is available at: http://umasscaps.org/pdf/wldhab.pdf.

of the previous wildlife habitat assessment performed by Call of the Wild Consulting in 2009 (Call of the Wild 2009) and vernal pool surveys performed by Stantec and other consultants between 2015 and 2018 (Stantec 2018), the results of which are summarized herein.

2.1.1 25% Design Submittal and Preliminary Resource Area Impacts

The existing data review also considered the 25% Design Submittal prepared by Vanasse Hangen Brustlin, Inc. (VHB) dated November 17, 2016 (Appendix A), and the associated wetland resource area impact tables for floodplain, Bordering Vegetated Wetland (BVW), and Bank dated September 25, 2017 (Appendix B).

2.2 FIELD ASSESSMENT

Following the completion of the existing data review, Stantec CWBs performed the field assessment along the full length of the proposed BFRT in Sudbury to evaluate general wildlife habitat and potential for Project adverse effect relative to the Guidance. The Guidance was referenced to determine each wetland resource area to assess, followed by a determination of the impact being above or below the "significance" threshold to identify the appropriate field data form (i.e., Guidance's Appendix A or B). The results of field form for each wetland resource area were used to assess whether or not the Project will adversely affect wildlife habitat.

Based on the preliminary wetland resource area impact calculations prepared by VHB (Appendix B) and our interpretation of the Guidance, Appendix A of the Guidance was used as the field data form when evaluating wetland resource areas where impact was proposed based on the 25% Design Submittal. Appendix A provides a simplified evaluation of small-scale alterations to ensure protection for certain "important habitat features" and identify projects that warrant detailed wildlife habitat evaluations (i.e., Appendix B of the Guidance). Appendix A also was deemed applicable based on the localized nature of proposed impacts based on the 25% Design Submittal. The following is a summary of the proposed wetland resource area impacts that triggered Appendix A of the Guidance.

- The Project proposes 4,681 square feet (sf; 3,670 sf temporary/1,011 sf permanent) of impact to BVW. Appendix A applies when impacts are below 5,000 sf to BVW.
- The Project proposes 1,752 linear ft (lf; 1705 lf temporary/47 lf permanent) of impact to Bank. Appendix A applies when impacts are above 50 lf to Bank.
- The Project proposes to fill approximately 3 cubic yards and cut approximately 73 cubic yards of floodplain/Bordering Land Subject to Flooding. The proposed impacts do not trigger Appendix A, but localized Bank habitat can be important to wildlife, so the wildlife habitat assessment evaluated where impact is proposed to this resource.
- Impacts to Previously Developed Riverfront Areas does not require a wildlife habitat assessment per the Guidance; however, Riverfront can be important to wildlife, so the wildlife habitat assessment considered these areas associated with Hop Brook, the unnamed tributary to Hop Brook, and Pantry Brook.

Stantec assessed the ROW for the following important habitat features outlined in Appendix A of the Guidance:

- Habitat for state-listed species
- Sphagnum hummocks and pools suitable as nesting habitat for four-toed salamanders
- Trees with large cavities (>18" diameter at entrance)
- Existing beaver, mink, or otter dens
- Areas within 100 feet of existing beaver, mink or otter dens
- Existing nest trees for birds that traditionally reuse nests (bald eagle, osprey, great blue heron)
- Land containing freshwater mussel beds
- Wetland and waterbodies know to contain open water in winter that may serve as waterfowl winter habitat
- Turtle nesting areas
- Vertical sandy banks (bank swallows, rough-winged swallows or kingfishers)

In addition to the above habitat features, the Guidance identifies the following habitat characteristics to evaluate when not commonly encountered in the surrounding area:

- stream bed riffle zones,
- springs,
- gravel stream bottoms (trout and salmon nesting substrate,
- plunge pools (deep holes) in rivers or streams, and;
- medium to large, flat rock substrates in streams.

The activities identified in Appendix A of the Guidance, if proposed within resources areas, that would trigger a detailed wildlife habitat evaluation include:

- Activities located in mapped "Habitat of Potential Regional or Statewide Importance"
- Activities affecting certified or documented vernal pool habitat, including habitat within 100 feet of a certified or documented vernal pool when within another jurisdictional 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 sf occurring in source areas other than Bordering Vegetated Wetland
- Activities affecting the sole connecter 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, and
- Dredging (>5,000 sf)

The evaluation not only considered Appendix A of the Guidance but additional evidence of wildlife use and potential wildlife habitat not identified on Appendix A and general design recommendations that would avoid, minimize, and mitigate impacts, where deemed applicable, to general wildlife habitat interests protected under the WPA.

3.0 RESULTS

The results of the existing data review and field assessment at the Project are presented below.

3.1 EXISTING DATA REVIEW

The BFRT is proposed along an existing ROW in a suburb of Greater Boston where adjacent primary land uses include residential, commercial / industrial, and open space available for conservation and recreation. Several of these larger open space parcels are owned by the Town and occur near the northern extent of the Project. Commercial / industrial uses primarily occur in the southern extent of the ROW, located south of Codjer Lane and near the Hudson Road (Route 27) and North Road (Route 117) road crossings. The ROW crosses several perennial or intermittent waterways, including Hop Brook and Pantry Brook. We understand the determination of whether a stream is perennial or not may be ongoing and is being performed by others. Wetland areas are present in lower lying areas along the ROW, some of which are associated with riparian areas.

Table 1 below summarizes the natural resource desktop data review and identifies resources within, or immediately adjacent to, the ROW. It is noteworthy that unique ecological communities and high value wildlife habitat requiring regulatory review are not present within or proximal to the Project; these include:

- Critical Habitat for federally listed species,
- Priority or Estimated Habitat for state-listed species or BioMap2 Critical Natural Landscape, or
- Area of Critical Environmental Concern.

Table 1. Existing Natural Resource Data Review, Bruce Freeman Rail Trail, Sudbury, Massachusetts

Resource Type Within or Immediately Adjacent* to Project	Yes	No
NHESP BioMap2 Core Habitat Core Habitat 1920 (mapped for Species of Conservation Concern)	X	
NHESP Critical Natural Landscape		X
NHESP Priority/Estimated Habitat for state listed species		X
NHESP Potential Vernal Pool (8 PVPs) PVPs 24213, 24206, 24192, 24191, 24159, 24158, 24157, 24155	X	
NHESP Certified Vernal Pool CVP 1428 between Route 27 & Morse Road CVP 2504 between Route 27 & Old Lancaster Road	X	
NHESP Natural Community		X
Area of Critical Environmental Concern		X
Critical Habitat for federally listed species		X
UMass CAPS Habitat of Potential Regional or Statewide Significance	X	
MassWildlife Coldwater Fisheries Resource Hop Brook Unnamed Tributary to Hop Brook	X	
Protected Open Space	X	
MassDEP wetlands	X	
Bicycle Trails	X	
Surface Water Protection Area (Zone A, B, or C)		X
Zone II Wellhead Protection Area	X	
Interim Wellhead Protection Area		X
FEMA National Flood Hazard Area	X	

Notes:
Data is derived from MassGIS with the exception of CAPS data from UMass and Critical Habitat data from USFWS.
* For the purposes of the data review, immediately adjacent is considered as present within 500 feet of the Project ROW.

BioMap2 Core Habitat[2] (for Species of Conservation Concern) as mapped by the NHESP occurs between Hudson Road (Route 27) and Morse Road (Figure 2a). The Project is not mapped as BioMap2 Critical Natural Landscape, which can overlap with BioMap2 Core Habitat. BioMap2 is intended as a strategic conservation planning tool designed by the by the Massachusetts Department of Fish and Game and Massachusetts Nature Conservancy in 2010 to guide strategic biodiversity conservation to focus land protection and stewardship on areas most critical for ensuring long-term persistence of rare and native species and their habitats, exemplary natural communities, and a diversity of ecosystems and includes

[2] BioMap2 Core Habitat consists of 1,242,000 acres that are critical for the long-term persistence of rare species and other Species of Conservation Concern, as well as a wide diversity of natural communities and intact ecosystems across the Commonwealth. It includes habitats of rare, vulnerable or uncommon species; Priority Natural Communities; high quality wetland, vernal pool, aquatic, and coastal habitats; and intact forest ecosystems.

the habitats and species of conservation concern identified in the State Wildlife Action Plan. When the NHESP updated Priority Habitat of Rare Species and Estimated Habitat of Rare Wildlife mapping in 2017 for the 14th Edition of the Natural Heritage Atlas, which are regulatory maps used for review under Massachusetts Endangered Species Act (MESA and WPA, respectively), the Project was not mapped within or proximal to either habitat. It is possible that the BioMap2 Core Habitat from 2010 overlapping the Project was due to the inclusion of NHESP Priority Habitat mapping that predated the 14th Edition of the Natural Heritage Atlas.

Two generally small areas, which are adjacent to but not within the Project, have been modeled by the UMass Conservation and Assessment Prioritization System (CAPS) [3] and are mapped as Habitat of Potential Regional or Statewide Importance[4]. The first is the existing CVP noted above and surrounding forest immediately west of the ROW between Hudson Road and Morse Road, and second is small open water wetland/PVP and shoreline area immediately west of the ROW near the Sudbury-Concord town line (Figure 2a). When areas modeled by CAPS occur within jurisdiction of the WPA, they are subject to the Guidance.

Hop Brook and an unnamed tributary to Hop Brook are designated as Coldwater Fisheries Resources by Massachusetts Division of Fisheries and Wildlife (MassWildlife) (Figure 2b). Wellhead Protection Areas, Zone IIs, occur at the northern and southern extents of the ROW (Figure 2b). The nearest Surface Water Protection Areas associated with Cambridge Reservoir and surrounding waterbodies of the Charles River Watershed are located in the adjacent towns of Lincoln, Weston, and Waltham. FEMA Floodzones can be generally associated with low-lying areas at waterway crossings and wetlands.

There are two National Wildlife Refuges (NWR) (2,480 acres), one state Wildlife Management Area (WMA, 411 acres), two State Forests (~1,630 acres), one municipal state forest (289 acres) and multiple other open space parcels located within 5 miles of the Project. The boundaries of the Pantry Brook State Park WMA and Great Meadows NWR are located approximately 1,100 feet and 2,100 feet east of the ROW, respectively (Figure 2c). The boundary of the Marlborough-Sudbury State Forest, Callahan State Forest, Memorial Forest, and Assabet River NWR are located approximately 2 miles west or southwest of the ROW. Non-federal or state protected open space within a mile of the ROW includes Mineway Brook Corridor, Brues Woods, Gray Reservation, and Emmons Conservation Restriction (Figure 2c). Using data publicly available through MassGIS, greater than 30% and more than 25,000 acres of the land area within a 5-mile buffer of the ROW is currently protected open space.

Mapped vernal pool habitat (Potential or Certified Vernal Pools, PVP and CVP, respectively) are present in low density and scattered along and generally proximal to the ROW. At a landscape scale, vernal pools are more common in other parts of Sudbury and nearby towns. Several PVPs are generally present in the northern extent of the ROW and two CVPs have been identified in the southern extent of the ROW (Figure 2a). Under WPA, vernal pool habitat protection includes the vernal pool and the 100-foot zone around the vernal pool when located within a wetland resource area.

[3] CAPS is an ecosystem-based (coarse-filter) approach for assessing the ecological integrity of lands and waters and subsequently identifying and prioritizing land for habitat and biodiversity conservation.
[4] Areas representing the 40% of the landscape with the highest potential wildlife habitat value as measured by CAPS, and applicable to the MassDEP Guidance when within the jurisdiction of WPA.

The ROW is mapped as a Bicycle Trail, which is a MassGIS data layer representing trails where bicycles are a permitted use and corridors with conversion potential. The mapping in Sudbury connects with the Bicycle Trail mapping in adjacent towns of Concord and Framingham. The Massachusetts Department of Conservation and Recreation created this data layer for the purpose of regional planning and mapping.

Call of the Wild Consulting performed a wildlife habitat assessment between 2007 and 2008 in response to the Town's request for a comprehensive four-season wildlife habitat assessment (Call of the Wild 2009). Wildlife habitat assessment results, evidence of species use, and recommendations were provided in 2009.

3.2 FIELD ASSESSMENT RESULTS

A two-day field survey was conducted on October 1–2, 2018 to evaluate general wildlife habitat conditions, wildlife use, and direct observations of wildlife species within and near delineated wetland resource areas within the ROW that may be adversely affected by the Project. MassDOT Environmental Services staff participated in the field assessment on October 1, 2018. Stantec's wildlife habitat assessment was subsequent to the wetland delineation conducted by VHB in 2015-2016 that supported development of the 25% Project Design Submittal. This evaluation is based on the 25% Project Design Submittal and proposed impacts at this early stage should continue to be evaluated as the Project design advances in an effort to further avoid and minimize the possibility of adverse effect to not only general wildlife habitat, but the other interests protected under the WPA.

As noted in Section 3.1, the ROW traverses a suburban setting with adjacent areas of protected open space, past/current agricultural use, and commercial/industrial businesses. Representative and dominant ecological communities which were observed adjacent to the ROW included variants of the Mixed Oak Forest/Woodland, White Pine-Oak Forest, and Red Maple Swamp as described in the *Classification of Natural Communities of Massachusetts* (Swain 2016). These communities are widespread and considered common and secure in Massachusetts. The encroachment of commercial and residential land uses within the ROW has occurred over time. The ROW is approximately 65 feet wide for most of its length and is predominantly a wooded corridor passing through multiple wetland areas, including vegetated wetlands, perennial/intermittent streams, and associated floodplain. Wetland areas are previously disturbed or presumed to be an artifact or, at a minimum, influenced hydrologically by the original ROW construction. The vegetated wetlands where temporary or permanent impacts are proposed generally occur at the toe of slope or near the edge of the rail bed. A further description of the wetland resource areas can be found in the VHB wetland report.

Within the ROW, the existing railbed (i.e., the earthen area containing the tracks and ties), is of variable width as a result of adjacent cut and fill slopes among other variables. The track, wooden ties, and ballast are visible along the ground surface over much of the ROW. A buildup of a shallow duff and/or soil layer over areas of ballast has occurred over time, allowing the colonization of some rooted native species; however, the dominant species are predominately invasive plant species within the ROW. It can be inferred that the initial construction of the rail bed involved the use of off-site and on-site fill material, which may have created depressions or lower lying areas and additionally caused soil compaction.

Portions of the ROW less frequented by pedestrian foot traffic in the northern section are heavily overgrown with dense shrubbery and vines. Overall, invasive species are common throughout, including: glossy buckthorn (*Frangula alnus*), Oriental bittersweet (*Celastrus orbiculatus*), and honeysuckle (*Lonicera spp.*), with occasional occurrences of winged euonymus (*Euonymus alatus*) and Japanese barberry (*Berberis thunbergii*), and with common reed (*Phragmites australis*) frequent in wetland resource areas.

3.2.1 Wildlife Observations

The mosaic of the wooded corridor interfacing with seasonal and permanent wetlands and small waterways represents habitat for a variety of wildlife species and their uses (e.g., foraging, breeding, shelter, nesting), including representative and regionally common species expected for a suburban or urban area. However, less common or rare species are also documented from nearby state WMAs and NWFs and possibly other open space or protected areas noted in section 3.1. For example, Blanding's turtle (*Emydoidea blandingii*), state-listed and candidate for federal listing, and spotted turtle (*Clemmys guttata*), previously state-listed, are known inhabitants at Great Meadows NWF. The closest NHESP documented occurrence of a state-listed rare species to the Project is blue-spotted salamander (*Ambystoma laterale*) observed at the previously certified CVP 1428 located just beyond 100 feet west of station 336+00, which is further described below in the Vernal Pool Survey section as CVP #13. Direct observations of wildlife species presence within the ROW primarily included common or generalist species typical of a suburban and forested landscape such as the conditions present at the Project and those in areas of eastern Massachusetts and the region. No state-listed or federally listed species were observed within the ROW during the assessment.

Mammals

Evidence of the wildlife species at the Project in part included mammals such as white-tailed deer (*Odocoileus virginianus)*, coyote (*Canis latrans*), raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), and red squirrel (*Tamiasciurus hudsonicus*). Open portions of the ROW provide ease of travel for mammalian species, while overgrown areas provide cover or shelter in addition to functioning as a potential travel corridor.

Evidence of prior beaver (*Castor canadensis*) activity (>5 years) within the ROW was noted in three areas and included stumps of hardwood species with evidence of beaver chew near the existing Hop Brook crossing. Inactive heavily deteriorated bank dens in the embankment close to the toe of slope at stations 264+00 near Pantry Brook and 477+00 near the open wetland modeled by CAPS were likely historically used by beaver or possibly river otter (*Lontra canadensis*). Within the ROW, including areas of proposed wetland impact, there were no observations of evidence of recent or current use by beaver, American mink (*Neovison vison*), or river otter. Riparian and open water habitat that would be considered suitable to support these species is limited at the Project, with the most likely exception of Hop Brook and Pantry Brook.

The presence of small mammal populations and additional larger mammals such as grey fox (*Urocyon cinereoargenteus*), raccoon, and other species using the ROW and adjacent areas, as reported by the Call of the Wild 2009, is anticipated given available suitable habitat to support these species.

A potential bat roost tree was identified near station 171+30 where an impact is proposed within a wetland resource area; however, potential roost trees were observed beyond the ROW and broader potential bat roost habitat, including mature trees, is expected to be common on the landscape. The spread of White Nose Syndrome has detrimentally impacted bat populations in the northeast United States.

Birds

Representative avian species such as red-tailed hawk (*Buteo jamaicensis*), American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), turkey (*Meleagris gallopavo*), black-capped chickadee (*Penthestes atricapillus*), gray catbird (*Dumetella carolinensis*), nuthatches (*Sitta* sp.), and several woodpeckers (*Picoides* sp.) were also observed at the Project. A pair of mallard ducks (*Anas plathrhynchos*) were observed in the open water wetland near the Sudbury/Concord town line. This area was modeled by CAPS and represents a small open water habitat for waterfowl and other bird species that is anticipated to freeze annually during winter months, unlike other larger open water habitats less likely to freeze in nearby WMAs and NWFs. Additional avian species anticipated to use the ROW and adjacent landscape include neotropical migrants and resident species typical of suburban forested and partially fragmented landscapes. The ROW provides an open corridor for avian travel and foraging, while overgrown areas provide increased cover, shelter, and nesting habitat, although these habitats are primarily located outside of jurisdictional areas. These types of habitats are not limited to the ROW and are expected to be abundant in the surrounding landscape.

Fisheries and Mussels

Hop Brook and an unnamed tributary to Hop Brook are designated as Coldwater Fisheries Resources by MassWildlife. Attributes of Coldwater Fisheries Resources include high water quality, natural flow regimes, cold water temperatures (less than 68°F), largely intact riparian area, and watershed connectivity. Hop Brook, the unnamed tributary to Hop Brook and additional potential perennial and intermittent streams were evaluated for the presence of fisheries and mussel habitat, including the habitat features and considerations identified in Appendix A.

The in-stream conditions at the existing Hop Brook crossing and nearby unnamed tributary to Hop Brook indicate a perennial condition with a sand and sparse gravel streambed with moderate shoreline and submerged aquatic vegetation. Habitat conditions are anticipated to support coldwater species where the ROW crosses these waterways. Species such as brook trout (*Salvelinus fontinalis*), dace (*Rhinichthys* spp.), and white suckers (*Catostomus commersonii*) may be present in small densities and are examples of species that would need to be documented to designate the waterway as a Coldwater Fisheries Resource by MassWildlife.

In-stream conditions at the Pantry Brook crossing include a higher percentage of muck/organic material in the substrate. Water quality is not expected to be as high in this area compared to Hop Brook and high water quality is needed to support coldwater species; however, habitat could support some warmwater species.

Conditions at and near each perennial waterway crossing did not appear suitable (e.g., substrate, depth) for mussel beds, nor was there evidence of the predation of mussels, such as empty shells, which is also an indication of species presence.

There is the potential for mussel beds, and plunge pools and gravel dominated substrates suitable for fish spawning to be present further up or downstream of the areas assessed for the Project. The designation of Coldwater Fisheries Resources for waterways at the Project indicates suitable conditions are present for coldwater fish species, which might also be suitable for some mussel species.

Vernal Pool Species

A vernal pool survey at the Project was conducted by Stantec in April 2018 (Stantec 2018) and evaluated eligibility under the NHESP 2009 *Guidelines for the Certification of Vernal Pool Habitat* and the Sudbury Wetlands Administration Bylaw Regulations (Bylaw) revised September 25, 2017. The results of the 2018 survey identified three vernal pools eligible for NHESP certification (PVP 4, PVP 11, and PVP 12a). CVP 13[5] continues to meet NHESP certification requirements, and PVP 9[6], PVP 17, and PVP 20 may meet criteria as a vernal pool under the Town's Bylaw. Amphibian species observed during the spring survey included: wood frog (*Lithobates sylvaticus*), spotted salamander (*Ambystoma maculatum*), red-backed salamander *(Plethodon cinereus)*, gray treefrog (*Hyla versicolor*), blue-spotted salamander (CVP 13; NHESP CVP# 1428), and spring peeper (*Pseudacris crucifer*).

There was no evidence of turtle nesting (i.e., shell fragments or nests excavated by mammals) or measurable areas of suitable turtle nesting habitat with the ROW or immediate vicinity observed during the 2018 vernal pool survey or wildlife habitat assessment.

4.0 EVALUATION OF ADVERSE EFFECT

The results of the data review and the results of the field survey were used to assess whether or not the Project will result in an adverse effect to wildlife habitat subject to the WPA. None of the important habitat features or other thresholds identified in Appendix A of the MassDEP guidance were observed within or proximal to wetland resource areas where temporary or permanent Project impacts are proposed. Additionally, no other high value habitats or species particularly sensitive to the construction of a rail trail were observed. The trail is not expected to be a barrier to wildlife usage patterns near the Project or at the landscape level, as most species would shift habitat usage patterns, as needed, to carry out their life cycles during construction and post-construction. Therefore, potential habitat impact within jurisdiction of the WPA is generally localized, temporary, occurring previously disturbed area, and would occur to habitat that is not considered critical; or limiting at the Project or the local landscape. As a result, no adverse effect to wildlife habitat within wetland resource areas is anticipated based on the 25% Design

[5] Obligate vernal pools species observed in 2018 included fairy shrimp (*Eubranchipus* spp.) and blue-spotted salamander (*Ambystoma laterale*) egg masses.
[6] The NHESP confirmed Stantec's 2018 identification of two dead salamanders as the lead phase for eastern red-backed salamander.

Submittal. As the Project design develops further, recommendations are provided below for consideration in consultation with the Sudbury Conservation Commission and other resource agencies, as appropriate.

5.0 ADDITIONAL DESIGN CONSIDERATIONS AND RECOMMENDATIONS

The following additional recommendations relative to the protection of wildlife habitat should be considered as Project planning and design continues.

1. Locate the Project limit of disturbance within existing ROW to the greatest extent practical, including staging areas, construction access, parking, and scenic vistas.

2. Avoid or minimize tree clearing where possible. For example, the forested habitat surrounding high value or productive vernal pools (e.g., certified or certifiable by NHESP), particularly the 100-foot zone surrounding the boundary of the pool breeding habitat.

3. Implement Best Management Practices (BMPs) to avoid/minimize potential impacts to wetland resources areas that support wildlife habitat. For example, avoidance and minimization of erosion and sedimentation into wetland resource areas, use of clean heavy machinery at Project to limit/avoid introduction of invasive non-native plant species, avoidance of machinery refueling in buffer zones, and general housekeeping (including final site cleanup).

4. Establish a robust erosion and sedimentation control program per MassDEP Erosion and Sedimentation Control Guidelines and guidance from the Sudbury Conservation Commission, including monitoring and timely maintenance throughout construction due to the proximity of limits of work near some wetland resource areas.

5. Use plantings and seed from native plant species during restoration of disturbed areas. The selection of species for plantings should consider enhancing or replacing wildlife habitat use (e.g., fruiting shrubs, pollinator habitat, evergreen species for cover, etc.).

6. Incorporate minimum Massachusetts Stream Crossing Standards at perennial waterway crossings to the maximum extent practical. Consider these standards in additional areas that may provide high value wildlife habitat (e.g., intermittent stream). In the case of Hop Brook, the reuse/rehabilitation of the existing bridge to span the brook is being considered for the design.

7. Consider maintaining or creating wildlife crossing passage at strategic locations underneath the trail (e.g., existing cattle crossing used by wildlife, new crossing where amphibians migrate from the forest to high value vernal pools close to the ROW).

8. If scenic vistas or additional parking are proposed, cite these in areas that avoid and minimize the potential impact to wildlife habitat and wildlife behavior.

9. Monitoring of Priority and Estimated Habitat mapping by the NHESP for the potential presence of state-listed species near or at the Project as environmental permitting continues.

10. Avoid or minimize installation of physical barriers that would create impassable conditions across the trail for some smaller wildlife species.

11. Consider leash and waste clean-up rules for pets at the Project.

12. Strategically girdling trees (e.g., cottonwood) that are located a safe distance from the ROW (to avoid creating hazard tree to humans). This management practice would increase the number of standing dead trees that could offer natural cavities and crevices for wildlife (e.g., roosting bats, nesting birds and waterfowl, small mammal dens).

13. Beneficially reuse trees and brush cleared during on-site site preparation to create new or enhance existing brush piles near the ROW to serve as wildlife habitat (e.g., refugia for small mammals, amphibians, and reptiles; and nesting habitat for songbirds).

14. Avoid and minimize effects of temporary construction and permanent lighting to the maximum extent practical to minimize the potential for the disruption of wildlife behavior. If permanent lighting is proposed, use full cutoff lens to direct lighting downward toward the trail surface to avoid and minimize the secondary effect to adjacent wildlife habitat.

15. Consider strategically locating signage along the trail (e.g., trail heads or parking areas) to educate trial users about wildlife and wetland ecology.

6.0 REFERENCES

Call of The Wild Consulting. 2009. Comprehensive Four-Season Wildlife Habitat Evaluation Phase II Bruce Freeman Rail Trail Project. Prepared for Sudbury Conservation Commission.

Fay, Spofford, & Thorndike, 2006. Bruce Freeman Rail Trail Environmental & Engineering Assessment. Prepared for Town of Sudbury, Massachusetts.

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Stantec

APPENDIX B WILDLIFE HABITAT EVALUATION REPORT FOR CULVERT 4
Bruce Freeman Rail Trail, Sudbury, Massachusetts

February 4, 2022

Prepared for:
Massachusetts Department of Transportation

Prepared by:
Stantec Consulting Services Inc.

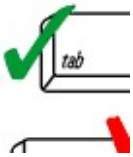
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 1. Summary Sheet

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



Bruce Freeman Rail Trail -Massachusetts Department of Transportation
Project Name

Sudbury and Concord
Location

Bank 115 LF (100 SF Perm. & 15 Temp. for work in stream) — January 12, 2022
Size of Area Being Impacted — Date

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

Name	Waterbody/ Waterway	Wetland	Upland*	Total Area
1. Stream-LUWW	Intermittent Stream	410 P; 141 T	N/A	410 P; 141 T
2. Stream-Bank	Intermittent Stream	115 LF	N/A	115 LF
3.				
4.				
5.				
6.				
7.				

*Riverfront Area/BLSF

Attach Sketch map and/or photos of the Impact Areas

Narrative Description of Site (attach separate page if necessary)

Culvert 4 is located along the railroad tracks south of the intersection of the rail trail with Hudson Road and Peakham Road at approximately Station 167+20. There is an intermittent stream, an unnamed tributary to Hop Brook, and it is designated by the Massachusetts Division of Fisheries and Wildlife as a Coldwater Fisheries Resource. The stream flows west and southwest in this location. The right Bank (west) is bounded by residential development along Peakham Street, while there is mature upland immediately on the west and south sides of the stream. A wooded swamp lies to the northeast of the Culvert 4 work area and is part of a more extensive wetlands complex in this area.

Certification

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

Michele Simoneaux — Michele Simoneaux
Signature of Wildlife Specialist (per 310 CMR 10.60 (1) (b)) — Typed or Printed Name

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LIST OF FIGURES

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1 Introduction

On behalf of the Massachusetts Department of Transportation (MassDOT), Stantec Consulting Services Inc. (Stantec) performed a detailed Appendix B Wildlife Habitat Evaluation for the proposed work area associated with the Culvert 4 replacement on the proposed Bruce Freeman Rail Trial (BFRT; Project) located in Sudbury, Massachusetts, between the intersection of Hudson Road and Peakham Road to the Concord town line (Figure 1; Photo 1). The culvert is located approximately at Station 167+20 at the BF#30 flag series (Photo 2 and Photo 3).

The Appendix B Wildlife Habitat Evaluation herein described was conducted on January 12, 2022 by Michele Simoneaux, Professional Wetland Scientist (PWS #2461) of Stantec Consulting, qualified to conduct evaluations per the requirements in 310 CMR 10.60. The evaluation considered the recently proposed impacts per the 100% Submittal Permitting Plan Set included with the Fuss & O'Neill Notice of Intent application package dated December 22, 2021. The assessed temporary and permanent impacts to wetland resource areas proposed in the Plan Set are subject to the Massachusetts Wetlands Protection Act regulations (310 CMR; WPA) and are relative to the guidance of the *2006 Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands* (Guidance)[1] developed by the Massachusetts Department of Environmental Protection (MassDEP).

The right of way (ROW) is currently owned by MassDOT. The ROW is approximately 65 feet wide for most of its length and is predominantly a wooded corridor passing through multiple wetland areas, including vegetated wetlands, perennial/intermittent streams, and associated floodplain. The Town of Sudbury (Town) is considering rehabilitation of the ROW in Sudbury to interconnect with trails in adjacent towns (Fay, Spofford, and Thorndike 2006). In April 2020, Stantec performed a General Wildlife Habitat Evaluation for the 25% design phase of the approximately 4.6-mile-long trail that is proposed along the former Lowell Secondary Track of the Old Colony Rail Road that operated between Lowell and Framingham, Massachusetts. Based on the preliminary wetland resource area impact calculations prepared by VHB, the Appendix A forms were used as the field data form when evaluating wetland resource areas where impact was proposed based on the 25% Design Submittal. Appendix A evaluations were deemed applicable based on the localized nature of proposed impacts based on the 25% Design Submittal. The design submittal is now at 100% and impacts have been further evaluated. The need for a detailed Appendix B Wildlife Habitat Evaluation has been identified for the work associated with the Culvert 4 replacement because the impacts are twice the threshold of 50 LF of Bank alteration.

2 Purpose and Need

Based on information in the Fuss & O'Neill NOI (December 22, 2021), we understand that Culvert 4, a mortared stone box culvert with clay pipes has collapsed and the outlet is buried. As a result, the

[1] MassDEP. 2006 *Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands* is available at: http://umasscaps.org/pdf/wldhab.pdf.

unnamed tributary to Hop Brook has cut around the collapsed culvert and washed through the existing rail embankment (Photo 7). The culvert will be removed and replaced with 48" diameter reinforced concrete pipe buried 2' with a natural stream channel bottom. The stream alignment will be restored to the former culvert location. There are an estimated 100 LF of permanent impact and 15 LF of temporary impact to Inland Bank associated with this work. The Appendix B Wildlife Habitat Evaluation was performed because the impact to Inland Bank at Culvert 4 is greater than 2 times the threshold for Bank (> 50 LF). The Culvert 4 replacement work is part of a larger project and, for the purposes of this WHE, only the area within 50' of the limit of work was evaluated for this effort.

See Attachment A Detailed Wildlife Habitat Evaluation Form for site description, classification, % cover, soils data and wildlife habitat features. Attachment B contains site photos taken on January 12, 2022, the day of observation associated with this report.

3 Methodology

Methodology is described below for the data review and field survey associated with the Appendix B Wildlife Habitat Evaluation at Culvert 4.

3.1 Existing Data Review

Stantec reviewed the NOI submitted by Fuss & O'Neill to understand the specific areas of proposed impacts to jurisdictional areas, the Abbreviated Notice of Resource Area Delineation (ANRAD) dated July 2016 by VHB and the Amended ORAD filed by MassDOT and VHB, dated June 15, 2020. MassMapper https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html, and Google Earth (desktop version) were also used to develop an understanding of landscape context and review connectivity of the impact resources to other wetlands systems. USGS WebSoilSurvey (https://websoilsurvey.sc.egov.usda.gov) was used to identify the soil type of the general study area in order to address the requirements for information on soils on the form. No supplemental soil evaluations were completed in the field, as the resources being impacted are Inland Bank and Land Under Waterbodies and Waterways.

3.2 Field Assessment

Following the completion of the existing data review, Stantec performed the wildlife habitat evaluation field assessment along the railroad at the Culvert 4 in Sudbury to specifically evaluate potential impacts to wildlife habitat associated with the proposed culvert replacement. For the purposes of the Appendix B Wildlife Habitat Evaluation, the "study area" was identified as the area of proposed temporary and permanent impacts to Inland Bank and Land Under Waterbodies and Waterways, as well as the area within approximately 50' feet radius from the culvert replacement limit of work, which included upland and wetland habitat. The temperature was approximately 31° F and there was 3-5' of snow on the ground. The subject stream was partially ice-covered and the substrate type and conditions could not be fully observed. Herbaceous vegetation was also not able to be assessed due to the time of year and snow cover.

The Detailed Wildlife Habitat Evaluation Form was completed by hand during the January 12, 2022 observation session and the information transcribed by the PWS to the attached electronic version of the field form (Attachment A). There was a focus on Important Habitat Characteristics that are present and might need to be replaced or restored after the project is complete.

4 Summary of Evaluation Observations

The results of the existing data review and field assessment at the Culvert 4 study area are presented below.

4.1 Field Assessment Results

Portions of the ROW leading to Culvert 4 are somewhat overgrown with dense shrubbery and vines. Overall, invasive species are common throughout, including: glossy buckthorn (*Frangula alnus*), Oriental bittersweet (*Celastrus orbiculatus*), and honeysuckle (*Lonicera* spp.), with occasional occurrences of winged euonymus (*Euonymus alatus*) and Japanese barberry (*Berberis thunbergii*).

4.1.1 WILDLIFE CONSIDERATIONS

Direct observations of wildlife species presence within the ROW primarily included common or generalist species typical of a suburban and forested landscape such as the conditions present at the Project and those in areas of eastern Massachusetts and the region. Observations were limited to seasonal activity of species active in winter. No state-listed or federally listed species were observed within the ROW during the WHE assessment.

Mammals

Evidence of the wildlife species at the Project in part included mammals such as white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*) through direct observations of tracks in the snow or scat. Open portions of the ROW provide ease of travel for mammalian species, while overgrown areas provide cover or shelter in addition to functioning as a potential travel corridor.

Birds

The ROW provides an open corridor for avian travel and foraging, while overgrown areas provide increased cover, shelter, and nesting habitat, although these habitats are primarily located outside of jurisdictional areas. These types of habitats are not limited to the ROW and are expected to be abundant in the surrounding landscape.

Fisheries

Hop Brook and an unnamed tributary to Hop Brook are designated as Coldwater Fisheries Resources by MassWildlife. Attributes of Coldwater Fisheries Resources include high water quality, natural flow regimes, cold water temperatures (less than 68°F), largely intact riparian area, and watershed

connectivity. Hop Brook, the unnamed tributary to Hop Brook and additional potential perennial and intermittent streams were evaluated for the presence of fisheries and mussel habitat, including the habitat features and considerations that were identified in the 2020 Appendix A Wildlife Habitat Evaluation. Given the shallow and intermittent nature of the unnamed tributary, it is unlikely that it provides prime habitat for cold water fish species year around.

The Appendix B WHE biologist did not observe any fish during the evaluation and was unable to directly observe the majority of the stream substrate due to winter-related conditions; however, as presented in the Stantec General Wildlife Habitat Evaluation, the in-stream conditions at the existing Hop Brook crossing and nearby unnamed tributary to Hop Brook indicate a perennial condition with a sand and sparse gravel streambed with moderate shoreline and submerged aquatic vegetation. Habitat conditions are anticipated to support coldwater species where the ROW crosses these waterways. Species such as brook trout (*Salvelinus fontinalis*), dace (*Rhinichthys* spp.), and white suckers (*Catostomus commersonii*) may be present in small densities and are examples of species that would need to be documented to designate the waterway as a Coldwater Fisheries Resource by MassWildlife.

Amphibians and Reptiles

There was no evidence of turtle nesting (i.e., shell fragments or nests excavated by mammals), as winter is not a suitable time of year for turtles in eastern Massachusetts to nest; however, there were no measurable areas of suitable turtle nesting habitat with the study area or immediate vicinity observed during the 1-day assessment. The unnamed stream has potential cover and nesting areas that are suitable for some species of stream salamanders, as noted throughout the form and in this report. There are also multiple areas of large woody debris on the ground that would be suitable for small mammals, amphibians and reptiles within the study area and larger landscape.

5 Important Habitat Characteristics

A number of “Important Habitat Characteristics”, as specified within the Guidance, were identified within the limit of work or the 50’ radius study area. Please see Part 2 Table VI of the Detailed Wildlife Habitat Evaluation form for a summary and quantification of the observed wildlife habitat features.

Medium to large flat rocks within the stream: There are a number of flat rocks, greater than 6” within the limit of work that could potentially provide cover for stream salamanders and nesting habitat for spring salamander (*Gyrinophilus porphyriticus*) and northern two-lined salamanders (*Eurycea bislineata*); however, spring salamanders may not occur in eastern Massachusetts. (Photo 8).

Flat rocks and logs on Bank: The Bank in this portion of the unnamed tributary to Hop Book is steep but not high and contains both cut and fallen logs that could potentially serve as cover for stream salamanders. (Photo 7)

Undercut or Overhanging Banks with crevices: There are a number of small areas of Bank within the study area where the Banks have eroded and are undercut, providing potential habitat for small mammals. (Photo 10 and Photo 12)

Mud flats (freshwater): There is a marginal area of exposed mud within the existing stream channel that is approximately 2 feet wide by 3 feet long. It is located at the confluence of the unnamed stream to Hop Brook and the BF#30 series jurisdictional stream under the Sudbury Wetlands Bylaw at the railroad track crossing. This area is not classified as a "Freshwater Mud Flat Community" and likely only serves as marginal habitat value due to its size. (Photo 4)

6 Evaluation Of Adverse Effect

Pursuant to 310 CMR 10.60, the results of the data review and the results of the field survey were used to assess whether the proposed impacts at Culvert 4 will result in an adverse effect to wildlife habitat subject to the WPA. A number of Important Habitat Characteristics were observed in or adjacent to the work footprint for the culvert replacement project. None of the important habitat features identified will be permanently lost on a greater landscape scale as a result of the work associated with Culvert 4, as it is a short-duration project with a limited footprint and will improve stream quality and conditions post-construction (i.e. stabilize existing eroding banks through the railroad bed/fill while improving hydraulic capacity of existing culvert and sediment transport). Photo 2 and Photo 3.

Additionally, no other high value habitats or species particularly sensitive to the construction of a rail trail were observed. The new repaired culvert is not expected to be a barrier to wildlife usage patterns in the Project or at the landscape level, as most species would shift habitat usage patterns, as needed, to carry out their life cycles during construction and post-construction. Therefore, potential habitat impact within jurisdiction of the WPA is localized, temporary, occurring in an area impacted by a collapsed culvert in a previously disturbed area, and would occur to habitat that is not considered critical. As a result, we do not anticipate an adverse effect to wildlife habitat within wetland resource areas based on the 100% Design Submittal.

7 Additional Design Considerations and Recommendations

Some of the following additional recommendations were included with the General Habitat Evaluation conducted in 2020 and are repeated here, as they are relevant to the protection of wildlife habitat associated with the culvert 4 replacement work. The work to repair Culvert 4 will enhance wildlife habitat value and help the railroad embankment material from further erosion and washing sediment into the stream. Additionally, the project is already at 100% design and this work has been designed to meet the Massachusetts Stream Crossing Standards and appropriate BMP's are being proposed at all phases of the project.

1. Preserve larger rocks, especially flat stones from the stream and strategically place back into stream post-construction.

2. Avoid or minimize installation of physical barriers that would create impassable conditions across the trail for some smaller wildlife species.

3. Consider an invasive species management plan.

4. Beneficially reuse trees and brush cleared during on-site site preparation to create new or enhance existing brush piles near the ROW and new culvert to serve as wildlife habitat (e.g., refugia for small mammals, amphibians, and reptiles; and nesting habitat for songbirds).

8 References

Fuss & O'Neill, Notice of Intent Sudbury Bike Path Construction (Bruce Freeman Rail Trail); Massacusetts Department of Transportation Highway Division, December 22, 2021

Fuss & O'Neill, Notice of Intent Sudbury Bike Path Construction (Bruce Freeman Rail Trail); Massacusetts Department of Transportation Highway Division, December 22, 2021 (revised)

Massachusetts Office of Geographic Information. Massachusetts Online Viewer (MassMapper). Available at MassMapper

Stantec Consulting Services Inc. (Stantec). 2018. Bruce Freeman Rail Trail Vernal Pool Survey. Prepared for Massachusetts Department of Transportation. Dated May 14, 2018.

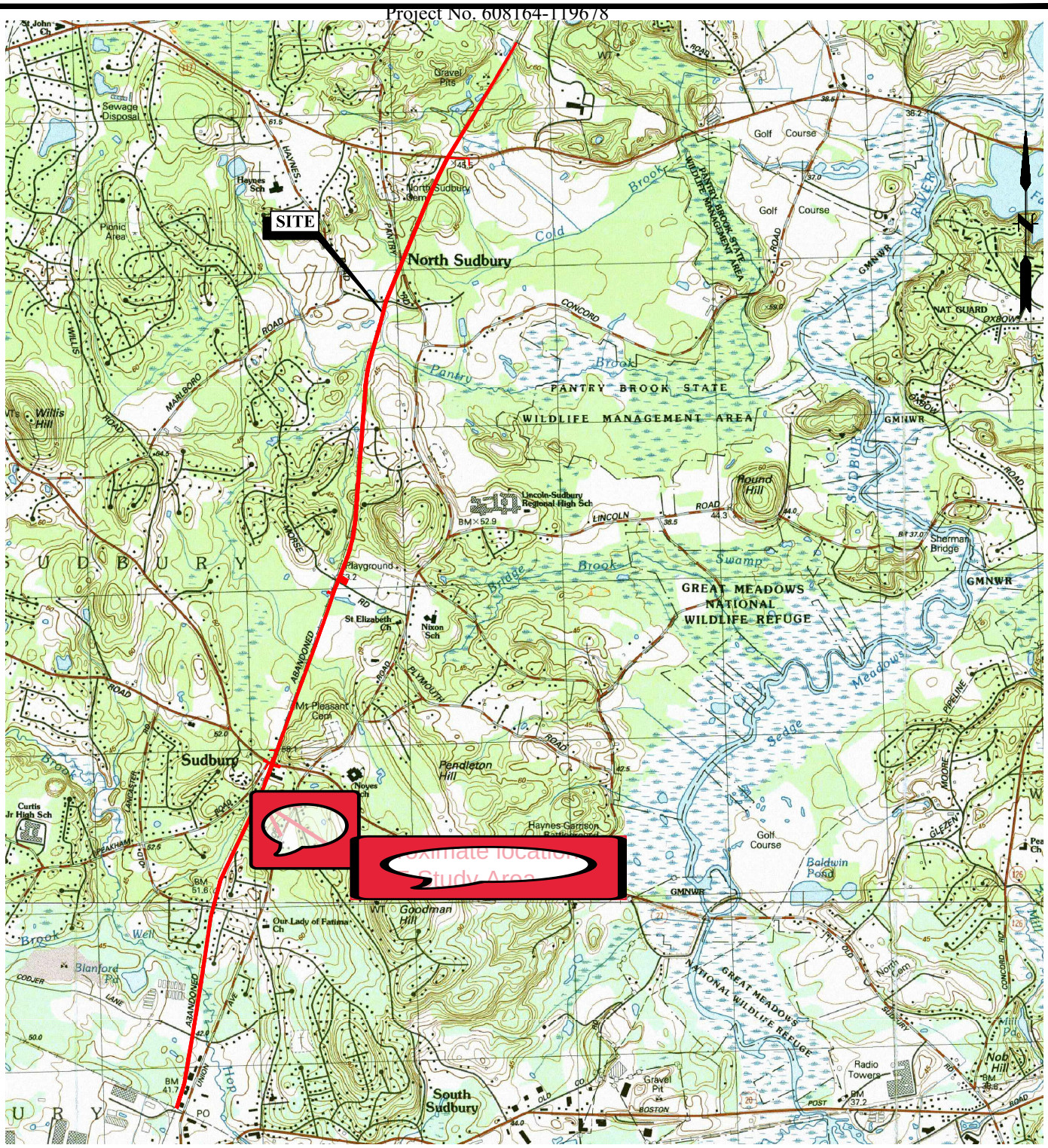
Stantec Consulting Services Inc. (Stantec). 2018. General Wildlife Habitat Assessment Report Bruce Freeman Rail Trail. Wildlife Habitat Assessment Relative to the 25% Design Submittal dated November 2016. Prepared for the Massachusetts Department of Transportation. Dated April 8, 2020.

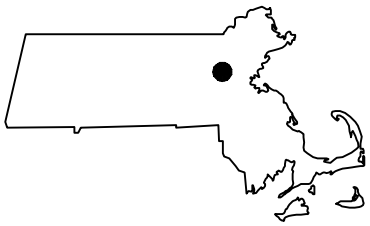
Swain, P. 2016. Classification of the Natural Communities of Massachusetts. Version 2.0. Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries and Wildlife. Westborough, Massachusetts.

USDA WebSoilSurvey https://websoilsurvey.sc.egov.usda.gov

FIGURES

Project No. 608164-11978





MAP REFERENCE

THIS MAP WAS PREPARED FROM THE FOLLOWING USGS TOPOGRAPHIC QUADRANGLE IMAGES: q209898, q209902, q209906, q209910, q213898, q213902, q213906 AND q213910.
QUADRANGLE IMAGES WERE PREPARED FROM MASS GIS DATA RECEIVED FROM OLIVER GIS ON 04/16/2021.
ORIGINAL MAP UNITS IN METERS.

SCALE: HORZ.: 1" = 3000' VERT.: DATUM: HORZ.: VERT.: 0 1500 3000 GRAPHIC SCALE	FUSS & O'NEILL 1550 MAIN STREET, SUITE 400 SPRINGFIELD, MA 01103 413.452.0445 www.fando.com	TOWN OF SUDBURY SITE LOCATION MAP BRUCE FREEMAN RAIL TRAIL SUDBURY MASSACHUSETTS	PROJ. No.: 20200785.A10 DATE: 10/27/2021 FIG.1

A00830 - 513

File Path: J:\DWG\P2020\0785\A10\608164\DWG\Environmental Plans\20200785A10_PERM01.dwg Layout: FIG.1 Plotted: Wed, October 27, 2021 - 2:45 PM User: akeegan
Plotter: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 CTB File: FO.STB
LAYER STATE:
MS VIEW:

ATTACHMENTS

ATTACHMENT A DETAILED WILDLIFE HABITAT EVALUATION FORM

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Appendix B: Detailed Wildlife Habitat Evaluation

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

I. General Information

Culvert Location 4 (embankment washout; along trail at Station 167 + 20)
Project Location (from NOI page 1)

1 and 2 (combined LUWW and Bank of same stream)
Impact Area (number/name)

January 12, 2022
Date(s) of Site Visit(s) and Data Collection

31 degrees F, approximately 3-5 inches of snow cover
Weather Conditions During Site Visit (if snow cover, include depth)

Michele Simoneaux, MSc., PWS, CESSWI — January 25, 2022
Person completing form per 310 CMR 10.60(1)(b) — Date this form was completed

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

Michele Simoneaux
Signature

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

A. Classification

1. For Wetland Resource Areas, complete the following:

System: Riverine — Subsystem: Intermittent

Class: Streambed — Subclass:

Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Saturated
- ☒ Intermittently exposed
- ☐ Temporarily flooded
- ☐ Semi-permanently flooded
- ☐ Intermittently flooded
- ☐ Seasonally flooded
- ☐ Artificially flooded

2. For Riverfront or Bordering Land Subject to Flooding Resource Areas, complete the following. Use a terrestrial classification system such as one of the two listed below:
   a. "Classification of the Natural Communities of Massachusetts (Draft)" by Patricia C. Swain and Jennifer B. Kearsley, MA DFW NHESP, Westborough, MA. July 2000. (Department of Fish & Game Website)
   b. "New England Wildlife: Habitat, Natural History, and Distribution" by Richard M. DeGraaf and Deborah D. Rudis, USDA Forest Service, Northeastern Forest Experiment Station. General Technical Report NE-108. August 1992. 491 pages.

Terrestrial-Forest/Woodland-Mixed Coniferous-Deciduous Forest/Woodland (White Pine-Oak Forest)
Community Name

Upland: White Pine and Northern Red Oak (majority) (only to east of RT; west residential
Vegetation Description

Mature White Pine and mixed oak community with large downed woody debris
Physical Description

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Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

B. Inventory (Plant community)

% Cover:	90	60	10	Can't assess	Can't assess
	Trees (> 20')	Shrubs (< 20')	Woody vines	Mosses	Herbaceous

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

Strata	Plant Species	Strata	Plant Species
Tree	Quercus rubra		
Tree	Pinus strobus		
Shrub	Lonicera spp.		
Shrub	Rosa multiflora		

C. Inventory (Soils)

Deerfield 256A	Moderately well-drained
Soil Survey Unit	Drainage Class
Loamy fine sand	up to 60 inches
Texture (upper part)	Depth
15-37 inches	
Depth to Water Table	

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

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

Wildlife Food

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

☐ Abundant ☐ Present ☒ Absent

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

☐ Abundant ☒ Present ☐ Absent

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Present ☒ Absent

Shrub and/or herbaceous vegetation suitable for veery nesting

☒ Present ☐ Absent

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Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Number of trees (live or dead) > 30" DBH: 2

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

12-18" dbh	18-24" dbh	> 24" dbh
1 (outside impact area)		1 outside impact area

Number of Tree Cavities in trunks or limbs of:

None identified high enough in tree for suitability for these species
6-12" diameter (e.g., tree swallow, saw whet owl, screech owl, bluebird, other songbirds)

None identified close enough to water for suitability for these species
12-18" diameter (e.g., hooded merganser, wood duck, common goldeneye, mink)

None identified suitable for these species
>18" diameter (e.g., hooded merganser, wood duck, common goldeneye, common merganser, barred owl, mink, raccoon, fisher)

Small mammal burrows

☐ Abundant ☒ Present ☐ Absent

Cover/Perches/Basking/Denning/Nesting Habitat

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

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

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

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

☐ Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

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

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

☐ Present ☒ Absent

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

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

☒ Turtles ☐ Foraging waterfowl

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

☐ Present ☒ Absent

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Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

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

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

☒ Present ☐ Absent

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

☒ Present ☐ Absent

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

☐ Present ☒ Absent

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

☒ Present ☐ Absent

Vertical sandy banks (bank swallow, kingfisher)

☐ Present ☒ Absent

Areas of ice-free open water in winter

☐ Present ☒ Absent

Mud flats

☒ Present ☐ Absent

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

☐ Present ☒ Absent

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

Turtle nesting sites

☐ Present ☒ Absent

Bank swallow colony

☐ Present ☒ Absent

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

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Wildlife Habitat Protection Guidance

Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Project area is within:

☐ 100' of beaver, mink or otter den, bank swallow colony or turtle nesting area

☐ 200' of Great Blue Heron or osprey nest(s)

☐ 1400' of a Bald Eagle nest[1]

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

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

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (pied-billed grebe)	☐ Present	☒ Absent

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

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

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

Flooded > 5 cm (marsh wren)	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

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

Flooded > 5 cm	☐ Present	☒ Absent
Flooded > 25 cm (least bittern, common moorhen)	☐ Present	☒ Absent

IV. Landscape Context

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

Is the impact area part of an emergent marsh at least	1.0 acre in size?	☐ Yes	☒ No
(marsh and waterbirds)	2.0 acres in size?	☐ Yes	☒ No
	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No

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

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Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

Is the impact area part of a wetland complex at least	2.5 acres in size?	☒ Yes	☐ No
(turtles, frogs, waterfowl, mammals)	5.0 acres in size?	☐ Yes	☒ No
	10.0 acres in size?	☐ Yes	☒ No
	25.0 acres in size?	☐ Yes	☒ No

For upland resource areas is the impact area part of contiguous forested habitat at least

(forest interior nesting birds)	50 acres in size?	☐ Yes	☐ No
	100 acres in size?	☐ Yes	☐ No
	250 acres in size?	☐ Yes	☐ No
	500 acres in size?	☐ Yes	☐ No
(grassland nesting birds)	> 1.0 acre in size?	☐ Yes	☐ No
(special habitat such as gallery floodplain forest, alder thicket, etc.)	> 1.0 acre in size?	☐ Yes	☐ No

B. **Connectivity with adjoining natural habitats**

☐ No direct connections to adjacent areas of wildlife habitat (little connectivity function)

☐ Connectors numerous or impact area is embedded in a large area of natural habitat (limited connectivity function)

☒ Impact area contributes to a limited number of connectors to adjacent areas of habitat (somewhat important for connectivity function)

☐ Impact area serves as *part of* a sole connector to adjacent areas of habitat (important for connectivity function)

☐ Impact area serves as *only* connector to adjacent areas of habitat (very important for connectivity function)

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

☐ Evidence of significant chemical contamination

☐ Evidence of significant levels of dumping

☐ Evidence of significant erosion or sedimentation problems

☒ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)

☒ Disturbance from roads or highways ☒ Other human disturbance

☐ Is the site the only resource area in the vicinity of an otherwise developed area

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

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Appendix B: Detailed Wildlife Habitat Evaluation

Part 2. Field Data Form (continued)

VI. Quantification Table for Important Habitat Characteristics

Habitat Characteristic	Amount Impacted in Impact Area	Current (entire site)	Post-Construction (entire site)
Example: standing dead trees 6-12” dbh	4	12	8
Med. to Lg. flat rocks within stream	3	>10*	Unable to assess
Flat rocks/logs on Bank	2	>5*	Unable to assess
Undercut Banks/crevices	1	>2*	Unable to assess
Mud flats (limited area)	estimated 6 SF	estimated 6 SF*	Unable to assess
*Study area was within 50' of LOW			

ATTACHMENT B PHOTO SHEETS

Photo 1. Existing railroad tracks leading to Culvert 4

Photo 2. Overview of railroad tracks over tributary to Hop Brook within proposed work area at Culvert 4

Photo 3. Mortared stone box culvert (#4) near Station 167 + 20 to be replaced

Photo 4. Unnamed tributary to Hop Brook within work footprint

Photo 5. A portion of the Bank *within* limit of work is comprised of small stone and gravel and has washed into the stream

Photo 6. Rocks and boulders are common within the stream

Photo 7. Bank below the railroad track at crossing; stream has cut around the collapsed culvert

Photo 8. Stream has a number of >6" flat stones that would be suitable cover for 2-lined salamanders

Photo 9. Coarse woody debris is present in the stream

Photo 10. A number of undercut banks and tree hollows formed by roots exist along the Bank

Photo 11. Limited cavities observed in trees near limit of work but none suitable for species such as tree swallows, saw whet owls, screech owls, bluebirds, etc., as they are not high enough in the tree

Photo 12. Patch of sand along the Bank of the intermittent stream not large enough or topographically well-positioned to offer turtle nesting habitat

Attachment C IMPORTANT HABITAT FEATURES MAP

ENVIRONMENTAL IMPACTS LEGEND

LINETYPE	DESCRIPTION
	LIMIT OF BORDERING VEGETATED WETLAND (BVW)
BLSF	EDGE OF BORDERING LAND SUBJECT TO FLOODING
	LIMIT OF BANK
	LIMIT OF FEMA FLOODWAY
BLSF	ZONE A FLOOD LIMIT (NO BFE)
	APPROX. LIMIT OF GRADING
100'WPA BZ	100' WPA BUFFER ZONE
100'WPA BZ-SUD RA	100' WPA BUFFER ZONE/100' SUDBURY AURA
100'BZ - AURA	100' WPA BUFFER ZONE/100' SUDBURY RESOURCE AREA
100'WPA VPBZ	100' WPA VERNAL POOL BUFFER ZONE
100'WPA RA	100' WPA RESOURCE AREA
200'WPA RA	200' WPA RESOURCE AREA
100'SUD RA	100' SUDBURY RESOURCE AREA
200'SUD RA	200' SUDBURY RESOURCE AREA
100'SUD VPBZ	100' SUDBURY VERNAL POOL BUFFER ZONE
AURA	100' or 200' SUDBURY AURA

LINETYPE	DESCRIPTION
	DRIVE SAMPLE BORING LOCATION
	TEST PIT LOCATION

HATCH	DESCRIPTION
	DISTURBANCE TO 100' WPA BUFFER ZONE (100' BZ)
	DISTURBANCE TO WPA 100' RIVERFRONT AREA (100' RA)
	DISTURBANCE TO WPA 200' RIVERFRONT AREA (200' RA)
	DISTURBANCE TO BLSF
	BORDERING VEGETATED WETLAND
	LIMIT OF BANK/LAND UNDER WATER

HATCH	DESCRIPTION
	TEMPORARY DISTURBANCE TO BVW / LUW / IVW
	PERMANENT DISTURBANCE TO BVW / LUW / IVW
	DISTURBANCE TO 100' WPA VERNAL POOL BZ

SUDBURY
BRUCE FREEMAN RAIL TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	XXX-XXXX(XXX)X	7	316
PROJECT FILE NO.	608164		

ENVIRONMENTAL IMPACT PLANS

CONTINUED ON SHEET NO. 6

CONTINUED ABOVE

DISTURBANCE TO 100' BUFFER ZONE

DISTRUBANCE TO 200' RIVER FRONT AREA

DISTRUBANCE TO 100' RIVER FRONT AREA

LIMIT OF BANK (WPA PERENNIAL STREAM)

EX. BOX CULVERT (SEE DRAINAGE & UTIL PLANS)

LIMIT OF BORDERING VEGETATIVE WETLAND

LIMIT WPA 100' BZ & 100' SUD AURA

LIMIT OF 100' WPA RA

LIMIT OF 200' WPA RA

LIMIT OF 100' WPA BUFFER ZONE / 100' SUD AURA

N 24° 56' 30" E 675.27'

SCALE: 1" = 20'

89 SF CULVERT REPAIR PERM IMPACT TO LUW

54 LF CULVERT REPAIR PERM IMPACT TO BANK

LIMIT OF BANK (WPA INTERMITTENT STREAM

4 LF CULVERT REPAIR TEMP IMPACT TO BANK

FUSS & O'NEILL

Attachment H

Northern Long-Eared Bat

Stantec Consulting Services Inc.
5 Dartmouth Drive Suite 200, Auburn NH 03032-3984

September 1, 2020

Attention: Tim Dexter
Fish & Wildlife Program Coordinator
Massachusetts Department of Transportation – Highway Division
Ten Park Plaza, Room 4260
Boston, MA 02116-3973

Dear Tim,

Project	Northern Long-eared Bat (NLEB) Presence/Absence Survey
MassDOT Project #	608164
Town	Sudbury, Massachusetts
Surveyor Name/Firm	Stantec Consulting Services Inc.
Detector Operation Dates	July 7–8 and 8–9, 2020
Survey Results	**NLEB NOT DETECTED**

This report contains the results of the Massachusetts Department of Transportation (MassDOT) northern long-eared bat (*Myotis septentrionalis*, [NLEB]) summer presence/absence survey performed for the Sudbury Bike Path Construction (Bruce Freeman Rail Trail) Project (MassDOT #608164; Project) in Sudbury, Massachusetts. Acoustic detectors deployed by Stantec Consulting Services Inc. (Stantec) did not detect the presence of NLEB. Automated U.S. Fish and Wildlife Service-approved software (Kaleidoscope Pro version 5.1.9 [KPro]) identified eighteen northern long-eared bats and indicated presence of NLEB based on nightly maximum likelihood estimate (MLE) scores; however, these files were determined to be high-frequency approach-phase calls of big brown bats (*Eptesisus fuscus*) and not NLEB. As such, presence was not confirmed based on our qualitative assessment. Thirty-six individual bat passes were autoclassified by KPro as the state endangered little brown bat (*Myotis lucifugus*) and presence was confirmed during qualitative assessment. One bat pass was autoclassified as the state endangered eastern small-footed bat (*Myotis leibii*) but this was determined to be a fragment of an eastern red bat (*Lasirus borealis*) based on our qualitative assessment.

Regards,

Stantec Consulting Services Inc.

Alex Pries
Project Manager

Phone: (603) 260-7434
Fax: (207) 729-2715
Alex.Pries@stantec.com

Attachment: NLEB Survey Report for Sudbury 608164
att2_USFWS_R5_Bat_ReportingForm_Rev.28June2016_Sudbury.xlsx
att3_Sudbury_2019_MassDOT_Batsurvey_Consultant_STN.zip

Stantec

Memo

To:	Tim Dexter, Fish and Wildlife Program Coordinator	From:	Alex Pries
	Massachusetts Department of Transportation Highway Division Ten Park Plaza, Room 4260 Boston MA 02116-3973		Auburn, New Hampshire Office
File:	179410716	Date:	September 1, 2020

Reference: Sudbury Bike Path Construction (Bruce Freeman Rail Trail), Sudbury, Massachusetts – Northern Long-eared Bat Acoustic Survey Report

INTRODUCTION

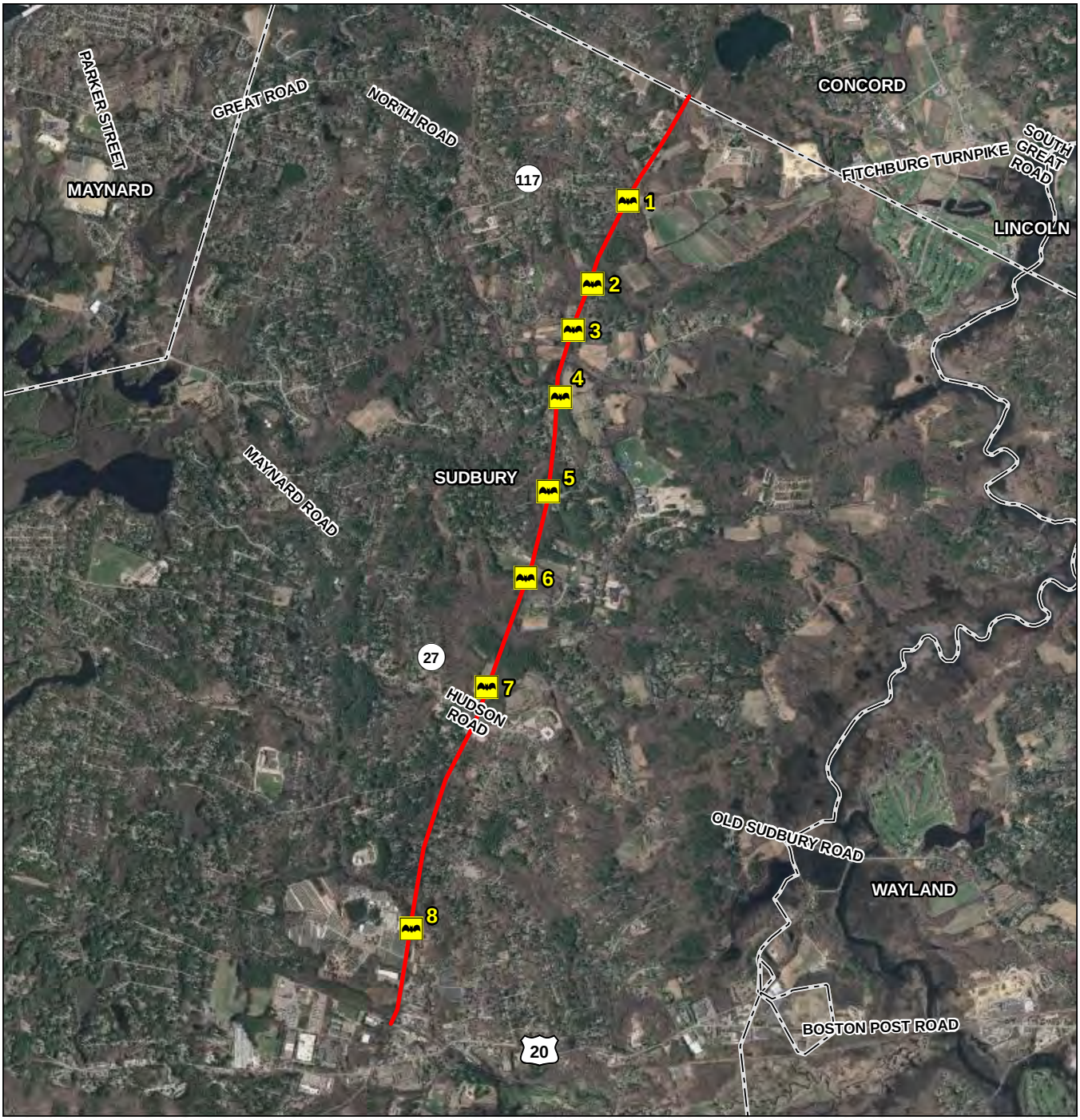
The Massachusetts Department of Transportation (MassDOT) retained Stantec Consulting Services Inc. (Stantec) to conduct an acoustic survey for the presence or probable absence of breeding populations of the federally threatened and state-listed endangered northern long-eared bat (*Myotis septentrionalis*; NLEB) along a proposed bike path (Bruce Freeman Rail Trail) in Sudbury, Massachusetts (Project). The Project includes potential tree clearing along 7.2 kilometers (km) of forested habitat (Figure 1). The purpose of the survey was to determine if this species is using these forested areas at the Project during the 2020 summer maternity season. The survey was conducted according to methods outlined in the U.S. Fish and Wildlife Service's (USFWS) March 2020 Range-wide Indiana Bat Summer Survey Guidelines (USFWS Guidelines)[1]. Stantec provided a Study Plan (Appendix A) for this acoustic survey to MassDOT and USFWS on June 11, 2020, based on USFWS Guidelines. After the Study Plan was approved by USFWS on June 22, 2020, Stantec conducted surveys on July 7 and 8, 2020. The USFWS Guidelines identified a survey window of May 15 to August 15 for acoustic surveys. This memorandum summarizes methods and results of the acoustic bat survey for the Project.

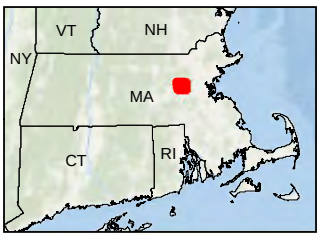
METHODS

FIELD SURVEY

Surveys were conducted according to the methods outlined in the Study Plan (Appendix A). The USFWS Guidelines specify survey effort for acoustic surveys based either on an area method or a linear method. Stantec determined that the linear method was more appropriate for this Project given the linear nature of proposed clearing limits. Per the survey efforts outlined in the USFWS Guidelines: Phase 2 Acoustic Surveys for linear projects, at least two detector-nights per km of suitable summer habitat are required for the Project. For the purposes of this survey, we have conservatively assumed that all forested areas immediately adjacent to the Project provide potential roost habitat for NLEB (suitable summer habitat) and may potentially be cleared during project construction. Accordingly, Stantec conducted 16 detector-nights (two detector-nights per km) of acoustic surveys as approved in the Study Plan.

[1] The USFWS has indicated that the USFWS Guidelines are to be used to detect presence of NLEB as well as Indiana bats. Available at https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html





Legend

- Acoustic Survey Location
- Project Area
- Municipal Boundary

0 0.75 Miles

(At original document size of 8.5x11)
1:45,000

N

Stantec

Project Location
Sudbury, MA

Prepared by KWH on 2020-05-27
TR by LJ on 2020-05-27
IR Review by AP on 2020-05-27

Client/Project 179410716
Massachusetts Department of Transportation
Boston Area-Sudbury Northern Long-eared Bat Acoustic Survey

Figure No.
1

Title
Northern Long-eared Bat Acoustic Survey Detector Location Map

Notes
1. Coordinate System: WGS 1984 Mercator 41
2. Background: MassGIS 2013-2014 USGS Color Orthoimagery

V:\1956\active\ Task Owner and other Non-BC1956 Jobs\179410716\03 data\gis cad\gis\MXDs\NLEB\179410716 01 NLEB Sudbury.mxd Revised: 2020-05-27 By: khoward

Stantec identified eight detector locations based on review of aerial imagery during a desktop analysis and land permission access to the right-of-way associated with the Project. Stantec biologists minimally adjusted survey sites in the field according to USFWS Guidelines, positioning detectors in potential flight corridors that could be suitable as NLEB foraging habitat. The eight detector locations were positioned along forested edges, small creeks or ponded/wetland areas, within open railroad corridors, or near open field areas (Figure 1). We recorded the location of each survey site using the OnX mobile app on an iPhone, photographed each site (Appendix B), and recorded habitat information on Stantec field datasheets and the USFWS Guidelines Appendix A Phase 1 Summer Habitat Assessments datasheet (Appendix C).

Stantec used eight full-spectrum acoustic bat detectors (Wildlife Acoustics© SM4) for the surveys, inspecting detectors and ensuring microphones met manufacturer calibration standards before deployment. Each detector was fitted with a SMM-U1 ultrasonic omnidirectional microphone and deployed according to the criteria in the USFWS Guidelines, positioning detectors in potential flight corridors that could provide suitable NLEB foraging habitat. Microphones were positioned in areas without vegetation or with minimal vegetation within ten meters (m) of the microphone and at least three m away from obstructions in any direction, and detectors were placed at least 200 m apart. Each detector was mounted with the microphone approximately three m above ground level and oriented horizontally to the ground to sample an optimal volume of air space in accordance with the USFWS Guidelines. The audio and data storage settings on each detector were set according to defaults recommended by the manufacturer (e.g., detectors will operate in “triggered.wav” mode using default trigger threshold settings). Each detector was set to record from 30 minutes before sunset until 30 minutes after sunrise and was powered with alkaline batteries.

DATA ANALYSIS

Although acoustic surveys focused on detecting NLEB, bat detectors are designed to detect all bats vocalizing in the vicinity of the detectors. Therefore, additional listed bat species can be detected, including eastern small-footed bat (*Myotis leibii*; state-listed endangered), little brown bat (*M. lucifugus*; state-listed endangered), and tricolored bat (*Perimyotis subflavus*; state-listed endangered). Though federally endangered Indiana bat (*M. sodalis*) is listed as endangered in Massachusetts, the state occurs outside the known range of this species and we do not believe that this species occurs at the Project. Therefore, Indiana bat was not included in acoustic analysis.

Stantec performed an initial coarse visual analysis of data to confirm that high frequency bats were recorded. Data were then converted to zero-crossing format and analyzed using Kaleidoscope Pro Software version 5.1.9 (KPro; classifier version 5.1.0), using a “0” sensitivity setting and selecting the appropriate species list for the Massachusetts region (excluding Indiana bat). This analysis method has been approved by the USFWS as suitable for analyzing full-spectrum bat data collected by SM4 units once the data have been converted to zero-crossing format.

KPro analyzes each acoustic file and assigns it a bat species identification if the program determines it contains a bat pass opposed to acoustic static. KPro also assigns a maximum likelihood estimate (MLE) to each species identified, at each detector site, for each night surveyed. According to the USFWS Guidelines, presence or probable absence of NLEB is based on the species’

MLE generated by KPro for each detector site for each night surveyed. An MLE of less than 0.05 indicates probable presence and an MLE greater than 0.05 indicates probable absence of that species at that detector site for that night.

Stantec manually reviewed all files recorded on nights with NLEB presence (MLE of less than 0.05) as a means of vetting the plausibility of NLEB presence on those nights. We also reviewed all high frequency files identified as any state listed bat species by the program, as a means of vetting the plausibility of additional bat species of interest.

RESULTS

HABITAT SURVEY

The Project area includes a proposed rail trail partially following an existing railroad with associated wetland areas traversing residential and commercial areas interspersed with fragmented stretches of forest (Figure 1). The forested habitat consists of mixed forest dominated by oak (*Quercus spp.*), maple (*Acer spp*.), and pine (*Pinus spp*.), with partially open understory. Many potential bat flight and foraging corridors exist through the surrounding mixed commercial or residential development.

FIELD SURVEY

Stantec deployed acoustic detectors on July 7, 2020, and surveys took place during the nights of July 7 and 8. Stantec monitored weather conditions at weather station KMASUDBU47 (Weather Underground, located approximately 0.7 miles west of the Project) after each night and confirmed that weather met the parameters outlined in the USFWS Guidelines during the first five hours surveyed after sunset:

- Temperatures exceeded 50°F;
- No precipitation or fog for 30 minutes or more; and
- Sustained wind speeds did not exceed nine miles/hour for 30 minutes or more.

Each detector was inspected in the field on July 9, 2020, to confirm proper operation during the two nights of deployment. Each detector operated successfully during the two nights of survey and were removed from the field.

ACOUSTIC ANALYSIS

Coarse visual analysis confirmed presence of high-frequency bat calls at each site. Analysis with KPro software identified 18 passes as NLEB and indicated presence of NLEB at three sites based on nightly MLE scores. However, visual QA/QC, performed by Dr. Trevor Peterson (see resume in Appendix D) indicated no presence, as files labeled NLEB were visually confirmed to be high frequency fragments of big brown bats (Table 1).

KPro did identify one pass as state-endangered eastern small-footed bat and indicated presence of the species at one site based on nightly MLE scores, although visual QA/QC determined that this file was a high frequency fragment of an eastern red bat (Table 1).

KPro also identified 36 passes as state-endangered little brown bat and indicated presence for the species at three sites (SU1, SU4, and SU6) based on nightly MLE scores. Visual QA/QC confirmed presence of little brown bats at Sites SU1 and SU6, but not SU4. KPro did not indicate presence of the species at the remaining five sites based on nightly MLE scores but did identify files as little brown bat at additional sites. Visual QA/QC confirmed presence of little brown bats at sites SU3 and SU8 (Table 1).

Additional species recorded at the Project included big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), and eastern red bat (*Lasiurus borealis*). Overall, big brown bats accounted for most recorded bat activity, followed by hoary bats and silver-haired bats. Of the eight sites, site SU6 had the most bat activity. Original full-spectrum and converted zero-crossing data files have been archived electronically and can be made available upon request. We have populated and included the USFWS R5 Bat Reporting Form and the 2020_MassDOT_Batsurvey_Consultant shapefile as electronic attachments.

Table 1. Acoustic analysis results for state and/or federally listed bat species based on KPro software and visual QAQC for acoustic surveys for bike path construction (Bruce Freeman Rail Trail), Sudbury, Massachusetts.

Species	Night	Detector Site								Visual QA/QC Notes
		KPro Analysis								
		# Passes (Nightly MLE Score)								
		SU1	SU2	SU3	SU4	SU5	SU6	SU7	SU8	
northern long-eared bat	7-Jul	0 (1.00)	0 (1.00)	0 (1.00)	3 (<0.01)	12 (0.00)	1 (0.03)	0 (1.00)	0 (1.00)	No presence detected during visual analysis, files labeled as MYSE were high frequency fragments of EPFU
	8-Jul	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	1 (0.01)	1 (0.26)	0 (1.00)	0 (1.00)	No presence detected during visual analysis, files labeled as MYSE were high frequency fragments of EPFU
eastern small- footed bat	7-Jul	1 (0.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	No presence based on visual QA/QC; file labeled as MYLE was a high frequency fragment of a LABO
	8-Jul	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	No passes/No presence
little brown bat	7-Jul	5 (0.01)	2 (0.17)	1 (0.85)	1 (0.68)	0 (1.00)	2 (1.00)	0 (1.00)	1 (0.95)	Presence confirmed based on visual QA/QC at site SU1
	8-Jul	4 (0.03)	0 (1.00)	0 (1.00)	6 (<0.01)	0 (1.00)	11 (<0.01)	2 (0.29)	1 (0.24)	Presence confirmed based on visual QA/QC at sites SU1, SU3, SU6, and SU8
tri-colored bat	7-Jul	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	No passes/No presence
	8-Jul	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)	No passes/No presence

CONCLUSIONS

Acoustic surveys for the Project were conducted according to requirements outlined by the USFWS Guidelines and the approved Study Plan submitted to the USFWS and MassDOT prior to fieldwork. NLEB were not detected during the survey, indicating probable absence of maternity colonies of the species at the Project during the 2020 field season. Little brown bat presence was documented at the Project based on visual analysis and nightly MLE scores. Bat activity occurred at all surveyed sites, consisting primarily of big brown bats, eastern red bats, and silver-haired bats.

Stantec Consulting Services Inc.

Alex Pries
Project Manager
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Fax: (207) 729-2715
Alex.Pries@ Stantec.com

Attachments:
APPENDIX A Study Plan
APPENDIX B Acoustic Detector Photographs
APPENDIX C NLEB Presence/Absence Acoustic Survey Datasheets and Habitat Assessment
APPENDIX D Resume of Trevor Peterson
APPENDIX E Screenshots of Bat Calls

APPENDIX A Study Plan

Boston Area Northern Long-Eared Bat Acoustic Survey Study Plan

June 22, 2020

Prepared for:

Massachusetts Department of Transportation
10 Park Plaza, Room 4260
Boston, MA 02116

Prepared by:

Stantec Consulting Services Inc.
30 Park Drive
Topsham, ME 04086

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1.0 INTRODUCTION

Massachusetts Department of Transportation (MassDOT) has retained Stantec Consulting Services Inc. (Stantec) to conduct acoustic surveys for the presence of northern long-eared bats (*Myotis septentrionalis*) along six linear transportation projects requiring tree clearing in Massachusetts (study):

- Sudbury: Sudbury Bike Path Construction (Bruce Freeman Rail Trail)
- Westford: W-26-002 Bridge Replacement: Stony Brook Road over Stony Brook
- Boxford-Georgetown: Border to Boston Trail from Georgetown Road to West Main Street (Route 97)
- Groveland: Groveland Community Trail, from Main Street to King Street
- Andover-Tewksbury: Highway lighting system rehabilitation and repair at the interchange of Interstate Routes 93 and 495
- Fitchburg-Leominster: Twin Cities Rail Trail construction Phase II

This study plan describes methods and level of effort for the acoustic survey to be conducted at each of the six project areas to determine the presence or probable absence of breeding populations of northern long-eared bats. The methods described follow the U.S. Fish and Wildlife Service's (USFWS) March 2020 Range-wide Indiana Bat Summer Survey Guidelines (USFWS Guidelines)[1,2]. Although acoustic surveys will focus on detecting northern long-eared bats, bat detectors are designed to detect all bats vocalizing in the vicinity of the detectors. Therefore, additional listed bat species may be detected including eastern small-footed bat (*Myotis leibii*; state-listed endangered), little brown bat (*M. lucifugus*; state-listed endangered), and tricolored bat (*Perimyotis subflavus*; state-listed endangered). Though federally endangered Indiana bat is listed as endangered in Massachusetts, the state occurs outside the current known range of this species and we do not believe that this species occurs within the six study areas. Therefore, Indiana bat will not be included in acoustic analysis at the six projects. The goal of the study is to assess if northern long-eared bats are utilizing potential habitat along each project during the 2020 summer maternity season.

2.0 SURVEY METHODS

We will conduct the surveys at each project within USFWS approved survey dates (15 May – 15 August 2020). Per the minimum survey efforts outlined in the USFWS Guidelines: Phase 2 Acoustic Surveys for linear projects, 2 detector-nights per kilometer (km) of suitable summer habitat that may be impacted are required for each Project. In this study plan, we have conservatively assumed that all forested areas immediately adjacent to each project's design limits provide potential roost habitat for northern long-eared bats (suitable summer habitat) and may potentially be cleared during project construction. As a result,

[1] United States Fish and Wildlife Service (USFWS). 2020. Range-Wide Indiana Bat Survey Guidelines. March 2020.
[2] The USFWS has indicated that the USFWS Guidelines are to be used to detect presence of northern long-eared bats as well as Indiana bats (*Myotis sodalis*).

and using the USFWS Guidelines, we have determined the following conservative level of effort for each area based on the distance of linear tree clearing:

- Sudbury: (7.2 km of potential tree clearing): 16 detector-nights (8 detectors deployed for 2 nights each)
- Westford: (0.1 km of potential tree clearing): 2 detector-nights (1 detector deployed for 2 nights)
- Boxford-Georgetown: (3.6 km of potential tree clearing): 8 detector-nights (4 detectors deployed for 2 nights each)
- Groveland: (3.2 km of potential tree clearing): 8 detector-nights (4 detectors deployed for 2 nights each)
- Andover-Tewksbury: (3.7 km of potential tree clearing): 8 detector-nights (4 detectors deployed for 2 nights each)
- Fitchburg-Leominster: (0.7 km of potential tree clearing): 2 detector-nights (1 detector deployed for 2 nights)

Stantec will use full-spectrum (e.g., Wildlife Acoustics© SM4) acoustic bat detectors for the surveys. Each detector will be fitted with an SMM-U2 ultrasonic omnidirectional microphone. We will deploy detectors according to the criteria in the USFWS Guidelines; positioning detectors in potential flight corridors that could provide suitable northern long-eared bat foraging habitat. As USFWS Guidelines recommend, microphones will be located in areas without vegetation or with minimal vegetation within 10 meters (m) of the microphone, any obstructions will be located at least 3 m away from microphones in any direction, and detectors will be placed at least 200 m apart.

Based on a review of aerial imagery during a desktop analysis and assumed access to the Right of Way (ROW) associated with each linear project, Stantec identified proposed detector locations for each project (Figures 1–6). The proposed locations along the edge of the ROW and adjacent to tree clearing areas are spread out across each project and target either large segments of forest or forested areas near a wetland, field, or bridge. Final detector deployment will be determined by the biologist in the field and is also subject to landowner permission and access. In areas without landowner permission or suitable access, final detector placement will be in the closest appropriate location within a town, municipal, or state ROW depending on the project. Final detector locations will also be based on a field assessment and by criteria in the USFWS Guidelines. We will record coordinates of the final detector locations using the Collector for ArcGIS application, document the approximate accuracy of the application, and photograph each detector so as to show scale (e.g., include a vehicle or person in the photo) and the surrounding habitat and the “detector-view." For each detector site, we will document relevant deployment and habitat information on a Stantec field datasheet and on the USFWS Guidelines Appendix A Phase 1 Summer Habitat Assessments datasheet (Appendix A).

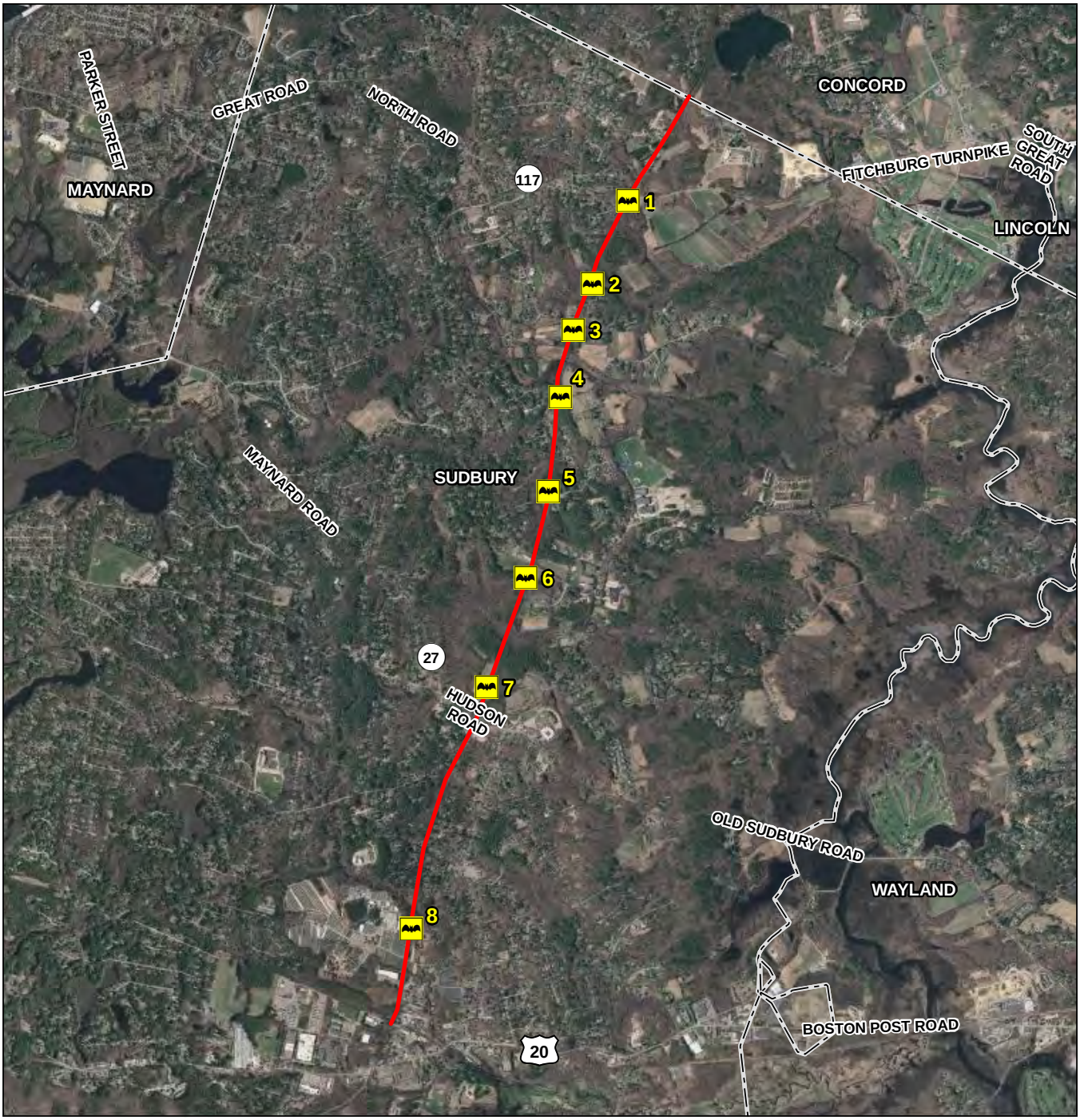
We will mount each detector so that the microphone is approximately 3 m above ground level and oriented horizontally to the ground to sample an optimal volume of air space in accordance with the USFWS Guidelines. We will set the audio and data storage settings on each detector according to defaults recommended by the manufacturer (e.g., detectors will operate in “triggered .wav” mode using

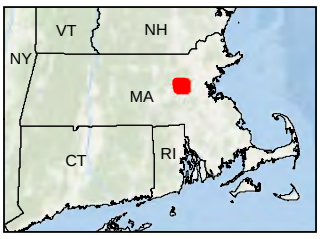
default trigger threshold settings recommended by the manufacturer). We will program each detector to record from 30 minutes before sunset until 30 minutes after sunrise and will power each detector with alkaline batteries.

We will leave detectors in place at each survey site until at least two calendar nights have been successfully surveyed during weather conditions that meet the parameters outlined in the USFWS Guidelines:

- Temperatures remain above 50° F during the first 5 hours of each survey night;
- Precipitation/fog persists for no more than 30 minutes during the first 5 hours of each survey night; and
- Sustained wind speeds do not exceed 9 miles/hour for 30 minutes or more during the first 5 hours of each survey night.

We will verify weather conditions by reviewing hourly data recorded by the nearest weather station to each detector site, accessed online via Weather Underground (www.wunderground.com). We will record the weather station ID for each station used on the corresponding field datasheet. Following the first two weather-appropriate nights of data collection, we will inspect each detector as soon as practicable in the field to confirm that each operated for two nights (i.e., check battery voltage, verify presence of recorded files, and view system status log files). Once confirmed, we will remove the detectors from the field. We will analyze only those data from the first two nights that meet the weather criteria.





Legend

- Proposed Acoustic Survey Location
- Project Area
- Municipal Boundary

0 0.75 Miles

(At original document size of 8.5x11)
1:45,000

N

Stantec

Notes

1. Coordinate System: WGS 1984 Mercator 41
2. Background: MassGIS 2013-2014 USGS Color Orthoimagery

Project Location
Sudbury, MA

Prepared by KWH on 2020-05-27
TR by LJ on 2020-05-27
IR Review by AP on 2020-05-27

Client/Project 179410716
Massachusetts Department of Transportation
Boston Area-Sudbury Northern Long-eared Bat Acoustic Survey

Figure No.
1

Title
Northern Long-eared Bat Acoustic Survey Proposed Location Map

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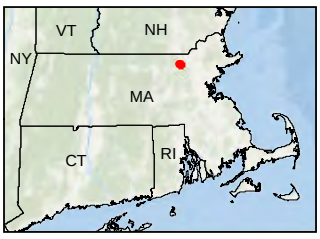

Legend

- Proposed Acoustic Survey Location
- Project Area
- Municipal Boundary

0 200 Feet

(At original document size of 8.5x11)
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Notes

1. Coordinate System: WGS 1984 Mercator 41
2. Background: MassGIS 2013-2014 USGS Color Orthoimagery

Stantec

Project Location
Westford, MA

Prepared by KWH on 2020-05-27
TR by LJ on 2020-05-27
IR Review by AP on 2020-05-27

Client/Project
179410716
Massachusetts Department of Transportation
Boston Area - Westford Northern Long-eared Bat Acoustic Survey

Figure No.
2

Title
Northern Long-eared Bat Acoustic Survey Proposed Location Map

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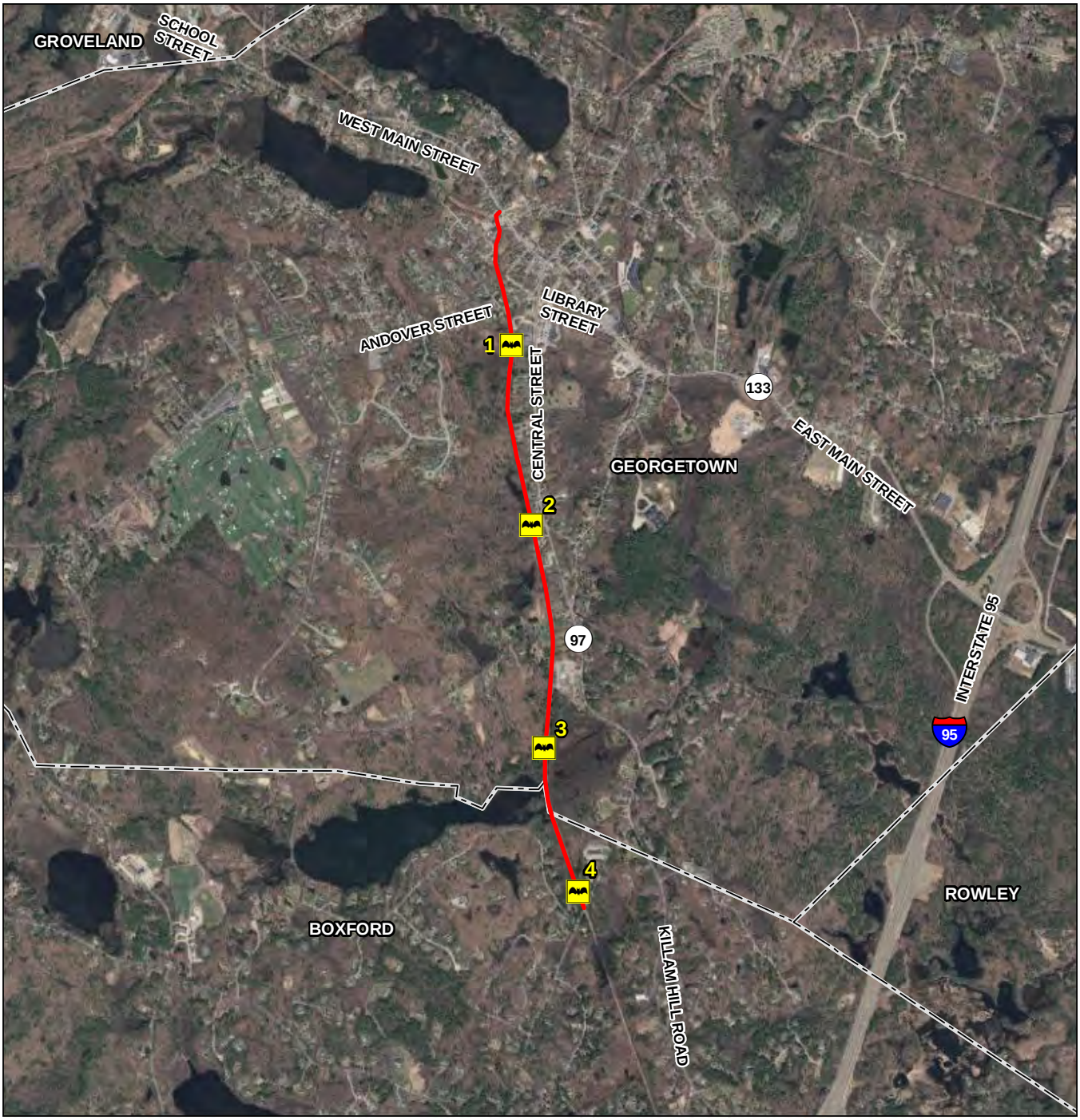

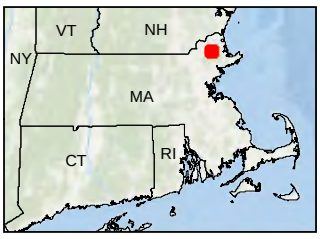

Legend

- Proposed Acoustic Survey Location
- Project Area
- Municipal Boundary

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(At original document size of 8.5x11)
1:31,680

N

Stantec

Project Location
Georgetown/Boxford, MA

Prepared by KWH on 2020-05-27
TR by LJ on 2020-05-27
IR Review by AP on 2020-05-27

Client/Project 179410716
Massachusetts Department of Transportation
Boston Area - Georgetown/Boxford Northern Long-eared Bat Acoustic Survey

Figure No.
3

Title
Northern Long-eared Bat Acoustic Survey Proposed Location Map

Notes
1. Coordinate System: WGS 1984 Mercator 41
2. Background: MassGIS 2013-2014 USGS Color Orthoimagery

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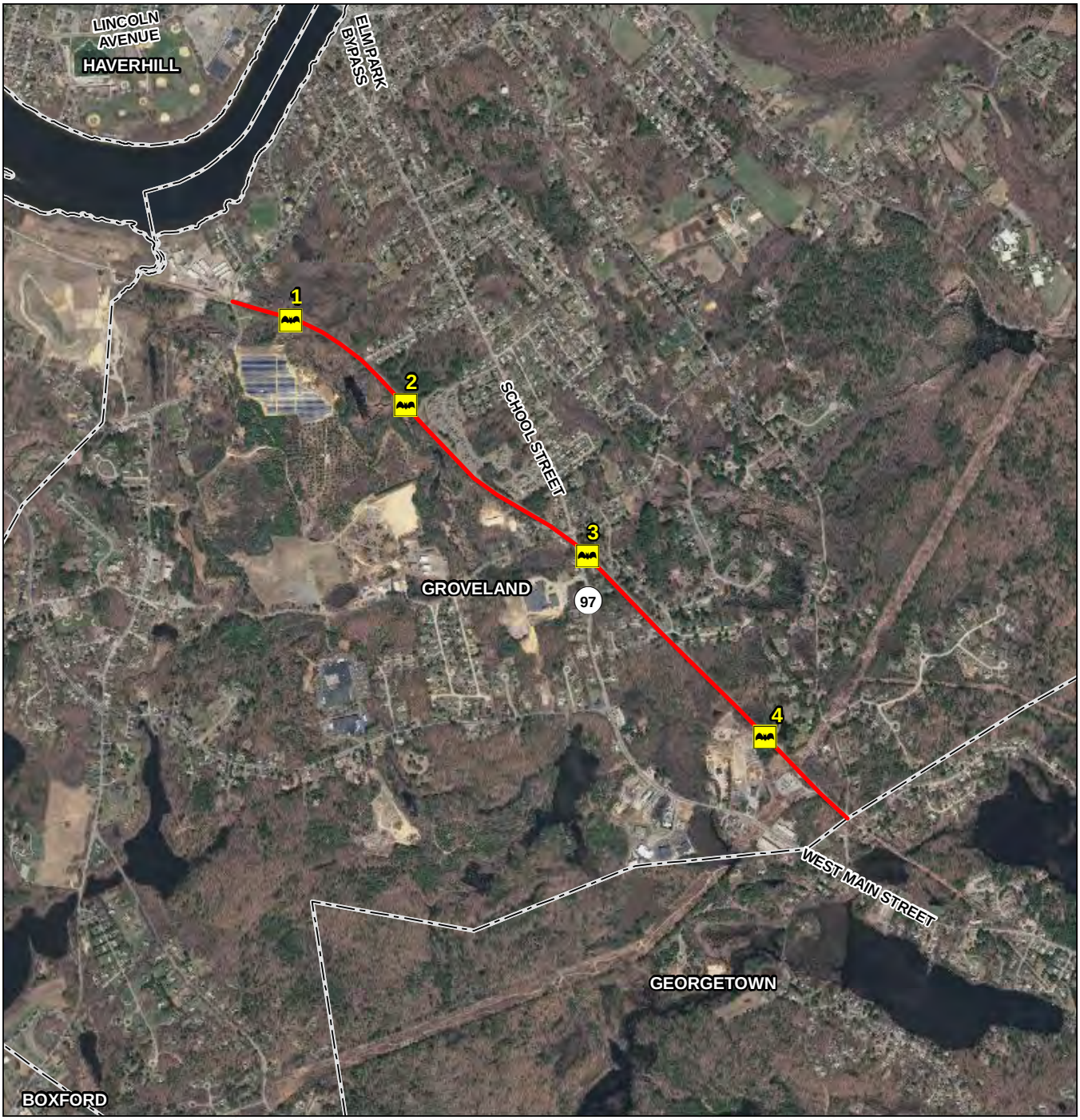

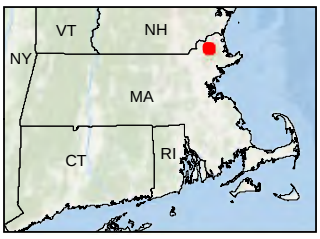

Legend

- Proposed Acoustic Survey Location
- Project Area
- Municipal Boundary

0 2,000 Feet

(At original document size of 8.5x11)
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Stantec

Notes

1. Coordinate System: WGS 1984 Mercator 41
2. Background: MassGIS 2013-2014 USGS Color Orthoimagery

Project Location
Groveland, MA

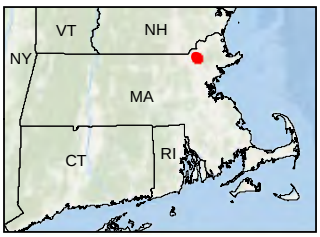
Prepared by KWH on 2020-05-27
TR by LJ on 2020-05-27
IR Review by AP on 2020-05-27

Client/Project
179410716
Massachusetts Department of Transportation
Boston Area - Groveland Northern Long-eared Bat Acoustic Survey

Figure No.
4

Title
Northern Long-eared Bat Acoustic Survey Proposed Location Map

V:\1956\active\ Task Owner and other Non-BC\1956 Jobs\179410716\03 data\gis cad\arcMXDs\NLEB\179410716 04 NLEB Groveland.mxd Revised: 2020-05-27 By: khoward



Legend

- Proposed Acoustic Survey Location
- Project Area
- Municipal Boundary

0 1,000 Feet

(At original document size of 8.5x11)
1:12,000

N

Stantec

Project Location
Andover/Tewksbury, MA

Prepared by KWH on 2020-05-27
TR by LJ on 2020-05-27
IR Review by AP on 2020-05-27

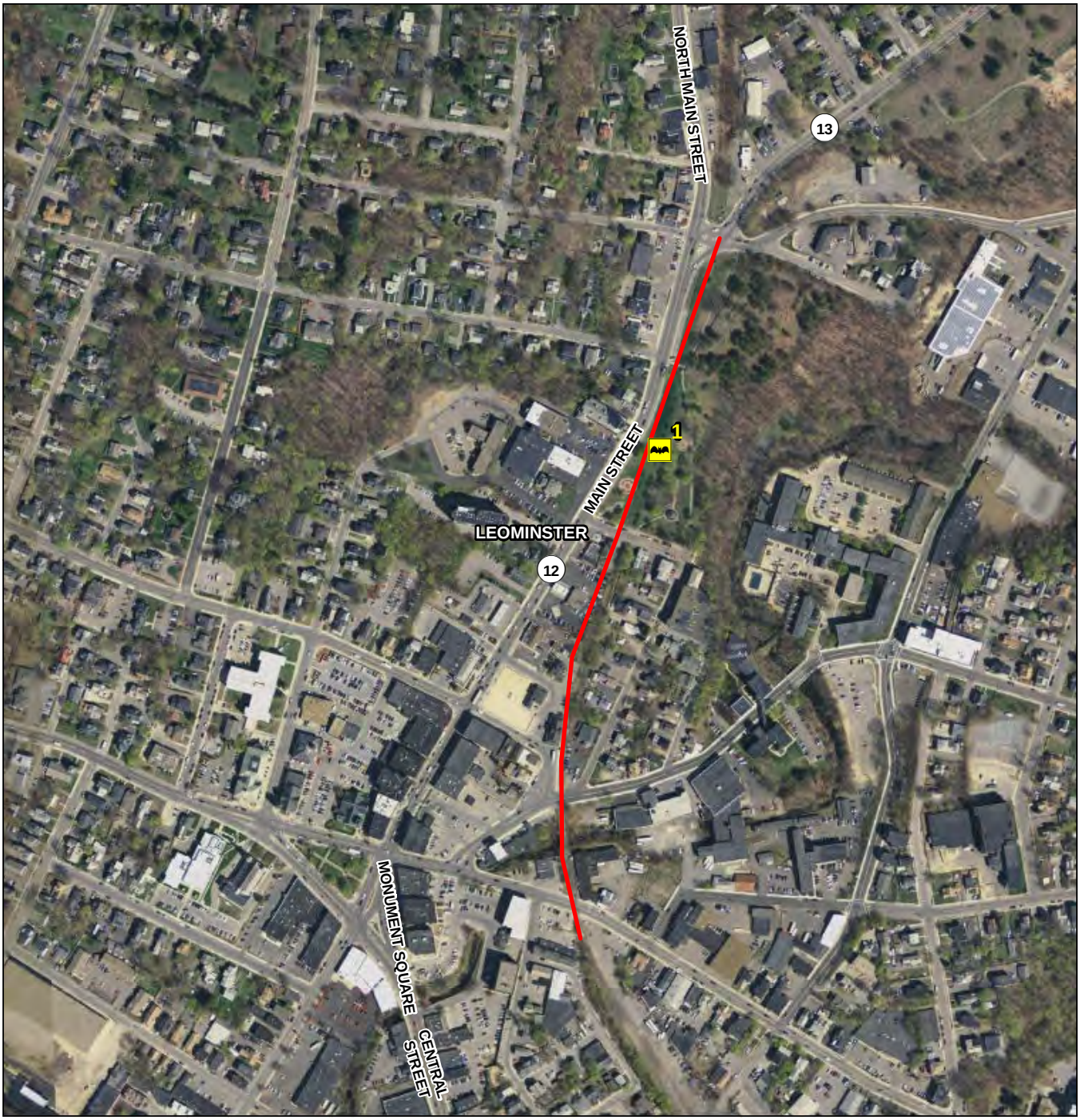
Client/Project
179410716
Massachusetts Department of Transportation
Boston Area - Andover/Tewksbury Northern Long-eared Bat Acoustic Survey

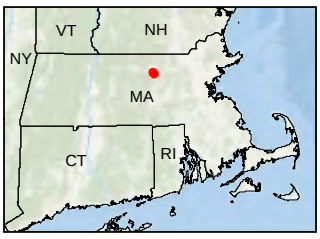
Figure No.
5

Title
Northern Long-eared Bat Acoustic Survey Proposed Location Map

Notes
1. Coordinate System: WGS 1984 Mercator 41
2. Background: MassGIS 2013-2014 USGS Color Orthoimagery

V:\1956\active\ Task Owner and other Non-BC\1956 Jobs\179410716\03 data\gis cad\gis\MXDs\NLEB\179410716 05 NLEB Andover.mxd Revised: 2020-05-27 By: khoward





Legend

- Proposed Acoustic Survey Location
- Project Area
- Municipal Boundary

0 500 Feet

(At original document size of 8.5x11)
1:6,000

N

Stantec

Notes

1. Coordinate System: WGS 1984 Mercator 41
2. Background: MassGIS 2013-2014 USGS Color Orthoimagery

Project Location
Fitchburg/Leominster, MA

Prepared by KWH on 2020-05-27
TR by LJ on 2020-05-27
IR Review by AP on 2020-05-27

Client/Project 179410716
Massachusetts Department of Transportation
Boston Area - Fitchburg/Leominster Northern Long-eared Bat Acoustic Survey

Figure No.
6

Title
Northern Long-eared Bat Acoustic Survey Proposed Location Map

V:\1956\active_Task Owner and other Non-BC\1956.Jobs\179410716\03_data\gis_cad\gis\MXDs\NLEB\179410716_06_NLEB_Fitchburg.mxd Revised: 2020-05-27 By: khoward

3.0 ANALYSIS

Stantec bat biologists will perform a coarse visual analysis of the data to confirm that high frequency bats were recorded, and if so, we will then analyze data using Kaleidoscope Pro Software version 5.1.9 (classifier version 5.1.0; Kaleidoscope), using a “0” sensitivity setting and by selecting for the Massachusetts region. This analysis method has been approved by the USFWS as suitable for analyzing full-spectrum bat data collected by SM4 units once the data have been converted to zero-crossing format. We will base presence or probable absence of northern long-eared bats on the maximum likelihood estimate (MLE) generated by Kaleidoscope for each night. An MLE of less than 0.05 indicates probable presence and an MLE greater than 0.05 indicates probable absence. Original full-spectrum and converted zero-crossing data files will be archived electronically and made available upon request.

Stantec will manually inspect each file recorded for each detector site/night that Kaleidoscope calculates probable presence (an MLE of less than 0.05) for northern long-eared bats. Stantec will also visually inspect each high frequency call sequence recorded by detectors, thereby manually vetting all high frequency call identification determinations (or lack of identification) made by Kaleidoscope. Though acoustic surveys will primarily focus on detecting northern long-eared bats and other high frequency species, calls from all bat species will be analyzed by the software and manually inspected. Stantec biologists with relevant experience and training in acoustic bat identification will conduct the manual vetting. Credentials and experience of biologists performing the manual vetting will be indicated in the survey report.

4.0 REPORTING

Stantec will prepare a separate report for each project describing the methods and results of the surveys as soon as possible after field work to ensure MassDOT meets their targeted transmittal to USFWS in late fall 2020. Each report will include completed Stantec and USFWS datasheets for the detector sites, a map showing the location of each detector site, photos of the detector setups, screenshots of listed bat species’ calls identified during analysis, tables summarizing the output from the Kaleidoscope identification software for all species identified, results of manual vetting, the resume of the biologist who conducted the manual vetting, the USFWS R5 Bat Reporting Form, and any other information required by the USFWS Guidelines. Associated Geographic Information System data, original acoustic data, status or log files, and software output will be retained and made available upon request. Stantec will also provide MassDOT with the results of the survey in excel format based on the 2020 MassDOT Bat Survey Consultant format.

APPENDIX A STANTEC NLEB BAT PRESENCE/ABSENCE ACOUSTIC SURVEY DATASHEET AND USFWS PHASE 1 SUMMER HABITAT ASSESSMENTS DATASHEET

NLEB Presence/Absence Acoustic Survey Datasheet - Stantec

Project No. 608164-19678

Project Name __________ Site ID __________ Weather Station Provider __________

Surveyor Initials __________ Lat. (+/- error) __________ Weather Station ID __________

Deployment Date __________ Long. (+/- error) __________

Sampling Location Specific Characteristics - Check all that apply

- ☐ Forest Canopy Opening
- ☐ Near water
- ☐ Recently logged with remaining potential roost trees
- ☐ Road and/or stream corridor with open tree canopy or canopy height > 10m
- ☐ Woodland edge
- ☐ Other - Describe __________

Additional Habitat Notes

Unit Specific Deployment Characteristics - Must meet all criteria

Y	N	
☐	☐	> 3 m in any direction from vegetation or other obstructions
☐	☐	Minimal or no vegetation within 10m in front of microphone
☐	☐	Parallel to woodland edge
☐	☐	>15m from known or suitable roosts
☐	☐	>3 m above ground level
☐	☐	>200m from adjacent acoustic sampling location
☐	☐	Within expected flight height

If any criteria are answered 'NO' justification is required

Unit Information

Make/Model __________ Data Division Ratio __________ Recording Schedule START __________

Serial Number __________ Sensitivity __________ Detection Range (m) __________ STOP __________

Housing/Weatherproofing description __________

Site Sketch

A00830 - 555

Daily Survey Data

Sampling Night # ________ Survey Date ____________

Y N

☐ ☐ Microphone operating normally

☐ ☐ Other unit operations normal

☐ ☐ Nightly temperatures >50F for first 5 hours

☐ ☐ No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours

☐ ☐ Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # ________ Survey Date ____________

Y N

☐ ☐ Microphone operating normally

☐ ☐ Other unit operations normal

☐ ☐ Nightly temperatures >50F for first 5 hours

☐ ☐ No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours

☐ ☐ Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # ________ Survey Date ____________

Y N

☐ ☐ Microphone operating normally

☐ ☐ Other unit operations normal

☐ ☐ Nightly temperatures >50F for first 5 hours

☐ ☐ No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours

☐ ☐ Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # ________ Survey Date ____________

Y N

☐ ☐ Microphone operating normally

☐ ☐ Other unit operations normal

☐ ☐ Nightly temperatures >50F for first 5 hours

☐ ☐ No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours

☐ ☐ Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials ____________

Y N

☐ ☐ Bats recorded

☐ ☐ High frequency calls exist >35kHz

Additional Coarse Analysis Notes

Automated Analysis

Application Name ____________________ Version __________

Output File Name ____________________________________

Biologist Initials __________

Night #	# of Calls	MLE	Additional Automated Analysis Notes

Application Name ____________________ Version __________

Output File Name ____________________________________

Biologist Initials __________

Night #	# of Calls	MLE	Additional Automated Analysis Notes

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: _____ Date: _____

Township/Range/Section: _____

Lat Long/UTM/ Zone: _____ Surveyor: _____

Brief Project Description

Project Area

	Total Acres	Forest Acres	Open Acres
Project			

	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing
Proposed Tree Removal (ac)			

Vegetation Cover Types

Pre-Project	Post-Project

Landscape within 5 mile radius

Flight corridors to other forested areas?
Describe Adjacent Properties (e.g. forested, grassland, commercial or residencial development, water sources)

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): _____

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)		Open and accessible to bats?		
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
Dominant Species of Mature Trees				
% Trees w/ Exfoliating Bark				
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
No. of Suitable Snags				

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? _____

Additional Comments:

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

APPENDIX B Acoustic Detector Photographs

Site SU1: View of microphone (left) and detector view (right). The microphone is located at the top of the metal pole, approximately 3 m above vegetation height, angled horizontally to the ground and oriented towards the forest opening over a small creek to the east.

Site SU2: View of microphone (left) and detector view (right). The microphone is located at the top of the metal pole, approximately 3 m above vegetation height, angled horizontally to the ground and oriented towards a wetland to the east.

Site SU3: View of microphone (left) and detector view (right). The microphone is located at the top of the metal pole, approximately 3 m above vegetation height, angled horizontally to the ground and oriented towards a large wetland to the east.

Site SU4: View of microphone (left) and detector view (right). The microphone is located at the top of the metal pole, approximately 3 m above vegetation height, angled horizontally to the ground and oriented towards the open railroad corridor to the north.

Site SU5: Detector view of site. The microphone is located at the top of the metal pole, approximately 3 m above vegetation height, angled horizontally to the ground and oriented towards the open railroad corridor to the south. Note: No microphone view of detector obtained at this site.

Site SU6: View of microphone (left) and detector view (right). The microphone is located at the top of the metal pole, approximately 3 m above vegetation height, angled horizontally to the ground and oriented towards the pond to the west.

Site SU7: Detector view of site. The microphone is located at the top of the metal pole, approximately 3 m above vegetation height, angled horizontally to the ground and oriented towards the open playing field to the north. Note: No microphone view of detector obtained at this site.

Site SU8: View of microphone (left) and detector view (right). The microphone is located at the top of the metal pole, approximately 3 m above vegetation height, angled horizontally to the ground and oriented towards the creek and riparian system to the east.

APPENDIX C NLEB Presence/Absence Acoustic Survey Datasheets and Habitat Assessment

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name: MASSDOT - SUDBURY
Date: 07/07/20 - 07/09/2020
Township/Range/Section:
Lat Long/UTM/ Zone: 301515 E; 4696050 N (Zone 19T)
Surveyor: A. Pries & D. Benedix

Brief Project Description

Creation of multi-use trail along abandoned railroad corridor.

Project Area

	Total Acres	Forest Acres	Open Acres
Project	?	?	?

Proposed Tree Removal (ac)	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing
	?	?	?

Vegetation Cover Types

Pre-Project	Post-Project
Mixed mosaic of hardwood/softwood stands & wetland/ open water areas	? Likely to remain the same as tree clearing limited to maintaining corridor for multi-use.

Landscape within 5 mile radius

Flight corridors to other forested areas?
Yes, railroad corridor likely allows for flight across the landscape.

Describe Adjacent Properties (e.g. forested, grassland, commercial or residencial development, water sources)
Mix of residential development, agriculture, & forests.

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?
Raymond Reservation (100 acres) is to immediate south. Piper Farm Conservation Area (70-acre) is about 0.5 mile to east.

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): Sudbury 1

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral: N/A	Intermittent: 1 ; 100'	Perennial: N/A	Describe existing condition of water sources: small, narrow creek running west to east near trailhead
Pools/Ponds (# and size)	N/A	Open and accessible to bats? N/A		
Wetlands (approx. ac.)	Permanent: N/A	Seasonal: N/A		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
	1	4	4	
Dominant Species of Mature Trees	oak, maple, & dedicious spp.			
% Trees w/ Exfoliating Bark	<5%	<5%	0%	
Size Composition of Live Trees (%)	Small (3-8 in): 5%	Med (9-15 in): 90%	Large (>15 in): 5%	
No. of Suitable Snags		1-2		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Yes

Additional Comments:
Detector placed towards small forest opening above the creek. Some larger diameter midstory/canopy hardwoods along riparian edge.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Ibat Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name: BOSTON-MASSDOT
Site ID: SUDBURY 1
Weather Station Provider: Weather Underground
Surveyor Initials: AJP
Lat. (+/- error): 42.41722
Weather Station ID: Liberty Hill KMASUDBU47
Deployment Date: 07/07/2020
Long. (+/- error): -71.40174

Sampling Location Specific Characteristics - Check all that apply

- [x] Forest Canopy Opening
- [x] Near water
- [ ] Recently logged with remaining potential roost trees
- [x] Road and/or stream corridor with open tree canopy or canopy height > 10m
- [x] Woodland edge
- [ ] Other - Describe

Additional Habitat Notes: Along small creek near trailhead

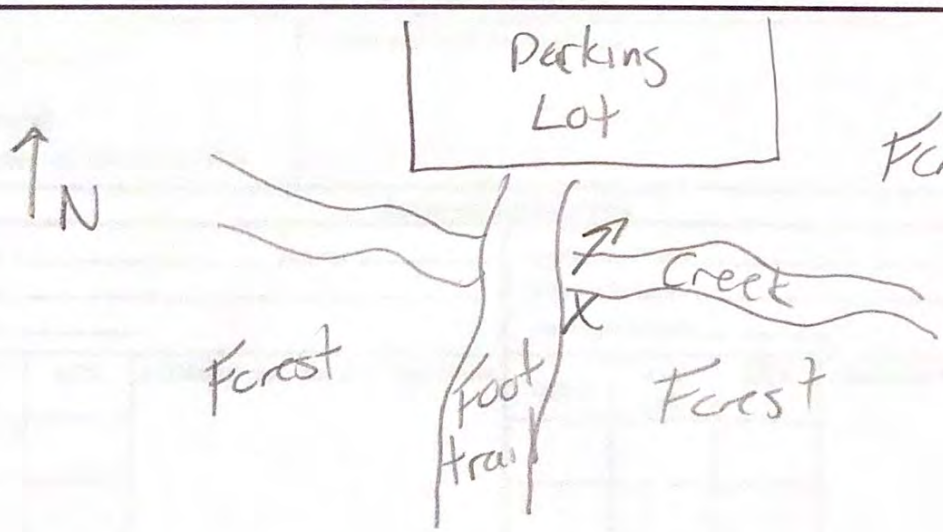
Unit Specific Deployment Characteristics - Must meet all criteria

Y	N		If any criteria are answered 'NO' justification is required
✓		> 3 m in any direction from vegetation or other obstructions	N/A
✓		Minimal or no vegetation within 10m in front of microphone	
✓		Parallel to woodland edge	
✓		>15m from known or suitable roosts	
✓		>3 m above ground level	
✓		>200m from adjacent acoustic sampling location	
✓		Within expected flight height	

Unit Information

Make/Model: SM4FS
Data Division Ratio: N/A
Recording Schedule START: -30 sunset
Serial Number: SH01782
Sensitivity: N/A
Detection Range (m): N/A
STOP: +30 sunrise
Housing/Weatherproofing description: None

Site Sketch



Daily Survey Data

Sampling Night # 1 Survey Date 07/07/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 2 Survey Date 07/08/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 7/7/20 Survey Date 1

Y	N	
☒	☐	Microphone operating normally
☒	☐	Other unit operations normal
☒	☐	Nightly temperatures >50F for first 5 hours
☒	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☒	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # 2 Survey Date 7/8/20

Y	N	
☒	☐	Microphone operating normally
☒	☐	Other unit operations normal
☒	☐	Nightly temperatures >50F for first 5 hours
☒	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☒	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials TSP

Y	N	
☒	☐	Bats recorded
☒	☐	High frequency calls exist >35kHz

Additional Coarse Analysis Notes

Automated Analysis

Application Name KPro Version 5.1.9g
Output File Name id_QAQC.csv
Biologist Initials TSP 5.1.0 classifier

Night #	# of Calls	MLE
1	5	0.011
2	4	0.030

Additional Automated Analysis Notes
MYLU
presence confirmed visually both nights

Application Name _____ Version _____
Output File Name Same
Biologist Initials _____

Night #	# of Calls	MLE
1	1	0

Additional Automated Analysis Notes
MYLE
presence not confirmed visually

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): SUDBURY 2

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial
	N/A	N/A	N/A
Pools/Ponds (# and size)	N/A	Open and accessible to bats? N/A	
Wetlands (approx. ac.)	Permanent 0.25ac	Seasonal N/A	

Describe existing condition of water sources: small cattail-dominated wetland with some shrub/tree encroachment

Forest Resources at Sample Site

	Canopy (> 50')	Midstory (20-50')	Understory (<20')
Closure/Density	5	4	1
Dominant Species of Mature Trees	Pines, maples, oaks		
% Trees w/ Exfoliating Bark	5%	5%	0%
Size Composition of Live Trees (%)	Small (3-8 in) 15%	Med (9-15 in) 80%	Large (>15 in) 5%
No. of Suitable Snags		2-3	

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Yes

Additional Comments:
Detector placed in NE corner of small wetland facing over wetland & larger trees. (0.25ac)

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy, examples of potential suitable snags and live trees; water sources

Ibat Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name: BOSTON - MASSDOT
Site ID: SUDBURY 2
Weather Station Provider: Weather Underground
Surveyor Initials: ASP
Lat. (+/- error): 42.41272
Weather Station ID: Liberty Hill KMASUDBU47
Deployment Date: 07/07/2020
Long. (+/- error): -71.40498

Sampling Location Specific Characteristics - Check all that apply

- [x] Forest Canopy Opening
- [ ] Near water
- [ ] Recently logged with remaining potential roost trees
- [ ] Road and/or stream corridor with open tree canopy or canopy height > 10m
- [x] Woodland edge
- [ ] Other - Describe

Additional Habitat Notes: along NE corner of wetland w/in largely canopied forest

Unit Specific Deployment Characteristics - Must meet all criteria

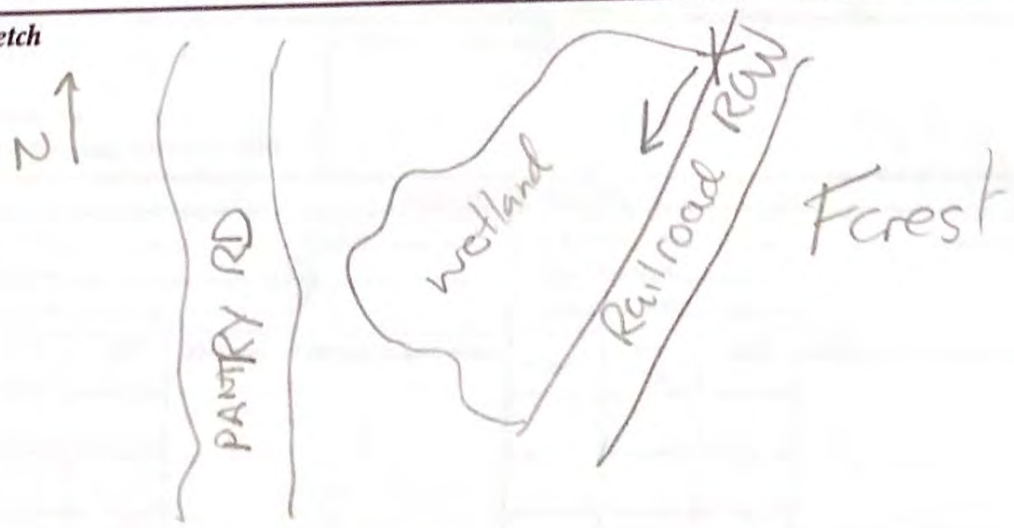
If any criteria are answered 'NO' justification is required: N/A

Y	N	
[x]	[ ]	> 3 m in any direction from vegetation or other obstructions
[x]	[ ]	Minimal or no vegetation within 10m in front of microphone
[x]	[ ]	Parallel to woodland edge
[x]	[ ]	>15m from known or suitable roosts
[x]	[ ]	>3 m above ground level
[x]	[ ]	>200m from adjacent acoustic sampling location
[x]	[ ]	Within expected flight height

Unit Information

Make/Model: SM4FS
Data Division Ratio: N/A
Recording Schedule START: -30 sunset
Serial Number: S4U00671
Sensitivity: N/A
Detection Range (m): N/A
STOP: +30 sunrise
Housing/Weatherproofing description: None

Site Sketch



Daily Survey Data

Sampling Night # 1 Survey Date 07/07/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 2 Survey Date 07/08/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 1 Survey Date 7/7

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # 2 Survey Date 7/8

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials TSP

Y	N	
☑	☐	Bats recorded
☑	☐	High frequency calls exist >35kHz

Additional Coarse Analysis Notes

LABO, no Myotis or PESU
MLE, no QAQC

Automated Analysis

Application Name KPro Version 5.1.9
Output File Name id-QAQC.xlsx
Biologist Initials TSP classifier 5.1.0

Night #	# of Calls	MLE	Additional Automated Analysis Notes
			no QAQC

Application Name _____ Version _____
Output File Name _____
Biologist Initials _____

Night #	# of Calls	MLE	Additional Automated Analysis Notes

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): SUDBURY 3

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral: N/A	Intermittent: N/A	Perennial: N/A	Describe existing condition of water sources: Small (0.5 ac) wetland covered in vegetation
Pools/Ponds (# and size)	N/A	Open and accessible to bats? N/A		
Wetlands (approx. ac.)	Permanent: 0.5 ac.	Seasonal: N/A		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50') 4	Midstory (20-50') 2	Understory (<20') 2	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
Dominant Species of Mature Trees	Oak, pine, maple			
% Trees w/ Exfoliating Bark	5%	5%	0%	
Size Composition of Live Trees (%)	Small (3-8 in) 10%	Med (9-15 in) 90%	Large (>15 in) <1%	
No. of Suitable Snags		1-3		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Yes

Additional Comments:
Detector placed next to wetland facing it, and adjacent to forest opening & larger diameter oaks / pines

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Ibat Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name: BOSTON - MASSDOT
Surveyor Initials: AJP
Deployment Date: 07/07/2020
Site ID: SUDBURY 3
Lat. (+/- error): 42.40877
Long. (+/- error): -71.40667
Weather Station Provider: Weather Underground
Weather Station ID: Liberty Mill KMASUDBU47

Sampling Location Specific Characteristics - Check all that apply

- [x] Forest Canopy Opening
- [x] Near water
- [ ] Recently logged with remaining potential roost trees
- [ ] Road and/or stream corridor with open tree canopy or canopy height > 10m
- [x] Woodland edge
- [ ] Other - Describe ____

Additional Habitat Notes: Along SW edge of wetland, located just downslope of old railroad track

Unit Specific Deployment Characteristics - Must meet all criteria

Y	N	Criterion
✓		> 3 m in any direction from vegetation or other obstructions
✓		Minimal or no vegetation within 10m in front of microphone
✓		Parallel to woodland edge
✓		>15m from known or suitable roosts
✓		>3 m above ground level
✓		>200m from adjacent acoustic sampling location
✓		Within expected flight height

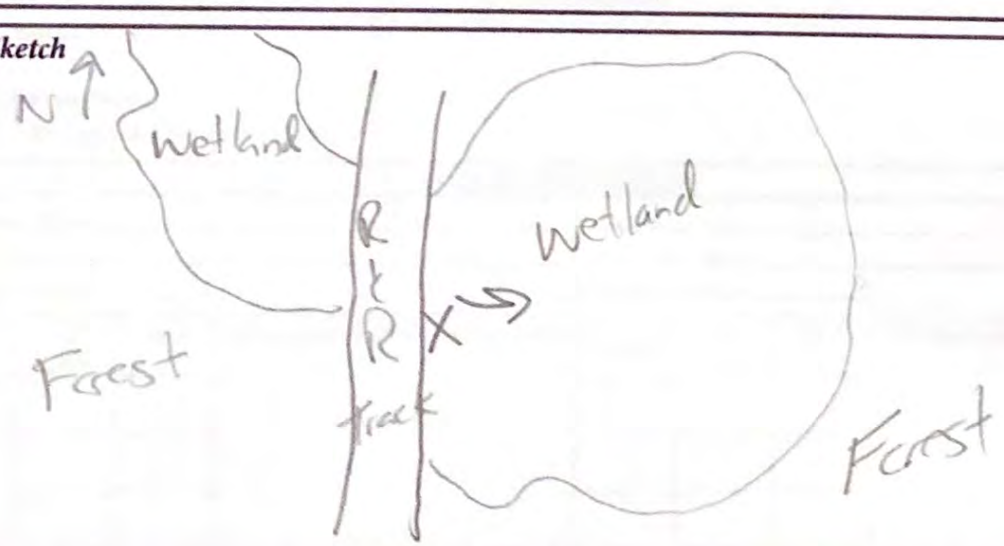
If any criteria are answered 'NO' justification is required

N/A

Unit Information

Make/Model: SM4 FS
Data Division Ratio: N/A
Recording Schedule START: -30 sunrise
Serial Number: S4U00796
Sensitivity: N/A
Detection Range (m): N/A
STOP: +30 sunset
Housing/Weatherproofing description: None

Site Sketch



Daily Survey Data
Sampling Night # 1 Survey Date 07/07/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data
Sampling Night # 2 Survey Date 07/08/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data
Sampling Night # 1 Survey Date 7/7

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data
Sampling Night # 2 Survey Date 7/8

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials TSP

Y	N	
☑	☐	Bats recorded
☑	☐	High frequency calls exist >35kHz

Additional Coarse Analysis Notes

Automated Analysis

Application Name Kpro Version 5.1.9g
Output File Name id-QAQC.xlsx
Biologist Initials TSP class. 5.1.0

Night #	# of Calls	MLE	Additional Automated Analysis Notes
			no QAQC

Application Name _____ Version _____
Output File Name _____
Biologist Initials _____

Night #	# of Calls	MLE	Additional Automated Analysis Notes

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): SUDBURY 4

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral: N/A	Intermittent: N/A	Perennial: N/A	Describe existing condition of water sources: No immediate water sources.
Pools/Ponds (# and size)	N/A	Open and accessible to bats? N/A		
Wetlands (approx. ac.)	Permanent: N/A	Seasonal: N/A		

Forest Resources at Sample Site

	Canopy (> 50')	Midstory (20-50')	Understory (<20')
Closure/Density	5	2	1
Dominant Species of Mature Trees	Pines & other conifers		
% Trees w/ Exfoliating Bark	<5%	<5%	<5%
Size Composition of Live Trees (%)	Small (3-8 in): 5%	Med (9-15 in): 90%	Large (>15 in): 5%
No. of Suitable Snags	0		

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Yes, likely for foraging & travel

Additional Comments:
small conifer-dominated stand with railroad corridor running through it. Mix of homes & agricultural lands to west & east. Detector placed facing open corridor as potential flight path

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Ibat Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name: BOSTON - MASSDOT
Surveyor Initials: AJP
Deployment Date: 07/07/2020
Site ID: SUDBURY 4
Lat. (+/- error): 42.40437
Long. (+/- error): -71.40800
Weather Station Provider: Weather Underground
Weather Station ID: Liberty Hill KMASUDBU47

Sampling Location Specific Characteristics - Check all that apply

- [x] Forest Canopy Opening
- [ ] Near water
- [ ] Recently logged with remaining potential roost trees
- [ ] Road and/or stream corridor with open tree canopy or canopy height > 10m
- [ ] Woodland edge
- [ ] Other - Describe

Additional Habitat Notes: Along railroad corridor w/ wetland to west

Unit Specific Deployment Characteristics - Must meet all criteria

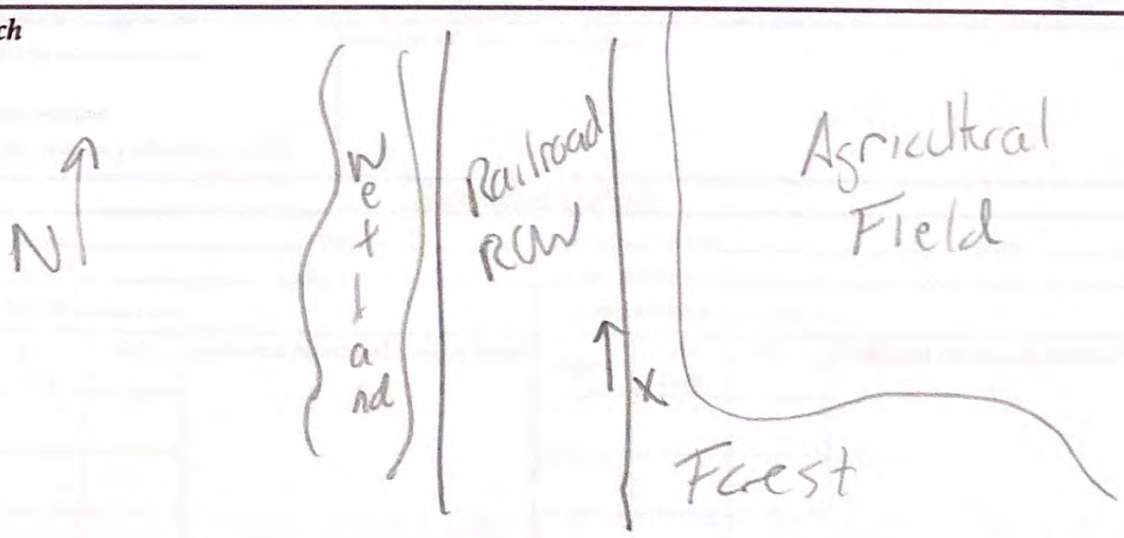
If any criteria are answered 'NO' justification is required

Y	N	
[x]	[ ]	> 3 m in any direction from vegetation or other obstructions
[x]	[ ]	Minimal or no vegetation within 10m in front of microphone
[x]	[ ]	Parallel to woodland edge
[x]	[ ]	>15m from known or suitable roosts
[x]	[ ]	>3 m above ground level
[x]	[ ]	>200m from adjacent acoustic sampling location
[x]	[ ]	Within expected flight height

Unit Information

Make/Model: SM4FS
Data Division Ratio: N/A
Recording Schedule START: -30 sunset
Serial Number: SM01252
Sensitivity: N/A
Detection Range (m): N/A
STOP: +30 sunrise
Housing/Weatherproofing description: None

Site Sketch



Daily Survey Data

Sampling Night # 1 Survey Date 07/07/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 2 Survey Date 07/08/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 1 Survey Date 7/7

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # 2 Survey Date 7/8

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials TSP

Y	N	
☑	☐	Bats recorded
☑	☐	High frequency calls exist >35kHz

Additional Coarse Analysis Notes

Automated Analysis

Application Name KPro Version 5.1.9g
Output File Name id-QAQC.xlsx
Biologist Initials TSP Class. 5.1.0

Night #	# of Calls	MLE	Additional Automated Analysis Notes
2	6	0.001	MYLU presence not confirmed (LABO fragments)

Application Name Same Version
Output File Name
Biologist Initials

Night #	# of Calls	MLE	Additional Automated Analysis Notes
1	3	<0.001	MYSE presence not confirmed (EPFU fragments)

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): Subject 5

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial
	N/A	1 / 100'	N/A
Pools/Ponds (# and size)	N/A	Open and accessible to bats? N/A	
Wetlands (approx. ac.)	Permanent N/A	Seasonal N/A	

Describe existing condition of water sources: small intermittent creek about 500' west of site

Forest Resources at Sample Site

Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')
	5	2	1

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%

Dominant Species of Mature Trees	Pines & hardwoods (maples, beech, oak)		
% Trees w/ Exfoliating Bark	<5%	<5%	<5%
Size Composition of Live Trees (%)	Small (3-8 in) 5%	Med (9-15 in) 90%	Large (>15 in) 5%
No. of Suitable Snags		0	

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Yes, Per foraging & travel

Additional Comments:
Similar conditions to Sudbury 4. Small mixed stand of pines/hardwoods along railroad corridor. Area surrounded by homes

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy, examples of potential suitable snags and live trees; water sources

Ibat Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name BOSTON-MASSDOT Site ID SUDBURY 5 Weather Station Provider Weather Underground
Surveyor Initials AJP Lat. (+/- error) 42.37813 Weather Station ID Liberty Hill KMASUDBU47
Deployment Date 07/07/2020 Long. (+/- error) -71.40874

Sampling Location Specific Characteristics - Check all that apply

- [ ] Forest Canopy Opening
- [ ] Near water
- [ ] Recently logged with remaining potential roost trees
- [ ] Road and/or stream corridor with open tree canopy or canopy height > 10m
- [x] Woodland edge
- [ ] Other - Describe

Additional Habitat Notes: Along railroad corridor

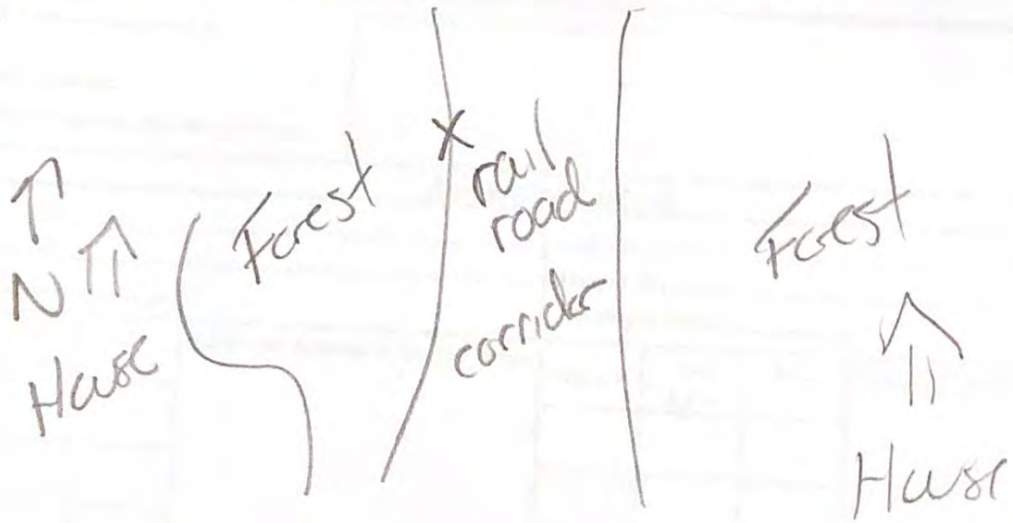
Unit Specific Deployment Characteristics - Must meet all criteria

Y	N		If any criteria are answered 'NO' justification is required
[x]	[ ]	> 3 m in any direction from vegetation or other obstructions	N/A
[x]	[ ]	Minimal or no vegetation within 10m in front of microphone	
[x]	[ ]	Parallel to woodland edge	
[x]	[ ]	>15m from known or suitable roosts	
[x]	[ ]	>3 m above ground level	
[x]	[ ]	>200m from adjacent acoustic sampling location	
[x]	[ ]	Within expected flight height	

Unit Information

Make/Model SM4FS Data Division Ratio N/A Recording Schedule START -30 sunset
Serial Number S4001286 Sensitivity N/A Detection Range (m) N/A STOP +30 sunrise
Housing/Weatherproofing description None

Site Sketch



Daily Survey Data

Sampling Night # 1 Survey Date 07/07/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 2 Survey Date 07/08/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 7/7 Survey Date 1

Y	N	
☑	☐	Microphone operating normally
☐	☐	Other unit operations normal
☐	☐	Nightly temperatures >50F for first 5 hours
☐	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☐	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # 2 Survey Date 7/8

Y	N	
☑	☐	Microphone operating normally
☐	☐	Other unit operations normal
☐	☐	Nightly temperatures >50F for first 5 hours
☐	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☐	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials TSP

Y	N	
☑	☐	Bats recorded
☑	☐	High frequency calls exist >35kHz

Additional Coarse Analysis Notes

Automated Analysis

Application Name Kpro Version 5.1.9g

Output File Name id-OAQC.xlsx

Biologist Initials TSP 5.1.0 classifier

Night #	# of Calls	MLE	Additional Automated Analysis Notes
1	12	0	MYSE Presence not confirmed (EPFU approach-phase fragments)
2	1	0.01	

Application Name _____ Version _____

Output File Name _____

Biologist Initials _____

Night #	# of Calls	MLE	Additional Automated Analysis Notes

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): Sudbury 6

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral: N/A	Intermittent: N/A	Perennial: N/A	Describe existing condition of water sources: small, farm pond.
Pools/Ponds (# and size)	1; 0.25ac.	Open and accessible to bats? Yes		
Wetlands (approx. ac.)	Permanent: N/A	Seasonal: N/A		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50') 4	Midstory (20-50') 3	Understory (<20') 2	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
Dominant Species of Mature Trees	Pines, beech, maple			
% Trees w/ Exfoliating Bark	<5%	<5%	<5%	
Size Composition of Live Trees (%)	Small (3-8 in): 5%	Med (9-15 in): 85%	Large (>15 in): 10%	
No. of Suitable Snags		1-3		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Yes

Additional Comments:
Mixed hardwoods/pines adjacent to agricultural field & open pond. Detector placed facing over the pond.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Ibat Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name: Boston MassDOT
Site ID: Sudbury 6
Weather Station Provider: Weather Underground
Surveyor Initials: DB
Lat. (+/- error): 42.39251
Weather Station ID: Liberty Hill KMASUDBU47
Deployment Date: 7/7/2020
Long. (+/- error): -71.41093

Sampling Location Specific Characteristics - Check all that apply

- [x] Forest Canopy Opening
- [x] Near water
- [ ] Recently logged with remaining potential roost trees
- [ ] Road and/or stream corridor with open tree canopy or canopy height > 10m
- [x] Woodland edge
- [ ] Other - Describe _____

Additional Habitat Notes: near pond off of ROW - 50 ft from rail bed

Unit Specific Deployment Characteristics - Must meet all criteria

If any criteria are answered 'NO' justification is required

Y	N	
[x]	[ ]	> 3 m in any direction from vegetation or other obstructions
[ ]	[x]	Minimal or no vegetation within 10m in front of microphone
[x]	[ ]	Parallel to woodland edge
[x]	[ ]	>15m from known or suitable roosts
[x]	[ ]	>3 m above ground level
[x]	[ ]	>200m from adjacent acoustic sampling location
[x]	[ ]	Within expected flight height

1 Maple branch hanging 9m in front of microphone

Unit Information

Make/Model: SM4FS
Data Division Ratio: N/A
Recording Schedule START: -30 Sunset
Serial Number: S4U00633
Sensitivity: N/A
Detection Range (m): N/A
STOP: +30 Sunrise
Housing/Weatherproofing description: None

Site Sketch

Daily Survey Data

Sampling Night # 1 Survey Date 07/07/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 2 Survey Date 07/08/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 1 Survey Date 7/7

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # 2 Survey Date 7/8

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials TSP

Y	N	
☑	☐	Bats recorded
☑	☐	High frequency calls exist >35kHz

Additional Coarse Analysis Notes

Automated Analysis

Application Name KPro Version 5.1.9g
Output File Name id-QAQC.xlsx
Biologist Initials TSP 5.10 classifier

Night #	# of Calls	MLE	Additional Automated Analysis Notes
2	11	0.0002	MYLU presence confirmed visually

Application Name Same Version
Output File Name Same
Biologist Initials

Night #	# of Calls	MLE	Additional Automated Analysis Notes
1	1	0.26	MYSE presence not confirmed (EPFU approach-phase)
2	1	0.03	

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): Sudbury 7

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral: N/A	Intermittent: N/A	Perennial: N/A	Describe existing condition of water sources: No immediate water sources
Pools/Ponds (# and size)	N/A	Open and accessible to bats? N/A		
Wetlands (approx. ac.)	Permanent: N/A	Seasonal: N/A		

Forest Resources at Sample Site

	Canopy (> 50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
Closure/Density	5	2	1	
Dominant Species of Mature Trees	Pines, oaks, beech, maple			
% Trees w/ Exfoliating Bark	5%	<5%	<5%	
Size Composition of Live Trees (%)	Small (3-8 in): 5%	Med (9-15 in): 90%	Large (>15 in): 5%	
No. of Suitable Snags		1-2		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Yes

Additional Comments:
Mixed stand of conifers & hardwoods of medium diameter. Site located next to open playing field to west & industrial/commercial area to southwest.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Ibat Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name: BOSTON - MASSDOT
Site ID: SUDBURY 7
Weather Station Provider: Weather Underground
Surveyor Initials: ASP
Lat. (+/- error): 42.38535
Weather Station ID: Liberty Hill KMASUDBU47
Deployment Date: 07/07/2020
Long. (+/- error): -71.41429

Sampling Location Specific Characteristics - Check all that apply

- [x] Forest Canopy Opening
- [ ] Near water
- [ ] Recently logged with remaining potential roost trees
- [ ] Road and/or stream corridor with open tree canopy or canopy height > 10m
- [x] Woodland edge
- [ ] Other - Describe

Additional Habitat Notes: At SE edge of Field located west of railroad corridor

Unit Specific Deployment Characteristics - Must meet all criteria

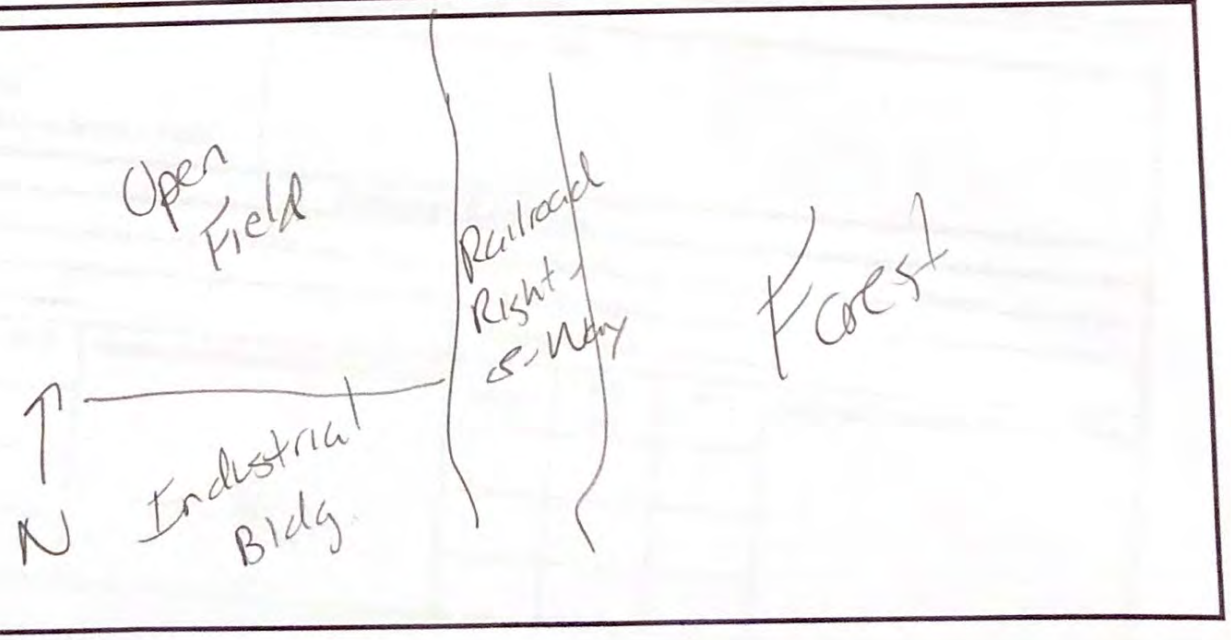
If any criteria are answered 'NO' justification is required: N/A

Y	N	
[x]	[ ]	> 3 m in any direction from vegetation or other obstructions
[x]	[ ]	Minimal or no vegetation within 10m in front of microphone
[x]	[ ]	Parallel to woodland edge
[x]	[ ]	>15m from known or suitable roosts
[x]	[ ]	>3 m above ground level
[x]	[ ]	>200m from adjacent acoustic sampling location
[x]	[ ]	Within expected flight height

Unit Information

Make/Model: SM4FS
Data Division Ratio: N/A
Recording Schedule START: -30 Sunset
Serial Number: S4U00631
Sensitivity: N/A
Detection Range (m): N/A
STOP: +30 Sunrise
Housing/Weatherproofing description: None

Site Sketch



Daily Survey Data

Sampling Night # 1 Survey Date 07/07/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 2 Survey Date 07/08/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 7/7 Survey Date 1

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # 2 Survey Date 7/8

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials TSP

Y	N	
☑	☐	Bats recorded
☑	☐	High frequency calls exist >35kHz

Additional Coarse Analysis Notes

2 files ID'd as MYEV were LABO fragments

Automated Analysis

Application Name KPro Version 5.1.9g

Output File Name id-QAQC.xlsx

Biologist Initials TSP classifier 5.1.0

Night #	# of Calls	MLE	Additional Automated Analysis Notes
			no QAQC required for MYSE

Application Name _____ Version _____

Output File Name Same

Biologist Initials _____

Night #	# of Calls	MLE	Additional Automated Analysis Notes

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): SUDBURY 8

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral: N/A	Intermittent: N/A	Perennial: 1,500'	Describe existing condition of water sources: well established creek & riparian/floodplain area to east of railroad corridor
Pools/Ponds (# and size)	N/A	Open and accessible to bats? N/A		
Wetlands (approx. ac.)	Permanent: N/A	Seasonal: N/A		

Forest Resources at Sample Site

	Canopy (> 50')	Midstory (20-50')	Understory (<20')
Closure/Density	4	3	1
Dominant Species of Mature Trees	Maples, beech, poplar		
% Trees w/ Exfoliating Bark	5%	10%	< 5%
Size Composition of Live Trees (%)	Small (3-8 in): 80%	Med (9-15 in): 75%	Large (>15 in): 5%
No. of Suitable Snags		3+	

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Yes.

Additional Comments:
Large creek drainage to east of the detector site. Some shrub/tree encroachment with riparian/floodplain edge. Clusters of moderately-sized trees between creek & railroad corridor.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Ibat Presence/Absence Acoustic Survey Datasheet - Stantec

Project Name: BOSTON - MASSDOT
Site ID: SUDBURY 8
Weather Station Provider: Weather Underground
Surveyor Initials: AJP
Lat. (+/- error): 42.36957
Weather Station ID: Liberty Hill KMASUDBU47
Deployment Date: 07/07/2020
Long. (+/- error): -71.42074

Sampling Location Specific Characteristics - Check all that apply

- [ ] Forest Canopy Opening
- [x] Near water
- [ ] Recently logged with remaining potential roost trees
- [ ] Road and/or stream corridor with open tree canopy or canopy height > 10m
- [x] Woodland edge
- [ ] Other - Describe

Additional Habitat Notes: western edge of stream/wetland complex; about 30' east of railroad ROW

Unit Specific Deployment Characteristics - Must meet all criteria

If any criteria are answered 'NO' justification is required

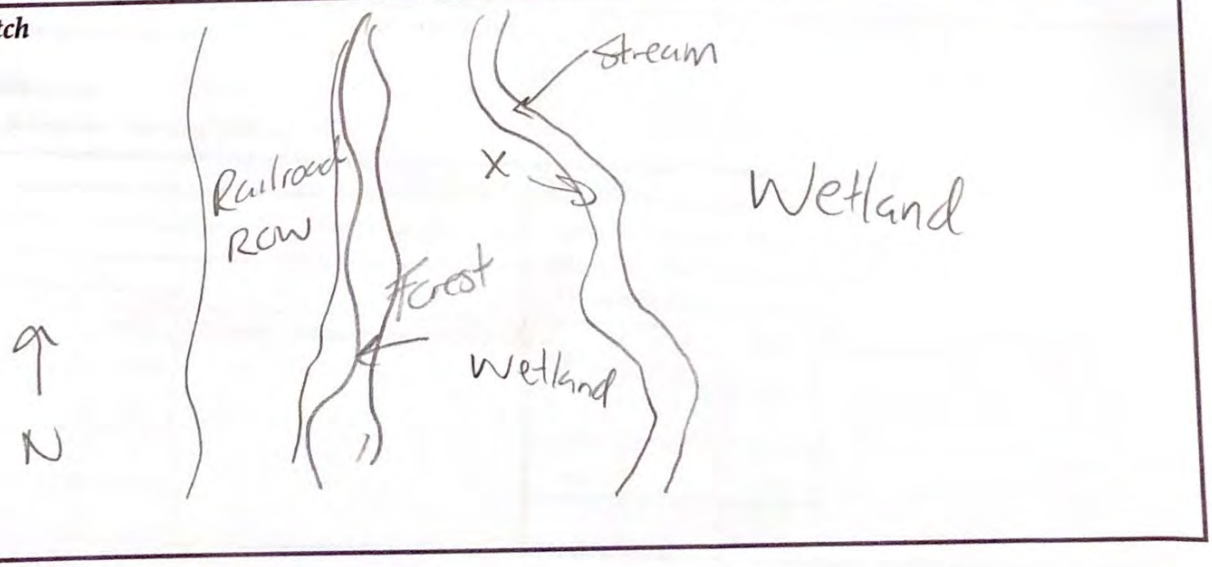
Y	N	
✓		> 3 m in any direction from vegetation or other obstructions
✓		Minimal or no vegetation within 10m in front of microphone
✓		Parallel to woodland edge
✓		>15m from known or suitable roosts
✓		>3 m above ground level
✓		>200m from adjacent acoustic sampling location
✓		Within expected flight height

N/A

Unit Information

Make/Model: SM4FS
Data Division Ratio: N/A
Recording Schedule START: -30 sunset
Serial Number: S4A01236
Sensitivity: N/A
Detection Range (m): N/A
STOP: +30 sunrise
Housing/Weatherproofing description: None

Site Sketch



Daily Survey Data

Sampling Night # 1 Survey Date 07/07/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 2 Survey Date 07/08/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

None

Daily Survey Data

Sampling Night # 1 Survey Date 7/7/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Daily Survey Data

Sampling Night # 2 Survey Date 7/8/20

Y	N	
☑	☐	Microphone operating normally
☑	☐	Other unit operations normal
☑	☐	Nightly temperatures >50F for first 5 hours
☑	☐	No fog/rain that exceeds 30 minutes or continues intermittently for first 5 hours
☑	☐	Sustained wind speeds not >9mph for 30 min for first 5 hrs

Additional Survey Notes

Coarse Analysis

Biologist Initials TSP

Y	N	
☑	☐	Bats recorded
☑	☐	High frequency calls exist >35kHz

Additional Coarse Analysis Notes

Automated Analysis

Application Name KPro Version 5.1.9g
Output File Name id-QAQC.xlsx
Biologist Initials TSP class. 5.1.0

Night #	# of Calls	MLE	Additional Automated Analysis Notes
1	1	0.95	MYLU presence confirmed visually both nights
2	1	0.24	

Application Name _____ Version _____
Output File Name _____
Biologist Initials _____

Night #	# of Calls	MLE	Additional Automated Analysis Notes

APPENDIX D Resume of Trevor Peterson

Dr. Peterson is a senior wildlife biologist and project manager specializing in renewable energy projects, bird and bat migration, and rare species assessments. He focuses on solutions to quantify and manage turbine-related wildlife impacts at terrestrial and offshore commercial wind projects. Since joining the company in 2003, Trevor's project experience has included a wide range of wide range of wildlife surveys at proposed and existing wind projects, rare bat surveys, breeding bird surveys, raptor surveys, nocturnal radar surveys, vernal pool water quality and ecological monitoring, rare turtle telemetry and demographic studies, natural community characterization, and vegetation monitoring. He earned his PhD in Ecology and Environmental Sciences from the University of Maine for his research on the use of long-term acoustic bat data to study bat migration and predict and manage potential impacts from land-based and offshore wind projects. Before working at Stantec, Trevor worked seasonally for the National Park Service at Acadia National Park and Isle Royale National Park and as an island caretaker for the Maine Island Trail Association. Dr. Peterson serves as Stantec's technical lead for acoustic bat surveys, responsible for updating equipment, survey methods, and data analysis/reporting methods.

EDUCATION

PhD Ecology and Environmental Sciences , University of Maine, Orono, ME, 2020

McMillan Offshore Survival Training, Castine, Maine, 2016

AB, Biology/Environmental Studies, Summa cum Laude, Phi Beta Kappa, Bowdoin College, Brunswick, Maine, 2002

Semester Program in Costa Rica, Tropical Field Biology, Environmental Studies, and Spanish, Duke University, Durham, North Carolina, 2000

CERTIFICATIONS & TRAINING

CPR, AED, and Basic First Aid, Americian Safety & Health Institute, Topsham, ME, 2019

Habitat Conservation Plan Training, US Fish and Wildlife Service National Conservation Training Center, Shepherdstown, WV, 2010

MEMBERSHIPS

Member, Northeast Regional Migration Monitoring Network

Member, Northeast Bat Working Group

Member, The Wildlife Society, Maine, May 2011-present

PROJECT EXPERIENCE

RENEWABLE ENERGY, OFFSHORE

Block Island Offshore Wind Farm | Block Island, Rhode Island | 2018-Present | Senior Scientist

Regional Offshore Acoustic Bat Monitoring | Gulf of Maine, mid-Atlantic, Great lakes

Tracking Bats using Nanotag Telemetry in the Gulf of Maine

RENEWABLE ENERGY

Activity-based Informed Curtailment: Using Acoustics to Design and Validate Smart Curtailment at Wind Farms | 2019 - 2022 | Prinicipal Investigator

Avian and Bat Surveys at New Creek Wind Energy Project | Grant County, West Virginia

Avian and Bat Surveys at Laurel Mountain Wind Energy Project | Randolph and Barbour Counties, West Virginia

NATURAL RESOURCE SERVICES

Natural Community Surveys and Resource Inventory | Moosehead Lake Region, Maine

Spotted Turtle and Vernal Pool Monitoring on Greenbush Railroad | Southeastern Massachusetts

Indiana Bat and Rare Bird Surveys at Proposed Wind Energy Project | Jefferson and Oswego Counties, New York

Acoustic Bat Surveys: Proposed Road Corridors | Tennessee

PUBLICATIONS

Peterson, T.. *Predicting and managing risk to bats at commercial wind farms using acoustics. A dissertation submitted in partial fulfillment of the requirements for the degree of doctor of philosophy, University of Maine.*, 2020.

Pelletier, S.K., K.S. Omland, K.S. Watrous and T.S. Peterson, Information synthesis on the potential for bat interactions with offshore wind facilities - final report. *US Department of the Interior, Bureau of Ocean Energy Management, Headquarters. Herndon, Virginia. OCS Study BOEM 2013-01163. 119 pp*, 2013.

Hildt, S. and T. Peterson. Surveying the damage: tools and techniques. *Invited Presentation at the NRDA Short Course, University of Massachusetts*, 2014.

Peterson, T.S., S.K. Pelletier, S.A. Boyden, and K.S. Watrous. Offshore acoustic monitoring of bats in the Gulf of Maine. *Northeastern Naturalist 21(1): 86-107*, 2014.

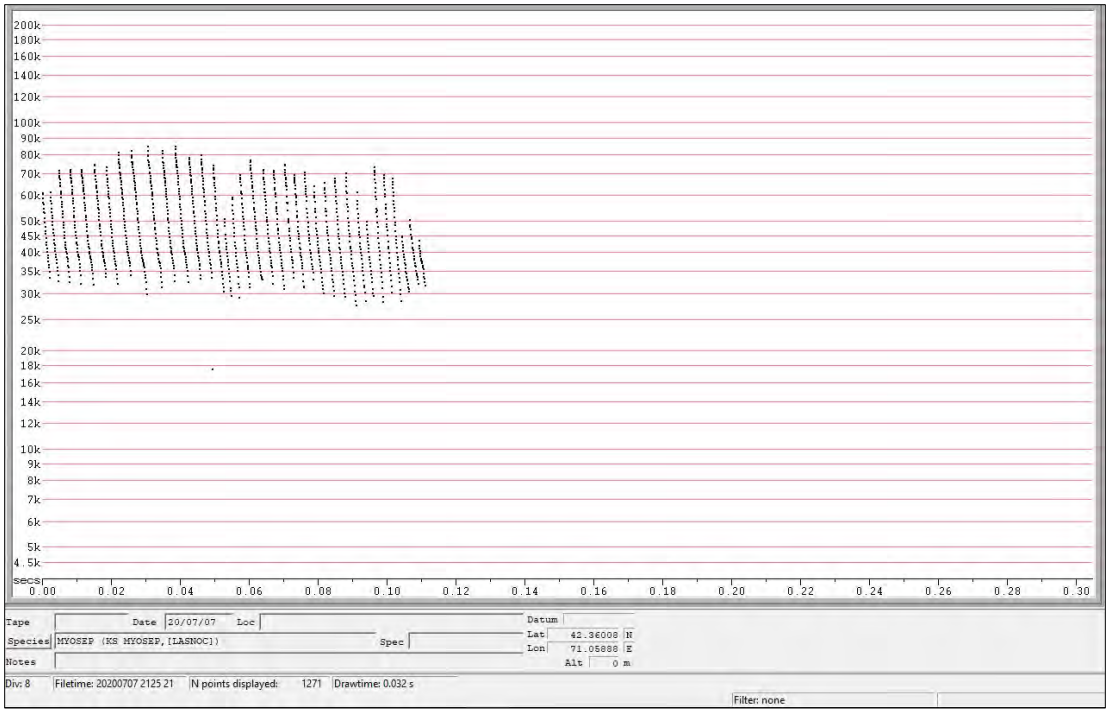
Johnson, J.S., L.E. Dodd, J.D. Kiser, T.S. Peterson, and K.S. Watrous. Food Habits of Myotis leibii along a Forested Ridgetop in West Virginia. *Northeastern Naturalist 19(4): 665-672*, 2012.

Johnson, J.S., K.S. Watrous, G.J. Giumarro, T.S. Peterson, S.A. Boyden, and M.J. Lacki. Seasonal and geographic trends in acoustic detection of tree-roosting bats. *Acta Chiropterologica, 13(1): 157-168*, 2011.

Peterson, T.S., A. Uesugi, and J. Lichter. Tree recruitment limitation by introduced snowshoe hares, Lepus americanus, on Kent Island, New Brunswick. *Canadian Field Naturalist 119 (4). 569-572*, 2005.

APPENDIX E Screenshots of Bat Calls

Appendix E, Figure 1. Screenshot of little brown bat call recorded at site SU1 on July 7, 2020.



Appendix E, Figure 2. Screenshot of approach-phase sequences from big brown bat at site SU5 autoclassifed as northern long-eared bat by KPro on July 7, 2020.

Appendix E Historic Property Screening

MAINTENANCE OF TRAFFIC SIGNALS

The Contractor shall provide all labor, equipment and material required for the total maintenance of all existing and proposed traffic signal control equipment, within the project limits, including damage by automobile accidents, unless otherwise specified under Subsection 7.17 "Traffic Accommodation" of the Standard Specifications, as amended, in which case Subsection 7.17 will govern. These provisions will apply to the signalized locations included as part of the Contract from the date of written notice given to the Engineer that the Contractor will begin work on the signals until the date when the Engineer shall recommend acceptance of the completed project. This written notice must be given before the Contractor may proceed with any work on the specified traffic signal system. For the purpose of these paragraphs, the phrase "Traffic Signal Control Equipment" is intended to include, but is not limited to, controllers, detectors, signal housings, supporting structures, cabinets, wires, conduit and all other ancillary electrical equipment used for traffic control. The cost of maintenance of signals shall be deemed to be included in the various traffic signal contract items, and no additional payments shall be made therefore, except as provided by Subsection 7.17 of the Standard Specifications as amended.

PRESERVATION OF HISTORICAL ARTIFACTS - BFRT

The Contractor shall take notice of historic artifacts along the project length. Historic artifacts and their disposition are labeled on the construction plans. The artifacts include, but are not limited to:

Station(s)	Artifact	Comments
Throughout	Existing Track and RR Ties	
176+00-181+50	Rail Siding (track , ties, etc) and stop mechanism	
142+70	Abandoned Elec Cabinet	
163+-5	Abandoned Elec Cabinet	
163+10	Signal	
275+20	Signal	
128+20	Abandoned Signal Well	
189+60	Battery on Conc Pad	
162+95	Concrete Pad	

Station(s)	Artifact	Comments
190+55	Cattle Crossing	
258+50	Cattle Crossing	
269+70	Cattle Crossing	
321+60	Cattle Crossing	
225+50	Concrete Post	
229+00	Concrete Post	
244+10	Metal Post	
274+30	Metal Post	
275+50	Metal Post	
332+95	Metal Post	
101+45	Post	
104+15	Post	
278+80-279+50	Wood Post	Inspect for structural integrity. Retain in existing location and condition.
119+50	Granite Mile Post / MM 5/21	
172+30	Granite Mile post / MM 6/20	
225+10	Granite Mile Post / MM 7/19	
279+00	Granite Mile Post / MM 8/18	
331+50	Granite Mile Post / MM 9/17	
129+50	Whistle Post	

Station(s)	Artifact	Comments
156+30	Whistle Post	
161+55	Whistle Post	
188+75	Whistle Post	
303+10	Upright Rail	
119+75 and 120+10	Sign	
200+50	Metal Rail Post	
107+00	Sign	
108+20	Sign	
152+30	Stone Wall segment	
167+50	Stone Wall segment	
171+00-171+80	Stone Wall segment	
230+40	RR Tie Steps	
101+75-104+40	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
142+0-142+75	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
145+75-153+80	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.

Station(s)	Artifact	Comments
168+30	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
171+00	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
228+00-239+90	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
245+40-255+80	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
267+90-276+40	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
288+00-302+50	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
327+70-331+50	Abandoned Utility Pole	Inspect for structural integrity. Retain in existing location and condition.
Numerous Sections	Wire Fence at edge of ROW	

In and/or addition to the above table of items, The Town of Sudbury has requested the contractor remove & stack the following items for future use as art installation or historic interpretation. Payment for removal, transportation, and stacking of these items shall be included under the respective contract items as shown below:

PRESERVATION OF HISTORICAL ARTIFACTS - BFRT

Material Type	Qty	Storage Location	Payment Item
Track rail pieces	75	Broadacres Farm at Riding Arena	129.71
Pantry Brook Bridge Beams	all	Broadacres Farm at Riding Arena	114.2
Hop Brook Bridge Beams	all	Broadacres Farm at Riding Arena	114.1
Rail Spikes	600	Broadacres Farm at Riding Arena	129.71
Rail Sensors	4	Broadacres Farm at Riding Arena	129.71
Rail Plates	200	Broadacres Farm at Riding Arena	129.71
Abutment blocks (not placed along corridor)	all	Broadacres Farm at Riding Arena	114.1/114.2

SUDBURY HISTORICAL COMMISSION

The Contractor shall take following note regarding the aforementioned "Abandoned Utility Pole" in the above table: In the event that after inspection by the Contractor and Resident Engineer that these telegraph poles are determined to pose a safety hazard or conflict due to construction operations, the MassDOT Resident Engineer shall consult with MassDOT Cultural Resources Unit (CRU) and the Historical Commission for further direction prior to any action (specifically removal) is taken. MassDOT CRU contact:

Kurt Jergensen
kurt.jergensen@state.ma.us
Historic Bridge Specialist
Environmental Services
MassDOT, Highway Division
Ten Park Plaza – Room 4260, Boston, MA 02116

SUDBURY HISTORIC DISTRICT COMMISSION

The Contractor shall be aware that Hudson Road is within a historic district of Sudbury. Shop drawing submittals for the decorative signal pole and associated materials shall also consult the Sudbury Historic District Commission (HDC) for review. The Town of Sudbury staff will coordinate this consultation upon receipt of shop drawings for these ornamental structures. The Contractor shall be made available to answer questions from the HDC as needed on the submittal.

December 22, 2021

Ms. Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

RE: Sudbury-Concord: Bruce Freeman Rail Trail, Phase 2D (MassDOT #608164)
Section 106 Review – No Adverse Effect

Dear Ms. Simon:

The Massachusetts Department of Transportation (MassDOT) proposes to expend federal funds to construct Phase 2D of the Bruce Freeman Rail Trail (BFRT). The BFRT is a multi-use recreational trail and alternative transportation corridor along the right of way (ROW) of the former Lowell Secondary Line of the Penn Central Railroad that will extend from Lowell to Framingham once completed. Phase 2D will extend for 4.95 miles from Powder Mill Road in Concord southerly to a point near the intersection of Station Road and Union Avenue in Sudbury. Work in water, including bridge construction and culvert replacement, will require a permit from the U. S. Army Corps of Engineers under Section 404 of the Clean Water Act.

Four phases of the BFRT have been completed or are currently under construction. Phase 1, extending from Lowell to Westford, opened in 2009. Phase 2A, through Westford, Carlisle and Acton, opened in 2018. Phase 2B, from South Acton to Commonwealth Avenue in Concord is presently under construction. Phase 2C, from Commonwealth Avenue to Powder Mill Road in Concord, opened in 2019. All segments of the BFRT, including Phase 2D and other future phases, have been designed with logical termini within existing transportation networks and can function independently.

Phase 2D of the BFRT will pass through the **Sudbury Center Historic District**, which is listed in the National Register of Historic Places, and the coterminous Old Sudbury Local Historic District. MassDOT has reviewed the project under the terms of the Massachusetts Statewide Programmatic Agreement for Section 106 of the National Historic Preservation Act of 1966, as amended [36 CFR Part 800.3(a)(2)] and has determined that the project will have No Adverse Effect on properties that are listed in or may be eligible for listing in the National Register of Historic Places.

Project Description

The project proposes to construct a ten-foot-wide paved bicycle path with two-foot graded shoulders on either side. The path will typically remain within the existing railroad right-of-way, with most of the proposed construction constrained to the existing railroad bed. All remaining steel rails and timber ties will be removed from the rail bed. Overgrown vegetation along the corridor will be cleared and grubbed, with particular attention to eradication of invasive species. Timber rail fences and steel-backed timber guardrail will be installed within the corridor as necessary. Offset intersections, as shown on the plans, will be constructed at most roadway crossings, with landscaping and sight distance improvements as necessary. Improvement of drainage and subsurface will require minor vertical and horizontal grading throughout the project corridor.

Limited construction is proposed outside of the ROW in Sudbury to provide connections from the BFRT to other Town-owned recreational properties at Parkinson's Field, Broad Acres Farm and Davis Field. A connector path will be constructed along the southerly edge of Parkinson's Field leading to an existing parking lot, with select landscape plantings adjacent to the path. A parking lot and rest area will be constructed at Broad Acres Farm, with a waterless restroom, seating area and 28' by 40' roofed pavilion. Additionally, a landscaped stormwater treatment swale will be constructed between the parking lot and rest area and the paved trail. Finally, a connector to Davis Field will be constructed, following easterly along North Street on existing sidewalk, then turning southerly along a new path on the westerly side of an existing parking lot at Davis Field. An archaeological assessment of the proposed work outside of the railroad ROW is provided below.

National Register-listed Sudbury Center Historic District

The project corridor will pass through the National Register-listed Sudbury Center Historic District and the Old Sudbury Local Historic District for approximately 700 feet roughly parallel to Peakham Road near the Hudson Road intersection. Contributing properties within the historic district that are located adjacent to the railroad ROW include: SUD.63, the Arthur R. Hawes House, 40 Hudson Road, an 1890 former railroad station associated with the Framingham & Lowell Railroad, moved and converted into a residence in the 1930s; SUD.174, the Leon & Jennie Hawes House, 30 Hudson Road, a 1925 Colonial Revival style dwelling; SUD.45, the William Brigham House, 623 Peakham Road, an 1820 Federal style dwelling.

MassDOT CRU staff worked with the Town of Sudbury and the Town's design consultant, Fuss & O'Neil, to avoid or minimize effects to contributing properties within the National Register-listed Sudbury Center Historic District. Proposed work within the historic district will include trail construction on the existing rail alignment, with a crossing incorporating new pedestrian signals and traffic signals at the intersection of Peakham Road and Hudson Road. A small rest area will be constructed at the southeastern corner of the intersection (Sheet 22), which will include a bench, two bicycle racks, a trash receptacle, hydration station and a display board. Improvements to drainage and pavement within the existing roadway footprint along Peakham Road and Hudson Road are also proposed. Design features within the historic district have been amended based on discussions with the Sudbury Historic Districts Commission (SHDC), as well as a letter sent to MassDOT on June 6, 2018 (enclosed). The proposed design has incorporated black painted ornamental cast iron light posts and mast arms to match existing traffic signal structures in the historic district at the intersection of Concord Road and Hudson Road. The SHDC has issued a letter of support for this project, dated April 16, 2021, in lieu of a Certificate of Appropriateness.

No temporary occupancies, permanent easements, or fee takings are required on parcels occupied by contributing properties within the National Register-listed historic district.

Preservation of Railroad Artifacts

During the course of the Section 106 review of the proposed project, MassDOT and the Town's design consultants have solicited comments relating to historic properties from the Sudbury Historical Commission (SHC). The SHC has been closely involved in the development of the proposed project. During meetings held in May and July 2021, the SHC expressed interest in retaining the existing late 19th/early 20th century railroad artifacts within the project area. The SHC also expressed interest in developing and installing interpretive panels at several locations to draw attention to certain railroad artifacts and other elements of particular interest. SHC members and interested volunteers will prepare material and images for these panels and provide drafts to Fuss & O'Neil.

While the project area in Sudbury includes numerous railroad artifacts, the railroad line lacks a cohesive character throughout the entire corridor to connect it to either the original construction of the Framingham & Lowell Railroad in 1871, or subsequent periods in the history of the line. The design, materials, and workmanship of the bridges and artifacts within the corridor was altered over the years, and significant elements such as roadway grade crossings, stations, freight depots and other railroad buildings have been relocated or lost entirely, and so, the rail line does not appear to be eligible for listing in the National Register of Historic Places. Nonetheless, Fuss & O'Neil has developed the attached list of extant railroad artifacts and noted the locations of those artifacts on the project plans. The majority of the artifacts identified will remain in place and will be undisturbed by proposed work. In instances where fragile artifacts may be damaged by machinery or disturbed during grading, such as select mile markers and whistle posts, these artifacts will be carefully removed, stored at a secure location and reset once construction is complete.

Inventoried Area

The railroad ROW passes through Broad Acres Farm (SUD.O), which is included in the Inventory of Historic Assets of the Commonwealth. Broad Acres Farm includes a c. 1920 Colonial Revival style dwelling, c. 1955 horse barn, a c. 1990 horseback riding arena and two smaller c. 1950-1960 barns, on a 35-acre property with 18 acres of pasture. The property was purchased by the Town of Sudbury in 2018 to be held for conservation and recreational uses, so it no longer functions as a farm. The property does not appear to be eligible for inclusion in the National Register, as most of the buildings lack architectural significance, and the history of the property as a horseback riding hobby farm does not bear a connection to the broader agricultural history of Sudbury or the region in general.

Bridges

One intact bridge is located along the railroad ROW within the project area, Bridge S-31-007 over Hop Brook is comprised of a steel deck plate girder superstructure constructed in 1896 by the New York, New Haven & Hartford Railroad, supported by earlier granite masonry abutments. The bridge is a typical example of a common structural type and exhibits no exceptional engineering details that might make it eligible for individual listing in the National Register. The proposed plans call for replacement of Bridge S-31-007 with a steel stringer superstructure and timber deck on the existing granite masonry abutments.

Reuse of the bridge over Hop Brook was considered but would have required substantial fill within the railroad ROW. The resulting alterations to the railroad grade, extensions to the abutment wingwalls, and impacts to surrounding wetlands were all deemed undesirable. The reuse of the existing abutments and wingwalls with a new superstructure, as well as retention of the existing level railroad grade are preferred.

A second bridge had been located along the railroad ROW within the project area until 2016 when the substructure collapsed. A torrent released by a breached beaver dam upstream scoured out the streambed and undermined the northerly abutment. The resulting collapse left the steel stringers badly deformed, but still in place. Bridge S-31-013 over Pantry Brook, constructed c. 1910, was comprised of a single-span steel stringer superstructure supported by earlier granite masonry abutments. The remaining granite blocks in the abutments will be removed and a new prefabricated reinforced concrete arch bridge will be constructed at the Pantry Brook crossing. The granite blocks will be reused throughout the project area, as barriers, boundary walls or accent pieces.

Historic Bridge Inventory forms and photographs of each bridge are enclosed with this submittal.

Archaeological Assessment

Review of the Massachusetts Historical Commission archaeological base maps indicated that numerous recorded pre-Contact sites are located in the vicinity of the project area. The sites in close proximity to the proposed trail are: 19-MD-406, an Archaic period campsite located approximately 200 feet to the east of the project area, in the vicinity of Station 8+00 in Concord; 19-MD-469, an indeterminate findspot located approximately 1300 feet east of the project area, in the vicinity Davis Field; 19-MD-512, an indeterminate site located approximately 1200 feet to the west of the project area, in the vicinity of Station 275+00; 19-MD-385, a Late Archaic period site located approximately 500 feet east of the project area, in the vicinity of Station 264+00; 19-MD-511, an indeterminate site located approximately 1700 feet east of the project area, in the vicinity of Station 264+00;19-MD-163, an indeterminate site located approximately 900 feet west of the project area, in the vicinity of Station 258+00; and 19-MD-385, a Late Archaic period site located approximately 1300 feet southeast of the southerly project limits. Review of the base maps indicated that two recorded historic archaeological sites are located in proximity to the project area: SUD.HA.12, the site of the 1871 Sudbury Center Railroad Station site (which burned in 1890), situated immediately east of the project area in the vicinity of Station 176+50; SUD.HA.13, the site of an ice house approximately 180 feet west of the project area in the vicinity of Station 275+00.

All recorded pre-Contact and historic archaeological sites are located outside of the project limits and are unlikely to be affected by the proposed work. The MassDOT Archaeologist has determined that most of the project's direct Area of Potential Effect (APE) has low archaeological sensitivity based on the impacts of previous railroad and roadway construction. The majority of the proposed work will take place within the existing railroad ROW, which has been disturbed by railroad construction and grading activities. A site visit on June 24, 2021 identified four locations of archaeological sensitivity where construction activities are proposed outside of the existing railroad ROW:

1) Trail connector path along Route 117 to the Davis Field parking lot (Station 1104+00).
2) Trail connector path to the existing parking lot at Parkinson Field, near 36 Hudson Street (Station184+50 LT).
3) Wetland replication area in an agricultural field associated with Broad Acres Farm, situated to the south of 82 Morse Road (Station 213+00 LT).
4) Parking/pavilion area in an agricultural field associated with Broad Acres Farm, situated to the east of 82 Morse Road (Station 216+50 RT).

MassDOT engaged the services of Archaeological and Historical Services, Inc. (AHS) to conduct an intensive (locational) survey in these four areas. On August 2, 2021 AHS submitted written notification about the upcoming survey to the Tribal Historic Preservation Officers (THPOs) of the Wampanoag Tribe of Gay Head (Aquinnah), the Mashpee Wampanoag Tribe, the Narragansett Tribe, as well as the Executive Director of the Massachusetts Commission on Indian Affairs. AHS also notified the SHC and the Sudbury Historical Society. MassDOT forwarded additional survey information to the SHC upon their request. AHS e-mailed the consulting parties on September 2, 2021, two weeks in advance of the subsurface testing to inform them of the fieldwork schedule. No response from the tribes was received. No Tribal cultural resource monitors or other interested parties were present during the fieldwork.

Subsurface testing was conducted by AHS on September 19 – 21, 2021. The survey of the four areas revealed only historic field scatter and no Native American artifacts were found. No further work is recommended in the four areas as it is unlikely to yield significant cultural materials or additional significant information. A copy of the Field Completion Memo submitted by AHS is attached.

Summary

In the opinion of MassDOT, the proposed construction of the Bruce Freeman Rail Trail along the former Lowell Secondary Line ROW will have No Adverse Effect on the National Register-listed Sudbury Center Historic District. No other National Register-listed or –eligible properties or areas are located within or immediately adjacent to the project area. The Town of Sudbury and MassDOT have consulted with the SHC and the SHDC and have revised the project design to address concerns expressed by both commissions. MassDOT is forwarding a copy of this No Adverse Effect finding by email to the SHC and the SHDC.

MassDOT solicits your concurrence with our **No Adverse Effect** finding for the project in accordance with Stipulation V.C.1 of the amended Section 106 Programmatic Agreement. A copy of this letter has been forwarded to the Federal Highway Administration as specified under the terms of the Programmatic Agreement. If you should have any questions about this project, please contact me at (207-590-4999).

Sincerely,

Kurt Jergensen
Historic Bridge Specialist
Environmental Services

cc: Casey Campetti, FHWA
Sudbury Historical Commission
Sudbury Historic Districts Commission
Beth Suedmeyer, Town of Sudbury

Encl: Archaeology Field Completion Memo
Railroad Artifacts inventory
Historic Bridge Inventory forms with photos
Project plans
Locus map
Correspondence

FUSS & O'NEILL

Attachment E

Cultural Resources Coordination

Certified Mail Documentation for Bruce Freeman Rail Trail Preconstruction Notice

All recipients below were sent a copy of the USACE Historical Property Notification Form, the ENG Form 4345 for the project, a USGS locus map, and the Plans.

Massachusetts Historical Commission
The Massachusetts Archives Bldg.
220 Morrissey Boulevard
Boston, MA 02125

Massachusetts Board of Underwater Archaeological Resources (BUAR)
251 Causeway Street, Suite 800
Boston, MA 02114

Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, MA 02535

Tribal Historic Preservation Officer
Mashpee Wampanoag Tribe
483 Great Neck Road South
Mashpee, MA 02649

Tribal Historic Preservation Officer
Narragansett Indian Longhouse
4425 South County Trail
Charlestown, RI 02813

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MAR 9 2022
SPRINGFIELD, MA 01115

Tribal Historic Preservation Officer
Mashpee Wampanoag Tribe
483 Great Neck Road South
Mashpee, MA 02649

20200785.A10 Task 150

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220 Morrissey Boulevard
Boston, MA 02125

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Tribal Historic Preservation Officer
Narragansett Indian Longhouse
4425 South County Trail
Charlestown, RI 02813

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Massachusetts Board of Underwater
Archaeological Resources (BUAR)
251 Causeway Street, Suite 800
Boston, MA 02114

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MAR 9 2022
SPRINGFIELD, MA 01115

Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head
(Aquinnah)
20 Black Brook Road
Aquinnah, MA 02535

20200785.A10 Task 150

US Army Corps of Engineers ®
New England District

IX: HISTORIC PROPERTY NOTIFICATION FORM

In accordance with General Condition 7, proponents must ensure and document that all potential historic properties within the permit area have been identified. To assist with this effort, proponents may send this form for self-verification activities, but must send this form for PCN activities, to the SHPO, BUAR and applicable THPO(s). You must include any Corps or state waterway agency application forms, plans and a copy of the USGS quadrangle map section that clearly marks the project location. It is recommended that you complete **all** fields (write "none" or "see attached application form" if applicable). The PCN sent to the Corps must include proof of having sent this form, e.g. the email or certified mail receipt that was used to send it, to the SHPO (does not accept email), BUAR and applicable THPOs. Please include any comments or requests received from these agencies with your PCN.

Project Name: Bruce Freeman Rail Trail Shared-Use Path Construction (MassDOT# 608164)
Address, City, State & Zip: 37 Union Ave, Sudbury, MA 01776
Project Proponent Name: Tim Dexter, MassDOT
Address: 10 Park Plaza, RM 4260, Boston, MA 02116
Phone(s) and Email: 857-274-8735, timothy.dexter@state.ma.us
Project Location (provide detailed description if necessary) Address, City, State & Zip:
The project is located in an inactive linear rail corridor. The northern terminus is located at the Sudbury/Concord town line. The southern terminus is located 4.4 miles to the south at a point 100ft west of 37 Union Ave in Sudbury, MA
Latitude/Longitude Coordinates (if address doesn't exist):
Waterway Name: Perennial waterways impacted: Hop Brook, Pantry Brook. Intermittent waterways impacted: various unnamed waterways,tributaries to Hop Brook and Pantry Brook

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name	**Type of License or Funding (specify)**
MassDEP	Chapter 91 Jurisdictional Determination/Minor Project Modification (WW04-000-0008)
Mass.Exec.Office of Energy and Env. Affairs	MEPA Certification (16482)
Sudbury Conservation Commission/MassDEP	NOI/Order of Conditions (301-1362)
Mass. Dept. of Transportation (MassDOT)	Funding(20%)
Federal Highway Administration (FHWA)	Funding(80%)

Project Description: Construction of a 4.4 mile paved shared-use path at the former location of a rail road corridor. The project includes two existing bridge crossing renovations (Hop Brook \Pantry Brook), one new 32-space parking area, and two side path connections to existing parking areas. The project includes a wetland replication area to replicate permanently impacted wetlands at a 1.5: 1 ratio (replicated area:impacted area).

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition: The surface of the existing inactive rail embankment and tracks will be demolished where the shared-use path will be built. The existing stone abutments of Pantry Brook Bridge will be partially demolished to construct the bridge replacement. There are no buildings within the limits of work, and there for no proposed building demolitions.

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation: No rehabilitation of existing buildings.

Does the project include new construction? If so, describe (attach plans and elevations if necessary): Construction of a 4.4 mile paved shared use path at the former location of a rail road corridor. The project includes two existing bridge crossing renovations (Hop Brook \Pantry Brook), one new 32-space parking area, and two side path connections to existing parking areas. The project includes a wetland replication area to replicate permanently impacted wetlands at a 1.5: 1 ratio (replicated area:impacted area).

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify: See attachment to this form.

What is the total acreage of the project area?

Woodland	4.7 acres		
Wetland	0.07 acres	Productive Resources:	
Floodplain	0.04 acres	Agriculture	0 acres
Underwater and/or bottomlands	0.04 acres	Forestry	0 acres
Open space	1.1 acres	Mining/Extraction	0 acres
Developed	8.8 acres	Total Project Acreage	0 acres

What is the acreage of the proposed new construction? The limits of work total 14.78 acres

What is the present land use of the project area? Of the 14.78 acre work area, 13.0 acres are within an inactive former rail corridor containing an inactive rail embankment and rail tracks. The proposed work areas outside of the rail corridor are currently maintained as fields. The fields are owned and operated by the Town of Sudbury.

Signature of person submitting this form: EM Bernardin Date: 3/2/2022

Name: Eric Bernardin

Address: 1550 Main St Suite 400

City/Town/Zip: Springfield, MA 01103

Telephone: 413-452-0445

Attachment to Historic Property Notification Form for MassDOT project 608164, Bruce Freeman Rail Trail in Sudbury, MA.

To your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify:

National Register-Listed Sudbury Historic District

The project corridor will pass through the National Register-listed Sudbury Center Historic District and the Old Sudbury Local Historic District for approximately 700 feet roughly parallel to Peakham Road near the Hudson Road intersection. Contributing properties within the historic district that are located adjacent to the railroad ROW include: SUD.63, the Arthur R. Hawes House, 40 Hudson Road, an 1890 former railroad station associated with the Framingham & Lowell Railroad, moved and converted into a residence in the 1930s; SUD.174, the Leon & Jennie Hawes House, 30 Hudson Road, a 1925 Colonial Revival style dwelling; SUD.45, the William Brigham House, 623 Peakham Road, an 1820 Federal style dwelling.

MassDOT CRU staff worked with the Town of Sudbury and the Town's design consultant, Fuss & O'Neil, to avoid or minimize effects to contributing properties within the National Register-listed Sudbury Center Historic District. Proposed work within the historic district will include trail construction on the existing rail alignment, with a crossing incorporating new pedestrian signals and traffic signals at the intersection of Peakham Road and Hudson Road. A small rest area will be constructed at the southeastern corner of the intersection (Sheet 22), which will include a bench, two bicycle racks, a trash receptacle, hydration station and a display board. Improvements to drainage and pavement within the existing roadway footprint along Peakham Road and Hudson Road are also proposed. Design features within the historic district have been amended based on discussions with the Sudbury Historic Districts Commission (SHDC), as well as a letter sent to MassDOT on June 6, 2018 (enclosed). The proposed design has incorporated black painted ornamental cast iron light posts and mast arms to match existing traffic signal structures in the historic district at the intersection of Concord Road and Hudson Road. The SHDC has issued a letter of support for this project, dated April 16, 2021, in lieu of a Certificate of Appropriateness.

No temporary occupiers, permanent easements, or fee takings are required on parcels occupied by contributing properties within the National Register-listed historic district.

Archaeological Assessment

Review of the Massachusetts Historical Commission archaeological base maps indicated that numerous recorded pre-Contact sites are located in the vicinity of the project area. The sites in close proximity to the proposed trail are: 19-MD-406, an Archaic period campsite located approximately 200 feet to the east of the project area, in the vicinity of Station 8+00 in Concord; 19-MD-469, an indeterminate findspot located approximately 1300 feet east of the project area, in the vicinity Davis Field; 19-MD-512, an indeterminate site located approximately 1200 feet to the west of the project area, in the vicinity of Station 275+00; 19-MD-385, a Late Archaic period site located approximately 500 feet east of the project area, in the vicinity of Station 264+00; 19-MD-511, an indeterminate site located approximately 1700 feet east of the project area, in the vicinity of Station 264+00;19-MD-163, an indeterminate site located approximately 900 feet west of the project area, in the vicinity of Station 258+00; and 19-MD-385, a Late Archaic period site located approximately 1300 feet southeast of the southerly project limits. Review of the base maps indicated that two recorded historic archaeological sites are located in proximity to the project area: SUD.HA.12, the site of the 1871 Sudbury Center Railroad Station site (which burned in 1890), situated immediately east of the project area in the vicinity of Station 176+50; SUD.HA.13, the site of an ice house approximately 180 feet west of the project area in the vicinity of Station 275+00.

Continued on next page

Attachment to Historic Property Notification Form for MassDOT project 608164, Bruce Freeman Rail Trail in Sudbury, MA.

All recorded pre-Contact and historic archaeological sites are located outside of the project limits and are unlikely to be affected by the proposed work. The MassDOT Archaeologist has determined that most of the project's direct Area of Potential Effect (APE) has low archaeological sensitivity based on the impacts of previous railroad and roadway construction. The majority of the proposed work will take place within the existing railroad ROW, which has been disturbed by railroad construction and grading activities. A site visit on June 24, 2021 identified four locations of archaeological sensitivity where construction activities are proposed outside of the existing railroad ROW:

1) Trail connector path along Route 117 to the Davis Field parking lot (Station 1104+00).
2) Trail connector path to the existing parking lot at Parkinson Field, near 36 Hudson Street (Station184+50 LT).
3) Wetland replication area in an agricultural field associated with Broad Acres Farm, situated to the south of 82 Morse Road (Station 213+00 LT).
4) Parking/pavilion area in an agricultural field associated with Broad Acres Farm, situated to the east of 82 Morse Road (Station 216+50 RT).

MassDOT engaged the services of Archaeological and Historical Services, Inc. (AHS) to conduct an intensive (locational) survey in these four areas. On August 2, 2021 AHS submitted written notification about the upcoming survey to the Tribal Historic Preservation Officers (THPOs) of the Wampanoag Tribe of Gay Head (Aquinnah), the Mashpee Wampanoag Tribe, the Narragansett Tribe, as well as the Executive Director of the Massachusetts Commission on Indian Affairs. AHS also notified the SHC and the Sudbury Historical Society. MassDOT forwarded additional survey information to the SHC upon their request. AHS e-mailed the consulting parties on September 2, 2021, two weeks in advance of the subsurface testing to inform them of the fieldwork schedule. No response from the tribes was received. No Tribal cultural resource monitors or other interested parties were present during the fieldwork.

Subsurface testing was conducted by AHS on September 19 – 21, 2021. The survey of the four areas revealed only historic field scatter and no Native American artifacts were found. No further work is recommended in the four areas as it is unlikely to yield significant cultural materials or additional significant information.

Appendix F Corrective Action Worksheet

Appendix G Amendments

CORRECTIVE ACTION WORKSHEET

I. Project Information

Project Name: ______________________ Project Identification Number: _______________

Project Manager: ____________________

Project Location: _____________________ Watershed: __________

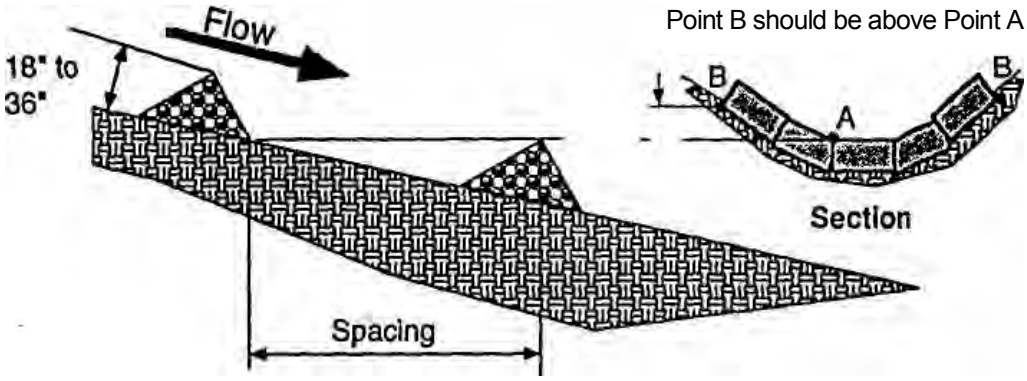
II. BMP Review Report

Problem Identified	BMP Currently Used	Corrective Action	BMP Proposed	Implementation	
				Method	Date

Appendix H Additional BMPs

TERRA Environmental
SWPPP - BMPs

Check Dams



DESCRIPTION

Check dams are small barriers consisting of straw bales, rock, or earth berms placed across a drainage swale or ditch. They reduce the velocity of small concentrated flows, provide a limited barrier for sediment and help disperse concentrated flows, reducing potential erosion.

PRIMARY USE

Check dams are used for long drainage swales or ditches in which permanent vegetation may not be established and erosive velocities are present. They are typically used in conjunction with other techniques such as inlet protection, rip rap or other sediment reduction techniques. Check dams provide limited treatment. They are more useful in reducing flow to acceptable levels for other techniques.

APPLICATIONS

Check dams are typically used early in construction in swales for long linear projects such as roadways. They can also be used in short swales with a steep slope to reduce unacceptable velocities. Primarily used in small steep channels where velocities exceed 2 fps.

DESIGN CRITERIA

- □ Check dams should be placed at a distance and height to allow small pools to form between each one. Typically, dam height should be between 18" and 36". Dams should be spaced such that the top of the downstream dam should be at the same elevation as the toe of the upstream dam.
- □ See design criteria for straw bales, sand bag berms, etc., for specific design criteria. Maximum allowable flow shall be based on the specific technique utilized and the velocity of flow.
- □ Major flows (greater than 2-year design storm) must pass the check dam without causing excessive upstream flooding.
- □ A deep sump should be provided immediately upstream of the check dam to capture excessive sediment.
- □ Check dams should be used in conjunction with other sediment reduction techniques prior to releasing flow offsite.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- □ Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- □ Floatable Materials
- o Other Construction Wastes

LEGEND

- · Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Check Dams

LIMITATIONS

Minor ponding will occur upstream of the check dams.

For heavy flows or high velocity flows, extensive maintenance or replacement of the dams will be required.

Check dams are not a total treatment technique. They should be used only in small open channels which drain 10 acres or less. They should not to be used in live streams or install in lined or vegetated channels.

MAINTENANCE REQUIREMENTS

Inspect for sediment buildup behind the check dam and signs of erosion around the check dam after each rain. Remove accumulated sediment whenever it reaches one-half the sump depth. Maintenance of the dams should adhere to the maintenance requirements of the management practice used for the dam.

TERRA Environmental
SWPPP - BMPs

Concrete Waste Management

DESCRIPTION

Concrete waste at construction sites comes in two forms; 1) excess fresh concrete mix including truck and equipment washing, and 2) concrete dust and concrete debris resulting from demolition. Both forms have the potential to impact water quality through contact with storm water runoff.

PRIMARY USE

This BMP should be utilized at sites in which concrete waste is present.

APPLICATIONS

A number of water quality parameters can be affected by introduction of concrete - especially fresh concrete. Concrete affects the pH of runoff, causing significant chemical changes in water bodies and harming aquatic life. Suspended solids in the form of both cement and aggregate dust are also generated from both fresh and demolished concrete waste.

Current Unacceptable Waste Concrete Disposal Practices

- □ Dumping in streets or vacant areas on the job-site
- □ Illicit dumping away from the jobsite
- □ Dumping into ditches or drainage facilities

Recommended Disposal Practices

- □ Avoid unacceptable disposal practices listed above (i.e., perform washout of trucks offsite, whenever possible).
- □ Develop pre-determined, safe concrete disposal areas.
- □ Provide a washout area with a minimum of 6 cubic feet of containment area volume for every 10 cubic yards of concrete poured. If washout must occur onsite, conduct washout according to the following procedures:
  - Construct a temporary pit or bermed area as a designated wash-out area at least 50 feet from storm drains, open ditches, or water bodies, then either:
  - wash out concrete wastes and backfill the pit, or
  - wash out wastes into the temporary pit where the concrete can harden, be broken up, and then disposed of off-site.
- □ When washing concrete to remove fine particles and expose the aggregate, avoid creating runoff by draining the water to a bermed or level area.
- □ Never dump waste concrete illicitly.
- □ Treat runoff from storage areas through the use of structural controls as required.

Education

- □ Drivers and equipment operators should be instructed on proper disposal and equipment washing practices (see above).
- □ Supervisors must be made aware of the potential environmental consequences of improperly handled concrete waste.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- o Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- • Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Concrete Waste Management

Enforcement

- □ The construction site manager or foreman must ensure that employees and pre-mix companies follow proper procedures for concrete disposal and equipment washing.
- □ Employees violating disposal or equipment cleaning directives must be re-educated or disciplined if necessary.

Demolition Practices

- □ Monitor weather and wind direction to ensure concrete dust is not entering drainage structures and surface waters.
- □ Where appropriate, construct sediment traps or other types of sediment detention devices downstream of demolition activities.

Requirements

- □ Use pre-determined disposal sites for waste concrete.
- □ Prohibit dumping waste concrete anywhere but pre-determined areas.
- □ Assign pre-determined truck and equipment washing areas.
- □ Educate drivers and operators on proper disposal and equipment cleaning procedures.

Costs

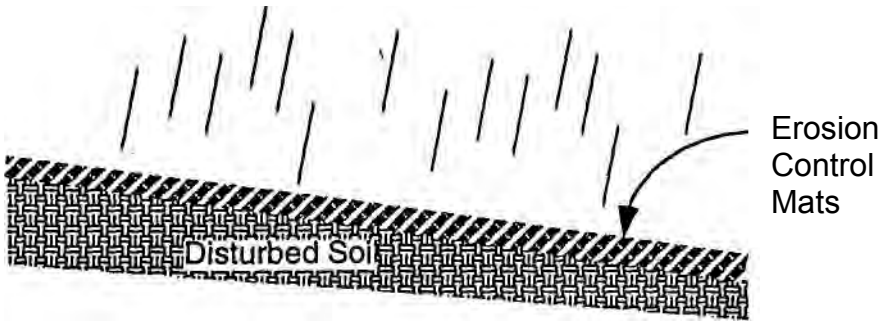
- □ Minimal cost impact for training and monitoring.
- □ Concrete disposal cost depends on availability and distance to suitable disposal areas
- □ Additional costs involved in equipment washing could be significant.

LIMITATIONS

This concrete waste management program is one part of a comprehensive construction site waste management program.

TERRA Environmental
SWPPP - BMPs

Erosion Control Mats



DESCRIPTION

An erosion control mat (ECM) is a geomembrane or biodegradable fabric placed over disturbed areas to limit the effects of erosion due to rainfall impact and runoff across barren soil. Erosion control mats are manufactured by a wide variety of vendors addressing a range of conditions such as vegetation establishment and high velocity flow. Types of matting include organic (jute, straw) and synthetic (plastic and glass fiber) materials.

PRIMARY USE

Mats can provide both temporary and/or permanent stabilization for disturbed soil or barren areas. They are used for areas that are difficult to stabilize such as steep slopes, temporary or permanent drainage swales, embankments or high traffic (pedestrian) areas. Some mats are reusable, reducing the cost of subsequent installations.

APPLICATIONS

Mats can be used on any construction-related disturbed area, but are particularly effective for erosion control of fine grained soils, and on short, steep slopes (such as stream banks) where erosion is high and growth of vegetation is slow.

DESIGN CRITERIA

A mat may be used by itself or in combination with netting or other anchors to promote soil stabilization. Choice of matting depends largely on slope, climate, soil type, and durability. Mats are usually installed according to the manufacturer's recommended guidelines. After appropriate installation, the matting should be checked for: uniform contact with the soil; security of the lap joints; and flushness of the staples with the ground.

Manufacturers information will verify acceptable applications for a particular product.

LIMITATIONS

Although marring is highly effective in controlling erosion, it may be less cost-effective than other BMPs for erosion control and it may require a contractor with considerable mat installation experience for installation.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- □ Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- □ Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Erosion Control Mats

MAINTENANCE REQUIREMENTS

Matted areas must be inspected on a weekly basis, and after significant (>0.5 inch) rainfall, for bare spots caused by weather related events. Missing or loosened matting must be replaced or re-anchored.

TERRA Environmental
SWPPP - BMPs

Hazardous Waste Management

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- Sediment
- Nutrients, Toxic Materials
- Oil & Grease
- o Floatable Materials
- Other Construction Wastes

LEGEND

- Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

DESCRIPTION

The hazardous waste management BMP addresses the problem of storm water polluted with hazardous waste through spills or other forms of contact. The objective of the Management Program is to minimize the potential of storm water contamination from common construction site hazardous wastes through appropriate recognition, handling, storage and disposal practices.

It is not the intent of this management program to supersede or replace normal site assessment and remediation procedures. Significant spills and/or contamination warrant immediate response by trained professionals. Suspected job-site contamination should be immediately reported to regulatory authorities and appropriate actions taken. The General Permit requires reporting of significant spills to the National Response Center (NRC) at (800) 424-8802.

PRIMARY USE

These management practices along with applicable OSHA and EPA guidelines should be incorporated at all construction sites which use or generate hazardous wastes. Many wastes such as fuel, oil, grease, fertilizer and pesticide are present at most construction sites.

INSTALLATION, APPLICATION AND DISPOSAL CRITERIA

The hazardous waste management techniques presented here are based on proper recognition, handling, and disposal practices by construction workers and supervisors. Key elements of the management program are education, proper disposal practices, as well as provisions for safe storage and disposal. Following are lists describing the targeted materials and recommended procedures:

□ **Targeted Hazardous Waste Materials**

Paints	Greases
Solvents	Roofing tar
Stains	Pesticides
Wood preservatives	Fuels & lube oils
Cutting oils	Lead based paints (Demolition)

Storage Procedures

- □ Wherever possible, minimize use of hazardous materials. Minimize generation of hazardous wastes on the job-site.
- □ Segregate potentially hazardous waste from non-hazardous construction site debris.
- □ Designate a foreman or supervisor to oversee hazardous materials handling procedures.
- □ Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- □ Store waste materials away from drainage ditches, swales and catch basins.

- □ Use containment berms in fueling and maintenance areas and where the potential for spills is high.
- □ Ensure that hazardous waste collection containers are conveniently located.
- □ Do not allow potentially hazardous waste materials to accumulate on the ground.
- □ Enforce hazardous waste handling and disposal procedures.
- □ Clearly mark on all hazardous waste containers what materials are acceptable for the container.

Disposal Procedures

- □ Regularly schedule hazardous waste removal to minimize on-site storage.
- □ Use only reputable, licensed hazardous waste haulers.

Education

- □ Instruct workers in identification of hazardous waste
- □ Educate workers of potential dangers to humans and the environment from hazardous wastes
- □ Instruct workers on safety procedures for common construction site hazardous wastes
- □ Educate all workers on hazardous waste storage and disposal procedures
- □ Have regular meetings to discuss and reinforce identification, handling and disposal procedures (incorporate in regular safety seminars)
- □ Establish a continuing education program to indoctrinate new employees.

Quality Assurance

- □ Foreman and/or construction supervisor shall monitor on-site hazardous waste storage and disposal procedures.
- □ Educate and if necessary, discipline workers who violate procedures.
- □ Ensure that the hazardous waste disposal contractor is reputable and licensed.

Requirements

- □ Job-site hazardous waste handling and disposal education and awareness program.
- □ Commitment by management to implement hazardous waste management practices. Compliance by workers.
- □ Sufficient and appropriate hazardous waste storage containers.
- □ Timely removal of stored hazardous waste materials.

Costs

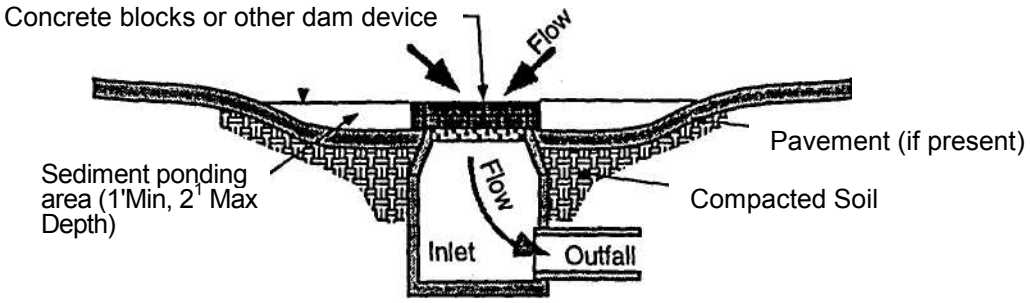
- □ Possible modest cost impact for additional hazardous storage containers.
- □ Small cost impact for training and monitoring.
- □ Potential cost impact for hazardous waste collection and disposal by licensed hauler - actual cost depends on type of material and volume.

LIMITATIONS

This practice is not intended to address site-assessments and pre-existing contamination. Major contamination, large spills and other serious hazardous waste incidents require immediate response from specialists. Demolition activities and potential pre-existing materials, such as asbestos, are not addressed by this program. Site specific information on plans is necessary. Contaminated soils are not addressed.

TERRA Environmental
SWPPP - BMPs

Inlet Protection



DESCRIPTION

Inlet protection consists of a variety of methods of intercepting sediment at low point inlets through the use of stone, filter fabric and other materials. This is normally located at the inlet, providing either detention or filtration to reduce sediment and floatable materials in storm water.

PRIMARY USE

Inlet protection is normally used as a secondary defense in site erosion control due to the limited effectiveness and applicability of the technique. It is normally used in new developments that include new inlets or during major repairs to existing roadways. Inlet protection has limited use in developed areas due to the potential for flooding, traffic safety and pedestrian safety and maintenance problems. Inlet protection can reduce sediment in storm sewer system by serving as a back up system to onsite controls, or by reducing sediment loads from controls with limited effectiveness such as straw bale dikes. Use only for drainage areas less than 1 acre unless a sediment trap first intercepts the runoff.

APPLICATIONS

Different variations are used for different conditions as follows:

- □ Filter barrier protection (similar to a silt fence barrier around the inlet) is appropriate when the drainage area is less than one acre and the basin slope is less than five (5) percent. This type of protection is not applicable in paved areas.
- □ Block and gravel (crushed stone, recycled concrete is also appropriate) protection is used when flows exceed 0.5 c.f.s. and it is necessary to allow for overtopping to prevent flooding (see sketch at top of fact sheet).
- □ Wire mesh and gravel protection (crushed stone, recycled concrete is also appropriate) is used when flows exceed 0.5 c.f.s. and construction traffic may occur over the inlet. This form of protection may be used with both curb and drop inlets.
- □ Excavated impoundment protection around a drop inlet may be used for protection against sediment entering a storm drain system. With this method, it is necessary to install weep holes to allow the impoundment to drain completely. The impoundment should be sized such that the volume of excavation shall be equal to 1800 to 3600 cubic feet per acre of contributing drainage area entering the inlet for full effectiveness.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- □ Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- □ Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Inlet Protection

DESIGN CRITERIA

- Filter fabric protection should be designed and maintained in a manner similar to silt fence.
- Maximum depth of flow should be eight (8) inches or less depending on vehicular and pedestrian traffic.
- Positive drainage is critical in the design of inlet protection. If overflow is not provided, flows which exceed the capacity of the inlet protection system should be routed through established swales, streets or other watercourses to minimize damage due to ponding, and to provide for public safety.

LIMITATIONS

Ponding will occur at the inlet with possible flooding as a result. Runoff will bypass protected inlets on slopes. Drainage area should be less than 1 acre.

Inlet protection is only viable at low point inlets. Inlets which are on a slope cannot be effectively protected because stormwater will bypass the inlet and continue downstream, causing an overload condition at inlets beyond.

MAINTENANCE REQUIREMENTS

Inspections should be made on a weekly basis, especially after large (> 0.5 inches) storm events. When a silt fence is used and the fabric becomes clogged, it should be cleaned or if necessary, replaced. Also, sediment should be removed when it reaches approximately one-half the height of the fence. If a sump is used, sediment should be removed when the volume of the basin is reduced by 50%.

For systems using stone filters, the stones must be pulled away from the inlet and cleaned or replaced when it becomes clogged with sediment. Since cleaning of gravel at a construction site may be difficult, an alternative approach would be to use the clogged stone as fill material and put new stone around the inlet.

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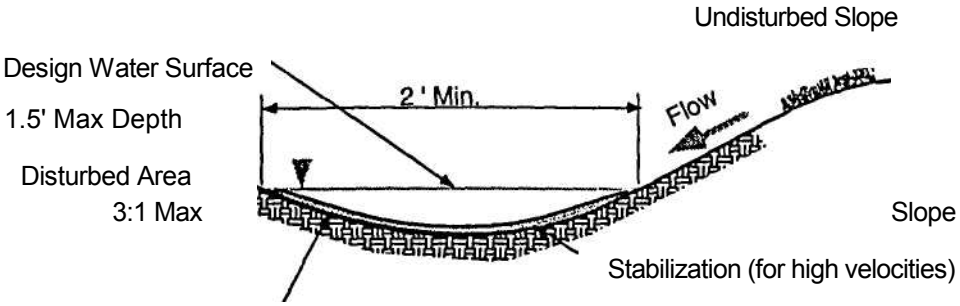
SWPPP - BMPs

Interceptor Swale



Cross Section

DESCRIPTION

An interceptor swale is a small v-shaped or parabolic channel which collects runoff and directs it to a desired location. It can either have a natural grass lining or depending on slope and design velocity, a protective lining of erosion matting, stone or concrete.

PRIMARY USE

The interceptor swale can either be used to direct sediment laden flow from disturbed areas into' a controlled outlet or to direct 'clean' runoff around disturbed areas. Since the swale is easy to install during early grading operations, it can serve as the first line of defense in reducing runoff across disturbed areas. As a method of reducing runoff across the disturbed construction area, it reduces the requirements of structural measures to capture sediment from runoff since the flow is reduced. By intercepting sediment laden flow downstream of the disturbed area, runoff can be directed into a sediment basin or other BMP for sedimentation as opposed to long runs of silt fence, straw bales or other filtration methods.

Based on site topography, swales can be effectively used in combination with diversion dikes.

APPLICATIONS

Common applications for interceptor swales include roadway projects, site development projects with substantial offsite flow impacting the site and sites with a large area(s) of disturbance. It can be used in conjunction with diversion dikes to intercept flows. Temporary swales can be used throughout the project to direct flows away from staging, storage and fueling areas along with specific areas of construction. Note that runoff which crosses disturbed areas or is directed into unstabilized swales must be routed into a treatment BMP such as a sediment basin.

Grass lined swales are an effective permanent stabilization technique. The grass effectively filters both sediment and other pollutants while reducing velocity.

DESIGN CRITERIA

□ Maximum depth of flow in the swale should be 1.5 feet based on a 2 year design storm peak flow. Positive overflow must be provided to accommodate larger storms.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- Floatable Materials
- □ Other Construction Wastes

LEGEND

- Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Interceptor Swale

- □ Side slopes of the swale should be 3:1 or flatter.
- □ Minimum design channel freeboard should be 6 inches.
- □ The minimum required channel stabilization for grades less than 2 percent and velocities less than 6 feet per second may be grass, erosion control mats or mulching. For grades in excess of 2 percent or velocities exceeding 6 feet per second, stabilization in the form of high velocity erosion control mats, a three inch layer of crushed stone or rip rap is required. Velocities greater than 8 feet per second are discouraged.
- □ Check dams can be used to reduce velocities in steep swales. See check dam BMP fact sheet for design criteria.
- □ Interceptor swales must be designed for flow capacity based on Manning's Equation to ensure a proper channel section. Alternate channel sections may be used when properly designed and accepted.
- □ Consideration must be given to the possible impact that any swale may have on upstream or downstream conditions.
- □ Swales must maintain positive grade to an acceptable outlet.

LIMITATIONS

Interceptor swales must be stabilized quickly upon excavation so as not to contribute to the erosion problem they are addressing.

Swales may be unsuitable to the site conditions (too flat or steep).

Limited flow capacity for temporary swales. For permanent swales, the 1.5 feet maximum depth can be increased as long provisions for public safety are implemented.

MAINTENANCE REQUIREMENTS

Inspection must be made weekly and after each significant (0.5-inch or greater) rain event to locate and repair any damage to the channel or to clear debris or other obstructions so as not to diminish flow capacity. Damage from storms or normal construction activities such as tire ruts or disturbance of swale stabilization shall be repaired as soon as practical.

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SWPPP - BMPs

Vehicle and Equipment Maintenance and Repair

DESCRIPTION/PRIMARY USE

Prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment maintenance and repair.

APPLICATIONS/DESIGN CRITERIA

- □ Keep equipment clean, don't allow excessive build-up of oil and grease.
- □ Keep drip pans or containers under the areas that might drip.
- □ If maintenance must occur onsite, use designated areas, located away from drainage courses, to prevent the runon of stormwater and runoff of spills.
- □ Changing motor oil or performing equipment maintenance in non-appropriate areas. Use the vehicle maintenance area.
- □ Use offsite repair shops as much as possible. Maintaining vehicles and equipment outdoors or in areas where vehicle or equipment fluids may spill or leak onto the ground can pollute stormwater. If you maintain a large number of vehicles or pieces of equipment, consider using an offsite repair shop.
- □ Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- □ Place a stockpile of spill cleanup materials where it will be readily accessible.
- □ Inspect equipment for leaks.
- □ Keep the equipment yard clean.
- □ Segregate wastes.
- □ Make sure oil filters are completely drained and crushed before recycling or disposal.
- □ Make sure incoming vehicles are checked for leaking oil and fluids.
- □ Do not hose down work areas.
- □ Do not pour materials down drains; use dry sweeping.
- □ Recycle greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic, and transmission fluids.
- □ Use recycled products.
- □ Clean small spills with rags, general clean-up with damp mops and larger spills with absorbent material.
- □ Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- □ Train employees and subcontractors.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- o Sediment
- o Nutrients, Toxic Materials
- • Oil & Grease
- o Floatable Materials
- □ Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Vehicle and Equipment Washing and Steam Cleaning

LIMITATIONS

Space and time limitations may preclude all work being conducted indoors.

It may not be possible to contain and clean up spills from vehicles/equipment brought onsite after working hours.

Drain pans (usually 1' x 1") are generally too small to contain antifreeze, which may gush from some vehicles, so drip pans (3' x 3') may have to be purchased or fabricated.

Identification of engine leaks may require some use of solvents.

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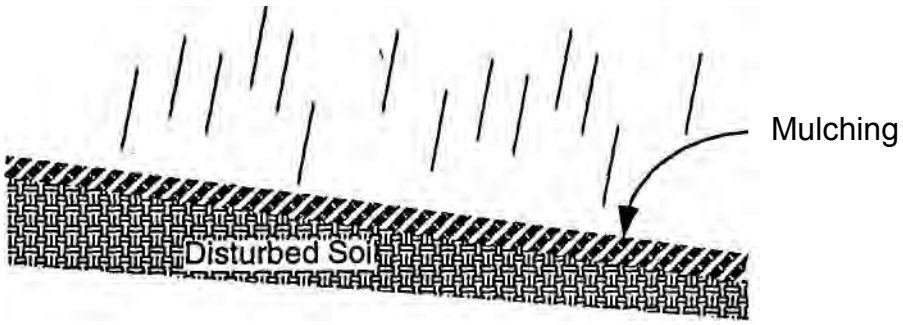
Mulching



DESCRIPTION

Mulching is the application of a layer of chopped straw, hay or other material which is spread uniformly over barren areas to reduce the effects of erosion from rainfall. Types of mulch include organic materials, straw, wood chips, bark or other fibers. Mulch also comes in prepackaged forms, using straw, hay or other material with organic and inorganic binding systems.

PRIMARY USE

Mulch is used to temporarily and/or permanently stabilize clear or freshly seeded areas. It protects the soil from erosion and moisture loss by lessening the effects of wind, water, and sunlight. It also decreases the velocity of sheet flow, thereby reducing the volume of sediment-laden water leaving the mulched area.

APPLICATIONS

Mulch may be used on any construction-related disturbed area for surface protection including:

- Freshly seeded or planted areas,
- Areas at risk during unsuitable growing conditions,
- Areas that are not conducive to seeding or planting; such as where slopes are 2:1 or greater.

DESIGN CRITERIA

Mulch may be used by itself or in combination with netting or other anchors to promote soil stabilization.

Several manufacturers provide organic mulch with an attached netting to simplify installation. Installation should adhere to manufacturer's specifications and requirements.

- □ Choice of mulch depends largely on slope, climate, and soil type in addition to availability of different materials. Straw and hay are the recommended choices due to their availability and biodegradability.
- □ Mulch should be applied in an even and uniform manner where concentrated water flow is negligible.
- □ For areas using straw mulch and the slope is greater than 3-5 percent, anchoring of the mulch with a Krimper Tool is required.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- • Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Mulching

LIMITATIONS

Mulches are subject to removal by wind or water under severe climatic conditions. Mulches lower the soil temperature which may result in longer seed germination periods.

Wood fiber mulches should be used only in areas with over 20 inches annual precipitation.

Organic mulches are not permanent erosion control measures.

Mulches tend to lower the soil surface temperature, and may reduce germination of some seeds.

Permanent mulches for arid regions should include gravel and decomposed soils.

MAINTENANCE REQUIREMENTS

Mulched areas must be inspected on a weekly basis, and after significant (>0.5 inch) rainfall, for thin or bare spots caused by natural decomposition or weather related events. Mulch in high traffic areas should be replaced on a regular basis to maintain uniform protection.

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Oil Water Separators and Water Quality Inlets

DESCRIPTION

Oil/water separators are designed to remove one specific group of contaminants: petroleum compounds and grease. However, separators will also remove floatable debris and settleable solids. Two general types of oil/water separators are used: conventional gravity separator and the coalescing plate interceptor (CPI).

PRIMARY USE/APPLICATIONS/DESIGN CRITERIA

Applicable to situations where the concentration of oil and grease related compounds will be abnormally high and source control cannot provide effective control. The general types of areas where this situation is likely are truck, car, and equipment maintenance and washing areas, as well as maintenance areas. Conventional separators are capable of removing oil droplets with diameters equal to or greater than 150 microns. A CPI separator should be used if smaller droplets must be removed. Sizing of the facility is based on anticipated influent oil concentration, water temperature, and the effluent goal.

LIMITATIONS

Little data on oil characteristics in storm water leads to considerable uncertainty about performance.

MAINTENANCE REQUIREMENTS

Clean frequently of accumulated oil, grease, and floating debris.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

□ Sediment

o Nutrients, Toxic Materials

• Oil & Grease

□ Floatable Materials

o Other Construction Wastes

LEGEND

• Significant Impact

□ Medium Impact

o Low Impact

? Unknown or Questionable Impact

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SWPPP - BMPs

Outdoor Loading/Unloading of Materials

DESCRIPTION

Prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

APPROACH

- □ Park tank trucks or delivery vehicles so that spills or leaks can be contained.
- □ Cover the loading/unloading docks to reduce exposure of materials to rain.
- □ Seal or door skirt between trailer and building can also prevent exposure to rain.
- □ Design loading/unloading area to prevent stormwater runon:
  - grading or berming, and
  - position roof downspouts to direct stormwater away from loading/unloading areas.
- □ Contain leaks during transfer.
- □ Use drip pans under hoses,
- □ Make sure fork lift operators are properly trained.
- □ Employee training for spill containment and cleanup.

Requirements

- □ Costs (Capital, O&M)
  - Should be low except when covering a large loading/unloading area.

- □ Maintenance
  - Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
  - Check loading and unloading equipment regularly for leaks:
    - valves,
    - pumps,
    - flanges, and
    - connections

LIMITATIONS

Space and time limitations may preclude all transfers from being performed indoors or under cover.

It may not be possible to conduct transfers only during dry weather.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- o Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- • Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

TERRA Environmental
SWPPP - BMPs

Outdoor Material Storage

PURPOSE

Prevent or reduce the discharge of pollutants to storm water from outdoor storage areas for significant material (e.g., fuels, chemicals, bagged material on pallets, soils or asphalt material bulk storage, deicing compounds, etc.)

APPROACH

APPROACH TO FUTURE FACILITIES AND UPGRADES:
Design of New Facilities and Existing Facility Upgrades

- □ Require the use of appropriate water quality control structures for fuel and chemical storage areas such as detention/retention basins and sumps. Develop appropriate minimum performance standards for these water quality control structures and implement a reporting program to monitor the performance and maintenance of these structures
- □ Chemical, fuel, and oil dispensing (non-aircraft) areas should be covered, if possible.
- □ Develop standard guidelines for the management of storm water which collects in secondary containment areas.

APPROACH TO EXISTING FACILITY ACTIVITIES:
Operational Considerations
Good Housekeeping

- □ Avoid dispensing from drums positioned horizontally in cradles. Dispensing materials from upright drums equipped with hand pumps is preferred. Always use drip pans and self closing spigots if dispensing from horizontally positioned drums.
- □ Store drums and containers on pallets or other structures to keep the container out of contact with storm water.
- □ Use drum lids to prevent rainfall from washing materials and drippage from the top of containers to the storm drain system.
- □ Discharge collected storm water from secondary containment areas according to guidelines developed by the federal government and applicable state and local regulations.
- □ Store all materials in their original containers or containers approved for that use. Ensure that all containers are appropriately sealed. Store empty containers indoors or under cover or move them off-site.
- □ Properly label all chemical containers with information, including their contents, hazards, spill response and first aid procedures, manufacturer's name and address, and storage requirements. Maintain copies of MSDS on file for any materials stored and/or handled by the applicator.

Physical Site Usage

- □ Protect all significant materials from rainfall, run-on, runoff and wind dispersal to the maximum extent practicable. Viable options are:
  - Store material indoors.
  - Cover the storage area with a roof.
  - Cover the material with a temporary covering made of polyethylene, polypropylene, or hypalon.
  - Minimize storm water run-on by enclosing the area, building a berm around the area, store indoors, or completely cover.

TARGETED ACTIVITIES

- □ Aircraft/Vehicle/Equipment Maintenance
- □ Aircraft/Vehicle Fueling
- □ Fuel/Chemical/Equipment Storage
- □ Cargo Handling

TARGETED POLLUTANTS

- □ Fuel
- □ Solvents/Cleaning Solutions
- □ Deicing/Anti-Icing Fluids

KEY APPROACHES

- □ Store materials indoors or under cover
- □ Store drums/containers on pallets
- □ Provide berming or secondary containment
- □ Develop/implement an SPCC, if required
- □ Perform and document periodic inspections

Outdoor Material Storage

- □ Reduce the quantities of significant materials stored outside (i.e., chemicals) to the minimum volume required based on variables such as release potential, usage, and shelf life.
- □ Make use of existing overhangs to the extent practicable.

Structural Controls

- □ Provide berming or secondarily contain storage tankers, ASTs, drums and containers.
- □ Install and maintain catch basin filter inserts.

Maintenance

- □ Inspect, clean and maintain sumps, if applicable.

Contingency Response

- □ Develop and implement a Spill Prevention Control and Countermeasures (SPCC) Plan, if required under guidelines set forth in40CFR, Section 112.3(a), (b).
- □ Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur.
- □ Post signs at all chemical storage locations in clearly visible locations noting the materials stored, emergency contacts, and spill cleanup procedures.

Inspection and Training

- □ Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education (see SC-10 for storm water pollution education approaches), right-to-know awareness training, and hazardous materials management.
- □ Perform and document periodic inspections in a log book. Inspection items should include the following:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator failure.
- Check for failure of piping system (pipes, pumps, flanges, couplings, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases.
- Visually inspect new tanks or containers for loose fittings, poor welds, and improper or poorly fitted gaskets.

REQUIREMENTS

- □ Capital and O&M costs will vary widely depending on the size of the facility and the necessary controls. Costs associated with on-site detention/retention facilities could be high.

LIMITATIONS

- □ Storage structures must meet local building and applicable local Uniform Fire Code (UFC) requirements. However, spills and releases are frequently caused by improper handling rather than structural deficiencies.

RELEVANT RULES AND REGULATIONS

Federal:

.29 CFR 1910 (Subparts G, H, I, J and K) Hazardous Materials, Environmental Controls and Personnel Protection
.29 CFR 1910.1200 OSHA Hazard Communication Standard
.40 CFR 260-262, 268 amd 270-272 Hazardous Waste Management
.40 CFR 280-281 Underground Storage Tanks
.40 CFR 302 Designation, Reportable Quantities and Notification Requirements for Hazardous Substances under CERCLA
.40 CFR 372 Toxic Chemical Release Reporting: Community Right-to-Know
.40 CFR 110.3 Discharge of Oil
.40 CFR 112 Oil Pollution Prevention (SPCC/OPA Plans)
.40 CFR 117.3 Determination of Reportable Quantities for a Hazardous Substance

Outdoor Material Storage

.40 CFR 122-124 NPDES Regulations for Storm Water Discharges
.40 CFR 401 Effluent Limitation Guidelines
.49 CFR 171-173, 175 and 177 Department of Transportation Regulations

State:

.314 CMR 1.00-15.00 Water Pollution Control
.310 CMR 30.00 Hazardous Waste
.527 CMR 9.00 Tanks
.527 CMR 4.00 Fuel Oil Burning Equipment
.527 CMR 5.00 Garages
.527 CMR 14.00 Handling of Flammable Materials
.Massachusetts General Law Chapter 111F Massachusetts Right-to-Know
.310 CMR 33.00 Massachusetts Right-to-Know
.105 CMR 670.00 Massachusetts Right-to-Know (Department of Public Health)
.780 CMR 2.00 Massachusetts Building Code
.248 CMR 2.00 Massachusetts Plumbing Code
.360 CMR 10.00 MWRA Regulations

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Outdoor Storage of Raw Materials, Products, and By-Products

DESCRIPTION

Prevent or reduce the discharge of pollutants to stormwater from outdoor material and product storage areas by enclosing or covering materials, installing secondary containment, and preventing stormwater runon.

PRIMARY USE

These management practices, along with applicable OSHA and EPA guidelines, should be incorporated at all construction sites which use or generate hazardous wastes and or materials. Many materials such as fuel, oil, grease, fertilizer and pesticide are present at most construction sites.

APPROACH

- □ Designate an area of the construction site for material delivery and storage.
  - Locate this area near the construction entrance, away from waterways and drainage courses.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms
  - Make the area secure.
- □ Methods of storage of reactive, ignitible, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See also the Flammable and Combustible Liquid Code, NFPA30.
- □ Keep an accurate, up-to-date inventory in the site-specific SWPPP of the materials delivered and stored onsite.
- □ Keep the inventory down. Store only the amount immediately needed. Store as few hazardous materials on site and as infrequently as possible.
- □ Handle hazardous materials as infrequently as possible.
- □ Whenever possible, store materials in a covered area with secondary containment such as an earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in concrete mixing trays or other small trays.
- □ Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on pallets and within secondary containment.
- □ If drums must be maintained exposed to rainfall, store them at a slight angle to reduce ponding of rainwater on the lids and to reduce corrosion.
- □ Keep chemicals in their original containers, and well labeled.
- □ Train concerned employees and subcontractors in proper handling of all wastes and materials onsite.
- □ Employees trained in emergency spill cleanup procedures should be present when dangerous materials or liquid chemicals are unloaded. Protect materials from rainfall, runon, and runoff:
  - Store materials indoors.
  - Cover the storage area with a roof.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- o Sediment
- □ Nutrients, Toxic Materials
- • Oil & Grease
- o Floatable Materials
- • Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

  - Cover the material with a temporary covering made of polyethylene, polypropylene, or hypalon when outside of a covered area.
  - Use "doghouses" for storage of liquid containers.
- □ Parking lots or other surfaces near bulk storage areas should be swept periodically to remove debris blown or washed from storage areas.
- □ Keep outdoor storage containers in good condition.
- □ Use berms and curbing.

Requirements

- □ Costs (Capital and O&M)
  - Costs should be low except where large areas may require covering.

- □ Maintenance
  - Berm and curbing repair and patching
  - Maintenance of polypropylene and other temporary covers.

LIMITATIONS

Space limitations may preclude storing some materials indoors.

Some municipalities require that secondary containment areas (regardless of size) be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Storage sheds often must meet building and fire code requirements.

Paved areas should be sloped in a manner that minimizes the, pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5 percent is recommended.

Curbing should be placed along the perimeter of the area to prevent the runon of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas. The storm drainage system should be designed to minimize the use of catch basins in the interior of the area as they tend to rapidly fill with material. The area should be sloped to drain stormwater to the perimeter where it can be collected or to internal drainage alleyways where material is not stockpiled.

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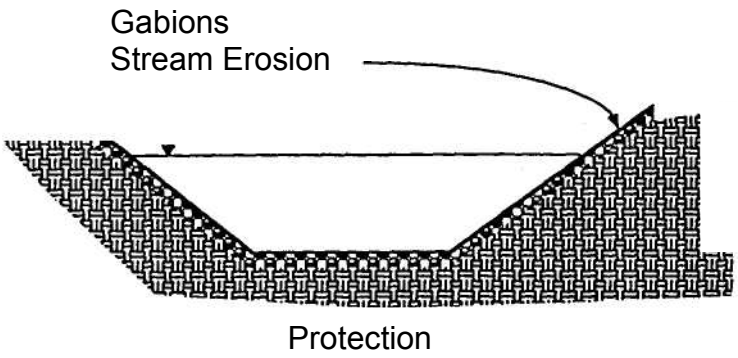
SWPPP - BMPs

Permanent Structural Controls



DESCRIPTION

Permanent erosion techniques consist of a wide variety of erosion prevention methods including gabions, retaining walls, and rip rap. These are not included as individual BMPs since they go beyond construction phase measures and due to the fact that their use is widespread in the region and the variety of design factors influencing design.

PRIMARY USE

Permanent erosion control is required at the completion of the construction phase of the project. This includes permanent structural methods as well as non-structural methods such as vegetation.

APPLICATIONS

Due to high installation cost and long term maintenance, permanent structural methods should be used only when necessary to address severe erosive conditions. In certain instances however, retaining walls are an effective method to reduce site slopes, reducing runoff velocity. Gabions and concrete rip-rap are effective in reducing stream bank erosion under severe concentrated flow conditions and at pipe outfalls.

DESIGN CRITERIA

Most structural controls such as gabions and rip-rap are designed based on the velocity of flow and the size of the stone used. Manufacturers' information addresses stone size along with basket dimensions for gabions.

Design of retaining walls is based on a variety of structural conditions including soil compressive strength, wall height and water table influence. Tables of dimensions for retaining walls based on site conditions are available from a variety of sources including the Concrete Reinforcing Steel Institute (CRSI).

A critical aspect with regards to the design of many permanent controls is adequate anchoring of the structure to prevent undermining of the foundation and washout of sediment at the edges of the structure. Where applicable, proper anchoring in the form of embedment or 'toe in' of the structure is required.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- o Other Construction Wastes

LEGEND

- Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Erosion Control Mats

LIMITATIONS

The initial cost is an important consideration in selection of permanent structural controls.

Stream bank erosion protection such as rip rap provides limited protection unless used extensively due to the potential for erosion at the edges of the rip rap.

MAINTENANCE REQUIREMENTS

Most stone or concrete structures require little maintenance, but may be subject to vandalism. As mentioned above, erosion around the structure may undermine the integrity of the structure. When maintenance is required, it is typically very extensive and costly.

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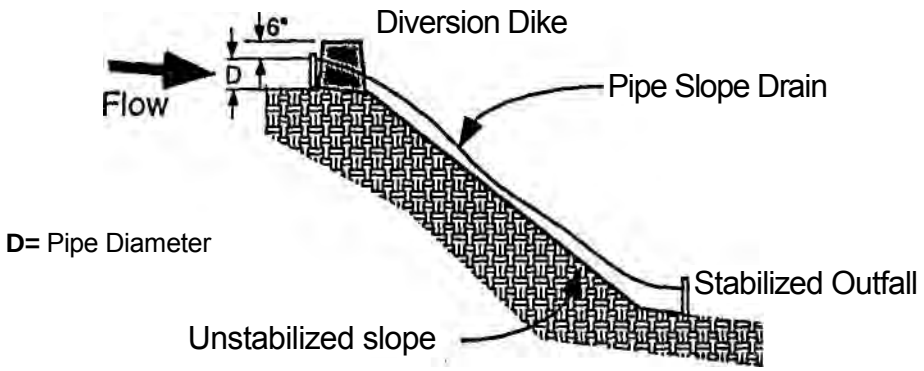
SWPPP - BMPs

Pipe Slope Drain



DESCRIPTION

A pipe slope drain is a temporary pipe line typically utilizing flexible pipe that conveys runoff down unstabilized slopes. The drain is anchored on the upstream end with some form of headwall to limit erosion and secure the pipe.

PRIMARY USE

A pipe slope drain is used on sites with a long, unstabilized, steep slope areas subject to erosion from overland flow. It is normally used in combination with interceptor swales or diversion dikes to direct the flow into the pipe area. The pipe, slope drain can provide service for a relatively large area. It does not treat the runoff. Therefore, if the runoff contains sediment, treatment through a controlled outlet will be required before the flow is released offsite.

APPLICATIONS

Sites with large berms or grade changes such as roadway embankments are candidates for a pipe slope drain. Since provisions must be made to direct the flow into the pipe drain, some grading is normally required upstream of the pipe slope drain. Installed properly, slope erosion can be greatly reduced (but not entirely eliminated) through the use of the drain.

Pipe slope drains also require a stabilized outlet. This is critical since the velocities at the outfall are normally high. Velocity dissipators as well as stone or concrete rip rap are typically required to reduce the velocity and spread the flow, reducing, erosion. Flow from a pipe slope drain should be routed to a sediment reduction BMP such as interceptor swales, diversion dikes or other suitable methods.

DESIGN CRITERIA

- □ The entrance to the pipe slope drain may be a standard corrugated metal pre-fabricated flared end section with an integral toe plate extending a minimum of 6 inches from the bottom of the end section.
- □ The grade of the entrance should be 3 percent or less.
- □ The berm at the entrance should have a minimum height of the pipe diameter plus 6 inches and a minimum width of three times the pipe diameter.
- □ All sections of the pipe slope drain should be connected using watertight collars or gasketed watertight fittings.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- □ Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- □ Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Pipe Slope Drain

- □ All sediment-laden runoff conveyed by the pipe slope drain should be directed to a sediment trapping facility.
- □ Temporary pipe slope drains are to be sized to accommodate runoff flows equivalent to a 10-year, 24-hour storm as calculated using the Rational Method and Manning's equation, but in no case should pipes be sized smaller than is shown in the following table:

Minimum Pipe Size	Maximum Contributing Drainage Area
12 inches	0.5 Acres
18 inches	1.5 Acres
21 inches	2.5 Acres
24 inches	3.5 Acres
30 inches	5.0 Acres

- □ Maximum drainage area for individual pipe slope drains should be 5 acres. For areas larger than 5 acres, additional drains should be added.
- □ Both the entrance and outfall of the pipe slope drain should be properly stabilized. Grass can normally be used at the entrance, but armor type stabilization such as stone or concrete rip rap is normally required to address the high velocities of the outfall.

LIMITATIONS

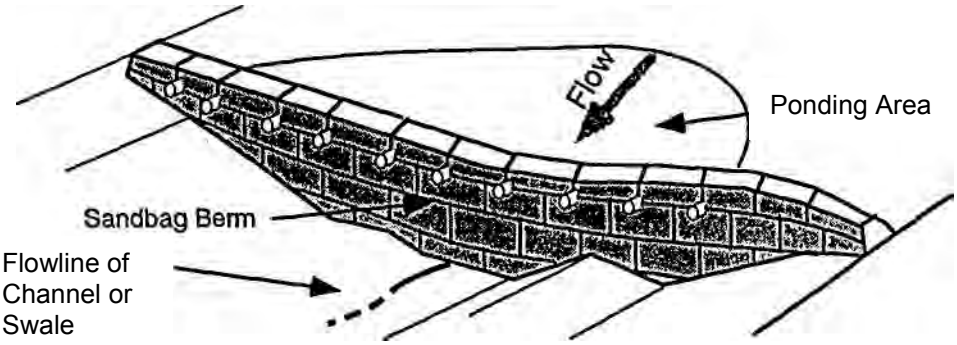
- □ Drains must be located away from construction areas since the drain can easily be damaged by construction traffic. Securing the pipe to the slope can be difficult and require significant maintenance during the life of the system.
- □ In situations where pipe slope drains convey sediment-laden runoff, pipes can become clogged during large rain events causing water to overtop the diversion dike, thereby creating a serious erosion condition.
- □ Grading is normally required upstream of the pipe slope drain in order to direct flow into the system. This can cause additional cost and maintenance.
- □ A pipe slope drain reduces erosion but does not prevent it or reduce the amount of sediment in runoff. Additional measures should be used in conjunction with the pipe slope drain to treat the flow.

MAINTENANCE REQUIREMENTS

Inspection must be made of the pipe after each significant (>0.5 inch) rain event to locate and repair any damage to joints or clogging of the pipe. In cases where the diversion dike has deteriorated from around the entrance of the pipe, it may be necessary to reinforce the dike with sandbags or to install a concrete collar to prevent failure. Signs of erosion around the pipe drain should be addressed in a timely manner by stabilizing the area with erosion control mats, crushed stone, concrete or other acceptable method.

TERRA Environmental
SWPPP - BMPs

Sand Bag Berm



APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- □ Floatable Materials
- o Other Construction Wastes

LEGEND

- Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

DESCRIPTION

Sandbag berms consist of stacked sandbags installed across a watercourse to direct flow around construction or to allow sedimentation to occur for flows downstream of disturbed areas. There are overflow pipes located in the top of the berm to allow controlled outflow of water after sedimentation has occurred.

PRIMARY USE

A sandbag berm is a temporary sediment control method that addresses the problem of construction in creeks, channels and other watercourses which carry a constant flow and is subjected to high, concentrated flows. A sandbag berm can also be used to create a small sedimentation pond prior to the completion of a permanent detention basin.

Sandbag berms can be used as check dams in temporary swales or borrow ditches.

Sandbag berms are not recommended for typical perimeter controls where sheet flow is prevalent.

APPLICATIONS

During utility or any type of construction in channels or stream beds, sandbag berms can be used as check dams across channels, serve as a barrier for utility trenches or even provide a temporary channel crossing for construction equipment without seriously affecting stream conditions. Sandbag berms can also be installed parallel to a roadway, providing a corridor of sediment control similar to that provided by a silt fence or hay bales with the exception that a sand bag dike is capable of controlling much higher flows and is much more durable. For site construction sandbag berms can be used to divert or direct flow or create a temporary sediment basin with the added dimension of being able to be moved to accommodate changes in construction much more easily than compacted earth berms.

DESIGN CRITERIA

- □ Berms are to be constructed along a line of constant elevation (a contour line) for use as perimeter control devices.
- □ Maximum flow through rate shall be 0.1 CFS per square foot of berm surface

Sand Bag Berm

- Minimum height shall be 18 inches.
- Minimum width of the berm shall be 18 inches at the top and 54 inches measured at the bottom.
- Maximum side slopes shall be 2:1.
- Maximum design freeboard shall be 0.3 feet
- Sandbags shall be consist of jute, polypropylene, polyethylene or polyamide woven fabric. Jute shall be composed of a uniform weave of undyed and unbleached single jute yarn weighing an average of 1.2 pounds per linear yard of cloth with approximately 78 warp ends per width of cloth. Polypropylene, polyethylene or polyamide woven fabric shall have a minimum unit weight of 4 ounces per square yard, a mullen burst strength of 300 psi minimum and ultraviolet stability exceeding 70 percent, and shall be filled with coarse sand or pea gravel.
- 4" diameter Schedule 40 or greater PVC pipe segments approximately 24 inches in length shall be used immediately below the top layer of sandbags to allow for flow through the berm.
- For severe velocities or high flows, woven wire mesh can be used to maintain the integrity of the berm.
- Sufficient room for the operation of sediment removal equipment shall be provided between the berm and other obstructions in order to properly remove sediment.
- The ends of the berm shall be turned upgrade or shall tie into natural grades to prevent bypass of stormwater.
- In channel applications, the center of the berm must be lower than the outside ends to prevent bypass around the berm.

LIMITATIONS

Sandbag berms are a costly, labor intensive technique which is suitable only for areas subjected to high concentrated flows. The permeability of the berms makes it unsuitable for low flow, perimeter conditions.

Ponding will occur directly upstream from the berm creating the possibility of flooding.

For sandbag berms located in high flow areas such as creeks, the potential for berm damage during high flows increases the requirement for maintenance.

MAINTENANCE REQUIREMENTS

Inspections should be made on a daily basis and after each significant (>0.5 inches) rain event. The sandbags shall be reshaped or replaced as need during the inspection. Silt should be removed when it reaches a depth of six (6) inches. In addition, weekly inspections should be made on the PVC pipe segments to assure clear flow.

TERRA Environmental
SWPPP - BMPs

Sandblasting Waste Management

DESCRIPTION

The objective of the management program is to minimize the potential of storm water quality degradation from sandblasting activities at construction sites. The key issues in this program are prudent handling and storage of sandblast media, dust suppression, and proper collection and disposal of spent media. It is not the intent of this program to outline all of the worker safety issues pertinent to this practice. Safety issues should be addressed by construction safety programs as well as local, state, and federal regulations.

INSTALLATION/APPLICATION CRITERIA

Since the media consists of fine abrasive granules, it can be easily transported by running water. Sandblasting activities typically create a significant dust problem which must be contained and collected to prevent off-site migration of fines.

Operational Procedures

- □ Use only inert, non-degradable sandblast media.
- □ Use appropriate equipment for the job, do not over-blast.
- □ Wherever possible, blast in a downward direction.
- □ Install a wind sock or other wind direction instrument.
- □ Cease blasting activities in high winds or if wind direction could transport grit to drainage facilities.
- □ Install dust shielding around sandblasting areas.
- □ Collect and dispose of all spent sandblast grit, use dust containment fabrics and dust collection hoppers and barrels.
- □ Non-hazardous sandblast grit may be disposed in permitted construction debris landfills or permitted sanitary landfills.
- □ If sandblast media cannot be fully contained, construct sediment traps downstream from blasting area where appropriate.
- □ Use sand fencing where appropriate in areas where blast media cannot be fully contained.
- □ If necessary, install misting equipment to remove sandblast grit from the air - prevent runoff from misting operations from entering drainage systems.
- □ Use vacuum grit collection systems where possible.
- □ Keep records of sandblasting materials, procedures, and weather conditions on a daily basis.
- □ Take all reasonable precautions to ensure that sandblasting grit is contained and kept away from drainage structures.

Educational Issues

- □ Educate all on-site employees of potential dangers to humans and the environment from sandblast grit.
- □ Instruct all on-site employees of the potential hazardous nature of sandblast grit and the possible symptoms of over-exposure to sandblast grit.
- □ Instruct operators of sandblasting equipment on safety procedures and personal protection equipment.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- Sediment
- Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- Other Construction Wastes

LEGEND

- Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Sandblasting Waste Management

- □ Instruct operators on proper procedures regarding storage, handling and containment of sandblast grit.
- □ Instruct operators to recognize unfavorable weather conditions regarding sandblasting activities.
- □ Instruct operators and supervisors on current local, state and federal regulations regarding fugitive dust and hazardous waste from sandblast grit.
- □ Have weekly meetings with operators to discuss and reinforce proper operational procedures.
- □ Establish a continuing education program to indoctrinate new employees.

Materials Handling Recommendations

- □ Sandblast media should always be stored under cover away from drainage structures.
- □ Ensure that stored media or grit is not subject to transport by wind.
- □ Ensure that all sandblasting equipment as well as storage containers comply with current local, state and federal regulations.
- □ Refer to Hazardous Waste BMP fact sheet if sandblast grit is known or suspected to contain hazardous components.
- □ Capture and treat runoff which comes into contact with sandblasting material or waste.

Quality Assurance

- □ Foremen and/or construction supervisor should monitor all sandblasting activities and safety procedures.
- □ Educate and if necessary, discipline workers who violate procedures.
- □ Take all reasonable precautions to ensure that sandblast grit is not transported off-site or into drainage facilities.

Requirements

- □ Education and awareness program for all employees regarding control of sandblasting and potential dangers to humans and the environment.
- □ Operator and supervisor education program for those directly involved in sandblasting activities - instructions on material handling, proper equipment operation, personal protective equipment, fugitive dust control, record keeping and reporting.
- □ Proper sandblast equipment for the job.
- □ Site-specific fugitive dust control and containment equipment.
- □ Site-specific fugitive dust control procedures.
- □ Compliance by supervisors and workers.

Costs

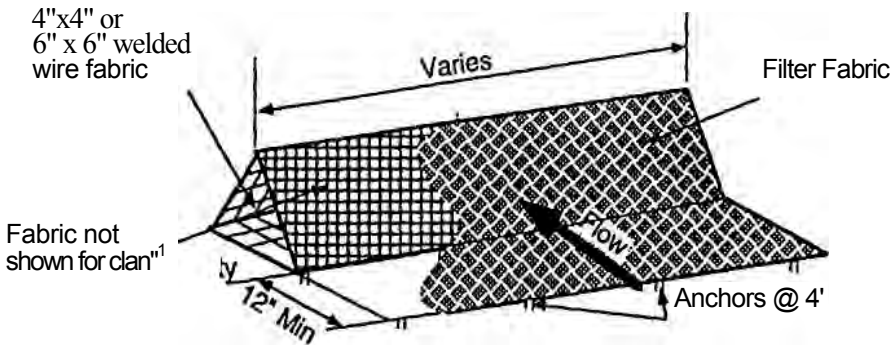
- □ Minimal cost for training and monitoring.
- □ Potential for significant cost for containment procedures on large jobs.
- □ Potential for significant costs associated with cleanup, correction and remediation if contamination occurs.

LIMITATIONS

Site specific solutions to sandblasting problems may be required. Sandblasting operations on structures known to contain hazardous materials require special procedures not specifically outlined above including professional hazardous waste specialists. Where hazardous materials are known or suspected, a site assessment and remediation plan may be necessary. This management program is one part of a comprehensive construction site waste management program.

TERRA Environmental
SWPPP - BMPs

Triangular Sediment Filter Dike



DESCRIPTION

A Triangular Sediment Filter Dike is a self contained silt fence consisting of filter fabric wrapped around welded wire fabric shaped into a triangular cross section. While similar in use to a silt fence, the dike is reusable, sturdier, transportable and can be used on paved areas or in situations where it is impractical to install embedded posts for support.

PRIMARY USE

Triangular filter dikes are used in place of silt fences, treating sediment flow at the perimeter of construction areas and at the perimeter of the site. Also, the dikes can serve as stream protection devices by preventing sediment from entering the streams or as check dams in small swales.

Triangular sediment filter dikes are especially useful for construction areas surrounded by pavement, where silt fence or hay bale installation is impractible. Since they can be anchored without penetration (through the use of rock), pavement damage can be minimized.

APPLICATIONS

Due to high installation cost and long term maintenance, permanent structural methods should be used only when necessary to address severe erosive conditions. In certain instances however, retaining walls are an effective method to reduce site slopes, reducing runoff velocity. Gabions and concrete rip-rap are effective in reducing stream bank erosion under severe concentrated flow conditions and at pipe outfalls.

DESIGN CRITERIA

- □ Dikes are to be installed along a line of constant elevation (along a contour line).
- □ Maximum slope perpendicular to the dike is 1:1.
- □ Maximum drainage flow to the dike should be 11 CFS per 100 linear feet of dike.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- • Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- □ Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Triangular Sediment Filter Dike

- □ Maximum distance of flow to dike should be 200 feet or less.
- □ Maximum concentrated flow to dike should be 1 CFS.
- □ If 50% or less of soil, by weight, passes the U.S. Standard sieve No. 200, select the equivalent opening size (E.O.S.) to retain 85% of the soil.
- □ Maximum equivalent opening size should be 70 (#70 sieve).
- □ Minimum equivalent opening size should be 100 (#100 sieve).
- □ If 85% or more of soil, by weight, passes the U.S. Standard sieve No. 200, triangular sediment dike should not be used due to clogging.
- □ Sufficient room for the operation of sediment removal equipment should be provided between the dike and other obstructions in order to properly remove sediment.
- □ The ends of the dike should be turned upgrade to prevent bypass of stormwater.

LIMITATIONS

Ponding will likely occur directly adjacent to the dike which may possibly cause flooding.

Triangular sediment filter dikes are not effective for conditions which include substantial concentrated flows or when they are not constructed along a contour line due to the potential for flow concentration and overtopping.

MAINTENANCE REQUIREMENTS

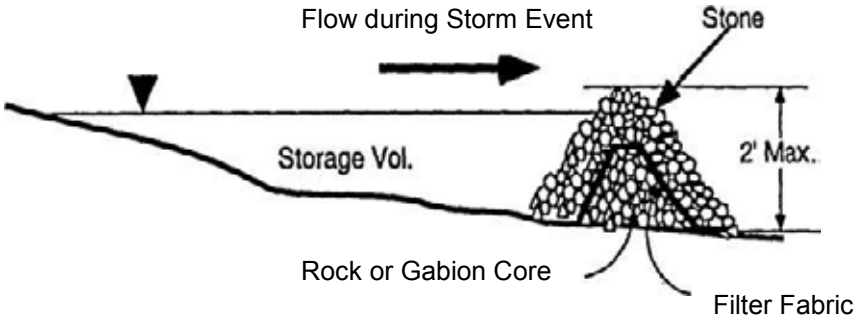
Inspections should be made on a weekly basis, especially after large (> 0.5 inches) storm events. If the fabric becomes clogged, it should be cleaned or if necessary, replaced.

Sediment should be removed when it reaches approximately 6 inches in depth. In addition, inspections should be made on a regular basis to check the structural integrity of the dike. If structural deficiencies are found, the dike should be immediately repaired or replaced.

As with silt fences, integrity of the filter fabric is important to the effectiveness of the dike. Overlap between dike sections must be checked on a regular basis and repaired if deficient.

TERRA Environmental
SWPPP - BMPs

Stone Outlet Sediment Trap



DESCRIPTION

A stone outlet sediment trap is a small ponding area formed by placing a stone embankment or gabion core with an integral stone filter outlet across a drainage swale for the purpose of detaining sediment-laden runoff generated by construction activities. The sediment trap detains runoff long enough to allow most of the suspended sediment to settle while still allowing for diffused flow of runoff.

PRIMARY USE

A sediment trap is used in situations where flows are concentrated in a drainage swale or channel. The sediment trap reduces velocities and allows for settling of sediment while allowing the area behind the trap to de-water. This is normally used for long term (18 months or less) applications in which a sediment basin is not feasible due to site or construction method restrictions. The use of a gabion core as opposed to an compacted earth core provides additional filtration and aids in dewatering the area as necessary.

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APPLICATIONS

Temporary stone outlet sediment traps are installed at locations where concentrated flows require a protected outlet to contain sediment or spread flow prior to discharge.

DESIGN CRITERIA

- □ Maximum drainage area contributing to the trap shall be 5 acres. For larger drainage area, a sediment basin should be used.
- □ The effectiveness of the trap is directly related to its size. A rule of thumb is that there should be 260 square feet of sediment trap surface per acre of drainage.
- □ Deposited sediment shall be removed when the depth of sediment is equal to one-third of the height of the outlet structure as measured from the original toe of slope to the crest of the outlet, or has reached a depth of 1 foot, whichever is less.
- □ The sediment trap may be formed completely by excavating or by construction of a compacted embankment. It should have a 2 feet deep sump for sediment storage. The outlet may be either a weir/spillway section, with the area below the weir acting as a filter for sediment and the upper area as the overflow spillway depth, or a riser perforated with 1 /2-inch diameter holes about 1 foot apart.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- • Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- □ Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Stone Outlet Sediment Trap

- A 3:1 or flatter aspect ratio between the trap length and width of the trap is desirable. Length is defined as the average distance from the inlet to the outlet of the trap.
- Determine the total trap dimensions by adding the depth required for the 2-year 24-hour design storm above the surface of the sediment storage volume, while not exceeding 3:1 side slopes (see attached figure).
- Minimum width of the embankment at the top shall be 3 feet.
- Minimum embankment slope shall be 3:1. D
- Maximum embankment height shall be 2 feet as measured from the toe of slope to the crest of the stone outlet. The height of the compacted earth embankment shall be 1 foot higher than the crest of the outlet.
- The maximum allowable flow-through rate shall be 0.1 CFS per square foot of the frontal area of the outlet structure.
- The effective life of the stone outlet sediment trap is approximately 18 months.

LIMITATIONS

Limited applications due to cost of construction, availability of materials, and the amount of land required.

Can cause minor flooding upstream of dam, impacting construction operations.

This technique serves as a temporary measure during construction. It should not be used for more than 18 months due to reduced efficiency.

MAINTENANCE REQUIREMENTS

Sediment shall be removed and the area directly behind the berm shall be regraded to its original dimensions at such point when the capacity of the impoundment has been reduced to one-half of its original storage capacity. The removed sediment shall be stockpiled or redistributed in areas which are protected from erosion.

The stone outlet structure should be inspected frequently and after each major rain event to check for clogging of the void spaces between stones. If the aggregate appears to be silted in such that efficiency is diminished, the stone should be replaced.

TERRA Environmental
SWPPP - BMPs

Straw Bale Barriers/Silt Fences

DESCRIPTION

A straw bale barrier consists of straw bales placed along a level contour in a shallow trench and staked to hold them in place. The barrier detains runoff, creating a pond behind the barrier where sedimentation occurs.

A silt fence is made of a filter fabric which has been entrenched, attached to supporting poles, and sometimes backed by a wire fence for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

APPLICATIONS

- □ Along the perimeter of the site
- □ Along streams and channels
- □ Across swales with small catchments
- □ Around temporary spoil areas
- □ Below other small, cleared areas

DESIGN CRITERIA

Hay Bales

- □ Use primarily in areas where sheet or rill flow occurs.
- □ No more than 1/4 acre per 100 feet of barrier should drain to the barrier.
- □ Installation along a level contour.
- □ Place in a 4-inch deep trench.
- □ Secure each bale with two stakes.
- □ Leave enough area behind the barrier for runoff to pond (no more than 1.5 ft or 0.5 cfs) and sediment to settle.

Silt Fences

- □ Use principally in areas where sheet or rill flow occurs.
- □ Install along a level contour, so water does not pond more than 1.5 feet at any point.
- □ No more than 1 acres, 100 ft., or 0.5 cfs of concentrated flow should drain to any point along the silt fence.
- □ Turn ends of fence uphill.
- □ Provide area behind the fence for runoff to pond and sediment to settle.
- □ Select filter fabric which retain 85 percent of the soil, by weight, based on sieve analysis, but is not finer than EOS70.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- • Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Straw Bale Barriers/Silt Fences

MAINTENANCE

- □ Inspect weekly and after each rainfall
- □ Repair wherever fence is damaged
- □ Remove sediment when it reaches a depth of 6 inches

LIMITATIONS

Hay Bales

- □ Straw bale dikes are not to be used for extended periods of time because they tend to rot and fall apart.
- □ Suitable only for sheet flow on slopes of 2 percent or flatter.
- □ Not appropriate for large drainage areas, limit to acre or less.
- □ Straw bales lose their effectiveness rapidly due to rotting, thus constant maintenance is required.

Silt Fences

- □ Do not use where 85 percent of the soil, by weight, passes through a No. 200 sieve because the filter fabric will clog.
- □ Do not place fence on a slope, or across any contour line.
- □ Do not use in streams, channels, or anywhere flow has concentrated.
- □ Do not use in locations where ponded water may cause flooding.

TERRA Environmental
SWPPP - BMPs

Solid Waste Management

DESCRIPTION

Large volumes of solid waste are often generated at construction sites including: packaging, pallets, wood waste, concrete waste, soil, electrical wiring, cuttings, and a variety of other materials. The solid waste management practice lists techniques to minimize the potential of storm water contamination from solid waste through appropriate storage and disposal practices.

PRIMARY USE

These practices should be a part of all construction practices. By limiting the trash and debris on site, storm water quality is improved along with reduced clean up requirements at the completion of the project.

APPLICATIONS

The solid waste management practice for construction sites is based on proper storage and disposal practices by construction workers and supervisors. Key elements of the program are education and modification of improper disposal habits. Cooperation and vigilance is required on the part of supervisors and workers to ensure that the recommendations and procedures are followed. Following are lists describing the targeted materials and recommended procedures:

□ **Targeted Solid Waste Materials**

Paper and cardboard containers
Plastic packaging
Styrofoam packing and forms
Insulation materials (non-hazardous)
Wood pallets
Wood cuttings
Pipe and electrical cuttings
Concrete, brick, and mortar waste
Shingle cuttings and waste Roofing tar
Steel (cuttings, nails, rust residue)
Gypsum board cuttings and waste
Sheathing cuttings and waste
Miscellaneous cutting and waste
Food waste
Demolition waste

Storage Procedures

- □ Wherever possible, minimize production of solid waste materials.
- □ Designate a foreman or supervisor to oversee and enforce proper solid waste procedures.
- □ Instruct construction workers in proper solid waste procedures. Segregate potentially hazardous waste from non-hazardous construction site debris.
- □ Keep solid waste materials under cover in either a closed dumpster or other enclosed trash container that limits contact with rain and runoff.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- o Sediment
- • Nutrients, Toxic Materials
- • Oil & Grease
- • Floatable Materials
- • Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

- □ Store waste materials away from drainage ditches, swales and catch basins.
- □ Do not allow trash containers to overflow.
- □ Do not allow waste materials to accumulate on the ground.
- □ Prohibit littering by workers and visitors.
- □ Police site daily for litter and debris.
- □ Enforce solid waste handling and storage procedures.

Disposal Procedures

- □ If feasible, segregate recyclable wastes from non-recyclable waste materials and dispose of Properly.
- □ General construction debris may be hauled to a licensed construction debris landfill (typically less expensive than a sanitary landfill).
- □ Runoff which comes into contact with unprotected waste should be directed into structural treatment facilities, such as silt fence, to remove debris.

Education

- □ Educate all workers on solid waste storage and disposal procedures.
- □ Instruct workers in identification of solid waste and hazardous waste.
- □ Have regular meetings to discuss and reinforce disposal procedures (incorporate in regular safety seminars).
- □ Clearly mark on all solid waste containers those materials that are acceptable.

Quality Control

- □ Foreman and/or construction supervisor shall monitor on-site solid waste storage and disposal procedures.
- □ Discipline workers who repeatedly violate procedures.

Requirements

- □ Job-site waste handling and disposal education and awareness program.
- □ Commitment by management to implement and enforce solid waste management program.
- □ Compliance by workers.
- □ Sufficient and appropriate waste storage containers.
- □ Timely removal of stored solid waste materials.
- □ Possible modest cost impact for additional waste storage containers.
- □ Small cost impact for training and monitoring
- □ Minimal overall cost impact.

LIMITATIONS

Only addresses non-hazardous solid waste.
One part of a comprehensive construction site management program.

TERRA Environmental
SWPPP - BMPs

Structure Construction and Painting

DESCRIPTION

Prevent or reduce the discharge of pollutants to stormwater from structure construction and painting by enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees and subcontractors.

APPROACH

- □ Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep the area.
- □ Use soil erosion control techniques if bare ground is exposed.
- □ Buy recycled or less hazardous products to the maximum extent practical.
- □ Enclose painting operations, consistent with local air quality and OSHA regulations.
- □ Properly store paints and solvents, See Material Delivery and Storage in this appendix.
- □ Properly store and dispose waste materials generated from the activity.
- □ See the waste management BMPs in this appendix.
- □ Recycle residual paints, solvents, lumber, and other materials to the maximum extent practical.
- □ Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.
- □ Clean the storm drain system in the immediate vicinity of the construction activity after it is completed.
- □ Educate employees who are doing the work.
- □ Inform subcontractors of company policy on these matters and include appropriate provisions in their contract to make certain proper housekeeping and disposal practices are implemented.

Requirements

- □ Costs (Capital, O&M)
  - These BMPs are generally of low to moderate cost.
- □ Maintenance
  - Maintenance should be minimal.

LIMITATIONS

Safer alternative products may not be available, suitable, or effective in every case.

Hazardous waste that cannot be re-used or recycled must be disposed of by a licensed hazardous waste hauler.

Be certain that actions to help stormwater quality are consistent with Cal- and Fed-OSHA and air quality regulations.

Additional Information - Structure Construction and Painting Construction and painting activities can generate pollutants that can reach stormwater if proper care is not taken. The sources of these contaminants may be solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

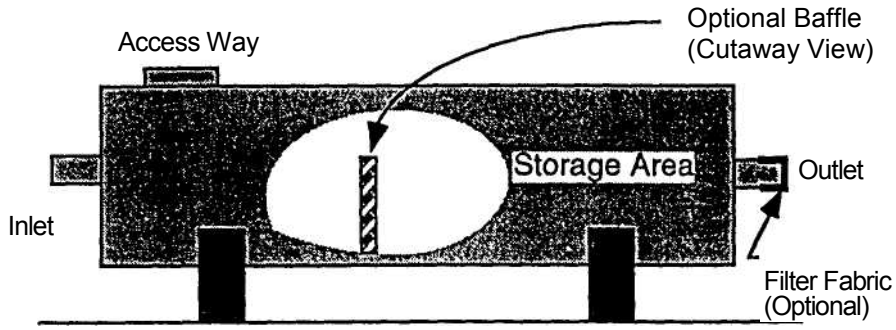
- o Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- • Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

TERRA Environmental
SWPPP - BMPs

Temporary Sediment Tank



DESCRIPTION

A temporary sediment tank (TST) is a large truck mounted tank used to hold sediment laden water to provide for sedimentation and filtration. For smaller applications, 55 gallon drums or other water tight container can be used for storage. Water is pumped into the tank where it is detained. If desired an outlet with a geofabric filter can be provided to release the flow after a period of detention.

PRIMARY USE

A TST is typically used at construction sites in urban areas where conventional methods of sediment removal (e. g., sediment traps, sediment basins) are not practical.

APPLICATIONS

Applications for a TST include utility construction in confined areas (such as a business district or large developed area) or localized construction in which other BMPs are not required such as small, depressed construction (e.g., tank farms). This includes pumpage from excavation in heavily developed or high traffic areas, with flows due to groundwater or runoff entering the trench or excavated area.

DESIGN CRITERIA

- □ A TST can be used as either a sedimentation or filtration device. If an oil sheen is present in the runoff, additional treatment will be required before release of runoff.
- □ For use as a small scale sedimentation basin, de-watering discharge is directed into the TST to a level below the tank midpoint and held for a minimum of 2 hours to allow settlement of a majority of the suspended particles. The tank should be designed for a controlled release when the contents of the tank reach a level higher than the midpoint. When sediment occupies 1/3 the capacity of the TST, it should be removed from the tank.
- □ As a filtration device, a TST is used for collecting de-watering discharge and flowing it through a filtered opening at the outlet of the tank to reduce suspended sediment volume. The filter opening in the TST should have an EOS (see silt fence BMP) of 70 or smaller.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- □ Sediment
- o Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Temporary Sediment Tank

LIMITATIONS

This is a specialized technique for the situations listed. It is not cost effective for normal sediment removal conditions.

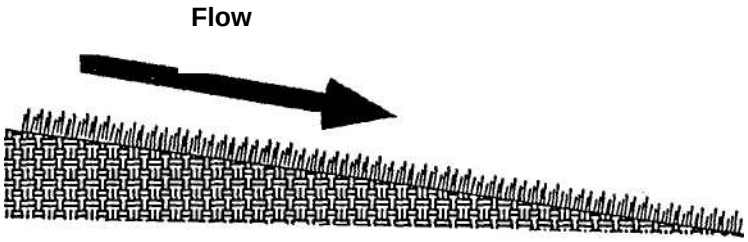
The use of a temporary sediment tank is limited by the capacity of the tank, the time required for settlement of suspended material, and disposal of the water and the sediment.

MAINTENANCE REQUIREMENTS

The temporary sediment tank should be inspected periodically during and after use. A tank should be cleaned out when it becomes 1/3 full of sediment.

TERRA Environmental
SWPPP - BMPs

Vegetation



DESCRIPTION

Vegetation, as a Best Management Practice, is the sowing of annual grasses, small grains or legumes to provide interim and permanent vegetative stabilization for disturbed areas.

PRIMARY USE

Vegetation is used as a temporary or permanent stabilization technique for areas disturbed by construction but not protected by pavement, building or other structures. As a temporary control, vegetation is used to stabilize stockpiles and barren areas which are inactive for long periods of time. As a permanent control, grasses and other vegetation provide good protection for the soil along with some filtering for overland runoff. Subjected to acceptable runoff velocities, vegetation can provide a good method of permanent storm water management.

Other BMPs may be required to assist in the establishment of vegetation. These other techniques include erosion control matting, swales and dikes to direct flow around newly seeded areas and proper grading to limit runoff velocities during construction.

APPLICATIONS

Vegetation effectively reduces erosion in swales, stock piles, berms, mild to medium slopes and along roadways. Vegetative strips can provide some protection when used as a perimeter control for utility and site development construction.

In many cases, the initial cost of temporary seeding may be high compared to tarps or covers for stockpiles or other barren areas subject to erosion. This initial cost should be weighed with the amount of time the area is to remain inactive, since maintenance cost for vegetated areas is much less than most structural controls.

DESIGN CRITERIA

Surface Preparation

- □ Interim or final grading must be completed prior to seeding.
- □ Steep slopes should be minimized.
- □ Install all necessary erosion structures such as dikes, swales, diversions, etc. prior to seeding.
- □ Groove or furrow slopes steeper than 3:1 on the contour line before seeding.
- □ Provide 4-6 inches of topsoil over rock, gravel or otherwise unsuitable soils. Seed-bed should be well pulverized, loose and uniform.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- • Sediment
- □ Nutrients, Toxic Materials
- o Oil & Grease
- o Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Vegetation

Plant Selection, Fertilization and Seeding

- □ Use only high quality, USDA certified seed.
- □ Use an appropriate species or species mixture adapted to local climate, soil conditions and season. Consult with the local office of the U.S. Soil Conservation Service (SCS) or Engineering Extension Service as necessary for selection of proper species and application technique in this area.
- □ Seeding rate should be in accordance with manufacturer's guidelines or as recommended by the SCS or engineering extension service.
- □ Fertilizer should be applied according to the manufacturer's recommendation with proper spreader equipment. Typical application rate for 10-10-10 grade fertilizer is 700-1000 lb/acre. DO NOT OVER APPLY FERTILIZER.
- □ If hydro-seeding is used, do not mix seed and fertilizer more than 30 minutes before application.
- □ Evenly apply seed using cyclone seeder, seed drill, cultipacker or hydroseeder.
- □ Provide adequate water to aid in establishment of vegetation.
- □ Use appropriate mulching techniques where necessary.

LIMITATIONS

Vegetation is not appropriate for areas subjected to heavy pedestrian or vehicular traffic. As a temporary technique, vegetation may be costly when compared to other techniques.

Vegetation is not appropriate for rock, gravel or coarse grained soils unless 4 to 6 inches of topsoil is applied.

MAINTENANCE REQUIREMENTS

Protect newly seeded areas from excessive runoff and traffic until vegetation is established. A watering and fertilizing schedule will be required to assist in the establishment of the vegetation.

TERRA Environmental
SWPPP - BMPs

Vehicle and Equipment Fueling

DESCRIPTION

Prevent fuel spills and leaks, and reduce their impacts to stormwater.

APPROACH

- □ If fueling must occur onsite, use a designated area, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- □ Design the fueling area to prevent the runon of stormwater and the runoff of spills:
  - Cover fueling area if possible.
  - Use a perimeter drain or slope pavement inward with drainage to sump.
  - Pave fueling area with cement rather than asphalt.
- □ If dead-end sump is not used to collect spills, install an oil/water separator.
- □ Install vapor recovery nozzles to help control drips as well as air pollution.
- □ Discourage "topping-off' of fuel tanks.
- □ Use secondary containment when transferring fuel from a tank truck to a fuel tank.
- □ Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- □ Do not conduct mobile fueling of equipment around the facility; rather, transport the equipment to designated fueling areas.
- □ Fueling vehicles and equipment outdoors or in areas where fuel may spill/leak onto the ground can pollute stormwater. If you fuel a large number of vehicles or pieces of equipment, consider using an offsite fueling station. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at your site.
- □ Place a stockpile of spill cleanup materials where it will be readily accessible.
- □ Carry out all Federal and State requirements regarding stationary aboveground storage tanks.
- □ Train employees and subcontractors in proper fueling and cleanup procedures.

REQUIREMENTS

- □ Costs (Capital and O&M)
  - The retrofitting of existing fueling area to minimize stormwater exposure or spill runoff can be expensive. Good design must occur during the initial installation. Extruded curb along the "upstream" side of the fueling area to prevent stormwater runon is of modest cost.

- □ Maintenance
  - Clean oil/water separators at the appropriate intervals.
  - Keep ample supplies of spill cleanup materials onsite.
  - Inspect fueling areas and storage tanks on a regular schedule.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- o Sediment
- □ Nutrients, Toxic Materials
- • Oil & Grease
- o Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Vehicle and Equipment Fueling

LIMITATIONS

Oil/water separators are only as effective as their maintenance program.

Spills from fueling or from the transfer of fuels to the storage tank can be a significant source of pollution. Fuels carry contaminants of particular concern to humans and wildlife, such as heavy metals, toxic materials, and oil and grease, which are not easily removed by stormwater treatment devices. Consequently, control at the source is particularly important. Adequate control can be achieved with careful design of the initial installation, retrofitting of existing installations, and proper spill control and cleanup procedures as described below.

TERRA Environmental
SWPPP - BMPs

Vehicle and Equipment Washing and Steam Cleaning

DESCRIPTION

Prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment washing and steam cleaning.

APPROACH

- □ Use of offsite commercial washing locations as much as possible.
- □ Washing vehicles and equipment outdoors or in areas where wash water flows onto the ground can pollute stormwater. If washing a large number of vehicles or pieces of equipment is required, consider conducting this work at an offsite commercial business. These businesses are better equipped to handle and dispose of the wash waters properly.
- □ Performing this work offsite can also be economical by eliminating the need for a separate washing operation at the site.
- □ When it is necessary to wash vehicles onsite, use designated wash areas, preferably covered to prevent contact with stormwater and bermed to contain wash water.
- □ Discharge wash water to sanitary sewer, after contacting DCAD and the local sewer authority.
- □ If washing must occur onsite, use designated, bermed wash areas to prevent wash water contact with storm water, creeks, rivers, and other water bodies. The wash area can be sloped for wash water collection and subsequent infiltration into the ground.
- □ Use as little water as possible to avoid having to install erosion and sediment controls for the wash area.
- □ Use phosphate-free, biodegradable soaps.
- □ Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrations leading to potential stormwater and groundwater contamination.

Requirements

- □ Capital costs vary depending on measures implemented.
  - Low cost ($500 - $1,000) for berm construction.
  - Medium cost ($5,000 - $20,000) for plumbing modifications (including re-routing discharge to sanitary sewer and installing simple sump).
  - High cost ($30,000 - $15,000) for onsite treatment and recycling. O&M costs increase with increasing capital investment.
- □ Maintenance
  - Berm repair and patching.
  - Inspection and maintenance of sumps, pumps, oil/water separators, and onsite treatment/recycling units.

APPLICATIONS

Source Controls

Activity BMPs

Treatment Controls

TARGETED CONSTITUENTS

- □ Sediment
- □ Nutrients, Toxic Materials
- • Oil & Grease
- o Floatable Materials
- o Other Construction Wastes

LEGEND

- • Significant Impact
- □ Medium Impact
- o Low Impact
- ? Unknown or Questionable Impact

Vehicle and Equipment Washing and Steam Cleaning

LIMITATIONS

Steam cleaning can generate significant pollutant concentrations requiring permitting, monitoring, pretreatment, and inspections. The measures outlined in this fact sheet are insufficient to address all the environmental impacts and compliance issues related to steam cleaning.

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades.

Sending vehicles/equipment offsite should be done in conjunction with a stabilized construction entrance.

Washing vehicles and equipment outdoors or in areas where wash water flows onto the ground can pollute stormwater. If the project will require washing a large number of vehicles or pieces of equipment, consider contracting out this work to a commercial business. These businesses are better equipped to handle and dispose of the wash waters properly. Contracting but this work can also be economical by eliminating the need for separate washing/cleaning operations at the site.

If washing/cleaning must occur onsite, consider washing vehicles inside a building to control the targeted constituents by directing them to the sanitary sewer where they can be pretreated or sent directly to the sanitary treatment facility. Washing operations outdoors should be conducted in a designated wash area having the following characteristics:

- Paved with Portland cement concrete,
- Covered or bermed to prevent contact with stormwater,
- Sloped for wash water collection,
- Discharges wash water to the sanitary or process waste sewer, or to a dead-end sump. Discharge pipe should have a positive control valve that allows switching between the storm drain and sanitary or process sewer,
- Clearly designated, and
- Equipped with an oil/water separator.

TERRA Environmental
SWPPP - BMPs

Waste Handling and Disposal

PURPOSE

Prevent or reduce the discharge of pollutants to storm water from waste handling and disposal by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, re-use, and recycling; and preventing run-on and runoff from waste management areas including garbage collection areas.

APPROACH

APPROACH TO FUTURE FACILITIES AND UPGRADES:
Design of New Facilities and Existing Facility Upgrades

- □ If possible, avoid the following characteristics when examining candidate sites for storing wastes:
  - Excessive slope.
  - High water table.
  - Locations near storm drain inlets
  - Locations near public access areas
- □ Waste handling and storage areas should be covered, if possible.
- □ Develop standard guidelines for the management of storm water which collects in secondary containment areas.
- □ Incorporate sanitary sewer drains into bermed, outdoor, non-hazardous waste storage areas, if approved by the local wastewater treatment agencies/regulations.

APPROACH TO EXISTING FACILITY ACTIVITIES:
Operational Considerations
Good Housekeeping

- □ Perform regular housekeeping activities in waste storage areas and surroundings.
- □ Recycle materials whenever possible.
- □ Inspect waste management areas for spills and waste management leached, containers for leaks
- □ Ensure that sediments and wastes are prevented from being washed or otherwise carried off-site.
- □ Schedule waste pickup as frequently as necessary to keep storage of waste to a minimum and to avoid overloaded/overfilled disposal containers.
- □ Minimize spills and fugitive losses such as dust or mist from loading areas.
- □ Maintain a minimal inventory of required chemicals to reduce the magnitude of potential spills and limit waste generation.
- □ Track waste generated:
  - Characterize waste streams.
  - Evaluate the process generating the waste.
  - Prioritize the waste streams using: manifests, bills of lading, biennial reports, permits, environmental audits, SARA Title III reports, emission reports, Material Safety Data Sheets (MSDS), NPDES discharge monitoring reports.

TARGETED ACTIVITIES

- □ Fuel/Chemical Storage
- □ Painting and Stripping
- □ Garbage Collection

TARGETED POLLUTANTS

- □ Oil and Grease
- □ Vehicle Fluids
- □ Solvents/Cleaning Solutions
- □ Dumpster Wastes

KEY APPROACHES

- □ Cover waste storage areas
- □ Recycle materials
- □ Regularly inspect and clean waste storage areas
- □ Berm waste storage areas to prevent contact with run-on or runoff
- □ Perform dumpster cleaning in designated areas
- □ Properly dispose of all fluids

- Inventory reports.
- Data on chemical spills.
- Emissions.

□ Find substitutes for harmful chemicals; properly dispose of unusable chemical inventory.

Physical Site Usage

□ Segregate and separate wastes.
□ Avoid locating waste handling and storage in areas with storm drain inlets/catch basins.
□ Locate waste storage areas beneath existing cover, if possible.

Structural Controls

□ Enclose or berm waste storage areas, if possible, to prevent contact with run-on or runoff.

Garbage Collection Areas

□ Design facilities to provide shelter and secondary containment for dumpsters.
□ Use covered dumpsters and keep them closed and locked.
□ Use only dumpsters with plugged drain holes to prevent leaks from waste materials.
□ Do not dispose of liquid wastes such as oils or hazardous materials into dumpsters.
□ Perform dumpster cleaning in designated areas that are bermed to contain wash water for a subsequent disposal or discharge to the sanitary sewer. Ramp scrubbers are effective in removing wash water from paved areas. Dispose of or recycle all fluids collected.

Contingency Response

□ Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur.
□ Equip waste transport vehicles with spill containment equipment.

Inspection and Training

□ Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education (see SC-10 for storm water pollution education approaches), right-to-know awareness training, and hazardous materials management. Perform and document in a log book periodic inspections of hazardous and non-hazardous waste storage areas. Inspection items should include the following:
  - Check for external corrosion and structural failure.
  - Check for spills and overfills due to operator failure.
  - Check for failure of piping system (pipes, pumps, flanges, couplings, hoses, and valves).
  - Check for leaks or spills during pumping of liquids or gases.
  - Visually inspect new tanks or containers for loose fittings, poor welds, and improper or poorly fitted gaskets.
  - Inspect tank foundations and storage area coatings.
  - Inspect dumpster areas for signs of leakage.

REQUIREMENTS

□ Capital and O&M costs for these programs will vary substantially depending on the size of the facility and the types of wastes handled.

LIMITATIONS

□ Hazardous waste that cannot be re-used or recycled must be disposed of by a licensed hazardous waste hauler.

Waste Handling and Disposal

RELEVANT RULES AND REGULATIONS

Federal:

.29 CFR 1910 (Subparts G, H, I, J and K) Hazardous Materials, Environmental Controls and Personnel Protection
.29 CFR 1910.1200 OSHA Hazard Communication Standard
.40 CFR 260-262, 268 amd 270-272 Hazardous Waste Management
.40 CFR 280-281 Underground Storage Tanks
.40 CFR 302 Designation, Reportable Quantities and Notification Requirements for Hazardous Substances under CERCLA
.40 CFR 372 Toxic Chemical Release Reporting: Community Right-to-Know
.40 CFR 110.3 Discharge of Oil
.40 CFR 112 Oil Pollution Prevention (SPCC/OPA Plans)
.40 CFR 117.3 Determination of Reportable Quantities for a Hazardous Substance
.40 CFR 122-124 NPDES Regulations for Storm Water Discharges
.40 CFR 401 Effluent Limitation Guidelines
.49 CFR 171-173, 175 and 177 Department of Transportation Regulations

State:

.314 CMR 1.00-15.00 Water Pollution Control
.310 CMR 30.00 Hazardous Waste
.527 CMR 9.00 Tanks
.527 CMR 4.00 Fuel Oil Burning Equipment
.527 CMR 5.00 Garages
.527 CMR 14.00 Handling of Flammable Materials
.Massachusetts General Law Chapter 111F Massachusetts Right-to-Know
.310 CMR 33.00 Massachusetts Right-to-Know
.105 CMR 670.00 Massachusetts Right-to-Know (Department of Public Health)
.780 CMR 2.00 Massachusetts Building Code
.248 CMR 2.00 Massachusetts Plumbing Code
.360 CMR 10.00 MWRA Regulations

Appendix I Qualifications and Delegation of Authority

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: _____ Signed: _____ Date: _____

StormwaterONE

Certifies that

Mike Rennie

has successfully completed the required courses of study and is recognized as a

Qualified Compliance Inspector of Stormwater (QCIS)

Completion Date 08/25/2022

Expiration Date 08/24/2024

Certification Number c5806f55

PDHs: 16

Andrew Demers

Andrew Demers, President

StormwaterONE

Certifies that

Jesse Vaughan

has successfully completed

Stormwater Management for Construction Activities

Completion Date June 23, 2021

Expiration Date June 23, 2023

Certificate Number 9fc85be5

PDHs: 6.0 | CEUs: 0.60

Andrew Demers, President

LITHO. IN U.S.A.

StormwaterONE

Acknowledges that

Eric Spada

has successfully completed the
Stormwater Training Program to become a

Qualified Compliance Inspector of Stormwater Advanced

1.7 CEUs | 17 PDHs

Courses Completed:

- Intro to Stormwater Management
- Intro to NPDES Permitting Program
- Principles and Practices
  - Erosion Control
  - Sediment Control
  - Pollution Control
- On-Site Construction Inspections

Completion Date: 03/23/2022

Expiration Date: 03/23/2024

Certificate Number: 00166568

Andrew Demers, President

Appendix J SWPPP Construction Site Inspection Form

Stormwater Construction Site Inspection Report

General Information

Project Name:	
Location:	
Date of Inspection:	Start/End Time:
Inspector's Name:	
Inspector's Title:	
Inspector's Contact Information:	
Describe present phase of construction:	
Type of Inspection: ☐ Regular ☐ Pre-storm event ☐ During storm event ☐ Post-storm event	

Weather Information

Has there been a storm event since the last inspection? ☐Yes ☐No
If yes, provide:
Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):

Weather at time of this inspection?
☐ Clear ☐Cloudy ☐ Rain ☐ Sleet ☐ Fog ☐ Snowing ☐ High Winds
☐ Other: Temperature:

Have any discharges occurred since the last inspection? ☐Yes ☐No
If yes, describe:

Are there any discharges at the time of inspection? ☐Yes ☐No
If yes, describe:

Certification Statement

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Inspector *Printed Name and Title* *Date*

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1. All inactive slopes and disturbed areas have been stabilized.	☐Yes ☐No	☐Yes ☐No	
2. Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	☐Yes ☐No	☐Yes ☐No	
3. Are all sanitary waste recepticles placed in secondary containment and free of leaks?	☐Yes ☐No	☐Yes ☐No	
4. Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	☐Yes ☐No	☐Yes ☐No	
5. Are discharge points and receiving waters free of any sediment deposits?	☐Yes ☐No	☐Yes ☐No	
6. Are storm drain inlets properly protected?	☐Yes ☐No	☐Yes ☐No	
7. Is the construction exit preventing sediment from being tracked into the street?	☐Yes ☐No	☐Yes ☐No	
8. Is trash/litter from work areas collected and placed in covered dumpsters?	☐Yes ☐No	☐Yes ☐No	
9. Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	☐Yes ☐No	☐Yes ☐No	
10. Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	☐Yes ☐No	☐Yes ☐No	
11. Are materials that are potential stormwater contaminants stored inside or under cover?	☐Yes ☐No	☐Yes ☐No	
12. Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	☐Yes ☐No	☐Yes ☐No	
13. (Other)	☐Yes ☐No	☐Yes ☐No	

Appendix K Spill Status Report Form

Project:

SPILL STATUS REPORT FORM
MADEP RTN: __- _____

Within 2 hours of a reportable fuel spill[1], the following specific information shall be transmitted via facsimile to Project Owner

1. Date and Time of Spill: _____

2. Date and Time of DEP Notification: _____

3. Project Name and Project No.: _____

4. Precise Location of Spill: _____

5. DEP Notification Given by: _____
   Name: _____
   Phone No.: _____

6. Response Action Completed by: _____
   Name: _____
   Phone No.: _____

7. Responsible Party: _____
   Contact Name: _____
   Phone No.: _____

8. Description and Total Quantity of Spilled Material:
   _____

9. Quantity of Material into Storm Drain or onto Soil Surface (please specify):
   _____

10. Spill Responder or Emergency Response Contractor:
    _____

11. Cleanup Status (Specific actions taken to clean up spill; Is clean up complete?):
    _____
    _____
    _____

11. LSP of Record and telephone number:
    _____

12. Approximate Volume of Waste Generated:
    _____

Signature: _____ Date and Time: _____
Print _____ Company Name: _____

NOTE: The reporting threshold for all fuels and oils is 10 gallons.