Dutton Road Bridge Replacement

Notice of Intent

Town of Sudbury Department of Public Works
275 Old Lancaster Road
Sudbury, MA 01776

November 2019

Tighe&Bond
Engineers | Environmental Specialists

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Tighe&Bond
Engineers | Environmental Specialists

S-5013-002
January 27, 2020

Sudbury Conservation Commission
275 Old Lancaster Road
Sudbury, MA 01776

Re: **Notice of Intent**
Dutton Road Bridge Replacement Project
Sudbury, Massachusetts

Dear Conservation Commissioners:

On behalf of Town of Sudbury Department of Public Works (DPW), Tighe & Bond respectfully submits one electronic and one hard copy of this Notice of Intent (NOI) for the Dutton Road Bridge Replacement Project in Sudbury, Massachusetts (Site Locus Map in Appendix A). The proposed project includes the replacement of the existing twin arch culvert bridge of Dutton Road over Hop Brook with a pre-cast concrete arched bridge. The proposed replacement will maintain pedestrian safety, improve the structure of the crossing, and improve the hydraulics and stream connectivity relative to existing conditions. In addition, the project includes the installation and relocation of various utilities as needed within the limits of work.

This NOI is being filed under the Massachusetts Wetlands Protection Act (WPA; M.G.L. c. 131 § 40) and the Town of Sudbury Wetlands Administration (Article XXII) and its implementing regulations. Proposed work will occur within Land Under Waterbodies and Waterways (LUWW), inland Bank, the 200-foot Riverfront Area associated with Hop Brook, as well as the 100-foot Buffer Zone to inland Bank and Bordering Vegetated Wetlands (BVW).

We look forward to having the opportunity to discuss this project with the Sudbury Conservation Commission at a future public hearing. We anticipate these materials are sufficient for the Commission to issue an Order of Conditions. Should you have any questions regarding this application or require any additional information, please do not hesitate to contact me at (508) 471-9631 or via email at RCanavan@tighebond.com.

Very truly yours,

TIGHE & BOND, INC.

Richard Canavan, PWS, Ph.D.
Principal Environmental Scientist

Enclosures

Copy: MA DEP NERO
William O'Rourke, PE, Deputy Director of Public Works

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WPA FORM 3

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

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

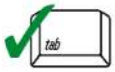
Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Sudbury
City/Town

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



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

A. General Information

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

Dutton Road	Sudbury	01776
a. Street Address	b. City/Town	c. Zip Code

Latitude and Longitude: 42.387903 (d. Latitude) -71.448981 (e. Longitude)

G05	0400
f. Assessors Map/Plat Number	g. Parcel /Lot Number

2. Applicant:

Daniel	Nason
a. First Name	b. Last Name

Department of Public Works
c. Organization

275 Old Lancaster Road
d. Street Address

Sudbury	MA	01776
e. City/Town	f. State	g. Zip Code

(978) 440-5421	(978) 440-5404	masond@sudbury.ma.us
h. Phone Number	i. Fax Number	j. Email Address

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

a. First Name	b. Last Name

Town of Sudbury
c. Organization

278 Old Sudbury Road
d. Street Address

Sudbury	MA	01776
e. City/Town	f. State	g. Zip Code

h. Phone Number	i. Fax Number	j. Email address

4. Representative (if any):

Richard	Canavan
a. First Name	b. Last Name

Tighe & Bond, Inc.
c. Company

120 Front Street Suite 700
d. Street Address

Worcester	MA	01608
e. City/Town	f. State	g. Zip Code

(508) 471-9631		RCanavan@tighebond.com
h. Phone Number	i. Fax Number	j. Email address

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

N/A- Fee Exempt	N/A- Fee Exempt	N/A- Fee Exempt
a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid

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Provided by MassDEP:

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A. General Information (continued)

6. General Project Description:

The proposed project includes the replacement of the existing twin arch culvert bridge of Dutton Road over Hop Brook with a pre-cast concrete arched bridge. In addition, the project includes the installation and relocation of various utilities as needed within the limits of work.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

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

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

1. ☒ Yes ☐ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

310 CMR 10.53 (3)(i)
2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Middlesex South
a. County

b. Certificate # (if registered land)

Not available
c. Book

Not available
d. Page Number

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

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

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

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

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

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☒ Bank	77 (1. linear feet)	139 (2. linear feet)
b. ☐ Bordering Vegetated Wetland	(1. square feet)	(2. square feet)
c. ☒ Land Under Waterbodies and Waterways	810 (1. square feet); 100 (3. cubic yards dredged)	983 (2. square feet)

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	150 (1. square feet); (3. cubic feet of flood storage lost)	150 (2. square feet); (4. cubic feet replaced)
e. ☐ Isolated Land Subject to Flooding	(1. square feet); (2. cubic feet of flood storage lost)	(3. cubic feet replaced)

f. ☒ Riverfront Area

1. Name of Waterway (if available) - **specify coastal or inland**

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 10,520 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
10,520	10,520	0

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

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

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

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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

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

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

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

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☒ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 100 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement

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

a. square feet of BVW

b. square feet of Salt Marsh

5. ☒ Project Involves Stream Crossings

0
a. number of new stream crossings

1
b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

a. ☐ Yes ☒ No

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

Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

August 1, 2017
b. Date of map

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

c. Submit Supplemental Information for Endangered Species Review*

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

(a) within wetland Resource Area _____ percentage/acreage

(b) outside Resource Area _____ percentage/acreage

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

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

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

(b) ☐ Photographs representative of the site

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

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

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

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

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

(d) ☐ Vegetation cover type map of site

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

(f) OR Check One of the Following

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

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

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

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

a. ☐ Not applicable – project is in inland resource area only b. ☒ Yes ☐ No

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

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

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: DMF.EnvReview-South@state.ma.us

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: DMF.EnvReview-North@state.ma.us

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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Provided by MassDEP:

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Sudbury
City/Town

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

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

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

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

   b. ACEC

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

   a. ☐ Yes ☒ No

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

   a. ☐ Yes ☒ No

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

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

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

      2. ☐ A portion of the site constitutes redevelopment

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

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

      1. ☐ Single-family house

      2. ☐ Emergency road repair

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

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

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

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

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

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

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D. Additional Information (cont'd)

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

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

Dutton Road Bridge Replacement
a. Plan Title

Tighe & Bond, Inc.
b. Prepared By

c. Signed and Stamped by

November 2019
d. Final Revision Date

1"=40'
e. Scale

f. Additional Plan or Document Title

g. Date

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

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

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

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☐ Attach Stormwater Report, if needed.

E. Fees

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

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

N/A- Fee Exempt
2. Municipal Check Number

N/A- Fee Exempt
3. Check date

N/A- Fee Exempt
4. State Check Number

N/A- Fee Exempt
5. Check date

N/A- Fee Exempt
6. Payor name on check: First Name

N/A- Fee Exempt
7. Payor name on check: Last Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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Provided by MassDEP:

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Sudbury
City/Town

F. Signatures and Submittal Requirements

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

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

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

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

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

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

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

Massachusetts Department of Environmental Protection
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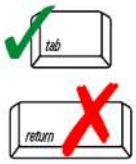
NOI Wetland Fee Transmittal Form

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

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



A. Applicant Information

1. Location of Project:

Dutton Road	Sudbury
a. Street Address	b. City/Town
N/A- Fee Exempt	N/A- Fee Exempt
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Daniel	Nason
a. First Name	b. Last Name

Town of Sudbury, Department of Public Works
c. Organization

275 Old Lancaster Road
d. Mailing Address

Sudbury	MA	01776
e. City/Town	f. State	g. Zip Code

(978) 444-5421		nasond@sudbury.ma.us
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name	b. Last Name

Town of Sudbury
c. Organization

275 Old Lancaster Road
d. Mailing Address

Sudbury	MA	01776
e. City/Town	f. State	g. Zip Code

h. Phone Number	i. Fax Number	j. Email Address

B. Fees

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

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

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

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

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

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

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

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

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B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 4(f)	1.5	$1,450	Fee Exempt

Step 5/Total Project Fee: Fee Exempt

Step 6/Fee Payments:

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

C. Submittal Requirements

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

Department of Environmental Protection
Box 4062
Boston, MA 02211

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

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

PROJECT NARRATIVE

Tighe&Bond

SECTION 1

Section 1
Introduction

Project Name: Dutton Road Bridge Replacement (Bridge No. S-31001)

Project Location: Dutton Road over Hop Brook, Sudbury, Massachusetts

Project Proponent: Town of Sudbury, Department of Public Works

This Notice of Intent (NOI) application is being submitted on behalf of the Town of Sudbury Department of Public Works (DPW) for the replacement of an existing bridge crossing of Dutton Road over Hop Brook in Sudbury, Massachusetts (the site). The proposed project area is located south of Hudson Road and north of Pratts Mill Road. Stearns Millpond and the Stearns Millpond Dam are located west of the project site, upstream of the structure.

1.1 Project Background and Purpose

The existing structure over Hop Brook within Dutton Road is a twin arch culvert that is a stone masonry arch with corrugated metal pipes added to the upstream portions of the culverts. There is also an adjacent pedestrian span. This structure meets the MassDOT classification of a bridge and is referred to as the existing bridge in this application.

Observations from Tighe & Bond staff in 2017 noted significant deterioration of the corrugated steel pipes, pipe sagging, loose and dislodged stones, heaving headwall, debris buildup, and scour. Deteriorated steel stringers were also observed on the downstream pedestrian bridge. According to MassDOT records, the original bridge was approximately constructed in 1850 and reconstructed circa 1900. The replacement of the existing bridge is based on the age and deterioration of the existing structure.

The project proposes to replace the existing twin arch culvert with an arch bridge. The proposed replacement will maintain pedestrian safety, improve the structure of the crossing, and improve the hydraulics and stream connectivity relative to existing conditions. In addition, the project includes the installation and relocation of various utilities as needed within the limits of work. The Town of Sudbury has obtained funding from MassDOT to support this bridge replacement.

Tighe&Bond

SECTION 2

Section 2
Existing Conditions

The project area is the Dutton Road crossing of Hop Brook, north of the intersection of Dutton Road and Pratts Mill Road. Dutton Road is a local two-lane roadway that runs generally north-south between Wayside Inn Road to Hudson Road in Sudbury. Dutton Road crosses Hop Brook twice, downstream of the outlet of Carding Mill Pond and downstream of the outlet of Stearns Millpond. The project area is located at the crossing downstream of Stearns Millpond at 42.387749°N, -71.448924°E near 530 Dutton Road.

A separate pedestrian bridge is located immediately downstream adjacent to the existing vehicular bridge. The pedestrian bridge was constructed more recently and is supported by steel stringers and wooden decking.

The land use in the vicinity of project area comprises of single-family residential development and forested open space. Open space upstream of the crossing consists of Stearns Millpond (formerly known as Pratts Mill). The Atkinson open space property is located north of Hop Brook and east of the project site and generally consists of forested upland and wetland areas.

The Town of Sudbury recently obtained approval from the Conservation Commission for the Reconstruction of the Stearns Millpond Dam (Massachusetts Department of Environmental Protection (MassDEP) File No. 301-1253). That project involves the repair of the existing dam to address the deficiencies as required by the Massachusetts Department of Conservation and Recreation (MADCR) Office of Dam Safety. That work includes the reconstruction of the dam spillway and includes the construction of a new low-level outlet.

2.1 Roadway and Utilities

The existing roadway approach to the bridge is composed of two 11-foot lanes with heavily vegetated gravel shoulders. The northbound travel lane has a bituminous curb at the edge of the roadway with a two-foot grass strip and a five-foot sidewalk. The southbound approach is very similar to the northbound approach only it does not have a curb and instead has a guardrail behind the sidewalk.

There are multiple utilities located at the project site including water, gas, and stormwater drainage, as well as overhead electric and telephone lines. A utility pole is located near the southeast corner of the stream crossing between the vehicular and pedestrian bridges. A 12-inch water line crosses the brook underneath the existing bridge, within the stream bed . A gas line crosses Hop Brook below the existing pedestrian bridge. The site survey identified existing stormwater drainage structures including catch basins and a stormwater outfall north of the stream crossing.

2.2 Wetland Resource Area Delineation Methodology

On September 26, 2018, Tighe & Bond conducted wetland resource area investigations and delineations within the limits of the Project Site. Representative site photographs are provided in Appendix B. Wetland resource areas were delineated using the MassDEP guidelines, 310 CMR 10.00, the United States Army Corps of Engineers Regional

Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (January 2012), and Town of Sudbury Wetlands Administration Bylaw (Article XXII) and its implementing regulations.

When conducting the delineation wetland flags from the delineation associated with the Dam Reconstruction project were present in the field. These resource areas were assessed and documented to support this application; however, we did not redelineate the area between Stearns Millpond and Dutton Road. Since there is a recently issued Order of Conditions (File No. 301-1253) for that area this application uses the limits of wetland resource areas already established with that approval.

Wetland flags east of Dutton Road were located by land survey except for the southern Bank of Hop Brook (WF 1A-1 to WF 1A-12), which were located by GPS on December 7, 2018 after the initial wetland flags were removed to avoid disturbing horses in a paddock at the abutting property.

2.3 Wetland Resource Areas

Wetland resources areas in the project area include Land Under Waterbodies and Waterways (LUWW), inland Bank, Isolated and Bordering Vegetated Wetlands (IVW; BVW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area. Wetland resource areas were named based on the wetland system number and alphabetical letter in the order in which they were observed. For example, "1A-1" refers to the first resource area observed within wetland system 1 (*e.g.,* Bank). A summary of the flag series within the project areas are outlined in Table 2-1.

TABLE 2-1 Summary of WPA Wetland Resource Areas by Wetland Series

Flag Numbers	Resource Area Type
WF 1A-1 → WF 1A-12	Bank
WF 1B-1 → WF 1B-7	Bank
WF B1 → WF B-14	Bordering Vegetated Wetland
WF A1 → WF A6	Isolated Vegetated Wetland
WF P1 → WF P5	Bank
WF R1 → WF R5	Bank
WF 1D-1 → WF 1D-2	Bordering Vegetated Wetland
WF 2A-1 → WF 2A-10	Bordering Vegetated Wetland
WF 3A-1 → WF 3A-7	Bordering Vegetated Wetland

2.3.1 Land Under Waterbodies and Waterways

Land Under Waterbodies and Waterways (LUWW) in the project area include Stearns Millpond and Hop Brook. The water surface elevation of Stearns Millpond is controlled by the spillway. Generally, the LUWW consisted of water over mucky sediment. The pond had emergent vegetation in the littoral zone including cattails (*Typha latifolia*) and duckweed (*Lemma sp.*).

Hop Brook is a perennial stream that flows from Stearns Millpond. The watershed upstream of the project site is approximately 8.96 square miles. The channel bed in the vicinity of the bridge includes cobbles and sand. Hop Brook is designated as a Cold Water Fishery by MassWildlife.

2.3.2 Inland Bank

A portion of the Bank abuts and confines Stearns Millpond west of the project site. The Bank gently slopes from maintained lawn and the earthen dam into the Stearns Millpond southwest of the project site. Immediately north of the spillway, the regulatory Bank consists of a stone masonry wall.

The regulatory Bank of Hop Brook runs from the spillway west of Dutton Road, east through the culvert. The riprap channel between the spillway and culverts is relatively straight and uniform. Vegetation in the vicinity of the dam is managed to keep woody vegetation away from the dam structures. The Bank downstream of the culverts includes trees with a canopy that extends over the Brook. The Bank coincides with Mean Annual High Water (MAHW) in the project area.

2.3.3 Isolated Vegetated Wetlands

The dam reconstruction project identified an Isolated Vegetated Wetlands west of Dutton Road. Isolated Vegetated Wetlands are regulated under Article XXII as Isolated Land Subject to Flooding (ILSF). Wetland A is located north of the gravel parking lot near the dam. This wetland is an isolated depression confined by the parking area, Dutton Road, and adjacent slopes. This depression includes areas lined with riprap. Vegetation in this wetland included honeysuckle (*Lonicera* sp.), multiflora rose (*Rosa multiflora*), Japanese knotweed (*Fallopia japonica*), and oriental bittersweet (*Celastrus orbiculatum*). Based on the vegetation, this wetland is best classified as a Palustrine Scrub-Shrub (PSS) wetland. The wetland held approximately two to four inches of water at the time of the site visit. This wetland has an approximate surface area of 1,110 sf (0.025 acres), which does not meet the ILSF bylaw criteria for an area that holds a minimum of one-eighth acre of water and six-inches of standing water once a year.

2.3.4 Bordering Vegetated Wetlands

Four Bordering Vegetated Wetlands (BVW) were delineated east of Dutton Road in the project area. These wetlands are presumed to be bordering Hop Brook based on hydraulic connections further to east away from the project site.

Wetland B is located west Dutton Road and south of the spillway and Hop Brook. This wetland is best classified as a Palustrine Emergent (PEM) wetland with a fringe of a Palustrine Forested (PFO) wetland. Seepage through the earthen dam and stormwater runoff inundate this area. Though the wetland is physically separated from other resource areas, seepage from the dam likely contributes to the hydrology for the wetland. Therefore, the wetland is considered a BVW. The boundary of the wetland coincides with a gentle slope to the south and is separated from the Bank of Hop Brook by a berm of soil that parallels the south Bank. Commonly observed vegetation included skunk cabbage (*Symplocarpus foetidus*), soft rush (*Juncus effusus*), slippery elm (*Ulmus rubra*), sensitive fern (*Onoclea sensibilis*), rough stemmed goldenrod (*Solidago rugosa*), and red maple (*Acer rubrum*). This wetland would meet the bylaw criteria for surface area and inundation.

Wetland 1C is a small wetland located above the north Bank of Hop Brook approximately 50 feet downstream of the existing pedestrian bridge. This small BVW is within the floodplain of Hop Brook. Wetland vegetation identified included winterberry (*Ilex verticilata*). Based on the vegetation, this wetland would be best classified as a PSS wetland.

Wetland 2A is located north of Hop Brook and is best classified as a PEM wetland with a PSS fringe. The western boundary coincides with the edge of the fill associated with the roadway. The other boundaries to the north and south coincide with the toe of a moderate slope. Common vegetation observed included cinnamon fern (*Osmunda cinnamomea*), jewelweed (*Impatiens capensis*), sweet pepperbush (*Clethra alnifolia*), and multiflora rose. A headwall with a culvert was located northwest corner of the wetland. Standing water was observed in this wetland at the time of the delineation.

Wetland 3A is located north of Wetland 2A. The vegetation in this wetland is similar to the vegetation described above for Wetland 2A. Wetland 3A includes a relatively large area of saturated soils and small patches of standing water. The wetland boundary is confined by the toe a steep slope to the north and a moderate slope to the south. The wetland boundary to the west is defined by the edge of fill associated with the roadway.

2.3.5 Bordering Land Subject to Flooding

Bordering Land Subject to Flooding (BLSF) is present in the project area and is associated with Hop Brook. The Federal Emergency Management Agency (FEMA) flood map (Panel No. 25017C0364F, effective July 7, 2014) maps both Zone AE and floodway flood hazard zones for Hop Brook. The limits of BLSF are depicted on the project plans based on the FEMA mapping of the project area.

2.3.6 Riverfront Area

Hop Brook is shown on the USGS topographic map (Maynard, Massachusetts; 1987) as a perennial stream. Accordingly, a 200-foot Riverfront Area extends horizontally from the banks of the perennial stream. Hop Brook flows through the existing twin arch culvert approximately 100 feet east of the spillway at Dutton Road. Riverfront Area in the project site includes Dutton Road, sidewalk, roadway shoulder, residential lawns, and forested areas.

2.3.7 Adjacent Upland Resource Areas

The Town of Sudbury Wetlands Administration Bylaw Regulations establishes the Adjacent Upland Resource Area which includes land within 100 feet of wetland resource areas and 25-feet of Isolated Vegetated Wetlands. The adjacent upland resource areas onsite include an existing gravel parking lot, maintained lawn, forested areas, and Dutton Road.

2.4 Rare Species

The Massachusetts Natural Heritage and Endangered Species Program (NHESP) Atlas (14th edition, August 1, 2017) and MassGIS online (August 2017) were consulted during the planning and design phases of this project. According to these sources, the site does not fall within *Priority Habitats of Rare Species* or *Estimated Habitats of Rare Wildlife*, as shown on Figure 2 in Appendix A. In addition, no NHESP certified or potential vernal pools are mapped within the project area. A mapped potential vernal pool is located north of the project area, outside of the limits-of-work. The project does not anticipate any work

affecting the potential vernal pool which is at a higher elevation than the work area. Article XXII expands the definition of vernal pool to include the presumption that ponded depressions containing at least 200 cubic feet of water provide vernal pool habitat unless demonstrated otherwise. The IVWs within the project area are within disturbed areas and do not fit the minimum water level requirements. Similarly, BVW within the project area did not contain the minimum water levels for vernal pool habitat.

2.5 Hydrology and Hydraulics

Tighe & Bond prepared a hydrologic and hydraulic (H&H) model of the Dutton Road Bridge watershed along Hop Brook. The H&H model was developed using HydroCAD (v. 10.00 15) and HEC-RAS (v. 5.0.5). The model development includes watershed land use conditions and attenuation for existing dams in the watershed. Details of the H&H model and can be provided upon request. The H&H model determined a bankfull-width of Hop Brook to be 30.5 feet, this was consistent but slightly wider than field measurements near the bridge based on Bank flags.

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SECTION 3

Section 3
Proposed Description

The project proposes the replacement of the existing road and pedestrian stream crossings. The entire project area occurs within wetland resource areas of the Wetlands Protection Act (WPA, 310 CMR 10.00) and Article XXII including Riverfront Area and Adjacent Upland Resource Areas.

3.1 Project Activities

3.1.1 Bridge Replacement

The project includes demolition of the existing arch culverts and pedestrian bridge and the construction of a new arch bridge. The proposed bridge structure is a pre-cast concrete arch spanning approximately 24-feet. The proposed bridge will be an approximately six-foot tall arch on five-foot tall precast pedestal footings with an open bottom. The project also includes the construction of new precast concrete block wingwalls on both the upstream and downstream ends of the crossing. The new wingwalls will provide protection for the structure and roadway and improve hydraulic conditions for the crossing. Formliners are recommended on the headwalls and wingwalls to provide stone texture to the concrete to improve aesthetics. The proposed roadway will include 11-foot travel lanes in both directions with two-foot shoulders. A five-foot sidewalk will be constructed on the east side of the bridge. Bridge rails approved in the MassDOT Bridge Manual for crash-test worthiness will be installed on the east and west sides of the bridge.

The bridge will be installed with work occurring "in the dry" using cofferdams and a dewatering system. The pedestal bases will be embedded below the streambed to provide and retain more natural benthic habitat conditions within the structure. The pedestal footings for the bridge will be approximately seven and a half feet wide. The footings for the wingwalls will be approximately five and half feet wide. A new stream channel bed will be constructed under the bridge at the location of the existing culverts, increasing the total hydraulic width from 12-feet to 24-feet under the roadway. Twelve inches of crushed stone will be placed beneath the pedestal footings to help distribute loads. A 36-inch layer of riprap salvaged from the existing bridge and supplemented as necessary will be placed over crushed stone for scour protection. Riprap is required per the MassDOT Bridge Manual to help minimize scour. The riprap will form a 2:1 slope within the structure. Twelve inches of natural streambed material will be salvaged from the existing channel and segregated and stockpiled on site. Following the bridge installation, the natural streambed material will be placed within the stream channel similar to preconstruction conditions to restore the existing riverbed substrate. The elevations and conditions of the existing streambed shall be maintained to the maximum extent practicable.

3.1.2 Utility Relocation

The construction of the new bridge requires reconstruction of the roadway approaches to the bridge. The defined profile will vary slightly from the existing profile. The typical roadway section includes a sidewalk east of the road and a sloped shoulder to the west. The northbound lane will have curbing at the edge of the shoulder leading into and out of the bridge curb. There will be a two-foot buffer behind the curb to match into the existing

roadway cross section. The horizontal and vertical alignments have been created to closely match the existing alignments.

Two new catch basins are proposed by the project north of the bridge for roadway drainage. These catch basin basins will connect into a new outfall.

The utilities within the vicinity of the project area will need to be modified in order to facilitate construction of the new bridge. These modifications include the relocation and replacement of underground water and gas mains, as well as the relocation of the utility poles with overhead wires. The utility pole currently located between the pedestrian and structural bridge will be relocated approximately 40 linear feet south. The water main will be relocated to east side of the bridge, underneath the sidewalk. The gas line will also be relocated to the east side of the bridge. The contractors will ensure that all utilities are functioning properly prior to the completion of construction.

The replacement of the bridge will improve the safety conditions for drivers and pedestrians. In addition, the project will improve the hydraulic connectivity of Hop Brook from the existing conditions. Additional discussion of the construction process is presented in the anticipated construction sequence and additional review of the selected project design in provided in the alternative analysis.

3.1.3 Easements and Access

While the Town possesses existing easements for the infrastructure in these locations, access via and work on several abutting parcels will be required in order to complete the project. The Town is in the process of establishing additional easements for these activities in locations where easements are already not in place. Access to the eastern bank will be obtained from the residence at 530 Dutton Road. Another temporary easement will be established with 557 Dutton Road to access along the western bank. The Town owns the parcel with the Stearns Millpond dam.

3.2 Anticipated Construction Sequence

The project proposes to temporary closure Dutton Road during bridge demolition and construction with an estimated closure of 10-12 weeks. The sequence may vary depending on the contractor's proposed schedule. The following is an approximate sequence of construction activities, some actions may occur concurrently:

- Install sediment and erosion controls
- Utility relocation and temporary utility facilities for construction
- Establish vehicle and pedestrian detours
- Close Dutton Road, including adjacent gravel parking for material laydown
- Establish water handling facilities for the isolation of work area from Hop Brook
- Demolish existing arch culverts and pedestrian bridge
- Construct bridge foundations
- Install precast arch bridge
- Construct stream channel at bridge
- Remove water handling and allow for Hop Brook to flow through the new bridge

- Complete approach roadway and drainage improvements
- Construct utility connections as necessary
- Stabilize shoulders and any exposed soil areas
- Open Dutton Road to traffic
- Remove sediment and erosion controls when stabilization is completed, and removal is authorized

3.3 Construction Period Protective Measures

The entire project area is located in an environmental sensitive area and requires work in several wetland resource areas. The project includes measures to maintain the flow of Hop Brook through the work area while avoiding unconfined work in flowing water.

3.3.1 Water Handling

The water handling during the demolition of the existing bridge and construction of the new bridge will isolate the work area from the stream flow to avoid potential sedimentation from construction activities. The final water handling design will be prepared by the contractor and submitted for engineering review to ensure the proposed temporary diversion is hydraulically adequate and meets the permit condition requirements. Based on the site conditions and construction requirements it is anticipated that a temporary cofferdam will be constructed immediately upstream and downstream of the construction area to divert Hop Brook through a culvert or culverts. The alignment of the temporary culverts may need to shift during the removal of the existing corrugated metal pipe arches. The water handling will protect the flows during the demolition from the existing stone arch material. A downstream coffer dam will also be required to ensure that any water in project site that accumulates during the construction of the footings for the new bridge are contained. Dewatering, if required, will require that the water is treated by a silt bag prior to discharge or equivalent Best Management Practice (BMP).

3.3.2 Cofferdams

Temporary cofferdams will be necessary to isolate the work area from normal flows. The cofferdam installation is anticipated to occur during low flow to limit the amount of water within the project area. The cofferdams may be installed in phases to allow normal flows around the work area without the need for flumes or pump if possible. The material composition of the cofferdam will be left to the contractor's discretion but could include such devices as Port-A-Dams, sandbags, sheet piles, and water filled bladders. Regardless of the measures implemented, the footprint will be limited to the area approved by all environmental permits. The locations of cofferdams are depicted on the enclosed site plans in Appendix A.

3.3.3 Erosion and Sedimentation Controls

The project includes standard BMPs to protect areas outside of the limit of work including:

- straw wattles, compost filter tubes, or an approved equivalent will be placed at the limit of grading in the roadway approach shoulders;
- catch basins near the project area will be protected with filter inserts;

- the limit of laydown will be marked in the gravel parking with construction fencing to define the limit-of-work;
- construction entrance will be installed at the gravel parking area;
- dewatering wastewater will be treated with a filter bag or equivalent and discharged in a stable upland area such as the approach roadway shoulders;
- stockpiles of soils, sands, and gravel will be protected with straw wattles, compost filter tubes, or an approved equivalent.

The newly constructed catch basins and drain pipes will be cleaned before receiving stormwater. The contractor will be required to maintain the barriers in good working order and to repair and replace sections, as necessary. These barriers will be inspected daily during construction and until disturbed soils have become stabilized.

3.3.4 Spill Prevention and Control

The contractor(s) will be required to conduct the work in an environmentally-safe manner and in accordance with applicable regulations for the management of fuels, waste oils, and hazardous substances. Refueling will not be allowed within jurisdictional areas to the extent practicable.

3.3.5 Cobble Segregation

The native riverbed cobble will be segregated and stockpiled in an upland area. Following the bridge installation, the stream bed will be stabilized with scour protection riprap and the cobble will be used to top-dress the area to restore the natural riverbed substrate. The cobble will be supplemented with similarly-sized and shaped material, as needed, to restore the existing riverbed substrate.

3.3.6 Stockpile Sediment or Soil

Stockpiles are to be located as far as possible from any surface water and will be protected from contact with stormwater using a temporary sediment barrier. Stockpiles should be surrounded by erosion controls to protect resource areas. Sediment or soil will either be live-loaded and hauled for disposal in the wet, or will be transported to a pre-defined stockpile area, based up on the contractor's preference.

3.3.7 Traffic Management Plan

A full road closure is anticipated throughout the duration of construction. The detour is planned to include Pratts Mill Road, Peakham Road, Old Lancaster Road, and Hudson Road for a total detour length of 4.0-miles. The detour is anticipated to be in effect for approximately 10-12 weeks with construction lasting a total of 12-16 weeks. Appropriate signage will be installed during the construction period. A full closure approach is environmentally preferable because it reduces the construction period and allows for the use of adjacent roadway for equipment storage.

3.3.8 Invasive Species Management Plan

Invasive species management elements have been incorporated into the project plans to reduce the potential for introduction of invasive plants into the project area. Measures will include the following:

- Construction equipment, including machinery and construction matting, will be cleaned of loose soils and plant matter before mobilization to the site.
- On-site soils, which are likely to carry non-native/invasive species seed, will not be used for grading and restoration activities.
- Work materials which enter the river, including the containment system and cofferdam materials, will be checked for aquatic invasive plants and cleaned prior to placement in the river. Any aquatic plants on construction equipment should be removed, bagged, and disposed of in an appropriate off-site location.

Under existing conditions, invasive species at this site include honeysuckle (*Lonicera* sp.), Japanese knotweed (*Fallopia japonica*), and oriental bittersweet (*Celastrus orbiculatum*). Given that these species are found within an Isolated Vegetated Wetland, complete eradication is not preferred. This plan will seek to reduce the spread of invasive species from this site to other areas and to limit the establishment of invasive species following construction.

3.3.9 Stabilization and Restoration

All areas disturbed by the project will be stabilized following construction. In the work area stabilization will include:

- Construction of a new stream channel bed at the bridge. The proposed channel includes large stones to protect the channel at higher flows and smaller sized material to keep the flows in the new bed.
- Restoration of the roadway which includes both roadway reconstruction and mill and overlay.
- Vegetative stabilization is proposed at roadway shoulders where grading will occur for roadway reconstruction or underground utility construction. This will be with an erosion control grass mix and may include erosion control blankets when grades are steeper. The restoration at the roadway shoulder anticipates that maintenance mowing will occur in these areas directly adjacent to the road and sidewalk.

The gravel parking area at Stearns Millpond will be restored to its existing conditions at the completion of the project. The restoration of abutting properties will be coordinated with the property owners with input from the Conservation Commission.

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SECTION 4

Section 4
Alternatives Analysis

4.1 Alternatives Analysis

An alternative analysis was conducted as part of the "Basis of Design" report for this project. That report reviewed projects constraints including wetlands, hydraulics, the approach roadways, adjacent properties (driveways), utilities and geotechnical conditions. An engineering and cost analysis were conducted to determine the best type of bridge structure to use based on the site constraints and span length.

The preliminary engineering guidelines of the MASSDOT Bridge Design Manual require new structures to have a design life of at least 75-years. Only structures capable of meeting a design service life of 75-years with minimal maintenance have been considered. The replacement structure is required to meet the Massachusetts Stream and River Crossing Standards (MASRCS) to the maximum extent practicable. These standards have the goals of maintaining fish and aquatic organism passage, maintain stream continuity and to provide wildlife passage.

In addition to a "No Action" alternative that would not meet the DPW's objectives of addressing the safety concerns this impaired crossing presents, other design alternatives which could enhance the resiliency of the infrastructure are described below, in no particular order. Table 4-1 and 4-2 provides a brief overview of the bridge alternatives that were considered.

Table 4-1 Advantages and Disadvantages of Bridge Alternatives- span length

Alternative	Advantages	Disadvantages
12-foot Span	Meets MassDOT requirements for replacing with the current size Passes 25-year storm	Provides the least benefit relative to MASRCS. Does not met the 1.2 times bankfull width stream standard
37-foot Span	Meets MASRCS Passes the 100-year storm	Increased project cost and requires changes to existing road profile that impacts floodplain, wetlands, and driveways
22-foot Span	Passes the 50-year storm Meets a majority of MASRCS	Does not met the 1.2 times bankfull width stream standard Would require a custom span to be built
24-foot Span	Passes the 50-year storm Meets a majority of MASRCS	Does not met the 1.2 times bankfull width stream standard

Table 4-2 Advantages and Disadvantages of Bridge Alternatives- superstructure span type

Alternative	Advantages	Disadvantages
Precast Concrete Arch	Precast concrete manufactured offsite which limits disturbance at the site Economically advantageous	Hydraulic capacity is limited by the arch relative to non-arch span Nearly matches shape of existing structure
Precast Concrete Rigid Form	Precast concrete manufactured offsite which limits disturbance Economically feasible Hydraulic capacity can be maximized with span	More expensive than a Precast Concrete Arch
Prestressed Concrete Beams	Can be used for long spans Hydraulic capacity can be maximized with span	Not economically feasible for design span

4.1.1 No Action

The No Action alternative would consist of making no attempts to improve the degraded condition of the culvert crossing. The culvert inlet would remain structurally impaired and be compromised. The Town desires to address the condition of their infrastructure in a planned and controlled manner, as opposed to as an emergency action. If sudden failure were to occur, debris would block the channel in an uncontrolled manner and have negative ecological impacts. For these reasons, a course of "No Action" is unacceptable to the Town.

4.1.2 Hydrology and Hydraulics

Based on an H&H Analysis three alternative span lengths were assessed:

- 37-foot span, fully meets stream crossing standards
- 22-foot span, meets stream crossing standards, except 1.2 times bankfull width
- 12-foot span, meets MassDOT requirements to match existing opening

The conclusion of the analysis found that the existing span and proposed 12-foot span can pass a 25-year storm, the 22-foot span can pass a 50-year storm and the 37-foot span can pass the 100-year storm. A 24-foot span arch is readily available where as a 22-foot arch span would need to be custom built. The 24-foot span was the preferred alternative as a span width that improves existing conditions and contains typical stream flow widths, while minimizing impacts to surrounding resource areas.

4.1.3 Structure type

The engineering alternatives analysis reviewed three structure types: precast concrete arch, precast concrete rigid frame, and prestressed concrete beams. The precast concrete arch was selected as the preferred alternative for the chosen span length based on construction cost. The increase in construction costs for a 37-foot span are estimated to be 30% to 35% more expensive than the 24-foot span.

4.1.4 Environmental Impacts

The proposed replacement bridge significantly improves the conditions in Hop Brook relative to the existing structure. Replacing the twin culverts with a single span significantly increases the openness ratio of the crossing. The new channel bed will improve water depths during low flows.

The selected 24-foot span width will have a relatively similar width as the existing culvert structure which minimizes the extent of disturbance outside of the existing roadway and shoulders. Longer bridges generally require larger abutments and thicker bridge decks. It is estimated that a 37-foot span would require raising the road surface at the bridge by 16-inches. That increase in road surface elevation would in turn require larger work areas at the bridge abutments, roadway shoulders and length of work in roadway approaches. The expanded limit of work required for a 37-foot span relative to the proposed 24-foot span, would require increasing the disturbances of Riverfront Area/Adjacent Upland Resource Area.

The benefit of meeting the 1.2 times bankfull width standard at this specific crossing is also minimized by the presence of a dam 125 feet upstream of the bridge. The goal of wider spans is to minimize the impacts of crossings on hydraulics and fish/wildlife passage. The adjacent dam has a much greater influence on these factors than the Dutton Road crossing.

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SECTION 5

Section 5
Regulatory Compliance

This section documents the project compliance with the Massachusetts Wetlands Protection Act and Sudbury Wetlands Administration Bylaw.

5.1 Massachusetts Wetlands Protection Act

5.1.1 Limited Project Status

The proposed bridge replacement qualifies for consideration as a Limited Project in accordance with 310 CMR 10.53(3)(i):

> *The maintenance, repair and improvement (but not substantial enlargement except when necessary to meet the Massachusetts Stream Crossing Standards) of structures, including dams and reservoirs and appurtenant works to such dams and reservoirs, buildings, piers, towers, headwalls, bridges, and culverts which existed on the effective date of 310 CMR 10.51 through 10.60 (April 1, 1983).*

The proposed roadwork replacement qualifies for consideration as a Limited Project in accordance with 310 CMR 10.53(3)(f):

> *The maintenance and improvement of existing roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage systems.*

Additionally, the associated utility work at the bridge would qualify as a Limited Project in accordance with 301 CMR 10.53 (3)(d).

> *The construction, reconstruction, operation and maintenance of underground and overhead public utilities, such as electrical distribution or transmission lines, or communication, sewer, water, and natural gas lines, may be permitted, in accordance with the follow general conditions and any additional conditions as deemed necessary by the issuing authority*

5.1.2 WPA Resource Area Alterations

The project requires temporary and permanent impacts to wetland resource areas. Temporary impacts are associated with water handling during construction. A summary of the resource area impacts can be found in Table 5-1.

TABLE 5-1
Summary of Alterations to Wetland Resource Areas

Resource Area	Proposed Alteration	Proposed Replacement
LUWW	810 Square Feet	983 Square Feet
Bank	77 Linear Feet	139 Linear Feet
BLSF	150 Square Feet	150 Square Feet
Riverfront Area (0-100 feet)	10,520 Square Feet	10,520 Square Feet
Riverfront Area (100-200 feet)	0 Square Feet	0 Square Feet

5.1.3 Bank

The Performance Standards for inland Bank are set forth at 310 CMR 10.54 (4)(a). *Any proposed work on a Bank shall not impair the following:*

1. The physical stability of the Bank

The project will not impair the physical stability of the Bank. The Bank alteration is limited to the area of the replacement bridge. The new bridge will have wing walls, which will increase the stability of the bank adjacent to the bridge and minimize erosion within the area.

2. The water carrying capacity of the existing channel within the bank;

The replacement of the existing twin culvert crossing with an open span improves the channel capacity in the project area and increases the ability of the stream to carry water through the bridge. The bridge is designed for a 50-year storm flow, while the existing bridge can accommodate a 25-year storm. In addition, the proposed bridge replacement increases the channel within the area, which will increase the water carrying capacity of the stream.

3. Ground and surface water quality;

The project is not anticipated to affect the water quality. Best management measures are proposed to isolate the construction activities while maintaining continuous flow of Hop Brook. The final conditions maintain existing conditions of the road with drainage improvements. There is no anticipated impacts to water quality as a result of this project.

4. The capacity of the Bank to provide breeding habitat, escape cover and food for fisheries; and

The proposed bridge replacement will not impair fisheries habitat value of Bank relative to existing conditions. Both the existing and proposed road crossings have limited Bank habitat value under the road crossing. In addition, the native river cobble will be segregated during construction and replaced within the stream channel following the completion of construction to restore the stream habitat.

5. The capacity of the Bank to provide important wildlife habitat functions. A project or projects on a single lot, for which Notice(s) of intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 50 feet (whichever is less) of land in the bank found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond

the above threshold may be permitted in they will have no adverse effects on wildlife habitat, as determined by procedures established under 310 CMR 10.60.

The alteration of the Bank for the project involves the replacement of the bridge and widening the existing stream crossing within that section of Hop Brook. As a result of the project, there will be approximately 62 linear feet of Bank created with the addition of the wing walls and widening the span. The proposed replacement bridge does not impair habitat capacity of the Bank relative to existing conditions. Both the Bank of the existing culverts and of the proposed bridge are limited with respect to wildlife habitat functioning. The replacement minimizes Bank alteration outside of the existing road crossing area, but will increase the amount of Bank within the project area.

6. Work on a stream crossing shall be presumed to meet the performance standard set forth in 310 CMR 10.54(4)(a) provided the work is performed in compliance with the Massachusetts Stream Crossing Standards by consisting of a span or embedded culvert in which, at a minimum, the bottom of a span structure or the upper surface of an embedded culvert is above the elevation of the top of the bank, and the structure spans the channel width by a minimum of 1.2 times the bankfull width. This presumption is rebuttable and may be overcome by the submittal of credible evidence from a competent source. Notwithstanding the requirement of 310 CMR 10.54(4)(a)5., the impact on bank caused by the installation of a stream crossing is exempt from the requirement to perform a wildlife habitat evaluation in accordance with the procedures contained in 310 CMR 10.60.

The Massachusetts Stream and River Crossing Standards note that fully meeting the standards in culvert replacement projects may not be achievable because of existing conditions including site constraints. The proposed replacement includes the replacement of twin culverts than have solid bottoms in sections with an open span that nearly doubles the channel width. As noted in the alternative analysis, the continuity of the river system of Hop Brook is significantly interrupted by the Stearns Millpond Dam. This dam acts as a barrier to upstream movement of most fish species. Further increases in the span length would require larger project area to construct a larger bridge and to match required changes in roadway grading. These changes would increase impacts to Riverfront Area along Dutton Road while only increasing connectivity in the approximately 125-foot section of constructed channel between the dam and bridge. The stream crossing has been designed to meet the Massachusetts Stream and River Crossing Standards to the maximum extent practicable.

5.1.4 Land Under Waterbodies and Waterways

Project compliance with the LUWW 310 CMR 10.56(4) performance standards is described in this section.

(a) Where the presumption set forth in 310 CMR 10.56(3) is not overcome, any proposed work within Land Under Water Bodies and Waterways shall not impair the following:

1. The water carrying capacity within the defined channel, which is provided by said land in conjunction with the banks;

The project will improve the water carrying capacity by increasing the hydraulic opening at this stream crossing. In addition, the widened span of the new bridge will increase the amount of LUWW present by 21%. This increase represents an improved capacity of the stream bed to carry water.

2. *Ground and surface water quality;*

   The project consists of the replacement of an existing roadway crossing without significant roadway widening. No significant increases in impervious surfaces or changes in land use are anticipated that would impair water quality. This work provides minor improvements in roadway stormwater drainage, which will improve surface water quality.

3. *The capacity of said land to provide breeding habitat, escape cover and food for fisheries; and*

   The increased area for Hop Brook with a single open bottomed channel will provide an improvement in the work area relative to existing conditions. The stream channel will be restored following the completion of the work by spreading the native cobble and riverbed material over the riprap. The habitat conditions will remain constrained by the adjacent dam.

(b) The capacity of said land to provide important wildlife habitat functions. A project or projects on a single lot, for which Notice(s) of intent is files on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold may be permitted in they will have no adverse effects on wildlife habitat, as determined by procedures established under 310 CMR 10.60.

The project will result in a net increase in LUWW area and replaces stream flow in a twin culvert with a single span. These changes will not impair the capacity of LUWW to provide wildlife habitat relative to existing conditions.

The conditions at 310 CMR 10.56(4)(c) and (d) address boat channels and state-listed rare species habitat which are not present at the project site.

5.1.5 Bordering Land Subject to Flooding

The Performance Standards for Bordering Land Subject to Flooding are set forth at 310 CMR 10.57(4)(a).

1. *Compensatory flood storage shall be provided for all flood storage volume that will be lost as the result of a proposed project within Bordering Land Subject to Flooding, when in the judgment of the issuing authority said loss will cause an increase or will contribute incrementally to an increase in the horizontal extent and level of flood water during peak flows.*

   Compensatory flood storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. Further, with respect to waterways, such compensatory volume shall be provided within the same reach of the river, stream or creek.

The project will not result in a change in flood storage volume. The project seeks to minimize grading changes through the entire work area to minimize the impact. The work in floodplain is primarily related to the replacement of the twin culverts with the arch span. These changes will result in an increase hydraulic capacity of the crossing and the ability of the bridge to handle larger storm events.

2. *Work within Bordering Land Subject to Flooding, including work required to provide the above-specified compensatory flood storage, shall not restrict flows so as to cause an increase in flood stage or velocity.*

   The propose project improves conditions by removing the current flow restriction and replacing the structure with an increased span that allows increased flow. The project does not increase flood stage elevations or flow velocities based on the hydraulic analysis of the new span.

3. *Work in those portions of bordering land subject to flooding found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. Except for work which would adversely affect vernal pool habitat, a project or projects on a single lot, for which Notice(s) of Intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the threshold, or altering vernal pool habitat, may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.*

   The proposed work in BLSF is under 5,000 square feet. As noted in the performance standard discussion of LUWW and Bank, the proposed replacement of the twin culverts with a single open span does not impair wildlife habitat. Both structures are limited in habitat capacity but the new single span will increase the openness ratio of the crossing which results in improved conditions.

5.1.6 Riverfront Area

This section describes how the proposed project satisfies the Riverfront redevelopment provisions at 310 CMR 10.58 (5). The performance standards are provided below in italics, while the details of project design follow.

(a) At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c. 131 § 40. When a lot is previously developed but no portion of the riverfront area is degraded, the requirements of 310 CMR 10.58(4) shall be met.

The project seeks to minimize work in Riverfront Area while replacing the existing road crossing within the footprint of the existing structure. The primary benefit of the replacement crossing is that it converts a twin culvert to a single open span.

(b) Stormwater management is provided according to standards established by the Department.

The project does improve the existing conditions for stormwater management in Dutton Road. Please refer to Appendix D for additional details regarding stormwater compliance.

(c) Within 200 foot riverfront area, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25 foot riverfront areas, except in accordance with 310 CMR 10.58(5)(f) or (g).

The project includes construction within the Hop Brook because the existing structure is located in and over the stream channel. Due to the nature of the work, the project cannot be relocated. Best management practices will be utilized during construction to limit the impact to the area.

(d) Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5)(f) or (g).

The design of the replacement bridge is located within the footprint of the existing structures. The work seeks to minimize the expansion of the structure while allowing for a single clear span. The span has been increased to meet Massachusetts Stream and River Crossing Standards to the maximum extent practicable.

(e) The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).

The area of proposed work will include the existing bridge, Dutton Road, and the abutting properties. Temporary access to the eastern bank will require disturbance to a vegetated portion of Riverfront Area. Following the completion of construction, the area will be restored. The Dutton Road corridor has been altered and includes the road, utilities and parking area at the former mill site. The proposed work does not permanently exceed the degraded areas of Riverfront Area in the project area.

(f) When an applicant proposed restoration on-site of degraded riverfront area, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(c), (d) and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to the criteria. Areas immediately along the river shall be selected for restoration. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Restoration shall include

1. *removal of all debris, but retaining any trees or other mature vegetation;*
2. *grading to a topography which reduces runoff and increases infiltration;*
3. *coverage by topsoil at a depth consistent with natural conditions at the site; and*
4. *seeding and planting with an erosion control seed mixture, followed by plantings of herbaceous and woody species appropriate to the site.*

The project does not propose mitigation as restoration of disturbed areas. The project will restore roadway shoulders that are disturbed by the project with loam and seed consistent with the description of restoration in Section 3.3.8.

(g) When an applicant proposes mitigation either on-site or in the riverfront area within the same general area of the river basin, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(c), (d), or (e) at a ratio in square feet of at least 2:1 mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Mitigation may include off-site restoration of riverfront areas, conservation restrictions under M.G.L. c. 184 §§ 31 to 33 to preserve undisturbed riverfront area that could otherwise be altered under 310 CMR 10.00, the purchase of development rights within the riverfront area, the restoration of bordering vegetated wetland, projects to remedy an existing adverse impact on the interests identified in M.G.L. c. 131 § 40 for which the applicant is not legally responsible, or similar activities undertaken voluntarily by the applicant which will support a determination by the issuing authority of no significant adverse impact. Preference shall be given to potential mitigation projects, if any, identified in a River Basin Plan approved by the Secretary of the Executive Office of Environmental Affairs.

No mitigation is proposed with this project. The work is within existing disturbed of Riverfront Area associated with Dutton Road. The work will improve the crossing relative to existing conditions by converting a twin culvert to a single open span.

5.2 Public Notice

Abutters were notified in accordance with the WPA. The abutter notification form, a copy of the list of abutters prepared by the Sudbury Assessors' office, and tax maps are provided in Appendix C.

5.3 Sudbury Bylaw

The proposed activities are also subject to the Sudbury Wetlands Administration Bylaw. Aspects of Article XXII that are more stringent than the WPA are discussed in the following sections.

5.3.1 Adjacent Upland Areas

The bridge is a water dependent structure and the replacement with a new structure will provide improved stream continuity of the Hop Brook. The nature of the proposed project does not allow the project to be relocated away from resource areas. A majority of the work will occur within previously disturbed areas with the areas of work being designed to limit impacts to resource areas to the extent practicable. Following the completion of construction, the area will be restored as detailed in Section 3.3.8. The DPW respectfully requests that the Conservation Commission waive the mitigation requirements and permanent disturbance area restriction to allow this project to proceed.

5.3.2 Cold Water Fisheries

Section 2.6 of the Sudbury Wetland Administration Bylaw regulations details the importance and assumptions of cold water fisheries within Sudbury. Hop Brook has been designated by the Massachusetts Division of Fisheries and Wildlife as a cold water fishery

resource. The performance standards set forth are meant to protect the water quality and quantity within the stream. A dam further upstream does limit the capacity of the project area to provide valuable fishery habitat; however, the increased bridge span and openness ratio will increase the water carrying capacity of this reach of the stream.

The naturally vegetated area besides the stream will be maintained to the extent practicable. As discussed in Section 5.1.6, a majority of the existing Riverfront Area on the site has been previously disturbed and altered. The proposed project area has been designed to limit the footprint to the maximum extent while ensuring that construction equipment can be safely operated. Disturbed areas will be restored following the completion of construction. The native stream bed material will be segregated during construction and placed within the river to restore the benthic habitat.

APPENDIX A

FIGURES

FIGURE 1
SITE LOCATION
Dutton Road Bridge Replacement
Sudbury, Massachusetts

Tighe&Bond
Engineers | Environmental Specialists

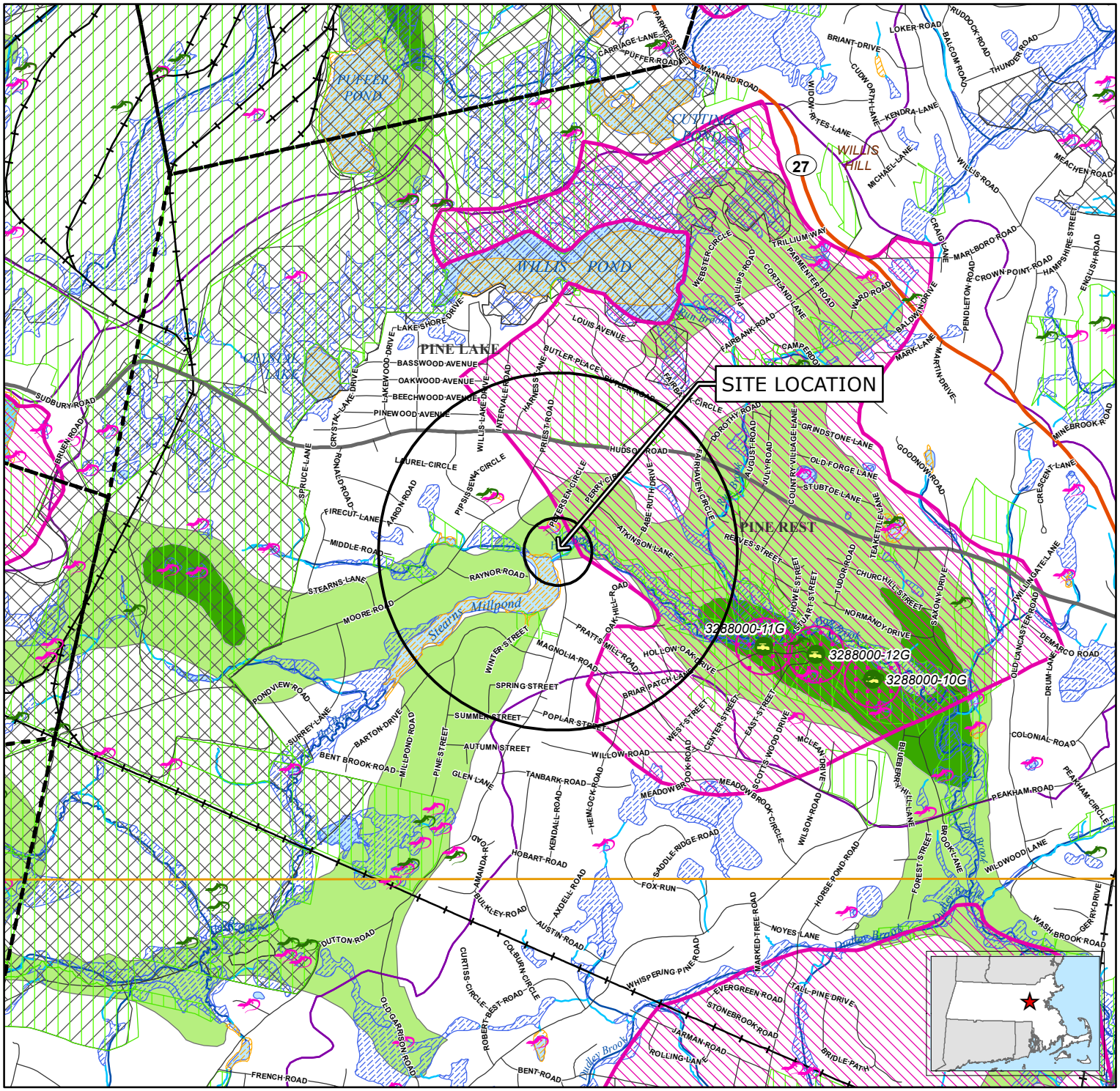
Based on USGS Topographic Map for
Maynard, MA Revised 1987 Contour Equals 3-Meters. [Site Quad]
Framingham, MA Revised 1987. Contour Equals 3-Meters.
Circles indicate 500-foot and half-mile radii

1:24,000
0 1,000 2,000
Feet

November 2018

V:\Projects\S\S5013\Maps\DuttonRdBridgeReplacement_SudburyMA_Topo.mxd [Exported By: kjw, 11/12/2018, 4:42:15 PM]

S-5013



Legend

- NHESP Certified Vernal Pools
- NHESP Potential Vernal Pools
- Non-Landfill Solid Waste Sites
- Proposed Well
- Emergency Surface Water
- Community Public Water Supply - Surface Water
- Community Public Water Supply - Groundwater
- Non-Community Non-Transient Public Water Supply
- Non-Community Transient Public Water Supply
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road
- Aquaducts
- Hydrologic Connections
- Stream/Intermittent Stream
- Powerline
- Pipeline
- Track or Trail
- Trains
- Public Surface Water Supply Protection Area (Zone A)
- DEP Approved Wellhead Protection Area (Zone I)
- DEP Approved Wellhead Protection Area (Zone II)
- DEP Interim Wellhead Protection Area (IWPA)
- Protected and Recreational Open Space
- Solid Waste Landfill
- Area of Critical Environmental Concern (ACEC)
- NHESP Priority Habitats for Rare Species
- NHESP Estimated Habitats for Rare Wildlife
- EPA Designated Sole Source Aquifer
- Major Drainage Basin
- Sub Drainage Basin
- MassDEP Open Water
- MassDEP Inland Wetlands
- MassDEP Coastal Wetlands
- MassDEP Not Interpreted Wetlands
- Public Surface Water Supply (PSWS)
- Water Bodies
- Non-Potential Drinking Water Source Area - High Yield
- Non-Potential Drinking Water Source Area - Medium Yield
- Potentially Productive Medium Yield Aquifer
- Potentially Productive High Yield Aquifer
- County Boundary
- Town Boundary
- USGS Quadrangle Sheet Boundary

1:24,000

0 1,000 2,000

Feet

N

FIGURE 2
PRIORITY RESOURCES

Dutton Road Bridge Replacement
Sudbury, Massachusetts

Data source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology
Circles indicate 500-foot and half-mile radii.
Data valid as of November 2019.

November 2019

Tighe&Bond
Engineers | Environmental Specialists

V:\Projects\S\S5013\Maps\DuttonRdBridgeReplacement_SudburyMA_Resource.mxd [Exported By: emdrake, 11/11/2019, 11:50:25 AM]

S-5013

FIGURE 3
SITE AERIAL OVERVIEW

Dutton Road Bridge Replacement
Sudbury, Massachusetts

December 2018

Tighe&Bond
Engineers | Environmental Specialists

Based on MassGIS Color Orthophotography (2013)

1:3,600
0 150 300
Feet

N

J:\S\S5013 Town of Sudbury\002 - Dutton Road Bridge\Drawings_Figures\GIS\MXD\Dutton Road Overview.mxd

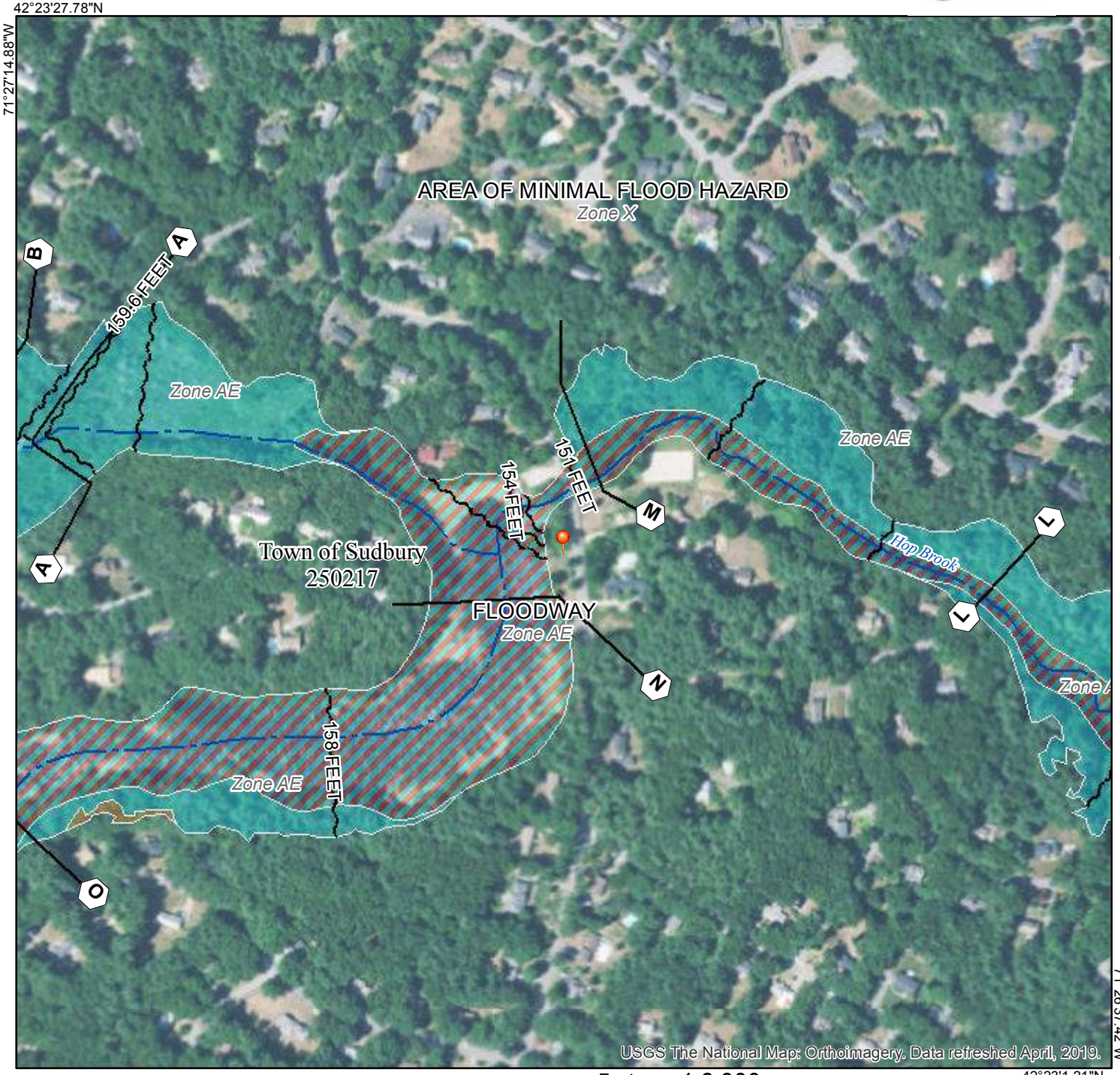
S-1852

National Flood Hazard Layer FIRMette

FEMA

42°23'27.78"N

71°27'14.88"W



USGS The National Map: Orthoimagery. Data refreshed April, 2019.

0 250 500 1,000 1,500 2,000 Feet

1:6,000

42°23'1.21"N

71°26'37.42"W

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/11/2019 at 7:39:58 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

TOWN OF SUDBURY, MASSACHUSETTS

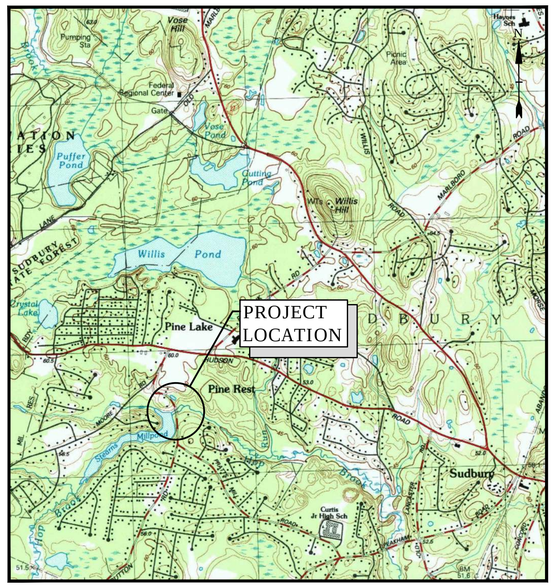
DUTTON ROAD BRIDGE REPLACEMENT

PROJECT NO: S5013-002

MassDOT BRIDGE NO. S-31011, BIN 7QD

JANUARY 2020

LIST OF DRAWINGS	
SHEET NO.	SHEET TITLE
	COVER
G-101	NOTES & LEGEND
C-101	EXISTING CONDITIONS & DEMOLITION PLANS
C-102	DESIGN PLAN & PROFILE
C-301	DUTTON ROAD CROSS SECTIONS
C-501	EROSION CONTROL NOTES & DETAILS
C-502	TYPICAL SECTION & DETAILS
C-503	DETAILS
S-001	BRIDGE KEY PLAN, PROFILES, LOCUS, & INDEX
S-101	GENERAL BRIDGE PLAN & ELEVATION
S-104	BRIDGE SECTIONS & DETAILS



LOCATION MAP
SCALE: 1" = 2000'

PREPARED FOR:

TOWN OF SUDBURY
DANIEL NASON, DIRECTOR OF PUBLIC WORKS

PREPARED BY:

Tighe&Bond
www.tighebond.com
446 Main Street
Worcester, MA 01608
(508) 754-2201

DAVID L. LORING, PE

ERIC OHANIAN, PE

PERMIT PLANS
NOT FOR CONSTRUCTION

GENERAL NOTES:

1. BASE PLAN AND EXISTING TOPOGRAPHY PREPARED FROM AN ACTUAL ON THE GROUND FIELD SURVEY CONDUCTED BY WSP USA INC. IN OCTOBER 2018. BORINGS WERE PERFORMED BY TECHNICAL DRILLING SERVICES ON OCTOBER 9th AND 10th, 2018.
2. THE HORIZONTAL DATUM SHOWN HEREON REFERENCES MASSACHUSETTS MAINLAND NORTH AMERICAN DATUM OF 1983 (NAD 83).
3. THE VERTICAL DATUM SHOWN HEREON REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. THE PROPERTY LINES SHOWN HEREON ARE NOT A RESULT OF AN ON THE GROUND SURVEY AND WERE TAKEN FROM THE MASSACHUSETTS GIS DATA AND THEREFORE ARE APPROXIMATE.
5. THE WETLAND RESOURCE AREAS SHOWN HEREON WERE DELINEATED BY TIGHE & BOND ON 9/26/2018 AND FIELD LOCATED BY WSP USA INC.
6. THE OWNER AND ENGINEER ASSUME NO RESPONSIBILITY FOR THE LOCATION OF EXISTING UTILITIES. THE ENGINEER AND OWNER MAKE NO GUARANTEE AS TO THE UNDERGROUND CONDITIONS THAT MAY BE ENCOUNTERED.
7. TEST PITS TO LOCATE EXISTING UTILITIES ARE REQUIRED AND ARE SHOWN ON THE DRAWINGS.
8. PER MASSACHUSETTS LAW, CONTRACTOR SHALL CALL 1-888-DIG-SAFE, (1-888-344-7233) AND THE TOWN OF SUDBURY, PRIOR TO ANY UNDERGROUND EXCAVATION ON SITE. THE DIG-SAFE SERVICE WILL FIELD LOCATE AND MARK UNDERGROUND UTILITIES IN THE FIELD. THE DIG-SAFE VERIFICATION NUMBER SHALL BE SUBMITTED TO THE TOWN OF SUDBURY PRIOR TO ANY DEMOLITION AND REMOVAL OR CONSTRUCTION WORK.
9. ALL EXISTING CONDITIONS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. IF FIELD CONDITIONS ARE OBSERVED THAT VARY SIGNIFICANTLY FROM THOSE SHOWN ON THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING FOR RESOLUTION OF THE CONFLICTING INFORMATION.
10. ALL WORK SHALL COMPLY WITH OSHA'S LATEST STANDARDS. ALL REQUIREMENTS OF OSHA'S EXCAVATION STANDARDS SHALL BE PROVIDED BY THE CONTRACTOR INCLUDING, BUT NOT LIMITED TO, THE PROVISION FOR A COMPETENT PERSON ON SITE AND ANY REQUIRED DOCUMENTATION THAT MAY REQUIRE CERTIFICATION BY A PROFESSIONAL ENGINEER.
11. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN ALL UTILITIES FUNCTIONING PROPERLY IN THE AREAS UNDER CONSTRUCTION PRIOR TO COMPLETION OF THE PROJECT. ALL PIPES AND STRUCTURES WITHIN THE LIMITS OF THIS CONTRACT SHALL BE LEFT IN A CLEAN AND OPERABLE CONDITION AT THE COMPLETION OF THE WORK. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT SAND AND SILT FROM DISTURBED AREAS FROM ENTERING THE SYSTEM. CONTRACTOR IS RESPONSIBLE FOR DAMAGE SUSTAINED TO ANY EXISTING UTILITIES. IT IS HIS RESPONSIBILITY TO NOTIFY THE RESPONSIBLE COMPANY AND MAKE REPAIRS TO THE REQUIREMENTS OF THE TOWN OR RESPECTIVE UTILITY COMPANY.
12. COORDINATE RELOCATION OR SUPPORTING OF UTILITY POLES WITH THE RESPECTIVE UTILITIES.
13. ANY AND ALL DEMOLISHED BUILDING MATERIALS, STRUCTURES, PIPES, PAVEMENT, CURBING, SURPLUS MATERIAL, AND SITE RUBBLE SHALL BE DISPOSED OF BY THE CONTRACTOR OFF-SITE AT HIS EXPENSE AND IN ACCORDANCE WITH ALL APPLICABLE STATE AND FEDERAL ENVIRONMENTAL REGULATIONS.
14. ALL MATERIALS AND METHODS ARE TO COMPLY WITH TOWN OF SUDBURY DPW STANDARDS, UNLESS OTHERWISE DIRECTED.
15. ALL DISTURBED AREAS SHALL BE LOAMED & SEEDED UNLESS OTHERWISE SPECIFIED. OVER EXCAVATE LOAM & SEED AREAS AS REQUIRED TO MEET GRADE.
16. WORK IS SITUATED WITHIN THE LIMITS OF 100 YEAR FLOODING PER FEMA COMMUNITY PANEL NUMBER 25017C0364F, (EFFECTIVE JULY 7, 2014). THE FLOODPLAIN ELEVATION IN THE PROJECT AREA RANGES BETWEEN EL 151 AND 150 FEET NGVD 1988.
17. REMOVED GUARDRAIL PANELS, POSTS, AND HARDWARE SHALL BE DELIVERED TO THE TOWN DPW YARD.
18. IF LOCATIONS, SIZES, ETC. CHANGE FROM THESE PLANS, THE NEW CHANGES SHALL BE SUBMITTED TO THE OWNER/ENGINEER FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
19. TAKE ALL NECESSARY MEASURES AND PROVIDE ALL NECESSARY CONTINUOUS BARRIERS OF SUFFICIENT TYPE, SIZE AND STRENGTH TO PREVENT ACCESS TO ALL OPEN EXCAVATIONS AT THE COMPLETION OF EACH DAY'S WORK.
20. STORE FUEL, OIL, PAINT, OR OTHER HAZARDOUS MATERIALS IN A SECONDARY CONTAINER AND REMOVE FROM THE SITE TO A LOCKED INDOOR AREA WITH AN IMPERVIOUS FLOOR DURING NON-WORK HOURS.
21. IMMEDIATELY REPORT SPILLS OF OIL AND/OR HAZARDOUS MATERIALS (OHM) TO THE MASS DEP.
22. PROVIDE A SUFFICIENT SUPPLY OF ABSORBENT SPILL RESPONSE MATERIALS, SUCH AS BOOMS OR BLANKETS, AT THE CONSTRUCTION SITES AT ALL TIMES TO CLEAN UP POTENTIAL SPILLS OF HAZARDOUS MATERIALS.
23. ATTENTION: THE WORK PROPOSED ON THESE DRAWINGS IS ALLOWED BY AN ORDER OF CONDITIONS ISSUED BY THE SUDBURY CONSERVATION COMMISSION AND AN ARMY CORPS OF ENGINEERS GENERAL PERMIT, WHICH INCLUDE STRICT STANDARDS AND REQUIREMENTS. NO WORK IS TO PROCEED UNTIL THE CONTRACTOR HAS REVIEWED AND AGREED TO ABIDE BY ALL OF THE CONDITIONS STATED THEREIN.

ABBREVIATIONS:

BC	BITUMINOUS CURB
BIT	BITUMINOUS
BL	BASELINE
CB	CATCH BASIN
CONC	CONCRETE
CS	CUT SPIKE
DMH	DRAIN MANHOLE
DWY	DRIVEWAY
E	EAST
EL/ELEV	ELEVATION
EXIST	EXISTING
'	FEET/FOOT
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
HMA	HOT MIX ASPHALT
HDPE	HIGH DENSITY POLYETHYLENE
"	INCH
INV	INVERT
L	LENGTH
MASSDOT	MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
MB	MAIL BOX
N	NORTH
NIC	NOT IN CONTRACT
PC	POINT OF CURVE
P	PROPERTY LINE
PROP	PROPOSED
PT.	POINT
PT	POINT OF TANGENT
R	RADIUS
RD	ROAD
RET	RETAIN
R&D	REMOVE AND DISPOSE
S	SOUTH
STA	STATION
TBR	TO BE REMOVED
T.O.W.	TOP OF WALL
UP	UTILITY POLE
W	WEST
YR	YEAR

LEGEND:

	EXISTING	NEW
ROADWAY BASELINE	1+00	
EDGE OF ROAD		
WATER PIPES	W	PW
DRAINAGE PIPES	D	
GAS PIPES	G	G
OVERHEAD WIRES	OHW	OE
PROPERTY LINE		
BOUND		
UTILITY POLE		
UTILITY POLE W/LIGHT		
ELECTRIC BOX		
HYDRANT		
WATER VALVE	WV	WV
WATER PUMP		
SIGN		
MAIL BOX		
TREE		
CATCH BASIN		
DRAIN MANHOLE		
DRAIN CULVERT		
RETAINING WALL		
EROSION CONTROLS		
FLOODZONE		
WETLAND FLAG LABEL	WF B2	
VEGETATED WETLANDS LIMIT		
MAJOR CONTOUR	5	5
MINOR CONTOUR	4	4
LIMIT-OF-WORK		
WOOD POST GUARDRAIL		
METAL POST GUARDRAIL		
FENCE		
BORING	B-1	
PROFILE ELEVATIONS	351.32	351.3
REMOVE AND DISPOSE		
COFFERDAMN		
VEGETATED WETLANDS		

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100% Plans Not For Construction

Dutton Road Bridge Replacement

Town of Sudbury

Sudbury, Massachusetts

MassDOT Bridge No. S-31011, BIN 7QD

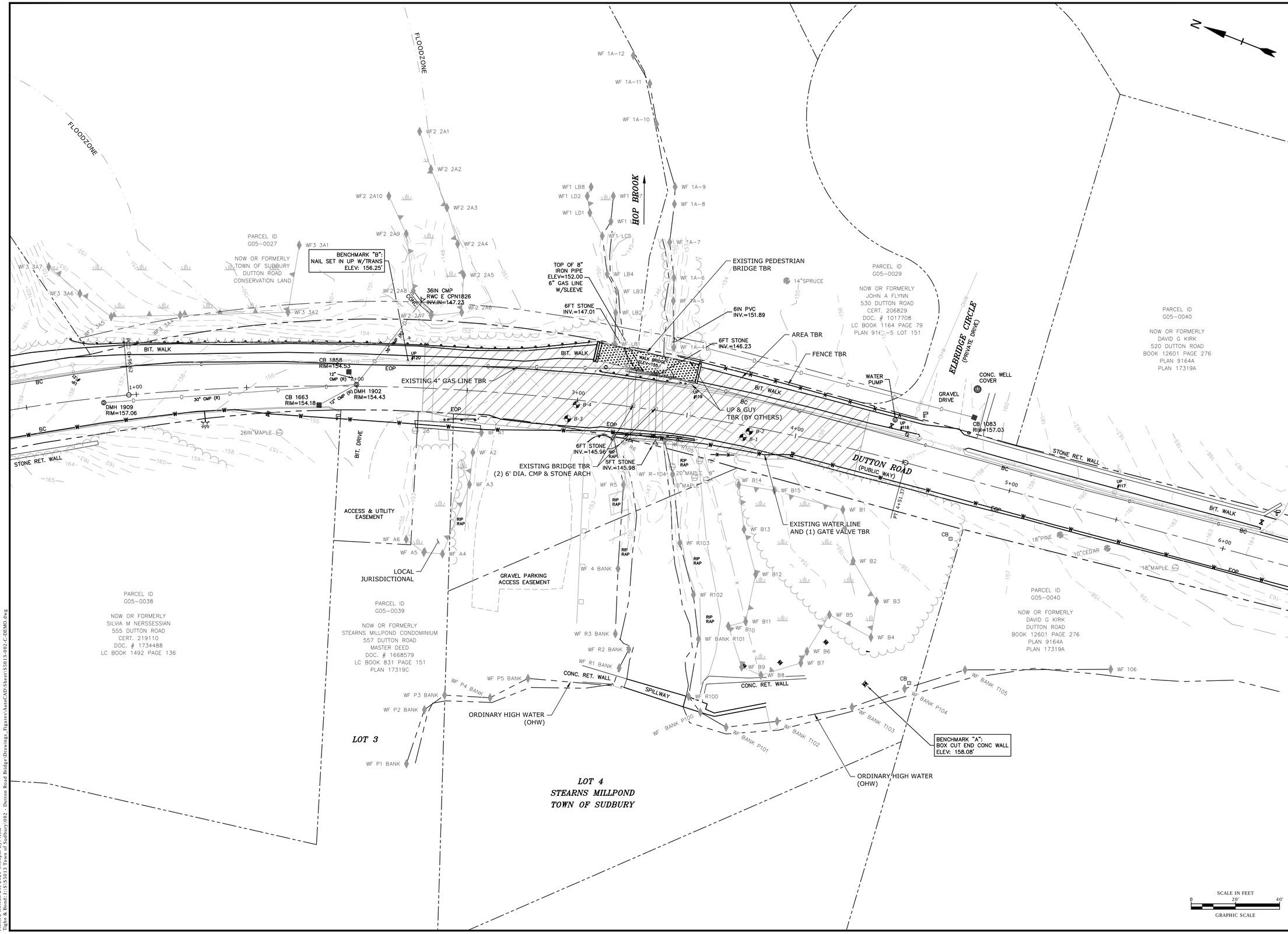
MARK	DATE	DESCRIPTION

PROJECT NO:	S5013-002
DATE:	JANUARY 20, 2020
FILE:	S5013-002-G-NOTE.DWG
DRAWN BY:	SCK
CHECKED:	DLL
APPROVED:	DLL

NOTES & LEGEND

SCALE: AS SHOWN

G-101
SHEET 2 OF 11



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EXISTING CONDITIONS & DEMOLITIONS PLANS

SCALE: AS SHOWN

C-101
SHEET 3 OF 11

Last Saved: 1/20/2020
Plotted: Jan 20, 2020-3:56pm By: AGB
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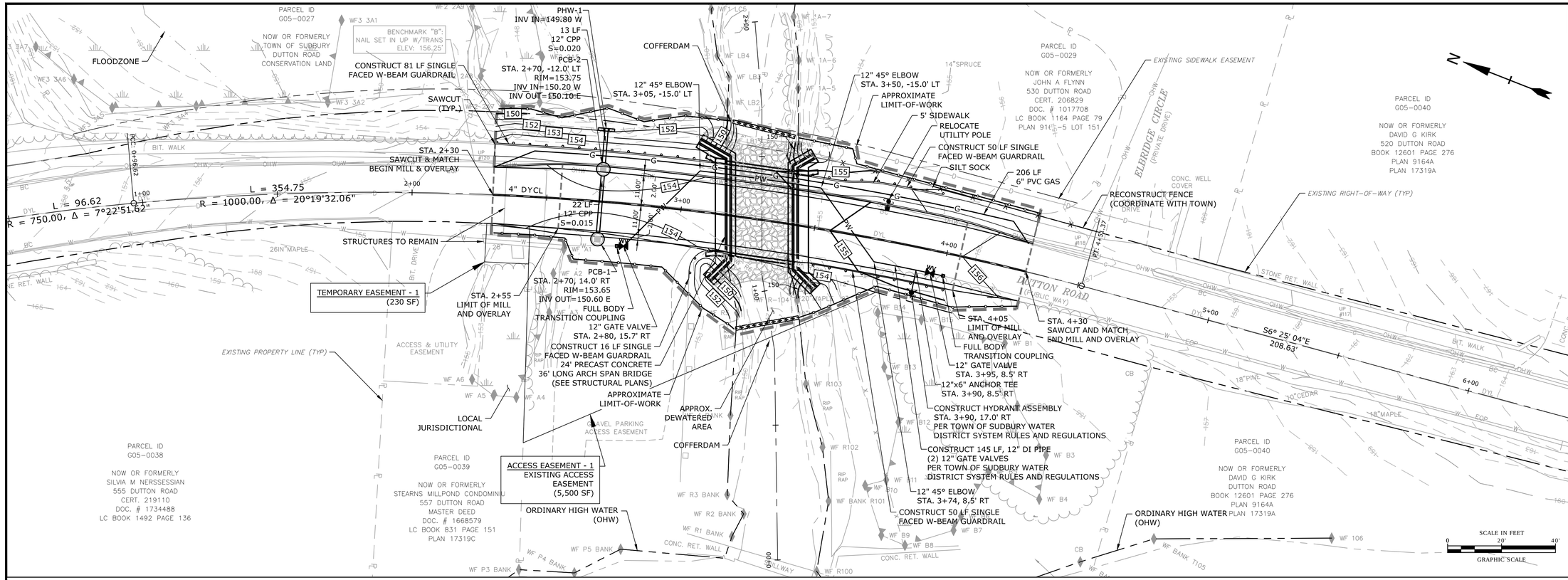
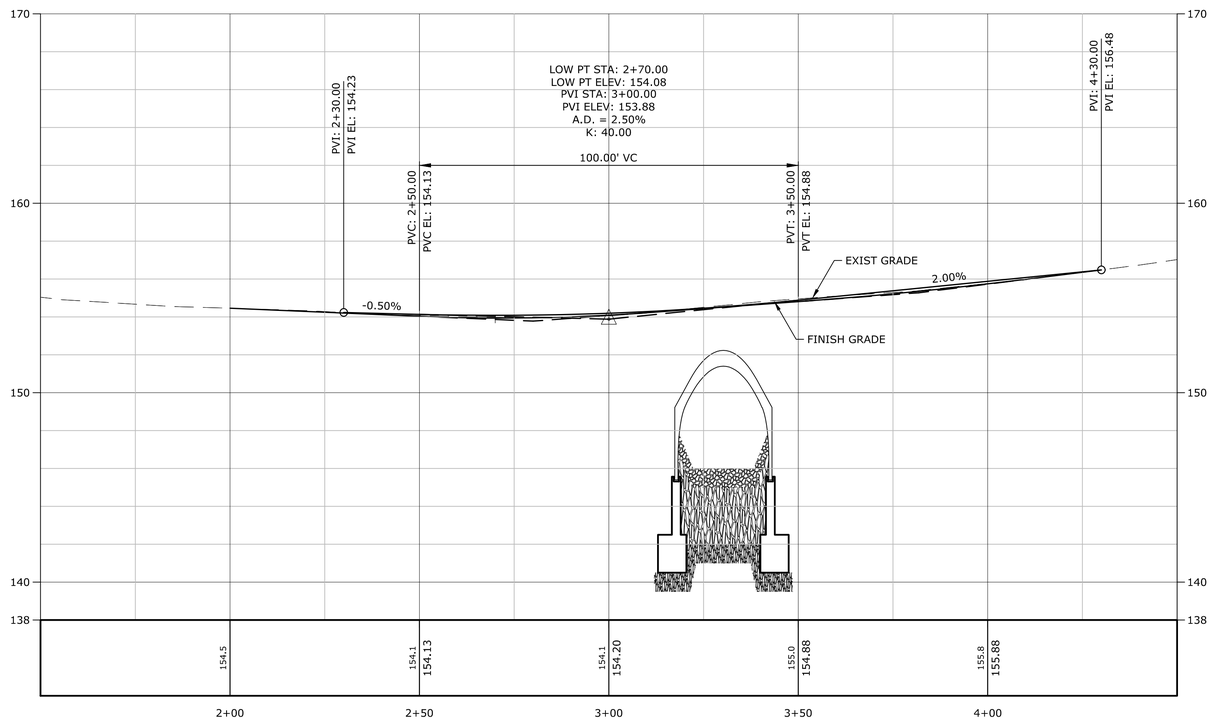


PLAN VIEW



DUTTON ROAD PROFILE

HORIZONTAL SCALE 1" = 20'
0 20' 40'
VERTICAL SCALE 1" = 4'
0 4' 8'

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DESIGN PLAN & PROFILE

SCALE: AS SHOWN

C-102

SHEET 4 OF 11

Last Saved: 1/20/2020
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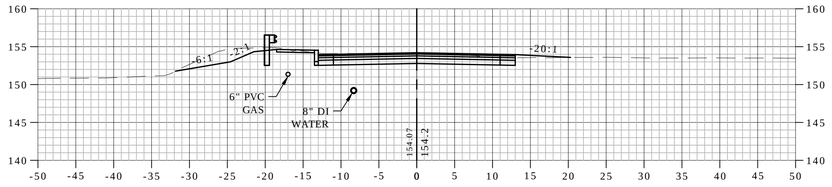

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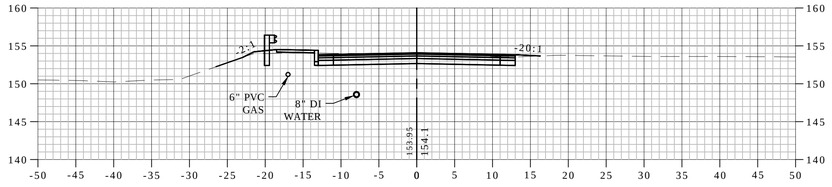

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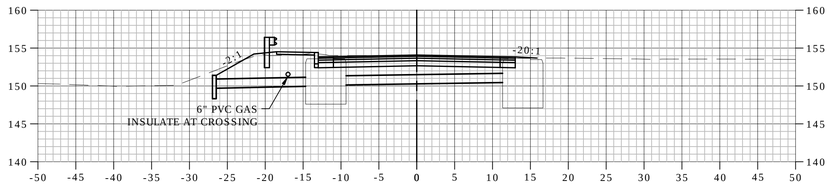

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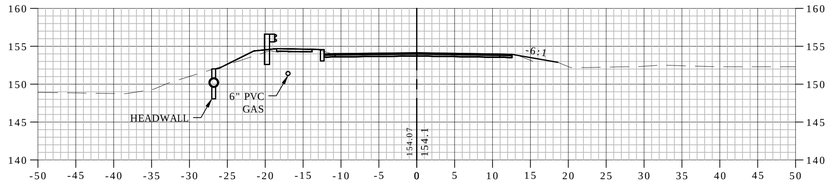

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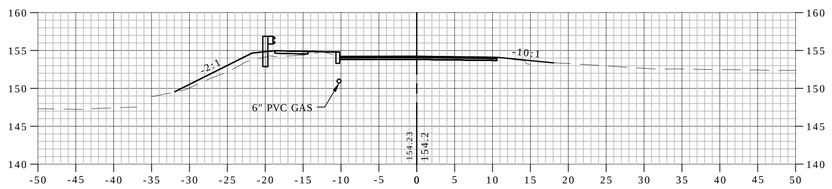

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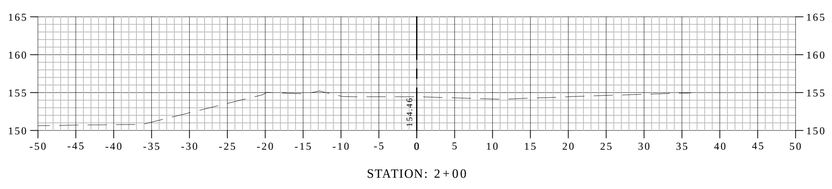

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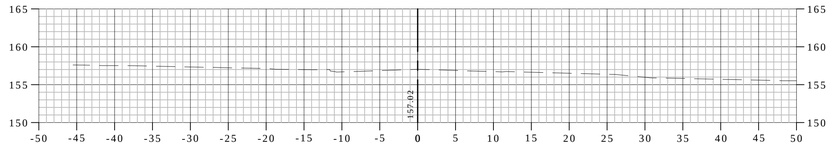

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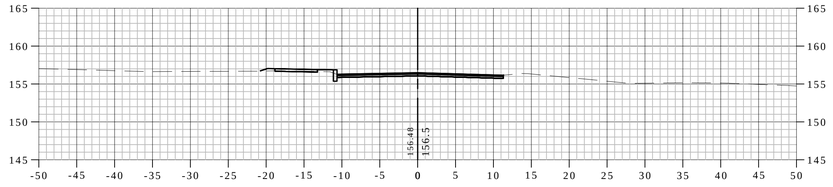

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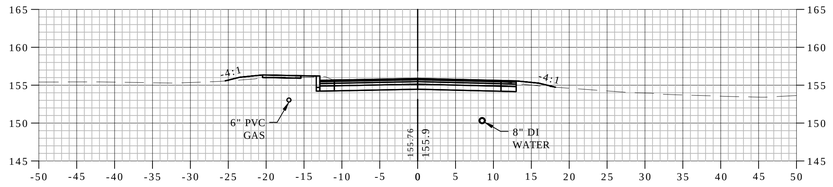

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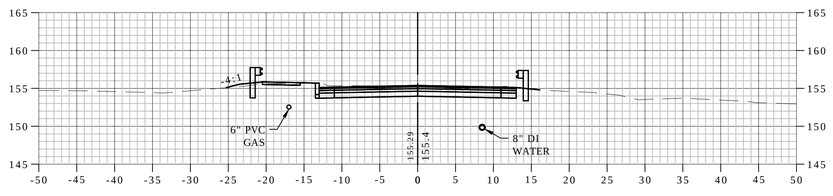

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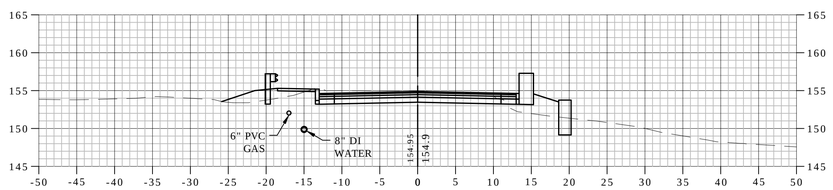

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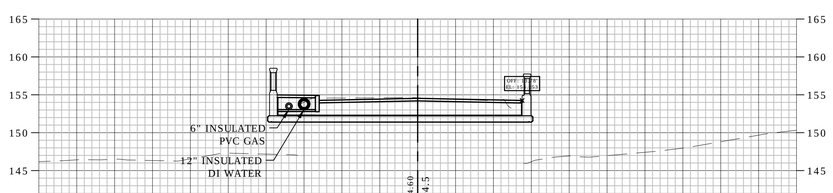

STATION: 3+30
BRIDGE

SCALE IN FEET
0 10' 20'
GRAPHIC SCALE

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Dutton Road Bridge Replacement

Town of Sudbury

Sudbury, Massachusetts

MassDOT Bridge No. S-31011, BIN 7QD

MARK	DATE	DESCRIPTION

PROJECT NO:	S5013-002
DATE:	~~JANUARY 20, 2020~~ JANUARY 20, 2020
FILE:	S5013-002-C-SCTN.DWG
DRAWN BY:	SCK
CHECKED:	DLL
APPROVED:	DLL

DUTTON ROAD
CROSS SECTIONS

SCALE: AS SHOWN

C-301
SHEET 5 OF 11

Last Saved: 1/20/2020
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PROJECT DESCRIPTION
THE PROJECT INCLUDES THE RECONSTRUCTION OF THE DUTTON ROAD BRIDGE AT HOP BROOK AS WELL AS ROADWAY RECONSTRUCTION TO FACILITATE THE EXCAVATION FOR THE NEW BRIDGE AND ALL ASSOCIATED UTILITIES INCLUDING WATER, GAS, AND ELECTRIC.

DISTURBED AREA
THE TOTAL AREA TO BE DISTURBED IS APPROXIMATELY 0.25 ACRES.

SOIL CHARACTERISTICS

NAME OF RECEIVING WATERS
THE STORMWATER RUNOFF FROM THE SITE WILL BE COLLECTED IN A CLOSED DRAINAGE SYSTEM PRIOR TO DISCHARGING TO AN UNNAMED WETLAND.

CONSTRUCTION SEQUENCE OF MAJOR ACTIVITIES:
1. CUT AND CLEAR TREES.
2. CONSTRUCT TEMPORARY AND PERMANENT SEDIMENT, EROSION AND DETENTION CONTROL FACILITIES. EROSION, SEDIMENT AND DETENTION MEASURES SHALL BE INSTALLED PRIOR TO ANY EARTH MOVING OPERATIONS THAT WILL INFLUENCE STORMWATER RUNOFF SUCH AS:
   - NEW CONSTRUCTION
   - DEVELOPMENT OF BORROW PIT AREAS
   - DISPOSAL OF SEDIMENT SPOIL, STUMP AND OTHER SOLID WASTE
   - CONTROL OF DUST
   - CONSTRUCTION OF ACCESS AND HAUL ROAD
   - NEARNESS OF CONSTRUCTION SITE TO RECEIVING WATERS
   - CONSTRUCTION DURING LATE WINTER AND EARLY SPRING
3. ALL PERMANENT DITCHES, SWALES, DETENTION, RETENTION AND SEDIMENTATION BASINS TO BE STABILIZED USING THE VEGETATIVE AND NON-STRUCTURAL BMPS PRIOR TO DIRECTING RUNOFF TO THEM.
4. CLEAR AND DISPOSE OF DEBRIS.
5. CONSTRUCT TEMPORARY CULVERTS AND DIVERSION CHANNELS AS REQUIRED.
6. GRADE AND GRAVEL ROADWAYS AND PARKING AREAS – ALL ROADS AND PARKING AREA SHALL BE STABILIZED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADE.
7. BEGIN PERMANENT AND TEMPORARY SEEDING AND MULCHING. ALL CUT AND FILL SLOPES SHALL BE SEEDED AND MULCHED WITHIN 72 HOURS OF ACHIEVING FINISHED GRADE.
8. DAILY, OR AS REQUIRED, CONSTRUCT TEMPORARY BERMS, DRAINS, DITCHES, PERIMETER EROSION CONTROL MEASURES, SEDIMENT TRAPS, ETC., MULCH AND SEED AS REQUIRED.
9. FINISH PAVING ALL ROADWAYS AND PARKING LOTS.
10. INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES.
11. COMPLETE PERMANENT SEEDING AND LANDSCAPING.
12. REMOVE TRAPPED SEDIMENTS FROM COLLECTOR DEVICES AS APPROPRIATE AND THEN REMOVE TEMPORARY EROSION CONTROL MEASURES.

SPECIAL CONSTRUCTION NOTES:
1. THE CONSTRUCTION SEQUENCE MUST LIMIT THE DURATION AND AREA OF DISTURBANCE.
2. THE PROJECT IS TO BE MANAGED IN A MANNER THAT CONTROLS THE REMOVAL OF INVASIVE SPECIES IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL CODES.
3. CUTTING AND CLEARING OF TREES SHALL NOT OCCUR IN JUNE OR JULY TO PROTECT POTENTIAL NORTHERN LONG-EARED BAT ROOSTING AREAS.
4. LOT DISTURBANCE, OTHER THAN THAT SHOWN ON THE APPROVED PLANS, SHALL NOT COMMENCE UNTIL AFTER THE ROADWAY HAS THE BASE COURSE TO DESIGN ELEVATION AND THE ASSOCIATED DRAINAGE IS COMPLETE AND STABLE.

EROSION CONTROL NOTES:
1. ALL EROSION CONTROL MEASURES AND PRACTICES SHALL CONFORM TO THE "COMPLETE EROSION AND SEDIMENTATION CONTROL GUIDELINES: A GUIDE FOR PLANNERS, DESIGNERS, AND MUNICIPAL OFFICIALS" PREPARED BY MASSDEP.
2. PRIOR TO ANY WORK OR SOIL DISTURBANCE, CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR EROSION CONTROL MEASURES AS REQUIRED IN THE PROJECT MANUAL.
3. CONTRACTOR SHALL INSTALL TEMPORARY EROSION CONTROL BARRIERS, INCLUDING HAY BALES, SILT FENCES, MULCH BERMS, SILT SACKS AND SILT SOCKS AS SHOWN IN THESE DRAWINGS AS THE FIRST ORDER OF WORK.
4. SILT SACK INLET PROTECTION SHALL BE INSTALLED IN ALL EXISTING AND PROPOSED CATCH BASIN INLETS WITHIN THE WORK LIMITS AND BE MAINTAINED FOR THE DURATION OF THE PROJECT.
5. PERIMETER CONTROLS INCLUDING SILT FENCES, MULCH BERM, SILT SOCK, AND/OR HAY BALE BARRIERS SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT UNTIL NON-PAVED AREAS HAVE BEEN STABILIZED.
6. THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF ALL TEMPORARY EROSION CONTROL DEVICES UPON COMPLETION OF CONSTRUCTION.
7. ALL DISTURBED AREAS NOT OTHERWISE BEING TREATED SHALL RECEIVE 6" LOAM, SEED AND FERTILIZER.
8. INSPECT ALL INLET PROTECTION AND PERIMETER CONTROLS WEEKLY AND AFTER EACH RAIN STORM OF 0.25 INCH OR GREATER. REPAIR/MODIFY PROTECTION AS NECESSARY TO MAXIMIZE EFFICIENCY OF FILTER. REPLACE ALL FILTERS WHEN SEDIMENT IS 1/3 THE FILTER HEIGHT.
9. CONSTRUCT EROSION CONTROL BLANKETS ON ALL SLOPES STEEPER THAN 3:1.

STABILIZATION:
1. AN AREA SHALL BE CONSIDERED STABLE WHEN ONE OF THE FOLLOWING HAS OCCURRED:
   A. BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED;
   B. A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED;
   C. A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIPRAP HAS BEEN INSTALLED;
   D. EROSION CONTROL BLANKETS HAVE BEEN PROPERLY INSTALLED.;
   E. IN AREAS TO BE PAVED, "STABLE" MEANS THAT BASE COURSE GRAVELS MEETING THE REQUIREMENTS OF MASSDOT STANDARD FOR ROAD AND BRIDGE CONSTRUCTION, 2016, HAVE BEEN INSTALLED.
2. WINTER STABILIZATION PRACTICES:
   A. ALL PROPOSED VEGETATED AREAS THAT DO NOT EXHIBIT A MINIMUM OF 85 PERCENT VEGETATIVE GROWTH BY OCTOBER 15, OR WHICH ARE DISTURBED AFTER OCTOBER 15, SHALL BE STABILIZED BY SEEDING AND INSTALLING EROSION CONTROL BLANKETS ON SLOPES GREATER THAN 3:1, AND SEEDING AND PLACING 3 TO 4 TONS OF MULCH PER ACRE, SECURED WITH ANCHORED NETTING, ELSEWHERE. THE INSTALLATION OF EROSION CONTROL BLANKETS OR MULCH AND NETTING SHALL NOT OCCUR OVER ACCUMULATED SNOW OR ON FROZEN GROUND AND SHALL BE COMPLETED IN ADVANCE OF THAW OR SPRING MELT EVENTS;
   B. ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85 PERCENT VEGETATIVE GROWTH BY OCTOBER 15, OR WHICH ARE DISTURBED AFTER OCTOBER 15, SHALL BE STABILIZED TEMPORARILY WITH STONE OR EROSION CONTROL BLANKETS APPROPRIATE FOR THE DESIGN FLOW CONDITIONS;
   C. AFTER NOVEMBER 15, INCOMPLETE ROAD OR PARKING SURFACES, WHERE WORK HAS STOPPED FOR THE WINTER SEASON, SHALL BE PROTECTED WITH A MINIMUM OF 3 INCHES OF CRUSHED GRAVEL PER MASSDOT, OR IF CONSTRUCTION IS TO CONTINUE THROUGH THE WINTER SEASON BE CLEARED OF ANY ACCUMULATED SNOW AFTER EACH STORM EVENT;
3. STABILIZATION SHALL BE INITIATED ON ALL LOAM STOCKPILES, AND DISTURBED AREAS, WHERE CONSTRUCTION ACTIVITY SHALL NOT OCCUR FOR MORE THAN TWENTY-ONE (21) CALENDAR DAYS BY THE FOURTEENTH (14TH) DAY AFTER CONSTRUCTION ACTIVITY HAS PERMANENTLY OR TEMPORARILY CEASED IN THAT AREA. STABILIZATION MEASURES TO BE USED INCLUDE:
   A. TEMPORARY SEEDING;
   B. MULCHING.
4. WHEN CONSTRUCTION ACTIVITY PERMANENTLY OR TEMPORARILY CEASES WITHIN 100 FEET OF NEARBY SURFACE WATERS OR DELINEATED WETLANDS, THE AREA SHALL BE STABILIZED WITHIN SEVEN (7) DAYS OR PRIOR TO A RAIN EVENT. ONCE CONSTRUCTION ACTIVITY CEASES PERMANENTLY IN AN THESE AREAS, SILT FENCES, MULCH BERMS, HAY BALE BARRIERS AND ANY EARTH/DIKES SHALL BE REMOVED ONCE PERMANENT MEASURES ARE ESTABLISHED.
5. DURING CONSTRUCTION, RUNOFF WILL BE DIVERTED AROUND THE SITE WITH EARTH DIKES, PIPING OR STABILIZED CHANNELS WHERE POSSIBLE. SHEET RUNOFF FROM THE SITE WILL BE FILTERED THROUGH SILT FENCES, MULCH BERMS, HAY BALE BARRIERS, OR SILT SOCKS. ALL STORM DRAIN BASIN INLETS SHALL BE PROVIDED WITH FLARED END SECTIONS AND TRASH RACKS. THE SITE SHALL BE STABILIZED FOR THE WINTER BY NOVEMBER 15.
6. ALL AREAS SHALL BE STABILIZED WITHIN 45 DAYS OF INITIAL DISTURBANCE.

DUST CONTROL:
1. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTROL DUST THROUGHOUT THE CONSTRUCTION PERIOD.
2. DUST CONTROL METHODS SHALL INCLUDE, BUT BE NOT LIMITED TO SPRINKLING WATER ON EXPOSED AREAS, COVERING LOADED DUMP TRUCKS LEAVING THE SITE, AND TEMPORARY MULCHING.
3. DUST CONTROL MEASURES SHALL BE UTILIZED SO AS TO PREVENT THE MIGRATION OF DUST FROM THE SITE TO ABUTTING AREAS INCLUDING BUT NOT LIMITED TO QUARRY STREET.

STOCKPILES:
1. LOCATE STOCKPILES A MINIMUM OF 50 FEET AWAY FROM CATCH BASINS, SWALES, AND CULVERTS.
2. ALL STOCKPILES SHOULD BE SURROUNDED WITH TEMPORARY EROSION CONTROL MEASURES PRIOR TO THE ONSET OF PRECIPITATION.
3. PERIMETER BARRIERS SHOULD BE MAINTAINED AT ALL TIMES, AND ADJUSTED AS NEEDED TO ACCOMMODATE THE DELIVERY AND REMOVAL OF MATERIALS FROM THE STOCKPILE. THE INTEGRITY OF THE BARRIER SHOULD BE INSPECTED AT THE END OF EACH WORKING DAY.
4. PROTECT ALL STOCKPILES FROM STORMWATER RUN-OFF USING TEMPORARY EROSION CONTROL MEASURES SUCH AS BERMS, SILT SOCK, OR OTHER APPROVED PRACTICE TO PREVENT MIGRATION OF MATERIAL BEYOND THE IMMEDIATE CONFINES OF THE STOCKPILES.

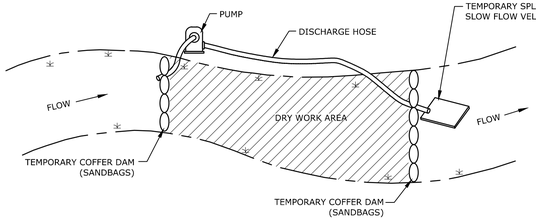
OFF SITE VEHICLE TRACKING:
1. THE CONTRACTOR SHALL CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE(S) PRIOR TO ANY EXCAVATION ACTIVITIES.

VEGETATION:
1. TEMPORARY GRASS COVER:
   A. SEEDBED PREPARATION:
      a. APPLY FERTILIZER AT THE RATE OF 600 POUNDS PER ACRE OF 10-10-10. APPLY LIMESTONE (EQUIVALENT TO 50 PERCENT CALCIUM PLUS MAGNESIUM OXIDE) AT A RATE OF THREE (3) TONS PER ACRE;
   B. SEEDING:
      a. UTILIZE ANNUAL RYE GRASS AT A RATE OF 40 LBS/ACRE;
      b. WHERE THE SOIL HAS BEEN COMPACTED BY CONSTRUCTION OPERATIONS, LOOSEN SOIL TO A DEPTH OF TWO (2) INCHES BEFORE APPLYING FERTILIZER, LIME AND SEED;
      c. APPLY SEED UNIFORMLY BY HAND, CYCLONE SEEDER, OR HYDROSEEDER (SLURRY INCLUDING SEED AND FERTILIZER). HYDROSEEDINGS, WHICH INCLUDE MULCH, MAY BE LEFT ON SOIL SURFACE. SEEDING RATES MUST BE INCREASED 10% WHEN HYDROSEEDING;
   C. MAINTENANCE:
      a. TEMPORARY SEEDING SHALL BE PERIODICALLY INSPECTED. AT A MINIMUM, 95% OF THE SOIL SURFACE SHOULD BE COVERED BY VEGETATION. IF ANY EVIDENCE OF EROSION OR SEDIMENTATION IS APPARENT, REPAIRS SHALL BE MADE AND OTHER TEMPORARY MEASURES USED IN THE INTERIM (MULCH, FILTER BARRIERS, CHECK DAMS, ETC.).
2. VEGETATIVE PRACTICE:
   A. FOR PERMANENT MEASURES AND PLANTINGS:
      a. LIMESTONE SHALL BE THOROUGHLY INCORPORATED INTO THE LOAM LAYER AT A RATE OF THREE (3) TONS PER ACRE IN ORDER TO PROVIDE A PH VALUE OF 5.5 TO 6.5;
      b. FERTILIZER SHALL BE SPREAD ON THE TOP LAYER OF LOAM AND WORKED INTO THE SURFACE. FERTILIZER APPLICATION RATE SHALL BE 800 POUNDS PER ACRE OF 10-20-20 FERTILIZER;
      c. SOIL CONDITIONERS AND FERTILIZER SHALL BE APPLIED AT THE RECOMMENDED RATES AND SHALL BE THOROUGHLY WORKED INTO THE LOAM. LOAM SHALL BE RAKED UNTIL THE SURFACE IS FINELY PULVERIZED, SMOOTH AND EVEN, AND THEN COMPACTED TO AN EVEN SURFACE CONFORMING TO THE REQUIRED LINES AND GRADES WITH APPROVED ROLLERS WEIGHING BETWEEN 4-1/2 POUNDS AND 5-1/2 POUNDS PER INCH OF WIDTH;
      d. SEED SHALL BE SOWN AT THE RATE SHOWN BELOW. SOWING SHALL BE DONE ON A CALM, DRY DAY, PREFERABLY BY MACHINE, BUT IF BY HAND, ONLY BY EXPERIENCED WORKMEN. IMMEDIATELY BEFORE SEEDING, THE SOIL SHALL BE LIGHTLY RAKED. ONE HALF THE SEED SHALL BE SOWN IN ONE DIRECTION AND THE OTHER HALF AT RIGHT ANGLES TO THE ORIGINAL DIRECTION. IT SHALL BE LIGHTLY RAKED INTO THE SOIL TO A DEPTH NOT OVER 1/4 INCH AND ROLLED WITH A HAND ROLLER WEIGHING NOT OVER 100 POUNDS PER LINEAR FOOT OF WIDTH;
      e. HAY MULCH SHALL BE APPLIED IMMEDIATELY AFTER SEEDING AS INDICATED ABOVE;
      f. THE SURFACE SHALL BE WATERED AND KEPT MOIST WITH A FINE SPRAY AS REQUIRED, WITHOUT WASHING AWAY THE SOIL, UNTIL THE GRASS IS WELL ESTABLISHED. ANY AREAS WHICH ARE NOT SATISFACTORILY COVERED WITH GRASS SHALL BE RESEEDED, AND ALL NOXIOUS WEEDS REMOVED;
      g. THE CONTRACTOR SHALL PROTECT AND MAINTAIN THE SEEDED AREAS UNTIL ACCEPTED;
      h. A GRASS SEED MIXTURE CONTAINING THE FOLLOWING SEED REQUIREMENTS SHALL BE APPLIED AT THE INDICATED RATE:

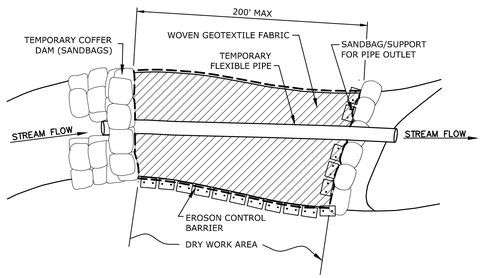
SEED MIX	PERCENT BY WEIGHT
REBEL 2 TALL FESCUE	70%
PALMER PERENNIAL RYE GRASS	20%
BARON KENTUCKY BLUEGRASS	10%

      IN NO CASE SHALL THE WEED CONTENT EXCEED ONE (1) PERCENT BY WEIGHT. ALL SEED SHALL COMPLY WITH STATE AND FEDERAL SEED LAWS. SEEDING SHALL BE DONE NO LATER THAN SEPTEMBER 15. IN NO CASE SHALL SEEDING TAKE PLACE OVER SNOW.
3. DORMANT SEEDING (SEPTEMBER 15 TO FIRST SNOWFALL):
   A. FOLLOW PERMANENT MEASURES SLOPE, LIME, FERTILIZER AND GRADING REQUIREMENTS. APPLY SEED MIXTURE AT TWICE THE INDICATED RATE. APPLY MULCH AS INDICATED FOR PERMANENT MEASURES.

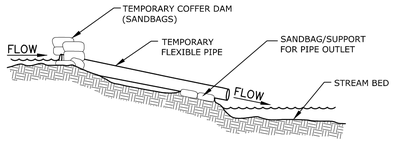
SPILL PREVENTION:
1. CONTRACTOR SHALL BE FAMILIAR WITH SPILL PREVENTION MEASURES REQUIRED BY LOCAL, STATE AND FEDERAL AGENCIES. AT A MINIMUM, CONTRACTOR SHALL FOLLOW THE BEST MANAGEMENT SPILL PREVENTION PRACTICES OUTLINED BELOW.
2. THE FOLLOWING ARE THE MATERIAL MANAGEMENT PRACTICES THAT SHALL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES DURING CONSTRUCTION TO STORMWATER RUNOFF:
   A. GOOD HOUSEKEEPING - THE FOLLOWING GOOD HOUSEKEEPING PRACTICE SHALL BE FOLLOWED ON SITE DURING CONSTRUCTION:
      a. ONLY SUFFICIENT AMOUNTS OF PRODUCTS TO DO THE JOB SHALL BE STORED ON SITE;
      b. ALL MATERIALS STORED ON SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR PROPER (ORIGINAL IF POSSIBLE) CONTAINERS AND, IF POSSIBLE, UNDER A ROOF OR OTHER ENCLOSURE;
      c. MANUFACTURER'S RECOMMENDATIONS FOR PROPER USE AND DISPOSAL SHALL BE FOLLOWED;
      d. THE SITE SUPERINTENDENT SHALL INSPECT DAILY TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS;
      e. SUBSTANCES SHALL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER;
      f. WHENEVER POSSIBLE ALL OF A PRODUCT SHALL BE USED UP BEFORE DISPOSING OF THE CONTAINER.
   B. HAZARDOUS PRODUCTS - THE FOLLOWING PRACTICES SHALL BE USED TO REDUCE THE RISKS ASSOCIATED WITH HAZARDOUS MATERIALS:
      a. PRODUCTS SHALL BE KEPT IN THEIR ORIGINAL CONTAINERS UNLESS THEY ARE NOT RESEALABLE;
      b. ORIGINAL LABELS AND MATERIAL SAFETY DATA SHALL BE RETAINED FOR IMPORTANT PRODUCT INFORMATION;
      c. SURPLUS PRODUCT THAT MUST BE DISPOSED OF SHALL BE DISCARDED ACCORDING TO THE MANUFACTURER'S RECOMMENDED METHODS OF DISPOSAL.
   C. PRODUCT SPECIFIC PRACTICES - THE FOLLOWING PRODUCT SPECIFIC PRACTICES SHALL BE FOLLOWED ON SITE:
      a. PETROLEUM PRODUCTS:
         - ALL ON SITE VEHICLES SHALL BE MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO REDUCE LEAKAGE;
         - PETROLEUM PRODUCTS SHALL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED. ANY ASPHALT BASED SUBSTANCES USED ON SITE SHALL BE APPLIED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
      b. FERTILIZERS:
         - FERTILIZERS USED SHALL BE APPLIED ONLY IN THE MINIMUM AMOUNTS DIRECTED BY THE SPECIFICATIONS;
         - ONCE APPLIED FERTILIZER SHALL BE WORKED INTO THE SOIL TO LIMIT EXPOSURE TO STORMWATER;
         - STORAGE SHALL BE IN A COVERED SHED OR ENCLOSED TRAILERS. THE CONTENTS OF ANY PARTIALLY USED BAGS OF FERTILIZER SHALL BE TRANSFERRED TO A SEALABLE PLASTIC BIN TO AVOID SPILLS.
      c. PAINTS:
         - ALL CONTAINERS SHALL BE TIGHTLY SEALED AND STORED WHEN NOT REQUIRED FOR USE;
         - EXCESS PAINT SHALL NOT BE DISCHARGED TO THE STORM SEWER SYSTEM;
         - EXCESS PAINT SHALL BE DISPOSED OF PROPERLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS OR STATE AND LOCAL REGULATIONS.
   D. SPILL CONTROL PRACTICES - IN ADDITION TO GOOD HOUSEKEEPING AND MATERIAL MANAGEMENT PRACTICES DISCUSSED IN THE PREVIOUS SECTION, THE FOLLOWING PRACTICES SHALL BE FOLLOWED FOR SPILL PREVENTION AND CLEANUP:
      a. MANUFACTURER'S RECOMMENDED METHODS FOR SPILL CLEANUP SHALL BE CLEARLY POSTED AND SITE PERSONNEL SHALL BE MADE AWARE OF THE PROCEDURES AND THE LOCATION OF THE INFORMATION AND CLEANUP SUPPLIES;
      b. MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP SHALL BE KEPT IN THE MATERIAL STORAGE AREA ON SITE. EQUIPMENT AND MATERIALS SHALL INCLUDE BUT NOT BE LIMITED TO BROOMS, DUSTPANS, MOPS, RAGS, GLOVES, GOGGLES, KITTY LITTER, SAND, SAWDUST AND PLASTIC OR METAL TRASH CONTAINERS SPECIFICALLY FOR THIS PURPOSE;
      c. ALL SPILLS SHALL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY;
      d. THE SPILL AREA SHALL BE KEPT WELL VENTILATED AND PERSONNEL SHALL WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT INJURY FROM CONTACT WITH A HAZARDOUS SUBSTANCE;
      e. SPILLS OF TOXIC OR HAZARDOUS MATERIAL SHALL BE REPORTED TO THE APPROPRIATE LOCAL, STATE OR FEDERAL AGENCIES AS REQUIRED;
      f. THE SITE SUPERINTENDENT RESPONSIBLE FOR DAY-TO-DAY SITE OPERATIONS SHALL BE THE SPILL PREVENTION AND CLEANUP COORDINATOR.
   E. VEHICLE FUELING AND MAINTENANCE PRACTICE:
      a. CONTRACTOR SHALL MAKE AN EFFORT TO PERFORM EQUIPMENT/VEHICLE FUELING AND MAINTENANCE AT AN OFF-SITE FACILITY;
      b. CONTRACTOR SHALL PROVIDE AN ON-SITE FUELING AND MAINTENANCE AREA THAT IS CLEAN AND DRY;
      c. IF POSSIBLE THE CONTRACTOR SHALL KEEP AREA COVERED;
      d. CONTRACTOR SHALL KEEP A SPILL KIT AT THE FUELING AND MAINTENANCE AREA;
      e. CONTRACTOR SHALL REGULARLY INSPECT VEHICLES FOR LEAKS AND DAMAGE;
      f. CONTRACTOR SHALL USE DRIP PANS, DRIP CLOTHS, OR ABSORBENT PADS WHEN REPLACING SPENT FLUID.



PLAN VIEW - PUMP COFFERDAM

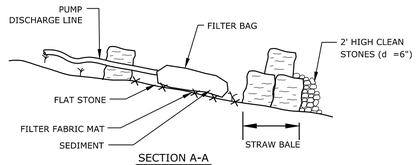


PLAN VIEW - FLUME PIPE COFFERDAM

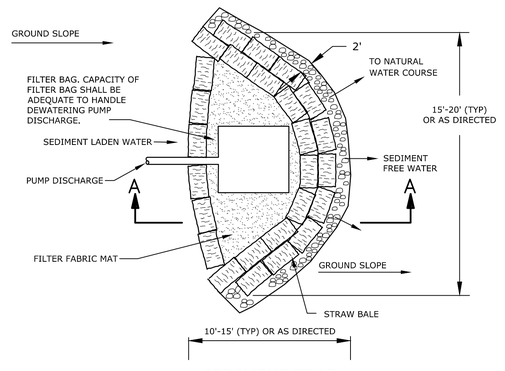


ELEVATION VIEW - FLUME PIPE COFFERDAM

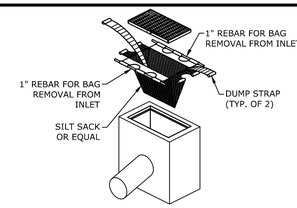
TEMPORARY COFFER DAM
NO SCALE



SECTION A-A



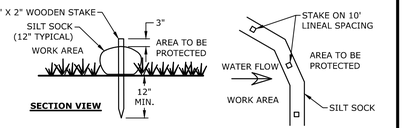
SEDIMENT TRAP
NO SCALE



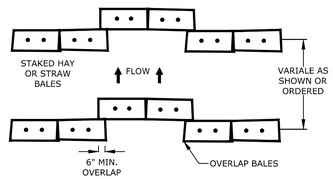
NOTES:
1. INLET PROTECTION BARRIER SHALL BE SILT SACK BY ACF ENVIRONMENTAL OR APPROVED EQUAL.
2. INLET PROTECTION BARRIER SHALL BE INSTALLED IN ALL EXISTING AND PROPOSED CATCH BASINS LOCATED WITHIN THE LIMIT OF WORK.
3. SILT SACK SHALL BE INSPECTED REGULARLY AND MAINTAIN IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

INLET PROTECTION BARRIER
NO SCALE

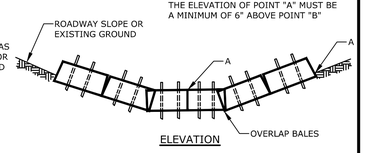
NOTES:
1. SILT SOCK SHALL BE SILT SOXX BY FILTREXX OR APPROVED EQUAL.
2. SILT SOCK SHALL BE FILLED WITH FILTERMEDIA BY FILTREXX OR APPROVED EQUAL.
3. WHERE TWO SILT SOCKS ARE JOINED, A MINIMUM OF 2 FEET OF OVERLAP SHALL BE MAINTAINED.
4. SILT SOCKS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.



SILT SOCK
NO SCALE

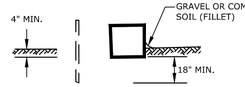


PLAN

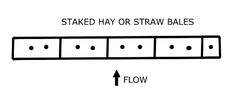


ELEVATION

HAYBALE GRADE STABILIZATION STRUCTURE

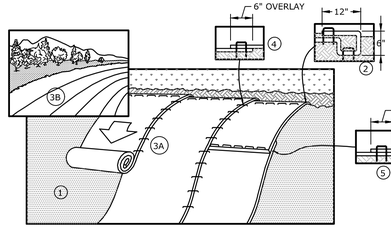


HAYBALE EMBEDDMENT DETAIL



HAYBALE BARRIER AT TOE OF SLOPE

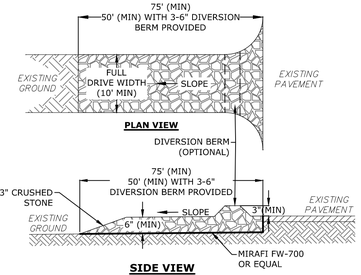
HAYBALE DETAILS
NO SCALE



NOTES:
1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE, 36" OVER THE GRADE BREAK, BY ANCHORING THE BLANKET IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UPSLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES SPACED 12" APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS DOWN THE SLOPE. ALL BLANKETS MUST BE SECURELY FASTENED TO THE SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN ON THE STAPLE PATTERN GUIDE.
4. STAPLE LENGTHS SHALL BE A MINIMUM OF 8 INCHES.
5. EROSION CONTROL BLANKET SHALL BE 'EAST COAST EROSION CONTROL ECC-2B™' OR APPROVED EQUAL.

STABILIZATION BLANKET
NO SCALE

NOTE:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF SEDIMENT FROM THE SITE. WHEN WASHING IS REQUIRED, IT SHALL BE DONE SO RUNOFF DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING STORM DRAINS, DITCHES, OR WATERWAYS



STABILIZED CONSTRUCTION EXIT
NO SCALE

Tighe&Bond
Engineers | Environmental Specialists

100% Plans Not For Construction

Dutton Road Bridge Replacement

Town of Sudbury

Sudbury, Massachusetts

MassDOT Bridge No. S-31011, BIN 7QD

MARK	DATE	DESCRIPTION

PROJECT NO:	S5013-002
DATE:	JANUARY 20, 2020
FILE:	S5013-002-C-DTLS.DWG
DRAWN BY:	SCK
CHECKED:	DLL
APPROVED:	DLL

EROSION CONTROL NOTES & DETAILS

SCALE: AS SHOWN

C-501
SHEET 6 OF 11

Last Saved: 1/10/2020
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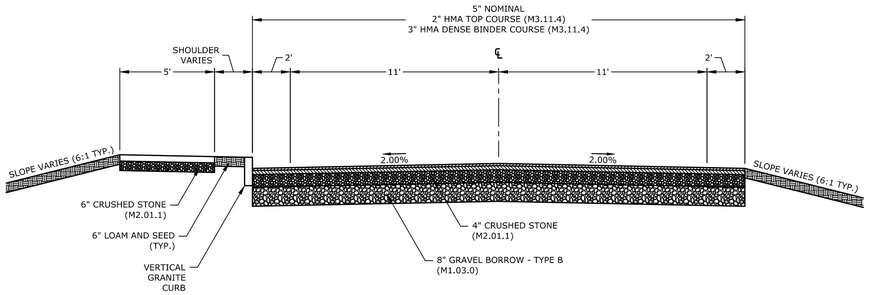
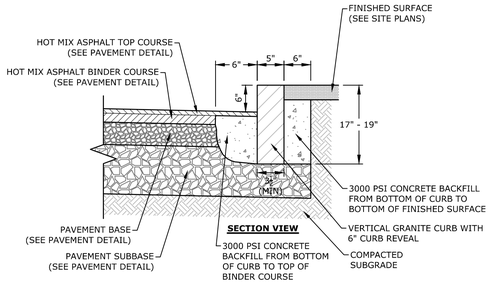
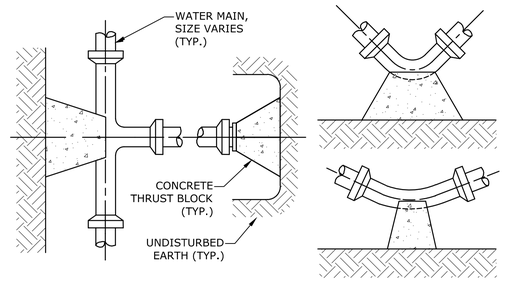


DUTTON ROAD TYPICAL SECTION
NO SCALE



NOTES:
1. SEE MASSDOT M9.04.1 FOR ITEM SPECIFICATIONS
2. SEE MASSDOT E 106.3.0 FOR INSTALLATION METHOD

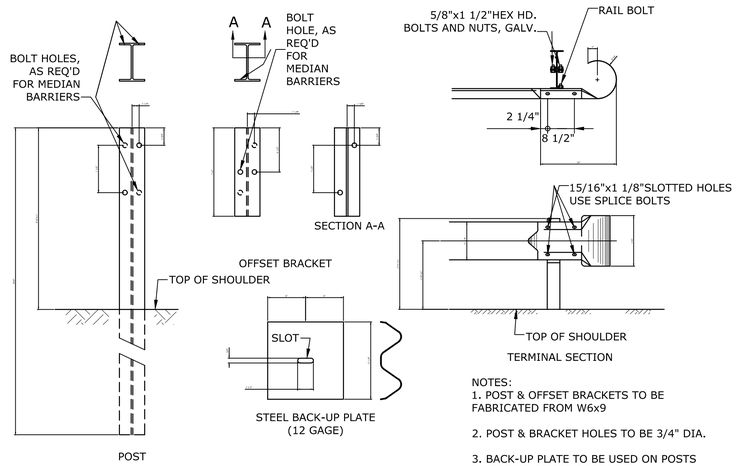
VERTICAL GRANITE CURB - TYPE VA4
NO SCALE



TEST PRESSURE = 200psi	SQUARE FEET OF CONCRETE THRUST BLOCKING BEARING ON UNDISTURBED MATERIAL				
REACTION TYPE	PIPE SIZE				
	4"	6"	8"	10"	12"
A 90°	0.89	2.19	3.82	11.14	17.24
B 180°	0.65	1.55	2.78	8.38	12.00
C 45°	0.48	1.19	2.12	6.02	9.32
D 22-1/2°	0.25	0.60	1.06	3.08	4.74
E 11-1/4°	0.13	0.30	0.54	1.54	2.38

NOTES:
1. POUR THRUST BLOCKS AGAINST UNDISTURBED MATERIAL, WHERE TRENCH WALL HAS BEEN DISTURBED, EXCAVATE LOOSE MATERIAL AND EXTEND THRUST BLOCK TO UNDISTURBED MATERIAL. NO JOINTS SHALL BE COVERED WITH CONCRETE.
2. ON BENDS AND TEES, EXTEND THRUST BLOCKS FULL LENGTH OF FITTING.
3. PLACE BOARD IN FRONT OF ALL PLUGS BEFORE POURING THRUST BLOCKS.
4. WHERE M.J. PIPE IS USED, M.J. PLUG WITH RETAINER GLAND MAY BE SUBSTITUTED FOR END BLOCKINGS.
5. INSTALLATION AND STANDARD DIMENSIONAL REQUIREMENTS SHALL BE WITH CITY OF PORTSMOUTH WATER DEPARTMENT STANDARDS.

THRUST BLOCKING DETAIL
NO SCALE



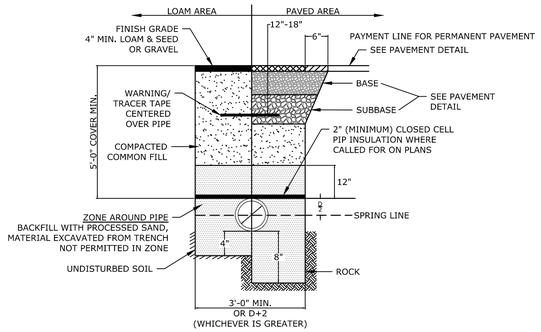
NOTES:
1. POST & OFFSET BRACKETS TO BE FABRICATED FROM W6x9

2. POST & BRACKET HOLES TO BE 3/4" DIA.

3. BACK-UP PLATE TO BE USED ON POSTS WHERE NO SPLICE OCCURS

4. FABRICATION DIMENSIONS ALSO APPLY TO "C" POSTS & BRACKETS.

STEEL BEAM HIGHWAY GUARD TYPE SS - W RAIL POST & OFFSET BRACKET DETAILS
NO SCALE



NOTES:
1. SAND BEDDING AND BACKFILL FOR FULL WIDTH OF THE TRENCH FROM 4" BELOW PIPE IN EARTH AND 8" BELOW PIPE IN ROCK UP TO 12" ABOVE TOP OF PIPE.

2. ALL UTILITIES SHALL BE INSTALLED PER THE INDIVIDUAL UTILITY COMPANY STANDARDS. COORDINATE ALL INSTALLATIONS WITH INDIVIDUAL UTILITY COMPANIES AND THE TOWN OF SUDBURY.

3. PAYMENT FOR PAVEMENT INSTALLED BEYOND PAYMENT LINE WILL BE MADE WHEN SUCH INSTALLATION IS SPECIFICALLY AUTHORIZED BY THE ENGINEER.

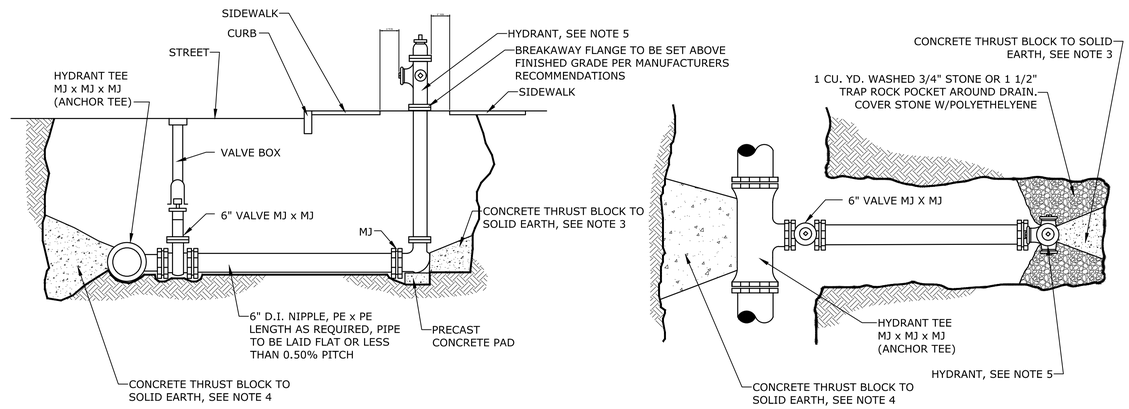
WATER TRENCH
NO SCALE

SIZE (IN.)	FITTING	MINIMUM * RESTRAINED LENGTH, FT. ( ) INDICATES POLYWRAPPED
8"	90° BEND	47 (54)
8"	45° BEND	19 (22)
8"	22 1/2° BEND	9 (11)
8"	11 1/4° BEND	5 (5)
8"	DEAD END	99 (142)
8"	12"x8" TEE BRANCH	70 (100)
8"	12"x8" REDUCER	75 (107)
12"	90° BEND	66 (77)
12"	45° BEND	27 (32)
12"	22 1/2° BEND	13 (15)
12"	11 1/4° BEND	7 (8)
12"	DEAD END	142 (202)
12"	45° VERTICAL UP BEND	27 (32)
12"	45° VERTICAL DOWN BEND	59 (84)
12"	12" TEE	122 (175)

* MINIMUM RESTRAINED LENGTH BASED ON DIPRA, "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE," 3rd EDITION, 1992.

FOLLOWING CONDITIONS APPLY:
SOIL TYPE: SAND SILT
MAX. PRESSURE: 200psi
LAYING CONDITIONS: TYPE 2
BURIED DEPTH: 5'

MINIMUM RESTRAINED LENGTHS FOR DI PIPE



ELEVATION PLAN

NOTES
1. ALL CONCRETE TO BE CAST-IN-PLACE (3000 PSI)
2. ALL MJ JOINTS SHALL HAVE RETAINER GLANDS
3. CARE SHALL BE TAKEN TO SHIELD HYDRANT BASE DRAIN HOLES DURING PLACEMENT OF THE CONCRETE THRUST BLOCK. DRAIN HOLES SHALL BE VERIFIED AS OPEN AND FREE OF OBSTRUCTIONS PRIOR TO BACKFILLING.
4. CARE SHALL BE TAKEN TO SHIELD ALL MECHANICAL JOINT GLANDS AND BOLTS DURING PLACEMENT OF CONCRETE THRUST BLOCK. ALL BOLTS AND GLANDS SHALL BE FREE AND UNOBSTRUCTED BEFORE BACKFILLING.
5. HYDRANT SHALL BE SET PLUMB. VERTICAL HYDRANT EXTENSIONS SHALL BE USED AS NECESSARY TO PROPERLY LOCATE THE BREAKAWAY FLANGE PER MANUFACTURERS RECOMMENDATIONS.
6. POLYETHYLENE SHEETING SHALL BE PLACED OVER THE FITTING AND/OR HYDRANT BASE TO PREVENT DIRECT CONTACT OF CONCRETE WITH THE FITTING.

HYDRANT INSTALLATION
NO SCALE

Tighe&Bond
Engineers | Environmental Specialists

100% Plans Not For Construction

Dutton Road Bridge Replacement

Town of Sudbury

Sudbury, Massachusetts

MassDOT Bridge No. S-31011, BIN 7QD

MARK	DATE	DESCRIPTION

PROJECT NO:	S5013-002
DATE:	JANUARY 20, 2020
FILE:	S5013-002-C-DTLS.DWG
DRAWN BY:	SCK
CHECKED:	DLL
APPROVED:	DLL

TYPICAL SECTION & DETAILS

SCALE: AS SHOWN

C-502
SHEET 7 OF 11

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Printed: Jan 20, 2020 - 3:57pm By: AGB
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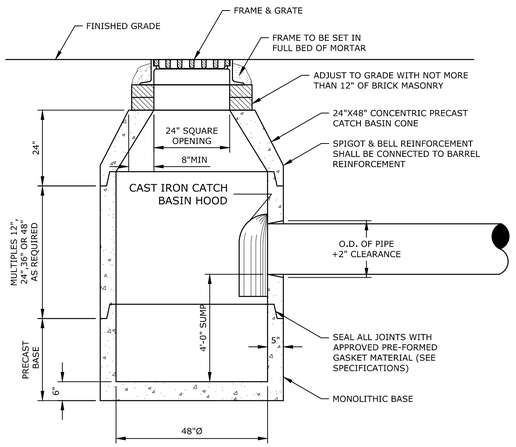
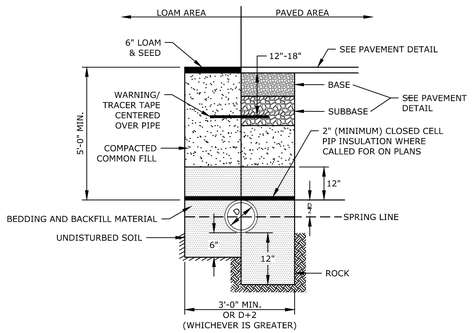


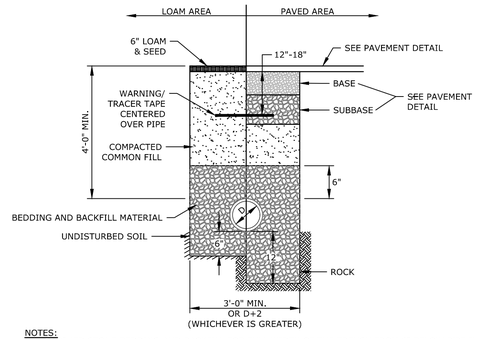
NOTES:
1. FOR USE WITH PVC PIPE, PROVIDE RUBBER BOOT SIMILAR TO MANHOLE DETAIL.
2. FOR USE WITH OTHER TYPES OF PIPE, SEAL JOINT BETWEEN PIPE AND CATCH BASIN WITH GROUT.

PRECAST CONCRETE CATCH BASIN
NO SCALE



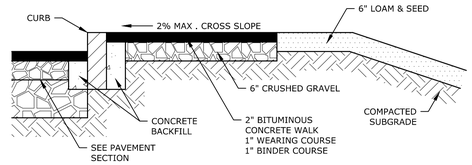
NOTES:
1. SAND BEDDING AND BACKFILL FOR FULL WIDTH OF THE TRENCH FROM 6" BELOW PIPE IN EARTH AND 12" BELOW PIPE IN ROCK UP TO 12" ABOVE TOP OF PIPE.
2. ALL UTILITIES SHALL BE INSTALLED PER THE INDIVIDUAL UTILITY COMPANY STANDARDS. COORDINATE ALL INSTALLATIONS WITH INDIVIDUAL UTILITY COMPANIES AND THE TOWN OF SUDBURY.

GAS TRENCH
NO SCALE



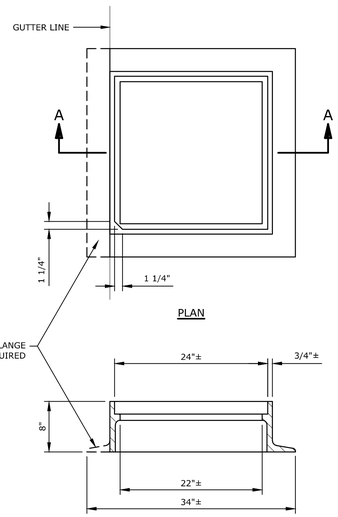
NOTES:
1. CRUSHED STONE BEDDING AND BACKFILL FOR FULL WIDTH OF THE TRENCH FROM 6" BELOW PIPE IN EARTH AND 12" BELOW PIPE IN ROCK UP TO 6" ABOVE TOP OF PIPE.
2. ALL UTILITIES SHALL BE INSTALLED PER THE INDIVIDUAL UTILITY COMPANY STANDARDS. COORDINATE ALL INSTALLATIONS WITH INDIVIDUAL UTILITY COMPANIES AND THE TOWN OF SUDBURY.

STORM DRAIN TRENCH
NO SCALE



NOTES:
1. SEE SITE PLAN FOR SIDEWALK WIDTH, LOCATIONS AND CURB TYPE.
2. SEE GRADING, DRAINAGE & EROSION CONTROL PLAN FOR WALK AND SIDESLOPE GRADES.

BITUMINOUS CONCRETE SIDEWALK
NO SCALE

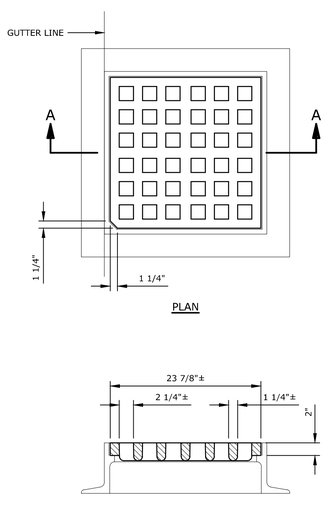


PLAN

SECTION A-A

NOTES:
1. MINIMUM FRAME WEIGHT:
   4 FLANGE - 295± LBS
   3 FLANGE - 265± LBS
2. MATERIAL - CAST IRON, SEE SPECIFICATIONS
3. FOR ADDITIONAL INFORMATION SEE MHD 201.6.0

CATCH BASIN FRAME
NO SCALE

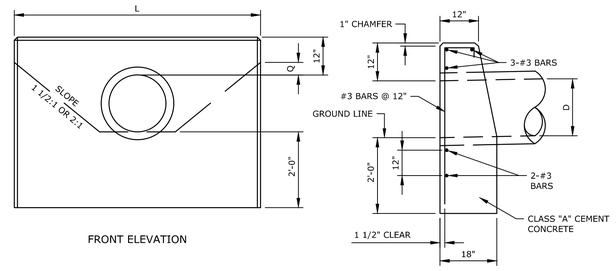


PLAN

SECTION A-A

NOTES:
1. MINIMUM WEIGHT OF GRATE - 190 LBS.
2. MATERIAL - CAST IRON, SEE SPECIFICATIONS.

CATCH BASIN GRATE
NO SCALE



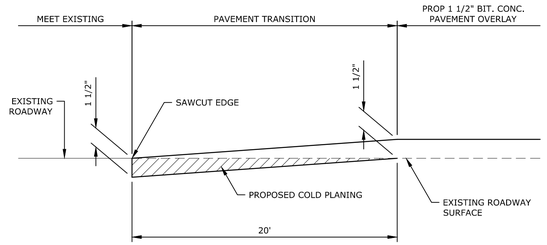
FRONT ELEVATION

END ELEVATION

PIPE DIAM.	1 1/2:1 SLOPE			TRENCH EXCAV. 1'-0" DEPTH	2:1 SLOPE			TRENCH EXCAV. 1'-0" DEPTH
D	L	CONC. OR F.S.M. CU. YDS.	STEEL LBS.	CU. FT.	L	CONC. OR F.S.M. CU. YDS.	STEEL LBS.	CU. FT.
8"	4'-2"	0.77	15	21.60	5'-10"	1.08	21	27.40
10"	4'-10"	0.92	20	23.91	6'-8"	1.28	23	30.35
12"	5'-6"	1.08	21	26.25	7'-6"	1.49	29	33.25
15"	6'-6"	1,34	24	29.75	8'-9"	1.82	32	37.63
18"	7'-6"	1.61	30	33.25	10'-0"	2.18	39	42.00
21"	8'-6"	1.95	34	37.35	11'-6"	2.62	43	47.25
24"	9'-3"	2.16	35	39.38	12'-6"	2.97	50	50.75
30"	10'-6"	2.63	44	43.75	15'-0"	3.86	62	59.50
Q	4" FOR 1 1/2:1 SLOPE				6" FOR 2:1 SLOPE			

NOTES:
1. PORTLAND CEMENT CONCRETE SHALL BE 3000 PSI, 1 1/2" MAX AGGREGATE.
2. STEEL REINFORCEMENT SHALL CONFORM TO AASHTO M-31, GRADE 400.
3. ALL CONCRETE DIMENSIONS SHOWN ARE MINIMUM.
4. FOR ADDITIONAL DETAILS SEE MHD 206.4.0

PIPE ENDS FOR 8" TO 30" PIPE CULVERTS
NO SCALE



PAVEMENT OVERLAY TRANSITION
NO SCALE

Tighe&Bond
Engineers | Environmental Specialists

100% Plans Not For Construction

Dutton Road Bridge Replacement

Town of Sudbury

Sudbury, Massachusetts

MassDOT Bridge No. S-31011, BIN 7QD

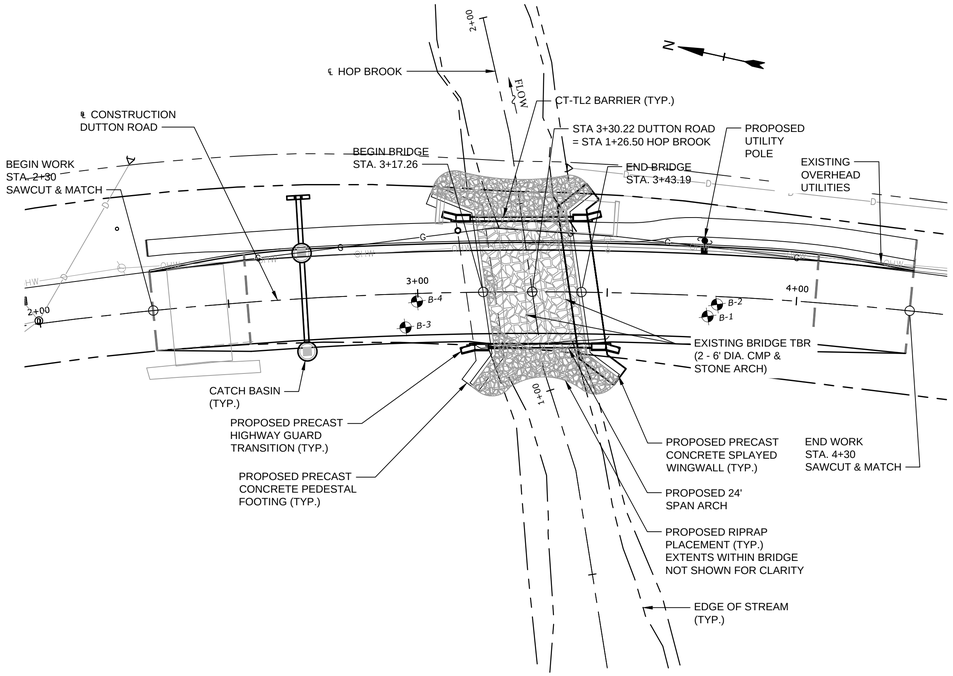
MARK	DATE	DESCRIPTION

PROJECT NO:	S5013-002
DATE:	JANUARY 20, 2020
FILE:	S5013-002-C-DTLS.DWG
DRAWN BY:	SCK
CHECKED:	DLL
APPROVED:	DLL

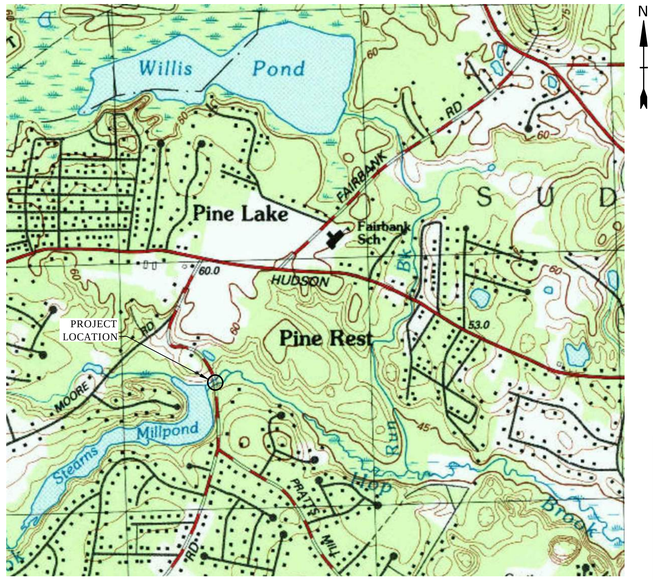
DETAILS

SCALE: AS SHOWN

C-503
SHEET 8 OF 11



KEY PLAN
1" = 20'



LOCUS PLAN
SCALE: 1"=1000'

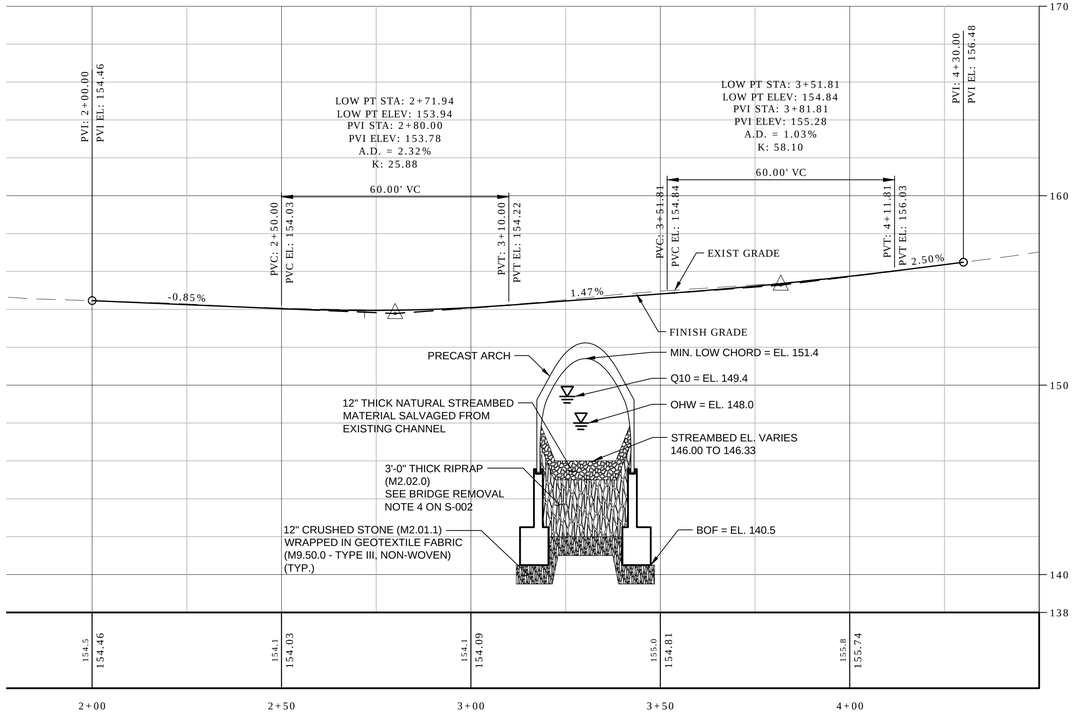
BRIDGE DRAWING INDEX

REFERENCE DRAWING INDEX

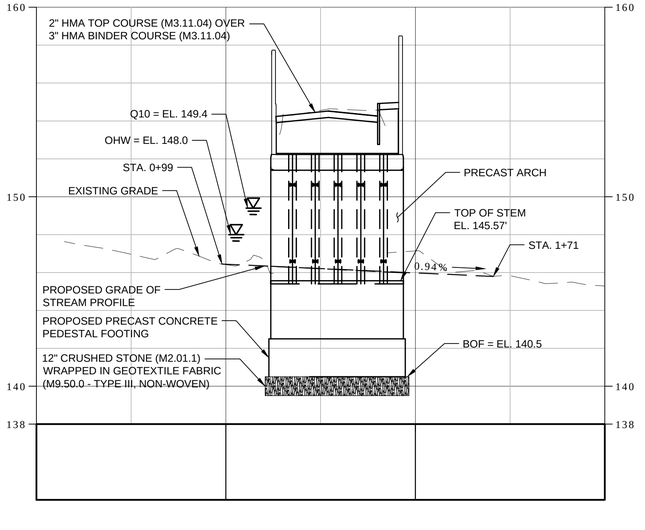
R-101	CT-TL2 BARRIER DETAILS
R-102	PRECAST HIGHWAY GUARDRAIL TRANSITION DETAILS
R-103	TOP OF PRECAST HIGHWAY GUARDRAIL TRANSITION FOR CT-TL2 BARRIER
R-104	GUARDRAIL TRANSITION TO BRIDGE RAIL (BACK OF SIDEWALK)
R-105	GUARDRAIL TRANSITION TO BRIDGE RAIL (FACE OF CURB)

HYDRAULIC DATA	
DRAINAGE AREA	9.0 SQ. MILES
WATER CONTROL FLOOD DISCHARGE (5 YR)	136 CFS
DESIGN FLOOD DISCHARGE (10 YR)	236 CFS
DESIGN FLOOD ANNUAL CHANCE (RETURN FREQUENCY)	10% (10-YEARS)
DESIGN FLOOD VELOCITY (10 YR)	3.8 FPS
DESIGN FLOOD ELEVATION (10 YR)	149.4 FEET
BASE (100-YR) FLOOD DATA	
BASE FLOOD DISCHARGE (100 YR)	1,161 CFS
BASE FLOOD ELEVATION (100 YR)	154.8 FEET
DESIGN AND CHECK SCOUR DATA	
SCOUR DESIGN FLOOD ANNUAL CHANCE (RETURN FREQUENCY)	4% (25-YEARS)
DESIGN FLOOD ABUTMENT SCOUR DEPTH	3.4 FEET
SCOUR CHECK FLOOD ANNUAL CHANCE (RETURN FREQUENCY)	2% (50-YEARS)
CHECK FLOOD ABUTMENT SCOUR DEPTH	5.3 FEET
FLOOD OF RECORD	
DISCHARGE	UNKNOWN
FREQUENCY (IF KNOWN)	N/A
MAXIMUM ELEVATION	N/A
DATE	N/A
HISTORY OF ICE FLOES	UNKNOWN
EVIDENCE OF SCOUR AND EROSION	UNKNOWN

NOTE: THE HYDRAULIC ANALYSIS ASSUMES NO MAJOR CHANGES IN THE LOCAL HYDRAULIC REGIME WILL OCCUR WITHIN THE DESIGN LIFE OF THE REPLACEMENT BRIDGE (E.G., STEARNS MILLPOND DAM WILL NOT BE REMOVED NOR WILL MAJOR CHANGES BE PERFORMED TO THE STEARNS MILLPOND DAM SPILLWAY. SCOUR ANALYSIS DOES NOT CONSIDER RIPRAP IN ACCORDANCE WITH MASSDOT BRIDGE DESIGN MANUAL 3.2.9.4.



PROFILE - DUTTON ROAD
SCALE: 1" = 20'H, 1"=4'V



PROFILE - HOP BROOK
SCALE: 1" = 20'H, 1"=4'V

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING

STATE BRIDGE ENGINEER — DATE

Tighe&Bond
Engineers | Environmental Specialists

100% Plans Not For Construction

Dutton Road Bridge Replacement

Town of Sudbury

Sudbury, Massachusetts

MassDOT Bridge No. S-31011, BIN 7QD

MARK	DATE	DESCRIPTION

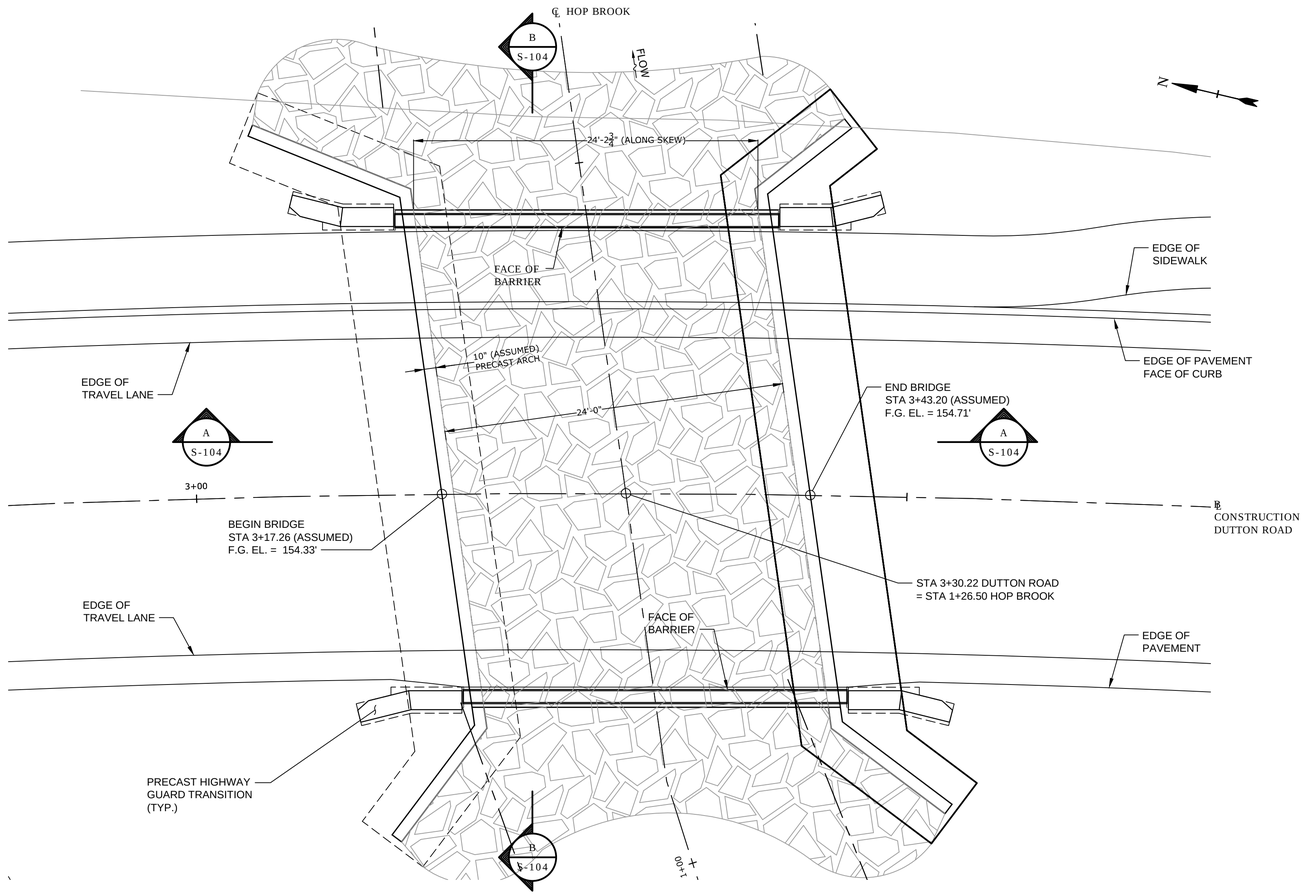
PROJECT NO:	S5013-002
DATE:	JANUARY, 2020
FILE:	S5013-002-S-001.dwg
DRAWN BY:	DPB/DRF
CHECKED BY:	EAO/BRB
APPROVED BY:	DLL

BRIDGE KEY PLAN, PROFILES, LOCUS, & INDEX

SCALE: AS SHOWN

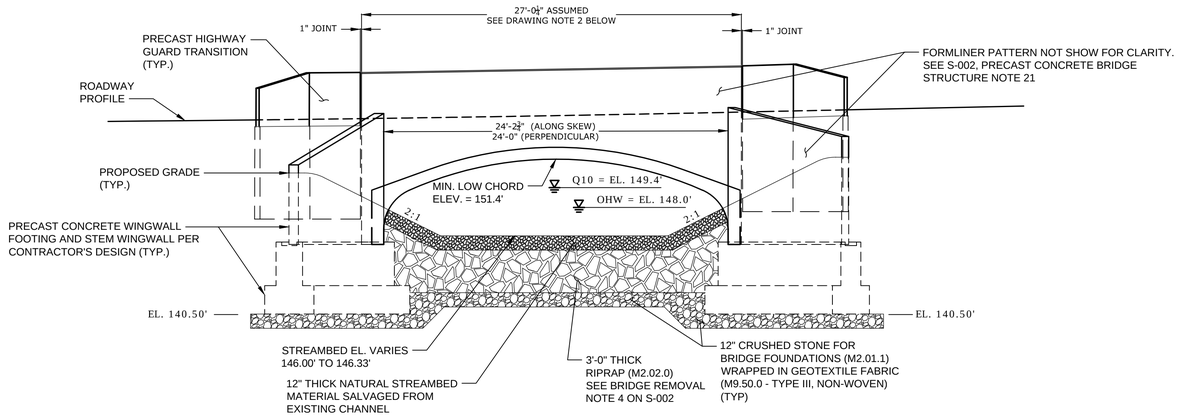
S-001
SHEET 9 OF 11

Last Saved: 1/20/2020
Plotted: Jan 20, 2020-3:57pm By: AGB
Tighe & Bond: J:\S\S5013 Town of Sudbury\002 - Dutton Road Bridge\Drawings, Figures\AutoCAD\Sheet\S5013-002-S-001.dwg



GENERAL BRIDGE PLAN

3/16" = 1'-0"



ELEVATION (LOOKING EAST)

3/16" = 1'-0"

DRAWING NOTES:

1. FOR HYDRAULIC DATA TABLE, SEE SHEET S-001.
2. DIMENSIONS AND STATIONS SHOWN AS 'ASSUMED' ARE BASED ON PRELIMINARY DESIGN THICKNESS OF PRECAST ARCH WALLS. CONTRACTOR TO VERIFY THICKNESS BASED ON HIS/HER FINAL DESIGN AND ADJUST DIMENSIONS/STATIONING AS NEEDED.

0 4' 8' 12'

SCALE: 3/16"= 1'-0"

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING

STATE BRIDGE ENGINEER _____ DATE _____

Tighe&Bond
Engineers | Environmental Specialists

100% Plans Not For Construction

Dutton Road Bridge Replacement

Town of Sudbury

Sudbury, Massachusetts

MassDOT Bridge No. S-31011, BIN 7QD

MARK	DATE	DESCRIPTION

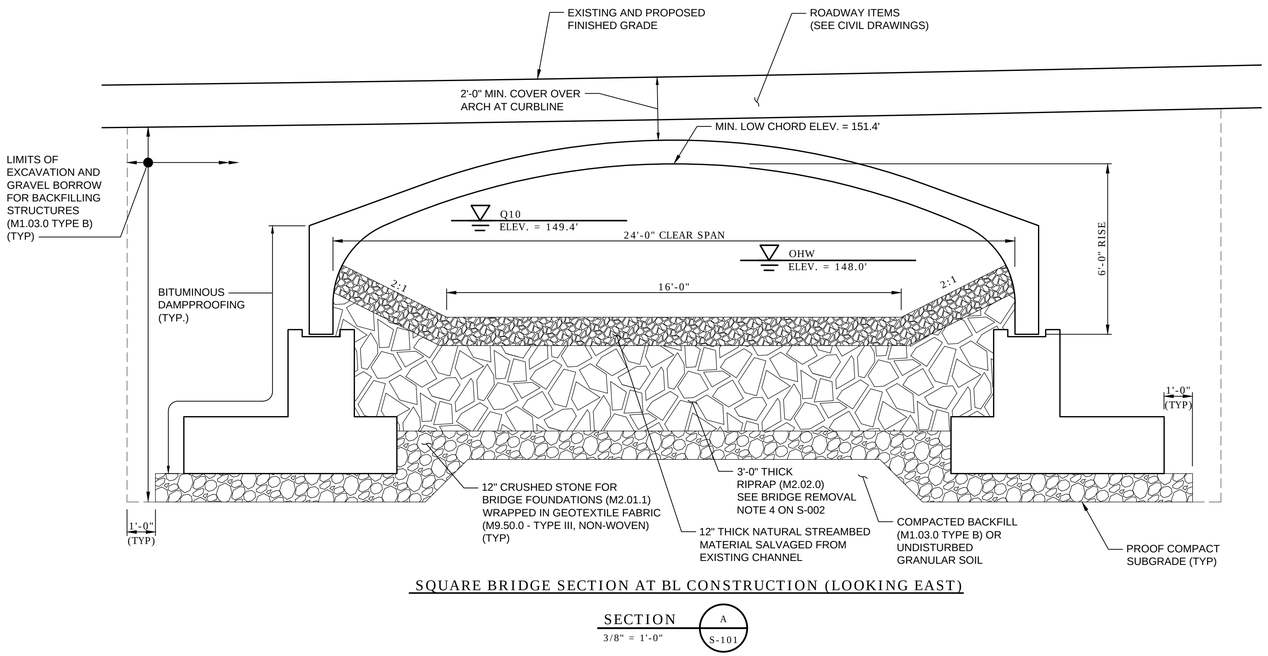
PROJECT NO:	S5013-002
DATE:	JANUARY, 2020
FILE:	S5013-002-S-101.dwg
DRAWN BY:	DPB/DRF
CHECKED BY:	EAO/BRB
APPROVED BY:	DLL

GENERAL BRIDGE PLAN & ELEVATION

SCALE: AS SHOWN

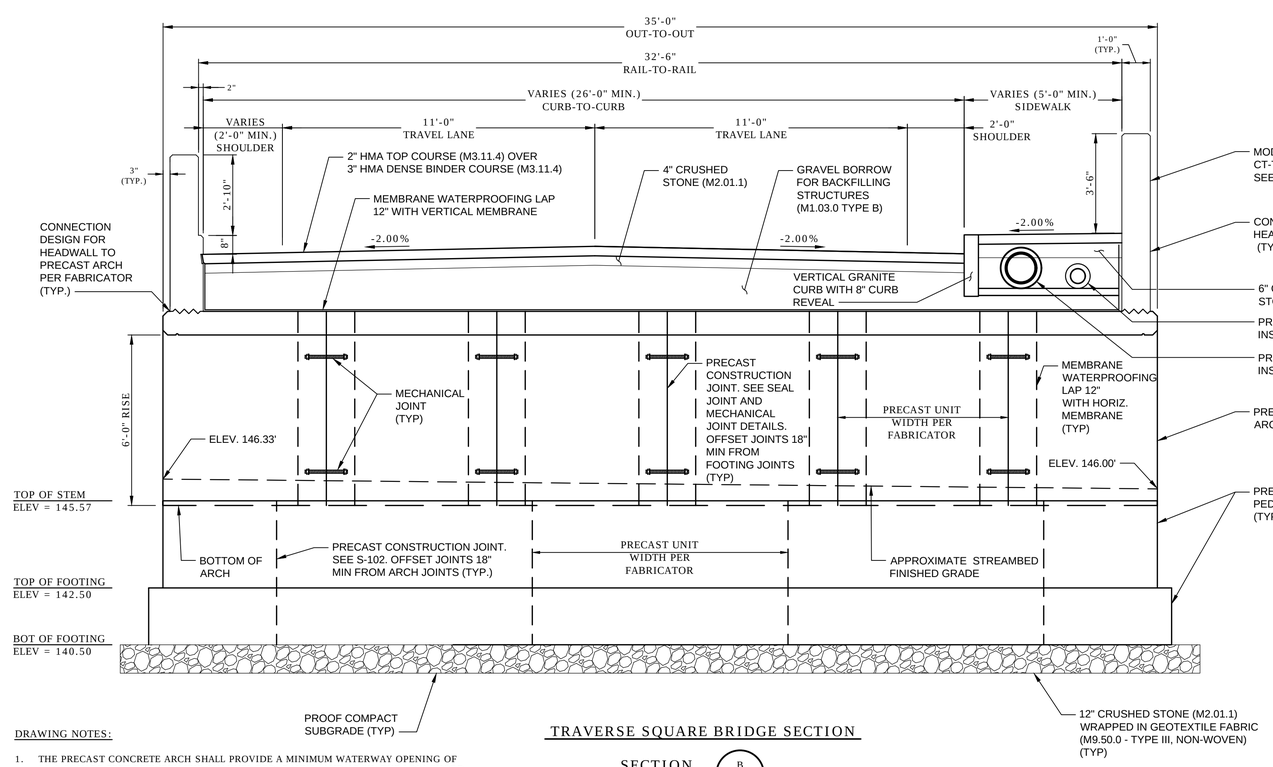
S-101
SHEET 10 OF 11

Last Saved: 1/30/2020
Plotted: Jan 20, 2020-4:31pm By: AGB
Tighe & Bond: \\tighebond.com\data\Data\Projects\S\S5013 Town of Sudbury\002 - Dutton Road Bridge\Drawings_Figures\AutoCAD\Sheet\S5013-002-S-101.dwg



SQUARE BRIDGE SECTION AT BL CONSTRUCTION (LOOKING EAST)

SECTION A S-101
3/8" = 1'-0"

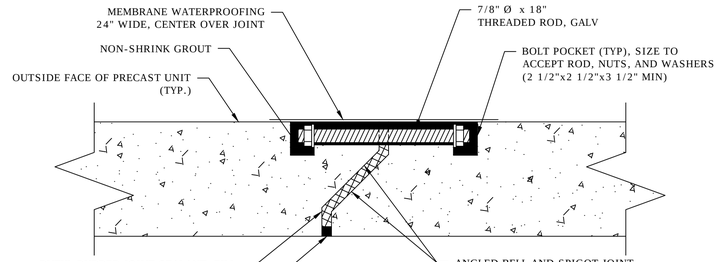


TRAVERSE SQUARE BRIDGE SECTION

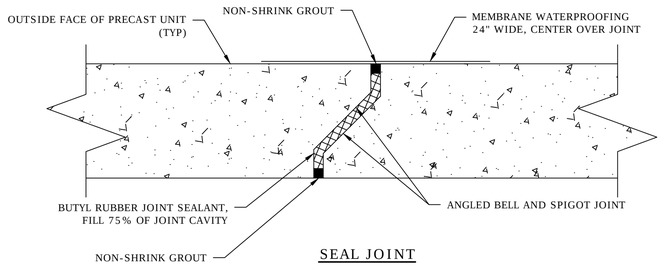
SECTION B S-101
3/8" = 1'-0"

DRAWING NOTES:

1. THE PRECAST CONCRETE ARCH SHALL PROVIDE A MINIMUM WATERWAY OPENING OF 80.0 SQUARE FEET BETWEEN THE CHANNEL BED, BANKS, AND ARCH. THE LOW CHORD SHALL HAVE A MINIMUM ELEVATION OF 151.4 FEET.



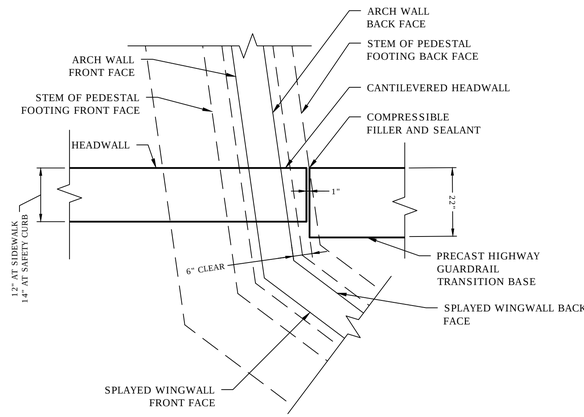
MECHANICAL JOINT
NO SCALE



SEAL JOINT
NO SCALE

JOINT NOTES:

1. PROVIDE BUTYL RUBBER JOINT SEALANT (ASTM C-990 & AASHTO M-198) BETWEEN PRECAST CONCRETE UNITS.
2. PROVIDE A MINIMUM OF 7 MECHANICAL CONNECTORS BETWEEN EACH ARCH UNITS (3 ON TOP AND 2 ON EACH SIDE) AND 2 MECHANICAL CONNECTORS BETWEEN WINGWALL UNITS, SPACED APPROXIMATELY EVENLY.
3. ALL BOLT POCKETS SHALL BE FILLED WITH NON-SHRINK GROUT.
4. SHEET MEMBRANE SHALL BE PLACED IN 2-FOOT WIDE STRIPS, CENTERED OVER THE TOP AND/OR SIDES OF EACH JOINT.



HORIZONTAL SECTION AT SPLAYED WINGWALL

SECTION 4 R-102
1/2" = 1'-0"

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING

STATE BRIDGE ENGINEER _____ DATE _____

Tighe&Bond
Engineers | Environmental Specialists

100% Plans Not For Construction

Dutton Road Bridge Replacement

Town of Sudbury

Sudbury, Massachusetts

MassDOT Bridge No. S-31011, BIN 7QD

MARK	DATE	DESCRIPTION

PROJECT NO:	S5013-002
DATE:	JANUARY, 2020
FILE:	S5013-002-S-104.dwg
DRAWN BY:	DPB/DRF
CHECKED BY:	EAO/BRB
APPROVED BY:	DLL

BRIDGE SECTIONS & DETAILS

SCALE: AS SHOWN

S-104
SHEET 11 OF 11

Last Saved: 1/20/2020
Plotted: 01/21/2020-2:50pm By: AGB
Tighe & Bond-J:\S5013 Town of Sudbury\002 - Dutton Road Bridge\Drawings_Figures\AutoCAD\Sheet\S5013-002-S-104.dwg

APPENDIX B

SITE PHOTOGRAPHS

Photographic Log

Client: Town of Sudbury

Site: Dutton Road over Hop Brook

Job Number: S-5013-02

Photograph No.: 1	**Date:** 9/28/2018	**Direction Taken:** East
Description: A view of the existing twin culvert inlet crossing at Dutton Road over Hop Brook.		

Photograph No.: 2	**Date:** 9/28/2018	**Direction Taken:** Northeast
Description: Detail of CMP culverts and stone masonry headwall at the culvert inlets		

Photographic Log

Client: Town of Sudbury

Site: Dutton Road over Hop Brook

Job Number: S-5013-02

Photograph No.: 3	**Date:** 9/28/2018	**Direction Taken:** North
Description: A view of the existing Dutton Road at crossing and adjacent pedestrian bridge.		

Photograph No.: 4	**Date:** 9/28/2018	**Direction Taken:** West
Description: The pedestrian bridge over Hop Brook. The stone masonry end wall of the bridge structure is obscured by the pedestrian bridge.		

Photographic Log

Client: Town of Sudbury

Site: Dutton Road over Hop Brook

Job Number: S-5013-02

Photograph No.: 5	**Date:** 6/15/2017	**Direction Taken:** Northwest
Description: The existing gas line is located underneath the pedestrian bridge.		

Photograph No.: 6	**Date:** 6/15/2017	**Direction Taken:** East
Description: The existing conditions inside of one of the twin culverts in the stone arch part of the culvert.		

Photographic Log

Client: Town of Sudbury

Site: Dutton Road over Hop Brook

Job Number: S-5013-02

Photograph No.: 7	**Date:** 9/26/2018	**Direction Taken:** Northwest
Description: Dutton Road and existing parking area at Stearns Millpond, north of Hop Brook.		

Photograph No.: 8	**Date:** 9/26/2018	**Direction Taken:** West
Description: A view of Stearns Millpond spillway and Hop Brook flowing toward the twin culvert.		

Photographic Log

Client: Town of Sudbury

Site: Dutton Road over Hop Brook

Job Number: S-5013-02

Photograph No.: 9	**Date:** 12/7/2018	**Direction Taken:** North
Description: The existing utility pole will be relocated south as a result of the proposed project.		

APPENDIX C

ABUTTER NOTIFICATION INFORMATION

NOTIFICATION TO ABUTTERS

Under the Massachusetts Wetlands Protection Act

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following:

A. The name of the applicant is Town of Sudbury Department of Public Works.

B. The applicant has filed a Notice of Intent with the Conservation Commission for the municipality of the Sudbury seeking permission to remove, fill, dredge or alter an Area Subject to Protection or within 100 feet of an area Subject to Protection, Under the Wetlands Protection Act (General Laws Chapter 131, Section 40).

C. The address of the lot where the activity is proposed is Dutton Road by Stearns Millpond. The applicant is proposing to replace the existing bridge with a new precast concrete 24-foot arch to restore the stream continuity.

D. Copies of the Notice of Intent may be examined at the Sudbury Conservation Commission between the hours of 9:00 A.M. and 3:00 P.M. on the following days of the week: Monday through Thursday. Copies are also available 10:00 A.M. through 2:00 P.M. on Fridays.

For more information on the filing or proposed work, call: Richard Canavan, Tighee & Bond at (508) 471-9631.

Check One: This is the applicant ☐, representative ☐, or other☐ (specify):

E. Copies of the Notice of Intent[1,2] may be obtained from either (check one) the applicant ☐, or the applicant's representative ☐, by calling this telephone number: (508) 471-9631 between the hours of 8:00 A.M. and 5:00 P.M. on the following days of the week: Monday through Friday.

F. Information regarding the date, time and place of the public hearing[3] may be obtained from the Sudbury Conservation Commission, by calling the following telephone number: (978) 440-5471 between the hours of 9:00 A.M. and 3:00 P.M. on the following days of the week: Monday through Thursday. The Commission is available 10:00 A.M. through 2:00 P.M. on Fridays.

Check One: This is the applicant ☐, representative☐ or other ☐ (specify): Conservation Office.

---

[1] **Copies of the NOI may be requested for an additional cost. Please contact the applicant's representative for more information.**

[2] **You also may contact the Department of Environmental Protection Northeast Regional Office for more information about this application or the Wetlands Protection Act at: (978) 694-3200.**

[3] **Notice of the public meeting, listing all hearings, including the date, time and place, will be posted in the Town Hall not less than forty-eight (48) hours in advance of the meeting date.**

Abutter Notification Form for Conservation Notice of Intent

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

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

Abutters may be found on the MAPS section on Town of Sudbury website.

Name	Address	Town	State	Zip Code	Book/Page	Property Address
KIRK DAVID G & ANN B	520 DUTTON RD	SUDBURY	MA	01776	12601-276	520 DUTTON RD
TOWN OF SUDBURY	278 OLD SUDBURY ROAD	SUDBURY	MA	01776	700-130	DUTTON RD
FLYNN LAURA M & JOHN A	530 DUTTON RD	SUDBURY	MA	01776	205829	530 DUTTON RD
SNOW CELIA M	528 DUTTON RD	SUDBURY	MA	01776		528 DUTTON RD
NERSSESSIAN SILVIA M & SHAWN M	555 DUTTON RD	SUDBURY	MA	01776	1492-136	555 DUTTON RD
KIRK DAVID G & ANN B	520 DUTTON RD	SUDBURY	MA	01776	12601-276	DUTTON RD
NORMANT MICHAEL C	557 DUTTON RD UNIT 1	SUDBURY	MA	01776	68027-323	557 DUTTON RD UNIT 1
HEIDER CATHERINE E	10 CAMPUS DR	DEDHAM	MA	02026	66009-426	557 DUTTON RD UNIT 2
WU HSINGMEI	557 DUTTON RD UNIT 3	SUDBURY	MA	01776	68446-584	557 DUTTON RD UNIT 3
HAUSCHILD FRANK	557 DUTTON RD UNIT 4	SUDBURY	MA	01776	67638-161	557 DUTTON RD UNIT 4
KANNAN SIDDHARTH &	557 DUTTON RD UNIT 5	SUDBURY	MA	01776	70147-370	557 DUTTON RD UNIT 5
MANDAN KARYN	557 DUTTON RD UNIT 6	SUDBURY	MA	01776	71517-373	557 DUTTON RD UNIT 6
SMITH WILLIAM L & JANET M TR	17 SHERMAN ST	MARLBORO	MA	01752	40-10	557 DUTTON RD UNIT 7
TOWN OF SUDBURY	278 OLD SUDBURY ROAD	SUDBURY	MA	01776	1331-72	0 DUTTON RD

ATKINSON LN
DUTTON RD (SCENIC)
PETERSEN CIR
PERRY CIR
BABE RUTH DR
PIPISSEWA CIR
WHITE OAK LN
MOORE RD
RAYNOR RD
ELBRIDGE CIR (PRIVATE)
RES A-1
HOP BROOK
HOP BROOK LN
PRATT'S MILL RD
BARTON DR
WINTER ST (PRIVATE)
SYCAMORE RD
MAGNOLIA RD
LINDEN RD
OAK HILL RD
F04
F05
F06
G04
G06
H04
H05
H06

THIS MAP IS FOR ASSESSMENT PURPOSES. IT IS NOT VALID FOR LEGAL DESCRIPTION OR CONVEYANCE.

THE HORIZONTAL DATUM IS THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM, NAD 83.

TAX MAPS PREVIOUSLY MAINTAINED BY PEOPLE GIS

REVISED & REPRINTED BY

CAI Technologies
Precision Mapping. Geospatial Solutions.
11 Pleasant Street, Littleton, NH 03561
800.322.4540 - www.cai-tech.com

LEGEND

PARCELS
PARCEL HOOKS
EASEMENT LINES
STREAMS
WATER BODIES
RAIL ROW
BUILDINGS
PARCEL NUMBER (337)
ACREAGE 1.2 AC
DIMENSION 100
ZONING DISTRICT
LOT NUMBER 35A

SCALE: 1" = 120'
FEET 120 60 0 120 240 360
METERS 30 15 0 30 60 90

REVISED TO: JANUARY 1, 2019

INDEX DIAGRAM

PROPERTY MAPS
SUDBURY
MASSACHUSETTS

MAP NO.
G05

APPENDIX D

STORMWATER CHECKLIST

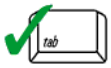
TABLE OF CONTENTS

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

☐ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☒ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☐ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☐ Name of the stormwater management system owners;
- ☐ Party responsible for operation and maintenance;
- ☐ Schedule for implementation of routine and non-routine maintenance tasks;
- ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☐ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

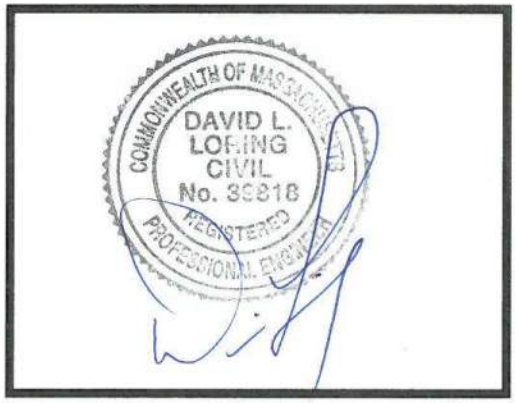
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Section 1
Registered Professional Engineer's Certification

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



Registered Professional Engineer Block and Signature 12/26/2019

Signature, Date

Section 2
Project Type

The project proposes to replace the existing twin arch culvert with an arch bridge in Dutton Road. The bridge replacement requires grading for the construction of new bridge abutments, for regrading the approach roadways, and utilities relocations. The project will replace a separate pedestrian bridge with a sidewalk on the replacement bridge. The project does not significantly widen Dutton Road relative to existing conditions. The Town of Sudbury has obtained funding from MassDOT to support this bridge replacement.

Section 3
LID Measures

As a redevelopment in a roadway right-of-way the options to implement LID are limited. The project does avoid permanent loss of wetlands and uses 'country drainage' where feasible away from the bridge.

Section 4
Stormwater Management Standards

Standard 1: No New Untreated Discharges

The project will not result in any new stormwater conveyance discharging untreated stormwater directly to the waters of the Commonwealth. The project includes one new outfall will be connected to new deep sump catch basins, which will allow filtration before discharging through the outfall. There will be approximately 425 square feet of new impervious area added to the project area in the form of two-foot wide shoulders, which will increase driver and pedestrian safety within the area. This outfall is designed to avoid erosive stormwater velocities at the outlet.

Standard 2: Peak Rate Attenuation

The project will not result in any significant changes in impervious area or other site conditions. Currently, the site experiences overland sheet flow discharging directly to waters of the Commonwealth. By the installation of catch basins and a new outfall, the water will be contained and treated prior to discharge.

Standard 3: Recharge

There will be a minimal change in impervious area for the project site. The current area consists of a grass strip in between a sidewalk and the paved roadway. The conversion of the area to a shoulder with curbing will not significantly impact infiltration in the project area.

Standard 4: Water Quality

There are no anticipated impacts to the water quality at the project site. The project adds deep sump catch basins to help remove sediment from stormwater. The project otherwise generally maintains the existing roadway configuration. The project will improve hydraulic conditions in Hop Brook which may improve water quality by increasing the hydraulic opening at the bridge to reduce velocity and scour downstream of the bridge.

Standard 5: Land Uses With Higher Potential Pollutant

This proposed project is not situated within, nor will result in the development of, areas that qualify for consideration as a Land Use With Higher Potential Pollutant Loads.

Standard 6: Critical Areas

The proposed project is located within a Critical Area for cold water fisheries. Due to the nature of the project, the proposed area cannot be relocated to another area. The project is designed to limit the footprint of work to the maximum practicable extent. Best management practices will be utilized during construction to protect resource areas.

Standard 7: Redevelopments and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

This project is a limited project in accordance with 310 CMR 10.53(3)(i), as the work consists of "*the maintenance, repair and improvement (but not substantial enlargement except when necessary to meet the Massachusetts Stream Crossing Standards) of structures, including dams and reservoirs and appurtenant works to such dams and reservoirs, buildings, piers, towers, headwalls, bridges, and culverts which existed on the effective date of 310 CMR 10.51 through 10.60 (April 1, 1983).*" This Stormwater Report steps through each of the stormwater standards and explains how the proposed project applies to each standard, or meets each standard to the maximum extent practicable.

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

Construction Period Pollution Prevention and Erosion and Sedimentation Control measures are presented on the project drawings. The project will result in the disturbance of less than 1 acre, so the work will not trigger registration under the EPA Construction Stormwater General Permit and preparation of a SWPPP. However, appropriate erosion and sediment controls will be implemented during construction. The following measures will be implemented during construction:

- The contractor will be required to designate a site manager who will serve as the responsible party for installing, monitoring, inspecting, and correcting problems with erosion and sediment controls.
- Erosion and sediment controls will be installed prior to initiation of construction.
- Paved surfaces will be swept regularly during construction.
- Erosion and sediment controls will be inspected weekly or more frequently and within 24 hours of storms of 0.5 inches or more. Problems will be corrected before the next rain event.

Standard 9: Operation and Maintenance Plan

A site specific Operations and Maintenance Plan will not be created for this bridge. The maintenance of the project area will fall under the general plan of maintenance for local roads by the Sudbury DPW.

Standard 10: Prohibition of Illicit Discharges

No illicit discharges will result from the proposed project. The project will result in a short section of stormwater piping that would be difficult for a third party to connect to. The identification and removal of illicit discharges will be managed under the Sudbury's municipal program for illicit discharge removal.

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