

REPLACEMENT OF LAKE AVENUE CULVERT NO. 017005 OVER CUSSGUTTER BROOK

City of Bristol



Prepared by: WSP USA

Prepared for: City of Bristol



Final Design Report

Date: February 2023

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Problem, Definition, Purpose and Need

WSP USA Inc. (WSP) was engaged by the City of Bristol (City) to provide engineering services for the complete replacement of Bridge No. 017005 Lake Avenue over Cussgutter Brook. The purpose of this report is to describe the design completed. In addition to this Design Report, plans and a cost estimate have been prepared associated with design completion.

Bridge No. 017005 supports Lake Avenue over Cussgutter Brook in Bristol, Connecticut. Lake Avenue is generally a north-south roadway and is classified as an urban minor arterial with an average daily traffic of approximately 3,300 vehicles and a posted speed limit of 25 mph. The structure has a total width of 73 feet, curb-to-curb width of about 32 feet and is located approximately ½ mile south of the intersection with Glenn Street. Existing bridge is composed of a reinforced concrete slab on the west and steel rails non-composite with a concrete slab on the east supported by masonry walls providing an approximately three feet tall by eleven feet opening, estimated to have been built in 1920 and reconstructed in 1950.

The purpose and need for this project is to address the structural deficiency of the bridge. The roadway vertical alignment of Lake Avenue is adequate and therefore proposed to match existing conditions. The roadway horizontal alignment is proposed to be revised to accommodate staging that maintains traffic on the structure throughout construction.

General

The project limits start approximately ½ mile south of the intersection with Glenn Street. The total project length is 291 feet. It is noted that access will need to be maintained for one residential driveway within these limits throughout construction. The travel way will remain open as the proposed culvert will be constructed with a staged construction approach.

Bridge No. 017005 shall be replaced in its entirety with a box culvert. This includes removing the existing 73 feet long substructure and superstructure which is composed of a combination of masonry abutments, a reinforced concrete slab, and steel rail top.

Lake Avenue is the only facility within the project limits. Lake Avenue is generally a north-south roadway and is classified as an urban minor arterial. The existing roadway carries one travel lane in each direction which is proposed to remain for final condition as shown in the Typical Sections drawing.

For the length of the project, Lake Avenue will be constructed to a 30 foot wide roadway with one 11 foot lane and four foot shoulder in each direction. The width slightly varies at the project limits to tie into the existing roadway geometry. Additionally, bituminous concrete curbing will be installed on either side of the roadway.

The proposed structure type is a 5.5 feet by 15 feet precast box culvert. Headwalls and wingwalls will be constructed of reinforced cast in place concrete. On the east end of the culvert, roadway obstructions are proposed outside of the roadway clear zone therefore no roadside safety measures are proposed. On the west end of the culvert, there is existing guiderail proposed to be replaced. The limits of guiderail to be replaced extend to the southern limits of the project as it will need to be temporarily removed for staged construction.

Context and Design Controls

Bridge No. 017005 carries Lake Avenue over Cussgutter Brook. Lake Avenue is an urban minor arterial with an average daily traffic of 3,300 vehicles and a posted speed limit of 25 mph.

The topography within the project limits is consistently sloped downward to the north. At the crossing, the drainage area is 0.57 square miles. Wetland flagging was completed by Soil Science and Environmental Services and survey was completed by WSP USA. The local wetlands delineated are shown on the design plans and the wetland delineation report can be found in Appendix D.

The project is located within a neighborhood with residential, business, and industrial zoned properties in Bristol, CT. Adjacent properties serve a commercial seasonal amusement park, Lake Compounce and a residence with the same owner. As the existing conditions do not have sidewalk connectivity along Lake Avenue, pedestrian traffic is minimal at the crossing. However, 300 feet south of the bridge is a pedestrian crossing from the Lake Compounce employee park entrance to the employee parking lot.

Geometric Design

Roadway design values are based on the City of Bristol’s Code of Ordinances (August 5, 1975, version May 12, 2020) and the 2003 edition of the CTDOT Highway Design Manual for an Urban Minor Arterial with a design speed of 30 mph and a posted speed of 25 mph. In the event of conflicts between City and State standards, WSP will review the conflict with the City. Table 1 summarizes the proposed geometric details used for the project.

Table 1 – Geometric Design Criteria			
Classification	CTDOT Standard	City Standard	As Designed
Functional Classification	Urban Minor Arterial	Urban Minor Arterial	Urban Minor Arterial
Design Speed	25-30 mph		30 mph
Travel Lane Width	11'-12'	30' wide through street	11'
Shoulder Width	4'-8' (right), 2'-4' (left)		4'
Cross Slope Travel Lane	1.5%-2.0%	5" constructed as parabolic curve	5" constructed as parabolic curve
Cross Slope Shoulder	Same as travel lane (<4'), 4%-6% (>4')		
Roadside Clear Zone	12' (clear zone); 1.5' (operational offset)		12' (clear zone); 1.5' (operational offset)
Stopping Sight Distance	200'		> 200'
Minimum Radius	230'	200'	400'
Maximum Grade	11%	10%	1.06%
Minimum Grade	0.5%	1.0%	1.06%
Crest Vertical Curve (K Value)	19	30	N/A
Sag Vertical Curve (K Value)	37	30	N/A

Horizontal

The horizontal alignment for the project is proposed to be altered along Lake Avenue. The proposed alignment will allow for the staged construction of the culvert and provide a larger radius curve than existing. The existing roadway is curved with a radius of 275 feet through most of the project limits with tangent at the southern project limits. The proposed roadway is similar but curved with a radius of 400 feet through most of the project limits with tangent at the southern project limits.



Vertical

The vertical alignment for the project is proposed to match existing conditions along Lake Avenue. The vertical alignment consists of a tangent grade of 1.06% throughout the project limits.

Traffic Control and Management

To perform the culvert replacement, staged construction will be used as detailed in the Maintenance and Protection of Traffic drawings. The first stage will shift traffic to the west to construct the east end of the culvert. The second stage will shift traffic to the east to construct the west end of the culvert. While staging traffic on the east side of the culvert, traffic will be reduced to a single lane with alternating traffic controlled by temporary signalization. Video detection will be used solely for the driveway within the project limits to exit the property.

Staged construction is proposed at the request of the City due to the high volume of vehicles that use the Lake Compounce employee entrance during construction months. Signage will be placed ahead of the construction zone to notify vehicles to slow speeds for a reduced roadway width. Closures needed for driveway reconstruction will be coordinated with the property owner.

Peak hour traffic data obtained from CTDOT's website reports an approximate Average Daily Traffic (ADT) volume of 3,300 vehicles per day. It is recommended to install construction signs to inform the motorists in advance of the start of the construction for the through traffic to plan and seek alternative routes.

There are no traffic control improvements proposed for this project.

Existing and Proposed Pavement Structure

Lake Avenue is a City owned facility therefore the proposed pavement structure shall abide by the City of Bristol's Code of Ordinances (August 5, 1975, version May 12, 2020). The pavement structure subbase shall consist of eight inches of subbase. The base course shall be six inches of processed aggregate base meeting latest provisions of The Standard Specifications for Roads, Bridges, Facilities and Incidental Construction, Form 818, published by CTDOT. Finally, the surface course shall consist of four inches of bituminous concrete, also in accordance with Form 818, laid in two equal courses. This pavement structure is shown in Typical Sections. It is assumed that the existing pavement structure is composed of the same materials and thickness as the proposed.

Illumination Conditions and Recommendations

Currently, two cobra head lights are attached to the utility poles on either side of Lake Avenue within the project limits. The project proposes to keep the existing lighting.

Geotechnical

To investigate site conditions, three test borings (S-1 through S-2A) were drilled by New England Boring Contractors, Inc. March 4, 2021. Subsurface investigation findings and foundation recommendations can be found in the Geotechnical Engineering Report prepared by Freeman Companies, LLC dated April 23, 2021.

ADA Compliance

There are no sidewalks existing or proposed within the project limits.



Pedestrian and Bicycle Accommodation

There are no sidewalks existing or proposed within the project limits, pedestrians are not a contributing transportation mode for this project. Bicyclists are not a significant contributing transportation mode for this project, however four foot shoulders provided on either side of the roadway for travel.

Rights of Way

The project site is surrounded by two separate parcels with the same owner, Festival Fun Parks, LLC. The existing bridge inlet and outlet are both on private properties. One of the abutting properties is an amusement park and the other is a residence for park management.

The existing right of way for the roadway is a minimum 66 feet wide. Due to the close proximity of a driveway to the culvert and the use of staged construction, the construction work zone will be compact and a separate laydown area will be required during construction.

Property takes are not anticipated for this project but property easements and rights are required. Easements included easements for highway purposes and construction easements for temporary drainage. Rights include rights to remove shrubs/trees and relocate masonry pedestal. Two properties will have right of way impacts. These impacts are summarized in a “Schedule of Property Owners” contained in Appendix A.

Environmental Analysis and Permitting

Based on project requirements, the following permits were obtained for this project:

- Bristol Conservation Commission Inland Wetlands Agency Permit
- Southington Inland Wetlands and Watercourse Agency Permit

The following permit is required:

- U.S. Army Corps of Engineers Connecticut Self-Verification (SV)

Inquiries have been sent to SHPO, THPO, and CTDEEP Fisheries for review of project impacts. Comments received from CTDEEP Fisheries have been incorporated. THPO has confirmed there are no concerns with the project affecting historic properties. Once a response is received from SHPO the Self-Verification permit will be submitted.

The project is not located in a historic district nor are any of the adjacent properties registered historical places. No historical or archaeological impacts are anticipated for this project.

Noise is only anticipated to increase during the construction of the project. The equipment and machinery used will meet all local, state and federal noise regulations. The area is residential and commercial.

Bristol is part of the Greater Connecticut nonattainment zone (EPA). Impacts to air quality are only anticipated short-term during construction. Dust control methods, such as the use of water, will be utilized if deemed necessary in dry conditions.

Hydraulics, Drainage and Erosion Control

The Lake Ave Culvert carries Lake Avenue over Cussgutter Brook. Hydrologic and hydraulics studies have been performed for the replacement of the culvert by WSP. The results of each study are summarized as follows:

Discharges for Cussgutter Brook were developed in the Hydrology and Hydraulics Analysis Report dated April 2021. The 50-year discharge at Lake Ave is 398 cubic feet per second (cfs). Per the CTDOT Drainage Manual, the hydraulic design requirements for a Small Structure culvert is to provide a minimum freeboard of 1 foot during the 50-year flood event. The existing culvert with a 10.5 feet wide x 3.25 feet tall hydraulic opening does not meet the hydraulic design requirements for a small structure. HEC-RAS calculations indicate that the water surface elevation overtops the road at the existing culvert during a storm event less than a 25-year flood event.

It is proposed to replace the existing culvert with a proposed culvert that will provide a 15 feet wide x 3.5 feet tall hydraulic opening (culvert is 15 feet x 5.5 feet with 2 foot of natural stream bed material placed at the bottom of the culvert). The proposed culvert will improve the hydraulic capacity and will allow for the continuous uninterrupted flow of the 50-year flood event.

Minor drainage improvements are proposed for this project. Two catch basins are proposed to be constructed with Type “C” catch basins to the south of the culvert. The existing storm drainage system consisted of a catch basin outletting into the culvert top which will be removed. Both catch basins will outlet in the southeast wingwall of the culvert. The new closed drainage system will consist of Reinforced Concrete Pipe (RCP).

Soil erosion will be minimized during construction by limiting the amount of disturbed areas at any given time, utilizing proper erosion control measures and inlet protection.

The flows of Cussgutter Brook will be temporarily handled during construction using a combination of water handling cofferdams and temporary bypass pipes. These were sized consistent with the recommendations in the CTDOT Drainage Manual, Section 6.15 Hydrology for Temporary Facilities which determined a 2-year flood event was applicable.

Contaminated and Hazardous Materials

There are no properties adjacent to the project that are suspected to use hazardous materials. Therefore, contaminated materials are not anticipated on this project.

Utilities

There are several public service utilities that exist within the project corridor both underground and overhead. Overhead utilities (telephone, cable, and power lines) are present along the east side of Lake Avenue. Underground utilities include a 8” PVC sewer line, 6” force main sewer line, and 12” water line underneath the culvert.

Permanent relocation of some overhead utilities is required. Eversource has installed new poles within the project limits and the lower overhead lines have not yet been relocated to the new poles. It is proposed that this work is completed prior to the culvert replacement so the older existing pole will not be located within the clearzone. With this work completed, temporary relocation of the electric and other overhead wires is not anticipated for the culvert construction as the precast box is 10 feet minimum from the overhead lines.

Test pits were performed to identify conflicts with the underground utilities and proposed culvert. The 6" sewer force main was unable to be identified however it is anticipated that it is outside the limits of the proposed culvert. Therefore an item was added to the contract for the Contractor to identify the utilities prior to proceeding with the existing culvert removal. The 8" PVC sewer line was confirmed via manhole inverts at a depth of approximately 14ft below grade and therefore is not in conflict with the proposed culvert.

The 12" waterline was identified in the center of the existing roadway 7'-8" below grade. At this depth, the utility is in conflict with the proposed box culvert. Relocation of this utility is included within the Contract documents as coordinated with City of Bristol Water and Sewer Department.

Structure

It is proposed to replace the Divinity Street Culvert with a precast reinforced concrete box culvert with a 5.5 feet tall by 15 feet wide opening. The structure bottom will be buried 2 foot below the stream bed with natural stream bed material. The culvert is proposed to be 48.5 feet long with cast-in-place reinforced concrete wingwalls on spread footings, approximately 25 feet shorter than the existing culvert.

The precast concrete box culvert provides an accelerated construction phase and simplified construction methods. The culvert end and wingwalls will have a 42" exposed vertical face parapet mounted on top. The east end of the culvert is placed outside of the clear zone to eliminate safety concerns and the need for guiderail. The west end of the culvert is placed a minimum 4'-3" behind the proposed guiderail for sufficient guiderail deflection.

Cost Estimate Summary

The City of Bristol has applied for State Local funding for this project. If approved, the replacement of Bridge No. 017005 will be paid for by 50% local funds and 50% State funds under the State Local Bridge Program. The construction cost estimate for the project is \$1,390,000. The estimate was prepared in accordance with CTDOT Estimating Guidelines. Unit prices were obtained from CTDOT AASHTOWare Project Estimator. A detailed breakdown of the construction cost is provided in the Design Cost Estimate.

Construction Schedule

A construction schedule was prepared based on the anticipated construction activities for this project. It is anticipated that the construction activities will last approximately 27 weeks from April through October of the construction year. The construction year is to be determined by the City of Bristol. In-water construction activities are limited to June 1 through September 30. The detailed construction schedule can be referenced in Appendix C.

Appendix

A) Schedule of Property Owners

SCHEDULE OF PROPERTY OWNERS

Replacement of Lake Avenue Culvert over Cussgutter Brook

Bristol, CT

Project No. 000-000

May 2022

SERIAL NO.	OWNER	LOCATION	TAKING AREA (SQ. FT.)	EXCESS AREA	BUILDING PART.	TYPE OF SEARCH	TYPE OF TAKE	TAKE CLASS	REMARKS
1	Festivale Fun Parks LLC.	STA 11+65 LT			NO	FULL	RIGHT		See plans for rights.
			600 +/-		NO	FULL	EASEMENT	D	Easement for Highway Purposes
			540 +/-		NO	FULL	EASEMENT	D	Construction Easement for Temporary Drainage
2	Festivale Fun Parks LLC.	STA 11+65 RT			NO	FULL	RIGHT		See plans for rights.
			765 +/-		NO	FULL	EASEMENT	D	Easement for Highway Purposes
			820 +/-		NO	FULL	EASEMENT	D	Construction Easement for Temporary Drainage

TAKING CLASSES

A = INDUSTRIAL AREA

B = BUSINESS

C = RESIDENTIAL (HOUSE)

D = STRICTLY LAND

B) Cost Estimate

**REPLACEMENT OF LAKE AVENUE CULVERT OVER CUSSGUTTER BROOK
BRISTOL, CONNECTICUT
FINAL DESIGN COST ESTIMATE**

February 2023

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
0202000	EARTH EXCAVATION	CY	710	\$35.83	\$25,439.30
0202216 A	EXCAVATION AND REUSE OF EXISTING CHANNEL BOTTOM MATERIAL	CY	64	\$82.96	\$5,309.44
0202217 A	SUPPLEMENTAL STREAMBED CHANNEL MATERIAL	EST	1300	\$1.00	\$1,300.00
0202452 A	TEST PIT	EA	1	\$2,000.00	\$2,000.00
0202529	CUT BITUMINOUS CONCRETE PAVEMENT	LF	635	\$4.21	\$2,673.35
0203202	STRUCTURE EXCAVATION - EARTH (EXCLUDING COFFERDAM AND DEWATERING)	CY	545	\$39.06	\$21,287.70
0204151 A	HANDLING WATER	LS	1	\$60,000.00	\$60,000.00
0207000	BORROW	CY	160	\$28.86	\$4,617.60
0209001	FORMATION OF SUBGRADE	SY	1460	\$5.70	\$8,322.00
0211000	ANTI-TRACKING PAD	SY	74	\$33.24	\$2,459.76
0212000	SUBBASE	CY	235	\$63.70	\$14,969.50
0213100	GRANULAR FILL	CY	60	\$74.97	\$4,498.20
0216000	PERVIOUS STRUCTURE BACKFILL	CY	235	\$73.63	\$17,303.05
0219001 A	SEDIMENTATION CONTROL SYSTEM	LF	480	\$7.43	\$3,566.40
0219011 A	SEDIMENT CONTROL SYSTEM AT CATCH BASIN	EA	3	\$187.59	\$562.77
0304002	PROCESSED AGGREGATE BASE	CY	290	\$63.30	\$18,357.00
0406171	HMA S0.5	TON	291	\$175.75	\$51,143.25
0406236	MATERIAL FOR TACK COAT	GAL	110	\$19.76	\$2,173.60
0406999 A	ASPHALT ADJUSTMENT COST	EST	1	\$600.00	\$600.00
0586001	TYPE 'C' CATCH BASIN - 0'-10' DEEP	EA	1	\$4,465.53	\$4,465.53
0586002	TYPE 'C' CATCH BASIN (4' SUMP) - 0'-10' DEEP	EA	1	\$4,503.55	\$4,503.55
0601062	FOOTING CONCRETE	CY	30	\$866.34	\$25,990.20
0601064	ABUTMENT AND WALL CONCRETE	CY	18	\$1,418.63	\$25,535.34
0601085 A	15' X 5.5' PRECAST CONCRETE BOX CULVERT	LF	49.0	\$1,800.00	\$88,200.00
0601121	PARAPET CONCRETE	LF	78	\$442.15	\$34,487.70
0601502	1/2" PREFORMED EXPANSION JOINT FILLER FOR BRIDGES	SF	61	\$9.46	\$577.06
0602030	DEFORMED STEEL BARS - GALVANIZED	LB	4810	\$3.56	\$17,123.60
0606004 A	RELOCATE MASONRY PEDESTAL WITH LIGHTING	LS	1	\$6,000.00	\$6,000.00
0686000.15	15" R.C. PIPE - 0' - 10' DEEP	LF	29	\$87.16	\$2,527.64
0686000.18	18" R.C. PIPE - 0' - 10' DEEP	LF	12	\$117.38	\$1,408.56
0703012	MODIFIED RIPRAP	CY	4	\$146.83	\$587.32
0707009 A	MEMBRANE WATERPROOFING (COLD LIQUID ELASTOMERIC)	SY	105	\$132.72	\$13,935.60
0708001	DAMPPROOFING	SY	50	\$24.31	\$1,215.50
0716000	TEMPORARY EARTH RETAINING SYSTEM	SF	1070	\$40.42	\$43,249.40
0755010	GEOTEXTILE (SEPARATION - MEDIUM SURVIVABILITY)	SY	180	\$5.91	\$1,063.80
0815001	BITUMINOUS CONCRETE LIP CURBING	LF	576	\$10.36	\$5,967.36
0819002 A	PENETRATING SEALER PROTECTIVE COMPOUND	SY	50	\$29.23	\$1,461.50
0822100.01	TEMPORARY TRAFFIC BARRIER	LF	220	\$70.15	\$15,433.00
0822100.02	TEMPORARY TRAFFIC BARRIER (PINNED)	LF	130	\$31.79	\$4,132.70
0822101.01	RELOCATED TEMPORARY TRAFFIC BARRIER	LF	160	\$5.50	\$880.00
0822101.02	RELOCATED TEMPORARY TRAFFIC BARRIER (PINNED)	LF	100	\$32.00	\$3,200.00
0910023	R-B TERMINAL SECTION	EA	1	\$2,439.34	\$2,439.34
0910300 A	METAL BEAM RAIL (R-B MASH)	LF	190	\$31.91	\$6,062.90
0912503	REMOVE METAL BEAM RAIL	LF	210	\$7.29	\$1,530.90
0922501	BITUMINOUS CONCRETE DRIVEWAY	SY	30	\$80.55	\$2,416.50
0943001	WATER FOR DUST CONTROL	MGA	210	\$6.13	\$1,287.30
0944000	FURNISHING AND PLACING TOPSOIL	SY	700	\$12.83	\$8,981.00
0950019 A	TURF ESTABLISHMENT - LAWN	SY	700	\$3.40	\$2,380.00
0950040 A	CONSERVATION SEEDING FOR SLOPES	SY	160	\$2.55	\$408.00
0950043 A	WETLAND GRASS ESTABLISHMENT	SF	850	\$1.05	\$892.50
0952051 A	CONTROL AND REMOVAL OF INVASIVE VEGETATION	SY	250	\$13.96	\$3,490.00
0970006	TRAFFICPERSON (MUNICIPAL POLICE OFFICER)	EST	1	\$3,000.00	\$3,000.00
0970007	TRAFFICPERSON (UNIFORMED FLAGGER)	HR	100	\$27.66	\$2,766.00
0974000	REMOVAL OF EXISTING MASONRY	CF	2200	\$39.07	\$85,954.00
0978002	TRAFFIC DRUM	EA	13	\$91.04	\$1,183.52
1118101 A	TEMPORARY SIGNALIZATION	LS	1	\$61,900.00	\$61,900.00
1205209	TYPE DE-9 DELINEATOR	EA	2	\$160.00	\$320.00
1208931 A	SIGN FACE - SHEET ALUMINUM (TYPE IX RETROREFLECTIVE SHEETING)	SF	17	\$116.65	\$1,983.05
1209114	HOT-APPLIED PAINTED PAVEMENT MARKINGS 4" YELLOW	LF	640	\$0.45	\$288.00
1209124	HOT-APPLIED PAINTED PAVEMENT MARKINGS 4" WHITE	LF	1250	\$0.48	\$600.00
1209129	HOT-APPLIED PAINTED PAVEMENT MARKINGS 12" WHITE	LF	24	\$1.04	\$24.96
1210101	4" WHITE EPOXY RESIN PAVEMENT MARKINGS	LF	600	\$1.15	\$690.00
1210102	4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	LF	620	\$1.18	\$731.60
1211001	REMOVAL OF PAVEMENT MARKINGS	SF	790	\$1.55	\$1,224.50
1220027	CONSTRUCTION SIGNS	SF	129	\$23.47	\$3,027.63
1300005 A	RELOCATION OF WATER MAINS	LS	1	\$50,000.00	\$50,000.00
1403501 A	RESET MANHOLE (SANITARY SEWER)	EA	2	\$1,076.24	\$2,152.48
1802210.07	TEMPORARY SAND BARREL (700 lb.)	EA	2	\$372.75	\$745.50

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
1802210.14	TEMPORARY SAND BARREL (1400 lb.)	EA	8	\$433.30	\$3,466.40
1802210.21	TEMPORARY SAND BARREL (2100 lb.)	EA	4	\$410.67	\$1,642.68
1802211.07	RELOCATION OF TEMPORARY SAND BARREL (700 lb.)	EA	1	\$184.60	\$184.60
1802211.14	RELOCATION OF TEMPORARY SAND BARREL (1400 lb.)	EA	4	\$179.29	\$717.16
1802211.21	RELOCATION OF TEMPORARY SAND BARREL (2100 lb.)	EA	2	\$185.92	\$371.84
TOTAL					\$801,390.64
0201001	CLEARING & GRUBBING (2% OF TOTAL CONTRACT ITEMS)	LS	1	\$18,317.50	\$18,317.50
0971001 A	MAINTENANCE & PROTECTION OF TRAFFIC (3% OF TOTAL CONTRACT ITEMS)	LS	1	\$27,476.25	\$27,476.25
0975004	MOBILIZATION AND PROJECT CLOSEOUT (6.5% OF TOTAL CONTRACT ITEMS)	LS	1	\$59,531.88	\$59,531.88
0980020	CONSTRUCTION SURVEYING (1% OF TOTAL CONTRACT ITEMS)	LS	1	\$9,158.75	\$9,158.75
TOTAL CONTRACT ITEMS					\$915,875.02
INCIDENTALS (25% OF TOTAL CONTRACT ITEMS)				25.0%	\$228,968.75
TOTAL CONTRACT ITEMS PLUS INCIDENTALS					\$1,145,000.00
CONSTRUCTION CONTINGENCIES (10% OF TOTAL CONTRACT ITEMS)				10.0%	\$114,500.00
INFLATION @ 5% x 2.151 INFLATION FACTOR = INFLATION ADJUSTMENT FACTOR				11.00%	\$125,950.00
TOTAL CONSTRUCTION COST					\$1,385,450.00
SAY					\$1,390,000.00

C) Construction Schedule

PROJECT NO. 000-000
REPLACEMENT OF LAKE AVE CULVERT OVER CUSSGUTTER BROOK
BRISTOL, CONNECTICUT

ANTICIPATED BID PHASE SCHEDULE

<u>Milestone</u>	<u>Completion Date</u>	
Advertise	December 8, 2024	
Bid Phase	January 7, 2025	30 days
Award	March 8, 2025	60 days
Notice to Proceed	April 22, 2025	45 days
Project Completion	October 30, 2025	191 Project Calendar Days

CONSTRUCTION SCHEDULE

Activity	1-Apr	8-Apr	15-Apr	22-Apr	29-Apr	6-May	13-May	20-May	27-May	3-Jun	10-Jun	17-Jun	24-Jun	1-Jul	8-Jul	15-Jul	22-Jul	29-Jul	5-Aug	12-Aug	19-Aug	26-Aug	2-Sep	9-Sep	16-Sep	23-Sep	30-Sep	7-Oct	14-Oct	21-Oct	28-Oct	
				Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18	Week 19	Week 20	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26	Week 27		
Mobilize																																
Clearing and grubbing																																
Install wetland, sedimentation, and construction protection																																
Install temporary water handling																																
Construct temporary roadway																																
Shift Traffic																																
Demolish existing culvert - east																																
Install proposed culvert - east																																
Form, cure and strip wingwall footings - east																																
Form, cure and strip wingwall stems - east																																
Install streambed and embankment materials - east																																
Shift Traffic																																
Demolish existing culvert - west																																
Install proposed culvert - west																																
Form, cure and strip wingwall footings - west																																
Form, cure and strip wingwall stems - west																																
Install streambed and embankment materials - west																																
Shift Traffic																																
Final paving of roadway																																
Final striping of roadway																																
Install guiderail																																
Demobilize																																

Active Construction
 In-water Construction Allowed

D) Wetland Flagging Report

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.

Wetland Delineations Ecological Studies Site Assessments Project Planning Soil Testing

July 16, 2020

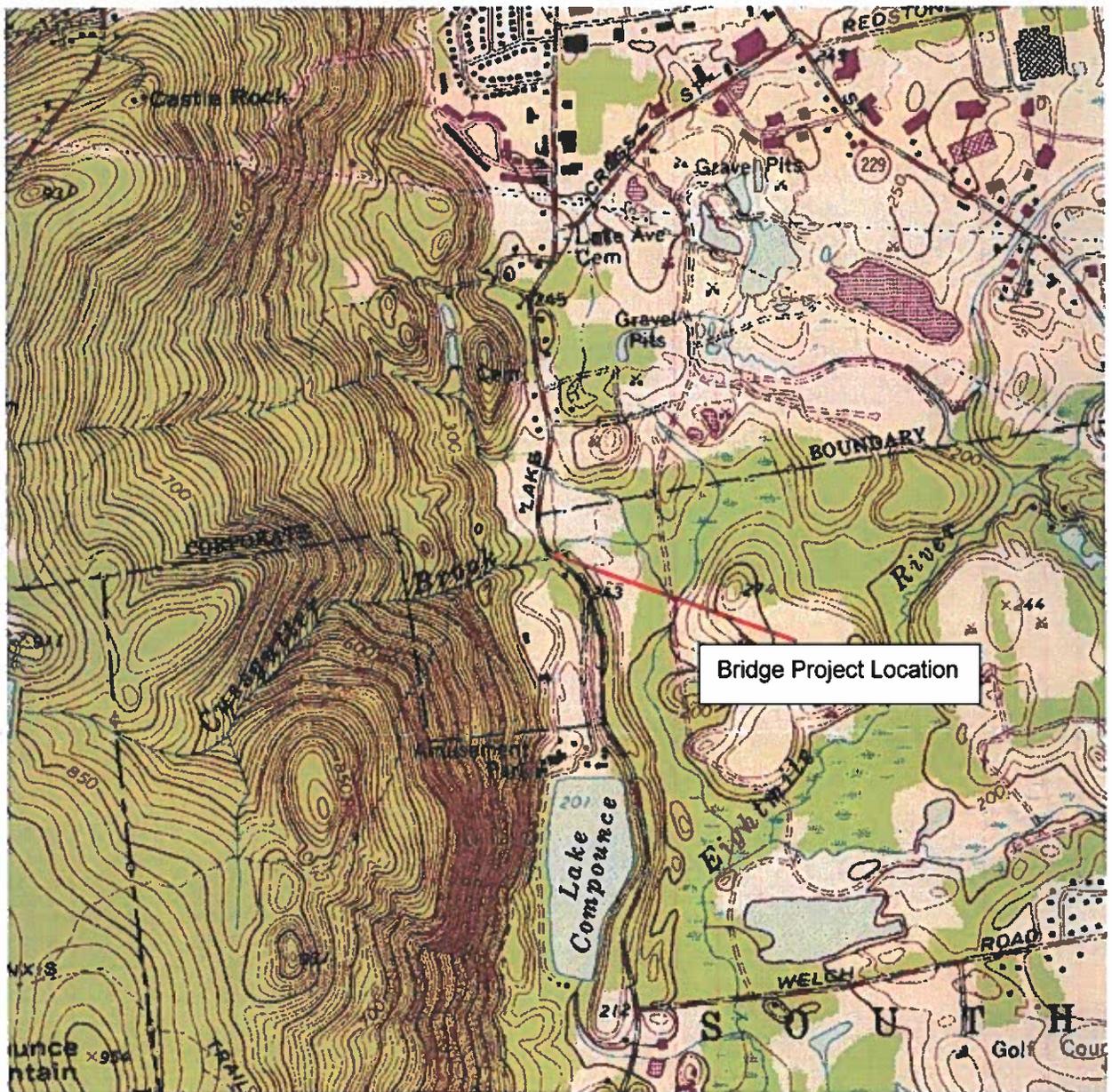
ATTN: Thomas Laliberte, P.E.
WSP USA, Inc.
500 Winding Brook Drive
Glastonbury, CT 06033

**Re: Wetlands Delineation Report
Lake Avenue Bridge Over Cussgutter Brook Project Area, Bristol, CT
SSES Job No. 2020-49-CT-BRS**

Dear Mr. Laliberte:

In accordance with your request, Scott D. Stevens, Registered Professional Soil Scientist and Jennifer L. Beno, Biologist/Wetland Scientist, with Soil Science And Environmental Services, Inc. (SSES) inspected the above-referenced bridge project area on June 30, 2020. The purpose of the inspection was to identify regulated wetlands and watercourses within the designated project area under the existing conditions encountered during the date of the site inspection. The ordinary high water level along Cussgutter Brook also was identified within the project area during the inspection. The project site is situated in the southern portion of Bristol (Figure 1).

Regulated waters and wetlands present in and near the project area include Cussgutter Brook and associated CT inland wetlands. Definitions of waters and wetlands that are regulated by the State of Connecticut and Federal Government are presented in Appendix I. Rivers and streams are regulated by the State of CT as watercourses, according to the Inland Wetlands and Watercourses Act. Rivers and streams are regulated by the Federal Government as "Waters of the U.S." Wetlands are defined differently by the State of CT and the Federal Government. CT Inland Wetlands are defined by soil types that are either poorly drained, very poorly drained, floodplain or alluvial. Federal Wetlands consist of areas that are inundated or saturated by ground or surface water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.



**SOIL SCIENCE and
ENVIRONMENTAL
SERVICES, INC.**

U.S.G.S. Topography Map
Lake Avenue Bridge over
Cussgutter Brook Project Area
Bristol, CT

Date 7/1/2020

Figure No. 1

A spade and auger were used to dig test holes for soils identification during the investigation. The vegetation communities and any physical indicators of hydrology in the project area were also examined. The CT inland wetland boundaries within the project area were delineated with consecutively numbered pink survey tapes. No Federal wetlands are present within the bridge project area. A sketch map of the delineated wetland boundaries is included as Figure 2.

CONNECTICUT INLAND WETLANDS & SOIL TYPES

CT inland wetlands were delineated within the Lake Avenue bridge over Cussgutter Brook project area in Bristol, CT during the June 30, 2020 inspection. See Figure 2. The CT wetlands are dominated by a very narrow palustrine forested (PFO) wetland community confined to the edges of Cussgutter Brook.

The wetland soils within the project area include:

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

The non-wetland soils within the project area include:

38 Hinckley gravelly sandy loam (Typic Udorthents) – This is a deep, excessively drained, gravelly sandy textured soil that developed over sandy and gravelly, glacial outwash derived from schist, gneiss and granite. Hinckley soils occur in valleys, outwash plains, terraces, kames and eskers landforms.

306 Udorthents-Urban land complex This map unit consists of extensive areas where soils have been disturbed from land development along with large areas of impervious surfaces associated with streets, parking lots, buildings and other structures.

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

701 Ninigret fine sandy loam (Aquic Dystrudepts) – This is a deep, moderately well drained, friable, coarse-loamy and loamy textured soils that developed over sandy and gravelly, glacial outwash derived from schist, gneiss and granite. Outwash soils occur in valleys, outwash plains and terraces.



**Figure No. 2 – Sketch of CT Wetland Boundaries (approx.)
(Aerial photo from CT Environmental Conditions Online)**



Narrow Cussgutter Brook watercourse and wetland corridor – up-stream (west) of bridge (6/30/2020).



Narrow Cussgutter Brook watercourse and wetland corridor – down-stream (east) of bridge (6/30/2020).

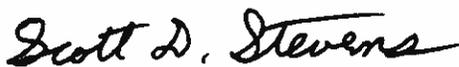
ORDINARY HIGH WATER MARK IDENTIFICATION

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

The above-listed indicators were utilized during the June 30, 2020 investigation to determine the estimated ordinary high water (OHW) along Cussgutter Brook watercourse channel within the project area based on existing conditions observed during the inspection. Blue survey tapes were tied onto plant material at a few locations within the project area in order to identify the OHW elevation. The knot of the tied survey tape marks the estimated OHW elevation. A sketch map showing the approximate locations of the OHW survey tapes is included in Figure 3.

Respectfully submitted,

SOIL SCIENCE AND ENVIRONMENTAL SERVICES, INC.



Scott D. Stevens
Registered Professional Soil Scientist



Jennifer L. Beno
Biologist/Wetland Scientist



Figure No. 3 – Sketch of Ordinary High Water Flag Locations (approx.)
(Aerial photo from CT Environmental Conditions Online)

APPENDIX I

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

I. State of Connecticut

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

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

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

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

II. Federal Government

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

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

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

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