Street No./ Name:

TOWN OF LEDYARD
INLAND WETLANDS AND WATERCOURSES COMMISSION (IWWC)
APPLICATION FOR PERMIT (Or Commission ruling that a permit is not needed)

Application No.
Receipt Date

Date Submitted

Applicant/Agent Steve Masalin, DPW Director
Owner (if different) Town of Ledyard

Address 741 Col. Ledyard Hwy., Ledyard 06339
Address of Owner 741 Col. Ledyard Hwy., Ledyard 06339

Phones 860-464-3238 / _____ cell
Phone 860-464-3222

- **I have received information on the Army Corps of Engineers permit procedure.**
- **I have read and have included all the application and site plan requirements in Section 7 of the IWWC Regulations**

Steven E. Masalin
Signature of Applicant/ Agent

Location of Property Lantern Hill Road Bridge No. 137-001 over Whitford Brook

Tax Assessor's Map No. None
Zoning District R-80

Written Description of Proposed Activity

The Towns of Ledyard and Stonington propose to reconstruct the existing Lantern Hill Road Bridge over Whitford Brook. The existing bridge is in fair condition and replacement is recommended.

Proposed Erosion/ Sediment Control Measures: Refer to the attached design drawings.

Total Area of Site 0.293 acres
Total Area of Wetlands per Official Inventory Map 0.034 acres

Amount of Fill, in Cubic Yards 40
Disturbed Area, in Square Feet 850 or in Acres 0.020

Area Increase/Decrease in Wetlands 0.011 acre decrease (For Map Amendment Only*)

Soil Types from USDA Soil Survey Walpole, Scarboro, Ninigret & Tisbury, and Haven & Enfield

General Description of Vegetative Cover Within the project limits, the areas adjacent to the roadway are wooded.

Name and Address of Adjacent Property Owners

1. Stimpson Properties, 325 Macready Ave., Monroe, OH 45050
2. Grace & Bjorn Olson, 264 Wolf Neck Rd., Mystic, CT 06355
3. Nancy Howie, 28 Pheasant Run Dr., Gales Ferry, CT 06335

Anticipated Start Date 4/2022 Completion Date 12/2022

List previous IWWC application #'s _____

IWW Commission Disposition: IWWC Regulations; Section _____ Classification _____

_____

_____
Signature of Chair

FEE: _____ + **$60.00 State Fee =** _____ **DATE PAID** _____ **RECEIPT #** _____

Project Summary for Town Inland Wetland Permit Applications
Lantern Hill Road over Whitford Brook
Bridge No. 137-001, Ledyard/Stonington
6/21/2017

Project Overview

Wengell, McDonnell and Costello Consulting Engineers (WMC) has been retained by the Town of Ledyard to perform design services for the reconstruction of Lantern Hill Road Bridge No. 137-001 over Whitford Brook. The roadway is a paved rural local road which carries two lanes of traffic but has a roadway width of less than 17 feet over the bridge. At the crossing, Whitford Brook forms the corporate limits between the Towns of Ledyard and Stonington. The bridge is located along the easterly border of Ledyard and situated in the most northwesterly corner of Stonington. North of the structure, Lantern Hill Road has a general north-south alignment but then turns to a northeasterly-southwesterly direction at the bridge. Upstream of the crossing, the brook flows in a southerly direction then flows southwesterly downstream of the bridge.

The existing bridge was reportedly built in 1950. The proposed replacement structure is a precast concrete, 3-sided culvert with a hydraulic clear span length of 33 feet (normal). The culvert will be supported by cast-in-place reinforced concrete abutments founded on spread footings with the top of abutment footings set below the elevation of total bridge scour for the 500 year discharge which causes the maximum computed scour depth for this crossing. The project will receive funding from the U.S. Department of the Interior Bureau of Indian Affairs and the Connecticut DOT Local Bridge Program with the remaining local share equally split between the Towns of Ledyard and Stonington.

According to the 2011New London County Flood Insurance Study (FIS), the bridge is located within an unnumbered "A" approximate flood zone with no regulatory discharges or Floodway adopted. The watershed area upstream of Bridge No. 137-001 is estimated to be 4.938 mi^2 which places the crossing in the DOT Intermediate Structure category (between 1 and 10 mi^2 drainage area). The DOT *Drainage Manual* recommends that Intermediate Structures should be designed for a minimum of one foot of both superstructure underclearance and roadway freeboard for the 100 year design discharge.

Estimated project impacts are as follows:

State Wetland Impacts (sf/acres)

	Wetland		Watercourse		Total	
	sf	acres	sf	acres	sf	acres
Permanent	178	0.004	289	0.007	467	0.011
Temporary	114	0.003	269	0.006	383	0.009
Total	292	0.007	558	0.013	850	0.020

100' Upland Review Area Impacts (sf/acres)
10,076 sf
0.231 acres

Project Summary for Town Inland Wetland Permit Applications
Lantern Hill Road over Whitford Brook
Bridge No. 137-001, Ledyard/Stonington
6/21/2017

State Wetland Fill Volumes (cy)

Type	Concrete	Asphalt	Riprap/Stone	Earth	Total
Cut				20	20
Fill	5		12	3	18

Watercourse Fill Volumes (cy)

Type	Concrete	Asphalt	Riprap/Stone	Earth	Total
Cut	3			17	20
Fill			22		22

Upland Review Fill Volumes (cy)

Type	Concrete	Asphalt	Riprap/Stone	Earth	Total
Cut	32	70		1613	1715
Fill	265	270	441	447	1423

Floodplain Fill Volumes (cy)

Type	Concrete	Asphalt	Riprap/Stone	Earth	Total
Cut	20	40		1175	1235
Fill	250	120	375	210	955

The project requires inland wetlands approvals from both the Town of Ledyard and Stonington. It is expected that the project will be eligible for Section 404 General Permit approval by the U.S. Army Corps of Engineers as a Self-Verification project.

Existing Structure

The existing superstructure is reinforced concrete supported on reinforced concrete abutments. The foundations are assumed to be shallow spread footings. The hydraulic clear span length of the structure is 12.9 feet (normal) and is on a skew of approximately 31º to the roadway. The roadway width over the bridge is less than 17 feet which does not allow for two-way traffic over the crossing even though Lantern Hill Road is a two-lane roadway. Vehicular safety at the bridge is further compromised by a horizontal curve over the structure and a resulting poor sight distance. On either side of the bridge, there are low points in the roadway profile with the low point located 105 north of the existing northerly bridge abutment (Station 3+55) 0.2 feet lower than the southerly low point at Station 1+34. Note that the northerly low point is only 5 inches higher than the existing upstream bridge low chord elevations. During the March 30, 2010 flood, the northerly roadway approach was overtopped, refer to included Photos 11 and 12.

The main channel upstream of Lantern Hill Road is confined by concrete/stone walls for the first 30 feet upstream of the bridge. Within this short reach, the channel bottom consists of large boulders (see Photo 6) indicating that high channel velocities periodically move smaller substrate downstream. Upstream beyond this reach, a stone wall continues along the left (easterly) streambank. Along this reach, the streambed consists of coarse gravel and cobbles with overhanging brush within the channel. The floodplains are relatively flat with a moderately dense cover of trees and brush.

Downstream of the bridge, Whitford Brook transitions into a series of multiple channels flowing through a relatively wide and flat floodplain characterized as a deciduous wooded swamp community. Both the channels and floodplain are densely vegetated with trees and brush. A stone wall runs along the middle portion of the "main" channel, separating it into two sub-channels. During two different field visits in 2016, the channel immediately downstream of Lantern Hill Road was notably obstructed by several downed trees which likely impacts bridge hydraulics (see Photos 2 and 4).

The existing conditions hydraulic analysis indicates that relative to approach cross section 1374, the computed 100 year flood elevation is 1.6 feet above the bridge low chord on the upstream side which is inconsistent with the *Drainage Manual* recommended one foot of superstructure underclearance for intermediate size structures. At the northerly roadway low point, the 100 year flood elevation at the approach section is above the roadway by 1.2 feet. Existing roadway overtopping at the northerly low point is estimated to occur between the 2 and 10 year flood events which is considerably less than an ideal hydraulic performance.

Proposed Project

The project proposes to replace the existing bridge with a 33 foot (normal) clear span precast concrete, 3-sided culvert with open bottom. The span length was selected to satisfy the 1.2 times the bankfull width design criterion established by the U.S. Army Corps of Engineers for Section 404 general permits. To accommodate the longer span length, the proposed upstream low chord of the culvert will be 0.8 feet lower than that for the existing bridge. The 3-sided culvert will be supported by cast-in-place reinforced concrete abutments founded on spread footings with the tops of footings set below the maximum total computed scour depth. The proposed abutments will be skewed 30º to the roadway baseline and set back behind the existing bridge abutments which will remain in place but cut down to elevation 73 feet to provide riparian wildlife shelves on both sides. 73 feet is the approximate elevation of ordinary high water which typically is the preferred elevation for riparian shelves. To safely accommodate two-way vehicular traffic over the bridge, the travel way will be increased from the present less than 17 foot width to 26 feet.

The project includes 185 feet of associated road work to match the proposed bridge into the existing roadway geometry. Similar to the existing roadway, the proposed road will drain via sheet flow with no subsurface drainage facilities. The proposed extents of the project do not include the existing roadway low points on either side of the bridge at approximately Stations 1+34 and 3+55,

which limits potential improvements in roadway overtopping conditions. WMC recommends that intermediate size riprap be placed to protect the proposed wingwalls, riparian shelves and downstream roadway approach embankments from erosion during flood conditions. The proposed extents of riprap along the downstream roadway approaches will protect the embankments from erosion during an overtopping flood event such as that which occurred on March 30, 2010. The placement of riprap along the channel bottom has been limited to minimize impacts to fisheries resources. All riprap at elevation 73 feet and below will be top dressed with natural streambed material to provide a more inviting exposed surface for wildlife and aquatic resources.

The project hydraulic analyses indicate that roadway overtopping conditions will be somewhat improved compared to existing conditions but will still be inconsistent with the hydraulic design guidelines recommended in the *Drainage Manual* for intermediate structures. Computed roadway overtopping at the northerly low point will be improved from the present 2-10 year recurrence to approximately the 25 year frequency discharge. For the 100 year discharge, the computed flood elevation at approach cross section 1374 is 1.8 feet above the low chord of the proposed culvert and 0.5 feet above the northerly roadway low point. Since roadway overtopping is computed for the 100 year discharge, the roadway will be posted as prone to flooding in accordance with DOT typical practice.

Options to improve computed hydraulic conditions north of the bridge to satisfy the guidelines of the *Drainage Manual* would require that the proposed project limits be extended from 185 feet to approximately 365 feet, the roadway profile be raised approximately 1.5 feet at the existing northerly low point and retaining walls be constructed to minimize fill limits within the adjacent wetlands. Discussions between the Towns and WMC concluded that increasing the project scope as such would be beyond the original intent of the project and would not be pursued further.

The planned project schedule is to start construction in April 2018 and finish in November 2018. To minimize impacts to aquatic resources, unconfined instream activities are to be limited to the period June 1 to September 30. Construction is to be completed in as single stage with the roadway closed to traffic. In accordance with ConnDOT recommendations, the recommended water handling has been designed for the 2 year frequency discharge.

The following properties abut the proposed project limits:

1. Ledyard, 565 Lantern Hill Road, M89-B1210-L565, Owner- Stimpson Properties, 325 Macready Ave., Monroe, OH 45050
2. Stonington, 264 Wolf Neck Road, M143-B2-L1, Owner- Grace & Bjorn Olson, 264 Wolf Neck Rd., Mystic, CT 06355
3. Stonington, no property address, M142-B1-L1G, Owner- Nancy Howie, 28 Pheasant Run Dr., Gales Ferry, CT 06335

Hydraulic Results

The following hydraulic design criteria are applicable for the proposed project:

- **Existing versus Proposed Condition-** Upstream of Lantern Hill Road, the proposed project will improve computed 100 year flood elevations by up to 0.7 feet compared to existing conditions. For cross sections 1229 and 1275, located 53 feet and 8 feet downstream of the existing downstream bridge face, there are minor computed increases of 0.01 and 0.16 feet in the 100 year proposed flood profile compared to present conditions. Both of these increases are well below the one foot maximum increase allowed by the National Flood Insurance Program [Section 60.3(c)(10)] and would not affect any developed property.

- **Superstructure Underclearance and Roadway Freeboard-** Section 9.3.5 of the *Drainage Manual* recommends a minimum of one foot of both superstructure underclearance and roadway freeboard for the 100 year design discharge for Intermediate Structures (between 1 and 10 mi^2 drainage area). The proposed conditions hydraulic analysis indicates that the computed flood elevation at approach cross section 1374 is 1.8 feet above the low chord of the proposed culvert and 0.5 feet above the northerly roadway low point with an estimated roadway overtopping return frequency of approximately 25 years. These are inconsistent with the design guidelines of the *Drainage Manual*, however, local roads may be designed to lesser standards if :

  a. The road has low traffic volumes.
  b. Alternate routes are available.
  c. Flood discharges may be allowed to cross over roads that are at or close to the floodplain grade.
  d. Water surface elevations shall not be increased by more than one foot, nor allowed to cause damage to upstream properties.
  e. Provisions are made to barricade the road when overtopped.
  f. The road is posted as being subject to flooding.

  The proposed project satisfies each of the above, therefore, it is permissible for the proposed design to be inconsistent with the hydraulic guidelines of the *Drainage Manual*. As stated previously, options to improve proposed hydraulic conditions were discussed with the Towns and it was concluded that designing for such would be beyond the original intent of the project.

- **Natural Condition Analysis-** Section 9.3.5 of the *Drainage Manual* recommends, for Intermediate Structures, that the proposed 100 year water surface profile should be no more than 1 foot above the Natural profile. The hydraulic analyses indicates that the proposed profile would be within 0.4 feet of Natural at the bridge upstream approach cross section (1374) which is consistent with the intent of this design criterion.

- **Fisheries-** DEEP Fisheries has met with WMC at the project site and offers the following design recommendations (see enclosed emails), each of which has been incorporated into the project design:

    1. Inland Fisheries staff request pursuing bridge replacement options which least disturb and alter instream habitats. As such, we highly recommend replacement at this location with either a clear span bridge or 3 sided structure that does not contain an artificial bottom or floor.
    2. As design proceeds, please provide more detail regarding any future instream work associated with substructure rehabilitation and any installation of riprap. It is important to minimize the overall footprint and instream placement of riprap that might be required for scour protection. Mitigation may be required for excessive filling associated with scour protection activities.
    3. As a best management practice, any "unconfined" instream work within Whitford Brook should be restricted to the period from June 1 to September 30, inclusive.

Project Alternatives

The do nothing alternative or the rehabilitation of the existing bridge are not viable options due to its fair condition, concerns relative to bridge scour and inadequate width for two-way traffic. The original intent of the project was to replace the crossing with a four sided box culvert. However, DEEP Fisheries indicated that they would require an open bottom replacement structure which is the proposed recommended alternative. Options to raise the profile to improve roadway flooding were investigated but are not recommended because such would either increase wetland impacts or necessitate the construction of long and expensive retaining walls.

Supporting Documentation

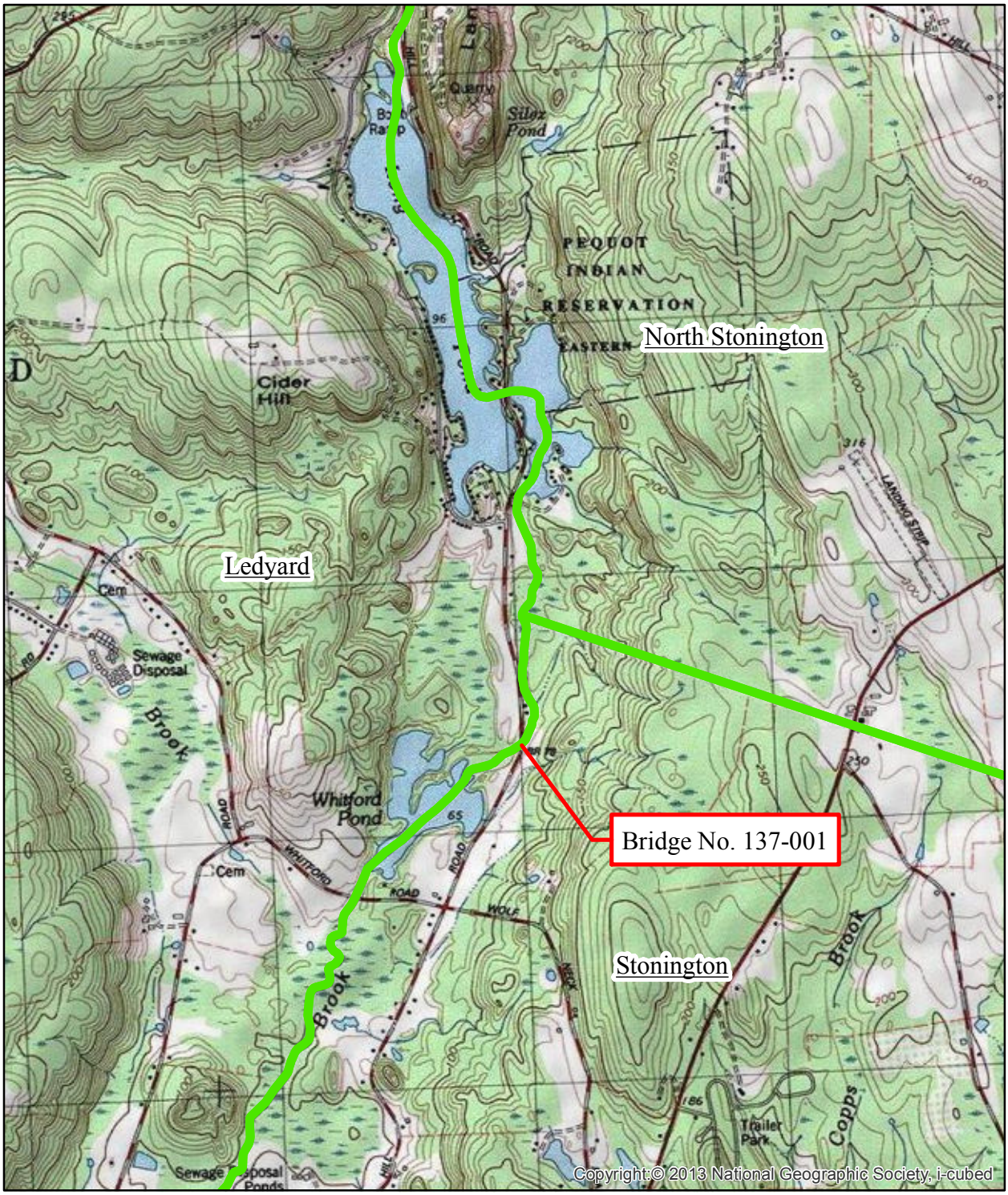
The following documentation is enclosed in support of this permit application:

1. Project Summary for Town Inland Wetland Permit Applications, 6/21/2017
2. Project Location Map, Old Mystic USGS Quadrangle
3. Project Photos
4. Plans- "Replacement of Lantern Hill Road Bridge over Whitford Brook", WMC, 6/15/2017
5. Connecticut Inland Wetland Impact Plan, WMC, 4/10/2017
6. Wetland Delineation Report- Soil Science and Environmental Services, Inc., 2/4/2016
7. DEEP Fisheries Initial Review, 5/2016 emails
8. DEEP Natural Diversity Data Base Map, June 2017- Project site is within a NDDB identified area. Coordination with DEEP Wildlife is pending.
9. Map showing Northern Long-Eared Bat areas of concern in Connecticut, 2/1/2016- Project site is outside an area of concern
10. DEEP Aquifer Protection Area Map, 2/14/2017- Project site is outside any aquifer protection area

11. USDA Soil Survey, Web Soil Survey, 6/8/2017
12. DEEP Reporting Form

Lantern Hill Road over Whitford Brook
Bridge No. 137-001
Ledyard/Stonington

Project Location Map, Old Mystic USGS Quadrangle



0 1,000 2,000 4,000 Feet

1:24,000

1 inch equals 2,000 feet

N
W E
S

WMC Consulting Engineers
Newington, CT 06111
(860)667-9624

Photo Index

Photo 1- Looking Upstream from Bridge (3/8/2016)

Photo 2- Looking Downstream from Bridge (3/8/2016)
Note Downstream Channel Obstructions

Photo 3- Upstream Bridge Face (3/8/2016)

Photo 4- Downstream Bridge Face (3/8/2016)
Note Downstream Channel Obstructions

Photo 5- Downstream Bridge Face (10/16/2015)
Note Concrete Block Wingwall

Photo 6- Inlet Channel Typical Streambed Composition (3/8/2016)
Note Large Size of Streambed Material

Photo 7- Looking Downstream through Bridge Opening (8/24/2016)
Note Concrete Shelves both Sides

Photo 8- Looking Upstream through Bridge Opening (10/16/2015)
Note Concrete Shelves both Sides

Photo 9- Looking Northerly along Roadway (3/8/2016)

Photo 10- Looking Southerly along Roadway (3/8/2016)

Photo 11- Looking Southerly towards Bridge (3/30/2010)

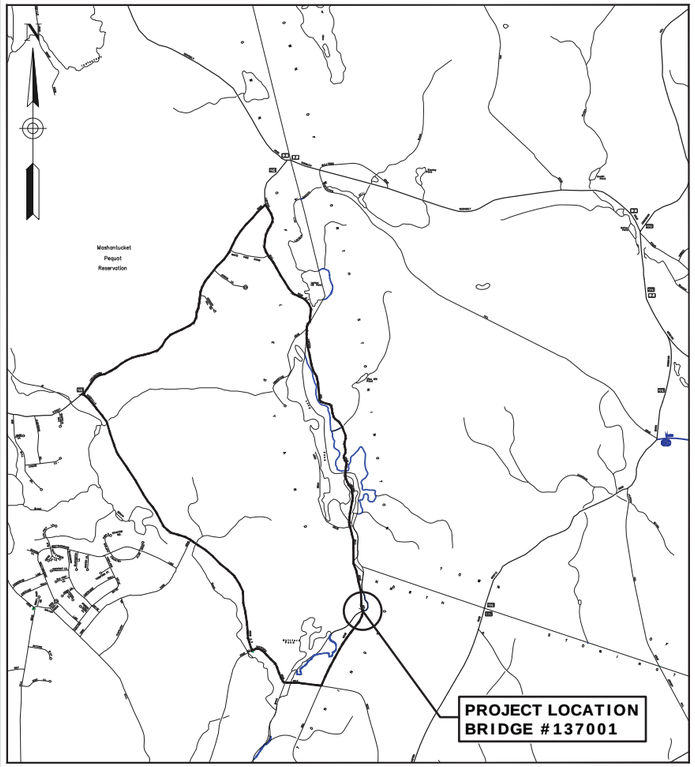
Photo 12- Looking Southerly towards Bridge (3/30/2010)

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	1	23

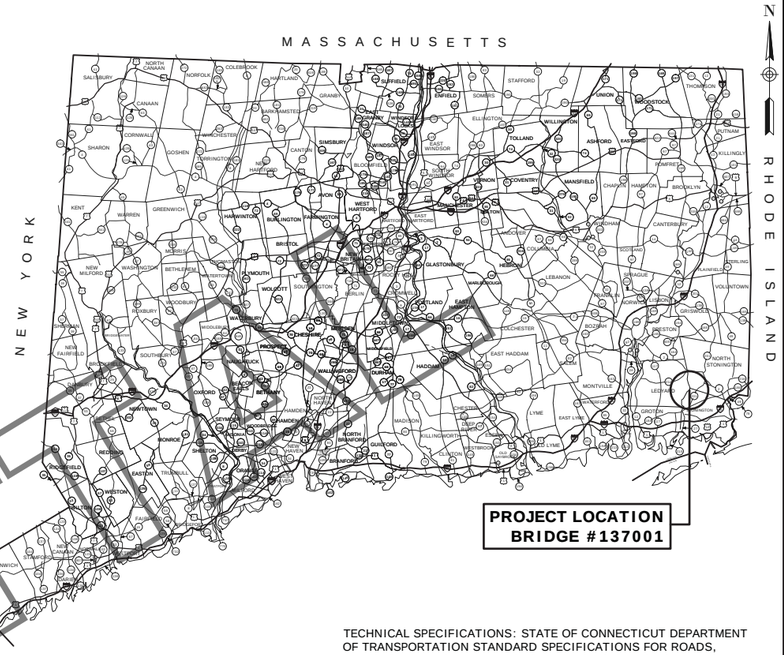
TOWN OF LEDYARD, CONNECTICUT

PLAN FOR
REPLACEMENT OF LANTERN HILL ROAD BRIDGE
OVER WHITFORD BROOK

FEDERAL AID NO. TBD
STATE PROJECT #TBD
BRIDGE #137001
ROADWAY RECONSTRUCTION
STATION 1+40.00 TO STATION 3+25.00
TO BE MAINTAINED BY THE TOWN OF LEDYARD



LOCATION MAP
SCALE: 1" = 2500'



ROAD CLASSIFICATION: LOCAL RURAL
DESIGN SPEED: 25 MPH
ADT (2016): 1,071 V.P.D.
ROADSIDE CLEAR ZONE: 7' MIN.

TECHNICAL SPECIFICATIONS: STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROADS, BRIDGES AND INCIDENTAL CONSTRUCTION (FORM 817) AND ALL LATEST SUPPLEMENTAL SPECIFICATIONS THERETO, AS WELL AS ANY SPECIAL PROVISIONS BY THE TOWN OF LEDYARD.

DESIGN STANDARDS: AASHTO POLICY ON THE GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, DATED 2004 AND THE CONNECTICUT DEPARTMENT OF TRANSPORTATION HIGHWAY DESIGN MANUAL DATED 2003.

SURVEY: ALL COORDINATES ON THE PROJECT ARE BASED ON NAD 83. ALL ELEVATIONS ARE BASED ON NAVD 1988.

CONNECTICUT DEPARTMENT OF TRANSPORTATION OR TOWN OF LEDYARD BIDDING AND OTHER INFORMATION AND DOCUMENTS WHICH ARE OBTAINED THROUGH THE INTERNET, WORLD WIDE WEB SITES OR OTHER SOURCES ARE NOT TO BE CONSTRUED TO BE OFFICIAL INFORMATION FOR THE PURPOSES OF BIDDING OR CONDUCTING OTHER BUSINESS WITH THE TOWN OF LEDYARD.

IT IS THE RESPONSIBILITY OF EACH BIDDER AND ALL OTHER INTERESTED PARTIES TO OBTAIN ALL BIDDING RELATED INFORMATION AND DOCUMENTS FROM OFFICIAL SOURCES WITHIN THE TOWN OF LEDYARD.

PERSONS AND/OR ENTITIES WHICH REPRODUCE AND/OR MAKE SUCH INFORMATION AVAILABLE BY ANY MEANS ARE NOT AUTHORIZED BY THE TOWN OF LEDYARD TO DO SO AND MAY BE LIABLE FOR CLAIMS RESULTING FROM THE DISSEMINATION OF UNOFFICIAL, INCOMPLETE AND/OR INACCURATE INFORMATION.

SIGNED SUBMITTED

LIST OF DRAWINGS

SHEET NO.	TITLE
1	TITLE SHEET
2	DETAILED ESTIMATE SHEET
3	DETOUR PLAN
4	EXISTING CONDITIONS PLAN
5	ROADWAY PLAN
6	ROADWAY PROFILE
7	ROADWAY DETAILS
8 - 9	ROADWAY SECTIONS
10	CONSTRUCTION SEQUENCE AND HANDLING WATER PLAN
11	HANDLING WATER DETAILS
12	EROSION AND SEDIMENTATION CONTROL DETAILS
13	STRUCTURE PLAN, ELEVATION AND SECTION
14	BORING LOGS
15	STRUCTURE LAYOUT PLAN
16	ABUTMENT #1 PLAN AND ELEVATION
17	ABUTMENT #2 PLAN AND ELEVATION
18 - 19	WINGWALL DETAILS
20	ABUTMENT AND WINGWALL DETAILS
21	APPROACH WALL DETAILS
22 - 23	3-TUBE CURB MOUNTED BRIDGE RAIL

STANDARD DRAWINGS

DWG. NO.	TITLE

STANDARD CONVENTIONS

North Arrow W/No. Coor. — Grid Arrow

Edge Of Road
Concrete Pavement
Dirt Road
B.C.L.C.
Concrete Curb
Guide Rail
Concrete Median Barrier
Bit. Walk
Conc. Sidewalk
Railroad Tracks
Chain Link Fence
Rustic Fence
Pipe Fence
Board Fence
Water Edge
Stream
Ditch
TOWN LINE
Boring Location

Limit Of Marsh
Stone Wall
Ledge Outcrop
Connecticut Wetland Limits
Federal Wetlands Limits
STATE LINE
Power Line
Swamp
Building
Transmission Tower
Riprap
Hedge Row
Tree Line
Shrub
Evergreen Tree
Deciduous Tree
Highway Line
Street Line
Property Line
Lot Line
Easement Line

LEGEND:

Iron Pin (Found)
Monument (Found)
Sign
Manhole
"C" Catch Basin
"C-L" Catch Basin
Utility Pole
Light Pole
Metal Post
Guy Anchor
Water Gate
Gas Valve
Gas Meter
Mail Box
Underground Piping (San.,Stm.)
E — U/G Elec. Line
W — Water Line
OHW — Overhead Utilities
T — U/G Tele. Line
Property Line
100 — Contour Line
Wetlands Boundary
WF #69 — Wetlands Flag
WF #69 OHW — Ordinary High Water

DESIGNED BY WMC CONSULTING ENGINEERS

SUBMITTED BY _____ DATE _____

PUBLIC WORKS DIRECTOR/TOWN ENGINEER - TOWN OF LEDYARD

_____ DATE _____
STEVEN MASALIN, P.E.

DATE: 06/15/2017

THE INFORMATION INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE TOWN OF LEDYARD AND IS NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

WHEREVER THE PAY UNITS IN THE LEFT COLUMN APPEAR ON THE DETAILED ESTIMATE SHEET, THEY SHALL BE CONSTRUED TO MEAN THE EQUIVALENT PAY UNITS IN THE RIGHT COLUMN ON THE PROPOSAL FORM.

c.y.	C.Y.
l.f.	L.F.
ton	TON
s.y.	S.Y.
lb.	LB.
s.f.	S.F.
gal.	GAL.
c.f.	C.F.
c.i.	C.I.

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	2	23

FOR THE CONSTRUCTION OF REPLACEMENT OF BRIDGE NO.137001, LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK IN THE TOWN OF LEDYARD, CONNECTICUT

ROADWAY ITEMS

ITEM NUMBER	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X
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TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ROADWAY ITEMS

ITEM NUMBER	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X
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UNIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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BRIDGE ITEMS

ITEM NUMBER	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X	0000000X
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TO BE PROVIDED UPON FINAL DESIGN

NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.M.M.
DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

SFD SUBMITTAL

WMC CONSULTING ENGINEERS

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87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF LEDYARD
741 COLONEL LEDYARD HIGHWAY
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK
DETAILED ESTIMATE SHEET

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		2	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	3	23

LANTERN HILL ROAD / STREET BRIDGE REPLACEMENT / REHABILITATION CONSTRUCTION SIGNING

	SIGN	CONNDOT	DIMENSION	DESCRIPTION	NO. REQ.'D
*	A	80-9929	72" X 48"	LANTERN HILL ROAD CLOSED TO THRU TRAFFIC EFFECTIVE MONDAY (00/00)	2
	B	80-9078	60" X 30"	BRIDGE CLOSED 0.3 MILES AHEAD. LOCAL TRAFFIC ONLY	2
	C	80-9913	60" X 10"	LANTERN HILL ROAD	7
	D	80-9710	30" X 24"	DETOUR (RIGHT ARROW)	2
	E	80-9710	30" X 24"	DETOUR (LEFT ARROW)	2
	F	80-9710	30" X 24"	DETOUR (STRAIGHT ARROW)	1
**	G	80-9080	48" X 30"	ROAD CLOSED	2
**	H	31-0552	30"	STOP	2
	I	80-9708	24" X 18"	END DETOUR	2
**	J	80-9710	60" X 30"	LANTERN HILL ROAD CLOSED TO THRU TRAFFIC	3

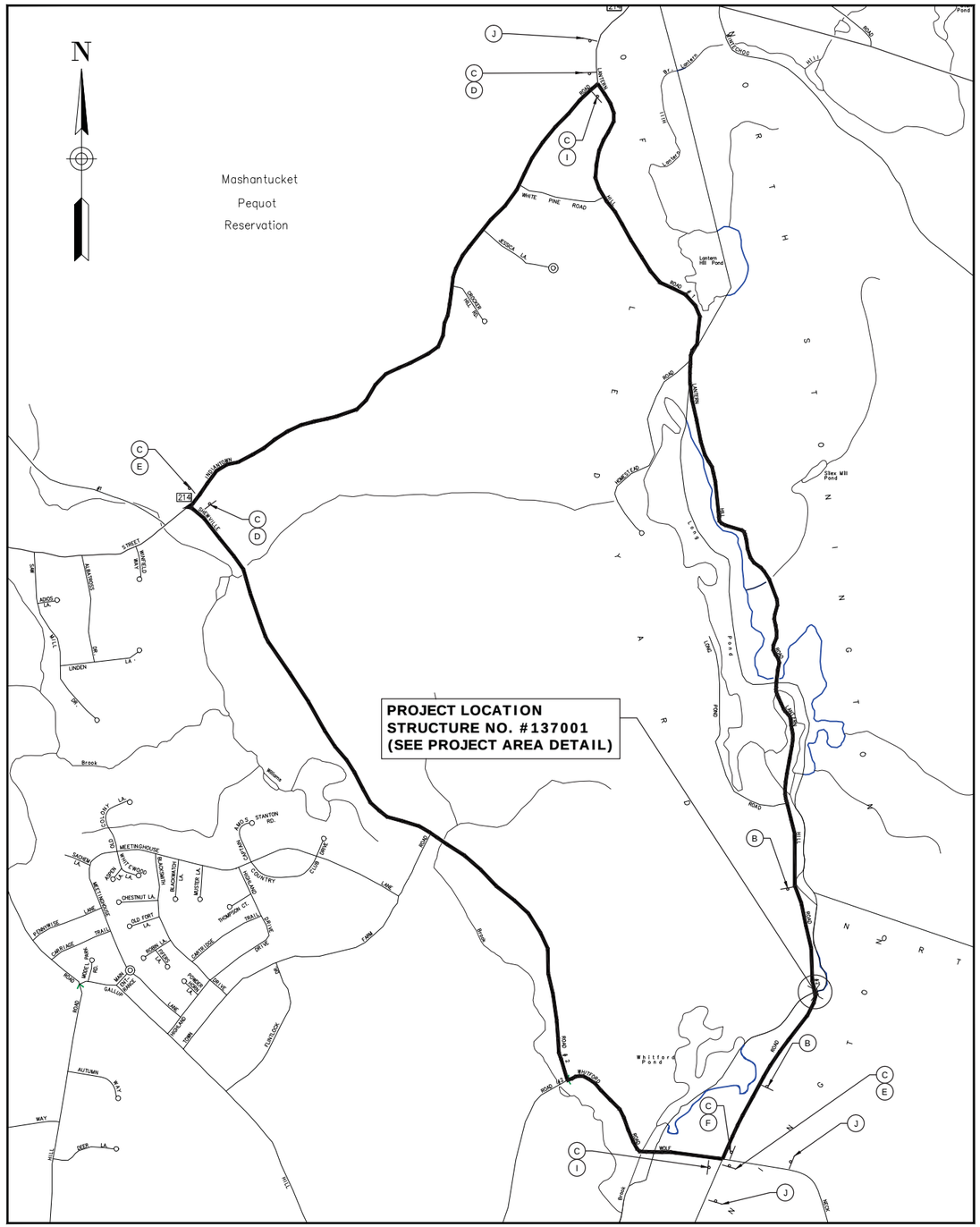
* INDICATES SIGNS TO BE VISIBLE AT LEAST 2 WEEKS PRIOR TO CONSTRUCTION AND THEN COVERED OR REMOVED DURING CONSTRUCTION (SEE NOTE 7, THIS SHEET)

** INDICATES SIGN THAT REQUIRE A BARRICADE WARNING LIGHT - HIGH INTENSITY

*** INDICATES SIGN TO ROTATED 90° (AS SHOWN)

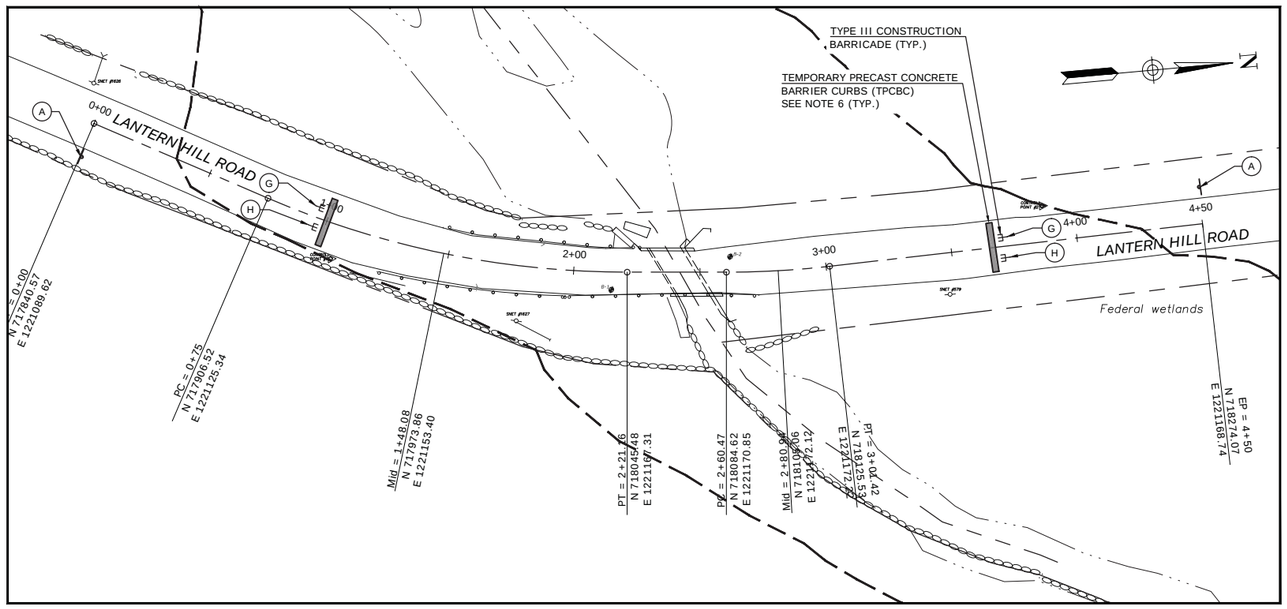
MAINTENANCE AND PROTECTION OF TRAFFIC NOTES

1. THE CONTRACTOR SHALL LOCATE AND PLACE ALL SIGNS AS INDICATED ON THIS SHEET OR AS DIRECTED BY THE ENGINEER.
2. THE CONTRACTOR SHALL CLOSE LANTERN HILL ROAD FOR THE DURATION OF THE BRIDGE REPLACEMENT AND ROADWAY CONSTRUCTION.
3. ALL TRAFFIC OVER LANTERN HILL ROAD SHALL BE DETOURED TO WOLF NECK ROAD IN STONINGTON, SHEWVILLE ROAD, AND INDIANTOWN ROAD (ROUTE 214).
4. TEMPORARY PRECAST CONCRETE BARRIER CURBS (TPCBC) SHALL BE PROVIDED AT BOTH ENDS OF THE WORK AREA TO ADEQUATELY WARN, AND PROHIBIT MOTORISTS AND PEDESTRIANS FROM USING THE BRIDGE DURING CONSTRUCTION. THE TPCBC SHALL EXTEND ACROSS THE FULL WIDTH OF THE EXISTING ROADWAY AND BEYOND. THE CONTRACTOR SHALL ALSO PROVIDE MOVEABLE TYPE III CONSTRUCTION BARRICADE IN FRONT OF THE TPCBC, OR AS ORDERED BY THE ENGINEER, TO FURTHER INSURE MOTORIST AND PEDESTRIAN SAFETY. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THE UPRIGHT STABILITY OF THE TYPE III CONSTRUCTION BARRICADES AT ALL TIMES.
5. ALL TRAFFIC CONTROL AND PROTECTION DEVICES, INCLUDING PAVEMENT MARKINGS, SHALL BE IN PLACE BEFORE RESPECTIVE CONSTRUCTION OPERATION COMMENCES.
6. ALL TPCBC TO HAVE THREE (3) TYPE DE-7A DELINEATORS MOUNTED ON TOP (10' SPACING) AND REFLECTIVE TAPE ON TRAFFIC SIDE FOR THE ENTIRE LENGTH; COST TO BE INCLUDED IN THE COST OF TEMPORARY PRECAST CONCRETE BARRIER CURB.
7. THE CONTRACTOR SHALL POST THE ADVANCE NOTICE SIGNS AT LEAST 2 WEEKS PRIOR TO CLOSING THE ROAD. NOTICE TO PROCEED WILL BE GIVEN TO INSTALL THE ADVANCED NOTICE SIGNS, BUT THE ROAD MUST REMAIN OPEN UNTIL THE DATE ON THE ADVANCE NOTICE SIGNS.



DETOUR PLAN

SCALE : 1" = 1000'



PROJECT AREA DETAIL

SCALE : 1" = 30'

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NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.M.M.
DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

SFD SUBMITTAL

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PREPARED FOR

TOWN OF LEDYARD

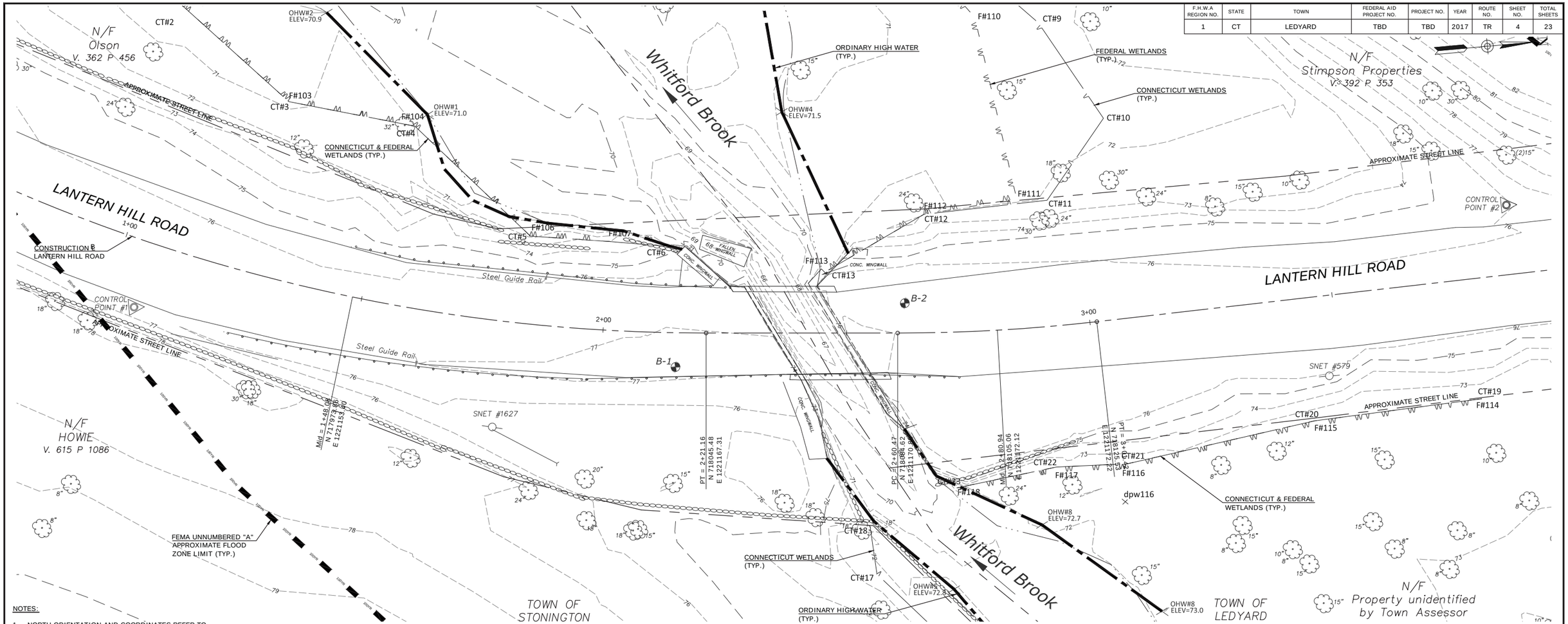
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK DETOUR PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		3	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	4	23



EXISTING ROADWAY PLAN

SCALE : 1" = 10'-0"

APPROXIMATE BORING LOCATIONS

NOTES:

1. NORTH ORIENTATION AND COORDINATES REFER TO CONNECTICUT GRID SYSTEM NAD 83/87.
2. ELEVATIONS BASED ON NAVD 1988.
3. SITE CONTROL CONFORM TO HORIZONTAL CLASS A-2 ACCURACY.
4. A PORTION OF THE SUBJECT PROPERTIES ARE WITHIN THE A ZONE AS PER FLOOD INSURANCE RATE MAP, NEW LONDON COUNTY, CONNECTICUT, PANEL 387 OF 554. MAP NUMBER 09011C0387G. EFFECTIVE DATE JULY 18, 2011.
5. PROPERTY AND STREETLINES SHOWN ARE APPROXIMATE AND CONFORM TO HORIZONTAL CLASS D ACCURACY.
6. LIMIT OF INLAND WETLANDS FLAGGED BY SOIL SCIENCE AND ENVIRONMENTAL SERVICES OF ROCKY HILL, CT. ON JANUARY 29, 2016.
7. SURVEY INCLUDING WETLAND FLAG LOCATIONS, PERFORMED BY WILLIAM HEARN, L.S., CHESTER, CT.

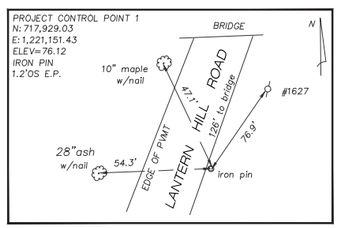
MAP REFERENCES:

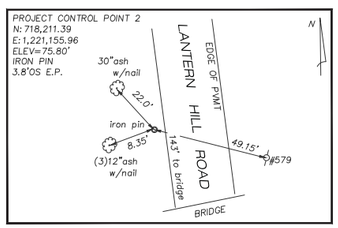
1. "SUBDIVISION PLAN APPLICATION BY WHITEHALL PROPERTIES PROPERTY OF WHITEHALL -WOLF NECK ASSOCIATES WOLF NECK ROAD & LANTERN HILL ROAD STONINGTON, CONNECTICUT" 1"=100' 12-2-1984.

GRAPHIC SCALE

10 0 5 10 20 40

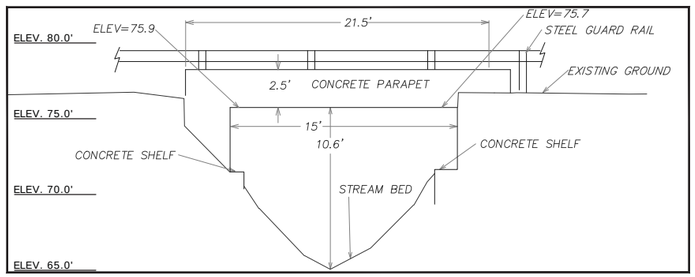
(IN FEET)
1 inch = 10 ft.





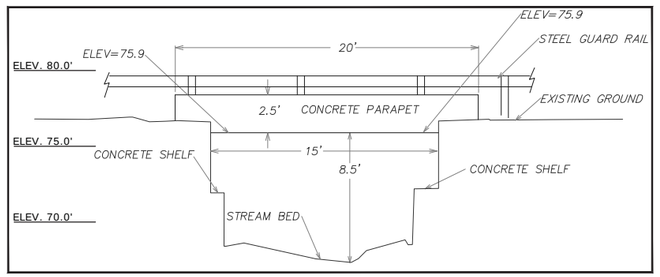
CONTROL POINT TIES

NOT TO SCALE



WEST ELEVATION (LOOKING DOWNSTREAM)

SCALE: 1" = 5'-0"



EAST ELEVATION (LOOKING DOWNSTREAM)

SCALE: 1" = 5'-0"

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NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.M.M.
DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

SFD SUBMITTAL

WMC CONSULTING ENGINEERS

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NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF LEDYARD

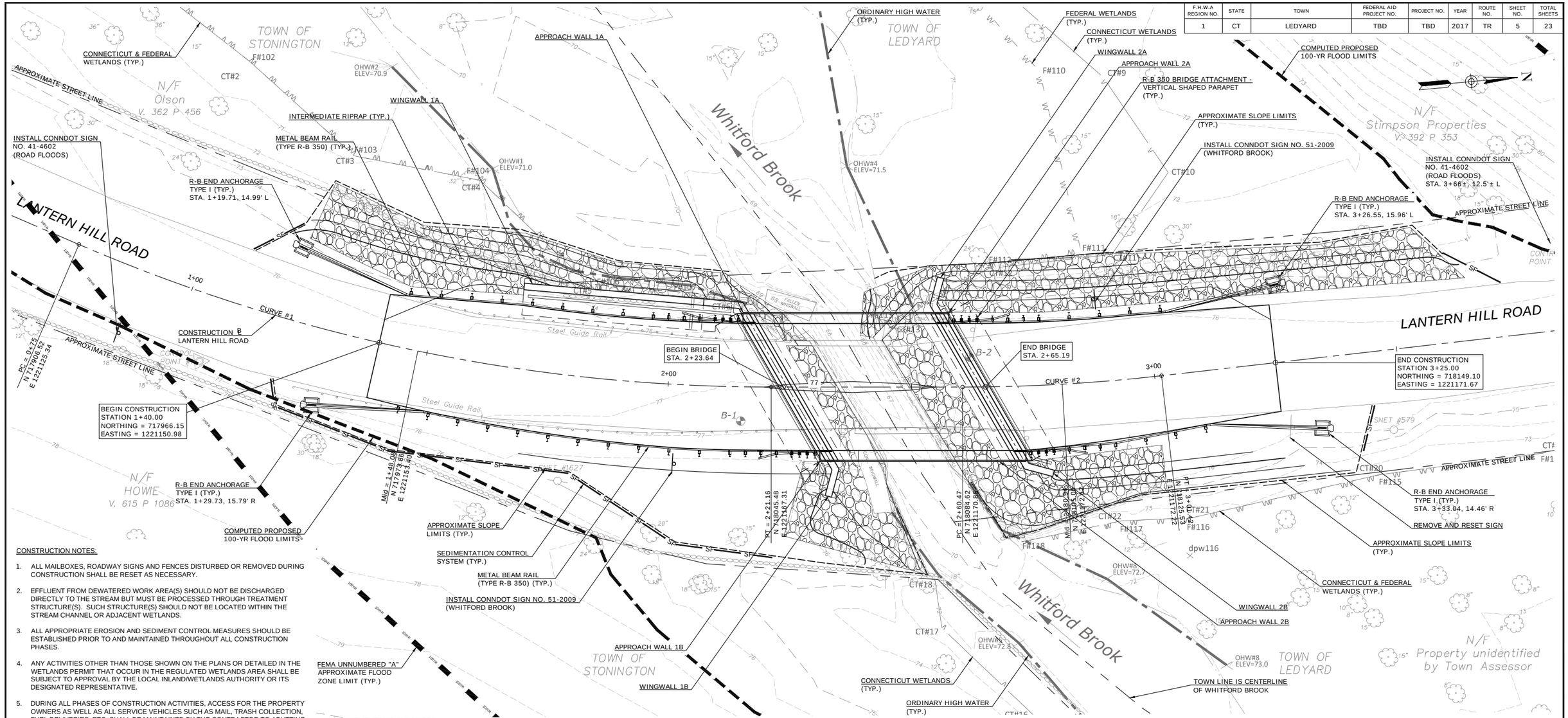
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK EXISTING CONDITIONS PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		4	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	5	23



PROPOSED ROADWAY PLAN

SCALE : 1" = 10'-0"

APPROXIMATE BORING LOCATIONS

CONSTRUCTION NOTES:

1. ALL MAILBOXES, ROADWAY SIGNS AND FENCES DISTURBED OR REMOVED DURING CONSTRUCTION SHALL BE RESET AS NECESSARY.
2. EFFLUENT FROM DEWATERED WORK AREA(S) SHOULD NOT BE DISCHARGED DIRECTLY TO THE STREAM BUT MUST BE PROCESSED THROUGH TREATMENT STRUCTURE(S). SUCH STRUCTURE(S) SHOULD NOT BE LOCATED WITHIN THE STREAM CHANNEL OR ADJACENT WETLANDS.
3. ALL APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE ESTABLISHED PRIOR TO AND MAINTAINED THROUGHOUT ALL CONSTRUCTION PHASES.
4. ANY ACTIVITIES OTHER THAN THOSE SHOWN ON THE PLANS OR DETAILED IN THE WETLANDS PERMIT THAT OCCUR IN THE REGULATED WETLANDS AREA SHALL BE SUBJECT TO APPROVAL BY THE LOCAL INLAND/WETLANDS AUTHORITY OR ITS DESIGNATED REPRESENTATIVE.
5. DURING ALL PHASES OF CONSTRUCTION ACTIVITIES, ACCESS FOR THE PROPERTY OWNERS AS WELL AS ALL SERVICE VEHICLES SUCH AS MAIL, TRASH COLLECTION, FUEL DELIVERIES, ETC. SHALL BE MAINTAINED BY THE CONTRACTOR TO ABUTTING PROPERTIES WITHIN THE LIMITS OF THE WORK.
6. LIMIT OF INLAND WETLANDS FLAGGED BY SOIL SCIENCE AND ENVIRONMENTAL SERVICES OF ROCKY HILL, CT. ON JANUARY 29, 2016.
7. SURVEY INCLUDING WETLAND FLAG LOCATIONS, PERFORMED BY WILLIAM HEARN, L.S., CHESTER, CT.

SURVEY NOTES:

HORIZONTAL DATUM:	NAD83/87
HORIZONTAL ACCURACY:	CLASS A-2
VERTICAL DATUM IS	NAVD88
VERTICAL ACCURACY:	CLASS T-2

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)

1 inch = 10 ft.

PAVEMENT MARKING NOTES:

1. FINAL PAVEMENT MARKING SHALL BE EPOXY RESIN AND SHALL MATCH EXISTING MARKINGS AT CONSTRUCTION LIMITS.
2. PAVEMENT MARKINGS SHALL BE INSTALLED PER TRAFFIC STANDARD SHEET TR-1210_03 "SPECIAL DETAILS & TYPICAL PAVEMENT MARKINGS FOR TWO-WAY HIGHWAYS".

SIGNING NOTES:

1. ALL EXISTING SIGNS WITHIN THE SIGNING LIMITS ARE TO BE REMOVED UNLESS OTHERWISE NOTED ON THE PLAN OR DIRECTED BY THE ENGINEER.
2. THE PERMANENT REMOVAL OF EXISTING SIGNS SHALL BE PAID FOR UNDER ITEM NO. 1206013 "REMOVAL OF EXISTING SIGNING".
3. SIGNS TO BE INSTALLED PER TRAFFIC STANDARD SHEETS TR-1208_01 "SIGN SUPPORT & PLACEMENT DETAILS, GORE EXIT SIGN" AND TR-1208_02 "METAL SIGN POSTS AND SIGN MOUNTING DETAILS", EXCEPT AS NOTED.
4. EXACT SIGN LOCATIONS TO BE VERIFIED BY THE ENGINEER.
5. SIGNS SHALL BE PLACED NO CLOSER THAN 10 FEET FROM UTILITY POLES.

DESIGN DATA

ROAD CLASS	LOCAL RURAL
DESIGN SPEED	25 MPH
ADT (2014)	1,071 VPD
RADIUS (MIN.)	155 FT.
e	N/A
MAXIMUM GRADE	1.13%
CROSS SLOPE	2.08%
K (SAG MIN.)	N/A
K (CREST MIN.)	12

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DESIGN	S.M.M.
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PREPARED FOR

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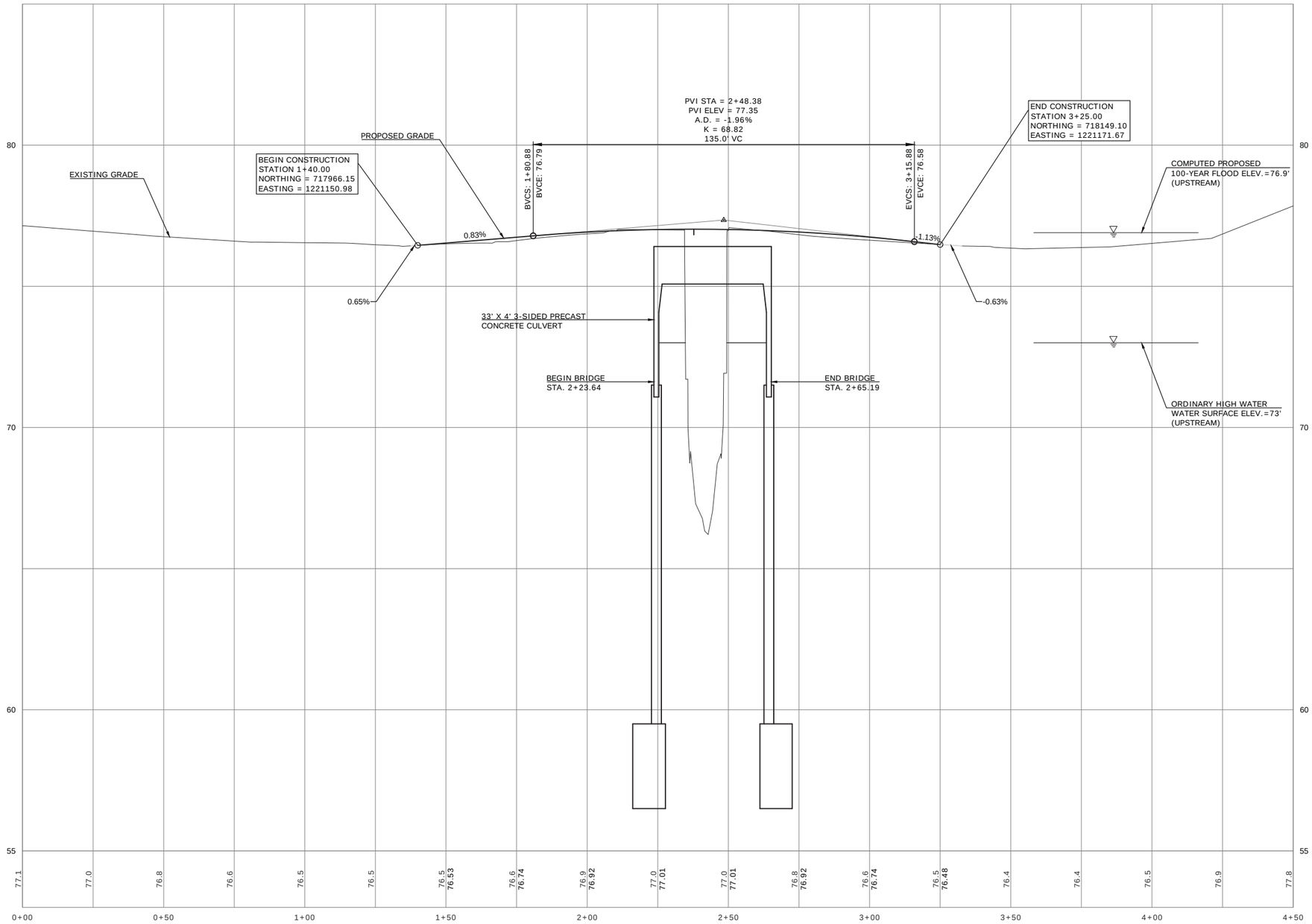
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK ROADWAY PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		5	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	6	23



DESIGN DATA	
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DESIGN SPEED	25 MPH
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RADIUS (MIN.)	155 FT.
e	N/A
MAXIMUM GRADE	1.13%
CROSS SLOPE	2.08%
K (SAG MIN.)	N/A
K (CREST MIN.)	12

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

PROPOSED ROADWAY PROFILE

HORIZONTAL SCALE : 1" = 20'-0"
VERTICAL SCALE : 1" = 2'-0"

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TOWN OF LEDYARD

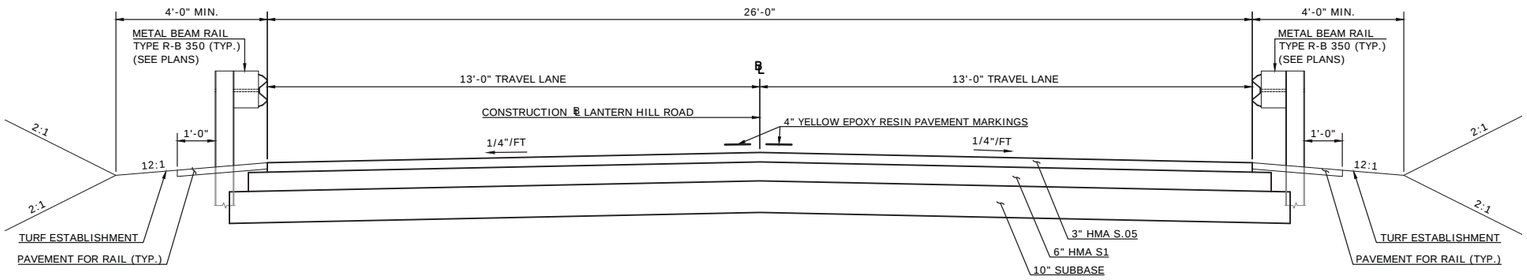
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK ROADWAY PROFILE

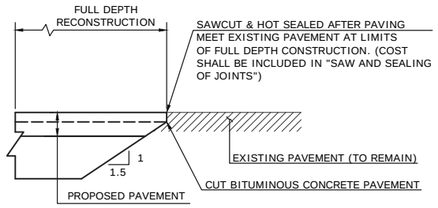
SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		6	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	7	23



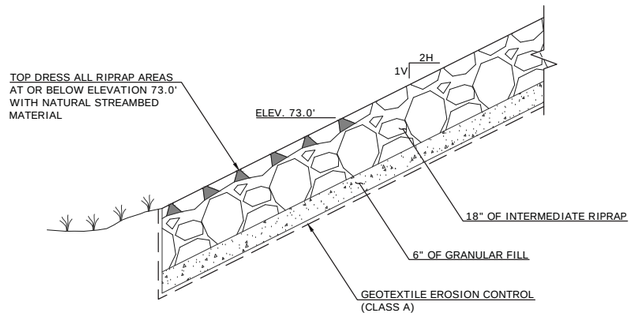
TYPICAL ROADWAY SECTION

SCALE: 1" = 2'-0"



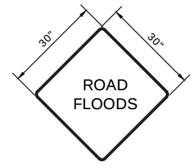
ROADWAY PAVEMENT TRANSITION DETAIL AT CONSTRUCTION LIMITS

SCALE: N.T.S.



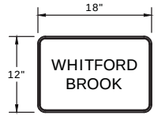
RIPRAP SLOPE DETAIL

SCALE: NOT TO SCALE.



CONNDOT SIGN NO. 41-4602

NOT TO SCALE



CONNDOT SIGN NO. 51-2009

NOT TO SCALE

SCHEDULE OF SIGNS

CONNDOT SIGN NO.	SIZE	LEGEND	LOCATION	ALUM. THK.	POSTS	BACKGROUND COLOR	LEGEND COLOR
51-2009	18" X 12"	WHITFORD BROOK	STA. 2+02±, 16.3'± R	0.080	2	GREEN	WHITE
51-2009	18" X 12"	WHITFORD BROOK	STA. 2+88±, 17.0' ± L	0.080	2	GREEN	WHITE
41-4602	30" X 30"	ROAD FLOODS	STA. 0+89±, 13.8' ± R	0.080	2	YELLOW	BLACK
41-4602	30" X 30"	ROAD FLOODS	STA. 3+99±, 12.5' ± L	0.080	2	YELLOW	BLACK

* NOTE: ALL COLORS SHALL BE TYPE IV RETROREFLECTIVE WITH THE EXCEPTION OF BLACK WHICH SHALL BE OPAQUE.

NOTES:
1. FOR SPECIFIC SIGN DESIGN CONTACT CONN. D.O.T., DIVISION OF TRAFFIC ENGINEERING FOR BOLT HOLE PATTERN REFER TO FHWA PUBLICATION "STANDARD HIGHWAY SIGNS". SIGNS OF DIFFERENT DIMENSIONS TO BE ERECTED ON THE SAME POSTS, OR SPAN/MAST ARM MOUNTED, MAY REQUIRE SPECIAL BOLT HOLE PATTERS.
2. POSTS - SEE TYP. SHEET (SHT #9) - "TYPICAL METAL SIGN POSTS AND SIGN MOUNTING DETAILS."
3. POSTS - TYPE A (EXCEPT WHERE NOTED WITH A "B" FOR TYPE B)
4. SIGNS SHALL BE FABRICATED OF ONE CONTINUOUS PIECE OF SHEET ALUMINUM. SPLICING OF SHEET ALUMINUM WILL NOT BE ACCEPTED.

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NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.M.M.
DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

SFD SUBMITTAL

WMC CONSULTING ENGINEERS

• WENGELL, McDONNELL & COSTELLO •
87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF LEDYARD

741 COLONEL LEDYARD HIGHWAY

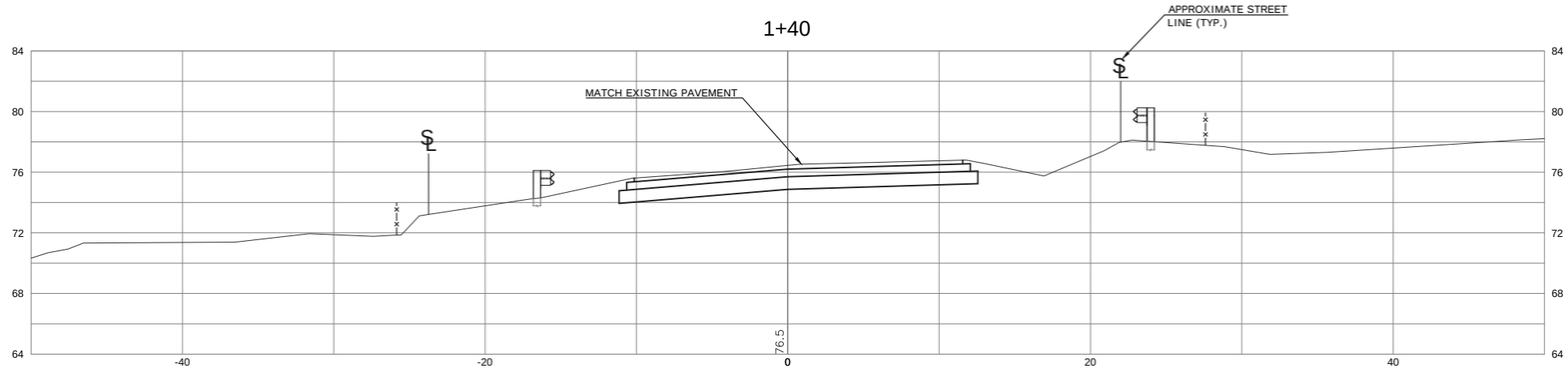
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK ROADWAY PLAN

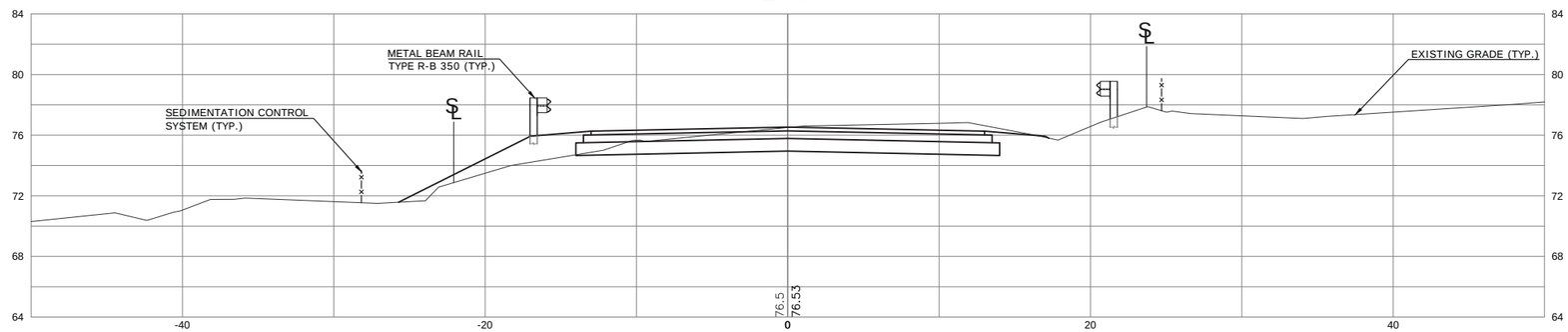
SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		7	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	8	23

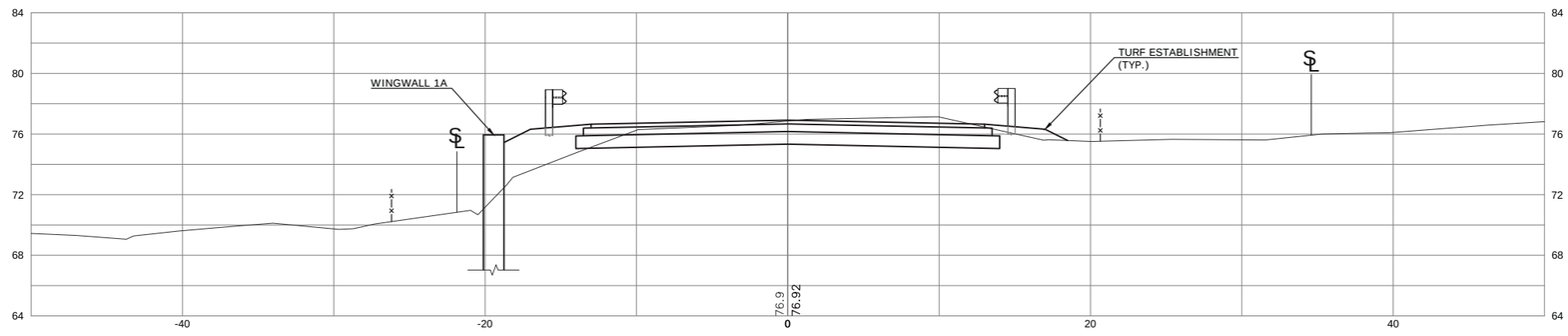
1+40



1+50



2+00



ROADWAY SECTIONS

SCALE: 1" = 5'-0"

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NO.	DATE	DESCRIPTION

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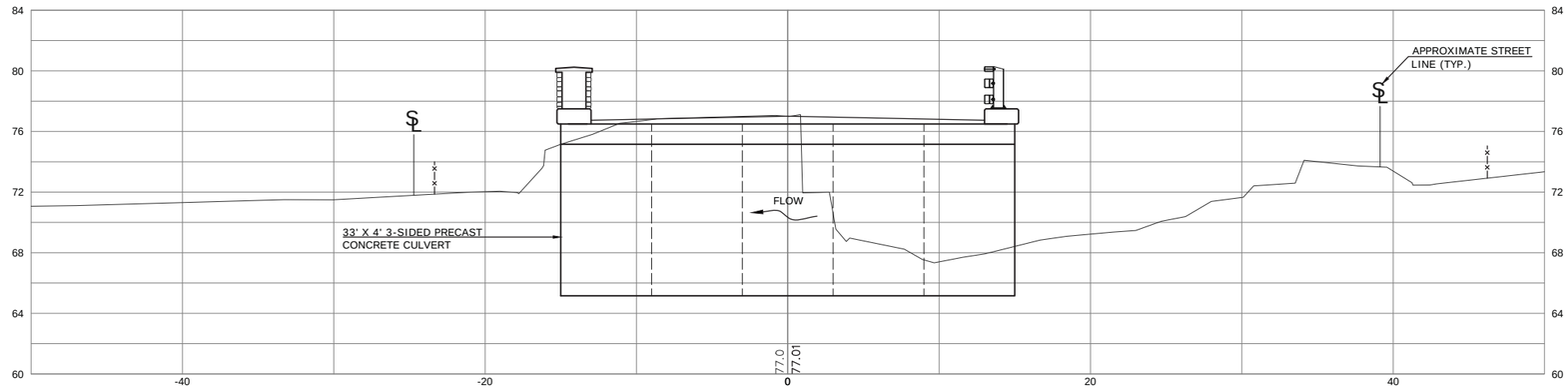
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK ROADWAY CROSS SECTIONS

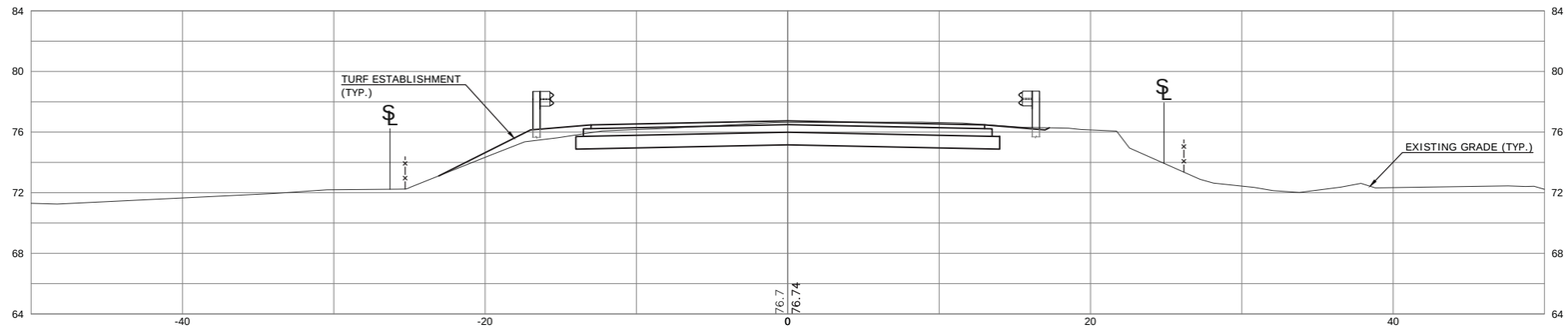
SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		8	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	9	23

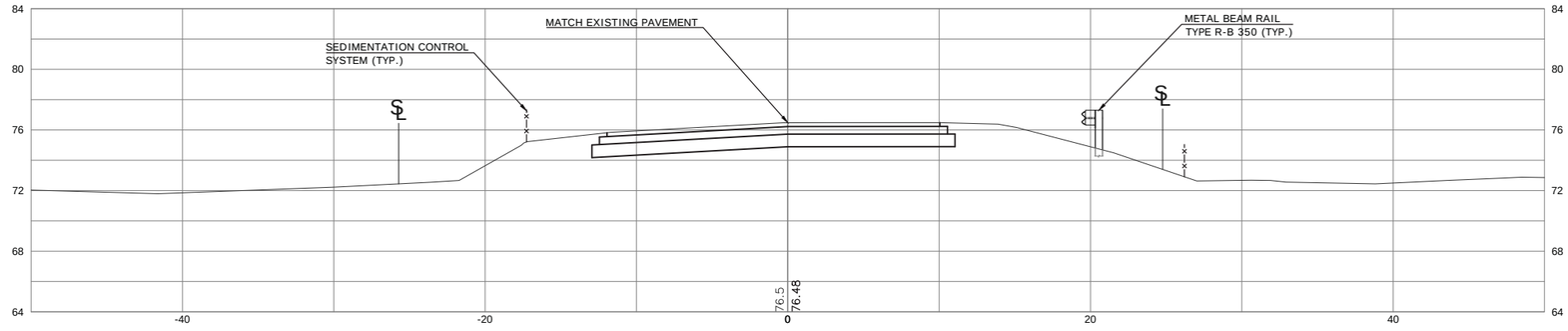
2+50



3+00



3+25



ROADWAY SECTIONS

SCALE: 1" = 5'-0"

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REVISIONS

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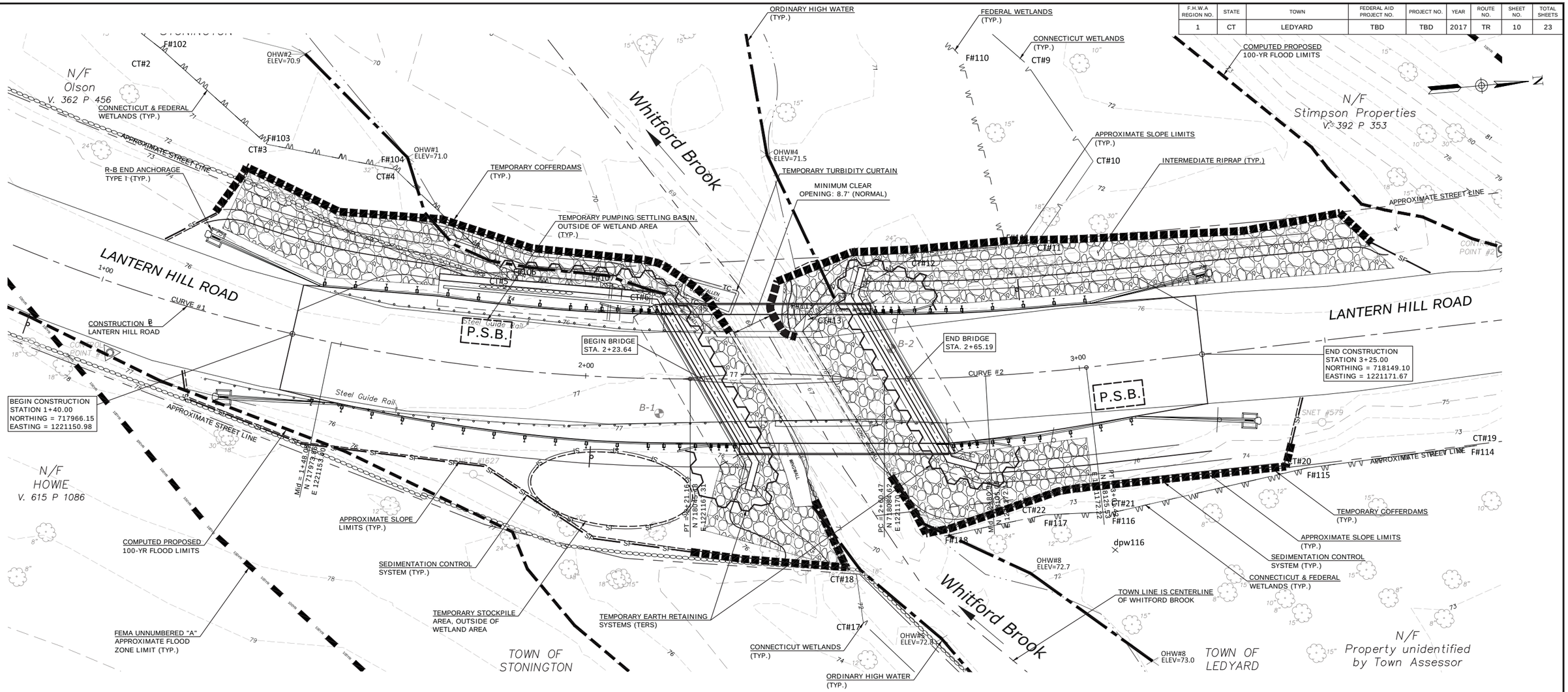
REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK ROADWAY CROSS SECTIONS

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		9	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	10	23



CONSTRUCTION SEQUENCE PLAN

SCALE: 1" = 10'-0"

1. INSTALL AND MAINTAIN EFFECTIVE EROSION AND SEDIMENTATION CONTROLS THROUGHOUT THE DURATION OF THE PROJECT, IN ACCORDANCE WITH THE CONTRACTOR'S APPROVED PLAN OR AS DIRECTED BY THE ENGINEER.
2. INSTALL TEMPORARY PRECAST BARRIER CURBING, CLOSING LANTERN HILL ROAD TO THROUGH TRAFFIC.
3. REMOVE EXISTING BRIDGE SUPERSTRUCTURE, PROTECTING THE BROOK FROM FALLING DEBRIS DURING THE REMOVAL. ANY DEBRIS WHICH FALLS INTO THE BROOK SHALL BE IMMEDIATELY REMOVED. KEEP THE EXISTING BRIDGE ABUTMENTS IN PLACE TO A TOP ELEVATION OF 74.5'.
4. INSTALL TEMPORARY EARTH RETAINING SYSTEMS (TERS) FOR THE INSTALLATION OF THE NEW BRIDGE ABUTMENTS, TOP OF TERS ELEVATION 74.5'.
5. CONSTRUCT THE NEW BRIDGE ABUTMENTS AND WINGWALLS.
6. REMOVE EXISTING "FALLEN WINGWALL" LOCATED ALONG THE BOTTOM OF THE STREAM CHANNEL AT THE SOUTHWESTERLY CORNER OF THE EXISTING BRIDGE. THE "FALLEN WINGWALL" SHALL BE TEMPORARILY ENCIRCLED BY A TURBIDITY CURTAIN TO PROTECT THE BROOK DURING SUCH REMOVAL.
7. INSTALL COFFERDAMS AT ENDS OF REMAINING EXISTING ABUTMENTS TO ELEVATION 74.5'.
8. BACKFILL ABUTMENTS AND REMOVE TERS.
9. INSTALL RIPRAP ALONG THE PROPOSED HORIZONTAL RIPARIAN SHELVES LOCATED BETWEEN THE EXISTING AND PROPOSED ABUTMENT FACES AND TOP DRESS WITH NATURAL STREAMBED MATERIAL TO ELEVATION 73.0'.
10. CUT REMAINING PORTIONS OF THE EXISTING BRIDGE ABUTMENTS DOWN TO ELEVATION 73.0'.
11. INSTALL THE THREE-SIDED PRECAST BOX SECTIONS AND PERFORM THE REMAINING CULVERT BACKFILL.
12. INSTALL THE REMAINING AREAS OF RIPRAP AS SHOWN ON THE PLANS AND TOP DRESS ALL AREAS AT OR BELOW ELEVATION 73.0' WITH NATURAL STREAMBED MATERIAL.
13. REMOVE THE REMAINING SECTIONS OF COFFERDAMS.
14. PAVE ROADWAY, FINALIZE GRADING AND INSTALL GUIDERAIL.
15. PERFORM FINAL SITE STABILIZATION AND CLEANUP AND REMOVE REMAINING EROSION AND SEDIMENTATION CONTROLS.

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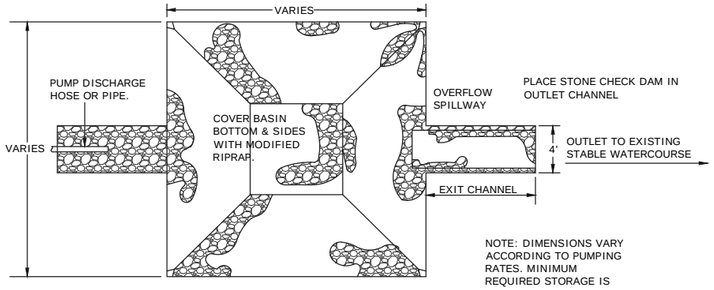
REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK CONSTRUCTION SEQUENCE AND HANDLING WATER PLAN

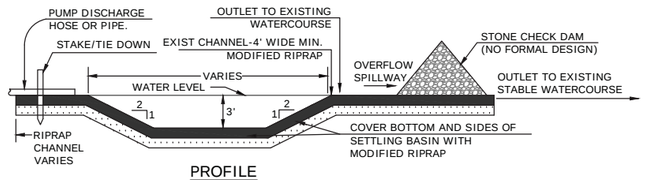
SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	LANTERN HILL RD	SFD	15097.10		10 23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	11	23



NOTE: DIMENSIONS VARY ACCORDING TO PUMPING RATES. MINIMUM REQUIRED STORAGE IS CALCULATED FROM SPILLWAY WEIR.

PLAN VIEW



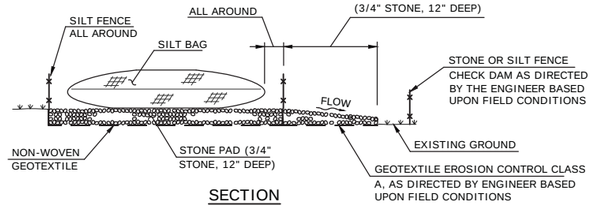
PROFILE

REFER TO PAGE 5-13-7 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL".

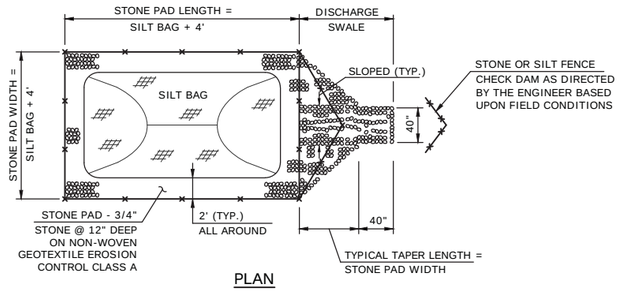
TYPE III PUMPING SETTLING BASIN

N.T.S.

PUMPING SETTLING BASIN NOTES:
1. LOCATION AS DIRECTED BY ENGINEER. REMOVE WHEN PUMPING IS COMPLETED.
2. PUMP DISCHARGE PAD HALL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST THE GENERAL WORK.
3. STORAGE VOLUME BASED UPON PUMP DISCHARGE, LARGER PAD DIMENSIONS MAY BE REQUIRED AS DIRECTED BY THE ENGINEER. (MINIMUM REQUIRED STORAGE, CUBIC FEET) = 16 x (PUMP DISCHARGE RATE, GPM)
4. TYPE II PUMPING SETTLING BASIN TO BE USED WHEN THE EXPECTED DURATION OF USE IS LESS THAN 3 MONTHS. TYPE III PUMPING SETTLING BASIN TO BE USED WHEN THE EXPECTED DURATION OF USE IS LONGER THAN 3 MONTHS.
5. SETTLING BASIN AND EXIT CHANNEL TO BE BACKFILLED AT COMPLETION OF WORK. AREA SHALL BE GRADED AND STABILIZED ACCORDING TO PLANS OR AS DIRECTED BY THE ENGINEER.

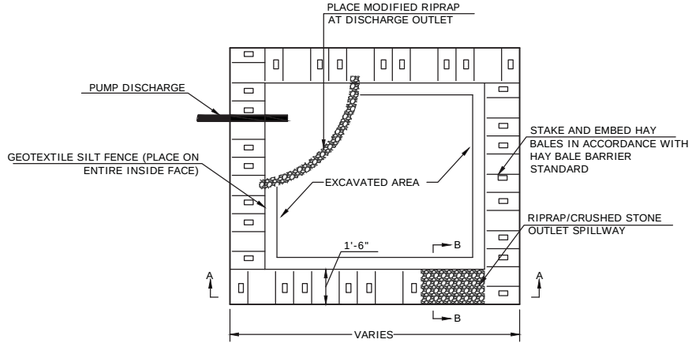


SECTION

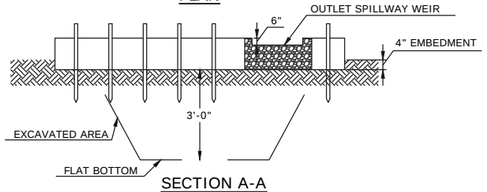


PLAN

SILT BAG INSTALLATION

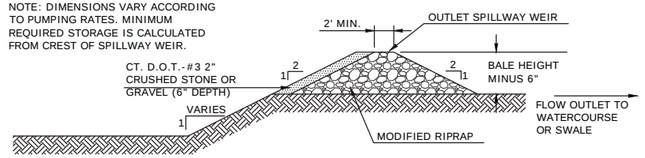


PLAN



SECTION A-A

NOTE: DIMENSIONS VARY ACCORDING TO PUMPING RATES. MINIMUM REQUIRED STORAGE IS CALCULATED FROM CREST OF SPILLWAY WEIR.

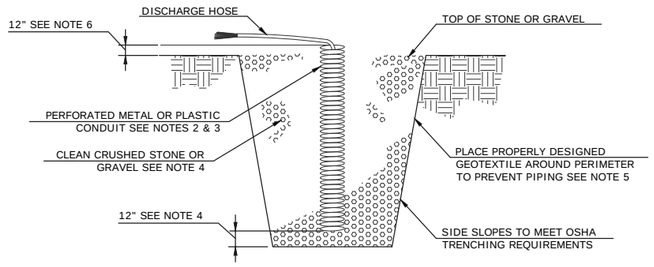


SECTION B-B

REFER TO PAGE 5-13-7 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL".

TYPE II PUMPING SETTLING BASIN

N.T.S.



REFER TO PAGE 5-13-3 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL".

NOTE:
1. OVERALL SUMP PIT DIMENSIONS SHALL BE COMPATIBLE WITH ANTICIPATED SEEPAGE RATES AND PUMP SIZE TO BE USED.
2. THE STANDPIPE DIAMETER AND NUMBER OF PERFORATIONS SHALL BE COMPATIBLE WITH THE PUMP SIZE BEING USED.
3. PERFORATIONS IN THE STANDPIPE SHALL BE EITHER CIRCULAR OR SLOTS. PERFORATION SIZE SHALL NOT EXCEED 1/2" IN DIAMETER.
4. CRUSHED STONE OR GRAVEL SHALL BE NO SMALLER THAN CT DOT #8 SIZE NOR LARGER THAN CT DOT #3 SIZE. CRUSHED STONE SHALL EXTEND A MINIMUM OF 12" BELOW THE BOTTOM OF THE STANDPIPE.
5. IF EXCESSIVE MOVEMENT OF FINE SOIL PARTICLES FROM THE SURROUNDING EXISTING SOILS IS ANTICIPATED, A PROPERLY DESIGNED GEOTEXTILE SHALL BE PLACED BETWEEN THE EXISTING SOILS AND THE CRUSHED STONE OR GRAVEL BACKFILL.
6. THE STANDPIPE SHALL EXTEND A MINIMUM OF 12" ABOVE THE SURROUNDING GROUND.

PUMP INTAKE

TYPICAL SECTION OF SUMP PIT

N.T.S.

GENERAL
EFFLUENT FROM DEWATERED WORK AREA(S) SHOULD NOT BE DISCHARGED DIRECTLY TO THE STREAM BUT BE PROCESSED THROUGH TREATMENT STRUCTURE(S). SUCH STRUCTURES SHOULD NOT BE LOCATED WITHIN THE STREAM CHANNEL OR ADJACENT WETLANDS.

THE PROJECT SHOULD NOT BE CONDUCTED IN A MANNER WHICH IMPEDES STREAM FLOW.

COFFERDAM NOTES
1. A CONSTRUCTION SEQUENCING PLAN AND A WATER HANDLING PLAN INCLUDING A CONTINGENCY PLAN FOR FLOOD EVENTS MUST BE SUBMITTED IN WRITING TO THE ENGINEER AND APPROVED BY THE ENGINEER PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION IN A WATERWAY.

2. TEMPORARY COFFERDAM AND PUMPING NOT PAID SEPARATELY. COST TO BE INCLUDED IN THE PAY ITEM "COFFERDAM AND DEWATERING".

3. WATER HANDLING PLAN IS EXAMPLE ONLY.

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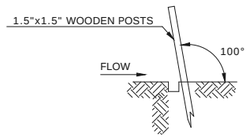
741 COLONEL LEDYARD HIGHWAY
LEDYARD, CT 06339

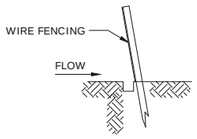
REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK
HANDLING WATER DETAILS

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		11	23

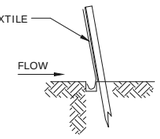
F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	12	23



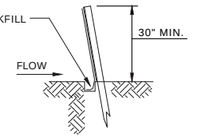
1. SET POSTS AND EXCAVATE A 6"x6" TRENCH. SET POSTS DOWN SLOPE. ANGLE 10° UPSLOPE FOR STABILITY AND SELF CLEANING.



2. ATTACH THE WIRE MESH FENCING TO POST.



3. ATTACH GEOTEXTILE TO THE WIRE FENCING AND EXTEND IT TO THE TRENCH.



4. BACKFILL THE TRENCH AND COMPACT THE EXCAVATED SOIL.

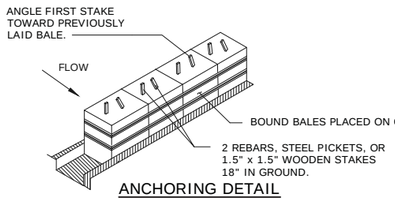
* WHEN INSTALLATION OF TRENCH IS IMPRACTICAL, ALTERNATE INSTALLATION SHALL BE TO LAY 6" FLAP HORIZONTALLY ON GROUND AND BURY FLAP BY RAMP SOIL OR STONE UP TO CONTROL FENCE. DEPTH OF RAMP SHALL BE AS REQUIRED TO HOLD DOWN FLAP WITHOUT LEAKAGE UNDER CONTROL FENCE WHILE MAINTAINING MINIMUM HEIGHT.

GEOTEXTILE FENCE SYSTEM

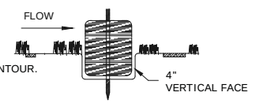
REFER TO PAGE 5-11-35 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL" AND PAGE 55 "ON-SITE MITIGATION FOR CONSTRUCTION ACTIVITIES".

SEDIMENTATION CONTROL SYSTEM INSTALLATION

N.T.S.



ANCHORING DETAIL



BEDDING DETAIL

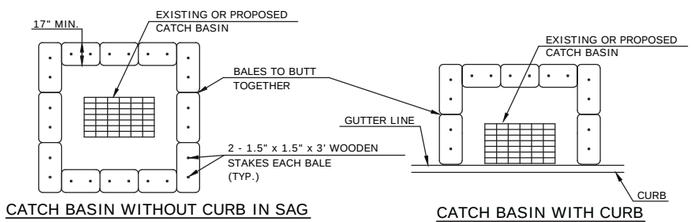
HAY BALE CONSTRUCTION SPECIFICATIONS:

1. HAY BALES SHALL BE PLACED AROUND NEWLY INSTALLED CATCH BASINS IN SAGS AND DROP INLETS TO PREVENT SEDIMENTATION AND OTHER DEBRIS FROM ACCUMULATING ON THE GRATE OR IN THE SUMP. HAY BALES SHOULD BE KEPT CLEAN AND FREE OF DEBRIS TO FACILITATE FLOW.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4", AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR REBARS DRIVEN THROUGH THE BALE. THE FIRST STAKE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

REFER TO PAGE 5-11-30 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL" AND PAGE 53 "ON-SITE MITIGATION FOR CONSTRUCTION ACTIVITIES".

HAY BALE DETAIL

N.T.S.



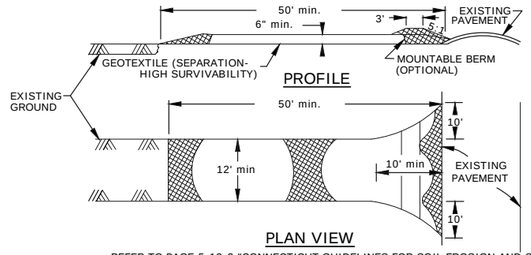
CATCH BASIN WITHOUT CURB IN SAG

CATCH BASIN WITH CURB

REFER TO PAGE 5-11-33 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL" AND PAGE 40 "ON-SITE MITIGATION FOR CONSTRUCTION ACTIVITIES".

SEDIMENTATION CONTROL DETAILS

N.T.S.



PROFILE

PLAN VIEW

REFER TO PAGE 5-12-2 "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL" AND PAGE 50 "ON-SITE MITIGATION FOR CONSTRUCTION ACTIVITIES".

CONSTRUCTION SPECIFICATION:

1. STONE SIZE - USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - AS REQUIRED, BUT NOT LESS THAN 50 FT (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30' MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN 6".
4. WIDTH - 12' MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. GEOTEXTILE - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE. GEOTEXTILE WILL NOT BE REQUIRED ON A SINGLE FAMILY RESIDENCE LOT.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAYS MUST BE REMOVED IMMEDIATELY.
8. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SETTLING AREA SIZED TO HOLD THE VOLUME OF WATER USED DURING ANY 2-HOUR PERIOD.
9. PERIODIC INSPECTION AND NECESSARY MAINTENANCE SHALL BE PROVIDED AFTER EACH RAINFALL.
10. THE COST OF CONSTRUCTING THE STABILIZED CONSTRUCTION ENTRANCE WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF THE GENERAL WORK.

STABILIZED CONSTRUCTION ENTRANCE

N.T.S.

GENERAL

THIS PLAN PROPOSES EROSION CONTROL MEASURES TO HELP CONTROL ACCELERATED EROSION AND SEDIMENTATION AND REDUCE THE DANGER FROM STORM WATER RUNOFF AT THE SITE. THE RUNOFF SHALL BE CONTROLLED BY THE INTERCEPTION, DIVERSION, AND SAFE DISPOSAL OF PRECIPITATION. RUNOFF SHALL ALSO BE CONTROLLED BY STAGING CONSTRUCTION ACTIVITY AND PRESERVING NATURAL VEGETATION WHENEVER POSSIBLE. EXISTING VEGETATION SHALL BE PROTECTED AND ONLY THAT CLEARING AND GRUBBING ABSOLUTELY NECESSARY FOR THE PROPOSED CONSTRUCTION SHALL BE PERFORMED. ALL DISTURBED AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AND CONTOUR, UNLESS OTHERWISE INDICATED ON THE PLANS. THE CONTRACTOR SHALL TAKE SPECIAL CARE WITH HIS CONSTRUCTION METHODS AND SHALL COMPLY WITH THE FOLLOWING GUIDELINES. REFERENCE IS MADE TO THE "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL" (2002), AS AMENDED. THE GUIDELINES ARE OBTAINABLE FROM THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION, 79 ELM STREET, HARTFORD, CONNECTICUT 06106, AND SHOULD BE USED AS A REFERENCE IN CONSTRUCTING THE EROSION AND SEDIMENTATION CONTROLS INDICATED ON THESE PLANS. AN ADDITIONAL REFERENCE IS THE 1994 CONNDOT PUBLICATION "ON-SITE MITIGATION FOR CONSTRUCTION ACTIVITIES".

EROSION CONTROL

ALL AREAS SHALL BE PROTECTED FROM EROSION DURING AND AFTER CONSTRUCTION, PARTICULARLY THE STORAGE OF EXCAVATED OR STOCKPILED MATERIAL. THE CONTRACTOR SHALL CAREFULLY STRIP ALL TOPSOIL, LOAM, OR ORGANIC MATTER PRIOR TO TRENCHING OR OTHER OPERATIONS AND SHALL STORE THEM SEPARATELY FROM ALL OTHER MATERIALS DURING EXCAVATION. EACH STOCKPILE MUST BE ADEQUATELY RINGED WITH SEDIMENTATION CONTROL SYSTEM (I.E. HAY BALES AND/OR GEOTEXTILE FENCE). DEBRIS AND OTHER WASTE RESULTING FROM EQUIPMENT MAINTENANCE AND CONSTRUCTION WILL NOT BE DISCARDED ON SITE. STABILIZING OF SLOPES SHALL BE DONE IMMEDIATELY AFTER CONSTRUCTION OF SLOPES. SLOPES STEEPER THAN 4:1 SHALL BE PROTECTED WITH EROSION CONTROL MATTING. THIS MATTING IS MANUFACTURED COMBINATIONS OF MULCH AND NETTING AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ALL OTHER AREAS SHALL BE MULCHED WITH HAY OR STRAW AT A RATE OF 2 TO 3 TONS PER ACRE. STRAW OR HAY MULCH MUST BE ANCHORED IMMEDIATELY AFTER SPREADING TO PREVENT WINDBLOWING. THE METHODS RECOMMENDED BY THE "CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENTATION CONTROL" SHALL BE USED FOR THE ANCHORING OF MULCH OR NETTING.

EROSION AND SEDIMENTATION CONTROL PLAN

AN EROSION AND SEDIMENTATION CONTROL PLAN MUST BE SUBMITTED IN WRITING TO THE ENGINEER AND APPROVED BY THE ENGINEER PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.
SEDIMENTATION CONTROL SYSTEM - THE SEDIMENTATION CONTROL SYSTEM SHALL CONSIST OF A GEOTEXTILE BARRIER FENCE. THE SEDIMENTATION CONTROL SYSTEM SHALL BE INSTALLED IMMEDIATELY AFTER A CUT SLOPE HAS BEEN GRADED, BEFORE A FILL SLOPE HAS BEEN CREATED AND AS INDICATED ON THE PLANS. THE SYSTEM IS DESIGNED TO INTERCEPT SILT AND SEDIMENT BEFORE IT REACHES THE WETLANDS OR WATERCOURSES. DEPOSITS OF SEDIMENT AND SILT ARE TO BE PERIODICALLY REMOVED FROM THE UPSTREAM SIDE OF THE FENCE. THIS MATERIAL IS TO BE SPREAD AND STABILIZED IN AREAS NOT SUBJECT TO EROSION, OR IN AREAS WHICH ARE NOT TO BE PAVED OR BUILT ON. THE SEDIMENTATION CONTROL SYSTEM IS TO BE REPLACED AS NECESSARY TO PROVIDE PROPER FILTERING ACTION. THE SYSTEM IS TO REMAIN IN PLACE AND BE MAINTAINED TO INSURE EFFICIENT SILTATION CONTROL UNTIL ALL AREAS ABOVE THE FENCE ARE STABILIZED AND VEGETATION HAS BEEN ESTABLISHED.

STACKED HAY BALES - HAY OR STRAW BALES USED FOR EROSION CONTROL SHALL BE STACKED AT CATCH BASINS WHERE SEDIMENT MAY ENTER THE CATCH BASIN OR AS DIRECTED BY THE RESIDENT ENGINEER. DEPOSITS OF SEDIMENT AND SILT ARE TO BE PERIODICALLY REMOVED FROM THE UPSTREAM SIDE OF THE EROSION CHECKS. THIS MATERIAL IS TO BE SPREAD AND STABILIZED IN AREAS NOT SUBJECT TO EROSION, OR IN AREAS WHICH ARE NOT TO BE PAVED OR BUILT ON. HAY OR STRAW BALES ARE TO BE REPLACED AS NECESSARY TO PROVIDE PROPER FILTERING ACTION. THE SYSTEM IS TO REMAIN IN PLACE AND BE MAINTAINED TO INSURE EFFICIENT SILTATION CONTROL UNTIL ALL AREAS ABOVE THE EROSION CHECKS ARE STABILIZED AND VEGETATION HAS BEEN ESTABLISHED.

IN ALL AREAS, REMOVAL OF TREES, BUSHES, AND OTHER VEGETATION, AND DISTURBANCE OF THE SOIL, IS TO BE KEPT TO AN ABSOLUTE MINIMUM WHILE ALLOWING PROPER DEVELOPMENT OF THE SITE.

DURING CONSTRUCTION, AS SMALL AN AREA OF SOIL AS POSSIBLE SHOULD BE EXPOSED FOR AS SHORT A TIME AS POSSIBLE. AFTER CONSTRUCTION, GRADE, RESPREAD TOPSOIL, AND STABILIZE SOIL BY SEEDING AND MULCHING AS TO PREVENT EROSION.

EROSION AND SEDIMENTATION CONTROL MAINTENANCE PROCEDURES

ALL EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE INSPECTED DURING CONSTRUCTION ON A DAILY BASIS AND FOLLOWING ALL STORMS BY THE RESIDENT ENGINEER. THE CONTRACTOR SHALL MAINTAIN AND MAKE REPAIRS AND REMOVE SEDIMENT AS REQUESTED BY THE RESIDENT ENGINEER. THIS WORK SHALL BE PERFORMED WITHIN 24 HOURS OF THE REQUEST AND THERE SHALL BE NO SEPARATE PAYMENT FOR THIS WORK.

THE CONTRACTOR SHALL CLEAN SEDIMENT AND DEBRIS FROM ALL DRAINAGE STRUCTURES, AND PIPES AT THE COMPLETION OF CONSTRUCTION, AND AS REQUESTED BY THE RESIDENT INSPECTOR TO KEEP THE SYSTEM FUNCTIONING PROPERLY DURING CONSTRUCTION.

FOLLOWING COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL REPAIR ALL ERODED AREAS AND ENSURE A GOOD STAND OF TURF IS ESTABLISHED THROUGHOUT. THE CONTRACTOR SHALL REPAIR ALL ERODED OR DISPLACED RIPRAP, AND CLEAN SEDIMENT COVERED STONES.

ALL APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE ESTABLISHED PRIOR TO AND BE MAINTAINED THROUGH ALL CONSTRUCTION PHASES.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE TOWN AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION

REVISIONS

SUPV. J.A.C.
DESIGN S.M.M.
DRAWN S.M.M.
CHECKED K.O.E.
DATE 06/15/2017

SFD SUBMITTAL

WMC CONSULTING ENGINEERS
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PREPARED FOR

TOWN OF LEDYARD

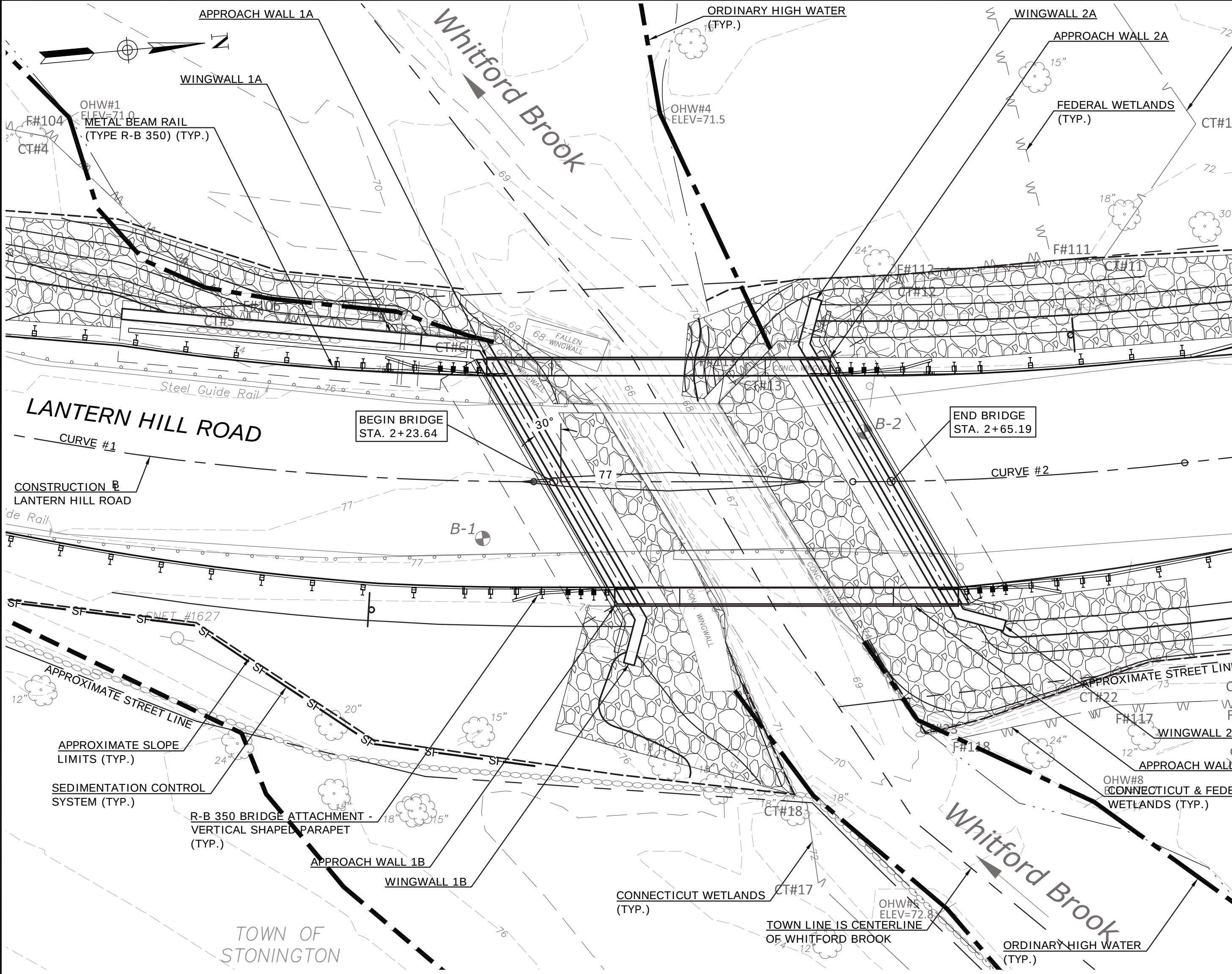
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK EROSION AND SEDIMENTATION CONTROL DETAILS

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	– LANTERN HILL RD –	SFD –	15097.10 –		12 23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	13	23

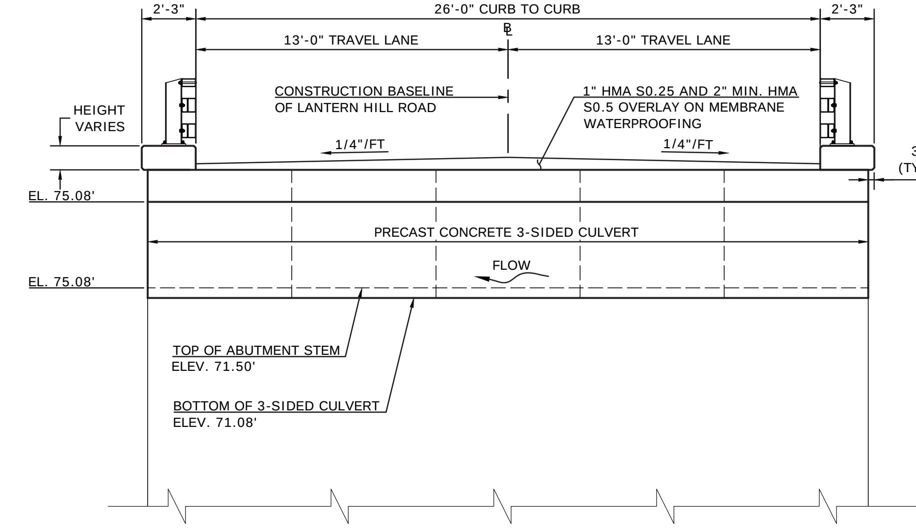


STRUCTURE PLAN

SCALE: 1" = 10'-0"

APPROXIMATE BORING LOCATIONS

QUANTITIES		
ITEM	UNIT	QTY
STRUCTURE EXCAVATION - EARTH (EXCLUDING COFFERDAM AND DEWATERING)	C.Y.	680
COFFERDAM AND DEWATERING	L.F.	490
GRANULAR FILL	C.Y.	130
PERVIOUS STRUCTURE BACKFILL	C.Y.	550
1/2" PREFORMED JOINT FILLER	S.F.	110
HMA S0.5	TON	30
HMA S0.25	TON	10
MATERIAL FOR TACK COAT	GAL.	35
REMOVAL OF SUPERSTRUCTURE	L.S.	1
CLASS "A" CONCRETE	C.Y.	270
CLASS "F" CONCRETE	C.Y.	30
PRECAST CONCRETE 3-SIDED CULVERT	L.F.	34.75
DEFORMED STEEL BARS	LBS	37100
DEFORMED STEEL BARS - EPOXY COATED	LBS	5000
CONCRETE FORM LINERS	S.F.	895
MEMBRANE WATERPROOFING (WOVEN GLASS FABRIC)	S.Y.	255
DAMPROOFING	S.Y.	130
TEMPORARY EARTH RETAINING SYSTEM	S.F.	5200
6" C.C.M.P. STRUCTURE UNDERDRAIN	L.F.	140
6" C.C.M. OUTLETS FOR UNDERDRAIN	L.F.	7
3 TUBE CURB MOUNTED BRIDGE RAIL	L.F.	60
REMOVAL OF EXISTING MASONRY	C.Y.	35



BRIDGE SECTION
(NORMAL TO BASELINE)

SCALE: 1/4" = 1"-0"

NOTICE TO BRIDGE INSPECTORS	
THE DEPARTMENT'S BRIDGE SAFETY PROCEDURES REQUIRE THIS BRIDGE TO BE INSPECTED FOR, BUT NOT LIMITED TO, ALL APPROPRIATE COMPONENTS INDICATED IN THE GOVERNING MANUALS FOR BRIDGE INSPECTION. ATTENTION MUST BE GIVEN TO INSPECTING THE FOLLOWING SPECIAL COMPONENTS AND DETAILS (THE LISTING OF COMPONENTS FOR SPECIAL ATTENTION SHALL NOT BE CONSTRUED TO REDUCE THE IMPORTANCE OF THE INSPECTION OF ANY OTHER COMPONENT OF THE STRUCTURE). THE FREQUENCY OF INSPECTION OF THIS STRUCTURE SHALL BE IN ACCORDANCE WITH THE GOVERNING MANUALS FOR BRIDGE INSPECTION, UNLESS OTHERWISE DIRECTED BY THE ENGINEER OF BRIDGES AND STRUCTURES, OR NOTED BELOW.	
COMPONENT OR DETAIL NONE	BRIDGE SHEET REF. NONE

GENERAL NOTES:

SPECIFICATIONS: CONNECTICUT DEPARTMENT OF TRANSPORTATION FORM 817 (2016).

DESIGN SPECIFICATIONS: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (AASHTO 2014, SEVENTH EDITION), AS SUPPLEMENTED BY THE CONNECTICUT DEPARTMENT OF TRANSPORTATION BRIDGE DESIGN MANUAL (2003).

ALLOWABLE DESIGN STRESSES:
CLASS "A" CONCRETE: BASED ON f'c = 3000 P.S.I.
CLASS "F" CONCRETE: BASED ON f'c = 4000 P.S.I.
REINFORCEMENT: (ASTM A615 GRADE 60) fy = 60,000 P.S.I.

CONCRETE:
THE SPECIFIED CONCRETE STRENGTH USED IN DESIGN (f'c) OF THE CONCRETE COMPONENTS IS NOTED ABOVE. THE MINIMUM COMPRESSIVE STRENGTH OF THE CONCRETE IN THE CONSTRUCTED COMPONENTS SHALL CONFORM TO THE REQUIREMENTS OF 'SECTION 6.01 CONCRETE FOR STRUCTURES'.

LIVE LOAD: HL-93, CT-L73.0, CT-L3S2, CT-P76.5, CT-P204, CT-P380 & CT-TLC

FUTURE PAVING ALLOWANCE: NONE

HMA OVERLAY: THIS SHALL CONSIST OF 2" MIN. OF HMA S0.5 ON TOP OF 1" OF HMA S0.25 ON MEMBRANE WATERPROOFING (COLD LIQUID ELASTOMERIC).

DIMENSIONS: ALL DIMENSIONS SHOWN ON THE PLANS ARE IN FEET AND INCHES EXCEPT IF NOTED OTHERWISE. ALL ELEVATIONS ARE GIVEN IN FEET. WHEN ELEVATIONS AND ARE GIVEN TO LESS THAN THREE DECIMAL PLACES, THE OMITTED DIGITS SHALL BE ASSUMED TO BE ZEROS.

EXISTING DIMENSIONS: DIMENSIONS OF THE EXISTING STRUCTURE SHOWN ON THESE PLANS ARE FOR GENERAL REFERENCE ONLY AND ARE NOT GUARANTEED. THE CONTRACTOR SHALL TAKE ALL FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF THE FINISHED WORK AND SHALL ASSUME FULL RESPONSIBILITY OF THEIR ACCURACY. WHEN SHOP DRAWINGS BASED ON FIELD MEASUREMENTS ARE SUBMITTED FOR APPROVAL, FIELD MEASUREMENTS SHALL ALSO BE SUBMITTED FOR REFERENCE BY THE REVIEWER.

SUPERSTRUCTURE REMOVAL: BEFORE INITIATING CONSTRUCTION, CONTRACTOR SHALL SUBMIT A PLAN FOR APPROVAL DEFINING METHOD FOR PROTECTION OF THE STREAM AREA DURING REMOVAL OF EXISTING BRIDGE SUPERSTRUCTURE. COST TO BE INCLUDED IN THE COST OF REMOVAL OF SUPERSTRUCTURE.

COFFERDAMS AND DEWATERING: BEFORE INITIATING CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A PLAN FOR APPROVAL THAT DEFINES METHODS AND MATERIALS FOR CONTROLLING STREAM WATER (COFFERDAMS, ETC.), DEWATERING, STRUCTURE EXCAVATION AND PROTECTING THE STREAM DURING VARIOUS STAGES OF CONSTRUCTION. THE COST OF THIS WORK SHALL BE INCLUDED IN THE COST OF "COFFERDAM AND DEWATERING".

UTILITY RELOCATIONS: OVERHEAD OR UNDERGROUND UTILITY LINES MAY BE IN CONFLICT WITH TEMPORARY SHEETING OR COFFERDAMS, SETTING OF PRECAST CULVERT UNITS OR OTHER CONSTRUCTION. DEPENDING UPON THE CONTRACTOR'S CONSTRUCTION OPERATIONS, THESE UTILITIES MAY NEED TO BE RELOCATED TO TEMPORARY LOCATIONS FOR PORTIONS OF THE CONSTRUCTION OPERATIONS AND THEN MOVED BACK TO PERMANENT LOCATIONS WHICH MAY BE OTHER THAN CURRENT LOCATIONS. THE ACTUAL UTILITY RELOCATIONS (PERMANENT OR TEMPORARY) WILL BE THE RESPONSIBILITY OF THE INDIVIDUAL UTILITY OWNER, HOWEVER THE CONTRACTOR WILL BE REQUIRED TO COORDINATE ALL UTILITY RELOCATIONS WITH EACH UTILITY OWNER AND TO PHASE HIS WORK AS REQUIRED TO ACCOMMODATE TEMPORARY AND PERMANENT UTILITY RELOCATION WORK. THE CONTRACTOR SHALL HAVE NO RIGHT TO CLAIM EXTRA COMPENSATION FOR DELAYS OR STAGING AND PHASING OF HIS WORK DUE TO UTILITY RELOCATION WORK.

UNCONFINED IN-STREAM: ACTIVITIES MUST BE LIMITED TO THE TIME PERIOD JUNE 1 THROUGH SEPTEMBER 30.

CONCRETE NOTES:

CLASS "A" CONCRETE: CLASS "A" CONCRETE SHALL BE USED FOR WINGWALLS AND ABUTMENTS UNLESS NOTED OTHERWISE.

CLASS "F" CONCRETE: CLASS "F" CONCRETE SHALL BE USED FOR BRIDGE PARAPETS AND APPROACH WALLS.

JOINT SEAL: SEE SPECIAL PROVISIONS.

CONCRETE COVER: ALL REINFORCEMENT SHALL HAVE MIN. 2" COVER UNLESS DIMENSIONED OTHERWISE.

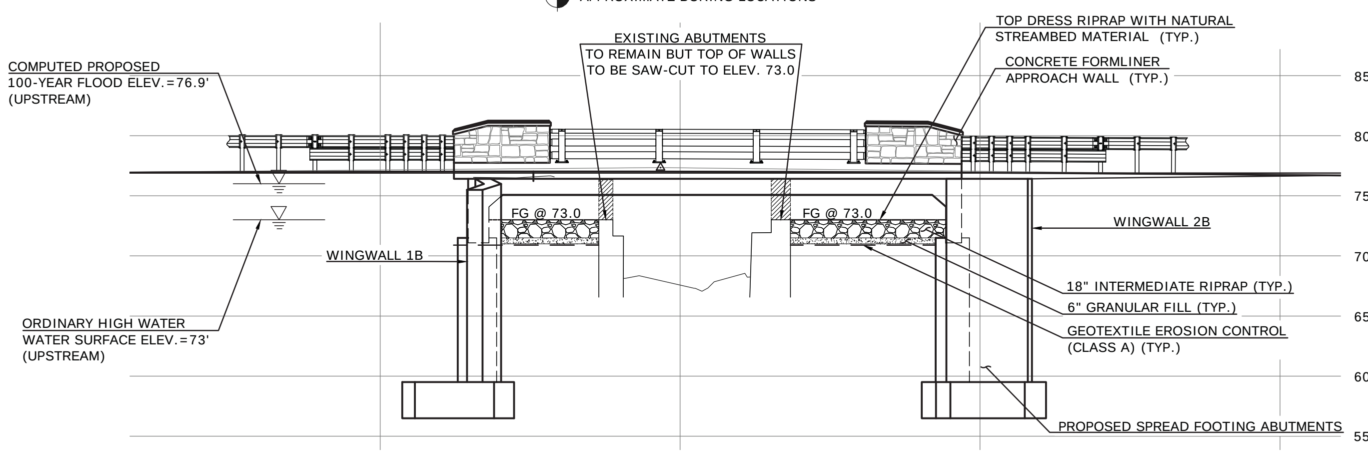
REINFORCEMENT: ALL REINFORCEMENT SHALL BE ASTM A615 GRADE 60.

EPOXY COATED REINFORCING BARS: ALL REINFORCEMENT IN THE BRIDGE PARAPETS AND TOPS OF APPROACH WALLS SHALL BE EPOXY COATED UNLESS NOTED OTHERWISE. THESE BARS SHALL BE INCLUDED IN THE PAY ITEM FOR "DEFORMED STEEL BARS (EPOXY COATED)"

CONSTRUCTION JOINTS: CONSTRUCTION JOINTS, OTHER THAN THOSE SHOWN ON THE PLANS, WILL NOT BE PERMITTED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.

EXPOSED EDGES: EXPOSED EDGES OF CONCRETE SHALL BE BEVELED 1"X1" UNLESS DIMENSIONED OTHERWISE

PRECAST THREE SIDED RIGID FRAME: FABRICATORS OF PRECAST THREE SIDED RIGID FRAME SHALL BE REQUIRED TO SUBMIT SHOP DRAWINGS PREPARED AND SIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF CONNECTICUT TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.



UPSTREAM STRUCTURE ELEVATION
(LOOKING DOWNSTREAM)

SCALE: 1/8" = 1'-0"

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NO.	DATE	DESCRIPTION
REVISIONS		

SUPV.	J.A.C.
DESIGN	S.M.M.
DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

SFD SUBMITTAL

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PREPARED FOR

TOWN OF LEDYARD

741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK STRUCTURE PLAN, ELEVATION AND SECTION

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET
D	LANTERN HILL RD	SFD	15097.10		13 OF 23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	14	23

Jaime Lloret
DRILLER
Sebghatullah Abdullah
INSPECTOR

TEST BORING REPORT
ASSOCIATED BORINGS CO., INC.
119 MARGARET CIRCLE, NAUGATUCK, CT 06770
Tel (203) 729-5435 Fax (203) 729-5116

SHEET 1 OF 1

CME-55
DRILLING EQUIPMENT
Wengall McDonnell Costello
CLIENT

SOILS ENGINEER

PROJECT NAME: Lantern Hill Road Bridge
PROJECT NUMEER: WMC Ref # 15097
LOCATION: Ledyard, Connecticut

Surface Elevation:
Date Started: 2/12/2016
Date Finished: 2/12/2016
Groundwa:er Observations
AT 6 'AFTER 0 HRS
AT 'AFTER HRS

	Auger	Casing	Sampler	Core Bar
Type	HSA		SS	
Size I. D.	3 1/4 in		2 in	
Hammer			140 lb	Bit
Fall			30 in	

Hole No. **B-1**
Line & Station
Offset
N Coordinate
E. Coordinate

DEPTH	Casing blows per foot	SAMPLE DEPTH IN FEET FROM - TO	NO.	PEN. INCH	REC. INCH	TYPE	BLOWS PER 6 INCHES ON SAMPLER 0 - 6	6 - 12	12-18	18-24	STRATA CHANGE: DEPTH, ELEV.	FIELD IDENTIFICATION OF SOIL, REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
		1.5 - 3.0	1	18	5	D	6	7	7	X	5"	Bituminous Concrete
												Br. C-F Sand and C-F Gravel, (Fill)
5		5.0 - 7.0	2	24	6	D	12	14	15	20	5	
											7	Br. M-F Silty Sand, Tr. Organics
												Br. C-F Sand and C-F Gravel, Continious Cobbles and Boulders
10		10.0 - 10.3	3	3	0	D	50/3"	X	X	X		Very Difficult Drilling
15		15.0 - 16.0	4	12	6	D	32	50	X	X		
20		20.0 - 21.5	5	18	10	D	25	36	50	X		
25		24.0 - 26.0	6	24	7	D	21	31	45	70	26	End of Boring - 26.0
30												
35												
40												

From Ground Surface to Feet Used Inch Casing Then Inch Casing For Feet

Footage in Earth 26.0 Footage in Rock 0.0 No. of Samples 6 Hole No. B-1

SAMPLE TYPE CODING: D = DRIVEN C = CORE A = AUGER UP = UNDISTURBED PISTON
PROPORTIONS USED: TRACE = 1-10% LITTLE = 10-20% SOME = 20-35% AND = 35-50%

B-1
STATION=2+15.01
OFFSET=7.03'R
NORTHING=718038.60
EASTING=1221173.69
ELEV.=77.10'

Jaime Lloret
DRILLER
Sebghatullah Abdullah
INSPECTOR

TEST BORING REPORT
ASSOCIATED BORINGS CO., INC.
119 MARGARET CIRCLE, NAUGATUCK, CT 06770
Tel (203) 729-5435 Fax (203) 729-5116

SHEET 1 OF 1

CME-55
DRILLING EQUIPMENT
Wengall McDonnell Costello
CLIENT

SOILS ENGINEER

PROJECT NAME: Lantern Hill Road Bridge
PROJECT NUMEER: WMC Ref # 15097
LOCATION: Ledyard, Connecticut

Surface Elevation:
Date Started: 2/12/2016
Date Finished: 2/12/2016
Groundwa:er Observations
AT 6 'AFTER 0 HRS
AT 'AFTER HRS

	Auger	Casing	Sampler	Core Bar
Type	HSA		SS	
Size I. D.	3 1/4 in		2 in	
Hammer			140 lb	Bit
Fall			30 in	

Hole No. **B-2**
Line & Station
Offset
N Coordinate
E. Coordinate

DEPTH	Casing blows per foot	SAMPLE DEPTH IN FEET FROM - TO	NO.	PEN. INCH	REC. INCH	TYPE	BLOWS PER 6 INCHES ON SAMPLER 0 - 6	6 - 12	12-18	18-24	STRATA CHANGE: DEPTH, ELEV.	FIELD IDENTIFICATION OF SOIL, REMARKS (INCL. COLOR, LOSS OF WASH WATER, ETC.)
		1.5 - 3.0	1	18	4	D	25	30	30	X	5"	Bituminous Concrete
												Br. C-F Sand and C-F Gravel, (Fill)
5		5.0 - 7.0	2	24	3	D	17	17	25	30	5	
											7	Br. M-F Silty Sand, Tr. Organics
												Br. C-F Sand and C-F Gravel, Continious Cobbles and Boulders
10		10.0 - 10.3	3	3	0	D	50/3"	X	X	X		Very Difficult Drilling
15		15.0 - 17.0	4	24	12	D	60	21	27	30		
20		20.0 - 20.2	5	2	0	D	50/2"	X	X	X		
25		25.0 - 27.0	6	24	8	D	15	30	28	31	27	End of Boring - 27.0
30												
35												
40												

From Ground Surface to Feet Used Inch Casing Then Inch Casing For Feet

Footage in Earth 27.0 Footage in Rock 0.0 No. of Samples 6 Hole No. B-2

SAMPLE TYPE CODING: D = DRIVEN C = CORE A = AUGER UP = UNDISTURBED PISTON
PROPORTIONS USED: TRACE = 1-10% LITTLE = 10-20% SOME = 20-35% AND = 35-50%

B-2
STATION=2+61.97
OFFSET=6.12'L
NORTHING=718086.64
EASTING=1221164.89
ELEV.=76.80'

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE TOWN AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION

REVISIONS

SUPV. J.A.C.
DESIGN S.M.M.
DRAWN S.M.M.
CHECKED K.O.E.
DATE 06/15/2017

SFD SUBMITTAL

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PREPARED FOR
TOWN OF LEDYARD
741 COLONEL LEDYARD HIGHWAY
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK BORING LOGS

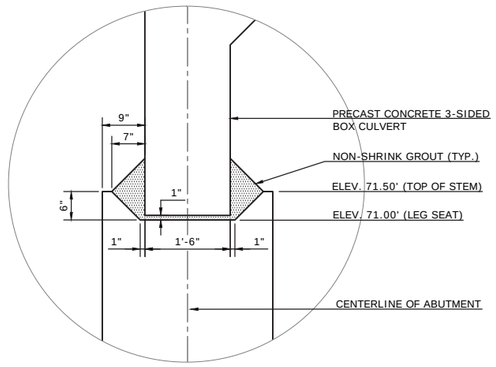
SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		14	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	15	23

WORKING POINTS		
W.P. #	NORTHING	EASTING
1	718075.94	1221185.18
2	718068.65	1221169.41
3	718061.35	1221153.64

TYPICAL ABUTMENT SECTION

SCALE: 1/2" = 1'-0"



DETAIL "A"

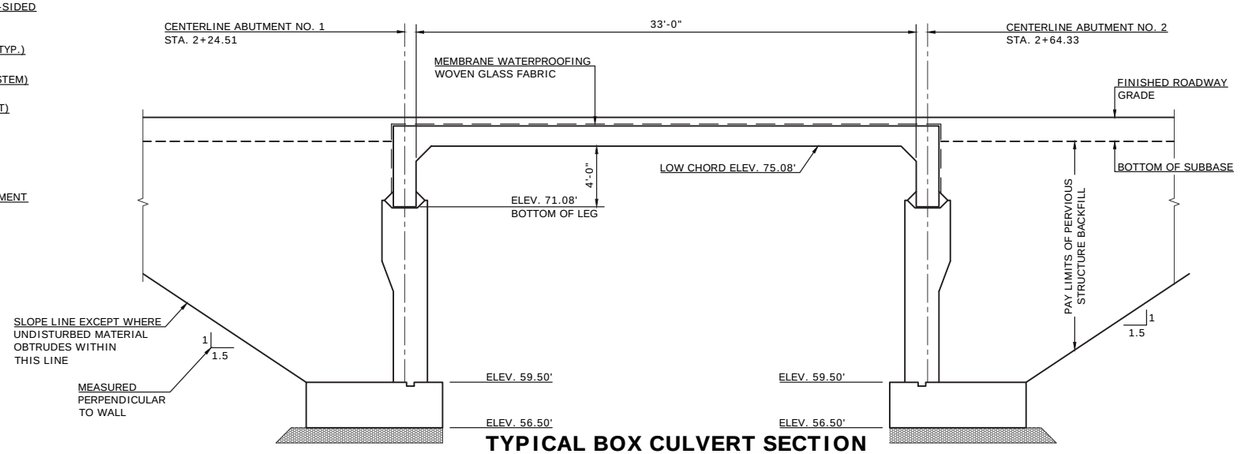
SCALE: 3/4" = 1'-0"

NOTES:

1. SEE ABUTMENT PLAN AND ELEVATION SHEETS FOR ELEVATION VIEWS OF ABUTMENT AND WINGWALLS.
2. SEE STRUCTURE DETAILS SHEETS FOR WINGWALL AND BRIDGE PARAPET SECTIONS AND DETAILS.
3. SEE APPROACH WALL DETAILS SHEET FOR APPROACH WALL SECTIONS AND DETAILS.

STRUCTURE LAYOUT

SCALE: 1" = 5'-0"



TYPICAL BOX CULVERT SECTION

(NORMAL TO BOX)
SCALE: 1" = 5'-0"

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NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.M.M.
DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

SFD SUBMITTAL

WMC CONSULTING ENGINEERS

• WENGELL, McDONNELL & COSTELLO •
87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF LEDYARD

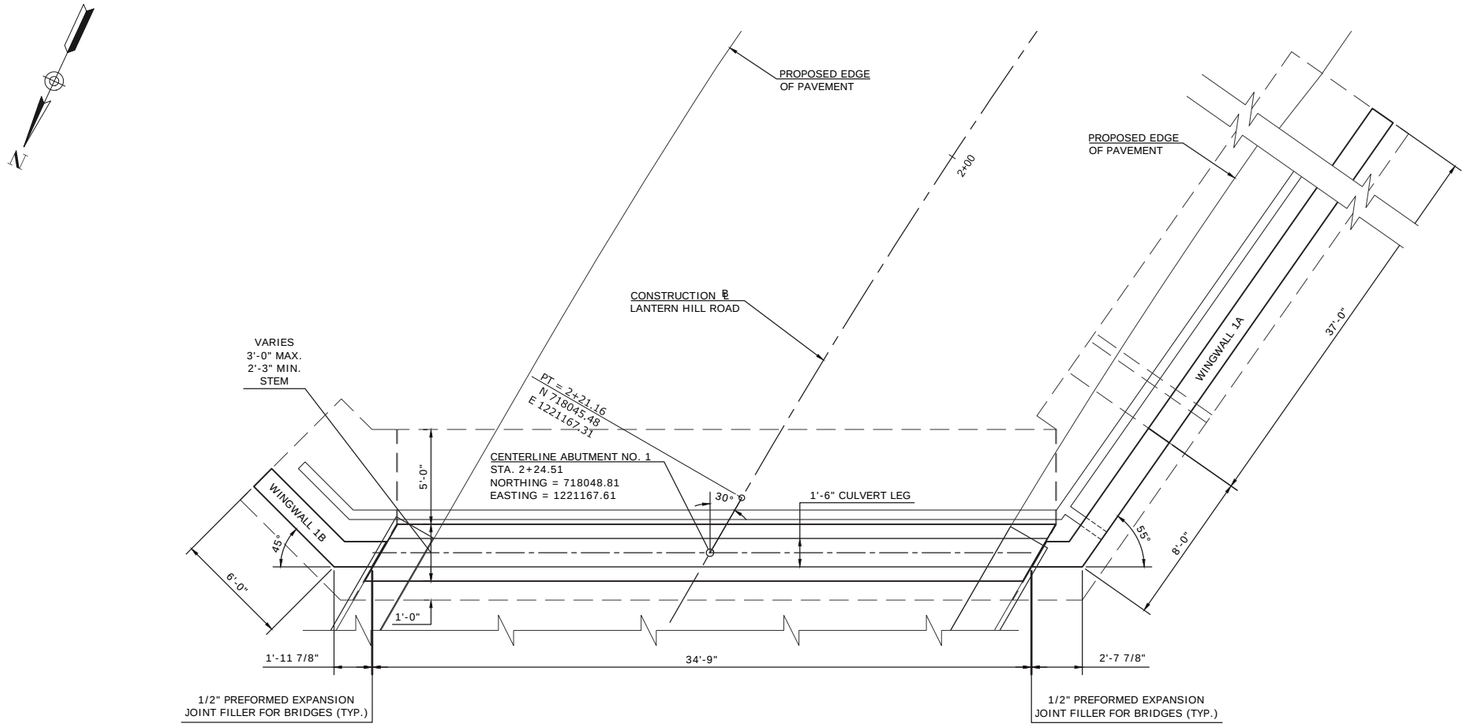
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK STRUCTURE LAYOUT PLAN

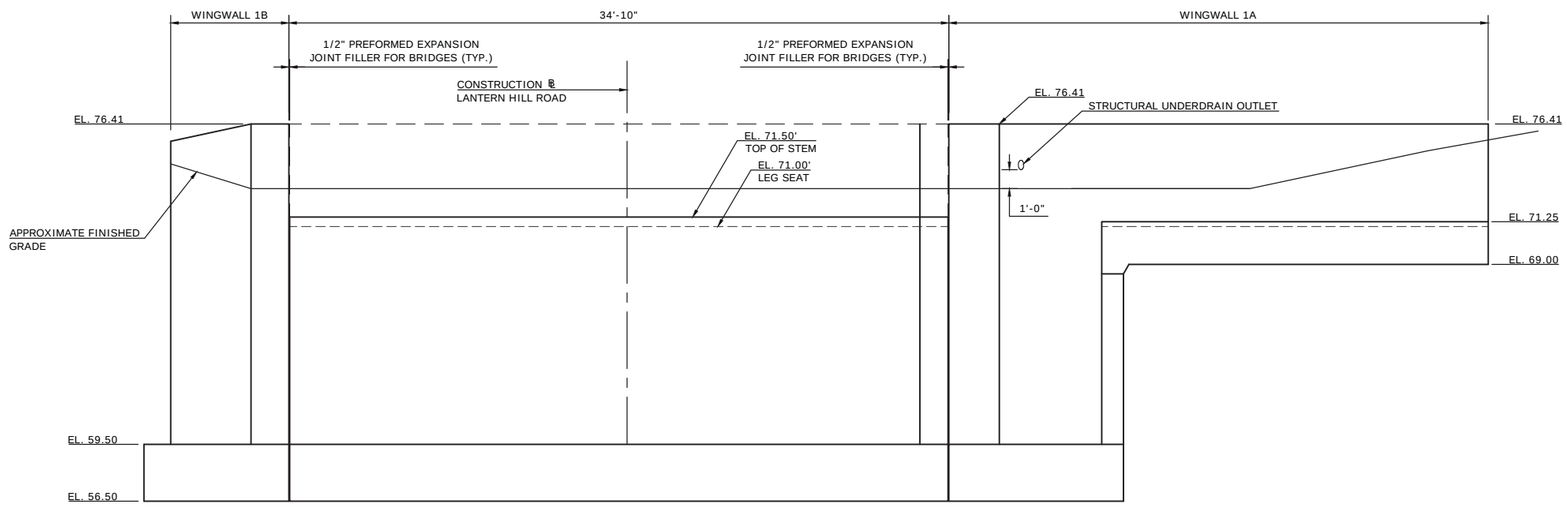
SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	– LANTERN HILL RD –	SFD	– 15097.10 –		15	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	16	23



ABUTMENT NO. 1 PLAN VIEW

SCALE: 1/4" = 1'-0"



ABUTMENT NO. 1 ELEVATION VIEW

SCALE: 1/4" = 1'-0"

NOTE:
INSTALL 1/2" PREFORMED EXPANSION JOINT FILLER BETWEEN WINGWALL STEM AND BOX CULVERT AND BETWEEN WINGWALL FOOTING AND CUTOFF/RETURN WALL.

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NO.	DATE	DESCRIPTION

REVISIONS

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DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

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TOWN OF LEDYARD

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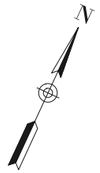
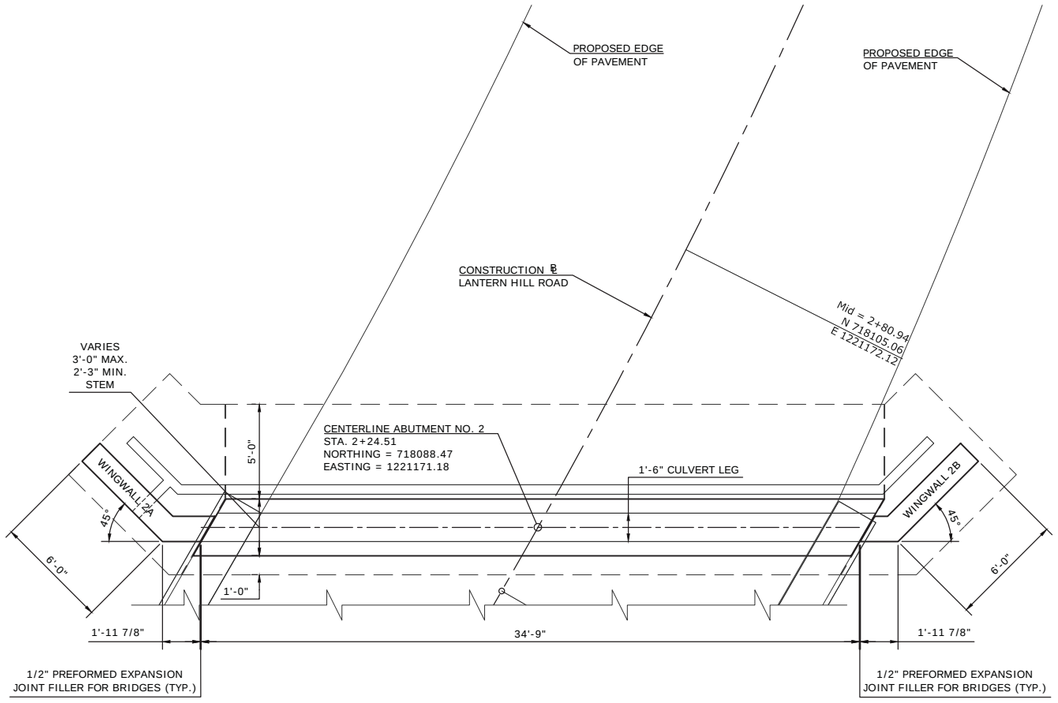
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK ABUTMENT #1 PLAN AND ELEVATION

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	– LANTERN HILL RD –	SFD	– 15097.10 –		16	23

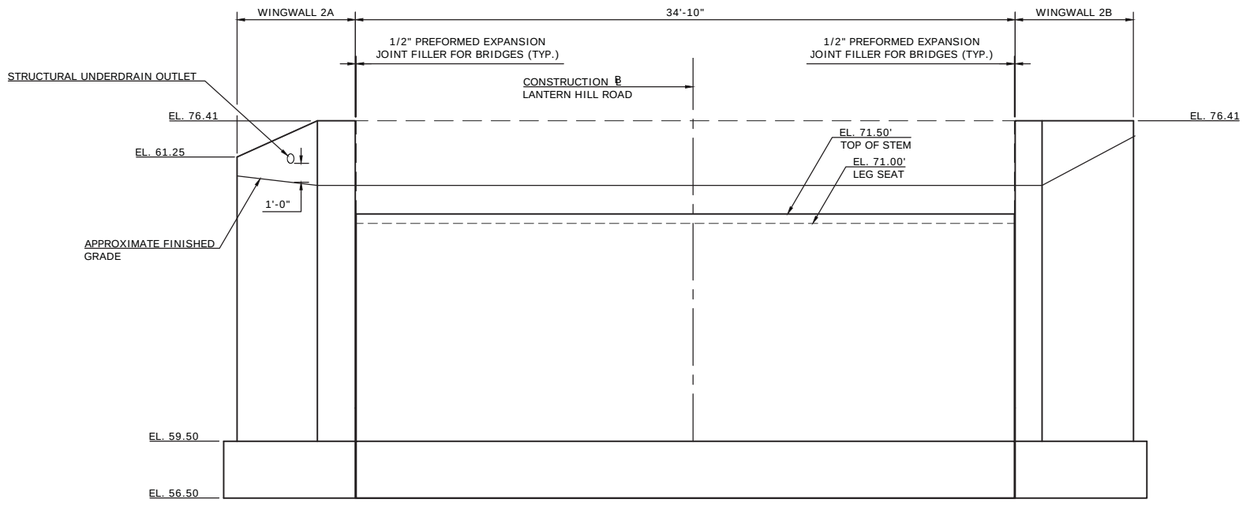
F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	17	23





ABUTMENT NO. 2 PLAN VIEW

SCALE: 1/4" = 1'-0"



ABUTMENT NO. 2 ELEVATION VIEW

SCALE: 1/4" = 1'-0"

NOTE:
INSTALL 1/2" PREFORMED EXPANSION JOINT FILLER BETWEEN WINGWALL STEM AND BOX CULVERT AND BETWEEN WINGWALL FOOTING AND CUTOFF/RETURN WALL.

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NO.	DATE	DESCRIPTION

REVISIONS

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CHECKED	K.O.E.
DATE	06/15/2017

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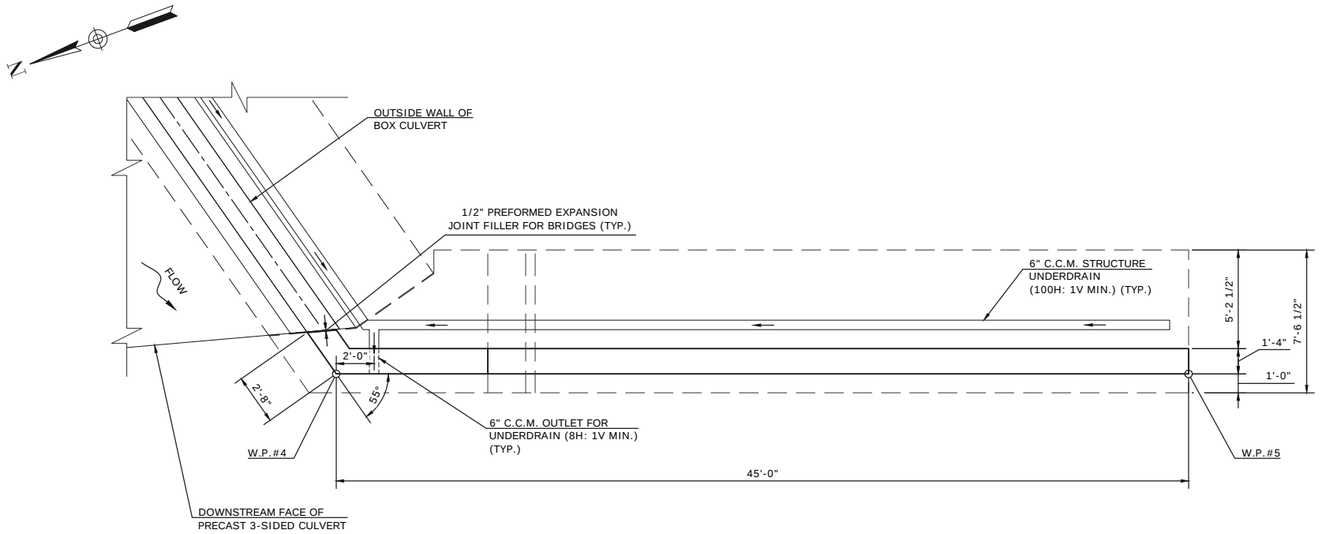
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK ABUTMENT #2 PLAN AND ELEVATION

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	– LANTERN HILL RD	– SFD	– 15097.10	–	17 / 23

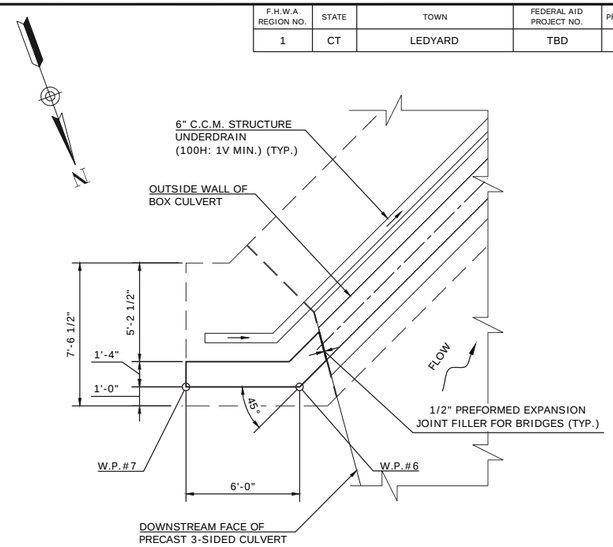
F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	18	23



WORKING POINTS		
W.P. #	NORTHING	EASTING
4	718041.24	1221149.46
5	717996.95	1221141.51
6	718057.82	1221185.31
7	718055.76	1221190.95

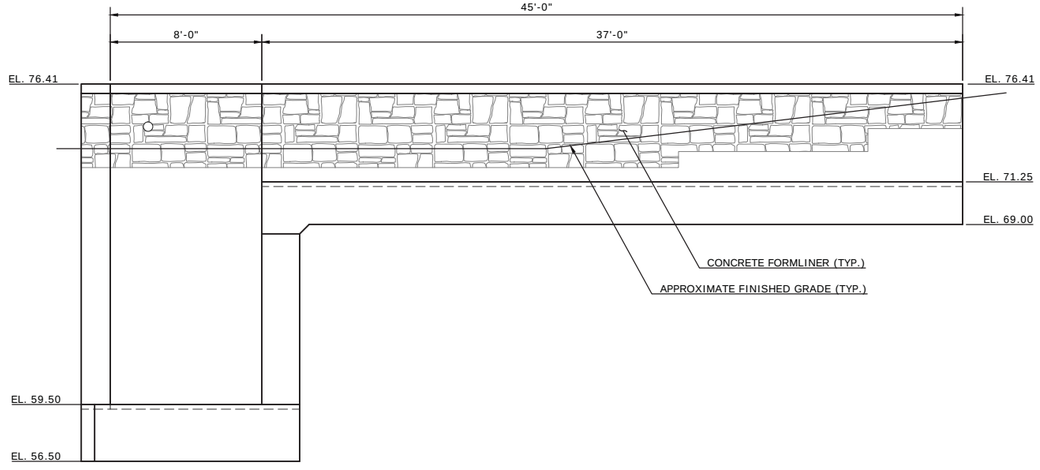
WINGWALL 1A PLAN

SCALE: 1/4" = 1'-0"



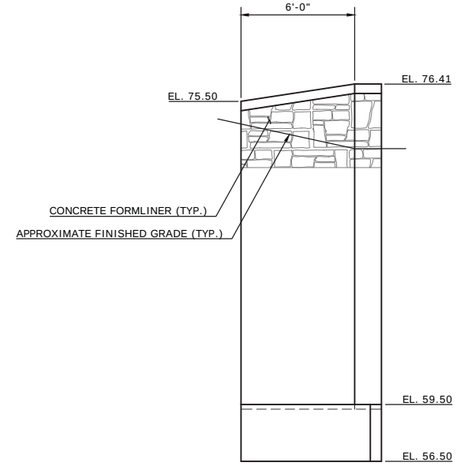
WINGWALL 1B PLAN

SCALE: 1/4" = 1'-0"



WINGWALL 1A ELEVATION VIEW

SCALE: 1/4" = 1'-0"



WINGWALL 1B ELEVATION VIEW

SCALE: 1/4" = 1'-0"

NOTE:
INSTALL 1/2" PREFORMED EXPANSION JOINT FILLER BETWEEN WINGWALL STEM AND BOX CULVERT AND BETWEEN WINGWALL FOOTING AND CUTOFF/RETURN WALL.

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TOWN OF LEDYARD

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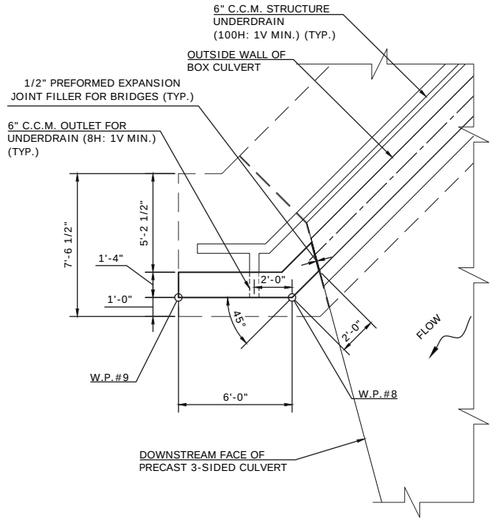
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK WINGWALL DETAILS (1 OF 2)

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	LANTERN HILL RD	SFD	15097.10		18 23

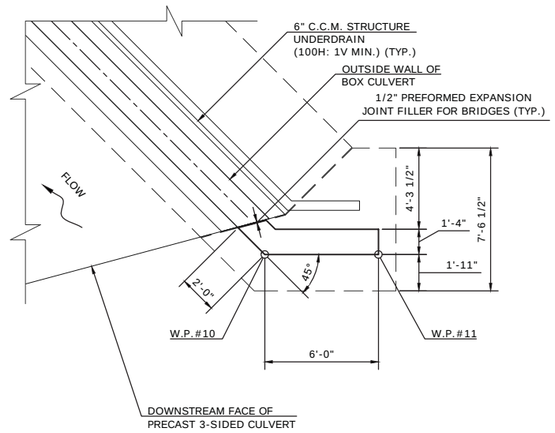
F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	19	23



WINGWALL 2A PLAN

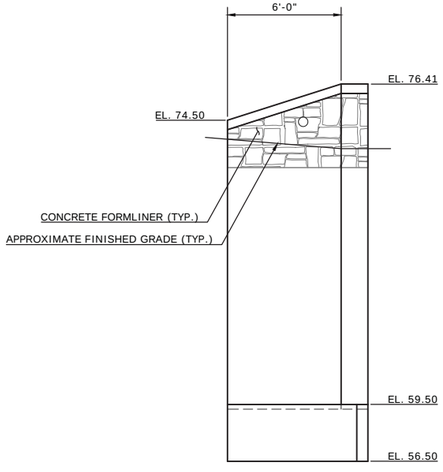
SCALE: 1/4" = 1'-0"

WORKING POINTS		
W.P. #	NORTHING	EASTING
8	718079.47	1221153.50
9	718081.54	1221147.87
10	718095.77	1221188.75
11	718101.41	1221190.82



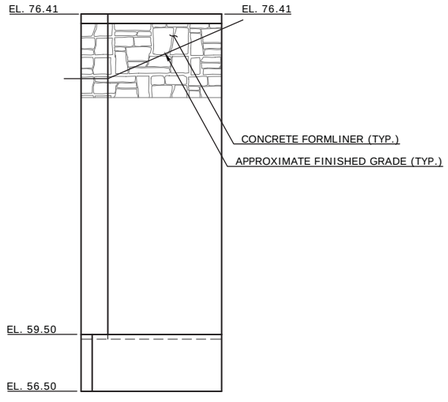
WINGWALL 2B PLAN

SCALE: 1/4" = 1'-0"



WINGWALL 2A ELEVATION VIEW

SCALE: 1/4" = 1'-0"



WINGWALL 2B ELEVATION VIEW

SCALE: 1/4" = 1'-0"

NOTE:
INSTALL 1/2" PREFORMED EXPANSION JOINT FILLER BETWEEN WINGWALL STEM AND BOX CULVERT AND BETWEEN WINGWALL FOOTING AND CUTOFF/RETURN WALL.

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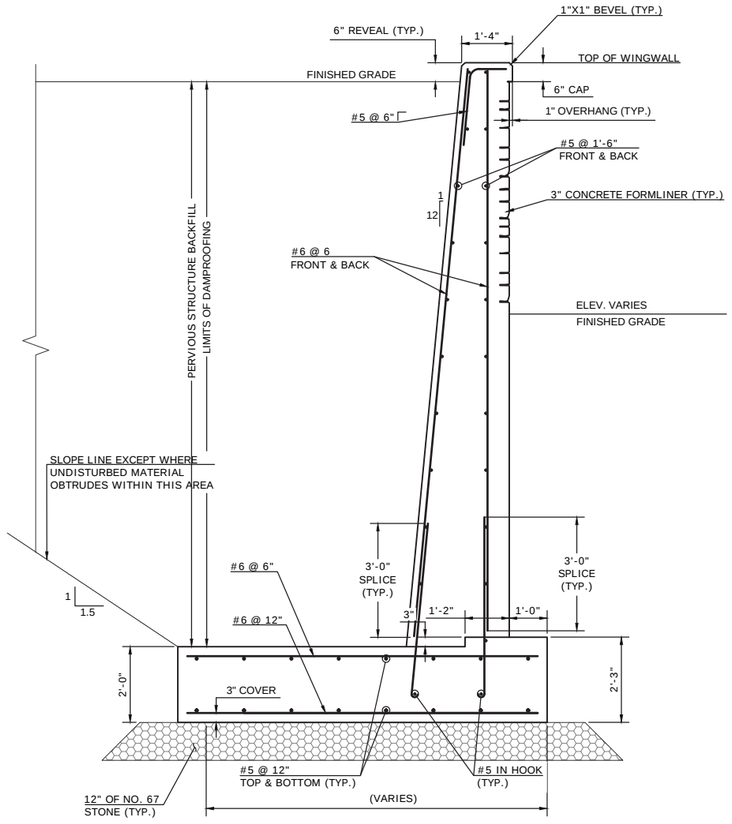
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK WINGWALL DETAILS (2 OF 2)

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	LANTERN HILL RD	SFD	15097.10		19 23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	20	23



TYPICAL WINGWALL SECTION

SCALE: 1/2" = 1'-0"

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TOWN OF LEDYARD

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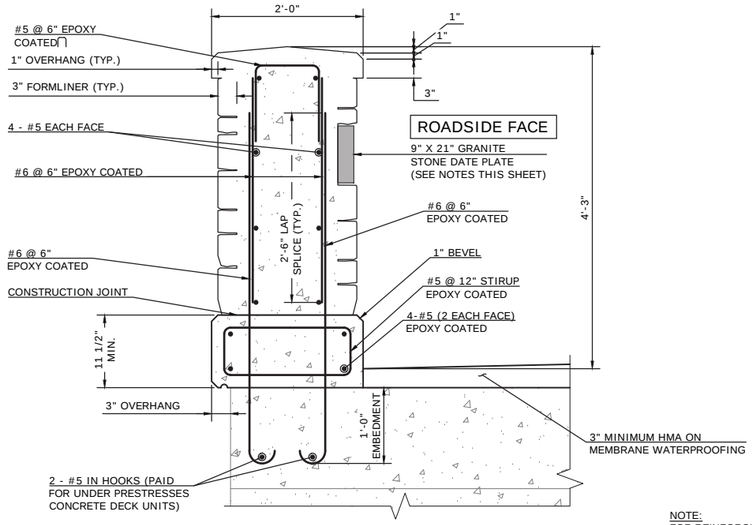
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK ABUTMENT AND WINGWALL DETAILS

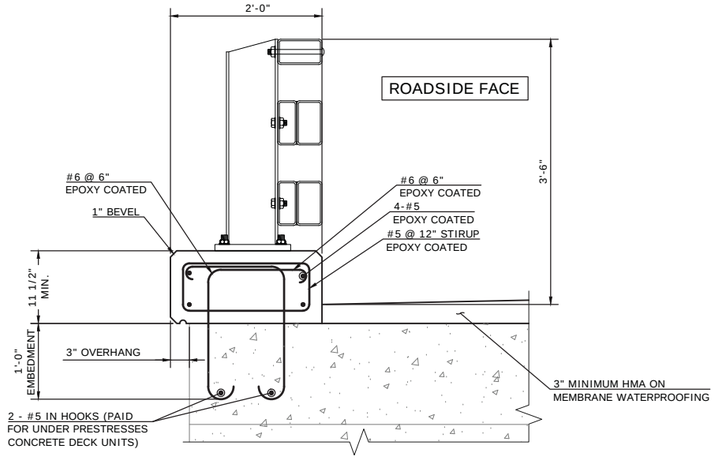
SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	LANTERN HILL RD	SFD	15097.10		20 23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	21	23



TYPICAL PARAPET SECTION (OTHER THAN MIDSPAN)

SCALE: 1" = 1'-0"



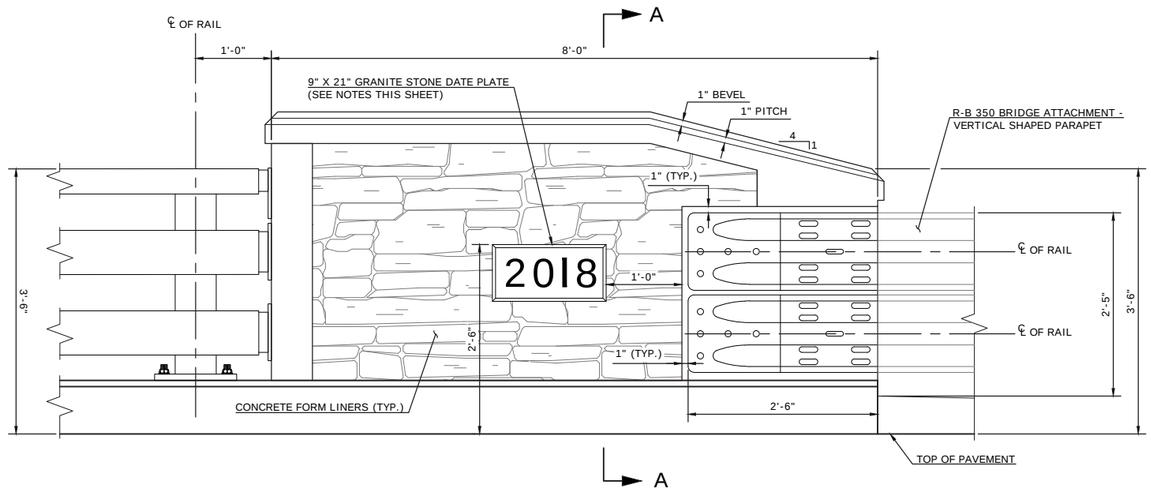
NOTE:
FOR REINFORCING WITHIN NEXT BEAMS, SEE "NEXT BEAM DETAILS" SHEET.

TYPICAL PARAPET SECTION (AT MIDSPAN)

SCALE: 1" = 1'-0"

NOTES:
GRANITE DATE PLATE

1. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS OF STONE DATE PLATE. DATE PLATE WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF THE ITEM "ASHLAR STONE MASONRY".
2. DATE PLATE SHALL BE LOCATED AT EACH LEADING APPROACH WALL, 1B & 2A.
3. DATE SHALL INDICATE CONSTRUCTION COMPLETION DATE.
4. LETTERING SHALL BE 5" HIGH BY 3" WIDE.



TYPICAL END BLOCK ELEVATION (VERTICAL GUIDERAIL - BRIDGE ATTACHMENT)

SCALE: 1" = 1'-0"

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PREPARED FOR

TOWN OF LEDYARD

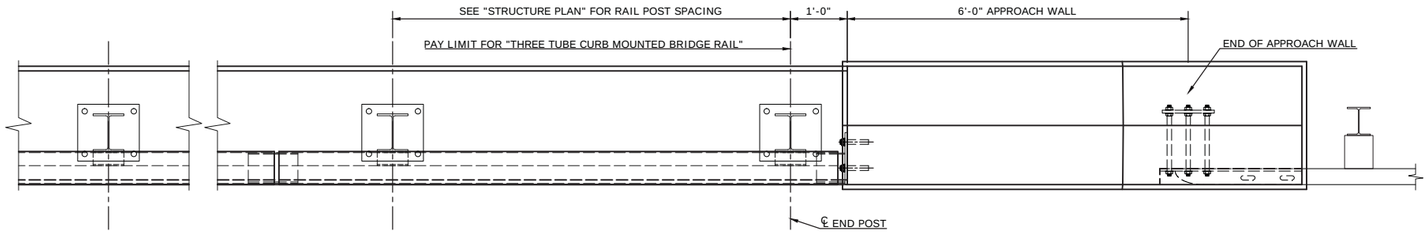
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

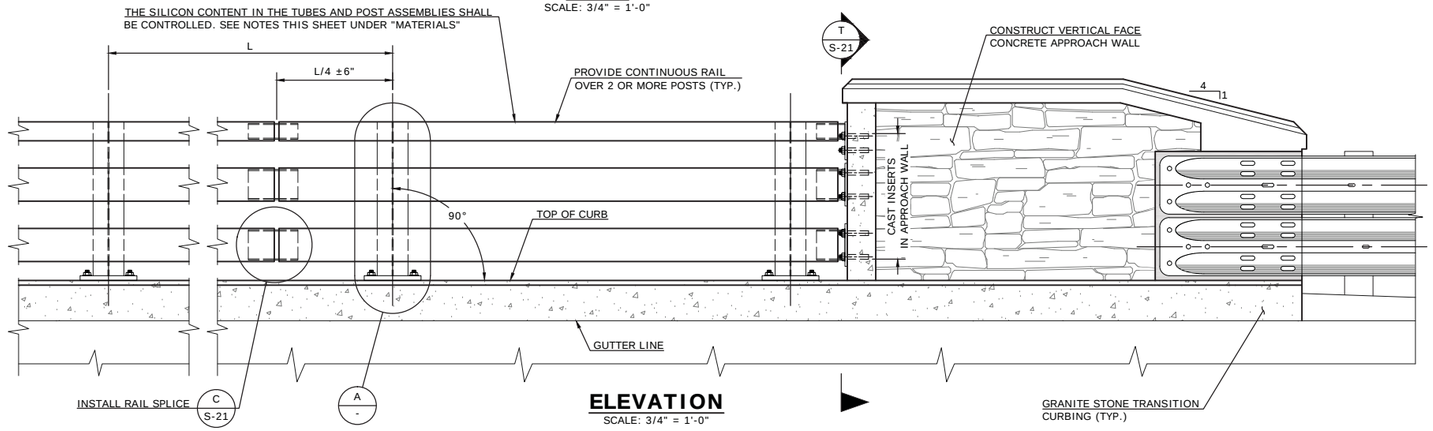
REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK APPROACH WALL DETAILS

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		21	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	22	23



PLAN
SCALE: 3/4" = 1'-0"



ELEVATION
SCALE: 3/4" = 1'-0"

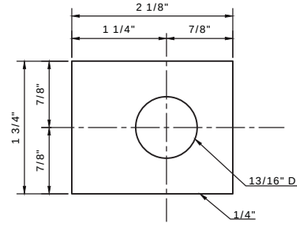


PLATE WASHER DETAIL
SCALE: 1" = 1'-0"

GENERAL NOTES:

THIS SHEET IS BASED ON A DESIGN DEVELOPED BY THE OREGON DEPARTMENT OF TRANSPORTATION WHICH MET ALL THE EVALUATION CRITERIA FOR AN NCHRP REPORT 350 BRIDGE RAIL AT TEST LEVEL 4 (TL-4). THIS DESIGN WAS TESTED BY THE TEXAS TRANSPORTATION INSTITUTE TO NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP) REPORT 350 TEST LEVEL 4 (TL-4) AND DOCUMENTED IN THREE SEPARATE REPORTS, ALL DATED MAY 2000, ENTITLED "NCHRP REPORT 350 TEST 4-10 OF THE OREGON 3-TUBE BRIDGE RAIL", "NCHRP REPORT 350 TEST 4-11 OF THE OREGON 3-TUBE BRIDGE RAIL", AND "NCHRP REPORT 350 TEST 4-12 OF THE OREGON 3-TUBE BRIDGE RAIL", RESPECTIVELY. THIS SYSTEM WAS ACCEPTED FOR USE ON THE NATIONAL HIGHWAY SYSTEM (NHS) BY THE FHWA BY MEMORANDUM DATED APRIL 22, 2003.

THIS RAIL SYSTEM IS ACCEPTABLE FOR USE AS A TL-4 RAIL SYSTEM AS A TRAFFIC RAIL (ADJACENT TO VEHICULAR TRAFFIC) AND ALSO AS A COMBINATION BARRIER (ALONG OUTER EDGES OF BRIDGE SIDEWALKS) AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

FABRICATE RAILS TO THE HORIZONTAL AND VERTICAL ALIGNMENT OF THE STRUCTURE. INSTALL POSTS NORMAL TO GRADE.

WEIGHT: WEIGHT OF SYSTEM IS 75 POUNDS PER LINEAR FOOT. THIS INCLUDES WEIGHT OF THE POSTS AT AN ASSUMED SPACING OF 8' BUT NOT THE WEIGHT OF THE CONCRETE CURB.

MATERIALS:

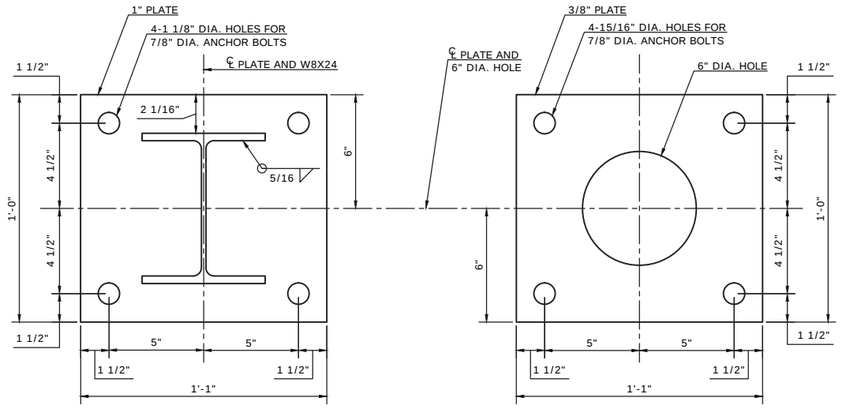
7/8" DIA. THREADED ANCHOR BOLTS FOR USE AS ANCHORAGES IN CONCRETE SHALL CONFORM TO ASTM A449. ANCHOR BOLTS SHALL BE BOLTED TO THE BASE PLATES USING 2 LEVELING NUTS AND WASHERS BELOW THE BASE PLATE AND STANDARD NUTS ABOVE THE BASE PLATE. ALL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

BOLTS USED FOR ATTACHING THE LOWER TUBES TO POSTS SHALL CONFORM TO ASTM A325. NUTS SHALL CONFORM TO ASTM A563 GRADES DH, DH3, C, C3, AND D OR A194 GRADES 2 OR 2H. WASHERS SHALL CONFORM TO ASTM F436. DOME HEAD BOLTS WITH WRENCH SLOTS USED FOR THE TOP RAIL SHALL CONFORM TO ASTM A307. ALL HARDWARE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

TUBULAR MEMBERS SHALL CONFORM TO ASTM A500 GRADE B OR A501. STEEL CONFORMING TO A513 OR A618 MAY BE SUBSTITUTED IN ACCORDANCE WITH THE SPECIAL PROVISION

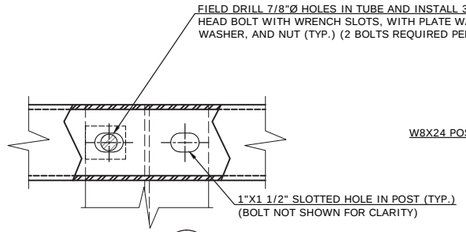
ALL OTHER STEEL SHALL CONFORM TO ASTM A572, GRADE 50 UNLESS NOTED OTHERWISE.

HOT-DIP GALVANIZE STRUCTURAL STEEL INCLUDING FASTENERS AFTER FABRICATION, SILICON CONTENT CONTENT OF DENOTED STEEL SHALL BE LIMITED TO BETWEEN 0 TO 0.04% OR 0.15% TO 0.25%.

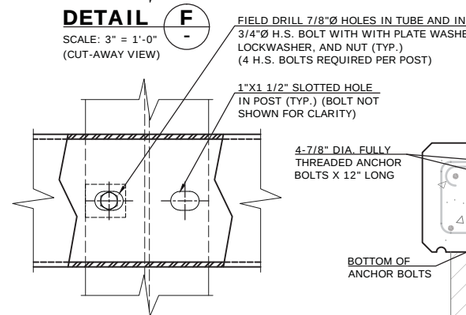


BASE PLATE DETAIL
SCALE: 3" = 1'-0"

ANCHORAGE PLATE DETAIL
SCALE: 3" = 1'-0"

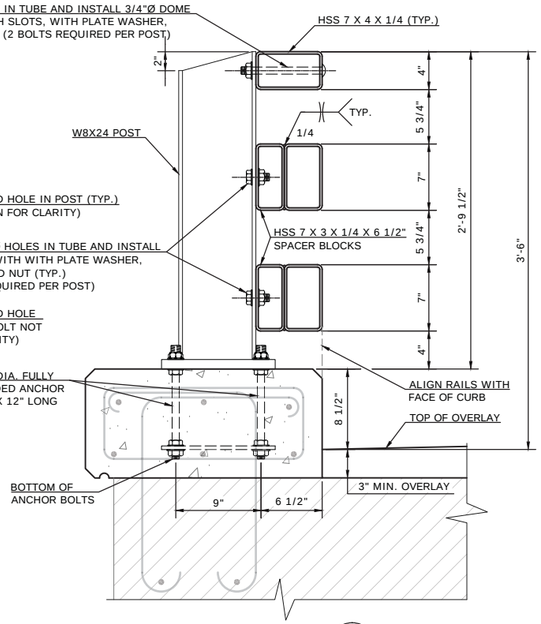


DETAIL F
SCALE: 3" = 1'-0"
(CUT-AWAY VIEW)

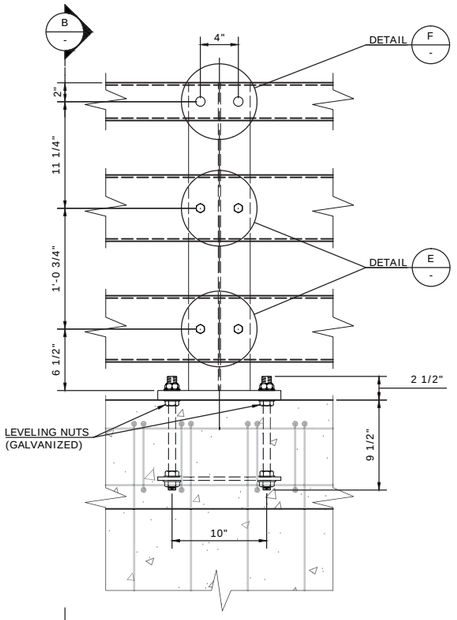


DETAIL E
SCALE: 3" = 1'-0"
(CUT-AWAY VIEW)

CURB AND POST DETAILS
SCALE: AS NOTED



SECTION B
SCALE: 1 1/2" = 1'-0"



SECTION A
SCALE: 1 1/2" = 1'-0"

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NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.M.M.
DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

SFD SUBMITTAL

WMC CONSULTING ENGINEERS

• WENGELL, McDONNELL & COSTELLO •
87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF LEDYARD

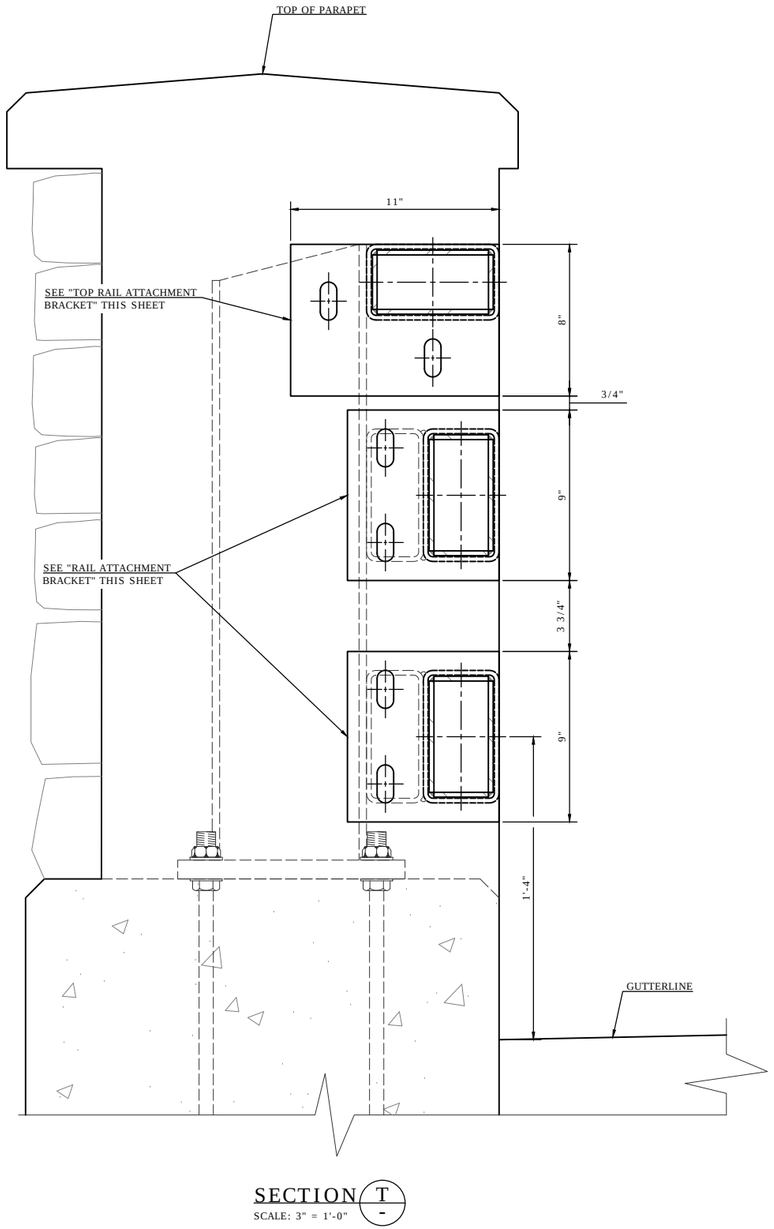
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

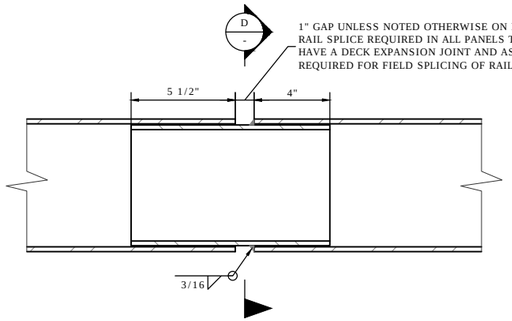
REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK 3-TUBE CURB MOUNTED BRIDGE RAIL

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		22	23

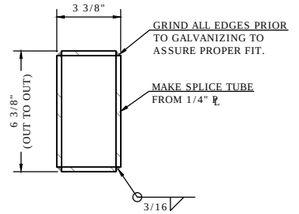
F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	23	23



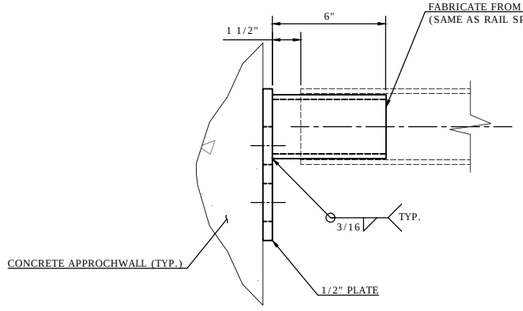
SECTION T
SCALE: 3" = 1'-0"



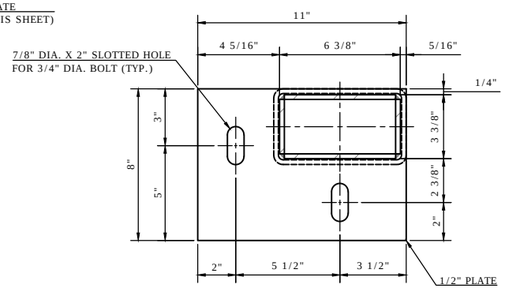
SECTION C
SCALE: 3" = 1'-0"



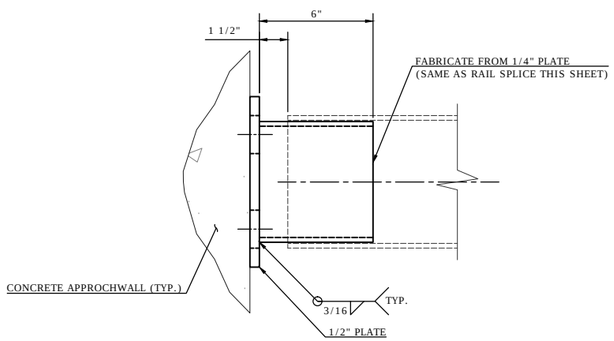
SECTION D
SCALE: 3" = 1'-0"



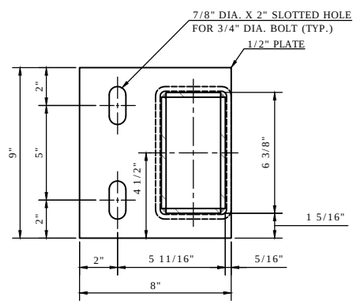
TOP RAIL ATTACHMENT BRACKET DETAIL ELEVATION
SCALE: 3" = 1'-0"



TOP RAIL ATTACHMENT BRACKET DETAIL PLAN
SCALE: 3" = 1'-0"



RAIL ATTACHMENT BRACKET DETAIL ELEVATION
SCALE: 3" = 1'-0"



RAIL ATTACHMENT BRACKET DETAIL PLAN
SCALE: 3" = 1'-0"

NOTES FOR GUIDE RAIL ATTACHMENTS:

THE 7/8" DIAMETER ANCHOR BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A449.

NUTS SHALL BE HEAVY HEX AND CONFORM TO THE REQUIREMENTS OF ASTM A563, PROPERTY CLASS 10S.

WASHERS SHALL BE CIRCULAR, HARDENED WASHERS CONFORMING TO THE REQUIREMENTS OF ASTM F436.

ALL ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ANCHOR PLATES SHALL CONFORM TO ASTM A36 AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.

ALL ANCHORAGE MATERIALS-INCLUDING THE ANCHOR PLATES, ANCHOR BOLTS AND HARDWARE SHALL BE INCLUDED FOR PAYMENT UNDER ITEM "R-B 350 BRIDGE ATTACHMENT - VERTICAL SHAPED PARAPET" (ROADWAY ITEM)

CONCRETE INSERTS: *

HOT-DIP GALVANIZED EXPANDED COIL CONCRETE INSERTS WITH CLOSED-BACK INSERTS THREADED TO RECEIVE 3/4" DIA. ASTM A307 BOLTS.
MINIMUM INSERT LENGTH = 4"
MINIMUM SAFE WORKING LOAD IN TENSION = 4000 LBS.

*

AS AN ALTERNATIVE TO CAST IN INSERTS, THE CONTRACTOR MAY FIELD DRILL HOLES IN THE COMPLETED APPROCHWALLS AND INSTALL A THREADED ROD/NUT SYSTEM TO SECURE THE BRACKETS. DRILLING METHODS SHALL BE BY CORE DRILLING AND SHALL NOT DAMAGE THE CONCRETE. IF THE CONTRACTOR ELECTS TO USE A DRILLED IN SYSTEM HE/SHE SHALL SUBMIT HIS/HER METHODS AND MATERIALS TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION OF THE APPROCHWALLS. ALL MATERIALS SHALL MEET OR EXCEED THE REQUIREMENTS INDICATED FOR THE CONCRETE INSERTS.

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NO.	DATE	DESCRIPTION

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DESIGN	S.M.M.
DRAWN	S.M.M.
CHECKED	K.O.E.
DATE	06/15/2017

SFD SUBMITTAL

WMC CONSULTING ENGINEERS

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87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF LEDYARD

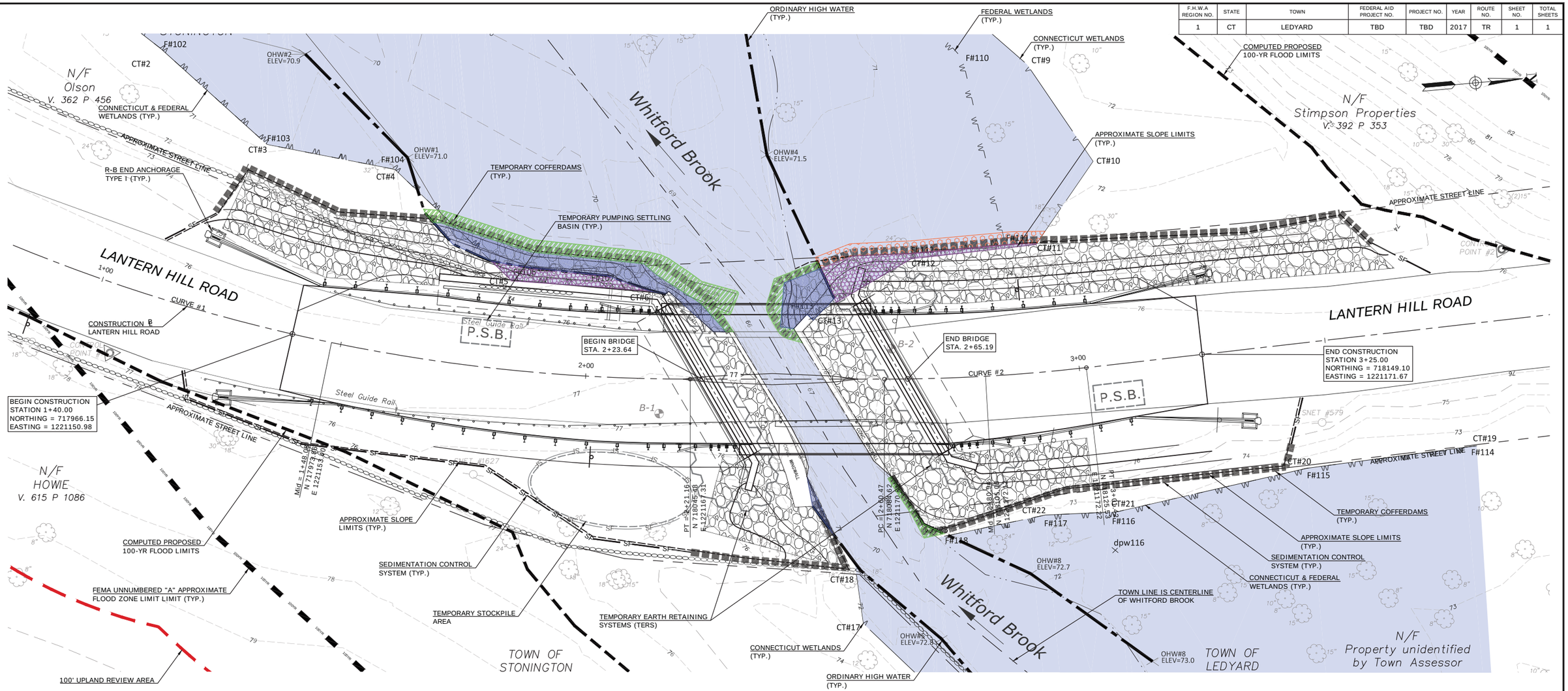
741 COLONEL LEDYARD HIGHWAY

LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK THREE TUBE CURB MOUNTED BRIDGE RAIL

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		23	23

F.H.W.A REGION NO.	STATE	TOWN	FEDERAL AID PROJECT NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
1	CT	LEDYARD	TBD	TBD	2017	TR	1	1



CONNECTICUT INLAND WETLAND IMPACT PLAN

SCALE: 1" = 10'-0"

LEGEND

- TEMPORARY WATERCOURSE IMPACT
- PERMENANT WATERCOURSE IMPACT
- TEMPORARY WETLAND IMPACT
- PERMENANT WETLAND IMPACT
- SF—— SF—— SEDIMENTATION CONTROL SYSTEM
- 100YR 100YR FEMA UNNUMBERED "A" APPROXIMATE FLOOD ZONE LIMIT
- ORDINARY HIGH WATER (OHW)
- CONNECTICUT WETLANDS LINE
- FEDERAL WETLANDS LINE
- CONNECTICUT/FEDERAL WETLANDS LINE
- 100' UPLAND REVIEW BOUNDARY

WETLAND IMPACTS

	WETLAND IMPACTS	WATERCOURSE IMPACTS	TOTAL
PERMANENT IMPACTS	178 S.F. (0.004 AC.)	289 S.F. (0.007 AC.)	467 S.F. (0.011 AC.)
TEMPORARY IMPACTS	114 S.F. (0.003 AC.)	269 S.F. (0.006 AC.)	383 S.F. (0.009 AC.)
TOTAL IMPACTS	292 S.F. (0.007 AC.)	558 S.F. (0.013 AC.)	850 S.F. (0.020 AC.)

UPLAND REVIEW AREA IMPACTS

TOTAL IMPACTS	10,076 S.F. (0.231 AC.)

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NO.	DATE	DESCRIPTION

REVISIONS

SUPV. J.A.C.
DESIGN S.M.M.
DRAWN S.M.M.
CHECKED K.O.E.
DATE 04/10/2017

SFD SUBMITTAL

WMC CONSULTING ENGINEERS
• WENGELL, McDONNELL & COSTELLO •
87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF LEDYARD
741 COLONEL LEDYARD HIGHWAY
LEDYARD, CT 06339

REPLACEMENT OF LANTERN HILL ROAD BRIDGE OVER WHITFORD BROOK CONNECTICUT INLAND WETLAND IMPACT PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	LANTERN HILL RD	SFD	15097.10		1	1

From: Scott Stevens <ssesinc@yahoo.com>
Sent: Thursday, August 11, 2022 9:41 AM
To: Michael Fanning
Subject: Sketch - Lantern Hill Road, Ledyard
Attachments: Sketch Lantern Hill Road Ledyard _000226.pdf

Good morning Mike,

We re-flagged the wetland boundaries in the Lantern Hill Road over Whitford Brook project area yesterday. Our 2022 wetland boundary delineation appears substantially the same as our wetland boundary delineation completed in 2016. We found several of our old flags still tied to vegetation, several old pink flags with our 2016 flag numbers, several that had fallen on the ground, and a few that were missing. We had to re-set all of the OHW flags since they were missing, on broken vegetation, and one appeared slightly low for the existing conditions. See attached sketch map.

Thanks and have a great day,

~Jenn
Jennifer Beno, Biologist/Wetland Scientist
Soil Science And Environmental Services, Inc.
95 Silo Drive
Rocky Hill, CT 06067
(203) 272-7837 phone
www.ssesinc.net

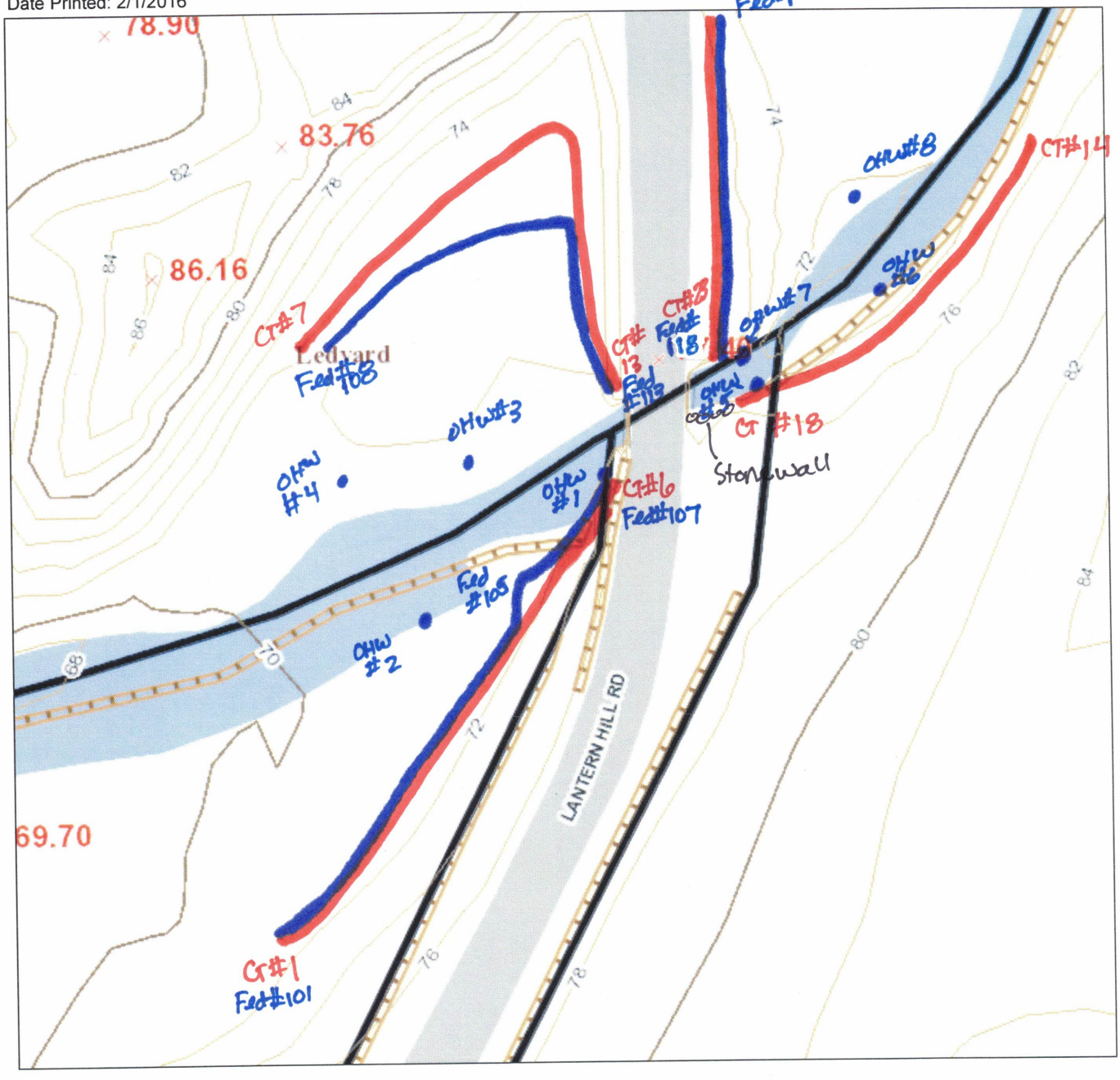
8/10/2022
Sketch

Town of Stonington

Geographic Information System (GIS)

orange CT# 1-6; 7-13; 14-18; 19-23
blue Fed # 101-107; 108-113; 114-118
blue OHW @ 8 locations
(elevation @ the knot)

Date Printed: 2/1/2016



MAP DISCLAIMER - NOTICE OF LIABILITY

This map is for assessment purposes only. It is not for legal description or conveyances. All information is subject to verification by any user. The Town of Stonington and its mapping contractors assume no legal responsibility for the information contained herein.

Approximate Scale: 1 inch = 50 feet

0 50 Feet

N W E S

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Wetland Delineations Ecological Studies Site Assessments Project Planning Soil Testing

February 4, 2016

RECEIVED
FEB 09 2016
WENGELL, McDONNELL & COSTELLO
CONSULTING ENGINEERS

ATTN: Seb Abdullah
WMC Consulting Engineers
87 Holmes Road
Newington, CT 06111

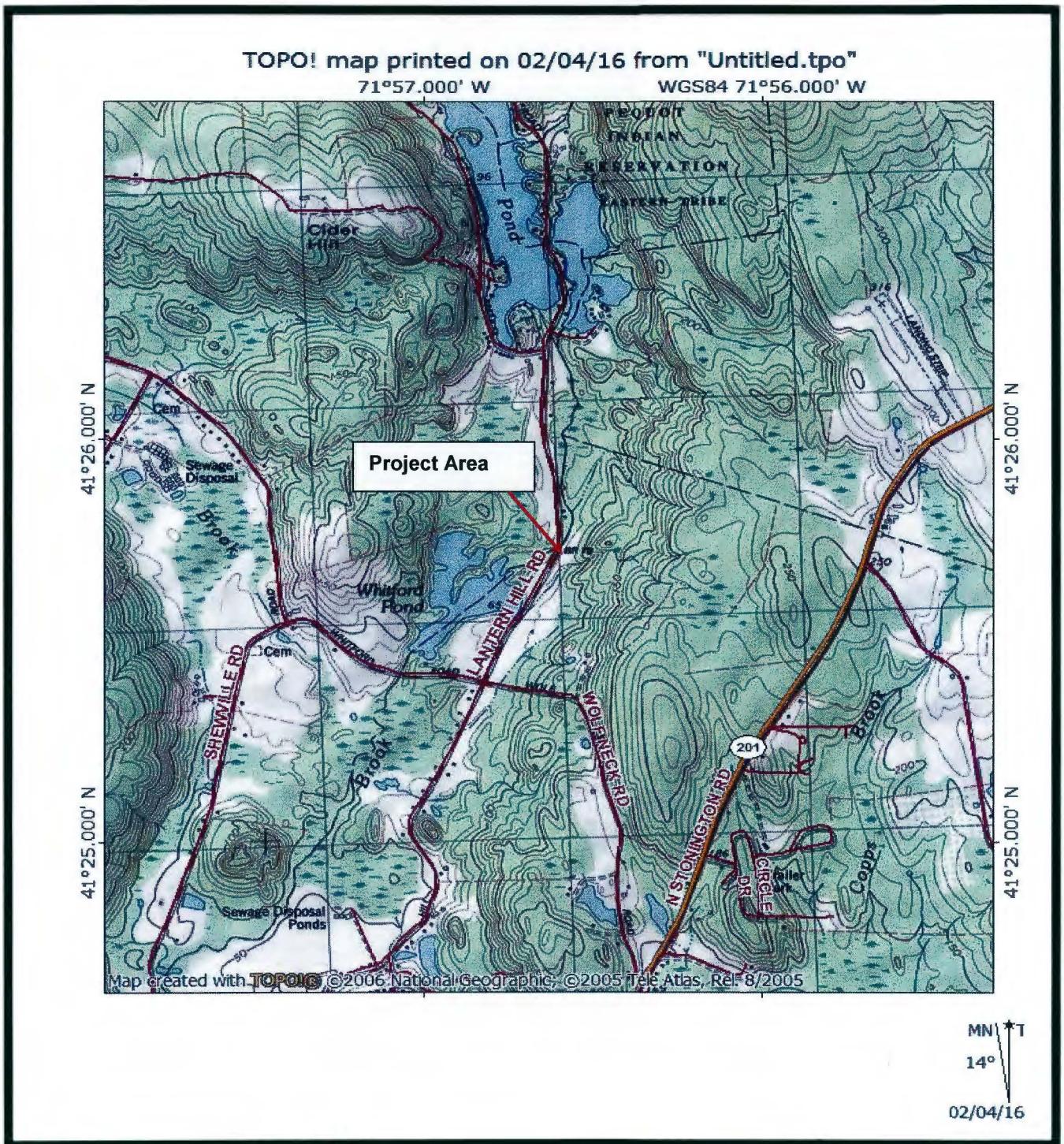
Re: Federal Wetland Delineation
Lantern Hill Road Bridge Over Whitford Brook, Ledyard, CT

Dear Mr. Abdullah:

In accordance with your request, Scott D. Stevens, Registered Professional Soil Scientist and Jennifer L. Beno, Biologist/Wetland Scientist, with Soil Science And Environmental Services, Inc. (SSES) inspected the Lantern Hill Road bridge over Whitford Brook project area in Ledyard, CT on January 29, 2016. The project area included approximately 100 feet up- and down-stream of the Lantern Hill Road bridge along Whitford Brook. The purpose of the inspection was to identify regulated wetlands and waters in the vicinity of the bridge project area.

The Lantern Hill Road bridge over Whitford Brook project area is located in the southeastern portion of the Town of Ledyard within a sparely developed residential area near the Stonington line (Figure 1). Regulated wetlands and watercourses are present in and near the project area, including CT Inland Wetlands, Federal Wetlands and a perennial watercourse. Definitions of waters and wetlands that are regulated by the State of Connecticut and Federal Government are presented in Appendix I. Rivers and streams are regulated by the State of CT as watercourses according to the Inland Wetlands and Watercourses Act. Rivers and streams are regulated by the Federal Government as "Waters of the U.S." Wetlands are defined differently by the State of CT and the Federal Government. CT Inland Wetlands are defined by soil types that are either poorly drained, very poorly drained, floodplain or alluvial. Federal Wetlands consist of areas that are inundated or saturated by ground or surface water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

95 Silo Drive · Rocky Hill · Connecticut · 06067 · (203) 272-7837 · ssesinc@yahoo.com



SOIL SCIENCE and ENVIRONMENTAL SERVICES, INC.	U.S.G.S. Topography Map Lantern Hill Road Bridge Over Whitford Brook, Ledyard, CT	Date 2/4/16 Figure No. 1

A spade and auger were used to dig test holes for soils identification during the investigation. The vegetation communities and any physical indicators of hydrology on the site were also examined. The limits of the CT Inland Wetlands and the Federal Wetlands were determined to differ within the limits of the project area. The CT Inland Wetland boundaries were delineated with consecutively numbered orange survey tapes, while Federal Wetland boundaries were delineated with consecutively numbered blue survey tapes. Sketch maps of the delineated wetland boundaries are included as Figures 2 and 3.

CONNECTICUT INLAND WETLANDS & SOIL TYPES

CT inland wetlands were delineated within the project area approximately 100 feet up- and down-stream of the bridge along Whitford Brook within the bridge replacement project area. See Figure 2. The wetland soils within the project area include:

13 Walpole sandy loam (Aeric Endoaquepts)- This is a deep, poorly drained, friable, coarse-loamy textured soil that developed over sandy and gravelly, glacial outwash. Outwash soils occur in valleys, outwash plains and terraces.

15 Scarboro muck (Histic Humaquepts) - This is a deep, very poorly drained soil with a thin (less than 15 inches thick) mucky surface that is underlain by sandy and gravelly, glacial outwash. The outwash was derived from schist, gneiss and granite. Outwash soils occur in valleys, outwash plains and terraces.

109 Fluvaquents-Udifluvents This soil map unit consists of well drained to very poorly drained, nearly level soils that formed in very recent alluvium deposited by rivers and streams. The soils are occasionally to frequently flooded, which often results in stream scouring, lateral erosion and shifting of soil from place to place. Soil characteristics, such as texture and stoniness, are usually highly variable within short distances.

The non-wetland soils within the project area include:

21 Ninigret and Tisbury soils (Aquic Dystrudepts) – These are deep, moderately well drained, friable, coarse-loamy and loamy textured soils that developed over sandy and gravelly, glacial outwash derived from schist, gneiss and granite. Outwash soils occur in valleys, outwash plains and terraces.

32 Haven and Enfield soils (Typic Dystrudepts) – These are deep, well drained, friable, loamy textured soil that developed over sandy and gravelly, glacial outwash derived from schist, gneiss and granite. Outwash soils occur in valleys, outwash plains and terraces.

308 Udorthents, smoothed This is a well drained to moderately well drained soil area that has had two or more feet of the original soil surface altered by filling, excavation or grading activities. Udorthents, smoothed soils commonly occur on leveled land and fill landforms.

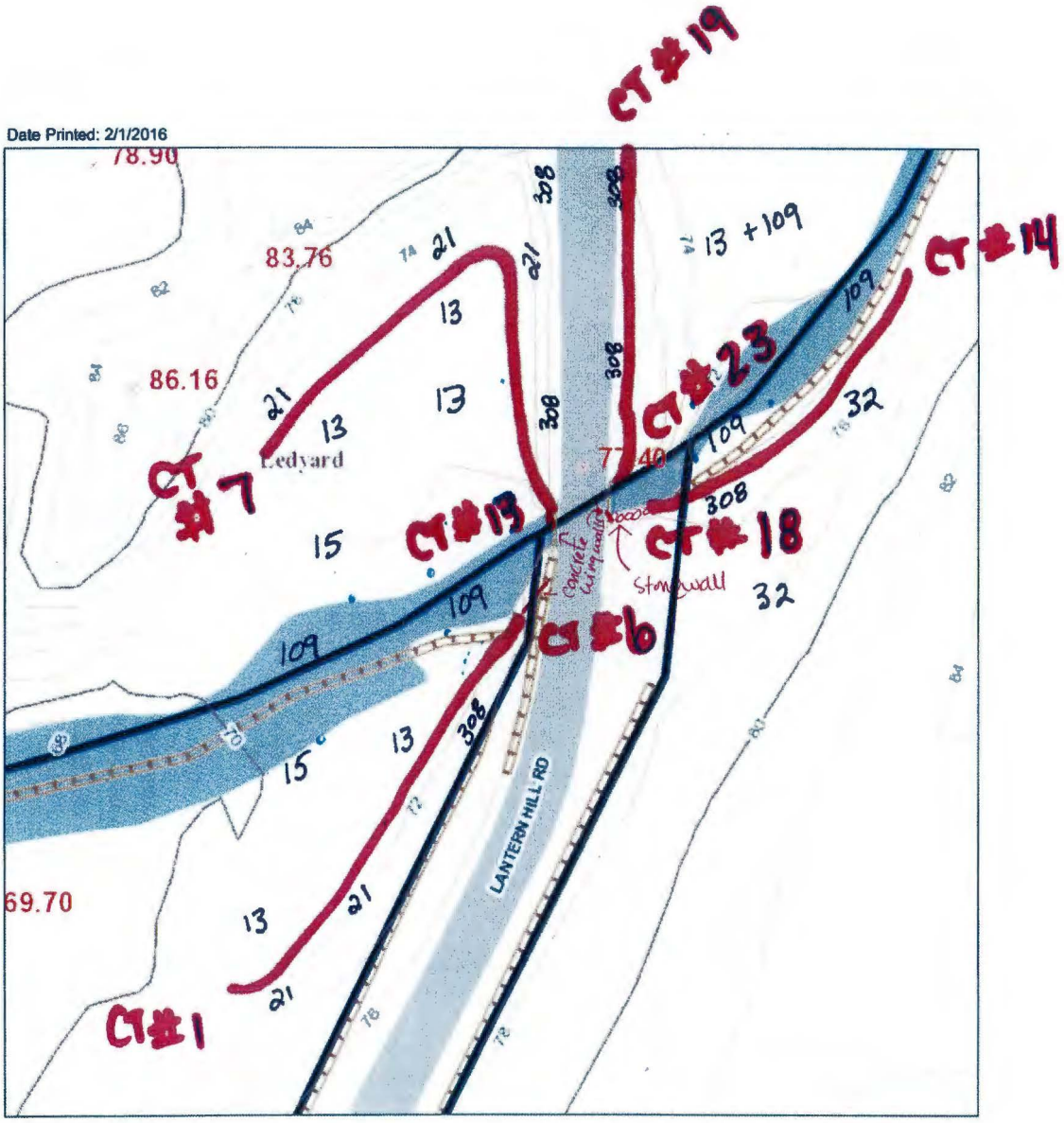


Figure 2 – CT Wetland Boundary Sketch Map (approximate)

FEDERAL WETLANDS

Federal wetlands were delineated within the Lantern Hill Road bridge over Whitford Brook project area. See Figure 3. The Federal wetlands consist of a deciduous wooded swamp community. One transect with two Federal Wetland Data Plots was established within the wooded swamp (Data Plot 116-W and 116-U). The approximate location of the transect and data plots are shown in Figure 3. The information gathered from each data plot was recorded on Federal Wetland Data Sheets. These sheets are included with this report.

Federal Wetland along Whitford Brook within Lantern Hill Road bridge project area (1/29/16).

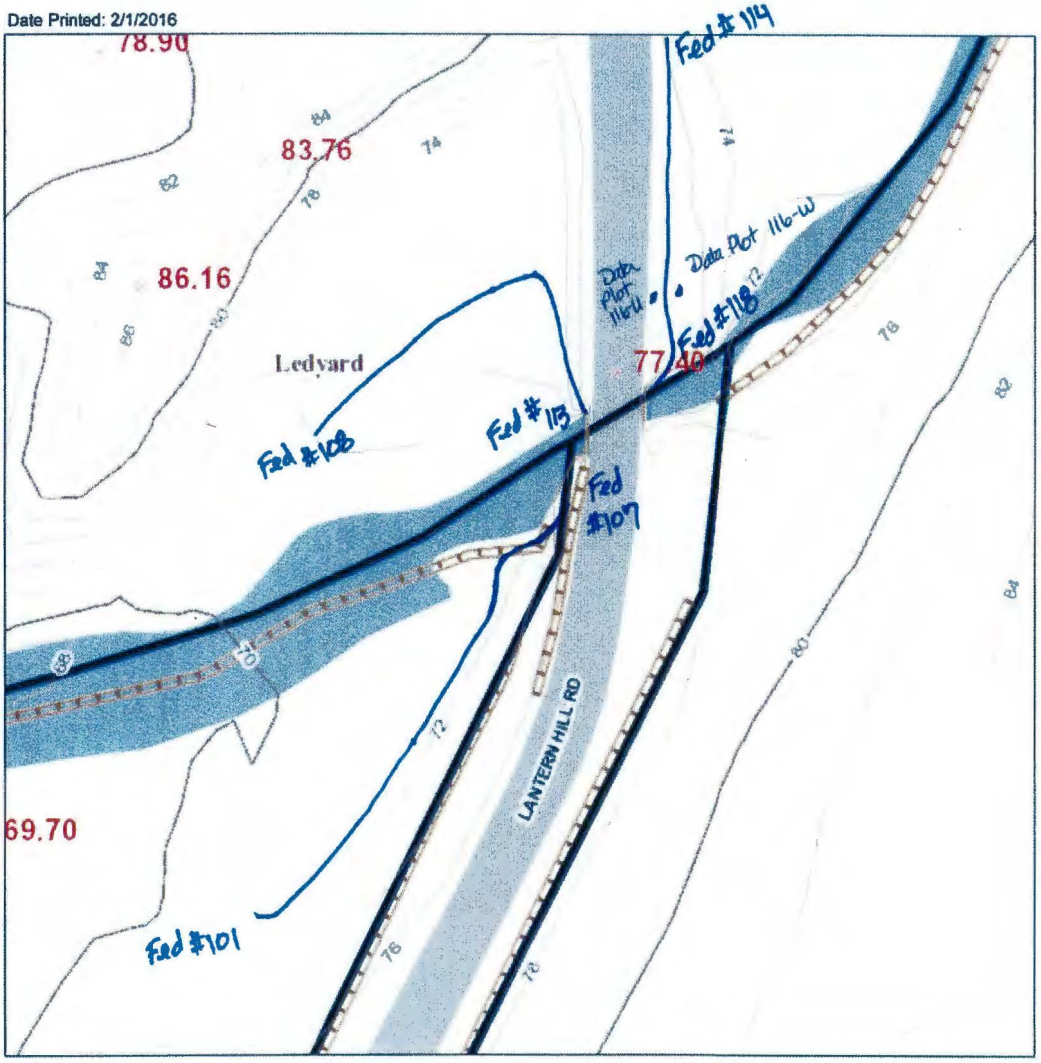


Figure 3 - Sketch of Federal Wetland Boundary (approximate)

ORDINARY HIGH WATER MARK IDENTIFICATION

The lateral limits of U.S. Army Corps jurisdiction for non-tidal rivers, streams and water bodies extends to the ordinary high water mark (OHW), in the absence of adjacent wetlands. The Corps defines the term "ordinary high water mark" as the following: "means the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." 33 CFR 328.3(e). The Corps recommends that whenever possible the investigator should consider the former indicators along with a number of others, that include: wracking; vegetation matted down, bent or absent; sediment sorting; leaf litter disturbed or washed away; scour; deposition; multiple observed flow events; beds and banks; water staining; and change in plant community.

The above-listed indicators were utilized during the January 29, 2016 investigation to determine the ordinary high water along the Whitford Brook watercourse within the Lantern Hill Road bridge project area. Blue survey tapes were tied onto branches and plant stems at several locations upstream and downstream of the bridge along the river banks to identify the OHW elevation. The knot of the tied survey tape marks the OHW elevation. A sketch showing locations of the OHW boundary survey tapes is presented in Figure 3.

Respectfully submitted,

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Scott D. Stevens

Jennifer L. Beno

Scott D. Stevens
Registered Professional Soil Scientist

Jennifer L. Beno
Biologist/Wetland Scientist

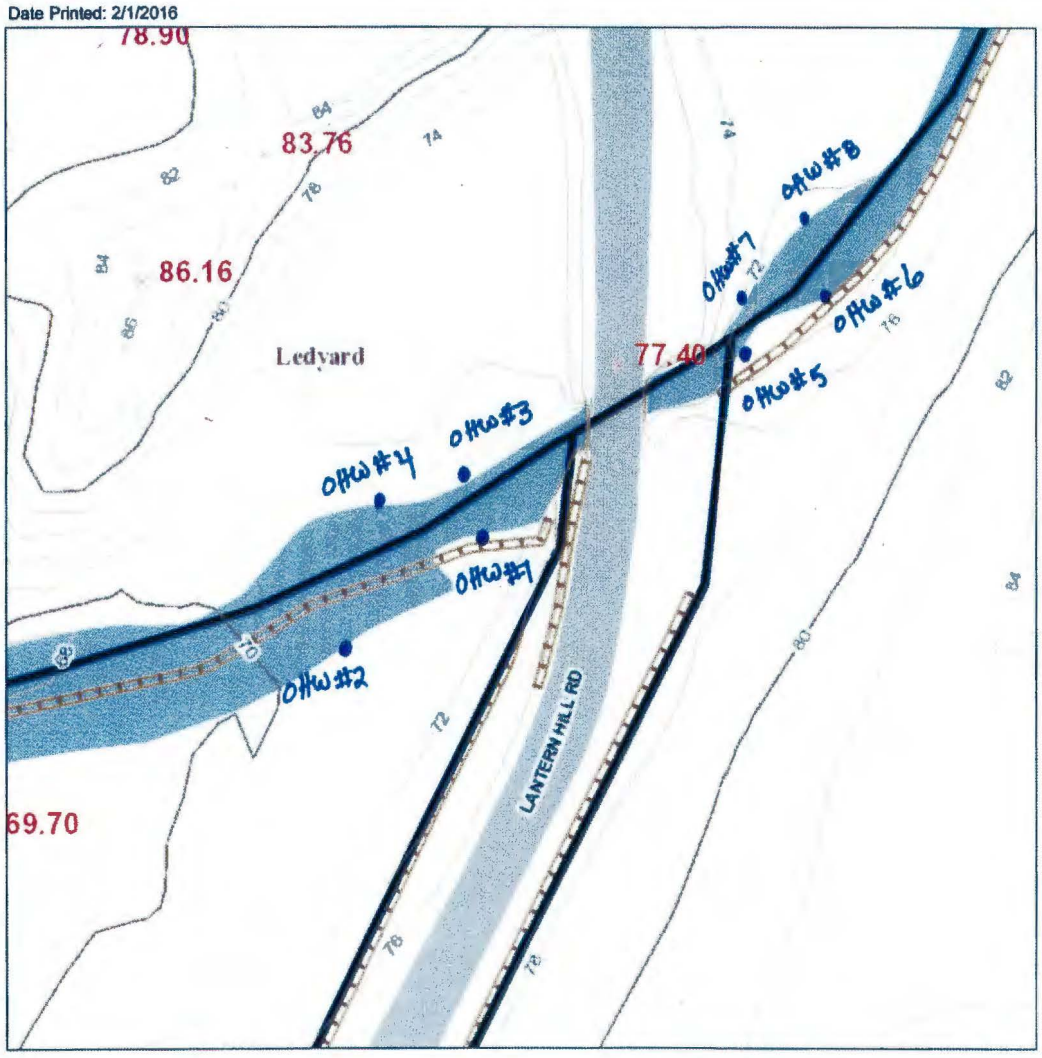


Figure 4 - Sketch of Ordinary High Water Flag Locations (approximate)

APPENDIX I

REGULATED WATERS AND WETLANDS BY THE STATE OF CT AND FEDERAL GOVERNMENT

I. State of Connecticut

Wetlands and watercourses are regulated in the State of Connecticut by the Connecticut General Statutes, Chapter 440, section 22a-28 to 22a-45. These Statutes are divided into the Inland Wetlands and Watercourses Act (sections 22a-36 to 22a-45) and the Tidal Wetlands Act (sections 22a-28 to 22a-35). Definitions of the resources are provided in the statutes.

Inland Wetlands, "means land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35, inclusive, which consist of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the Natural Resources Conservation Service of the United States Department of Agriculture" section 22a-38(15).

Watercourses "means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private which are contained within, flow through or border upon this state or any portion thereof, not regulated pursuant to sections 22a-28 to 22a-35, inclusive. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics: (A) Evidence of scour or deposits of alluvium or detritus, (B) the presence of standing or flowing water for a duration longer than a particular storm incident, and (C) the presence of hydrophytic vegetation" section 22a-38(16).

Tidal Wetlands are defined as "those areas which border on or lie beneath tidal waters, such as, but not limited to banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action, including those areas now or formerly connected to tidal waters, and whose surface is at or below an elevation of one foot above local extreme high water; and upon which may grow or be capable of growing some but not necessarily all, of the following:" (includes plant list) section 22a-29(2).

II. Federal Government

The Federal Government regulates waters and wetlands in accordance with the Code of Federal Regulations, Title 33, Parts 320 through 330 (33 CFR parts 320 to 330). Regulated areas include navigable waters; interstate waters; tributaries to navigable and interstate waters, including adjacent wetlands; and certain other waters and wetlands of the U.S. The United States Army Corps of Engineers has been authorized to regulate these waters and wetlands by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Definitions of wetlands and watercourses that are regulated by the Corps are found in Parts 328 and 329 of the Code.

Waters of the United States as defined in Part 328 means, " (1) all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce; (4) all impoundments of waters otherwise defined as waters of the U.S. under the definition; (5) tributaries of waters indentified in 1 thru 4; (6) territorial seas; and (7) wetlands adjacent to waters that were identified in 1 thru 6. Waters of the United States do not include prior converted cropland" (33 CFR Part 328.3 (a)).

Wetlands are a subset of waters of the United States and are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33CFR Part 328.3(b)). The 1987 U.S. Corps of Engineers Delineation Manual and the Draft Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (dated July 2008) provide information and procedures for conducting Federal Wetland delineation. The methodology established by the Federal Government uses a three parameter approach utilizing hydrologic indicators, hydrophytic vegetation and hydric soils for identifying Federal Wetlands.

Navigable waters of the United States as defined in Part 329 mean "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33CFR Part 329.2).

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lantern Hill Rd over Whitford Brook City/County: Ledyard / New London Sampling Date: 1/29/16

Applicant/Owner: WMC / Town of Ledyard State: CT Sampling Point: W6-U

Investigator(s): Scott Stevens + Jenn Bine - SSES Section, Township, Range: _____

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex Slope (%): _____

Subregion (LRR or MLRA): LRR Lat: ±41°25'44.94" Long: ±-71°56'36.32" Datum: _____

Soil Map Unit Name: Udorthents NWI classification: PIA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil ✓, or Hydrology _____ significantly disturbed? yes Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 11c-U

Tree Stratum (Plot size: ±30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	30	Y	FAC
2. Fraxinus americana	30	Y	FACW
3. Ulmus rubra	20	N	FAC
4.			
5.			
6.			
7.			
	80%	= Total Cover	

Sapling/Shrub Stratum (Plot size: ±5')			
1. Rosa multiflora	10	Y	FACU
2. Acer saccharum	10	Y	FACU
3. Lindera benzoin	5	N	FACW
4.			
5.			
6.			
7.			
	25%	= Total Cover	

Herb Stratum (Plot size: ±5')			
1. Eurybia divaricata	5	Y	FACU
2. Vitis labrusca	5	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	10%	= Total Cover	

Woody Vine Stratum (Plot size: ±30')			
1. Vitis labrusca	10	Y	FACU
2.			
3.			
4.			
	10%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 14% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point: 111e-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR3/2						Stony loamy sand - fill	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lantern Hill Rd over Whitford Brook City/County: Ledyard / New London Sampling Date: 1/29/16

Applicant/Owner: UMC / Town of Ledyard State: CT Sampling Point: 116-W

Investigator(s): Scott Stevens + Glenn Bero - SSES Section, Township, Range: _____

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR or MLRA): LRR Lat: ± 41°25'44.91" Long: ± -71°56'36.13" Datum: _____

Soil Map Unit Name: Walpole sandy loam + Fluvaquents-Udifluvents NWI classification: PFO1E

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? no Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? no (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes ✓	No _____	Depth (inches): ± 10
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): ± 8

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Data plot 116-W is situated at an elevation which is within approximately 12" of Whitford Brook and periodically gets flooded.

VEGETATION – Use scientific names of plants.

Sampling Point: 116-W

Tree Stratum (Plot size: ±30')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	50	Y	FAC
2. Ulmus rubra	30	Y	FAC
3. Fraxinus americana	10	N	FACU
4.			
5.			
6.			
7.			
	90%	= Total Cover	

Sapling/Shrub Stratum (Plot size: ±15')			
1. Lindera benzoin	50	Y	FACW
2. Rosa multiflora	40	Y	FACU
3.			
4.			
5.			
6.			
7.			
	90%	= Total Cover	

Herb Stratum (Plot size: ±5')			
1. Glyceria striata	25	Y	OBL
2. Rosa multiflora	25	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50%	= Total Cover	

Woody Vine Stratum (Plot size: ±30')			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

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Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: 116-W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR3/2						Stony sandy loam	
10-12	10YR4/3		10YR 4/6				stony loamy sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ✓ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

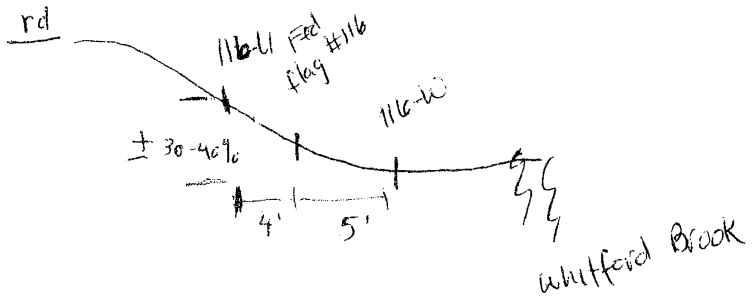
Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:



Subject:	RE: Lantern Hill Road Over Whitford Brook, Ledyard, BNI 37001, Initial Fisheries Coordination
From:	Murphy, Brian (Brian.Murphy@ct.gov)
To:	KElder@WMCENGINEERS.COM;
Cc:	Robert.Gilmore@ct.gov; Jeff.Caiola@ct.gov; Steve.Gephard@ct.gov; Mindy.Barnett@ct.gov; JCostello@WMCENGINEERS.COM; SMcdonnell@WMCENGINEERS.COM; Sdeledda@stonington-ct.gov; public.works.director@ledyardct.org; standrzejewski@sbcglobal.net;
Date:	Friday, May 20, 2016 1:41 PM

Hi Keegan,

Appreciate the additional information. I agree that fish passage will not be an issue with a box culvert dropped 2 ft. below grade, however instream habitat features that are very unique at this location would be eliminated and could not be replicated with the installation of a box culvert. I'd suggest investigating a 3 sided rigid frame structure, basically box culvert without a floor for this location which would preserve and protect instream habitat features. That being said, there are other state/federal regulatory staff that would review this project thus soliciting pre-application comments from those folks may provide some further insight into what type of structure would be allowed to be permitted. Thanks.

Regards,

Brian D. Murphy, Senior Fisheries Habitat Biologist

Inland Fisheries Division

Habitat Conservation and Enhancement Program

Connecticut Department of Energy and Environmental Protection
Eastern District Headquarters

209 Hebron Road

Marlborough, CT 06447
P: 860.295-9523|F: 860.295.8175|brian.murphy@ct.gov

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

On Thursday, May 12, 2016 1:27 PM, "Murphy, Brian" <Brian.Murphy@ct.gov> wrote:

Hi Steve,

Per your request, I have had an opportunity to provide preapplication comments relative to the replacement of Lantern Hill Road Bridge #137001 spanning Whitford Brook in Ledyard. Per your March 9, 2016 email correspondence, preliminary design concepts involve replacement of the existing clear span bridge with either single or twin box culverts. Enclosed are my preliminary comments regarding fish passage and habitat needs.

Fisheries Resources

Whitford Brook supports a diversity of resident and diadromous fish that includes: native brook trout, wild brown trout, longnose dace, tessellated darter, redbreast sunfish, hatchery reared adult trout and American eel. Whitford Brook and nearby Whitford Pond also support bridle shiner (Notropis bifrenatus) which is a State-listed Fish Species of Special Concern. Bridle shiner presence is commonly associated with open water patches surrounded by dense submergent/emergent aquatic vegetation. These habitats are just downstream of this road crossing closer to the inlet of Whitford Pond. Whitford Brook is also undergoing the restoration of anadromous river herring (alewife and blueback herring). With the removal of the Hyde Pond Dam in 2015, herring can now penetrate as far as the base of the Whitford Pond Dam. The long term restoration goal is to restore fish upstream into Lantern Hill Pond, the dam of which was repaired in 2012 and incorporated a concrete pool and weir fishway.

Current conditions at Lantern Hill Road Bridge #137001 provide for unrestricted fish passage at this crossing. The channel ranges from 3 to 5 feet deep in this area supporting a gravel/cobble substrate base interspersed with small to large boulders. Existing narrow, deep waters provide a diverse mixture of microhabitats providing good cover, velocity refugia and feeding stations for the fish community.

Recommendations

1. Inland Fisheries staff request pursuing bridge replacement options which least disturb and alter instream habitats. As such, we highly recommend replacement at this location with either a clear span bridge or 3 sided structure that does not contain an artificial bottom or floor.

2. As design proceeds, please provide more detail regarding any future instream work associated with substructure rehabilitation and any installation of riprap. It is important to minimize the overall footprint and instream placement of riprap that might be required for scour protection. Mitigation may be required for excessive filling associated with scour protection activities.

3. As a best management practice, any "unconfined" instream work within Whitford Brook should be restricted to the period from June 1 to September 30, inclusive. A June 1 through September 30 timeframe can be utilized as an effective mitigation measure for construction related disturbances due to the following reasons: (1) timeframe will serve to protect the spawning, egg incubation, and fry development of resident fishes, (2) timeframe does not interfere with seasonal migratory behaviors, and (3) timeframe coincides with historic low rainfall levels in Connecticut a period in which instream construction activities such as dewatering, excavation, trenching, and cofferdam placement are most effective.

Let me know if you have any further questions/concerns with these comments. Thanks.

Regards,
Brian D. Murphy, Senior Fisheries Habitat Biologist
Inland Fisheries Division
Habitat Conservation and Enhancement Program
Connecticut Department of Energy and Environmental Protection
Eastern District Headquarters
209 Hebron Road
Marlborough, CT 06447
P: 860.295-9523|F: 860.295.8175|brian.murphy@ct.gov

Natural Diversity Data Base Areas

LEDYARD, CT

June 2022

State and Federal Listed Species

Critical Habitat

Town Boundary

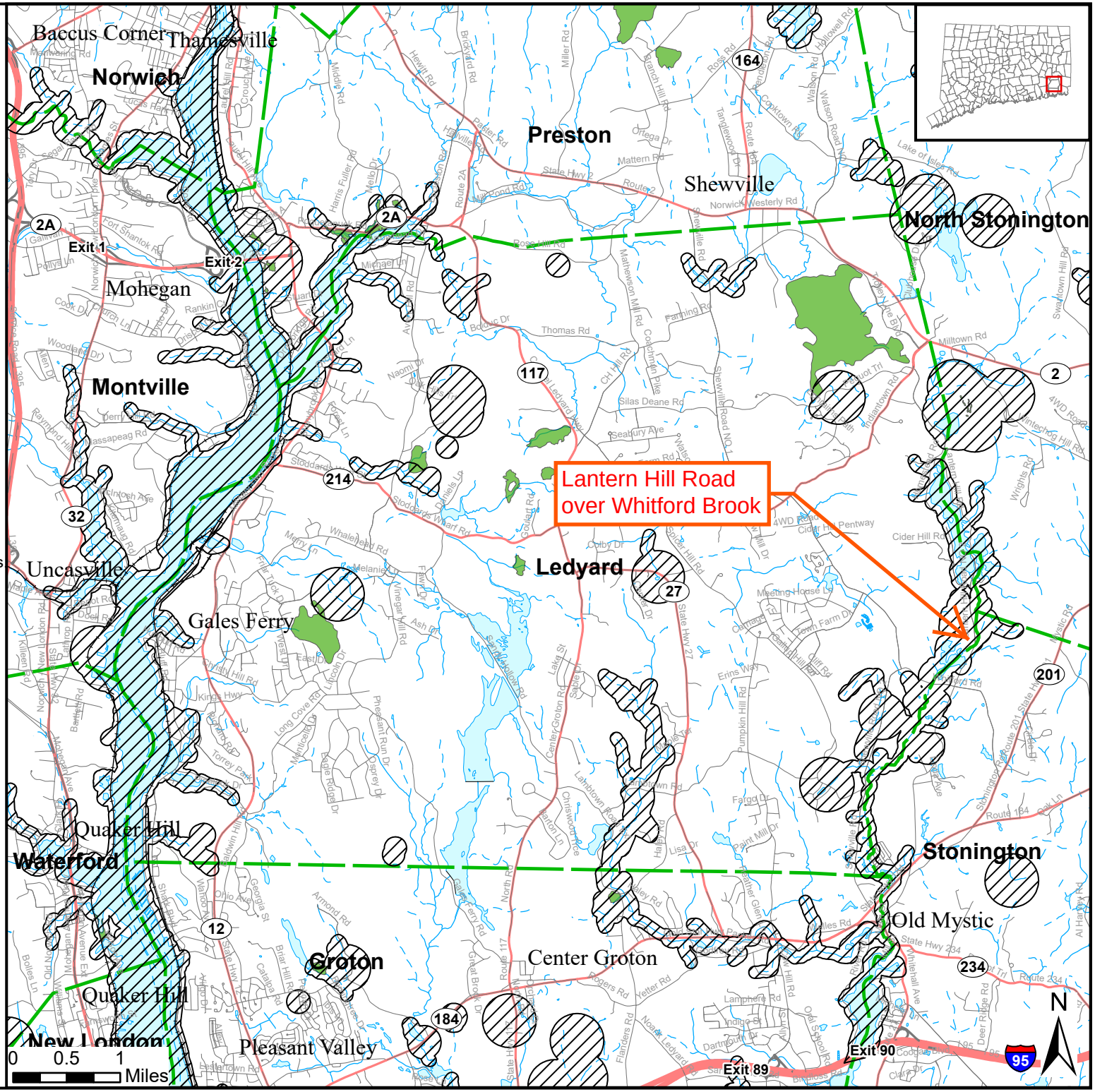
NOTE: This map shows general locations of State and Federal Listed Species and Critical Habitats. Information on listed species is collected and compiled by the Natural Diversity Data Base (NDDB) from a variety of data sources . Exact locations of species have been buffered to produce the generalized locations.

This map is intended for use as a preliminary screening tool for conducting a Natural Diversity Data Base Review Request. To use the map, locate the project boundaries and any additional affected areas If the project is within a hatched area there may be a potential conflict with a listed species. For more information, complete a Request for Natural Diversity Data Base State Listed Species Review form (DEP-APP-007), and submit it to the NDDB along with the required maps and information. More detailed instructions are provided with the request form on our website.
https://portal.ct.gov/deep-nddbrequest

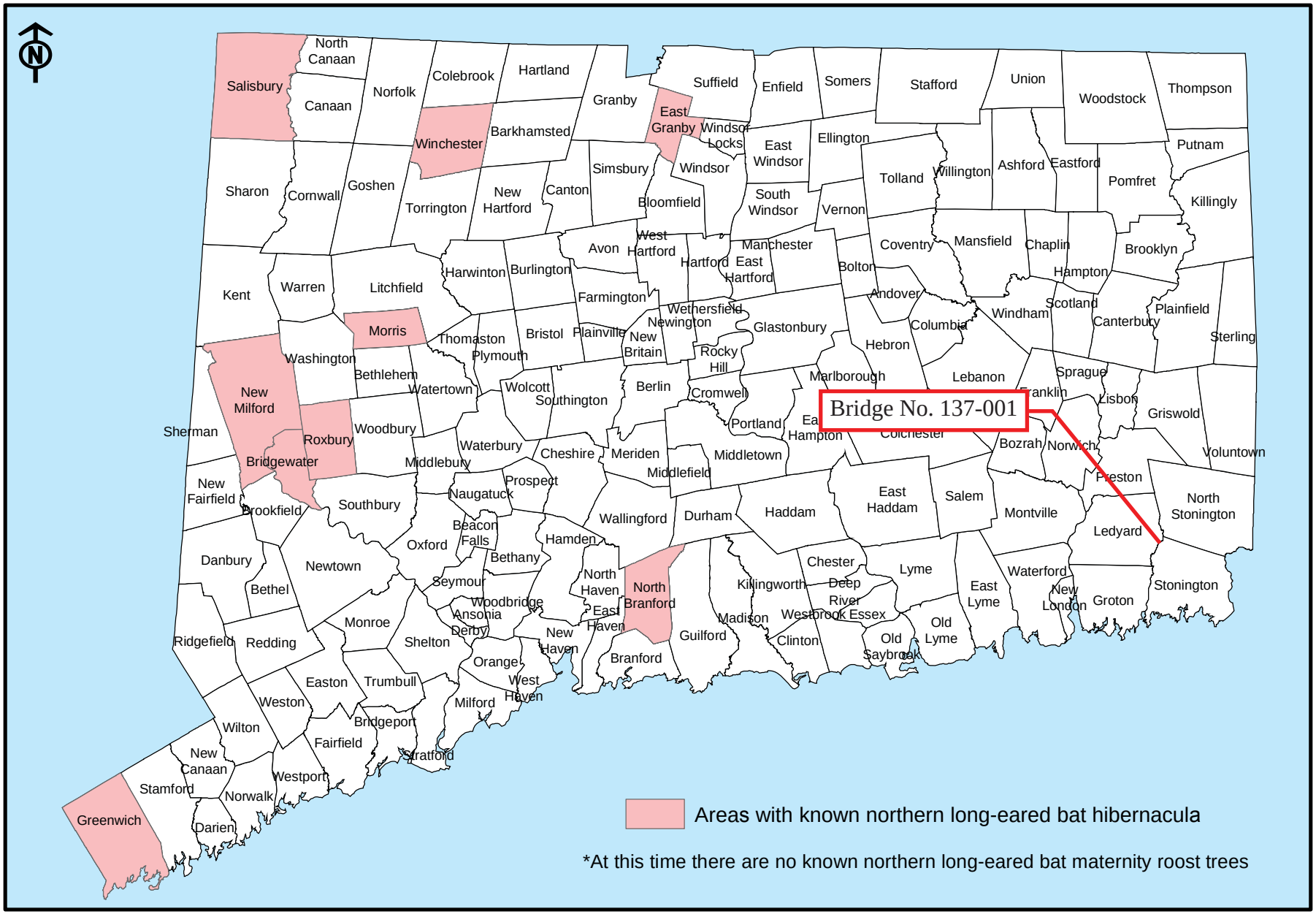
Use the CTECO Interactive Map Viewers at http://cteco.uconn.edu to more precisely search for and locate a site and to view aerial imagery with NDDB Areas.

QUESTIONS: Department of Energy and Environmental Protection (DEEP)
79 Elm St, Hartford, CT 06106
email: deep.nddbrequest@ct.gov
Phone: (860) 424-3011

Connecticut Department of Energy & Environmental Protection
Bureau of Natural Resources
Wildlife Division



Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance



February 1, 2016

For information on federal requirements visit http://www.fws.gov/midwest/endangered/mammals/nleb/

AQUIFER PROTECTION AREAS

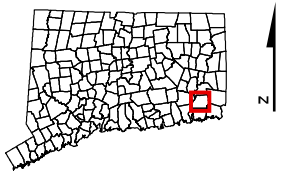
Ledyard, CT

December 23, 2021

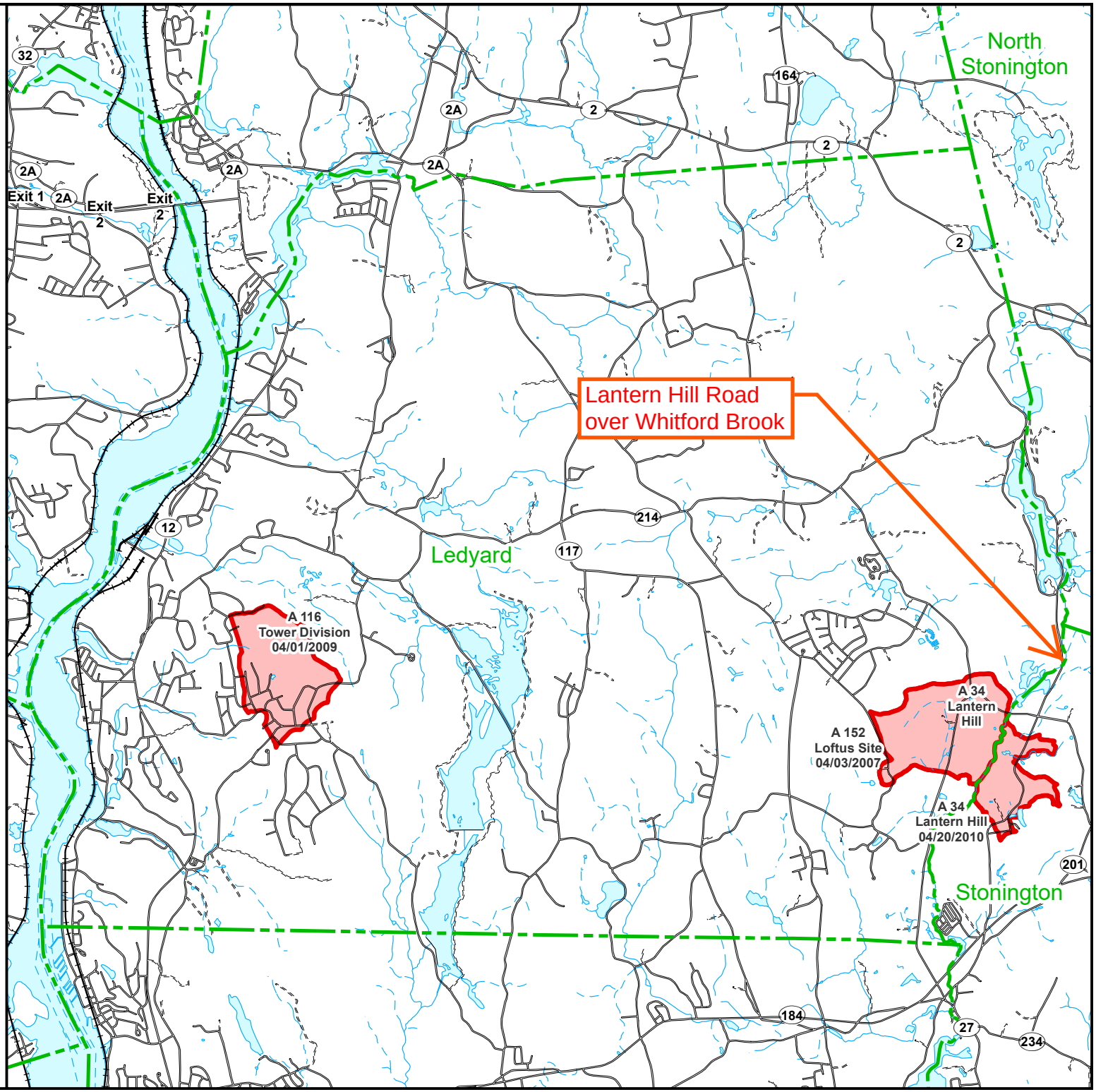
- Level A APA (Final Adopted)
- Level A APA (Final)
- Level B APA (Preliminary)
- Town Boundary

NOTE: The Aquifer Protection Areas were delineated through Connecitcut's Level A and Level B Mapping Processes. Aquifer Protection Areas are delineated for active public water supply wells in stratified drift that serve more than 1000 people, in accordance with Sections 22a-354c and 22a-354z of the Connecticut General Statutes. Level B Mapping delineates a preliminary aquifer protection area, providing an estimate of the land area from which the well draws its water. Level A Mapping delineates the final Aquifer Protection Area, which becomes the regulatory boundary for land use controls designed to protect the well from contamination. As Level A Mapping is completed for each well field and approved by DEEP, it replaces the Level B Mapping. Final Adopted Level A Areas are those where towns have land use regulations for them. Masschusetts and Rhode Island Wellhead Protection Areas may be shown for informational purposes.

QUESTIONS:
Bureau of Water Protection and Land Reuse
Planning and Standards Division
Phone: (860) 424-3020
www.ct.gov/deep/aquiferprotection



STATE OF CONNECTICUT
DEPARTMENT OF
ENERGY & ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127



Soil Map—State of Connecticut
(Lantern Hill Road Bridge No. 137-001)

Map Scale: 1:1,910 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 15, Sep 28, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—May 1, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

State of Connecticut (CT600)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
15	Scarboro muck, 0 to 3 percent slopes	3.5	24.8%
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	0.1	0.9%
32A	Haven and Enfield soils, 0 to 3 percent slopes	0.0	0.2%
32B	Haven and Enfield soils, 3 to 8 percent slopes	7.2	51.4%
38E	Hinckley loamy sand, 15 to 45 percent slopes	0.9	6.3%
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	2.3	16.2%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	0.0	0.1%
Totals for Area of Interest		**13.9**	**100.0%**

Connecticut Department of
ENERGY &
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79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

STATEWIDE INLAND WETLANDS & WATERCOURSES ACTIVITY REPORTING FORM

Pursuant to section 22a-39(m) of the General Statutes of Connecticut and section 22a-39-14 of the Regulations of Connecticut State Agencies, inland wetlands agencies must complete the Statewide Inland Wetlands & Watercourses Activity Reporting Form for **each** action taken by such agency.

This form may be made part of a municipality's inland wetlands application package. If the municipality chooses to do this, it is recommended that a copy of the Town and Quadrangle Index of Connecticut and a copy of the municipality's subregional drainage basin map be included in the package.

Please remember, the inland wetlands agency is responsible for ensuring that the information provided is **accurate** and that it reflects the **final** action of the agency. Incomplete or incomprehensible forms will be mailed back to the agency. Instructions for completing the form are located on the following pages.

The inland wetlands agency shall mail completed forms for actions taken during a calendar month no later than the 15th day of the following month to the Department of Energy and Environmental Protection (DEEP). Do **not** mail this cover page or the instruction pages. Please mail **only** the **completed** reporting form to:

DEEP Land & Water Resources Division
Inland Wetlands Management Program
79 Elm Street, 3rd Floor
Hartford, CT 06106

Questions may be directed to the DEEP's Inland Wetlands Management Program at (860) 424-3019.

INSTRUCTIONS FOR COMPLETING

THE STATEWIDE INLAND WETLANDS & WATERCOURSES ACTIVITY REPORTING FORM

Use a separate form to report EACH action taken by the Agency. Complete the form as described below.
Do NOT submit a reporting form for withdrawn actions.

PART I: Must Be Completed By The Inland Wetlands Agency

1. Choose the year and month the Inland Wetlands Agency took the action being reported. If multiple actions were taken regarding the same project or activity then multiple forms need to be completed.

2. Choose ONE code letter to describe the final action or decision taken by the Inland Wetlands Agency. Do NOT submit a reporting form for withdrawn actions. Do NOT enter multiple code letters (for example: if an enforcement notice was given and subsequent permit issued - two forms for the two separate actions are to be completed).

   A = A Permit Granted by the Inland Wetlands Agency (not including map amendments, see code D below)
   B = Any Permit Denied by the Inland Wetlands Agency
   C = A Permit Renewed or Amended by the Inland Wetlands Agency
   D = A Map Amendment to the Official Town Wetlands Map - or -
   An Approved/Permitted Wetland or Watercourse Boundary Amendment to a Project Site Map
   E = An Enforcement Action: Permit Revocation, Citation, Notice of Violation, Order, Court Injunction, or Court Fines
   F = A Jurisdictional Ruling by the Inland Wetlands Agency (i.e.: activities "permitted as of right" or activities considered non-regulated)
   G = An Agent Approval pursuant to CGS 22a-42a(c)(2)
   H = An Appeal of Agent Approval Pursuant to 22a-42a(c)(2)

3. Check "yes" if a public hearing was held in regards to the action taken; otherwise check "no".

4. Enter the name of the Inland Wetlands Agency official verifying that the information provided on this form is accurate and that it reflects the FINAL action of the agency.

PART II: To Be Completed By The Inland Wetlands Agency Or The Applicant - If Part II is completed by the applicant, the applicant MUST return the form to the Inland Wetlands Agency. The Inland Wetlands Agency MUST ensure that the information provided is accurate and that it reflects the FINAL action of the Agency.

5. Enter the name of the municipality for which the Inland Wetlands Agency has jurisdiction and in which the action/project/activity is occurring.

   Check "yes" if the action/project/activity crosses municipal boundaries and enter the name(s) of the other municipality(ies) where indicated. Check "no" if it does not cross municipal boundaries.

6. Enter the USGS Quad Map name or number (1 through 115) as found on the Connecticut Town and Quadrangle Index Map (the directory to all USGS Quad Maps) that contains the location of the action/project/activity. Click on the following website for USGS Quad Map information:
   http://ct.gov/deep/lib/deep/gis/resources/Index_NamedQuadTown.pdf

   ALSO enter the four-digit identification number of the corresponding Subregional Drainage Basin in which the action/project/activity is located. If the action/project/activity is located in more than one subregional drainage basin, enter the number of the basin in which the majority of the action/project/activity is located. Town subregional drainage basin maps can be found at UConn – CLEAR's website: http://clear.uconn.edu/data/map_set/index.htm

7. Enter the name of the individual applying for, petitioning, or receiving the action.

8. Enter the name and address or location of the action/project/activity. Check if the action/project/activity is TEMPORARY or PERMANENT in nature. Also provide a brief DESCRIPTION of the action/project/activity. It is always best to provide as much information as possible (i.e., don't just state "forestry", provide details such as "20 acre forestry harvest, permit required for stream crossing".)

9. Carefully review the list below and enter ONLY ONE code letter which best characterizes the action/project/activity. All state agency projects must code "N".

A = Residential Improvement by Homeowner
B = New Residential Development for Single Family Units
C = New Residential Development for Multi-Family / Condos
D = Commercial / Industrial Uses
E = Municipal Project
F = Utility Company Project
G = Agriculture, Forestry or Conservation
H = Wetland Restoration, Enhancement, Creation
I = Storm Water / Flood Control
J = Erosion / Sedimentation Control
K = Recreation / Boating / Navigation
L = Routine Maintenance
M = Map Amendment
N = State Agency Project
P = Other (this code includes the approval of concept plans with no-on-the-ground work)

10. Enter between one and four code numbers to best characterize the project or activity being reported. Enter "NA" if this form is being completed for the action of map amendment. You MUST provide code 12 if the activity is located in an established upland review area. You MUST provide code 14 if the activity is located beyond the established upland review area or no established upland review area exists.

1 = Filling
2 = Excavation
3 = Land Clearing / Grubbing (no other activity)
4 = Stream Channelization
5 = Stream Stabilization (includes lakeshore stabilization)
6 = Stream Clearance (removal of debris only)
7 = Culverting (not for roadways)
8 = Underground Utilities Only (no other activities)
9 = Roadway / Driveway Construction
10 = Drainage Improvements
11 = Pond, Lake Dredging / Dam Construction
12 = Activity in an Established Upland Review Area
14 = Activity in Upland

Examples: Jurisdictional ruling allowing construction of a parking lot in an upland where the municipality does not have an established upland review area must use code 14, other possible codes are 2 and 10. Permitted construction of a free standing garage (residential improvement by homeowner) partially in an established upland review area with the remainder in the upland must use code 12 and 14, other possible codes are 1 and 2.

11. Leave blank for TEMPORARY alterations but please indicate action/project/activity is temporary under question #8 on the form. For PERMANENT alterations, enter in acres the area of wetland soils or watercourses altered. Include areas that are permanently altered, or are proposed to be, for all agency permits, denials, amendments, renewals, jurisdictional rulings, and enforcement actions. For those activities that involve filling or dredging of lakes, ponds or similar open water bodies enter the acres filled or dredged under "open water body". For those activities that involve directly altering a linear reach of a brook, river, lakeshore or similar linear watercourse, enter the total linear feet altered under "stream". Remember that these figures represent only the acreage altered not the total acreage of wetlands or watercourses on the site. You MUST provide all information in ACRES (or linear feet as indicated) including those areas less than one acre. To convert from square feet to acres, divide square feet by the number 43,560. If this report is being completed for an agency jurisdictional ruling and detailed information is not available, provide an estimate. Enter zero if there is no alteration.

12. Enter in acres the area of upland altered as a result of an ACTIVITY REGULATED BY the inland wetlands agency, or as a result of an AGENT APPROVAL pursuant to CGS section 22a-42a(c)(2). Leave blank for TEMPORARY alterations but please indicate action/project/activity is temporary under question #8 on the form. Include areas that are permanently altered, or proposed to be permanently altered, for all agent approvals, agency permits, denials, amendments, renewals, jurisdictional rulings, and enforcement actions. You MUST provide all information in ACRES including those areas less than one acre. See directions above (#11) for conversion factor. If this report is being completed for an agent approval or an agency jurisdictional ruling and detailed information is not available, provide an estimate. Enter zero if there is no alteration.

13. Enter the acres that are, or are proposed to be, restored, enhanced or created for all agency permits, denials, amendments, renewals, jurisdictional rulings and enforcement actions. NOTE restored or enhanced applies to previously existing wetlands or watercourses. Created applies to a non-wetland or non-watercourse area which is converted into wetlands or watercourses (question #10 must provide 12 and/or 14 as an answer, and question #12 must also be answered). You MUST provide all information in ACRES including those areas less than one acre. See directions above (#11) for conversion factor. Enter zero if there is no restoration, enhancement or creation.

PART III: To Be Completed By The DEEP - Please leave this area blank. Incomplete or incomprehensible forms will be mailed back to the inland wetlands agency.

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GIS CODE #: ___ ___ ___ ___ ___ ___ ___ ___ ___
For DEEP Use Only

Statewide Inland Wetlands & Watercourses Activity Reporting Form

Please complete and mail this form in accordance with the instructions on pages 2 and 3 to:
DEEP Land & Water Resources Division, Inland Wetlands Management Program, 79 Elm Street, 3rd Floor, Hartford, CT 06106
Incomplete or incomprehensible forms will be mailed back to the inland wetlands agency.

PART I: Must Be Completed By The Inland Wetlands Agency

1. DATE ACTION WAS TAKEN: year: _____ month: _____
2. ACTION TAKEN (see instructions, only use one code): _____
3. WAS A PUBLIC HEARING HELD (check one)? yes ☐ no ☐
4. NAME OF AGENCY OFFICIAL VERIFYING AND COMPLETING THIS FORM:
   (print name) _____ (signature) _____

PART II: To Be Completed By The Inland Wetlands Agency Or The Applicant

5. TOWN IN WHICH THE ACTION IS OCCURRING (print name): Ledyard and Stonington
   does this project cross municipal boundaries (check one)? yes ☑ no ☐
   if yes, list the other town(s) in which the action is occurring (print name(s)): Ledyard, Stonington
6. LOCATION (see instructions for information): USGS quad name: Old Mystic or number: 88
   subregional drainage basin number: 2104
7. NAME OF APPLICANT, VIOLATOR OR PETITIONER (print name): Towns of Ledyard and Stonington
8. NAME & ADDRESS / LOCATION OF PROJECT SITE (print information): Lantern Hill Rd Bridge #137-001 over Whitford Brook
   briefly describe the action/project/activity (check and print information): temporary ☐ permanent ☑ description: Existing bridge replacement
9. ACTIVITY *PURPOSE* CODE (see instructions, only use one code): E
10. ACTIVITY *TYPE* CODE(S) (see instructions for codes): 9, 1, 2, 12
11. WETLAND / WATERCOURSE AREA ALTERED (must provide acres or linear feet):
    wetlands: 0.007 acres open water body: 0.013 acres stream: 70 linear feet
12. UPLAND AREA ALTERED (must provide acres): 0.231 acres
13. AREA OF WETLANDS / WATERCOURSES RESTORED, ENHANCED OR CREATED (must provide acres): 0 acres

DATE RECEIVED:

PART III: To Be Completed By The DEEP

DATE RETURNED TO DEEP:

FORM COMPLETED: YES NO

FORM CORRECTED / COMPLETED: YES NO