INLAND WETLAND APPLICATION

CAVALRY ROAD BRIDGE
OVER
SAUGATUCK RIVER

TOWN OF WESTPORT

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1. Application

SUBMIT TO:
Westport Conservation Department
Town Hall – Room 205
110 Myrtle Avenue
Westport, CT 06880
Phone: 203-341-1170
Fax: 203-341-1088

FOR OFFICE USE ONLY
File#: _____
Date Filed: _____
Class: _____
Fee: $ _____
Date Rec'd: _____
☐ **Cash** ☐ **Check #** _____
Final Inspection Y / N
As-Built Required Y / N

APPLICATION
WESTPORT CONSERVATION DEPARTMENT

PROJECT LOCATION: Cavalry Road Bridge(BRG.#04964) over Saugatuck River (.66 miles west of Weston Road)

ASSESSOR'S MAP # _____ TAX LOT # _____ ZONING DISTRICT B16

APPLICANT OR AGENT		OWNER
WMC Consulting Engineers	NAME	Town of Westport
87 Holmes Rd	ADDRESS	110 Myrtle Ave
Newington, CT 06111		Westport, CT 06880
(860) 667-9624	(H) PHONE (H)	(203) 341-1000
	(W) PHONE (W)	
jcostello@wmcengineers.com	E-MAIL	pratkiewich@westportct.gov

EXISTING CONDITIONS (Describe existing property and structures): Replacement of Cavalry Road Bridge over Saugatuck River (BRG.#04964).

PROJECT DESCRIPTION/PURPOSE (Describe the proposed activity): Replacement of Cavalry Road Bridge over Saugatuck River (BRG.#04964). The Bridge is located in both Westport and Weston.

I hereby depose and say that all statements contained herein and all exhibits attached hereto are true and binding to the best of my knowledge:

J A Costello
(Signature of Applicant)

01/06/2020
(Date)

The act of applying to the Conservation Commission and/or Department implies consent to the proposed activity, and grants permission to the Conservation Commission/Department and its agents to inspect the property herein described for the purpose of resource inventory, impact analysis, and compliance investigation at any time beginning on the date of the application filing, and extending through the pendency of any permit issued, or in the event of permit denial, for the purpose of compliance control.

(Signature of Property Owner)

January 2, 2020
(Date)

FOR DEPARTMENT USE ONLY

1. DEPARTMENT FINDINGS:

After preliminary review by department staff, the following areas, resources and levels of environmental licensure have been identified:

☐ Wetland(s) / Watercourse(s), section: _____
☐ Non-regulated Activity ☐ Permit Required ☐ **FEE $ _____**

☐ Wetland / Watercourse Setback(s), section: _____
☐ Non-regulated Activity ☐ Permit Required ☐ **FEE $ _____**

☐ Waterway Protection Line(s), section: _____
☐ Non-regulated Activity ☐ Permit Required ☐ **FEE $ _____**

☐ Staff Site Inspection for Determination of Wetland Boundary
☐ Administrative Review ☐ Conservation Commission Review ☐ **FEE $ _____**

☐ Sediment & Erosion Control Inspection Fee
☐ **FEE $ _____**

CONSERVATION CERTIFICATE OF COMPLIANCE FEE $ _____

STATE FEE $ _____

NOTICE FEE $ _____

TOTAL FEE DUE $ _____

The application has been classified as requiring the following ruling:
☐ DECLARATORY ☐ SUMMARY ☐ PLENARY

Public Hearing of the application by the Conservation Commission: ☐ is not required.
☐ is scheduled for _____.

Westport/Weston Health District Approval: _____ Public Sewer: Yes / No
Engineering Dept. review required: Yes/No Date Approved _____
Comments: _____
_____
_____

2. REQUEST FOR ADDITIONAL INFORMATION:

Please submit the information referenced in the attached schedule(s) by 4:00 p.m. on the _____ day of _____, 200___ .

Schedule(s): ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G

Other: _____
_____
_____

3. RESTRICTION, CONDITIONS AND LIMITATIONS:

This review is valid for a period of six (6) months from the date of review, shown below, and is subject to the following data/plan(s)/stipulation(s): _____
_____
_____
_____
_____

Reviewed by: _____ _____
(Conservation Department Staff Signature) (Date)

2. Schedule C – Wetland/Watercourses

TOWN OF WESTPORT

SCHEDULE C—WETLANDS / WATERCOURSES **APP # _____**

Due by 4:00 p.m. on _____

1. Pursuant to Section 9.6.2 relating to Soil Sample Data – the applicant/agent is to submit copy of a report by a "soil scientist" duly qualified in accordance with standards set by the U.S. Civil Service Commission, showing soil sample data, soil classifications, and a surveyed delineation of wetland soils as flagged by the scientist, including flag numbers (as requested by agency).

2. Pursuant to Section 9.6.3 relating to Biological Evaluations – the applicant/agent is to submit a list and evaluation of the plant and animal life that may be found within, depend upon, or use the wetlands and watercourses (as requested by agency).

3. Describe the anticipated impacts to wetlands and watercourses that may occur as the result of that portion of your proposal that may be located in wetlands, watercourses or their setbacks.

   Install temporary cofferdams around the existing pier and abutment as shown in the permit plans (sheet 6). Remove the existing pier, abutment and wingwalls. Install new integral abutments and wingwalls, complete embankment grading and remove all temporary cofferdams.

4. Describe the mitigation that is being proposed as part of your application in order to minimize disturbance and pollution of wetlands and watercourses, maintain or improve water quality, and prevent destruction of or enhance the natural habitats and functions of the wetlands and watercourses.

   Disturbance is minimized by reducing the limits of temporary cofferdams and confining impacts to only what is absolutely necessary for the replacement of the existing bridge.

5. List the alternatives to the proposed application that were considered and the reason for their abandonment.

   Alternative 2 – Steel Beams with Concrete Deck. Cons to this alternative are:
   1) Not as cost-effective
   2) Slightly longer construction duration (9 months) due to the cast-in-place deck slab.

   Alternative 3 – Prestressed Beams – Pretensioned Type NEBT - 39. Cons to this alternative are:
   1) Not as cost-effective
   2) Least hydraulically efficient alternative (lowest low chord).
   3) Slightly longer construction duration (9 months) due to the cast-in-place deck slab.

3. Schedule D – Waterway Protection Lines

TOWN OF WESTPORT

SCHEDULE D—WATERWAY PROTECTION LINES **APP#_____**

Due by 4:00 p.m. on_____.

1. Explain/submit information showing why/how the proposed activity as located within Waterway Protection Lines will not cause flooding, drainage, erosion and/or related conditions hazardous to life and property and will not have an adverse impact upon the flood-carrying and water-storage capacity of the town's waterways, including but not limited to the impact upon flood heights, hydrological energy flow, maintenance of essential and natural patterns of water circulation, drainage and basin configuration and maintenance of fresh- and saltwater exchange through the placement of culverts, tide gates or other drainage flood-control structures. *(Sec.148-8 of the Waterway Protection Line Ordinance)*

The proposed bridge will reduce flooding and increase the hydraulic capacity. See Hydraulic report

2. Explain/submit information showing why/how the proposed activity as located within the Waterway Protection Lines will not cause water pollution, erosion and/or environmentally related hazards to life and property and will not have an adverse impact on the preservation of the natural resources and ecosystems of the waterway, including but not limited to impact on ground or surface water, aquifers, plant and aquatic life, nutrient exchange and supply, thermal energy flow, natural pollution filtration and decomposition, habitat diversity, viability and productivity and natural rates and processes or erosion and sedimentation. *(Sec. 148-9 of the Waterway Protection Line Ordinance)*

The attached permit plans identify E&S and Turbidity Control measures that the Contractor is requi

3. Other:

4. Project Description

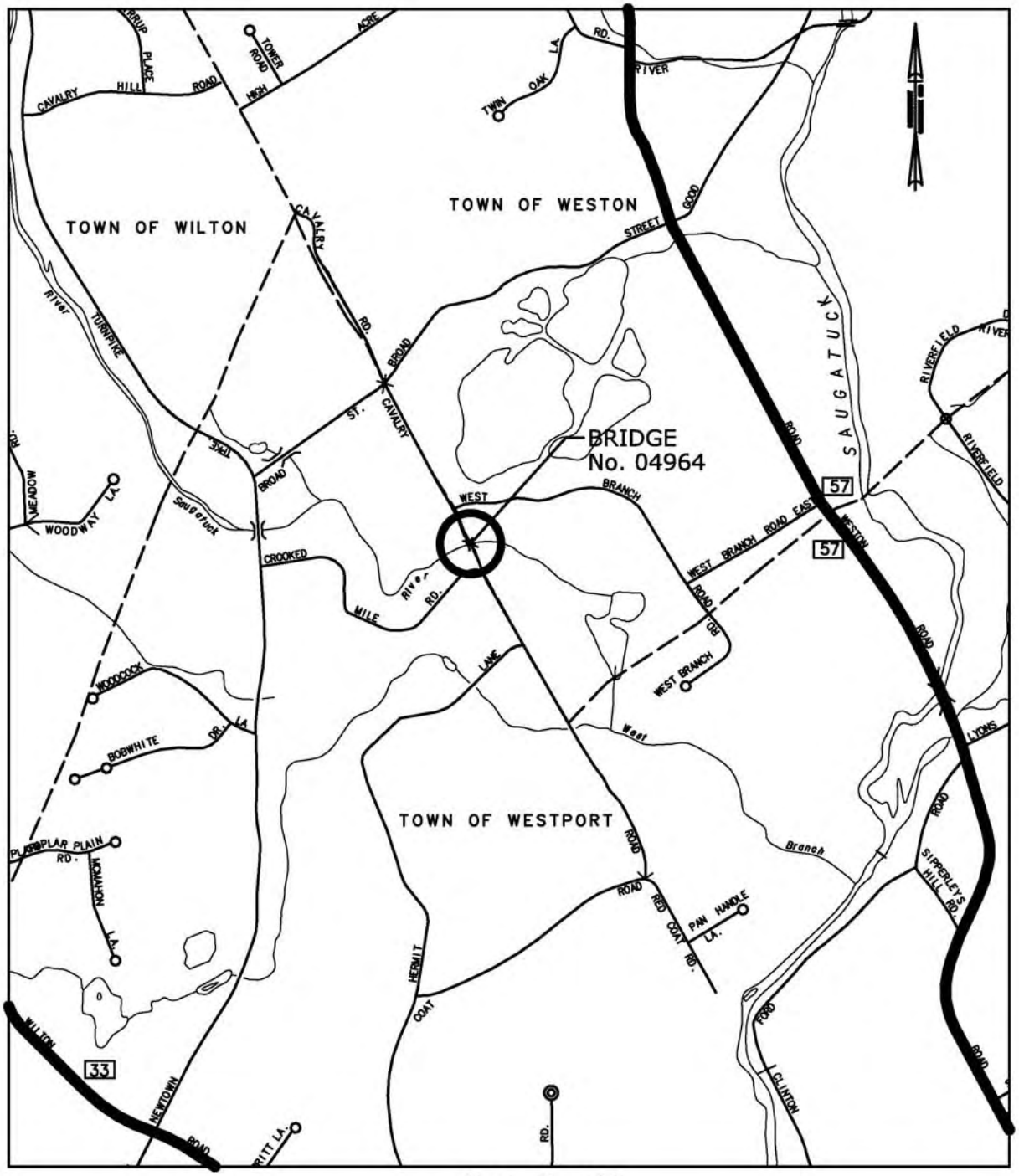
PROJECT DESCRIPTION:

Bridge No. 04964 supports Cavalry Road over the West Branch Saugatuck River and construction was reportedly completed in July 1957. The bridge is located in the southern end of Weston, sitting on the Weston-Westport town line (which runs down the center line of the road/bridge) just north of Crooked Mile Road, about 1 mile north of Route 15 (Merritt Parkway) and 1,500 feet east of Newtown Turnpike. The project is located within 500 feet of another municipality. Cavalry Road generally runs in a north-south direction and in the area of the bridge, is classified as an urban local road serving mostly sparse to moderate residential development. The 2016 Average Daily Traffic on Cavalry Road at the bridge estimated to be 622 vehicles per day with only minor truck traffic.

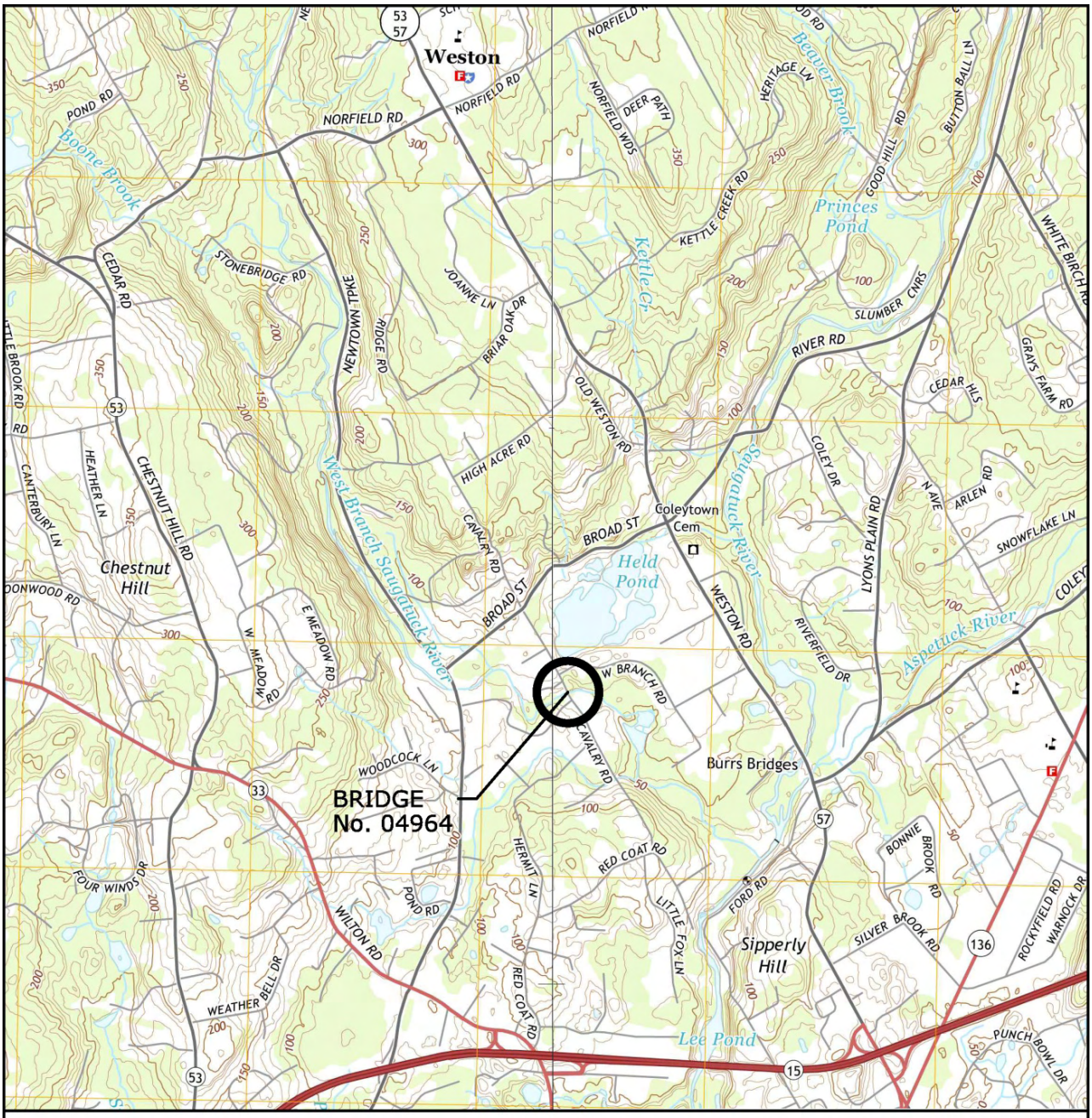
The existing bridge is a two-span structure consisting of two equal clear spans of 28.5' (abutment face to pier face), a total length of 63 feet, bearing to bearing length of 61.5 and a total clear span between abutments of 60 feet, including the 3 foot wide pier. According the 1956 record drawings, the superstructure consists of eight (8) eighteen (18) inch deep prestressed concrete deck units; the 6 inner units being 36" wide and the two fascia units 40" wide. The substructure is composed of reinforced concrete abutments and a center pier, all of which are supported on soil. Running generally west to east, the main channel of the river runs under the north span while the area under the south span is graded relatively flat about 5' above the main channel. The curb-to-curb width is 22-feet with no shoulders, which is 2 feet wider than the reported approach roadway width, and the total width out-to-out is 25.5 feet. There is a 4" gas main attached to the fascia of the west (upstream) curb/rail base and Aquarion Water Company documents indicate an existing 24" C.I. water main under the streambed just east (downstream) of the existing bridge, as well as a new 8" water main to be installed in 2017.

The proposed replacement bridge crossing will have a single span 72-foot clear opening perpendicular to the direction of flow. The new structure will consist of Precast Concrete NEXT Beams, supported on integral abutments with micropiles founded on bedrock. The width of the proposed structure will be increased, from the existing approximately 25.5 feet, to accommodate two 10-foot lanes and 2-foot shoulders. The total width (out-to-out) of the proposed structure, with open rail parapets, will be approximately 28 feet. The profile of the roadway will be elevated through the crossing area however the low point in the roadway will remain unchanged. Anticipated project sequences can be found in Permit Plans (Sheet 6).

5. Maps



STATE PROJECT NO.: 157-85 CITY/TOWN: WESTON/WESTPORT	STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION **FEDERAL LOCAL BRIDGE PROGRAM** **Reconstruction of Bridge No. 04964** **Cavalry Road over WB Saugatuck River**		DATE: MAY 2018



SCALE 1:24 000

1 ½ 0 1 MILE

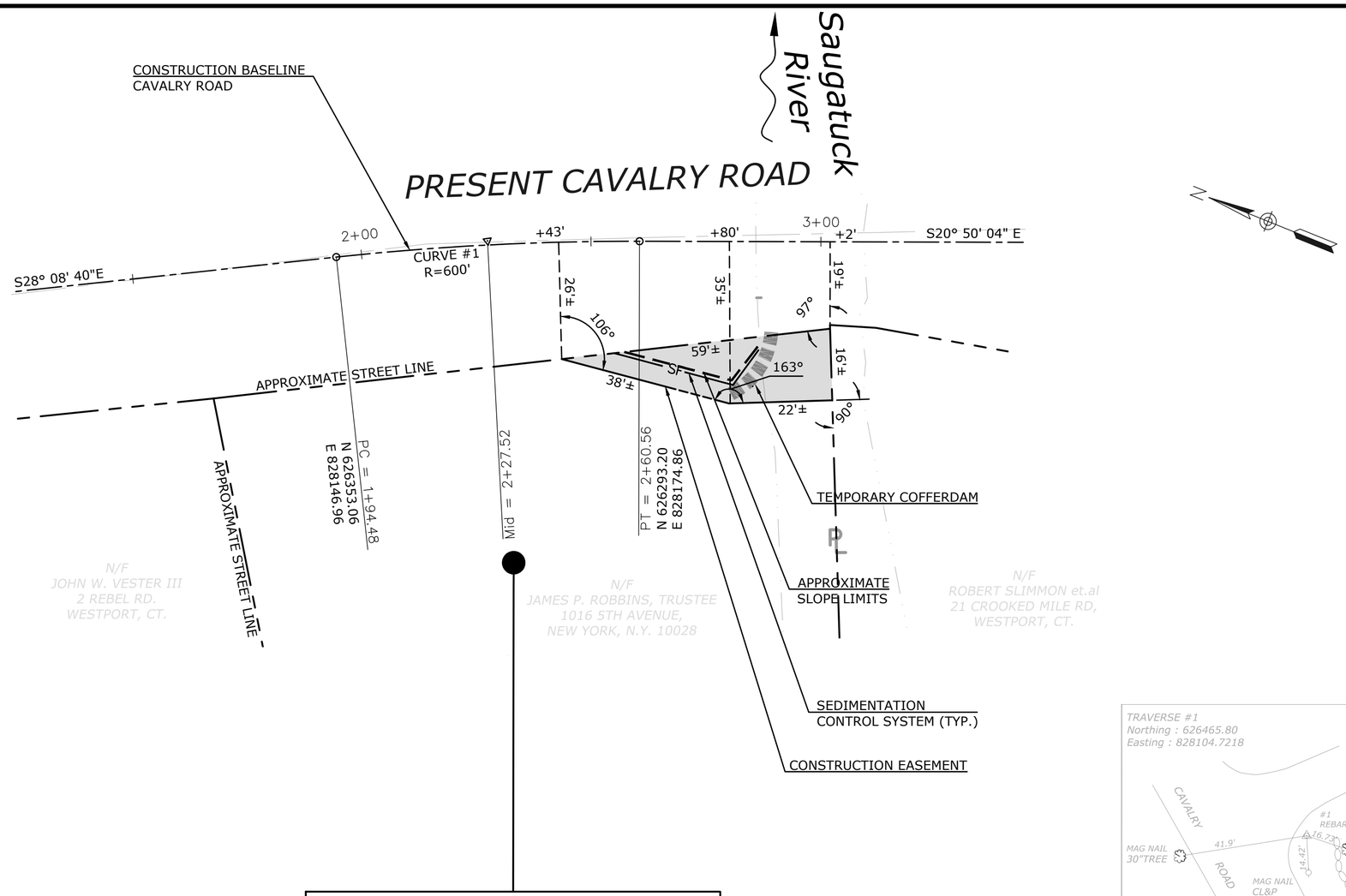
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

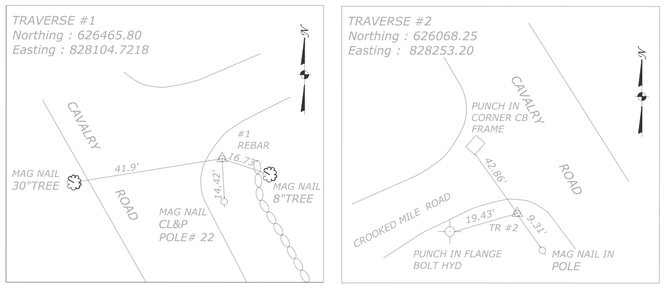
1 .5 0 1 KILOMETER

CONTOUR INTERAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

QUADRANGLE NO. **107-108**		**NORWALK N. & WESTPORT CT 2015**
STATE PROJECT NO.: 157-85 COUNTY: FAIRFIELD CITY/TOWN: WESTON/WESTPORT	APPLICATION BY: STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION **FEDERAL LOCAL BRIDGE PROGRAM** **Reconstruction of Bridge No. 04964** **Cavalry Road over WB Saugatuck River**	DATE: MAY 2018

6. Property Owners





SURVEY TIES

SCALE: NTS

NOTES:

1.THIS SURVEY AND MAP HAS BEEN PREPARED IN ACCORDANCE WITH SECTIONS 20-300B-1 THROUGH 20-300B-20 OF THE REGULATIONS OF CONNECTICUT'S DEPT. OF CONSUMER PROTECTION "STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON SEPTEMBER 26,1996. PROPERTY BOUNDARY DATA BASED ON A DEPENDENT RESURVEY CONFORMING TO HORIZONTAL ACCURACY CLASS D.

THE BASE LINE FROM WHICH THIS PROPERTY TRANSACTION IS REFERENCED CONFORMS TO CLASS A-2 HORIZONTAL ACCURACY.

2. THE FEATURES DEPICTED HEREON ARE THE RESULT OF THE GENERAL LOCATION SURVEY FOR THE PROJECT, OR AS MAY BE REFERENCED HEREON.

3. THE PROPERTY AND STREET LINES DEPICTED HAVE BEEN COMPLIED FROM VARIOUS SOURCES AND ARE NOT TO BE CONSTRUED AS NECESSARILY BEING OBTAINED AS THE RESULT OF A FIELD SURVEY, NOR DO THEY REPRESENT A PROPERTY/BOUNDARY OPINION.

4. THIS SURVEY IS NOT VALID WITHOUT A LIVE SIGNATURE AND EMBOSSED SEAL.

5. THE CONSTRUCTION EASEMENT DEPICTED HEREON WILL BE FORMALLY EXTINGUISHED BY AN AFFIDAVIT WHICH WILL BE FILED IN THE PUBLIC LAND RECORDS.

SURVEY NOTES:

HORIZONTAL DATUM: NAD83
HORIZONTAL ACCURACY: CLASS A-2
VERTICAL DATUM IS NGVD29
VERTICAL ACCURACY: CLASS T-2

JAMES P. ROBBINS, TRUSTEE

CONSTRUCTION EASEMENT FOR THE PURPOSE OF CONSTRUCTION OF BRIDGE NO. 04964 CAVALRY ROAD OVER SAUGATUCK RIVER ACQUIRED. TO EXCAVATE RIVER CHANNEL, REMOVE, USE OR RETAIN EXCAVATED MATERIAL ACQUIRED. TO INCLUDE TEMPORARY CONSTRUCTION ACCESS, TEMPORARY SILTATION CONTROL SYSTEM, TEMPORARY COFFERDAMS, TEMPORARY STORAGE OF MATERIALS, TEMPORARY UTILITY LOCATION AND PLACEMENT OF EQUIPMENT. EASEMENT TAKEN UNDER THIS PARAGRAPH WILL BE RESTORED BY GRADING OR SEEDING ANY DISTURBED AREAS. SAID EASEMENT WILL BE EXTINGUISHED UPON COMPLETION OF THE PROJECT, UNLESS SOONER EXTINGUISHED BY THE STATE.
EASEMENT AREA = 576± S.F.

CURVE DATA
CURVE #1
PI N 828162.56
PI E 626323.90
L = 66.07'
△ = 06°18'36"
R = 600.00'
T = 33.07'

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

DRAWN BY SAM	DATE 12/12/19
CHECKED BY KOE	DATE
REVISED BY	DATE
REVISED BY	DATE

DATE	REVISION	REQ. BY

TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

TOWN NO. 157
PROJECT NO. 157-85
SERIAL NO. 2 TITLE
SHEET 1 OF 1 DATE

RIGHT OF WAY SURVEY

TOWN OF WESTON

MAP SHOWING EASEMENT ACQUIRED FROM

JAMES P. ROBBINS, TRUSTEE

BY

THE STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

REPLACEMENT OF BRIDGE NO. 04964
CAVALRY ROAD BRIDGE OVER SAUGATUCK RIVER

SCALE : 1"=20' DECEMBER, 2019

MARK D. ROLFE, P.E.
CHIEF ENGINEER – BUREAU OF ENGINEERING AND CONSTRUCTION

7. Aquifer Protection Areas

AQUIFER PROTECTION AREAS

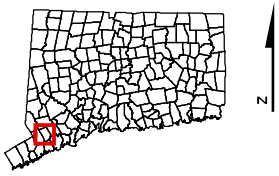
Weston, CT

August 26, 2019

- 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

Ridgefield
Weston
Wilton
Norwalk
Westport
Project Location
A 14 Coleytown 02/21/2008
A 14 Coleytown 04/28/2008
A 14 Coleytown 01/08/2009
A 14 Coleytown 12/13/2007
A 12 Canal Street 12/13/2007
102
107
7
53
57
58
136
33
106
15

8. Fisheries Letter

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

Marine Headquarters

333 Ferry Road • Old Lyme, CT 06371 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

---

TO: Michael Salter, Office of Environmental Planning, DOT

FROM: Bruce Williams, DEEP - Fisheries Division

DATE: July 18, 2017

SUBJECT: Preliminary Fisheries Review – DOT Project 157-TBD

Type of Permit:

☒1. **DOT Culvert/Bridge Projects Project#:** 157-TDB **Bridge#:** 04964
☐2. **Diversion**
☐3. **PGP/Inland Wetland**
☐4. **Water Quality Certification**

Applicant: Connecticut Department of Transportation

State P.E. Project #: **Town:** Westport/Weston

Waters: West Branch Saugatuck River **Sub Regional Basin #:** 7203

Project Scope: The existing Cavalry Road Bridge is scour critical and structurally deficient with severe leaks and cracks in the superstructure. The proposed rehabilitation includes a full bridge replacement. To alleviate scour potential DOT has proposed changing the design from the existing double span to a single span precast concrete deck supported by cast-in-place abutments and wingwalls. Enclosed are my preliminary comments.

Fisheries Resources: The Fisheries Division annually stocks a combined total of approximately 800 adult Brown Trout, Brook Trout, and Rainbow Trout in the West Branch Saugatuck River. In addition to stocked trout, the Fisheries Division has documented the presence of wild Brown Trout. Other documented fish species include American Eel, Cutlips Minnow, Creek Chub, Common Shiner, Golden Shiner, Blacknose Dace, Longnose Dace, Tessellated Darter, Bluegill, Pumpkinseed, Green Sunfish, Redbreast Sunfish, Brown Bullhead, Chain Pickerel, and White Sucker.

Comments/Recommendations:

1. Existing onsite conditions do not restrict fish passage, but the proposed single span bridge is preferable for fish passage and flood control to the existing double span.
2. To protect downstream fish habitat, turbidity control curtains should be maintained during construction and sedimentation controls should be maintained at the toe of the slope of all

disturbed areas until the project is completed and all disturbed areas are restored with native vegetation.

3. When the existing two-span bridge is replaced with a single span, the center pier should be cut and removed no less than one foot below grade.
4. To compensate for habitat loss, a cluster of three boulder should be placed mid-channel directly upstream and downstream of the bridge.
5. If riprap is used, efforts should be made to minimize the amount of area covered and all riprap should be covered with natural streambed material.
6. As a best management practice, any "unconfined" instream work 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.

CC. Steve Gephard

9. FMC Approval

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546

July 15, 2020

Mr. Chris Spaulding
First Selectman
Town of Weston
Weston Town Hall
PO Box 1007
56 Norfield Road
Weston, CT 06883

Dear Mr. Spaulding:

Subject: Flood Management Certification
Local Bridge Program Project No. 0157-0085
Reconstruction of Bridge No. 04964
Cavalry Road over West Branch of Saugatuck River
Town of Weston

In accordance with the Memorandum of Understanding between the Connecticut Department of Transportation (Department) and the Connecticut Department of Energy and Environmental Protection (DEEP) regarding flood management certifications for municipal projects, the Department has completed the review of the flood management certification prepared and submitted for the Town of Weston for the subject project, which states that the proposed activity is consistent with all applicable standards and criteria established in Section 25-68d(b) of the Connecticut General Statutes and Sections 25-68h-1 through 25-68h-3, inclusive, of the Regulations of Connecticut State Agencies.

The project consists of the replacement of Bridge No. 04964, Cavalry Road over West Branch of Saugatuck River in Weston, as shown on the project plans, dated January 23, 2020, and as documented in the Final Hydraulic Design Report and Floodway Report, both Dated January 17, 2020. A portion of the project is located within the 100-year flood zone of the West Branch of the Saugatuck River.

The certification is complete and approved, subject to the following Standard and Special Conditions:

<u>Standard Conditions</u>:

1. Time of Year Restriction on In-water Construction

    a. Between September 30 and May 31 the municipality shall not place fill, excavate material, or conduct any other construction activity in any watercourse unless such

activity is confined by a cofferdam or other device which isolates such activity from the watercourse, unless the DEEP Inland Fisheries Division has given written authorization otherwise.

b. The municipality shall not place fill, excavate material, or conduct any other activity in any watercourse stocked with fish by the commissioner or any other person, or in any tributary to such watercourse, from 12:01 a.m. on the Monday preceding the third Saturday in April through 12:00 midnight on the Sunday preceding the fourth Saturday in April.

c. The municipality shall not place fill, excavate material or conduct any other construction activity in or adjacent to any watercourse, which activity may adversely affect anadromous fish, during the time period when anadromous fish are known or reasonably believed to be migrating in the watercourse.

2. Pollution Prevention/Best Management Practices

The municipality shall not cause or allow the authorized activity, including any construction associated therewith, to result in pollution or other environmental damage and shall employ best management practices to prevent such damage. The municipality shall, in addition to employing any other best management practices necessary to prevent such damage, do the following:

a. Controlling Erosion

The municipality shall install and maintain in optimal condition erosion and sedimentation controls to prevent erosion and discharge of material into any waters of the state, including wetlands, as a result of the authorized activity or any construction associated therewith. Such controls shall be installed and maintained in conformity with the *Connecticut Guidelines for Soil Erosion and Sediment Control*, as revised, published by the Connecticut Council on Soil and Water Conservation pursuant to Section 22a-328 of the Connecticut General Statutes.

b. Proper Disposal of Material

All material and solid waste generated during any construction associated with such activity shall be disposed of in accordance with applicable federal, state and local law.

3. Storage of equipment/material within the flood plain should be avoided but, if absolutely necessary, the municipality will require the contractor to remove equipment and materials from the 100-year flood plain during periods when flood warnings have been issued or are anticipated by a responsible federal, state or local agency. It shall be the contractor's responsibility to be knowledgeable of such warnings when flooding is anticipated.

4. Work shall not be conducted in or adjacent to watercourses and reservoirs used as public drinking water supply sources without coordination with the water supply utility and Department of Public Health.

5. All temporary structures, cofferdams, and fill shall not impede the movement of flood flows and shall be removed at the completion of their use. The design of such temporary

structures, cofferdams and fill shall be based on the DOT Drainage Manual, where applicable. Sheet piling that is cut one foot below existing grade shall be considered removed.

6. All fill shall be clean material, free of stumps, rubbish, hazardous, and toxic material.

7. Once work is initiated, it shall proceed rapidly and steadily until completed and stabilized in order to minimize use of temporary structures and to minimize soil erosion.

Special Conditions:

1. When conducting boulder cluster placement, channel grading, and placing natural streambed material please contact the following DEEP personal ten days before the start of work, Matt Goclowski at 860-424-3926, matthew.goclowski@ct.gov or Steve Gephard at 860-447-4316 or steve.gephard@ct.gov

A copy of the completed certification forms are enclosed for your records. No revisions or alterations to the approved plans are allowed without obtaining written approval from the Department of such alterations.

This letter and certification forms must be attached to any subsequent permit applications for the municipal project that are submitted to the DEEP or the U.S. Army Corps of Engineers.

If there are any questions, please contact Mr. Michael E. Hogan, Transportation Principal Engineer, of the Hydraulics and Drainage Section, at michael.hogan@ct.gov.

Very truly yours,

Theodore H. Nezames, P.E.
2020.07.16 09:26:45-04'00'

Theodore H. Nezames
Engineering Administrator
Bureau of Engineering and Construction

Enclosure

Cc: Mr. Jeff Caiola, DEEP

Paul M. Metsack/clc Chow, Chong

Digitally signed by Chow, Chong
DN: E=Chong.Chow@ct.gov, CN="Chow, Chong", OU=Floor-3, OU=Headquarters, OU=DOT-Users, DC=DOT, DC=CT, DC=GOV
Reason: I have reviewed this document
Date: 2020.07.15 11:59:02-04'00'

bcc: Scott A. Hill
Theodore H. Nezames
Bartholomew P. Sweeney – Michael E. Hogan - Chong L. Chow - Paul M. Metsack
Rabih M. Barakat - Priti S. Bhardwaj - Marc P. Byrnes
Kimberly C. Lesay - Andrew H. Davis - Kevin F. Carifa - Jason M. Coite
David W. Harms

Digitally signed by Bartholomew Sweeney, P.E.
DN: E=Bartholomew.sweeney@ct.gov, CN="Bartholomew Sweeney, P.E.", OU=Department of Transportation, OU=Bureau of Engineering & Ecological Services, OU=Division of Engineering & Construction, OU=Structures Section, OU=Administration, OU=Bridge Design Unit, OU=Bridge Design Unit, OU=DOT-Users, DC=DOT, DC=CT, DC=GOV
Bartholomew Sweeney, P.E.

Statewide Flood Management Certification for
Federally and State Funded Municipal Projects

Attachment A: DOT

A-1: Engineering Certification

Name of Subject Facility and DOT Project Number:

Replacement of Bridge No. 04964
Cavalry Road over West Branch Saugatuck River, Weston/Westport, CT
State Project No. 157-85

Name of floodplain and watercourse:

West Branch Saugatuck River

I hereby certify, in reliance on the Municipal Official Certification, the Town Engineer / Consultant-Professional Certification, the DOT Hydraulics and Drainage Section and the DOT Environmental Planning reviews, that the above referenced project qualifies for the DEP Commissioner's approval pursuant to Section 25-68d of the General Statutes, and that the proposed activity described in this application is consistent with all applicable standards and criteria established in Sections 25-68d(b) of the General Statutes and Sections 25-68h-1 through 25-68h-3, inclusive, of the Regulations of Connecticut State Agencies.

Signature: Theodore H. Nezames, P.E.
2020.07.16 09:27:18-04'00'

Date

Print/Type: Theodore H. Nezames

Transportation Engineering Administrator
Bureau of Engineering and Construction

Statewide Flood Management Certification for
Federally and State Funded Municipal Projects

Attachment A: DOT

DOT Project No. 157-85

A-2: Hydraulics and Drainage Section Review

Based on my review and reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the proposed activity described in this application is consistent with all applicable standards and criteria established in Sections 25-68d(b) of the General Statutes and Sections 25-68h-1 through 25-68h-3, inclusive, of the Regulations of Connecticut State Agencies.

Signature: Michael E Hogan Digitally signed by Michael E. Hogan Date: 2020.07.14 09:31:17-04'00' _____ _____
Date

Print/Type: Michael E. Hogan
Transportation Principal Engineer
Hydraulics and Drainage Section

A-3: Environmental Planning Review

Based on my review and reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the proposed activity described in this application is consistent with all applicable standards found in the 2004 Connecticut Stormwater Manual, 2002 Erosion and Sedimentation Control Guidelines (as amended) and that there has been proper coordination with the Inland Fisheries Division and the Natural Diversity Database.

Signature: Andrew Davis Digitally signed by Andrew Davis Date: 2020.07.14 08:29:09 -04'00' _____ _____
Date

Print/Type: Andrew H. Davis
Transportation Supervising Planner
Office of Environmental Planning

Statewide Flood Management Certification for Federally and State Funded Municipal Projects

Attachment B: Municipality

B-1: Municipal Official Certification

Name of Applicant / Municipality: **Town of Weston**

DOT Project No.: **157-85**

Description of Proposed Project: **Replacement of Bridge No. 04964**

1. The recipient of federal and/or state funding will be:

Name: **Chris Spaulding, First Selectman**

Mailing Address: **56 Norfield Road**

City/Town: **Weston** State: **CT** Zip Code: **06883**

Phone: **(203) 222-2656** ext. Fax: **(203) 222-8871**

Based on my review and reasonable investigation, including my inquiry of those individuals responsible for preparing the information, the proposed activity described in this application is consistent with all applicable standards and criteria established in Sections 25-68d(b) of the General Statutes and Sections 25-68h-1 through 25-68h-3, inclusive, of the Regulations of Connecticut State Agencies.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes.

Signature: _____ 4-28-20
Date

Print/Type: **Chris Spaulding**
First Selectman

Statewide Flood Management Certification for
Federally and State Funded Municipal Projects

Attachment B: Municipality

B-2: Town Engineer / Consultant - Professional Certification

DOT Project No.: **157-85**

Description of Proposed Project: **Replacement of Bridge No. 04964**

Plan Dated and Revised Through: **April 2020**

Hydrologic and Hydraulic Study Dated: **April 2020**

I hereby certify that the prepared information and the proposed activity described in this application is consistent with all applicable standards and criteria established in Sections 25-68d(b) of the General Statutes and Sections 25-68h-1 through 25-68h-3, inclusive, of the Regulations of Connecticut State Agencies.

I understand that a false statement made in the submitted information may, pursuant to Section 22a-6 of the General Statutes, be punishable as a criminal offense under Section 53a-157b of the General Statutes, and may also be punishable under Section 22a-438 of the General Statutes.

Signature: Jay A. Costello

04/27/2020
Date

Print/Type: **Jay A. Costello, P.E.**
Professional Engineer

P.E. Number: **13202**

STATE OF CONNECTICUT
JAY A. COSTELLO
13202
LICENSED
PROFESSIONAL ENGINEER

Affix P.E. Stamp Here

10. Natural Diversity Data Base Map

Natural Diversity Data Base Areas

WESTON, CT

June 2016

State and Federal Listed Species & Significant Natural Communities

Town Boundary

NOTE: This map shows general locations of State and Federal Listed Species and Significant Natural Communities. Information on listed species is collected and compiled by the Natural Diversity Data Base (NDDB) from a number of data sources . Exact locations of species have been buffered to produce the general locations. Exact locations of species and communities occur somewhere in the shaded areas, not necessarily in the center. A new mapping format is being employed that more accurately models important riparian and aquatic areas and eliminates the need for the upstream/downstream searches required in previous versions.

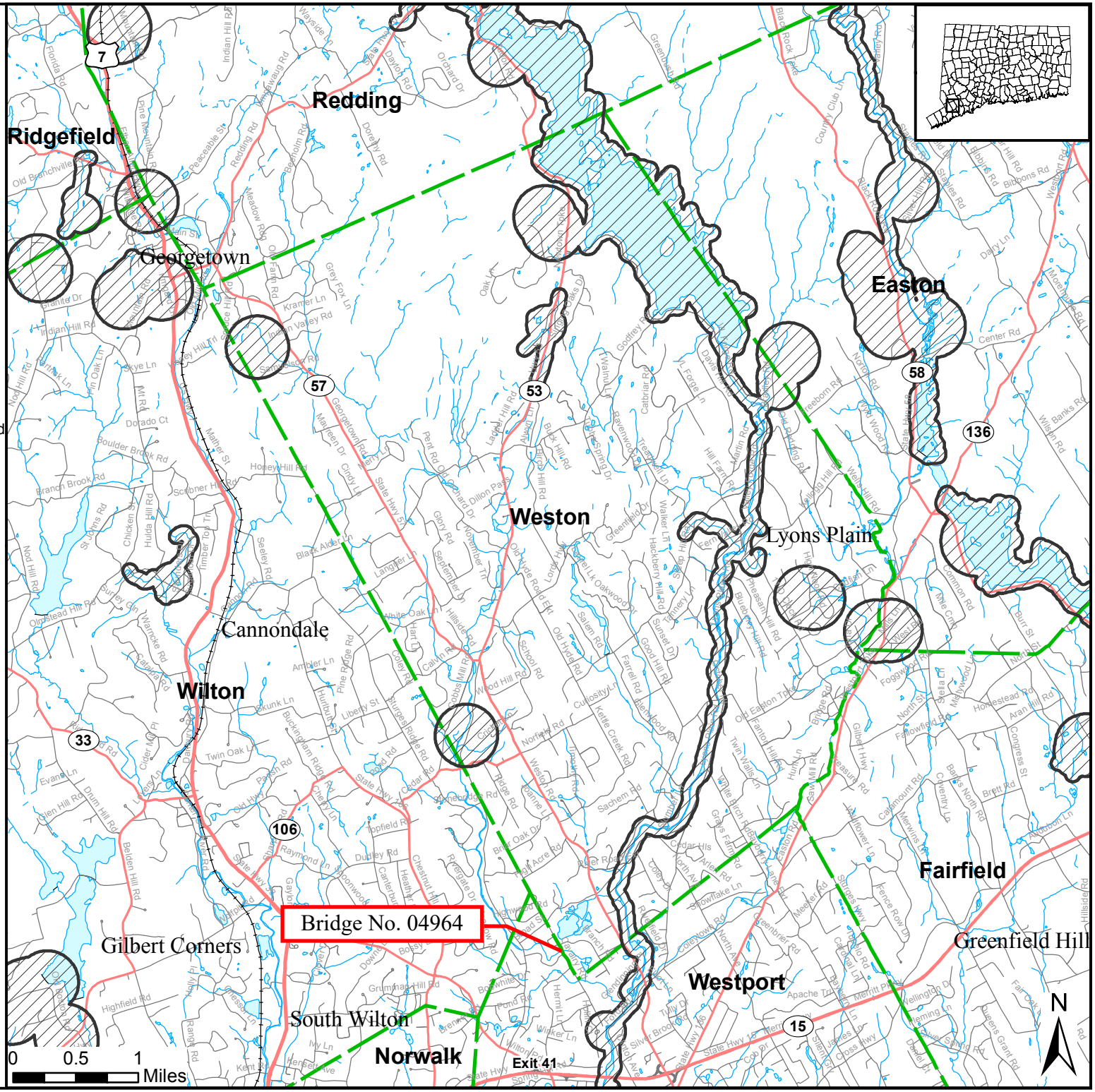
This map is intended for use as a preliminary screening tool for conducting a Natural Diversity Data Base Review Request. To use the map, locate the project boundaries and any additional affected areas. If the project is within a shaded area there may be a potential conflict with a listed species. For 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.

www.ct.gov/deep/nddbrequest

Use the CTECO Interactive Map Viewers at www.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
Phone (860) 424-3011

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



11. Wetlands / Watercourses Delineation Report

DAVISON ENVIRONMENTAL

10 Maple Street
Chester, CT 06412
860-803-0938
www.davisonenvironmental.com

Biodiversity Studies • Wetland Delineation & Assessment • Habitat Management • GIS Mapping • Permitting • Forestry

WETLANDS / WATERCOURSES DELINEATION REPORT

Date of Work: *5/14/2018*

Project Location: *Calvary Rd Bridge, Weston, CT*

Client:
Kimberly Clarke
Eolas Environmental, LLC
Southbury, CT 06488

IDENTIFICATION OF WETLANDS AND WATERCOURSES RESOURCES

Wetlands and watercourses present on property? Yes ☒ No ☐

Wetlands:		Watercourses:		Identification Method:	
Inland Wetlands	☐	Perennial Streams	☒	Auger and Spade	☐
Tidal Wetlands	☐	Intermittent Watercourses	☐	Backhoe Pits	☐

Numbering Sequences:

1-8	
9-13	
14-19	
20-26	

Wetland Plant Communities Present:

Forest ☐
Sapling/Shrub ☐
Wet Meadow ☐
Marsh ☐
Upland/Streamside ☒

Definitions and methodology for identification of state & federal regulated wetlands & watercourses

State wetlands were delineated according to the requirements of the CT Inland Wetlands and Watercourses Act (P.A. 155). Public Act 155 defines wetlands as areas of poorly drained, very poorly drained, floodplain, and alluvial soils, as delineated by a soil scientist. Watercourses are defined as bogs, swamps, or marshes, as well as lakes, ponds, rivers, streams, etc., whether natural or man-made, permanent or intermittent.

Federal wetlands were delineated in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (Version 2.0, January 2012). According to this method, three parameters must be satisfied for an area to be mapped as a wetland. These are wetland soils, hydrophytic vegetation, and wetland hydrology.

WETLAND SOIL TYPES

No wetland soils are present in the work area. There is an abrupt transition from the riverbank to the adjacent uplands. No alluvial or floodplain soils are present.

NON-WETLAND SOILS

The non-wetland soils were not examined in detail, except as was necessary to determine the wetland boundary. Non-wetland soils consist of Hinckley as well as Udorthents. The Hinckley series consists of very deep, excessively drained soils formed in water-sorted material (outwash). They are nearly level to very steep soils on terraces, outwash plains, deltas, kames, and eskers. The soils in this series are shallow to sand and gravel (12 to 30 inches).

Udorthents is a miscellaneous land type used to denote moderately well to excessively drained earthen material which has been so disturbed by cutting, filling, or grading that the original soil profile can no longer be discerned.

NOTES:

The wetlands and watercourses were delineated within the vicinity of the proposed bridge replacement. The limits of Connecticut and federal wetlands are identical at this site and consist of the ordinary high-water mark of the West Branch Saugatuck River. No bordering wetlands are present.

The ordinary high water mark was determined using typical indicators, including the presence of scoured leaf litter and matted vegetation, wrack deposits; and an observable water line on the riverbank.

A sketch map denoting the flagging sequences utilized in the field along with site photographs, are attached.

Eric Davison
Certified Professional Wetland Scientist
Registered Soil Scientist

Attachment: *(1) wetland sketch map*
(2) Site photographs

DELINEATION SKETCH MAP

SITE PHOTOGRAPHS

East Side OF Bridge

West Side of Bridge

12. Geotechnical Report

GEOTECHNICAL ENGINEERING REPORT

Replacement of Cavalry Road Bridge (04964) Over the West Branch of Saugatuck River

Town of Weston, Connecticut
October 17, 2018

Prepared for:
Wengell, McDonnell & Costello Consulting Engineers
87 Holmes Road, Newington, Connecticut, 0611

Prepared by:
Dulles Geotechnical and Materials Testing Services, Inc. (DGMTS)
14155 Sullyfield Circle, Suite H, Chantilly, Virginia 20151

DGMTS

A Certified SWam and MBE/DBE Firm

Safety Reliability Innovation Collaboration Integrity

October 17, 2018
Wengell, McDonnell & Costello Consulting Engineers
Attn: Mr. Keegan Elder
Address: 87 Holmes Road, Newington, Connecticut, 0611

Reference: Geotechnical Engineering Report
Replacement of Cavalry Road Bridge (04964) Over the West Branch of Saugatuck River
Town of Weston, Connecticut
Project No: 18024

Dear Mr. Keegan Elder:

Dulles Geotechnical and Materials Testing Services, Inc. (DGMTS) is pleased to submit this Geotechnical Engineering Report (GER) for Replacement of Cavalry Road Bridge (04964) Over the West Branch of Saugatuck River project. This report presents the findings of the field exploration, laboratory and field testing programs, and provides our geotechnical recommendations related to this project.

We appreciate the opportunity of providing our services for this project. Please contact the undersigned if you have any questions regarding this report.

Sincerely.
Dulles Geotechnical and Materials Testing Services, Inc. (DGMTS)
A Certified SWam and MBE/DBE Firm

STATE OF CONNECTICUT
TARIQ B. HAMID
No. 30477
LICENSED
PROFESSIONAL ENGINEER

Zichang Zhang, EIT
Project Engineer

Tariq Bin Hamid, Ph.D. PE
Senior Principal

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Appendix C: Laboratory Tests

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Appendix E: Engineering Analysis

1. Project Overview

This report presents the results of DGMTS' geotechnical study for the proposed Replacement of Cavalry Road Bridge (04964) Over the West Branch of Saugatuck River project. The scope of work for this geotechnical study included:

- Perform site visit to assess the existing site conditions;
- Preparation of boring layout plan for the project development
- Provide oversight and on-site inspection during boring operations;
- Bring all soil samples to DGMTS laboratory for review and testing;
- Prepare final boring logs;
- Prepare and submit a geotechnical report for the subject project detailing the subsurface conditions at the site and recommendations for design, including the types of foundation that will be suitable at the site.

2. Project Description

The project site is located just north of intersection of Cavalry Road and Crooked Mile Road in the Town of Weston, Connecticut. A site location map is presented as Figure A-1 in Appendix A. The project location is between Rebel Road and Crooked Mile Road with intersection to Cavalry Road, as shown in Figure 2-1. The Cavalry Road is a two-lane road with one lane in each direction. The existing Cavalry Road Bridge over the West Branch of Saugatuck River is a two-span bridge. The elevation of Cavalry Road within the project vicinity ranges between elevation (EL) 68 feet and (EL) 68.5 feet.

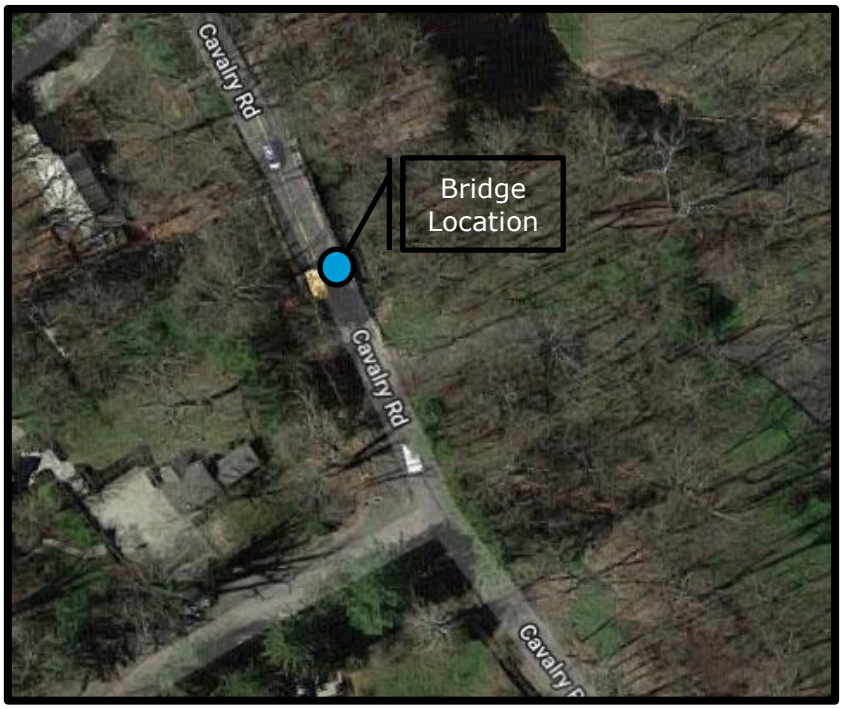


Figure 2-1: Site Location

The proposed bridge is single span with a clear span length of about 72 feet and total width of about 32.0 feet from out to out. The bottom elevation of the abutment will be at about elevation (EL) 58.0'. The bridge alternative plan is shown below in Figure 2-2.

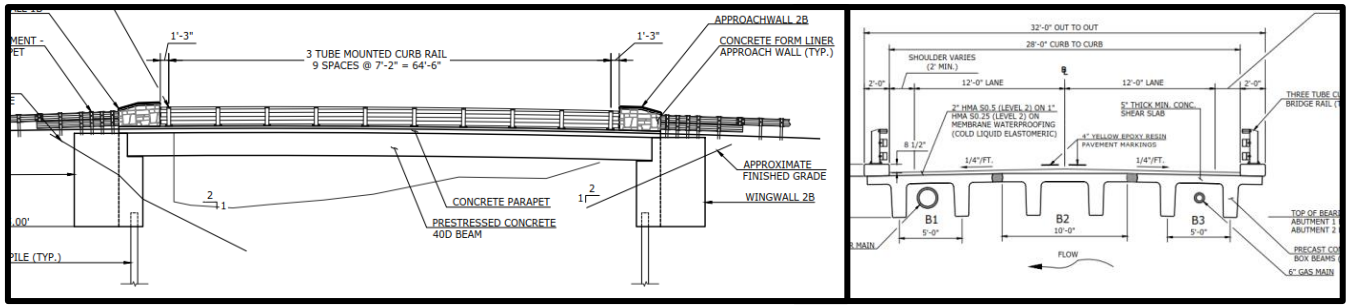


Figure 2-2: Proposed Bridge

3. Geotechnical Subsurface Exploration

Geotechnical subsurface exploration program consisted of drilling of four soil test boring. The subsurface exploration was conducted between May 21, 2018 and May 24, 2018.

Test boring was staked by DGMTS representative in the field. Boring location plan (Figure B-1) is attached in Appendix B. Test boring was drilled using Hollow Stem Auger (HSA) rig mounted on a truck. The soil boring was drilled by Associated Borings Co. Inc. Samples were obtained using standard split spoon sampler. A representative of DGMTS was present during the drilling. DGMTS representative brought the soil samples to DGMTS laboratory.

Selected soil samples were assigned for laboratory testing for soil classification purposes. The laboratory testing program was comprised of determining the moisture content, grain size distribution, and Atterberg limits of selected soil samples. The testing was conducted to analyze the suitability of on-site soils as foundation materials and in earthwork. Testing was generally performed according to American Society for Testing and Materials (ASTM) standards.

Test boring logs and the laboratory test results are presented in Appendices B and C, respectively, of this report. Test Boring Logs presented in Appendix B, provide details related to the subsurface conditions encountered in the borings. The stratification lines shown on the test boring log represents approximate transitions between material types. In situ, strata changes could occur gradually or at slightly different levels. Also, the boring depicts conditions at particular location and at the particular time indicated. Some conditions, particularly groundwater conditions could vary from the conditions encountered at the particular boring location.

3.1 Site Geology

The proposed Replacement of Cavalry Road Bridge (04964) Over the West Branch of Saugatuck River site lies within the Norwalk North quadrangle and lies within the Western Highlands of Connecticut. The Norwalk North quadrangle is underlain by metamorphosed sedimentary, volcanic, and igneous rocks intruded by synkinematic granitic rocks. However, rock was not encountered in any of the borings drilled at the site during our subsurface investigation and this is consistent with the fact that maximum local relief of about 250 ft occurs in the northern part of the Norwalk North quadrangle. Elevations on the site is ±68 feet (MSL) at the Cavalry Road Bridge Over the West Branch of Saugatuck River. Surficial geology maps describe the overburden soils poorly sorted, poorly stratified deposits generally composed of glacial

debris ranging from silt-size particles to boulders. A site geology map is presented as Figure A-2 in Appendix A of this report.

3.1.1 Subsurface Conditions at the Project Site

In general, the subsurface materials encountered in test borings completed at the project site are presented in the Table 3.1.1-1:

Table 3.1.1-1: Summary of Subsurface Materials

Stratum	North Abutment		South Abutment	Pier[1]
	Soil Boring			
	B-4	B-5	B-2	B-1
	Existing Ground Elevation (feet)			
	68.5	68.6	67.8	61.6
Asphalt	7 inches	7 inches	8 inches	--
Existing Fill	**(EL 67.9 to 58.5)** Brown-gray c-f SAND, some c-f gravel, little silt with Cobbles and Boulder **SPT ranges from 63 bpf to >100 bpf**	**(EL 68.0 to 58.6)** Dark gray c-f SAND, some c-f gravel with Cobbles and Boulder **SPT: 32 bpf**	**(EL 67.1 to 57.8)** Brown c-f SAND and c-f gravel with Cobbles and Boulder **SPT ranges from 42 bpf to 66 bpf**	**(EL 61.6 to EL 53.6)** Gray-brown, c-f SAND and c-f gravel with Cobbles and Boulders
Gravel and Sand	**(EL 58.5 to 28.5)** Gray-brown c-f GRAVEL, some c-f sand, little silt with Cobbles and Boulder **SPT ranges from 29 bpf to >100 bpf**	**(EL 58.6 to 28.6)** Gray-brown c-f SAND and c-f gravel, little silt with Cobbles and Boulders **SPT ranges from 19 bpf to >100 bpf**	**(EL 57.8 to 37.8)** Gray-brown c-f SAND, some c-f gravel, little silt with cobbles and Boulder **SPT ranges from 22 bpf to 36 bpf**	**(EL 53.6 to 31.6)** Dark Gray c-f SAND, some c-f gravel with Cobbles and Boulder **SPT ranges from 28 bpf to 60 bpf**
	(EL 28.5 to 12.5) Gray-brown c-f SAND and c-f gravel with Cobbles and Boulders **SPT >100 bpf**	**(EL 28.6 to 8.6)** Gray-brown, c-f SAND and c-f gravel with Cobbles and Boulders Boulder **SPT ranges from 46 bpf to >100 bpf** **End of Boring at 60 feet**	**(EL 37.8 to 12.8)** Gray-brown c-f SAND, some c-f gravel, little silt **SPT ranges from 15 bpf to 73 bpf**	**(EL 31.6 to 13.6)** Gray-brown, c-f SAND, little m-f gravel, little silt **SPT ranges from 47 bpf to 60 bpf**
	(EL 12.5 to 7.5) Cored Cobbles and Boulders to 61 feet **SPT >100 bpf** **End of Boring at 61 feet**		**(EL 12.8 to 7.8)** Gray-brown c-f SAND and c-f gravel with Cobbles and Boulders **SPT >100 bpf** **End of Boring at 60 feet**	**(EL 13.6 to 12.6)** Gray-brown c-f SAND and c-f gravel with Cobbles and Boulders **End of Boring at 49 feet**

1. Potential pier for an alternate two span bridge.

3.2 Groundwater Conditions

Groundwater was encountered in test boring drilled at the site. The groundwater levels observed in the test boring are shown on the individual logs in Appendix B and presented in Table 3.2-1.

Table 3.2-1: Summary of Groundwater

Test Boring No.	Existing Ground Surface Elevation (feet)	Depth from Existing Ground Surface to Groundwater Level (feet)	Groundwater Elevation (feet)
B-1	61.6	2.0	59.6
B-2	67.8	12.0	55.8
B-4	68.5	12.0	56.5
B-5	68.6	12.0	56.5

The groundwater at site varies between 2.0 feet to 12.0 feet below the existing ground surface at about elevation (EL) 59.6 feet to (EL) 55.8 feet.

The groundwater information presented in this report represent the conditions found on the date the borings were drilled. It should be noted that our groundwater observations are short-term; groundwater depths and subsurface soil moisture contents will vary with the water level in the river and environmental variations such as frequency and magnitude of rainfall and the time of year when construction is in progress.

3.3 Laboratory Test Results

Laboratory tests on selected soil samples were performed to determine their engineering properties. For this project, we performed moisture content (ASTM D2216), Atterberg limits (ASTM D4318), sieve analysis (ASTM D422). A summary of laboratory test results is presented in Table 3.3-1 and individual test results are presented in Appendix C of this report.

Table 3.3-1: Summary Laboratory Test Result

Test Boring No.	Depth (feet)	Sample Type	Moisture Content (%)	Liquid Limit (LL)	Plasticity Index (PI)	% Passing #10	% Passing # 200	USCS Classification
B-1	20-22	SPT	7.3	--	NP	45	12.2	Silty SAND with gravel (SM)
B-2	20-22	SPT	9.3	--	NP	41	10.1	Well graded SAND with Silt and Gravel (SW-SM)
B-4	10-12	SPT	5.1	--	NP	41	11.2	Well graded GRAVEL with sand & silt (GW-GM)

SPT = Standard Penetration Rate; NP= Non-Plastic

3.4 Seismic Consideration

Based on the subsurface conditions encountered at the site, the values provided in Table 3.4-1 are recommended for seismic design.

Table 3.4-1: Seismic Site Class Parameters

Seismic Site Class	D
Peak Ground Acceleration Coefficient	0.079 g
Spectral response acceleration at short periods, $\mathbf{S_s}$	0.155 g
Spectral response acceleration at 1-second period, $\mathbf{S_1}$	0.036 g
Site coefficient, $\mathbf{F_a}$	1.6
Site coefficient, $\mathbf{F_v}$	2.4
$A_s = F_{PGA}$ x PGA	0.127 g
$S_{DS} = F_a$ x S_s	0..248 g
$S_{D1} = F_v$ x S_1	0.087 g

The seismic values presented above in Table 3.4-1 were calculated using USGS Earthquake Hazards Program (access on October 2, 2018). Design maps detailed report is presented in Appendix D of this report.

4. Geotechnical Engineering Recommendations

The recommendations regarding, soil design parameters, lateral earth pressure coefficients, liquefaction, scour, Micropiles, and temporary excavation are presented herein are based on our current understanding of the project design requirements.

4.1 Soil Design Parameters and Lateral Earth Pressure

The following geotechnical design parameters may be used for the design.

Table 4.1-1: Summary of Soil Properties and Lateral Earth Pressure

Geotechnical Design Parameters	Existing Fill (c-f SAND, some gravel, cobbles, boulders)	c-f SAND, little gravel, cobbles	m-f GRAVEL, some c-f sand, trace silt
Dry Unit Weight, γ, pcf	100	110	125
Saturated Unit Weight, γ, pcf	105	120	130
Internal Friction Angle, ϕ, degree	25	32	34

Geotechnical Design Parameters	Existing Fill (c-f SAND, some gravel, cobbles, boulders)	c-f SAND, little gravel, cobbles	m-f GRAVEL, some c-f sand, trace silt
Sliding Resistance Factor (μ)	-	0.62	0.67
Bearing Capacity Resistance Factor	-	0.45	0.45
Concrete/Soil Coefficient of Friction*	-	0.40	0.42
Coefficient of Active Earth Pressure (K_a)	0.41	0.31	0.28
Coefficient of Passive Earth pressure (K_p)	2.46	3.25	3.54
Coefficient of at Rest Earth pressure (K_o)	0.58	0.47	0.44
Equivalent Fluid Pressure (K_a)[&]	43H	37H	37H
Equivalent Fluid Pressure (K_a)[@]	259D	391D	460D
Equivalent Fluid Pressure (K_a)[&]	61H	56H	57H

μ=Tan(ϕ); K_a = 1-sin(ϕ)/1+sin(ϕ), K_p = 1+sin(ϕ)/1-sin(ϕ);* K_o = 1-sin(ϕ); * = Tan(0.67xϕ)
[&] EFP = γ x LEP, H = height of the wall, [@] EFP = γ x LEP, D = depth of foundation embedment.

The lateral earth pressures shown in Table 4.1-1 are applicable only to cases where a subdrainage system is installed. Hydrostatic pressures are not included in the lateral earth pressures assuming the use of relatively granular or free draining backfill, and subdrainage (weepholes) at the base of wall below grade.

Where applicable, the design should consider surcharge loads using a rectangular earth pressure distribution. The surcharge pressure ordinate should be obtained by multiplying the surface surcharge pressure (q) by the lateral earth pressure coefficient in Table 4.1-1 for the respective backfill condition. Earth pressure recommendations consider a horizontal ground surface behind and in front of the wall. We should be contacted to provide alternative design parameters if sloping ground surface conditions are anticipated. In addition to static earth pressures, the structural designer should consider dynamic earth pressures due to seismic loading, as applicable.

4.2 Liquefaction

Liquefaction involves the sudden loss in strength of a saturated, cohesionless soil caused by the build-up of pore water pressure during cyclic loading, such as produced by an earthquake. For liquefaction to occur, liquefaction susceptible soils (loose to medium dense cohesionless soils) should be saturated and there should be strong shaking, such as caused by an earthquake. Further, a peak ground acceleration of 0.1g is generally considered a shaking threshold that is needed to produce liquefaction. Based on the peak ground acceleration value, laboratory test results, and groundwater level, it is our professional opinion that this site has no liquefaction potential.

4.3 Scour Analysis

Estimated scour depths during the 200 and 500-year flood event provided by WMC Consulting Engineers are presented below in Table 4.3-1.

Table 4.3-1: Summary of Scour Analysis

Location	Test Boring Nos.	Bottom of Integral Abutment Elevation (feet)	200-year Scour Elevation (feet)	500-year Scour Elevation (feet)
North Abutment	B-4 and B-5	58.0	61.0	60.5
South Abutment	B-2	58.0	59.0	57.9

4.4 Structural Loading

The structural loads were provided to us by WMC Consulting Engineers and are presented below.

- Strength - I = 180 kips/pile
- Service – I = 140 kips/pile

4.5 Abutment Foundation - Micropiles

Micropiles geotechnical and structural capacities are calculated based on AASHTO LRFD, Section 10.9. A nominal grout-to-ground bond (α_b) strength of 35 psi (Type B- Pressure Grouted) was used for Glacial Till. Table 4.5-1 presents the factored geotechnical resistance and bond length for Micropiles. Resistance factors provided in Tables 10.5.5.2.5-1 and 10.5.5.2.5-2 in AASHTO LRFD were used to calculate the factored geotechnical and structural resistances, with the calculation presented in Appendix E.

Table 4.5-1: Summary of Micropile Factored Resistance and Bond Length – Strength Limit

Micropile Diameter (in)	Bond Length (ft)	Reinforcing Bar Diameter (in)	Recommended Micropile Factored Resistance (kips)
7.0	35	2.25 (#18)	190
9.675	25	2.25 (#18)	184

The factored geotechnical resistance as presented in Table 4.5-1 above is also recommended for the service limit state with a resistance factor of 1.0. The factored geotechnical resistance as presented in Table 4.5-1 can also be used as the factored axial compressive structural resistance. For the extreme limit state, the factored resistance will be equal to the nominal resistance, since the resistance factor is equal to 1.0. The calculated extreme limit state resistance for the proposed micropiles sections are summarized in the Table 4.5-2.

Table 4.5-2: Summary of Micropile Factored Resistance and Bond Length – Strength Limit

Micropile Diameter (in)	Bond Length (ft)	Reinforcing Bar Diameter (in)	Recommended Micropile Factored Resistance (kips)
7.0	35	2.25 (#18)	345
9.675	25	2.25 (#18)	335

Minimum micropile tip elevations are presented below in 4.5-3.

Table 4.5-3: Estimated Highest Micropile Tip Elevation

Estimated Highest Micropile Tip Elevation (ft)	
7.0 Inch Diameter	**9.675 Inch Diameter**
13.0	23.0

A minimum of one test pile at each abutment location should be loaded to twice the design load not less than three days after completion of grouting. Installation of production micropiles should not begin until the data from the load tests have been evaluated by the geotechnical engineer. Adjustment to the pile lengths, pile capacity, bond length, grouting procedures, etc. may result from this load test program.

The capacity of these piles will depend upon the depth of penetration, size of piles and other factors. Plans prepared for the micropile installation scheme should be submitted to our office for review. The final design and installation of the micropiles should be provided by a specialty contractor with at least five years' experience in this application. The final design should be verified and approved based on the micropile load test results.

It is noted that cobbles and boulders were encountered; therefore, some difficulties may be expected during the drilling operation at isolated locations. Pre-drilling or offsetting of some of the micropiles is also expected. The contractor should be made aware of these conditions and include provisions in their bid to deal with them.

Grouting of micropiles should be completed the same day they are drilled and no micropile should be grouted to intermediate depths. The contractor should be equipped to handle obstructions, which may be encountered during installation of the drilled micropiles.

4.6 Temporary Excavation, Shoring, and Dewatering

Considering the groundwater level (EL 60 feet), it is anticipated that the excavation for the abutment will be below the groundwater level. This will require temporary shoring and dewatering. The dewatering may consist of both an aggressive system of individual sumps and pumps during excavation or a braced sheetpile wall cofferdam. The shoring should be designed for hydrostatic water pressure outside and dewatered conditions inside the shoring. The sheetpiles should be embedded an adequate depth below the bottom of the excavation to minimize the flow below the sheetpiles. The depth of penetration should be designed to provide a minimum factor of safety 1.5. A seal slab can be placed at the bottom of the

excavation and the amount of water entering the excavation can be pumped out from a sump. The actual design of the shoring system will be the responsibility of the contractor.

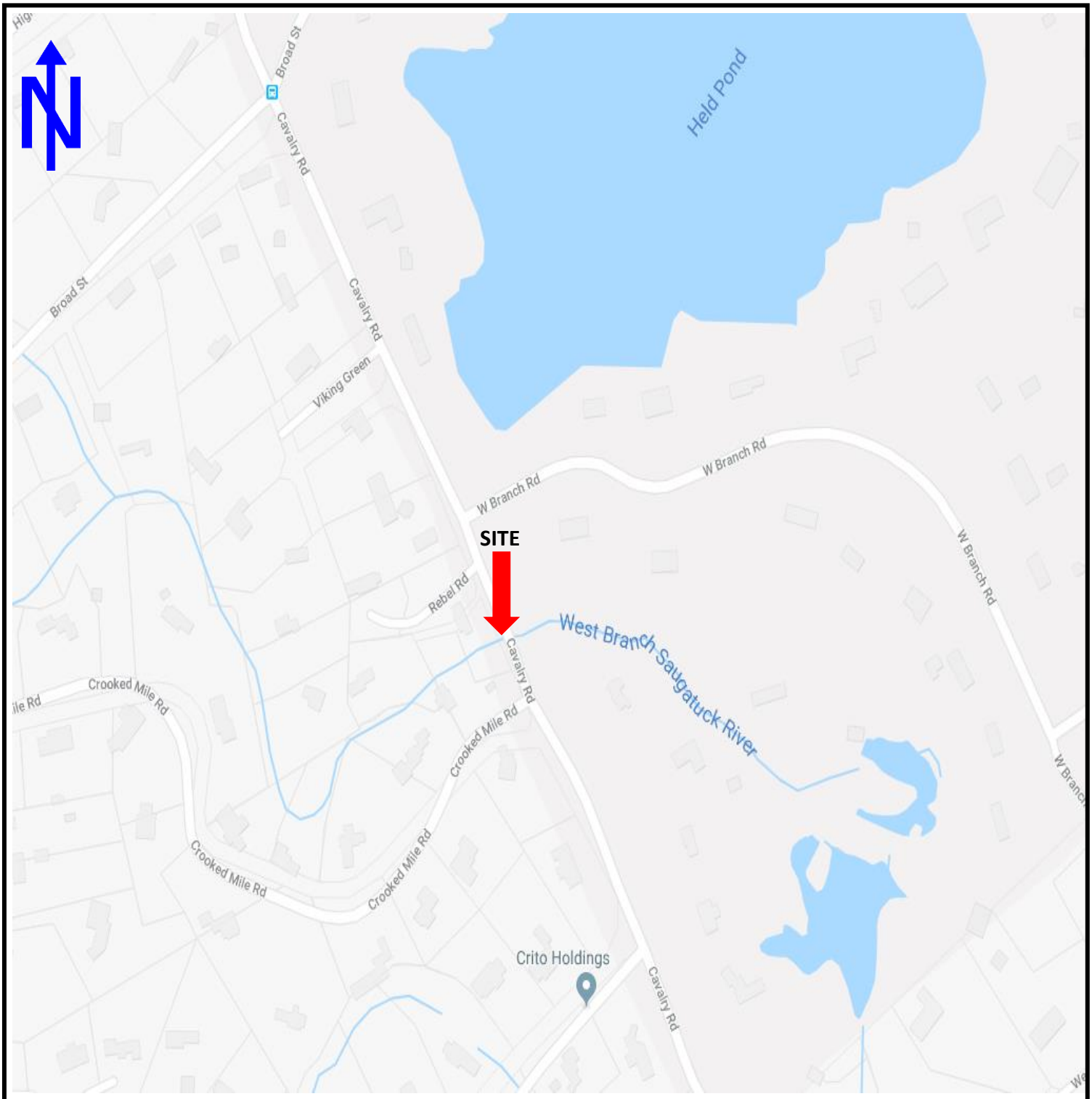
5. Limitations

Our professional services were performed consistent with the generally accepted geotechnical engineering principles and practices employed in the site area at the time the report was prepared.

Analyses, conclusions and recommendations presented in this report are based on site conditions as they existed at the time we performed our subsurface exploration. We assumed that subsurface soil conditions encountered at the location of exploratory test borings are generally representative of subsurface conditions across the project site. Actual subsurface conditions at locations between and beyond the exploratory test borings may differ. If subsurface conditions encountered during construction are different than those described in this report, we should be notified so that we can review and modify our recommendations as needed. We recommend that this report in its entirety be made available to contractors for informational purposes only.

Appendix A: Figures

Figure No. A-1: Site Location Map
Figure No. A-2: Site Geology Map



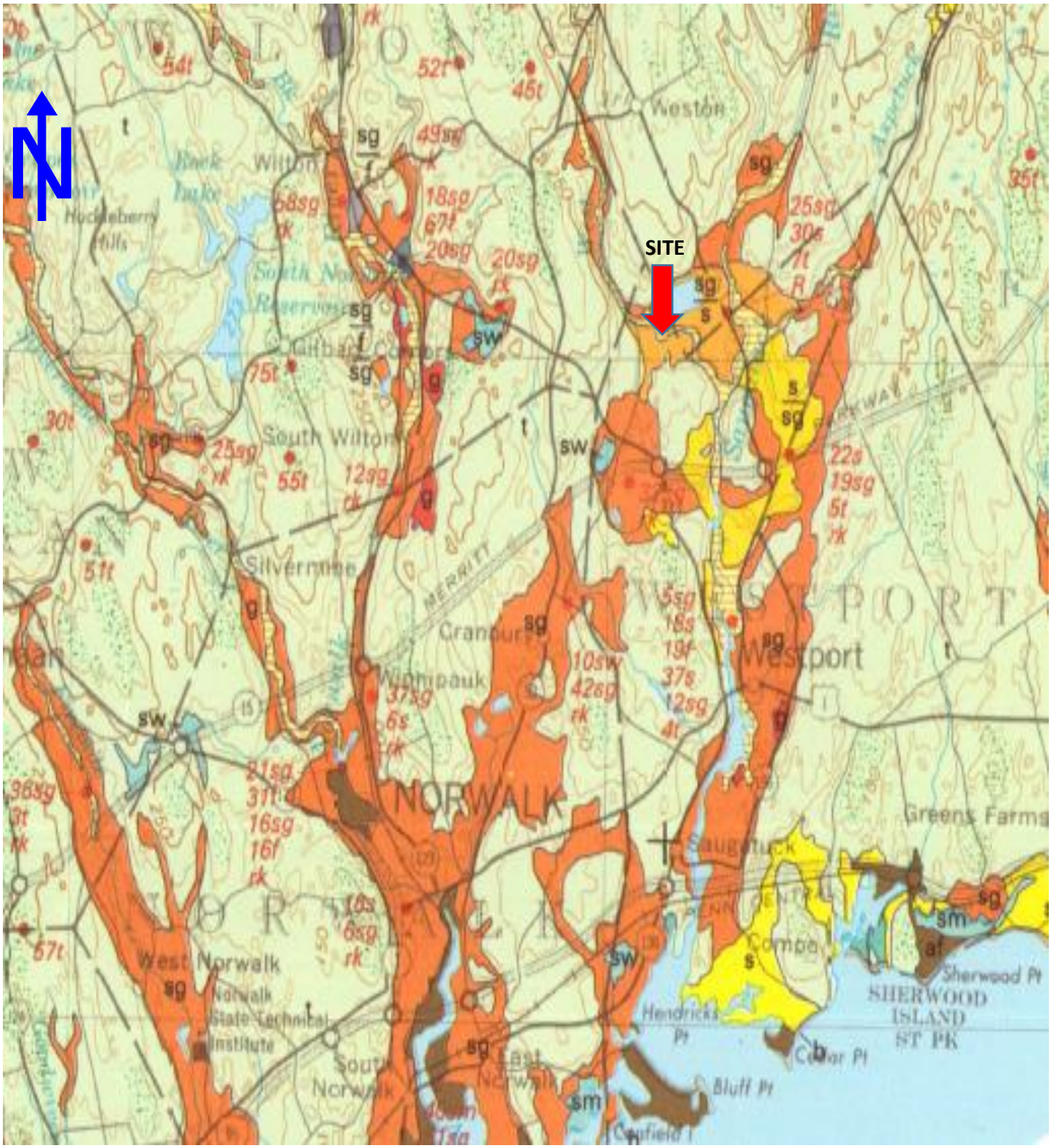
Google maps coordinates: (41.1023781515379, -73.39462691670056)

Dulles Geotechnical & Materials Testing Services, Inc.
14115 Sullyfield Circle, Suite H, Chantilly, VA 20151
Phone: 703-999-3207; www.dullesgeotechnical.com

TITLE: SITE LOCATION MAP

PROJECT: REPLACEMENT OF CAVALRY ROAD BRIDGE OVER THE WEST BRANCH OF THE SAUGATUCK RIVER - WESTON, CONNECTICUT

Date:	Drawn By:	Checked By:	Scale:	Figure No.:
10-15-2018	BP	TH	-	A-1



Dulles Geotechnical & Materials Testing Services, Inc.
14115 Sullyfield Circle, Suite H, Chantilly, VA 20151
Phone: 703-999-3207; www.dullesgeotechnical.com

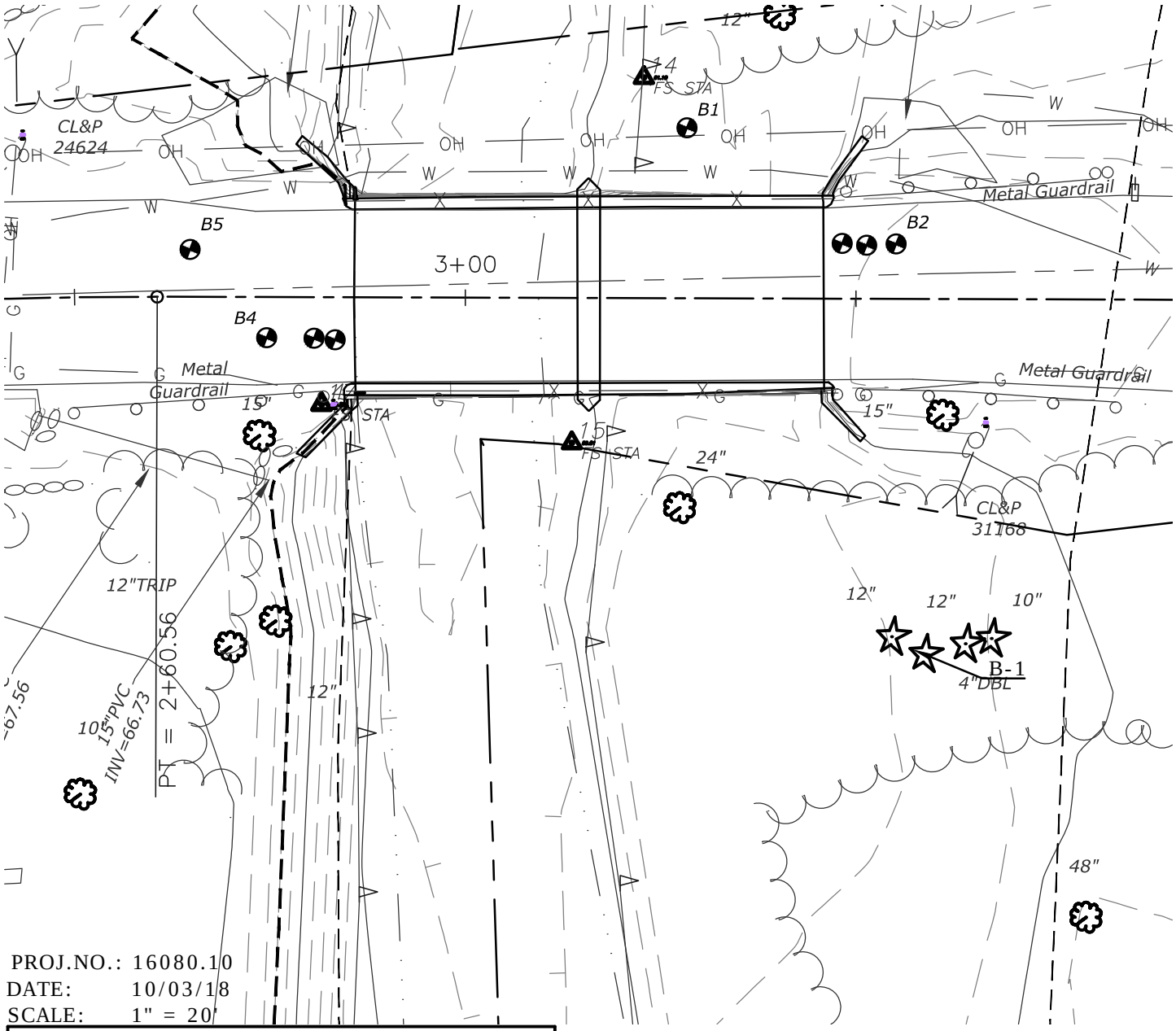
TITLE: SITE GEOLOGY MAP

PROJECT: REPLACEMENT OF CAVALRY ROAD BRIDGE OVER THE WEST BRANCH OF THE SAUGATUCK RIVER - WESTON, CONNECTICUT

Date:	Drawn By:	Checked By:	Scale:	Figure No.:
10-15-2018	BP	TH	-	A-2

Appendix B:Subsurface Investigation

Figure B-1: Boring Location Plan (1 Page)
Soil Test Boring Log (8 page)



PROJ.NO.: 16080.10
DATE: 10/03/18
SCALE: 1" = 20'

BORINGS			
BORING	ELEVATION	NORTHING	EASTING
B-1	61.56	626238.42	828220.30
B-2	67.84	626208.02	828216.53
B-4	68.46	626278.23	828175.24
B-5	68.56	626291.56	828182.06

WMC
CONSULTING ENGINEERS

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

FIGURE B-1: BORING LOCATION PLAN

REPLACEMENT OF CAVALRY ROAD BRIDGE OVER THE WEST BRANCH OF SAUGATUCK RIVER

PREPARED FOR:

TOWN OF WESTON

Dulles Geotechnical & Materials Testing Services, Inc.

TEST BORING LOG

Project Name: Replacement of Cavalry Road Bridge over the West Branch of Sugatuck River

Location: Weston, CT	**Route No.** -	**Bridge No.:**	04964
Driller: Jaime Lloret	**Type:** 3.25" HSA	**Hole No.:**	B-1
Inspector: Zichang	**Hammer Wt.:** 140 lb	**Stat./Offset:**	-
Engineer: -	**Hammer Fall:** 30"	**Northing:**	626238.42
Start Date: 5/25/2018	**Sampler Type:** Split Spoon 2"	**Easting:**	828220.30
Finish Date: 5/25/2018	**Core Barrel Type:** NV2	**Surface Elevation:**	61.56

Groundwater Observations: At 2' After 0 hrs At After

Depth (ft.)	Sample Type/No.	Blows on Sampler per 6 inches	Pen.	Rec.(in)	RQD %	Generalized Strata Description	Material Description	Elevation (ft.)
0						FILL	Gray-brown c-f SAND and c-f gravel with Cobbles and Boulders	
5								56.56
10	S-1	5 9 19 30	24	8		GRAVEL AND SAND	Dark gray c-f SAND, some c-f gravel with Cobbles and Boulders	51.56
15								46.56
20	S-2	30 30 30 28	24	3				41.56
25								36.56
30	S-3	25 28 19 21	24	13				31.56
35							Gray-brown c-f SAND, little m-f gravel	26.56
40								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportion Used: Trace = 1-10%, Little = 10-20%, Some = 20-35%, And = 35-50%

Continue on page 2

Total Penetration in Soil: 0' to 40' Rock: 0'

Soil Samples: S1-S3 No. of Core Runs: 0

NOTES:

Dulles Geotechnical & Materials Testing Services, Inc.	TEST BORING LOG **Project Name:** Replacement of Cavalry Road Bridge over the West Branch of Sugatuck River		
Location: Weston, CT	**Route No.** -	**Bridge No.:**	04964
Driller: Jaime Lloret	**Type:** 3.25" HSA	**Hole No.:**	B-1
Inspector: Zichang	**Hammer Wt.:** 140 lb	**Stat./Offset:**	-
Engineer: -	**Hammer Fall:** 30"	**Northing:**	626238.42
Start Date: 5/25/2018	**Sampler Type:** Split Spoon 2"	**Easting:**	828220.30
Finish Date: 5/25/2018	**Core Barrel Type:**	**Surface Elevation:**	61.56
Groundwater Observations:	At 2' After 0 hrs	At After	

Depth (ft.)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen.	Rec.(in)	RQD %	Generalized Strata Description	Material Description	Elevation (ft.)
40	S-4	24 22 28 35	24	4		GRAVEL AND SAND	Gray-brown c-f SAND and c-f gravel, little silt	
45								16.56
							Gray-brown c-f SAND and c-f gravel with Cobbles and Boulders	
50								11.56
							End of Boring @ 49 feet	
55								
60								
65								
70								
75								
80								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test
Proportion Used: Trace = 1-10%, Little = 10-20%, Some = 20-35%, And = 35-50%

Total Penetration in	NOTES:	Sheet
Soil: 40-49' Rock: 0		2 of 2
Soil Samples: S4 No. of Core Runs: 0		

Dulles Geotechnical & Materials Testing Services, Inc.	TEST BORING LOG **Project Name:** Replacement of Cavalry Road Bridge over the West Branch of Sugatuck River	
Location: Weston, CT	**Route No.** -	**Bridge No.:** 04964
Driller: Jaime Lloret	**Type:** 3.25" HSA	**Hole No.:** B-2
Inspector: Zichang	**Hammer Wt.:** 140 lb	**Stat./Offset:** -
Engineer: -	**Hammer Fall:** 30"	**Northing:** 626208.02
Start Date: 5/22/2018	**Sampler Type:** Split Spoon 2"	**Easting:** 828216.53
Finish Date: 5/23/2018	**Core Barrel Type:**	**Surface Elevation:** 67.84
Groundwater Observations:	At 12' After 0 hrs	At After

Depth (ft.)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec.(in)	RQD %	Generalized Strata Description	Material Description	Elevation (ft.)
0						ASPHALT	8" Bituminous Concrete	
	S-1	25 32 34 30	24	3				
5	S-2	12 16 26 50/4"	22	10		FILL	Brown c-f SAND, c-f gravel with Cobbles and Boulders	62.84
10	S-3	9 13 9 17	24	8				57.84
15								52.84
20	S-4	19 17 13 28	24	6		GRAVEL AND SAND	Gray-brown c-f SAND, some c-f gravel, little silt with Cobbles and Boulders	47.84
25	S-5	5 19 17 26	24	4				42.84
30	S-6	22 14 11 15	24	14				37.84
35	S-7	9 9 13 11	24	16			Gray-brown c-f SAND, some c-f gravel, little silt	32.84
40								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test
Proportion Used: Trace = 1-10%, Little = 10-20%, Some = 20-35%, And = 35-50%

Continue on page 2

Total Penetration in	NOTES:	Sheet
Soil: 0' to 40' Rock: 0'		1 of 2
Soil Samples: No. of		
S1-S7 Core Runs: 0		

Dulles Geotechnical & Materials Testing Services, Inc.

TEST BORING LOG

Project Name: Replacement of Cavalry Road Bridge over the West Branch of Sugatuck River

Location:	Weston, CT	**Route No.**	-	**Bridge No.:**	04964
Driller:	Jaime Lloret	**Type:**	3.25" HSA	**Hole No.:**	B-2
Inspector:	Zichang	**Hammer Wt.:**	140 lb	**Stat./Offset:**	-
Engineer:	-	**Hammer Fall:**	30"	**Northing:**	626208.02
Start Date:	5/22/2018	**Sampler Type:**	Split Spoon 2"	**Easting:**	828216.53
Finish Date:	5/23/2018	**Core Barrel Type:**	NV2	**Surface Elevation:**	67.84

Groundwater Observations: At 12' After 0 hrs | At After

Depth (ft.)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec.(in)	RQD %	Generalized Strata Description	Material Description	Elevation (ft.)
40	S-8	3 5 10 13	24	15		GRAVEL AND SAND	Gray-brown c-f SAND, some c-f gravel, little silt	
45	S-9	24 23 23 22	24	11				22.84
50	S-10	17 23 50 47	24	7				17.84
55	S-11	48 50/2''	8	0				12.84
							Gray-brown c-f SAND, and c-f gravel with Cobbles and Boulders (see note 1)	
60							End of Boring @ 60 feet	7.84
65								
70								
75								
80								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportion Used: Trace = 1-10%, Little = 10-20%, Some = 20-35%, And = 35-50%

Total Penetration in Soil: 40' to 60'

Soil Samples: S8 - S11

NOTES: 1) Used Roller Cone to advance to 60'

Dulles Geotechnical & Materials Testing Services, Inc.

TEST BORING LOG

Project Name: Replacement of Cavalry Road Bridge over the West Branch of Sugatuck River

Location: Weston, CT	**Route No.** -	**Bridge No.:**	04964
Driller: Jaime Lloret	**Type:** 3.25" HSA	**Hole No.:**	B-4
Inspector: Zichang	**Hammer Wt.:** 140 lb	**Stat./Offset:**	-
Engineer: -	**Hammer Fall:** 30"	**Northing:**	626278.23
Start Date: 5/21/2018	**Sampler Type:** Split Spoon 2"	**Easting:**	828175.24
Finish Date: 5/22/2018	**Core Barrel Type:**	**Surface Elevation:**	68.46
Groundwater Observations:	At 12' After 0 hrs	At After	

Depth (ft.)	Sample Type/No.	Blows on Sampler per 6 inches	Pen.	Rec.(in)	RQD %	Generalized Strata Description	Material Description	Elevation (ft.)
0						ASPHALT	7" Bituminous Concrete	
	S-1	24 33 30 45	24	6		FILL	Brown-gray c-f SAND, some c-f gravel, little silt with Cobbles and Boulders	
5								63.46
	S-2	9 49 50/3"	15	3				
10								58.46
	S-3	23 18 16 13	24	3		GRAVEL AND SAND	Gray-brown c-f GRAVEL and c-f sand, little silt with Cobbles and Boulder	
15								53.46
	S-4	24 28 27 22	24	11				
20								48.46
	S-5	50/0" X X X	0	0				
25								43.46
	S-6	5 22 33 27	24	8				
30								38.46
	S-7	35 20 17 26	24	7				
35								33.46
	S-8	11 14 15 16	24	9				
40								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportion Used: Trace = 1-10%, Little = 10-20%, Some = 20-35%, And = 35-50%

Continue on page 2

Total Penetration in Soil: 0' to 40' Rock: 0

Soil Samples: S1 - S8 No. of Core Runs: 0

NOTES:

Dulles Geotechnical & Materials Testing Services, Inc.

TEST BORING LOG

Project Name: Replacement of Cavalry Road Bridge over the West Branch of Sugatuck River

Location:	Weston, CT	**Route No.**	-	**Bridge No.:**	04964
Driller:	Jaime Lloret	**Type:**	3.25" HSA	**Hole No.:**	B-4
Inspector:	Zichang	**Hammer Wt.:**	140 lb	**Stat./Offset:**	-
Engineer:	-	**Hammer Fall:**	30"	**Northing:**	626278.23
Start Date:	5/21/2018	**Sampler Type:**	Split Spoon 2"	**Easting:**	828175.24
Finish Date:	5/22/2018	**Core Barrel Type:**		**Surface Elevation:**	68.46
Groundwater Observations:		At 12'	After 0 hrs	At	After

Depth (ft.)	SAMPLES: Sample Type/No.	Blows on Sampler per 6 inches	Pen.	Rec.(in)	RQD %	Generalized Strata Description	Material Description	Elevation (ft.)
40	S-9	12 8 13 12	24	3		GRAVEL AND SAND	(very difficult drilling below 40 feet)	
45	S-10	15 50/4" x x	10	5			Gray-brown c-f SAND and c-f gravel with Cobbles and Boulders	23.46
50	S-11	50/4" x x x	4	3				18.46
55	S-12	50/2" x x x	2	2				13.46
60							Cored Cobbles and Boulders to 61 feet. Continues with Augers	8.46
65							End of Boring @ 61 feet	
70								
75								
80								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test
Proportion Used: Trace = 1-10%, Little = 10-20%, Some = 20-35%, And = 35-50%

Total Penetration in Soil: 40' to 61' Rock:
Soil Samples: S8 - S12 No. of core runs:

NOTES: ATTEMPTED TO CONTINUE BORING BUT WAS UNABLE TO DRILL THROUGH BOULDERS. AUGERS WERE TERMINATED AT 57 FEET.

Dulles Geotechnical & Materials Testing Services, Inc.

TEST BORING LOG

Project Name: Replacement of Cavalry Road Bridge over the West Branch of Sugatuck River

Location: Weston, CT	**Route No.** -	**Bridge No.:**	04964
Driller: Jaime Lloret	**Type:** 3.25" HSA	**Hole No.:**	B-5
Inspector: Zichang	**Hammer Wt.:** 140 lb	**Stat./Offset:**	-
Engineer: -	**Hammer Fall:** 30"	**Northing:**	626291.56
Start Date: 5/24/2018	**Sampler Type:** Split Spoon 2"	**Easting:**	828182.06
Finish Date: 5/24/2018	**Core Barrel Type:**	**Surface Elevation:**	68.56

Groundwater Observations: At 12' After 0 hrs At After

Depth (ft.)	Sample Type/No.	Blows on Sampler per 6 inches	Pen. (in.)	Rec.(in)	RQD %	Generalized Strata Description	Material Description	Elevation (ft.)
0						ASPHALT	7" Bituminous Concrete	
5	S-1	13 16 16 10	24	5		FILL	Brown c-f SAND, some c-f gravel with Cobbles, Boulders	63.56
10	S-2	23 38 50/5" X	17	8		GRAVEL AND SAND	Gray-brown c-f SAND and c-f gravel, little silt with Cobbles and Boulders	58.56
15	S-3	49 28 31 46	24	13				53.56
20	S-4	36 18 33 47	24	6				48.56
25	S-5	9 22 20 17	24	7				43.56
30	S-6	14 24 36 23	24	9				38.56
35	S-7	4 9 10 16	24	8				33.56
40								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportion Used: Trace = 1-10%, Little = 10-20%, Some = 20-35%, And = 35-50%

Continue on page 2

Total Penetration in Soil:0' to 40' Rock: 0

Soil Samples: S1 - S7 No. of Core Runs: 0

NOTES:

Dulles Geotechnical & Materials Testing Services, Inc.

TEST BORING LOG

Project Name: Replacement of Cavalry Road Bridge over the West Branch of Sugatuck River

Location: Weston, CT	**Route No.** -	**Bridge No.:**	04964
Driller: Jaime Lloret	**Type:** 3.25" HSA	**Hole No.:**	B-5
Inspector: Zichang	**Hammer Wt.:** 140 lb	**Stat./Offset:**	-
Engineer: -	**Hammer Fall:** 30"	**Northing:**	626291.56
Start Date: 5/24/2018	**Sampler Type:** Split Spoon 2"	**Easting:**	626291.56
Finish Date: 5/24/2018	**Core Barrel Type:** NV2	**Surface Elevation:**	68.56

Groundwater Observations: At 12' After 0 hrs At After

Depth (ft.)	SAMPLES Sample Type/No.	Blows on Sampler per 6 inches	Pen.	Rec.(in)	RQD %	Generalized Strata Description	Material Description	Elevation (ft.)
40	S-8	28 24 22 25	24	18		Gravel AND SAND	Gray-brown, c-f SAND and c-f gravel, little silt with Cobbles and Boulders (very difficult drilling)	
45	S-9	50/1'' X X X	24	1				23.56
50	S-10	50/1'' X X X	24	1				18.56
55	S-11	50/3'' X X X	24	1				13.56
60							End of Boring @ 60 feet	8.56
65								
70								
75								
80								

Sample Type: S = Split Spoon C = Core UP = Undisturbed Piston V = Vane Shear Test

Proportion Used: Trace = 1-10%, Little = 10-20%, Some = 20-35%, And = 35-50%

Total Penetration in Soil:40' to 60' Rock: Soil Samples: S8 - S11 No. of Core Runs:	NOTES: Used Roller Cone to advance to 60'	Sheet 2 of 2

Appendix C: Laboratory Tests

Laboratory Test Results Summary (1 Page)
Liquid Limit, Plastic Limit, and Sieve Analysis (6 pages)

DULLES GEOTECHNICAL AND MATERIALS TESTING SERVICES, INC.

14119 Sullyfield Circle, Suite H, Chantilly, Virginia 20151 Phone: 703-999-3207

Laboratory Test Results Summary

Project Name	Cavalry Road Bridge	**Project Location**	Weston, CT
Project No.	18024	**Date**	6/11/2018

Broing No.	Depth (feet)	Sample Type	Moisture Content (%)	Liquid Limit	Plasticity Index	%Passing #10	% Passing # 200	Unified Soil Classification with Group Symbol	Soil Description based on Burmister Method
B-1	20-22	SPT	7.3	NP	---	45	12.2	Silty SAND with gravel (SM)	Dark gray c-f SAND, some c-f gravel, little silt
B-2	20-22	SPT	9.3	NP	---	41	10.1	Well graded SAND with Silt and Gravel (SW-SM)	Gray-brown c-f SAND, some c-f gravel, little silt
B-4	10-12	SPT	5.1	NP	---	41	11.2	Well graded GRAVEL with sand & silt (GW-GM)	Dark gray c-f GRAVEL and c-f sand, little silt

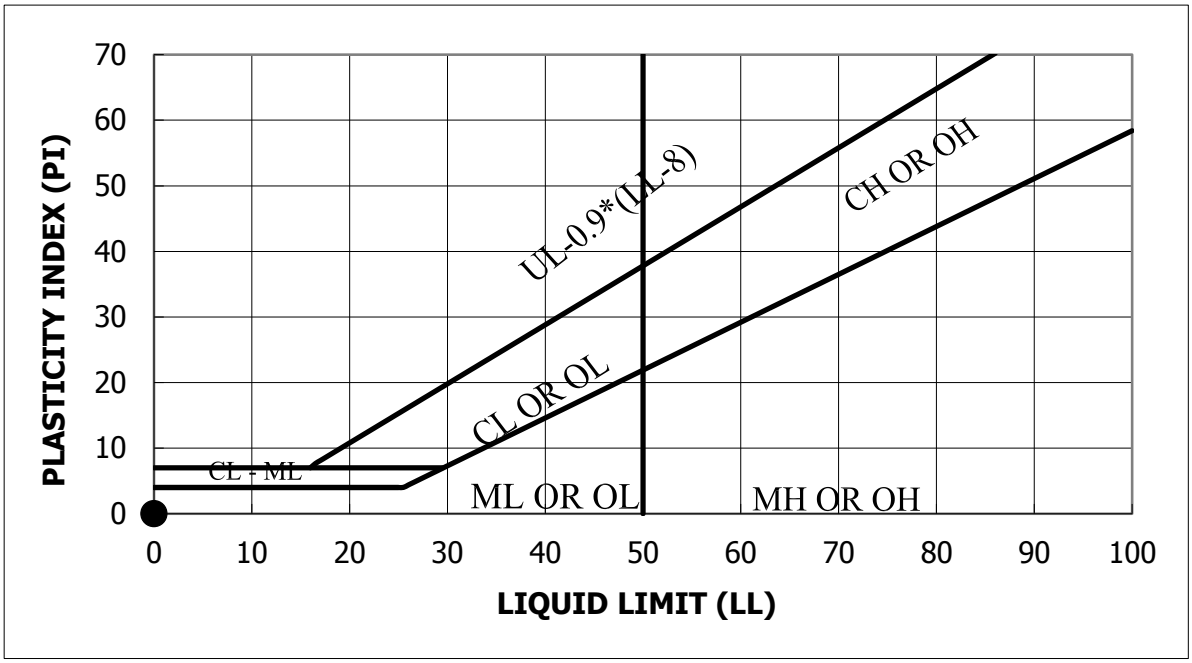
Notes: (1) Soil tests were performed as per applicable ASTM standards.

(2) NP = non-plastic

DULLES GEOTECHNICAL AND MATERIALS TESTING SERVICES, INC.
14155 Sullyfield Circle, Suite H, Chantilly, VA 20151 Phone: 703-999-3207

LIQUID AND PLASTIC LIMIT - ASTM D4318

Project No.	18024	**Project Name**	Cavalry Road Bridge, Weston, CT		
Boring No.	B-1	**Sample No.**	SPT-2	**Depth (ft)**	20.0-22.0
Date	5/31/2018	**Client**	WMC-CT		



Material Description (Burmister Method)	LL	PL	PI	% Passing #4	% Passing #200	USCS	w (%)
Dark gray c-f SAND some c-f gravel, little silt	NP	NP	---	56.3	12.2	SM	7.3
Color	**Dark gray**		**AASHTO Classification**			A-1-a	

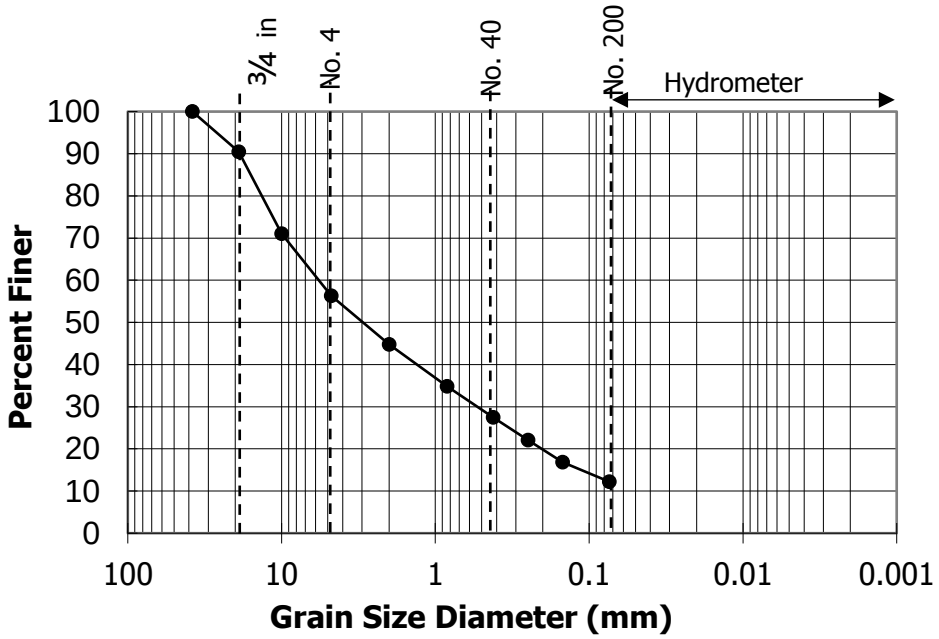
Test Method: AASHTO T-89 & T-90
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by PM Fakoor

Reviewed by

DULLES GEOTECHNICAL AND MATERIALS TESTING SERVICES, INC.
14155 Sullyfield Circle, Suite H, Chantilly, VA 20151 Phone: 703-999-3207

GRAIN SIZE ANALYSIS - AST D222					
Project No.	18024	**Project Name**	Cavalry Road Bridge, Weston, CT		
Boring No.	B-1	**Sample No.**	SPT-2	**Depth (ft)**	20.0-22.0
Date	5/31/2018	**Client**	WMC-CT		



SIEVE	% Passing
1 ½ "	**100**
3/4"	**90**
3/8"	**71**
#4	**56**
#10	**45**
#20	**35**
#40	**27**
#60	**22**
#100	**17**
#200	**12**
Pan	**---**

Soil Description Based on Burmister Method

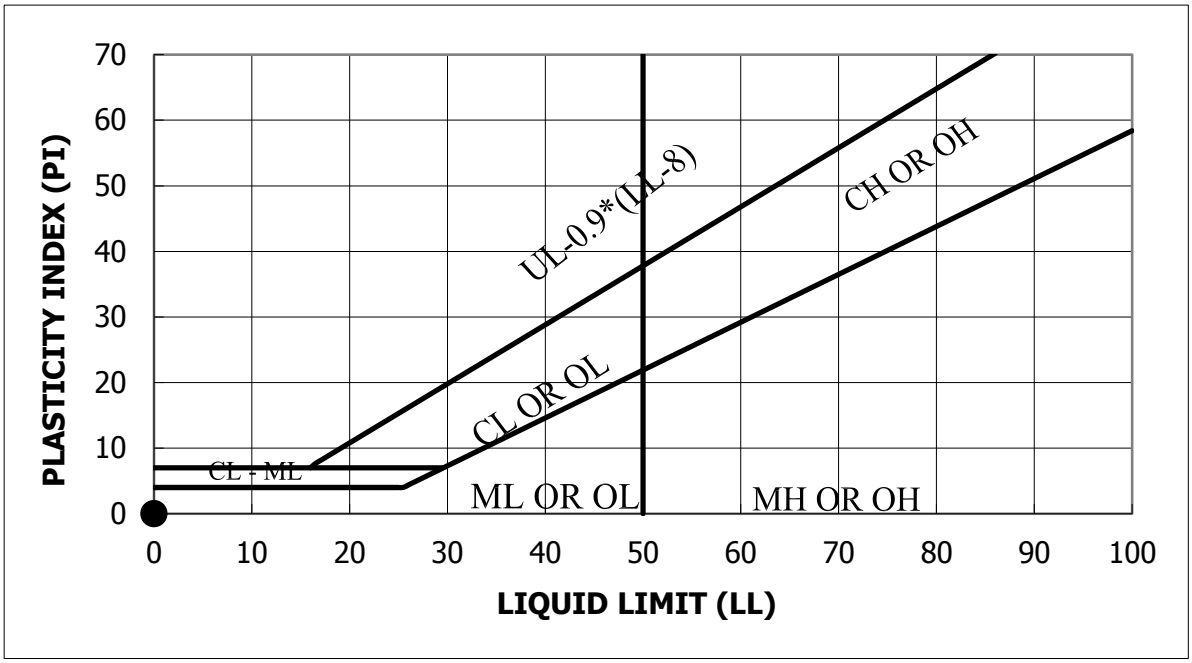
Dark gray c-f SAND some c-f gravel, little silt

Tested by: PM Fakoor

Reviewed by: _____

DULLES GEOTECHNICAL AND MATERIALS TESTING SERVICES, INC.
14155 Sullyfield Circle, Suite H, Chantilly, VA 20151 Phone: 703-999-3207

LIQUID AND PLASTIC LIMIT - ASTM D4318					
Project No.	18024	**Project Name**	Cavalry Road Bridge, Weston, CT		
Boring No.	B-2	**Sample No.**	SPT-4	**Depth (ft)**	20.0-22.0
Date	5/31/2018	**Client**	WMC-CT		



Material Description (Burmister Method)	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
Gray-brown c-f SAND, some c-f gravel, little silt	NP	NP	---	54.1	10.1	SW-SM	9.3
Color	Gray-brown		**AASHTO Classification**			A-1-a	

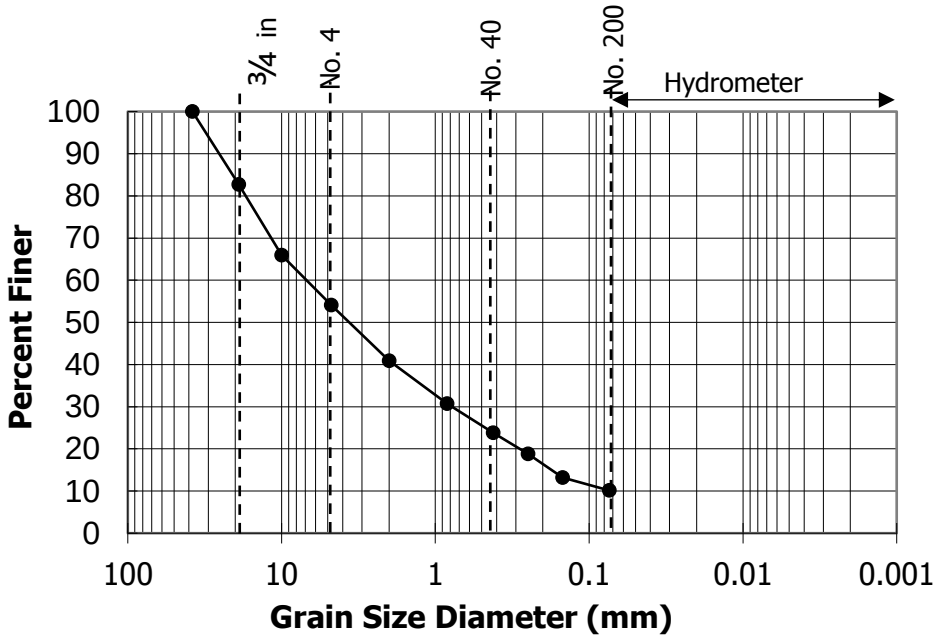
Test Method: AASHTO T-89 & T-90
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by PM Fakoor

Reviewed by

DULLES GEOTECHNICAL AND MATERIALS TESTING SERVICES, INC.
14155 Sullyfield Circle, Suite H, Chantilly, VA 20151 Phone: 703-999-3207

GRAIN SIZE ANALYSIS - AST D222					
Project No.	18024	**Project Name**	Cavalry Road Bridge, Weston, CT		
Boring No.	B-2	**Sample No.**	SPT-4	**Depth (ft)**	20.0-22.0
Date	5/31/2018	**Client**	WMC-CT		



SIEVE	% Passing
1 ½ "	**100**
3/4"	**83**
3/8"	**66**
#4	**54**
#10	**41**
#20	**31**
#40	**24**
#60	**19**
#100	**13**
#200	**10**
Pan	**---**

Soil Description Based on Burmister Method

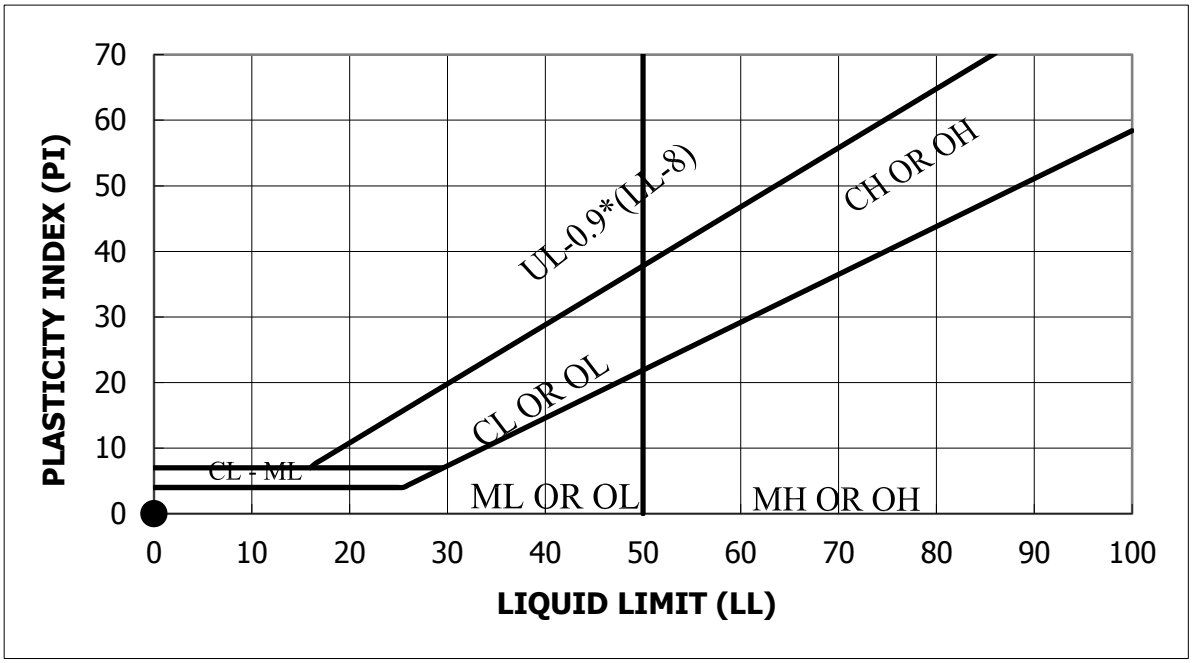
Gray-brown c-f SAND, some c-f gravel, little silt

Tested by: PM Fakoor

Reviewed by: _____

DULLES GEOTECHNICAL AND MATERIALS TESTING SERVICES, INC.
14155 Sullyfield Circle, Suite H, Chantilly, VA 20151 Phone: 703-999-3207

LIQUID AND PLASTIC LIMIT - ASTM D4318					
Project No.	18024	**Project Name**	Cavalry Road Bridge, Weston, CT		
Boring No.	B-4	**Sample No.**	SPT-3	**Depth (ft)**	10.0-12.0
Date	5/31/2018	**Client**	WMC-CT		



Material Description (Burmister Method)	LL	PL	PI	% Passing		USCS	w (%)
				#4	#200		
'Dark gray c-f GRAVEL and c-f sand, little silt	NP	NP	---	47.4	11.2	GW-GM	5.1
Color	Dark gray		**AASHTO Classification**			A-1-a	

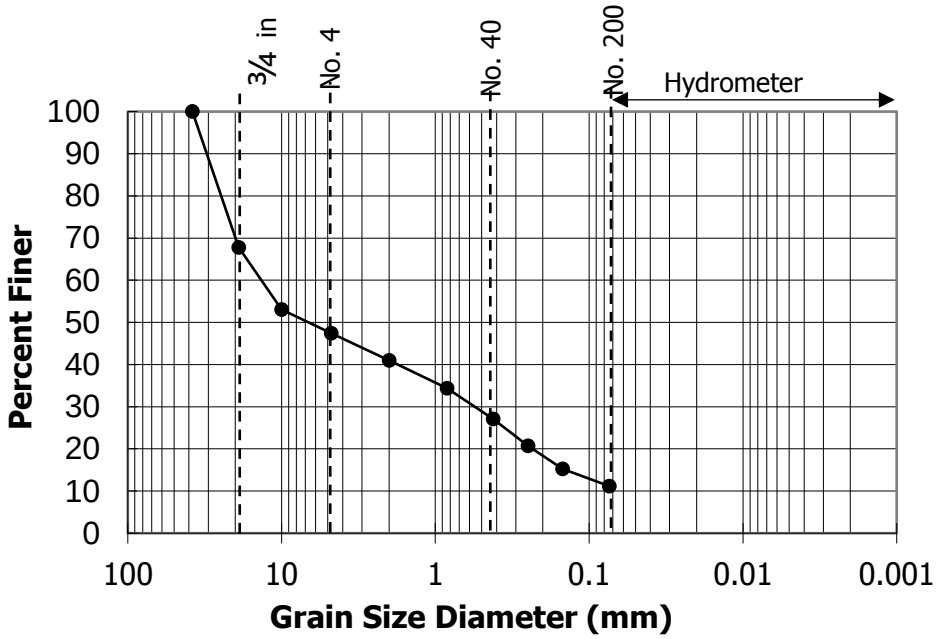
Test Method: AASHTO T-89 & T-90
Soil Classification by ASTM D2487 and AASHTO M 145

Tested by PM Fakoor

Reviewed by

DULLES GEOTECHNICAL AND MATERIALS TESTING SERVICES, INC.
14155 Sullyfield Circle, Suite H, Chantilly, VA 20151 Phone: 703-999-3207

GRAIN SIZE ANALYSIS - AST D222					
Project No.	18024	**Project Name**	Cavalry Road Bridge, Weston, CT		
Boring No.	B-4	**Sample No.**	SPT-3	**Depth (ft)**	10.0-12.0
Date	5/31/2018	**Client**	WMC-CT		



SIEVE	% Passing
1 ½ "	**100**
3/4"	**68**
3/8"	**53**
#4	**47**
#10	**41**
#20	**34**
#40	**27**
#60	**21**
#100	**15**
#200	**11**
Pan	**---**

Soil Description Based on Burmister Method

'Dark gray c-f GRAVEL and c-f sand, little silt

Tested by: PM Fakoor

Reviewed by: _____

Appendix D: Seismic Report

USGS Design Map Detailed Report (8 pages)

Design Maps Detailed Report

2009 AASHTO Guide Specifications for LRFD Seismic Bridge Design (41.10238°N, 73.39463°W)

Site Class D – "Stiff Soil"

Article 3.4.1 — Design Spectra Based on General Procedure

Note: Maps in the 2009 AASHTO Specifications are provided by AASHTO for Site Class B. Adjustments for other Site Classes are made, as needed, in Article 3.4.2.3.

From Figure 3.4.1-2 [1]	PGA = 0.079 g
From Figure 3.4.1-3 [2]	S_S = 0.155 g
From Figure 3.4.1-4 [3]	S_1 = 0.036 g

Article 3.4.2.1 — Site Class Definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Article 3.4.2.

Table 3.4.2.1–1 Site Class Definitions

SITE CLASS	SOIL PROFILE NAME	Soil shear wave velocity, $\bar{v}_s$, (ft/s)	Standard penetration resistance, $\bar{N}$	Soil undrained shear strength, $\bar{s}_u$, (psf)
A	Hard rock	$\bar{v}_s > 5{,}000$	N/A	N/A
B	Rock	$2{,}500 < \bar{v}_s \leq 5{,}000$	N/A	N/A
C	Very dense soil and soft rock	$1{,}200 < \bar{v}_s \leq 2{,}500$	$\bar{N} > 50$	>2,000 psf
D	Stiff soil profile	$600 \leq \bar{v}_s < 1{,}200$	$15 \leq \bar{N} \leq 50$	1,000 to 2,000 psf
E	Stiff soil profile	$\bar{v}_s < 600$	$\bar{N} < 15$	<1,000 psf
E	—	Any profile with more than 10 ft of soil having the characteristics: 1. Plasticity index $PI > 20$, 2. Moisture content $w \geq 40\%$, and 3. Undrained shear strength $\bar{s}_u < 500$ psf		
F	—	Any profile containing soils having one or more of the following characteristics: 1. Soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils, quick and highly sensitive clays, collapsible weakly cemented soils. 2. Peats and/or highly organic clays ($H > 10$ feet of peat and/or highly organic clay where H = thickness of soil) 3. Very high plasticity clays ($H > 25$ feet with plasticity index $PI > 75$) 4. Very thick soft/medium stiff clays ($H > 120$ feet)		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Article 3.4.2.3 — Site Coefficients

Table 3.4.2.3-1 (for F_{pga})—Values of F_{pga} as a Function of Site Class and Mapped Peak Ground Acceleration Coefficient

Site Class	Mapped Peak Ground Acceleration				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See AASHTO Article 3.4.3				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.079 g, F_{PGA} = 1.600

Table 3.4.2.3-1 (for F_a)—Values of F_a as a Function of Site Class and Mapped Short-Period Spectral Acceleration Coefficient

Site Class	Spectral Response Acceleration Parameter at Short Periods				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See AASHTO Article 3.4.3				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 0.155 g, F_a = 1.600

Table 3.4.2.3-2—Values of F_v as a Function of Site Class and Mapped 1-sec Period Spectral Acceleration Coefficient

Site Class	Mapped Spectral Response Acceleration Coefficient at 1-sec Periods				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See AASHTO Article 3.4.3				

Note: Use straight–line interpolation for intermediate values of S_1

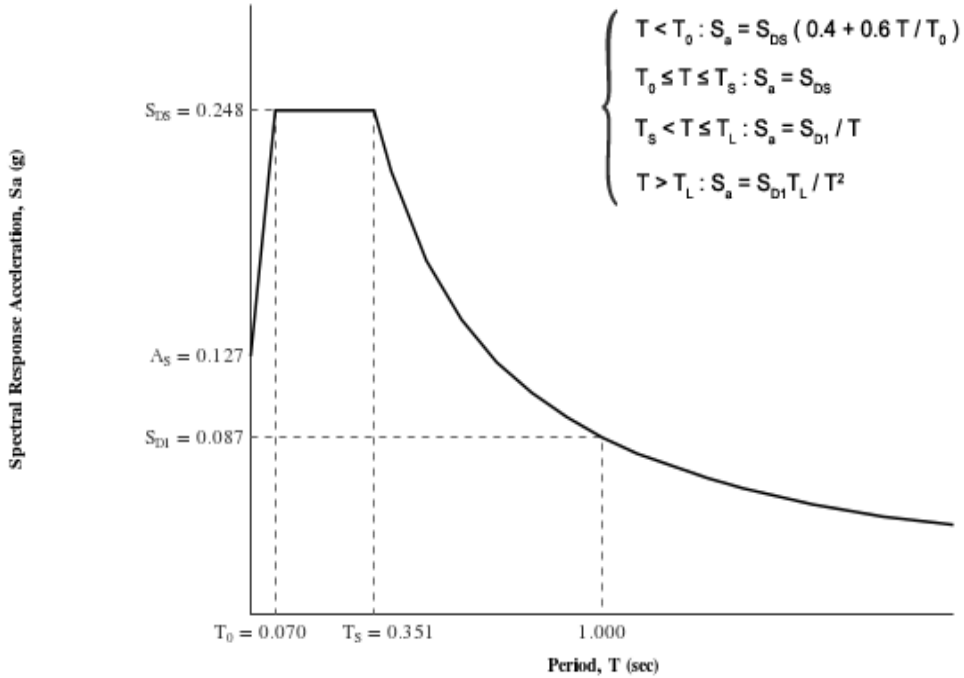
For Site Class = D and S_1 = 0.036 g, F_v = 2.400

Equation (3.4.1-1): $A_S = F_{PGA}\ PGA = 1.600 \times 0.079 = 0.127$ g

Equation (3.4.1-2): $S_{DS} = F_a\ S_S = 1.600 \times 0.155 = 0.248$ g

Equation (3.4.1-3): $S_{D1} = F_v\ S_1 = 2.400 \times 0.036 = 0.087$ g

Figure 3.4.1-1: Design Response Spectrum


$T < T_0 : S_a = S_{DS} (0.4 + 0.6 T / T_0)$
$T_0 \le T \le T_S : S_a = S_{DS}$
$T_S < T \le T_L : S_a = S_{D1} / T$
$T > T_L : S_a = S_{D1} T_L / T^2$
$S_{DS} = 0.248$
$A_S = 0.127$
$S_{D1} = 0.087$
$T_0 = 0.070$
$T_S = 0.351$
1.000
Period, T (sec)
Spectral Response Acceleration, Sa (g)

Article 3.5 - Selection of Seismic Design Category (SDC)

Table 3.5-1—Partitions for Seismic Design Categories A, B, C, and D

VALUE OF S_{D1}	SDC
$S_{D1} < 0.15g$	A
$0.15g \leq S_{D1} < 0.30g$	B
$0.30g \leq S_{D1} < 0.50g$	C
$0.50g \leq S_{D1}$	D

For S_{D1} = 0.087 g, Seismic Design Category = A

Seismic Design Category ≡ "the design category in accordance with Table 3.5-1" = A

References

1. *Figure 3.4.1-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/AASHTO-2009-Figure-3.4.1-2.pdf
2. *Figure 3.4.1-3*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/AASHTO-2009-Figure-3.4.1-3.pdf
3. *Figure 3.4.1-4*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/AASHTO-2009-Figure-3.4.1-4.pdf

Appendix E: Engineering Analysis

Factored Resistance of Micropile (1 page)

Dulles Geotechnical and Materials Testing Services, Inc. (DGMTS)

14115 Sullyfield Circle, Suite H, Chantilly, VA 20151 Phone: 703-999-3207

Project: Replacement of Cavalry Road Bridge (04964) Over the West Branch of Saugatuck River		Project Engineer: BP	
Project No.: 18034	Reviewer: TH	Date:	10/8/2018

FACTORED GEOTECHNICAL RESISTANCE OF MICROPILE

(Based on AASHTO LRFD , Section 10.9)

INPUT		
Casing Outside Diameter (inch)	**7**	**9.625**
Casing Wall Thickness (inch)	**0.5**	**0.472**
Reduction in outside diameter due to corrosion (inch)	**0.125**	**0.125**
Casing Yield Strength (psi), $F_{y\ casing}$	**80000**	**80000**
Reinforcing Bar Dia (inch) (#18)	**2.25**	**2.25**
Reinforcing Bar Yield Strength (psi), $F_{y\ bar}$	**750000**	**750000**
Grout Compressive Strength (psi)	**5000**	**5000**
Grout Diameter (inches), below casing	**7.5**	**10.125**
$\alpha_{bond\ nominal\ strength}$ (psi) (Type B)	**35**	**35**
Bond Length (feet)	**35**	**25**
Resistance Factor	**0.55**	**0.55**
OUTPUT		
Casing Outside Diameter (effective) (inch)	6.75	9.375
Pile Casing Inside Diameter (inch)	6	8.681
Pile Casing Steel Area (sq. in.)	7.51	9.84
Reinforcing Bar Area (sq. in.)	3.976	3.976
Grout Area (sq. in.)	24.30	55.21
Use minimum of $F_{y\ (bar)}$ or $F_{y\ (casing)}$	80000	80000
Structural Capacity Cased Length		
Factored Tension Resistance (tons), R_{TC}	**368**	**442**
Factored Compression Resistance (tons), R_{CC}	**326**	**427**
Structural Capacity Uncased Length		
Grout Area (sq. in.), below casing	40	77
Factored Tension Resistance (tons), R_{TU}	**127**	**127**
Factored Compression Resistance (tons), R_{CU}	**156**	**205**
Geotechnical Capacity		
$R_s = Resistance\ Factor * \pi * d_{bonded} * \alpha_{\ bonded} * L_{\ bonded}$		
Rs $_{factored\ geotechnical\ resistance}$ ***(tons)***	**95**	**92**

13. Hydraulics Report Excerpts

FEDERAL/LOCAL BRIDGE REHABILITATION PROGRAM
STATE PROJECT NO. 157-85

HYDRAULIC DESIGN REPORT

RECONSTRUCTION OF CAVALRY ROAD BRIDGE over WEST BRANCH OF SAUGATUCK RIVER (BRIDGE NO. 04964)

TOWNS OF WESTON AND WESTPORT, CT

Submitted: November 2019, Rev. APRIL 2020

Prepared For: WMC CONSULTING ENGINEERS

PREPARED BY:

Thomas J. Bulzak, P.E., L.S.

CHECKED BY:

04/27/2020

Jay A. Costello, P.E. - WMC Consulting Engineers Date:

CTDOT APPROVED HYDRAULIC ENGINEER:

04/27/2020

Thomas J. Bulzak, P.E., L.S. Date:

STATE OF CONNECTICUT THOMAS J. BULZAK No. 17942 LICENSED PROFESSIONAL ENGINEER

EcoDesign, LLC 2 Gatewood, Avon, CT 06001 (860) 677-4555

EXECUTIVE SUMMARY

1. LOCATION:

Structure No.:	**04964**	Project No.:	**157-85**
Towns:	**Weston & Westport**	Stations:	**1+00 - 4+30**
Highway:	**Cavalry Road**		
Stream:	**West Branch Saugatuck River**		

2. EXISTING STRUCTURE:

Superstructure Type:	**Two Span 56.3-foot Clear - Precast Concrete Deck Units**
Substructure Type:	**Concrete Gravity Wall Abutments and a Solid Stem Pier**
NBIS Item 113:	**3**

3. PROPOSED STRUCTURE:

Superstructure Type:	**72-foot Clear Span - Prestressed Concrete 40D NEXT Beams**
Substructure Type:	**Abutments & U-type Wing-walls**
Foundation Type:	**Integral Abutments on Micro Piles**
NBIS Item 113:	**5 - Foundation Designed to Resist Predicted Scour**

4. ROADWAY:

Classification:	**Rural Local Street**	System:	**Off**
ADT:	**622**	Date:	**2016**
Detour Length:	**3.0 miles**		

5. CHANNEL RATING:

NBIS Item 61:	Current BRI:	Recommended Rating:
	5 *(coded incorrectly)*	**8**

6. HYDROLOGY: Recommended Design Discharges:

Method: **Rounded Up USGS StreamStats Adjusted Based on Comparative Gage Data (#01212100) Analysis**

Watershed Area:	**11.2 Sq. Mi.**	2-year	**550 cfs**
Design Discharge:	**100-Year**	5-year	**900 cfs**
Structure Classification:	**Large**	10-year	**1,250 cfs**
Temporary Discharge	**2-year**	25-year	**1,600 cfs**
		50-year	**1,900 cfs**
		100-year	**2,200 cfs**
		200-year	**2,800 cfs**
		500-year	**3,400 cfs**

7. HYDRAULICS:

Model Used:	**HEC-RAS 5.0.7**	NBIS Item 71	Rating
Hydraulic Control:	**Subcritical**	Current BRI:	**9** *(coded incorrectly)*
Design Discharge:	**100-year**	Recommended	**6**

EXECUTIVE SUMMARY (Cont.)

CONCLUSIONS AND RECOMMENDATIONS:

The existing, two-span, 56.3-foot effective clear opening of Bridge No. 04964 is hydraulically inadequate. The crossing does not meet the bridge underclearance or the freeboard criteria at the low point in the roadway profile. The hydraulic analyses indicate that the existing structure causes approximately 0.9 feet of upstream backwater for the 100-year Design Discharge. For the Design Discharge the existing crossing operates in open flow and weir flow with approximately 16% of flow overtopping the low point in the road with maximum flow depth of approximately 1.4 feet.

The proposed replacement bridge crossing will have a single span 72-foot clear opening perpendicular to the direction of flow. The width of the proposed structure will be increased, from the existing approximately 25.5 feet, to accommodate two 10-foot lanes and 2-foot shoulders. The total width (out-to-out) of the proposed structure, with open rail parapets, will be approximately 28 feet. The profile of the roadway will be elevated through the crossing area however the low point in the roadway will remain unchanged.

The performed hydraulic analyses indicate that the proposed replacement structure will cause approximately 0.0 feet of upstream backwater for the 100-year Design Discharge. This proposed structure will operate in open flow and weir flow with approximately 11% of flow overtopping the low point in the road with maximum flow depth of approximately 1.2 feet. The proposed bridge superstructure will have a minimum of 0.5 feet of underclearance.

The southerly approach roadway will continue to be overtopped during the 100-year Design Discharge. The proposed bridge opening will modestly improve the roadway flooding conditions by making the low point of Cavalry Road passable during the 25-year (1,600 cfs) event versus the 10-year event (1,250 cfs) for the existing crossing.

Since the proposed crossing does not satisfy the underclearance and freeboard criteria the project will require CTDOT Drainage Manual Design Criteria Waiver.

Cavalry Road will be posted as being subject to flooding and will be barricaded by the Towns of Weston and Westport when overtopped.

HYDRAULIC DATA

1. LOCATION:

A.	Town:	**Weston & Westport**	State Project No.(s):	**157-85**
B.	Highway:	**Cavalry Road**	Station(s):	**1+00 - 4+30**
C.	Location Relative to Highway Landmark:		**100' North of Crooked Mile Road**	
D.	Stream:		**West Branch Saugatuck River**	
E.	Location Relative to Stream Landmark:		**200' Upstream of Confluence with Unnamed Tributary**	

2. DESIGN FLOOD:

A.	Hydrologic Procedure Used for Design		**Gage (#01212100) Adjusted USGS StreamStats Eq.**
B.	Hydrologic Procedure Used by FEMA		**Connecticut Water Resources Bulletin No. 36 Regression Eq.**
C.	Drainage Area		**11.2 sq. mi.**
D.	CTDOT Drainage Manual Structure Classification		**Large**
E.	Design Storm Frequency		**100-year**
F.	Required Underclearance/Freeboard at Design Discharge		**2 foot**
G.	Design Discharge		
	i.	CTDOT Design	**2,200 cfs**
	ii.	FEMA	**2,500 cfs**
	iii.	SCEL	**N/A**

3. HYDRAULIC ANALYSIS PROCEDURE:

A.	Model Used		**HEC-RAS, Version 5.0.7**
B.	Flow Regime		**Subcritical**
C.	Boundary Conditions		
	i.	Downstream	**Normal Depth based on FEMA Profiles**
	ii.	Upstream	**Critical Depth**
D.	Other Methods		**N/A**

4. HYDRAULIC CONTROL:

A.	Type of Control	**Critical Depth - Tailwater Shallow Weir approx. 535' Downstream**
B.	Location Relative to Proposed Construction	**Downstream Reach**

5. COEFFICIENTS OF ROUGHNESS:

A.	Downstream	Channel	**0.040-0.060**	Overbank	**0.080-0.10**
B.	At Crossing	Channel	**0.040**	Conduit	**N/A**
C.	Upstream	Channel	**0.040-0.060**	Overbank	**0.080-0.10**

6. EXISTING STRUCTURE, EVALUATION FOR THE DESIGN DISCHARGE:

A.	Type:		**Two Span 59.3-foot Clear - Precast Concrete Deck Units, Concrete Gravity Wall Abutments and a Solid Stem Pier**	
B.	Gross Waterway Opening	ft^2	**310.8**	
C.	Effective Waterway Opening	ft^2	**218.2**	[Energy/Weir Flow]
D.	Effective Width of Waterway Opening	ft	**56.3**	59.3' - 3.0' (pier)
E.	Depth of Waterway Opening	ft	**6.0**	
F.	Low Chord Elevation	ft	**65.8**	[Low Low Chord]
G.	Minimum Roadway Elevation	ft	**64.6**	Bridge Upstream Face
H.	W.S.E. at Bridge Approach Section	ft	**65.4**	
I.	Underclearance at Design Discharge	ft	**+0.4**	Bridge Approach Section
J.	Freeboard at Design Discharge	ft	**-0.8**	Bridge Approach Section
K.	Mean Velocity Through Structure	ft/s	**9.60**	

7. PROPOSED STRUCTURE, EVALUATION FOR THE DESIGN DISCHARGE:

A.	Type:		**72-foot Clear Span - Prestressed Concrete 40D NEXT Beams founded on Integral Abutments on Micro Piles**	
B.	Gross Waterway Opening	ft^2	**405.2**	
C.	Effective Waterway Opening	ft^2	**256.1**	[Energy/Weir Flow]
D.	Overall Width of Waterway Opening	ft	**72.0**	
E.	Depth of Waterway Opening	ft	**6.0**	
F.	Low Chord Elevation	ft	**65.8**	[Low Low Chord]
G.	Minimum Roadway Elevation	ft	**64.6**	Bridge Upstream Face
H.	W.S.E. at Approach Section	ft	**65.3**	
I.	Maximum Regulatory Elevation	ft	**66.3**	+1.0 over Natural W.S.E.
J.	Other Controlling W.S.E.	ft	**64.6**	Road Low Point Elev.
K.	Difference in W.S.E.			
	1. Proposed vs. Existing	ft	**-0.1**	
	2. Proposed vs. Natural	ft	**0.0**	
L.	Underclearance at Design Discharge	ft	**+0.5**	Bridge Approach Section
M.	Freeboard at Design Discharge	ft	**-0.7**	Bridge Approach Section
N.	Mean Velocity Through Structure	ft/s	**8.7**	

8. REMARKS:

A.	Navigational Requirements:		**None**
B.	Tidal Conditions:		**None**
C.	Record Floods:		**1927, 1938, 1955, 1978, 1979, 2007 and 2011**
D.	Average Daily Flow	[$Q_{AD} = 1.87\ (D.A.)^{0.98}$]	**20 cfs**
E.	Average Spring Flow	[$Q_{AS} = 3.62\ (D.A.)^{0.988}$]	**40 cfs**
F.	Flood Hazard Zone:		**AE**
G.	Vertical Datum:		**NAVD 1988**

14. Water Pollution Control Special Provision

ITEM # 0210820A – WATER POLLUTION CONTROL (ESTIMATED COST PLUS)

Description:

This work shall consist of measures to control water pollution and soil erosion through the use of berms, dikes, dams, sediment basins, erosion control matting, gravel, mulches, grasses, slope drains, ditches, channels, riprap, grading to control surface runoff and other erosion control devices or methods.

If the Contractor proposes changes in construction or scheduling which would affect the designed pollution controls, plans for revised pollution controls shall be submitted for the Engineer's approval before the start of construction.

The Contractor shall submit a plan showing erosion and sedimentation controls above and beyond those called for in the plans and specifications, necessitated by its proposed sequence of operations and construction activities. The construction shall not proceed until the erosion and sedimentation control plans have been approved by the Engineer. The Engineer may order additional control measures if the measures mentioned above prove insufficient.

The construction effort for this project requires work to be performed adjacent to, and directly over, the brook or river. As such, precautions must be taken by the contractor to insure that the stream area environment is not unnecessarily disturbed or is not contaminated with sediment, chemicals or other pollutants as a result of the contractor's operations or work. In addition to complying with the contract documents (plans & specifications), it is expected that the contractor will take all necessary precautions to protect the stream environment from his work operations, and that all work shall comply completely in all aspects to Section 1.10 of the Standard Specifications, and the requirements and attachments of local, State & Federal permits, as well as the requirements set forth in the Connecticut Department of Transportation document "Best Management Practices", which is a part of the Connecticut Department of Transportation publication "On-Site Mitigation for Construction Activities". Special provisions and additional pay items have been included in the contract documents to address these issues and the contractor is advised to review any special provisions.

The contractor will be expected to comply with the requirements of all permit and contract documents, including the stage construction and E&S control measures outlined therein. However, to insure understanding and compliance, the contractor will be expected to submit a written water pollution control plan, including individual plans or sections for removal of superstructure, construction operations & staging, E&S control, dewatering, disposal of excess material, stockpiling, etc.

In addition, the Contractor is reminded that review and approval authority is granted to the Town of Weston, the Town of Westport, and the State of Connecticut for all construction operations and related water pollution control procedures.

Materials:

The materials shall consist of items meeting the pertinent articles of the Standard Specifications and approved by the Engineer, or other items approved by the Engineer, such as:

a.) Soil tackifiers, erosion control matting, burlap, and plastic sheets. All materials shall be clean and free from noxious weeds, contaminants, and debris deleterious to plant growth. Erosion control matting shall be as specified in M.13.

b.) Slope drains or ditches may be constructed of pipe, rubble, riprap, sod, burlap, plastic sheets, Portland cement concrete, bituminous concrete, or other material approved by the Engineer.

c.) Seeding shall be as specified in 9.50 and M.13.

Water pollution prevention, including prevention and control of soil erosion and sedimentation is of primary importance. The minimum procedures required for construction operations, erosion and sediment (E&S) control and handling water shall be followed by the Contractor as outlined in the plans and specifications. Minimum requirements for the environmental portions of the water pollution control plan are presented as follows.

Erosion & Sediment Control Plan: The erosion & sedimentation (E&S) plan will essentially follow the contractor's proposed sequence of construction and as shown on the handling of water plans. The Contractor will be expected to follow the proposed handling water plans, install erosion & sedimentation controls in accordance with the approved E&S plan and maintain sediment and erosion controls such that they are effective at all times. To ensure understanding, confirm procedures and staging, and confirm compliance, prior to construction the Contractor will be required to prepare and submit (in writing) a Plan of Operations and an Erosion & Sediment (E&S) Control Plan to the Engineer, the Town of Weston Conservation Commission, and the Town of Westport Conservation Department for review and approval. If the E&S plan does not substantially follow and comply with the contract drawings, the contractor shall be required to revise his plan or obtain a modification from the Town of Weston and the Town of Westport. No construction activities shall commence until the Plan is approved by the Engineer, the Town of Weston Conservation Commission, and the Town of Westport Conservation Department. The Contractor will be required to comply with the approved Plan at all times. Any material or equipment placed or discharged to a wetland or watercourse, not in accordance with the contract documents or approved E&S plan, will be considered a wetlands violation and such material or equipment shall be removed immediately; the Contractor will then be required to restore the impacted wetland or watercourse as specified by the Town's Conservation Commission/Department.

Sedimentation and Erosion Controls will be installed by the contractor prior to the various stages of construction according to the approved plan, and these E&S controls will be modified and maintained as needed and directed by the Engineer as construction proceeds to ensure protection of the wetland resources. Standard sedimentation and erosion control practices will be as outlined in the "Connecticut Guidelines for Sedimentation and Erosion Control" (2002), as amended, and included in the construction contract documents. This will include temporary measures, which are shown on Erosion and Sediment Control Details, such as silt fence and hay bales. The certified E&S Plan will consist of the approved construction plans and the following outline:

Sediment Control – Prior to initiating any work in an area, silt fence or hay bales must be installed to encompass the limits of all work areas, as well as at the toe of all fill or cut slopes, in order to intercept sediment flow from work areas or from disturbed excavation or fill areas toward stream or wetland environments. Silt fence or hay bales shall remain in place until turf is sufficiently established to provide effective stabilization of disturbed area.

Turbidity Control Curtains – Prior to initiating any work over or in the stream area, turbidity curtains shall be installed in lengths and locations as may be directed by the Engineer, the Town of Weston Conservation Commission, or the Town of Westport Conservation Department, in order to intercept floating debris or sediment from downstream areas. Turbidity control curtains shall remain in place until all work in or above stream areas is complete.

Turf establishment – Turf establishment shall be performed on all disturbed areas immediately upon completion of each stage or sub-stage, or as otherwise directed by the Engineer. All turf establishment shall be repaired, supplemented and/or maintained by the contractor throughout the construction process and until the growth of long lived grasses is sufficiently established to provide effective stabilization of disturbed area.

Check Dams – Where roadway reconstruction causes significant areas or lengths of soil, gravel or process aggregate to be exposed, especially in areas if steep grades, check dams of stone, silt fence, hay bales or other approved type shall be installed at intervals (depending on grade, runoff volume and material) as required to slow velocities or re-direct flow such that erosion is minimized.

Catch Basins – Where catch basins are not installed in conjunction with a bituminous pavement course, or are installed in any location or sequence such that sediment is flowing into the catch basins, then effective temporary measures shall be taken at these catch basins to prevent silt laden water from entering these basins. These measures shall include, but not be limited to such measures as surrounding catch basins with silt fence or hay bales, inserting geotextile fabric under the frame, redirecting water to a silt fence, hay bale or stone check dams before it reaches the catch basins. All measures must be approved by the Engineer prior to installation and may be modified by the Engineer if measures are deemed to be inadequate or inappropriate.

Maintenance of E&S Measures – In his E&S plan, the contractor shall designate an employee as the responsible person for installation, inspection and maintenance of E&S measures, and this person shall work directly with the Town designated site inspector and

Town's environmental planner. All E&S control measures shall be maintained in accordance with contract documents and this E&S plan. As a minimum, measures shall be inspected and maintained by the contractor on a daily basis, as well as after storm events of ½ inch or more. On Friday afternoons, all measures shall be inspected and repaired as needed to ensure that they are in good working order for the upcoming weekend. First thing on Monday mornings, all measure shall be inspected to ensure that they are in good working order after the weekend.

Dewatering Plan: The contractor shall be required to control all water pumped in order to control water levels and dewater during trench and structural excavation operations. Turbid water generated by the Contractor through dewatering operations or other activities shall be effectively treated prior to discharge to a wetland or watercourse in order to avoid sedimentation of these systems. The contractor shall discharge ***all*** pump water to a riprap pump discharge pad, sedimentation basin, "silt bag", or a combination thereof, surrounded by silt fence or hay bales. Approximate locations are shown on the stage construction drawings and these locations may be modified upon approval of the engineer. In no case, however, shall such pump discharge pads be located within a wetland or watercourse, but they shall be set back from the stream as far as possible, and yet be reasonably convenient to the construction operations. To slow the discharge and increase cleansing, where ever possible, discharge pads shall be located in areas that will discharge through undisturbed underbrush and ground cover. Additional rows of silt fence, stone check dams or hay bale check dams shall be added as needed between discharge pads and the stream area to assist in cleansing discharge flow.

Based upon pump discharge volume and velocity, the dimensions of the pump discharge pads may be increased at the direction of the Engineer or the Town's environmental planner in order to mitigate any erosion or sedimentation caused by the pump discharge water. As needed, and as directed by the Engineer or environmental planner, all pump discharge pads will also be maintained by the Contractor to insure that dewatering activities do not discharge turbid waters to a wetland or watercourse.

To insure understanding & compliance, the Contractor shall also describe dewatering operations in his submitted E&S plan, including how he/she will perform all dewatering operations for all excavations and stages and how he/she will carry out the requirements of the contract drawings. Such operations shall, at the minimum, be in accordance with approved permits and the contract documents including the attached Staging Details Sheets and the Erosion and Sedimentation Control Detail Sheet.

Disposal of Excess Material: The Contractor will be required to submit, in writing, an excess material disposal plan to the Engineer, the Town of Weston Conservation Commission, and the Town of Westport Conservation Department. This plan shall include the disposal location, written evidence that he has permission from the land owner to dispose of this material, and a written statement from the owner that the disposal of this material on his property does not violate any local zoning or wetland regulations. The disposal of excess material shall be in accordance with all applicable federal, state and municipal laws and requirements and no excess material shall be disposed of until such plan is approved the Engineer, the Town of Weston Conservation Commission, and the Town of Westport Conservation Department.

Stockpile of Material on Site: The contractor shall be limited to stockpiling materials only in on-site locations that will be within the existing roadway or within slope and disturbance limits of the proposed work as shown on the contract drawings. All materials stockpiled on-site, must be surrounded by silt fence or other measures to prevent siltation of surrounding land or stream areas, as well as adequately protected from the weather as appropriate, including rain, wind and snow. The contractor shall repair, supplement or correct these protective measures as directed by the Engineer.

Construction Methods:

The Engineer has the authority to control the surface area of earth material exposed by construction operations and to direct the Contractor to immediately provide permanent or temporary pollution control measures to prevent contamination of adjacent streams, watercourses, lakes, ponds, or other areas of water impoundment. Every effort shall be made by the Contractor to prevent erosion on the Site and abutting properties.

All slopes shall be stabilized by mulching, seeding, or otherwise protected as the work progresses to comply with the intent of this specification.

All seeding shall include mulch or other protective covering approved by the Engineer.

When hay is used as a mulch with seeding, it shall be a minimum of 2 inches deep and held down with a tackifier.

When wood fiber mulch is used, it shall be applied in a water slurry at a rate of 2000 lb/ac with or immediately after the application of seed, fertilizer, and limestone.

All damaged slopes shall be repaired as soon as possible. The Engineer shall limit the surface area of earth material exposed if the Contractor fails to sufficiently protect the slopes to prevent pollution.

The Contractor shall, at all times, have on hand the necessary materials and equipment to provide for early slope stabilization and corrective measures to damaged slopes.

Temporary channels, ditches, and outfalls shall be protected prior to directing water into them to prevent erosion.

The erosion control features installed by the Contractor shall be maintained by the Contractor, and such installations shall be removed if ordered by the Engineer. Maintenance of erosion control measures by the Contractor shall include the clean out of accumulated sediment.

The Contractor shall operate all equipment and perform all construction operations so as to minimize pollution. The Contractor shall cease any of its operations which will increase pollution during rain storms.

The Contractor shall give the Engineer sufficient notice of impending shutdowns to enable the Engineer and Contractor to examine the Project and to implement erosion and pollution control work.

Detailed Water Pollution Control Plan: In addition to the significant concerns regarding pollution and/or sedimentation of the stream environment in which this project is located, the available construction working space for this project site is limited. Therefore, the sequencing and staging of operations and equipment is critical in order to maintain traffic, maximize the existing available space, and minimize sedimentation and/or pollution due to construction operations and water discharge. Prior to the commencement of any site work, the contractor shall submit for review and approval, a formal **Water Pollution Control Plan** that includes distinct and separate sections for E&S control, staging of construction operations, superstructure removal, dewatering, disposal of excess material and stockpiling of material on-site. Plans shall generally follow any plans or descriptions presented in the contract documents (plans and specifications), and shall be specific to the construction operation of each stage or phase of the work. Authority and jurisdiction for review and approval of this plan shall include the State of Connecticut, the Town of Weston, and the Town of Westport.

The Water Pollution Control Plan shall generally include, but not be limited to the following.

- **Construction Sequencing & Phasing Plan** (drawings & written description) that describes procedures and steps for maintaining traffic while sequencing all construction operations during all phases or stages of construction.
- **Erosion & Sedimentation Control Plan** including construction stage specific (utilities, structure and roadway) drawings and descriptions for controlling run-off and sedimentation, including proposed silt fence, check dams, catch basin protection, discharge pads, stockpile areas, etc. E&S plans shall incorporate all erosion and sediment requirements of the contract documents (plans and specifications) and the approved permits (including conditions and supporting information).
- **Dewatering Plan** that includes all procedures for handling discharge of excavation water including site plan showing location of all dewatering control structures, including cofferdams, pump intakes and discharges, portable filter boxes, portable sedimentation systems, silt control barriers, and discharge basins. Details of all dewatering devices including earth berms, cofferdams, sediment basins, etc. for dewatering and control of water from excavated areas should be provided, as well as pump and discharge capacity data. Construction phasing or sequencing of all operation should also be considered when preparing the plan; a separate plan should be submitted for each phase as required to reflect changes in control measures during different phases.
- **Procedures for Removal of Existing Superstructure** and protection of the stream and wetland areas during this process. Vehicles or equipment in the stream area is prohibited. Temporary scaffolding or ladders will be allowed in the stream area, but only for and during installation of protective measures.

The Water Pollution Control Plan shall also include and directly address each of the following:

- **Location for stockpiling** materials within the project area, including erosion & sedimentation protection controls for each area.
- **Location of Field Office** (include on E&S or construction phasing mapping).
- **Disposal of Excess Materials –** Means of disposal of concrete, earth, rock and other construction debris. These materials should not be discharged to a watercourse, placed in an area where they may wash into the watercourse or disposed of in the watershed. Location, property owner agreement and property owner compliance certification regarding zoning and wetlands regulations for all excavated material disposal sites.
- **Scrap Steel -** Location of an approved disposal site for scrap steel.
- **Emergency Spill Procedures** (Subcontractor/materials on site/refueling procedures/emergency phone numbers/etc.). Spills of fuel or any other hazardous materials shall be reported immediately by the Contractor to the Connecticut DEP Oil and Chemicals Spills Unit. The phone numbers of any contact agencies should be included in the proposed plan & prominently posted at the project site. Response plans for any accidental pollution of the watercourse and/or surrounding soil, and breakdown of water pollution and erosion and sedimentation control measures. Provisions for the quick retrieval of any machinery, equipment, debris or material which accidentally falls into the watercourse.
- **Equipment List** to be utilized including Model, Capacity, Year and Serial Number.
- **Working Drawings & back-up computations** for items such as Handling Water, cofferdams, sheet piling, Removal of Superstructure and Sedimentation & Erosion Control.
- **Debris -** Methods for preventing materials such as paint removal, bridge removal or other construction debris, dust, and blasting materials from falling into the watercourse. Discharge of these materials to the watercourse or disposal within the watershed is strictly prohibited. Vehicles or equipment in the stream area is prohibited. Temporary scaffolding or ladders will be allowed in the stream area, but only for and during installation of protective measures.
- **On-Site Vehicles** – Vehicles or equipment in the stream area is prohibited. Methods and locations of refueling, servicing, and storage of vehicles and machinery. In past bridge reconstructions, the Connecticut Department of Public Health has required that refueling and maintenance is done at least 200 feet from the watercourse and that machinery and vehicles be stored at least 100 feet from the watercourse when not in use. Securing of adequate storage and maintenance areas should be done prior to preparation of the plan and bidding.

  Servicing and refueling of vehicles and machinery should be done in a manner, which prevents the spillage of oil, gasoline, or other hazardous liquid onto the ground surface or into the watercourse. An impervious containment area is recommended for this purpose.
- **Storage of oil, paint, and other hazardous materials -** These materials should be removed from the site during non-working hours and stored in an indoor locked area.

- **Contact persons -** Name, address, and telephone number(s) of the Contractor contact person for the duration of the project.

Method of Measurement:

Measurement for payment of work and materials involved with the construction, application, and installation of water pollution controls will be as provided for under the applicable Contract items.

Temporary slope protection will be measured for payment by the number of square yards of slope protected in accordance with this specification and as directed by the Engineer. When no applicable contract item appears in the proposal for any additional measures installed but not shown on the plans, such work and materials shall be measured for payment as provided for under Article 1.09.04 – Extra and Cost-Plus Work. All extra work performed on an agreed price basis shall be incorporated on construction orders and paid on an item by item basis. All work performed under this item on a cost-plus basis will be paid under this item. No construction order will be needed to pay for this work.

The sum of money shown on the estimate and in the itemized proposal as "Estimated Cost Plus" for this work will be considered the price bid even though payment will be made only for actual work performed. The estimated cost plus figure is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figures will be disregarded and the original price will be used to determine the total amount bid for the Contract.

The preparation, submittal and revision of the various plans required under this special provision, as well as attendance and presentation at permitting agencies, shall not be measured separately for payment, but shall be included in the overall work of other contract pay items.

Basis of Payment:

Work will be paid for under the applicable Contract items or as provided for under 1.09.04 – Extra and Cost-Plus Work. No payment will be made for the clean out of accumulated sediment for either permanent or temporary erosion control measures.

Temporary pollution control measures that are made necessary by the Contractor's negligence, carelessness, failure to install permanent controls as a part of the work as scheduled and are ordered by the Engineer, or are made necessary by the Contractor's failure to perform the sequence and scheduling of work as part of the schedule as given in the Preconstruction Conference or as later amended and approved, will be ordered by the Engineer to be accomplished and performed by the Contractor at its own expense.

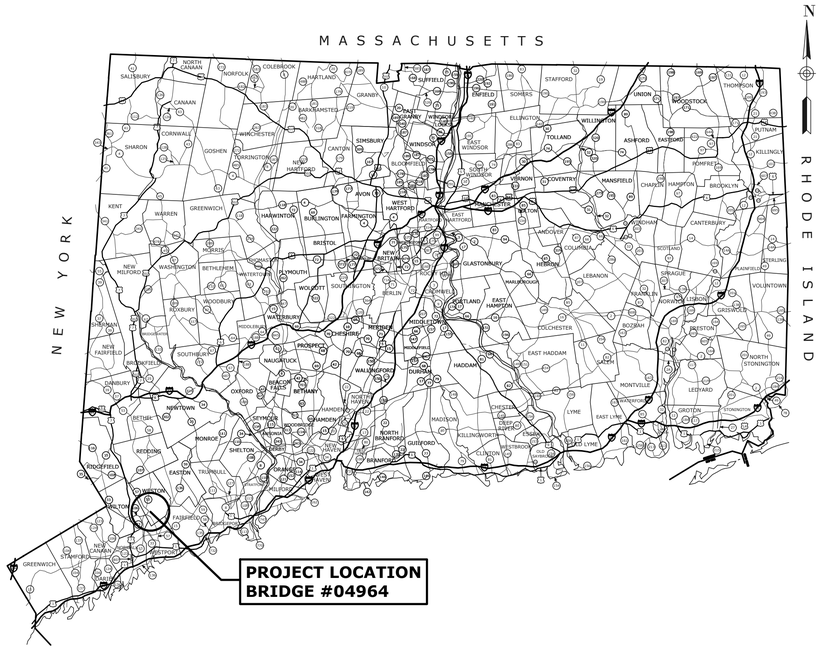
On areas off the right-of-way that are selected by the Contractor and which include but are not necessarily limited to borrow pits (other than commercially operated sources), Contractor's haul roads, disposal areas, storage, maintenance, batching areas, etc., temporary control work shall be the responsibility of the Contractor and shall be performed by the Contractor at its own expense

in a manner approved by the Engineer. No direct payment will be made for this work; the cost is to be included in other items of the Contract. Temporary control work on the aforesaid areas which are specifically designated for contractual operations by the State shall be paid for under the provisions of the specification.

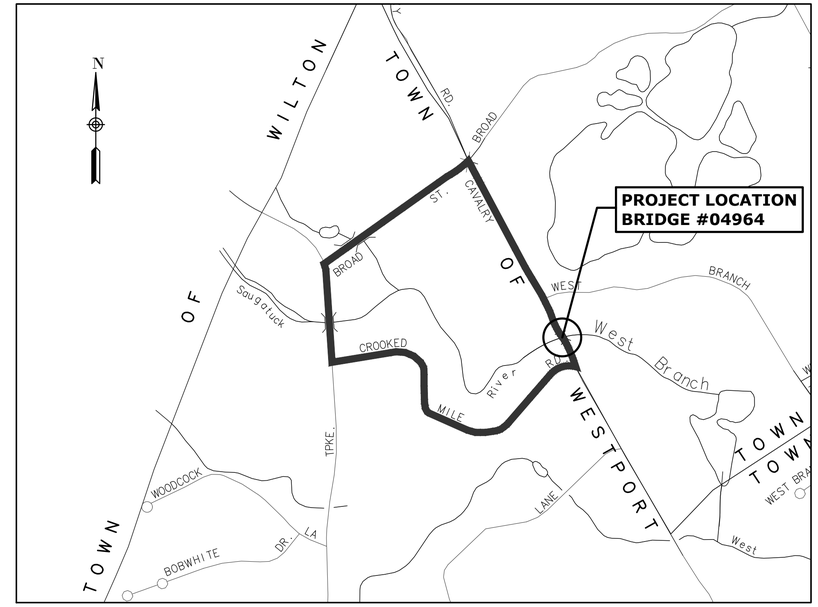
No additional payment shall be made for the preparation and implementation of the various plans addressed by this special provision, but this work shall be included in the related work items or in the general cost of the work, including preparation, submittal and revision of the overall plan for Water Pollution Control procedures, as well as meeting attendance and presentation to permitting agencies if required.

Pay Item	Pay Unit
Water Pollution Control	Est. +

15. Permit Plans



ENVIRONMENTAL PERMIT PLANS
STATE PROJECT NO. 157-85
REPLACEMENT OF BRIDGE NO. 04964
IN THE TOWN OF WESTON



LOCATION PLAN

SCALE: 1" = 500'

GENERAL NOTES:

1. THESE PLANS ARE INTENDED ONLY FOR ENVIRONMENTAL PERMITTING PURPOSES. THESE PLANS HOLD AUTHORITY FOR ALL ACTIVITIES CONCERNING THE REGULATED AREA. FOR DETAILED PLANIMETRIC INFORMATION AND PAYMENT REFER TO THE APPLICABLE CONTRACT DOCUMENTS.
2. THE DEPARTMENT OF TRANSPORTATION WILL ONLY SUBMIT REVISIONS TO DEEP AND USACE FOR CHANGES TO THE DESIGN THAT WILL AFFECT REGULATED AREAS.
3. FOR A DESCRIPTION OF THE WATERCOURSES, WETLANDS AND WETLAND SOILS SEE RELEVANT SECTIONS OF THE PERMIT APPLICATION.
4. HORIZONTAL DATUM BASED ON NAD83 TO AN ACCURACY OF CLASS A-2. VERTICAL DATUM IS BASED ON NGVD 1929 TO AN ACCURACY OF CLASS T-2.
5. ALL CONSTRUCTION ACTIVITIES WILL BE CONDUCTED IN ACCORDANCE WITH THE DEPARTMENT'S STANDARD SPECIFICATIONS FOR ROADS, BRIDGE, AND INCIDENTAL CONSTRUCTION, FORM 817, SECTION 1.10 AND WILL ALSO FOLLOW REQUIRED BEST MANAGEMENT PRACTICES (BMPs) AND SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH THE 2002 EROSION & SEDIMENTATION CONTROL GUIDELINES AND THE 2004 STORMWATER QUALITY MANUAL.
6. THE WETLANDS WERE FLAGGED IN THE FIELD BY EOLAS ENVIRONMENTAL, LLC MAY 14TH, 2018, AND LOCATED BY MARTINEZ COUCH & ASSOCIATES, LLC.

LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
PMT-01	TITLE SHEET
PMT-02	GENERAL SITE PLAN
PMT-03	WETLAND/WATERCOURSE IMPACT PLAN
PMT-04	100-YR FLOOD IMPACT PLAN
PMT-05	ELEVATION AND SECTION PLAN
PMT-06	STAGING/WATER HANDLING PLAN

LOCAL PERMIT PLANS

PLAN DATE: APRIL 27, 2020

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.A.
DRAWN	S.A.M
CHECKED	K.O.E.
DATE	4/27/2020

S.F.D. SUBMITTAL

WMC CONSULTING ENGINEERS

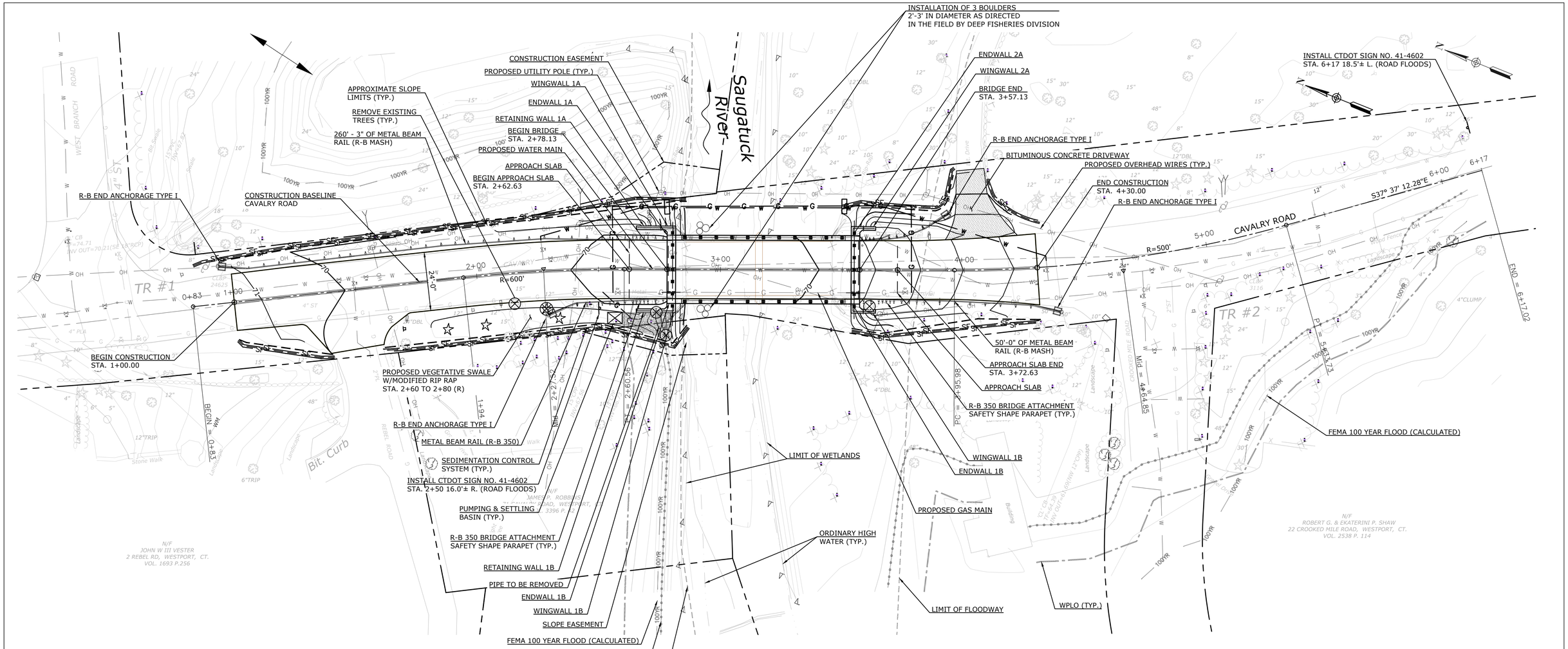
• WENGELL, McDONNELL & COSTELLO •
87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF WESTON
56 NORFIELD ROAD
WESTON, CT 06883

REPLACEMENT OF CAVALRY ROAD BRIDGE (NO. 04964) OVER SAUGATUCK RIVER
TITLE SHEET

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	CAVALRY ROAD	S.F.D.	16080.10		PMT-01	PMT-06



GENERAL SITE PLAN

SCALE: 1" = 20'-0"

NOTE:

1. "TYPE" BOULDERS APPROXIMATELY 3 FT. MIN. DIAMETER SHALL BE PLACED IN CLUSTERS AS DIRECTED IN THE FIELD BY THE ENGINEER OR THEIR AUTHORIZED DELEGATE. SEE SPECIAL PROVISION "PLACEMENT OF CHANNEL BOULDER"
2. FOR MULTIPLE CLUSTERS, THE DISTANCE BETWEEN CLUSTERS WILL BE BASED ON FIELD CONDITIONS.

FISHERIES NOTES:

1. TO COMPENSATE FOR HABITAT LOSS, A CLUSTER OF THREE BOULDER SHOULD BE PLACED IN THE LOCATION AS SHOWN ON THE PLANS, DIRECTLY UPSTREAM AND DOWNSTREAM OF THE BRIDGE.
2. TO PROTECT DOWNSTREAM FISH HABITAT, TURBIDITY CONTROL CURTAINS SHOULD BE MAINTAINED DURING CONSTRUCTION AND SEDIMENTATION CONTROLS SHOULD BE MAINTAINED AT THE TOE OF THE SLOPE OF ALL DISTURBED AREAS UNTIL THE PROJECT IS COMPLETED AND ALL DISTURBED AREAS ARE RESTORED WITH NATIVE VEGETATION.
3. WHEN THE EXISTING TWO-SPAN BRIDGE IS REPLACED WITH A SINGLE SPAN, THE CENTER PIER SHOULD BE CUT AND REMOVED NO LESS THAN ONE FOOT BELOW GRADE.

LEGEND

- SF — SEDIMENTATION CONTROL SYSTEM (SCS)
- ORDINARY HIGH WATER (OHW)
- STATE & FEDERAL WETLANDS
- LIMIT OF FLOODWAY
- 100YR — FEMA 100-YR FLOOD (CALCULATED)
- FEMA 25-YR FLOOD (CALCULATED)
- WPLO

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

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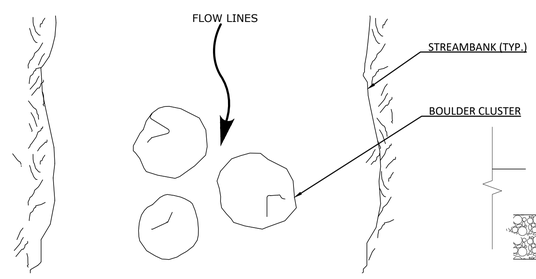
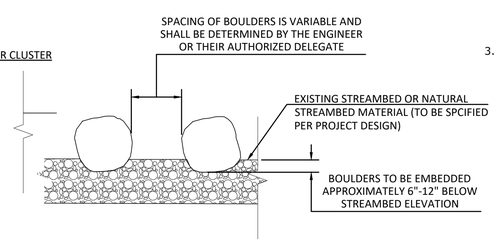


PLACEMENT OF CHANNEL BOULDERS PLAN VIEW

SCALE: N.T.S.



PLACEMENT OF CHANNEL BOULDERS SECTION VIEW

SCALE: N.T.S.

LOCAL PERMIT PLANS

PLAN DATE: APRIL 27, 2020

NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.A.
DRAWN	S.A.M
CHECKED	K.O.E.
DATE	4/27/2020

S.F.D. SUBMITTAL

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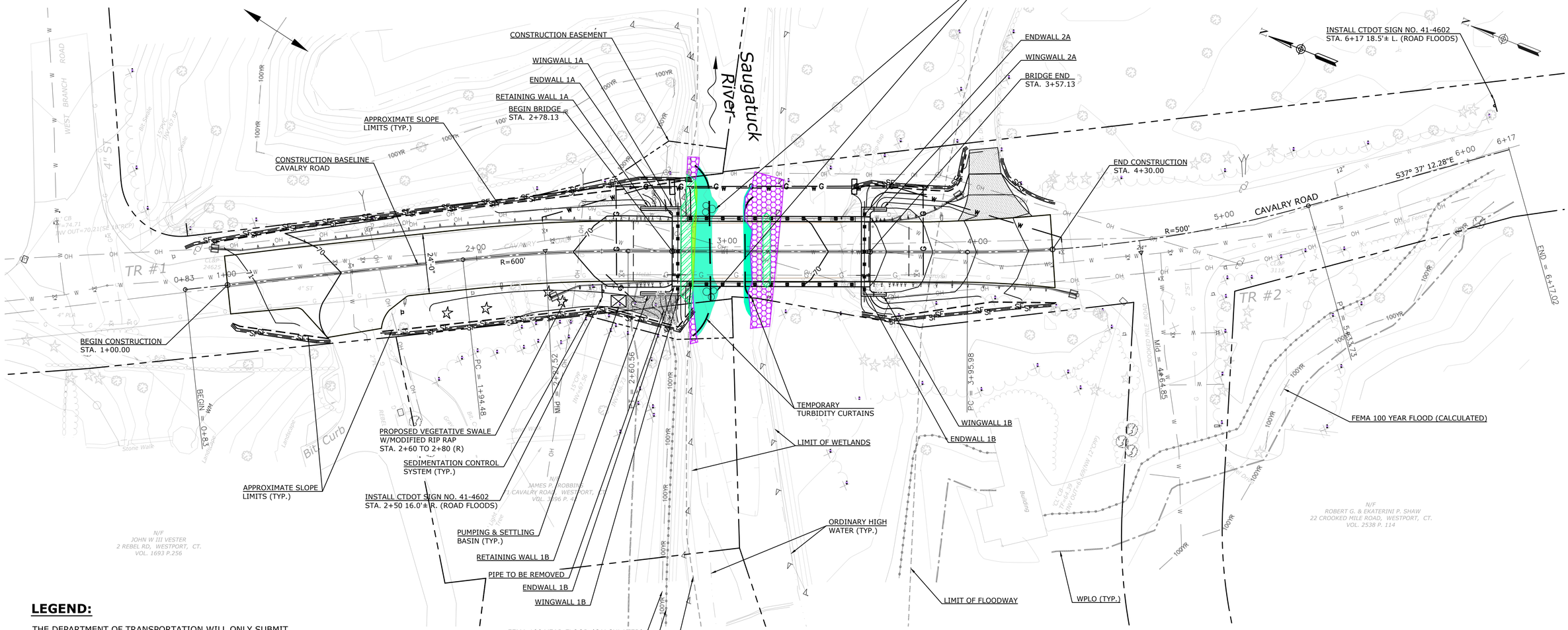
PREPARED FOR

TOWN OF WESTON
56 NORFIELD ROAD
WESTON, CT 06883

REPLACEMENT OF CAVALRY ROAD
BRIDGE (NO. 04964) OVER SAUGATUCK RIVER
GENERAL SITE PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D –	CAVALRY ROAD –	S.F.D. –	16080.10 –		PMT-02 / PMT-06



GENERAL SITE PLAN

SCALE: 1" = 20'-0"

LEGEND:

THE DEPARTMENT OF TRANSPORTATION WILL ONLY SUBMIT REVISIONS TO THE DEEP FOR CHANGES TO THE DESIGN THAT WILL EFFECT THE NOTED REGULATED AREAS.

- PERMANENT WATERCOURSE IMPACTS
- PERMANENT WETLAND IMPACTS
- TEMPORARY WATERCOURSE IMPACTS
- TEMPORARY WETLAND IMPACTS
- SF — SF — SF — SEDIMENTATION CONTROL SYSTEM (SCS)
- ORDINARY HIGH WATER (OHW)
- STATE & FEDERAL WETLANDS
- LIMIT OF FLOODWAY
- 100YR — FEMA 100-YR FLOOD (CALCULATED)
- FEMA 25-YR FLOOD (CALCULATED)
- WPLO

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WETLAND IMPACT TABLE

	WETLAND IMPACTS	WATERWAY IMPACTS	TOTAL
PERMANENT IMPACTS	299 S.F. (0.007 AC.)	38 S.F. (0.001 AC.)	337 S.F. (0.008 AC.)
TEMPORARY IMPACT	729 S.F. (0.017 AC.)	552 S.F. (0.013 AC.)	1,281 S.F. (0.030 AC.)
TOTAL IMPACTS	1,028 S.F. (0.024 AC.)	590 S.F. (0.014 AC.)	1,618 S.F. (0.038 AC.)

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

NOTE:

1. THE CONTRACTOR SHALL NOT WORK WITHIN THE LIMITS OF THE WETLANDS AND WATERCOURSE WITH THE EXCEPTION OF THOSE AREAS DELINEATED AS TEMPORARY OR PERMANENT IMPACTS TO THE WETLANDS AND WATERCOURSE. ALL DISTURBED AREAS SHALL BE RESTORED.
2. WOOD CHIP MULCH SHALL NOT BE PLACED IN THE WETLAND AREA.
3. DISTURBED AREAS BELOW THE WETLAND LIMIT SHALL BE SEEDED WITH A WETLAND SEED MIX. DISTURBED AREAS ABOVE THE WETLAND LIMIT SHALL BE COVERED WITH A WOOD CHIP MULCH OR A CONSERVATION SEED MIX. ALL DISTURBED AREAS SHALL BE RESTORED.

LOCAL PERMIT PLANS

PLAN DATE: APRIL 27, 2020

NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.A.
DRAWN	S.A.M
CHECKED	K.O.E.
DATE	4/27/2020

S.F.D. SUBMITTAL

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PREPARED FOR

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56 NORFIELD ROAD
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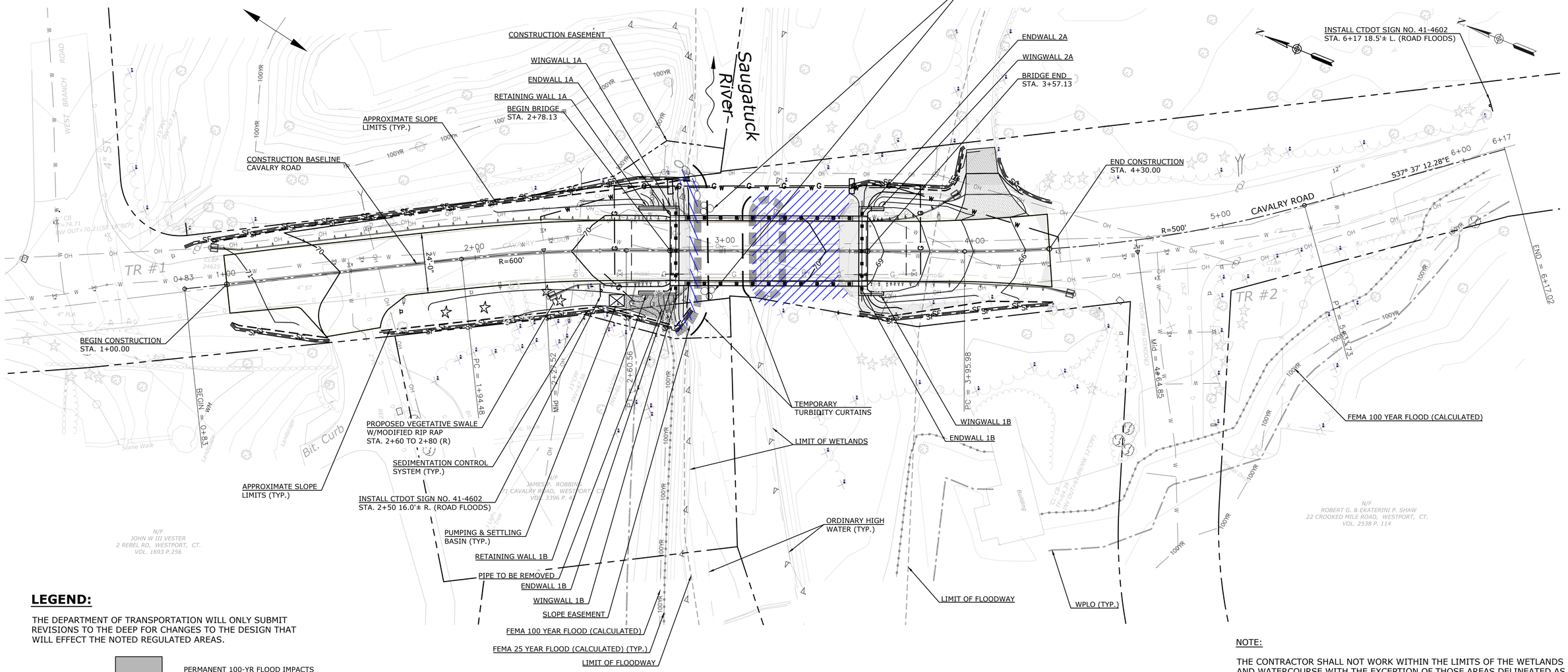
REPLACEMENT OF CAVALRY ROAD
BRIDGE (NO. 04964) OVER SAUGATUCK RIVER
WETLAND/WATERCOURSE IMPACT PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	CAVALRY ROAD	S.F.D.	16080.10		PMT-03 / PMT-06



LEGEND:

THE DEPARTMENT OF TRANSPORTATION WILL ONLY SUBMIT REVISIONS TO THE DEEP FOR CHANGES TO THE DESIGN THAT WILL EFFECT THE NOTED REGULATED AREAS.

- PERMANENT 100-YR FLOOD IMPACTS
- TEMPORARY 100-YR FLOOD IMPACTS
- SF — SF — SF — SEDIMENTATION CONTROL SYSTEM (SCS)
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- LIMIT OF FLOODWAY
- 100YR — FEMA 100-YR FLOOD (CALCULATED)
- TEMPORARY WATER HANDLING COFFERDAM
- FEMA 25-YR FLOOD (CALCULATED)
- WPLO

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NOTE:

THE CONTRACTOR SHALL NOT WORK WITHIN THE LIMITS OF THE WETLANDS AND WATERCOURSE WITH THE EXCEPTION OF THOSE AREAS DELINEATED AS TEMPORARY OR PERMANENT IMPACTS TO THE WETLANDS AND WATERCOURSE. ALL DISTURBED AREAS SHALL BE RESTORED.

100-YEAR FLOODPLAIN IMPACTS, CUT, & FILL INFORMATION

EXCAVATION IN 100–YEAR FLOODPLAIN	FILL IN 100–YEAR FLOODPLAIN
154 C.Y.	96 C.Y.

100-YEAR FLOODWAY IMPACTS, CUT, & FILL INFORMATION

EXCAVATION IN 100–YEAR FLOODWAY	FILL IN 100–YEAR FLOODWAY
101 C.Y.	0 C.Y.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

LOCAL PERMIT PLANS

PLAN DATE: APRIL 27, 2020

NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.A.
DRAWN	S.A.M
CHECKED	K.O.E.
DATE	4/27/2020

S.F.D. SUBMITTAL

WMC CONSULTING ENGINEERS

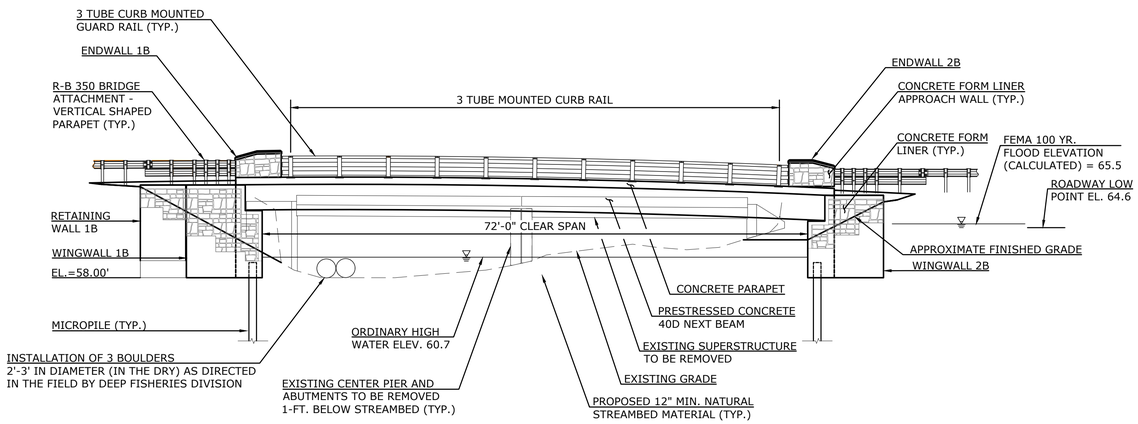
• WENGELL, McDONNELL & COSTELLO •
87 HOLMES ROAD
NEWINGTON, CT 06111
(860) 667-9624

PREPARED FOR

TOWN OF WESTON
56 NORFIELD ROAD
WESTON, CT 06883

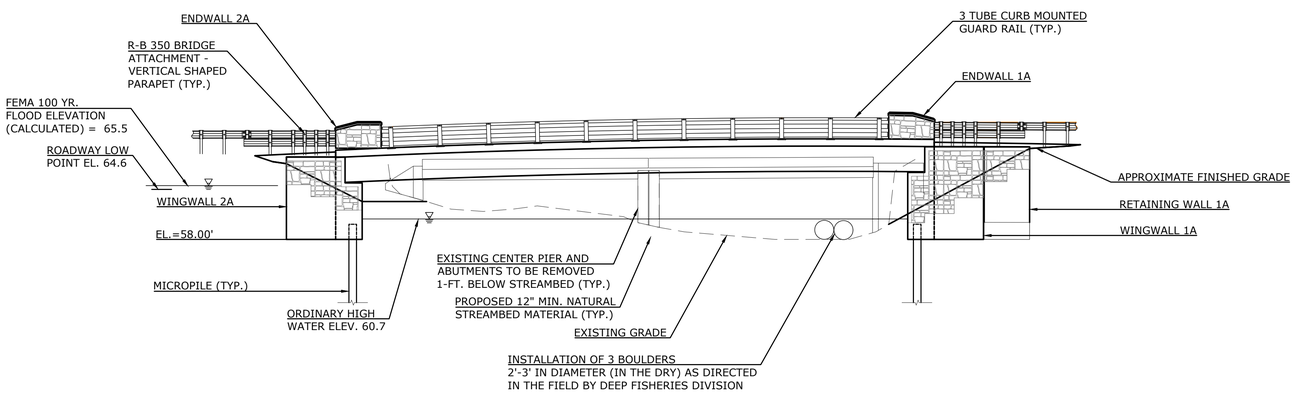
REPLACEMENT OF CAVALRY ROAD
BRIDGE (NO. 04964) OVER SAUGATUCK RIVER
100 YEAR FLOOD IMPACT PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET	OF
D	CAVALRY ROAD	S.F.D.	16080.10		PMT-04	PMT-06



STRUCTURE ELEVATION (LOOKING DOWNSTREAM)

SCALE: 1" = 10'-0"



STRUCTURE ELEVATION (LOOKING UPSTREAM)

SCALE: 1" = 10'-0"

OPENNESS RATIO (OR):

OR = OPEN AREA / BRIDGE LENGTH
OR = 405.2 S.F / 28 L.F. = 14.5 FT. (4.4 M)
14.5 FT. > 0.82 FT. (4.4 M > 0.25 M RECOMMENDED MINIMUM)

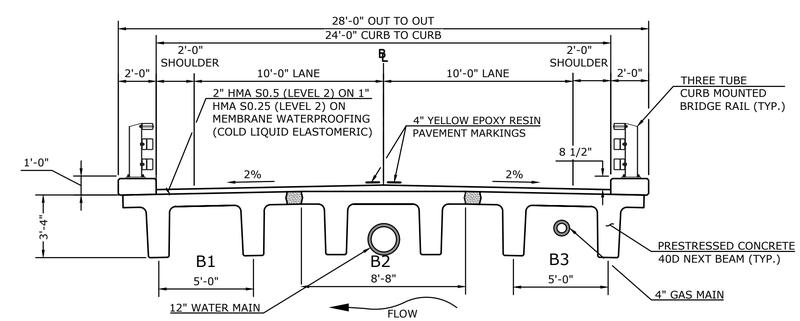
BANKFULL WIDTH (BFW):

BFW = 39 FT. EXISTING UPSTREAM (OHW)
1.2 X BFW = 47 FT.
47 FT. < 72 FT. PROPOSED BRIDGE SPAN

HYDRAULIC DATA	
DRAINAGE AREA	11.2 SQ. MILES
DESIGN FREQUENCY	100 YEAR
DESIGN DISCHARGE	2,200 C.F.S.
AVERAGE DAILY FLOW ELEVATION DOWNSTREAM	59.2 F.T. OBSERVED
UPSTREAM DESIGN WATER SURFACE ELEVATION	65.3 F.T.
DOWNSTREAM DESIGN WATER ELEVATION	64.0 F.T.
MAXIMUM SCOUR ELEVATION	56.7 F.T.
FREQUENCY	100-YEAR
DISCHARGE	2,200 C.F.S.
WORST CASE SCOUR SUB-STRUCTURE UNIT	SOUTH ABUTMENT

NATIVE STREAMBED MATERIAL NOTES:

1. NATIVE STREAMBED MATERIAL EXCAVATED DURING THE BRIDGE REPLACEMENT SHALL BE STOCKPILED AND THEN REPLACED WITHIN THE BRIDGE TO THE DEPTH SHOWN ON THE PLANS, AS DIRECTED BY THE ENGINEER, AND IN ACCORDANCE WITH THE PERMIT DOCUMENTS.
2. THE STOCKPILE SHALL BE LOCATED OUTSIDE THE WETLAND LIMITS AND PROTECTED WITH SEDIMENTATION CONTROL SYSTEM.



STRUCTURE SECTION

SCALE: 1" = 4'-0"

LOCAL PERMIT PLANS

PLAN DATE: JANUARY 27, 2020

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NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	J.A.C.
DESIGN	S.A.
DRAWN	S.A.M
CHECKED	K.O.E.
DATE	4/27/2020

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PREPARED FOR
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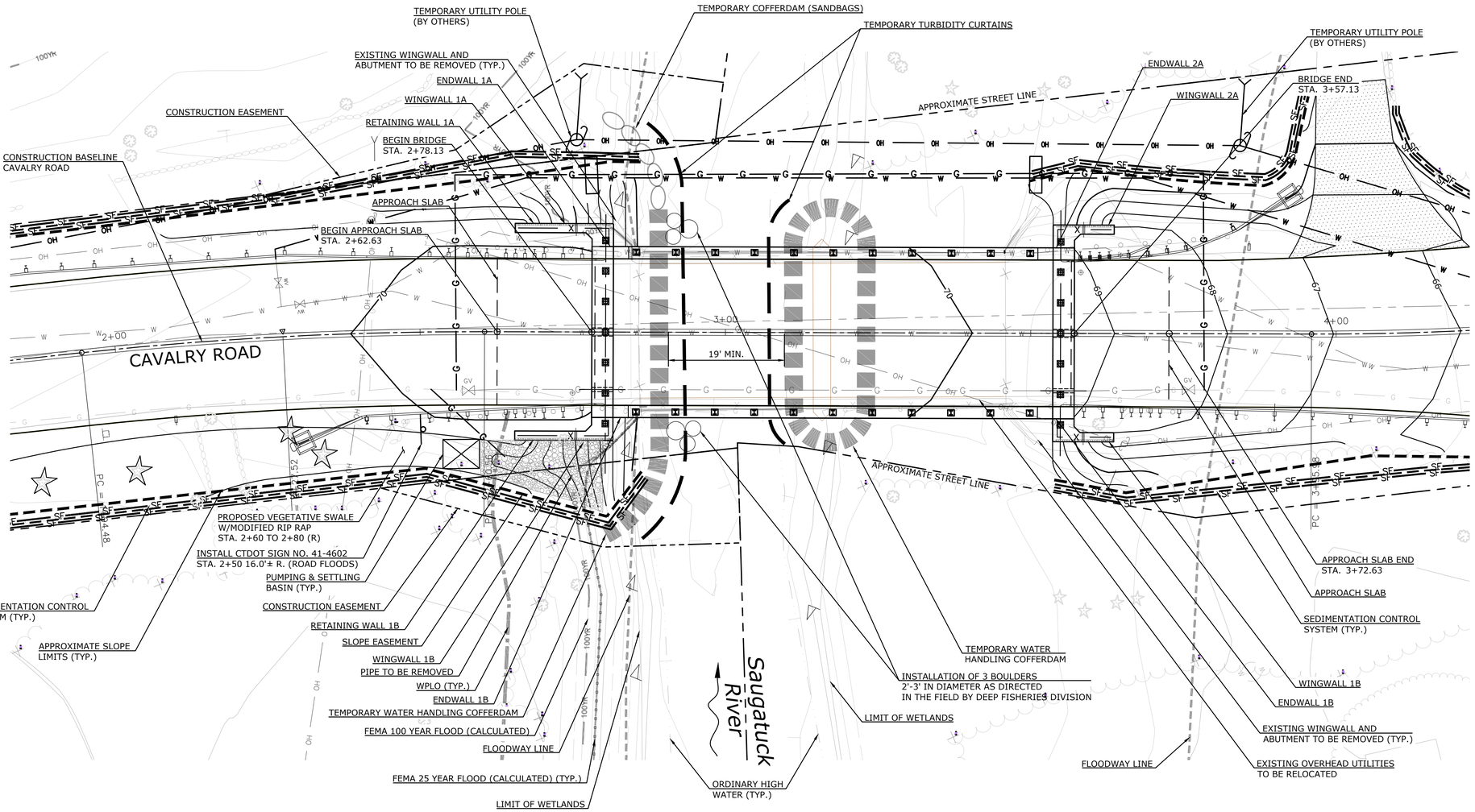
WESTON, CT 06883

REPLACEMENT OF CAVALRY ROAD BRIDGE (NO. 04964) OVER SAUGATUCK RIVER ELEVATION AND SECTION PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	CAVALRY ROAD	S.F.D.	16080.10		PMT-05 / PMT-06



HANDLING WATER PLAN

SCALE: 1" = 10'-0"

LEGEND

- SF — SF — SF — SEDIMENTATION CONTROL SYSTEM (SCS)
- ORDINARY HIGH WATER (OHW)
- STATE & FEDERAL WETLANDS
- LIMIT OF FLOODWAY
- 100YR — FEMA 100-YR FLOOD (CALCULATED)
- TEMPORARY WATER HANDLING COFFERDAM
- FEMA 25-YR FLOOD (CALCULATED)
- WPLO

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

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.

TEMPORARY FACILITIES HYDRAULICS	
AVERAGE DAILY FLOW	20 CFS
AVERAGE SPRING FLOW	40 CFS
2 - YEAR FREQUENCY DISCHARGE	550 CFS
TEMPORARY DESIGN DISCHARGE	550 CFS
TEMPORARY DESIGN FREQUENCY	2-YEAR
TEMPORARY WATER SURFACE ELEVATION UPSTREAM	62.7 FT.
TEMPORARY WATER SURFACE ELEVATION DOWNSTREAM	61.0 FT.

HANDLING WATER NOTES:

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 CAVALRY ROAD TO THROUGH TRAFFIC.
3. COORDINATE RELOCATION OF EXISTING UTILITIES.
4. REMOVE EXISTING BRIDGE SUPERSTRUCTURE, PROTECTING THE RIVER FROM FALLING DEBRIS DURING THE REMOVAL. A DEBRIS SHIELD SHALL BE USED, MINIMUM ELEVATION 63.2. DEBRIS SHIELD ELEVATIONS SET ABOVE INTERPOLATED 2-YR WSEL.
5. INSTALL TEMPORARY COFFERDAMS AS SHOWN. THE MINIMUM HYDRAULIC CLEAR OPENING BETWEEN THE COFFERDAMS SHALL BE 19'-0", NORMAL TO THE ALIGNMENT OF THE COFFERDAMS. THE TOP OF COFFERDAMS SHALL BE ELEVATION 63.7 UPSTREAM AND 62.0 DOWNSTREAM WHICH WILL PROVIDE PROTECTION FOR THE COMPUTED 2-YEAR TEMPORARY CONDITION FLOOD LEVEL WITH 1 FOOT FREEBOARD.
6. REMOVE THE EXISTING PIER, ABUTMENT AND WINGWALLS TO 1 FT. BELOW THE STREAMBED AND BACKFILL WITH NATURAL STREAMBED MATERIAL.
7. INSTALL NEW INTEGRAL ABUTMENTS AND WINGWALLS.
8. COMPLETE EMBANKMENT GRADING.
9. REMOVE ALL TEMPORARY COFFERDAMS.
10. COMPLETE REMAINING BRIDGE AND ROADWAY WORK.
11. THE SEDIMENTATION CONTROL SYSTEM IS TO BE REMOVED AFTER THE IMPACTED AREAS ARE STABILIZED AND VEGETATION HAS BEEN ESTABLISHED.
12. ALL UNCONFINED IN-STREAM ACTIVITIES MUST BE LIMITED TO THE TIME PERIOD JUNE 1 THROUGH SEPTEMBER 30.

LOCAL PERMIT PLANS

PLAN DATE: APRIL 27, 2020

NO.	DATE	DESCRIPTION

REVISIONS

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DESIGN	S.A.
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CHECKED	K.O.E.
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REPLACEMENT OF CAVALRY ROAD BRIDGE (NO. 04964) OVER SAUGATUCK RIVER
WATER HANDLING PLAN

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	CAVALRY ROAD	S.F.D.	16080.10		PMT-06 / PMT-06