



**Presentation to the
Town of Westport Flood &
Erosion Control Board**

**Deadman Brook
Watershed Study**

May 2, 2018

Employee owned. Client driven.

Connecticut | Maryland | Massachusetts | New Jersey | New York | Ohio | Pennsylvania | Texas



Deadman Brook Project Team

- Town of Westport
 - Peter A. Ratkiewich, P.E.

- BL Companies
 - David Cicia, P.E.
 - Michael Fisher, P.E.
 - Chad Perkoski, P.E.

Deadman Brook



BL Companies, Inc. • Employee Owned. Client Driven.



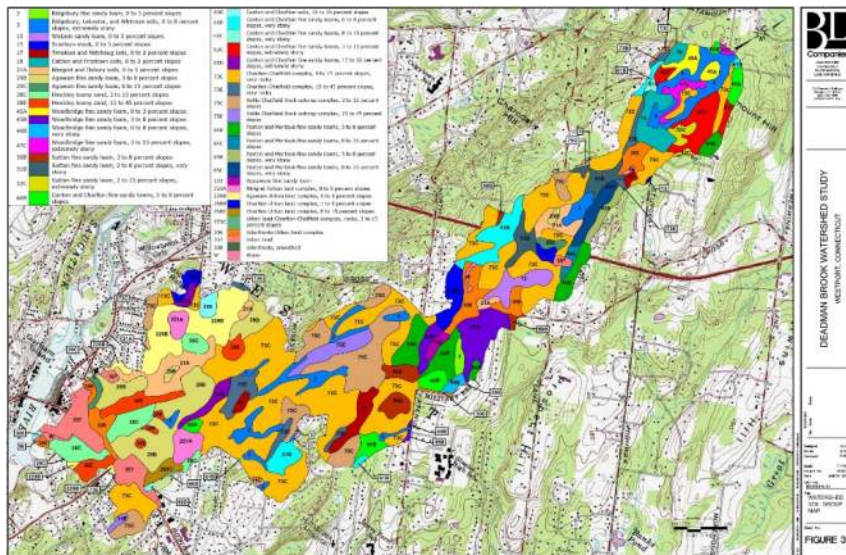
Project Funding

- Housing and Urban Development's Community Development Block Grant (Disaster Recovery Assistance)
 - Applied for After Superstorm Sandy in 2012
 - Funding received in March 2016




Deadman Brook Watershed Study

- Determine the Watershed Area
- Compute Hydrologic Flows
- Create a Hydraulic Model
- Apply the Developed Flows
- Determine Existing Areas of Concern
- Evaluate Potential Improvements




March 2018



Prepared for:
Town of Westport


DEADMAN BROOK WATERSHED STUDY
Town of Westport, CT

BL Project No. 16C6016
Town Project No. 17-852T

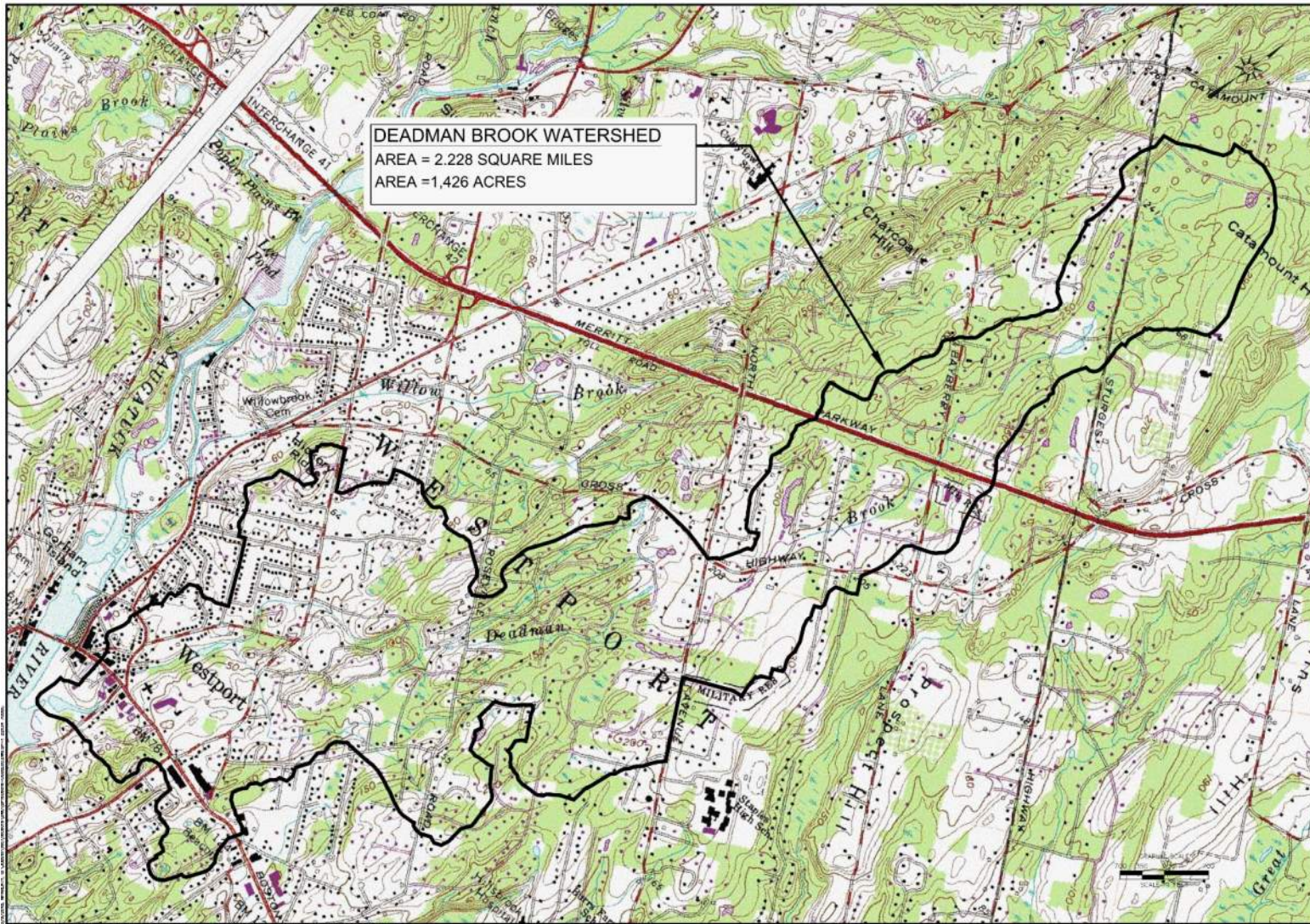


Prepared By: *Nicholas Parenty* Date: 03/09/2018
Checked By: *David Cicia* Date: 03/13/2018

PREPARED BY:
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10th Floor
Hartford, CT 06103



Deadman Brook Watershed Boundary



BL Companies
 ARCHITECTURE
 ENGINEERING
 ENVIRONMENTAL
 LAND SURVEYING

200 Newbury Parkway
 Meriden, CT 06450
 203.236.0100
 03/23/2018 File

DEADMAN BROOK WATERSHED STUDY
 WESTPORT, CONNECTICUT

Revised: _____ Date: _____
 No. _____ Date: _____

Designed by: S.G.P.
 Drawn by: S.G.P.
 Checked by: S.M.C.

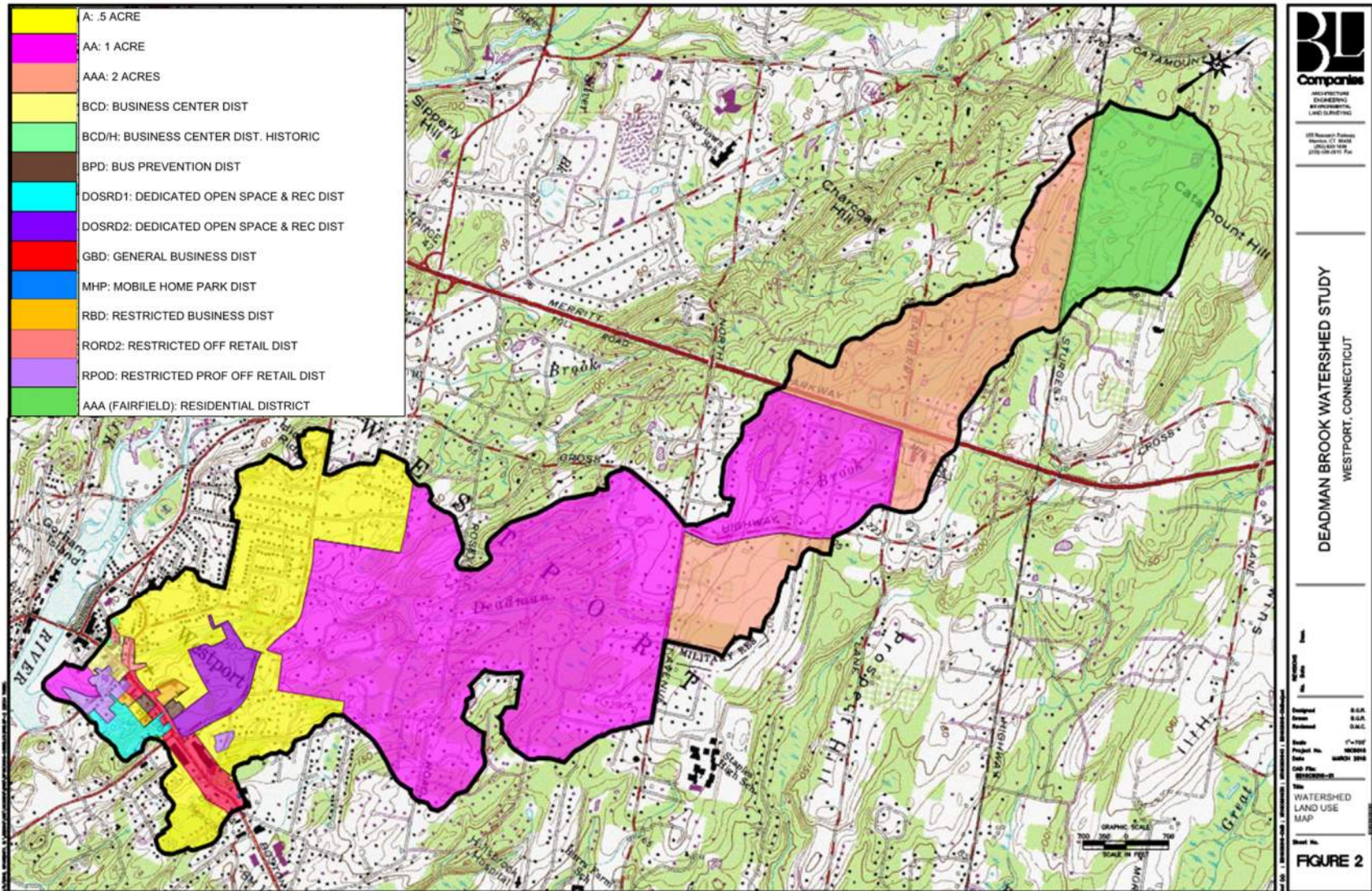
Scale: 1"=100'
 Project No.: 1000018
 Date: MARCH 2018
 CAD File: 80100018-01

Title: WATERSHED BOUNDARY MAP

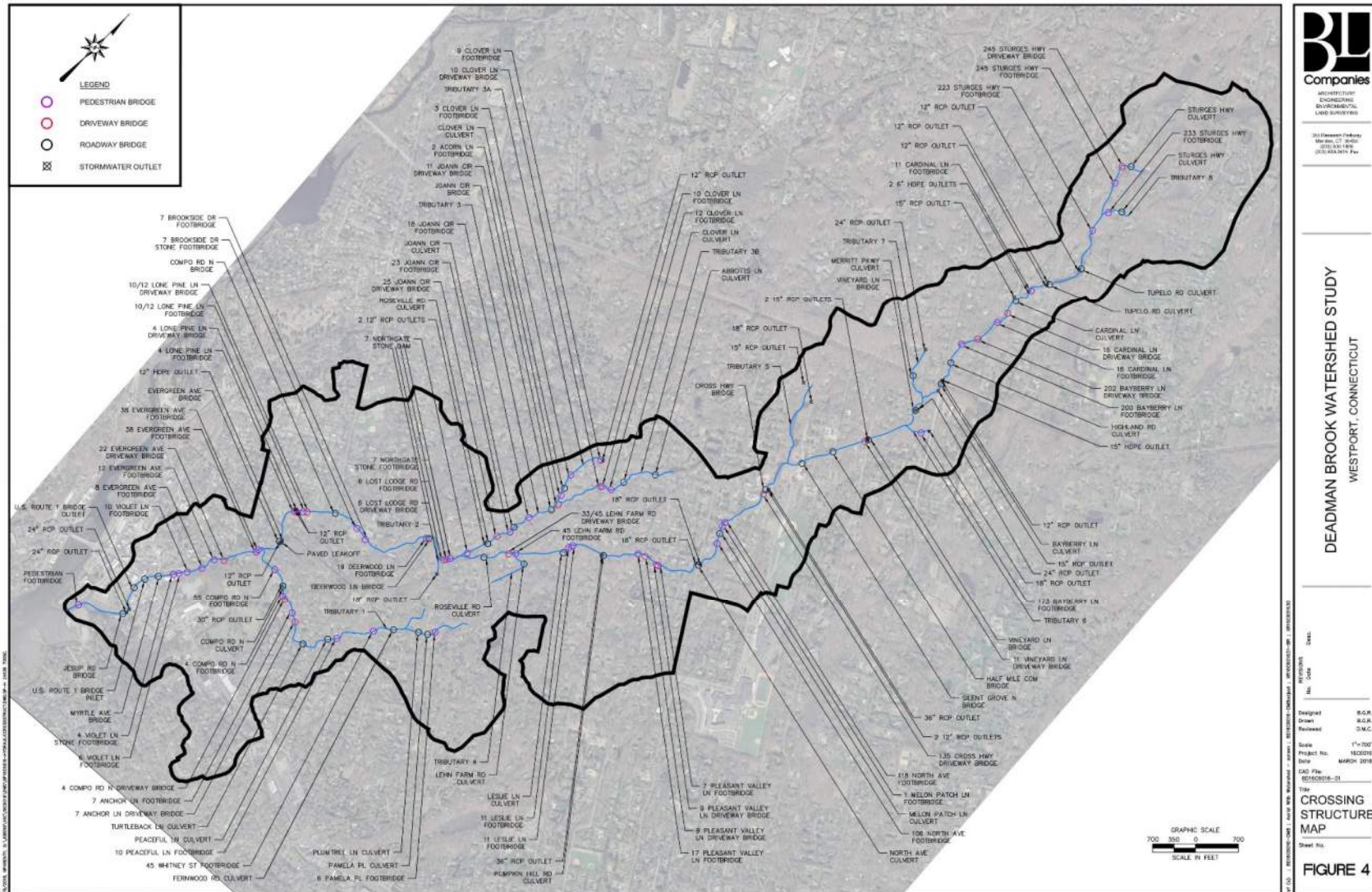
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FIGURE 1

Deadman Brook Watershed Land Use Map



Deadman Brook Crossing Structure Map



BL Companies
 ARCHITECTURE
 ENGINEERING
 ENVIRONMENTAL
 LAND SURVEYING

300 Connecticut Parkway
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**DEADMAN BROOK WATERSHED STUDY
 WESTPORT, CONNECTICUT**

DESIGNED: S.G.R.
 DRAWN: S.G.R.
 REVIEWED: S.W.C.

Scale: 1"=700'
 Project No.: 180208
 Date: MARCH 2018
 CAD File: 180208-01

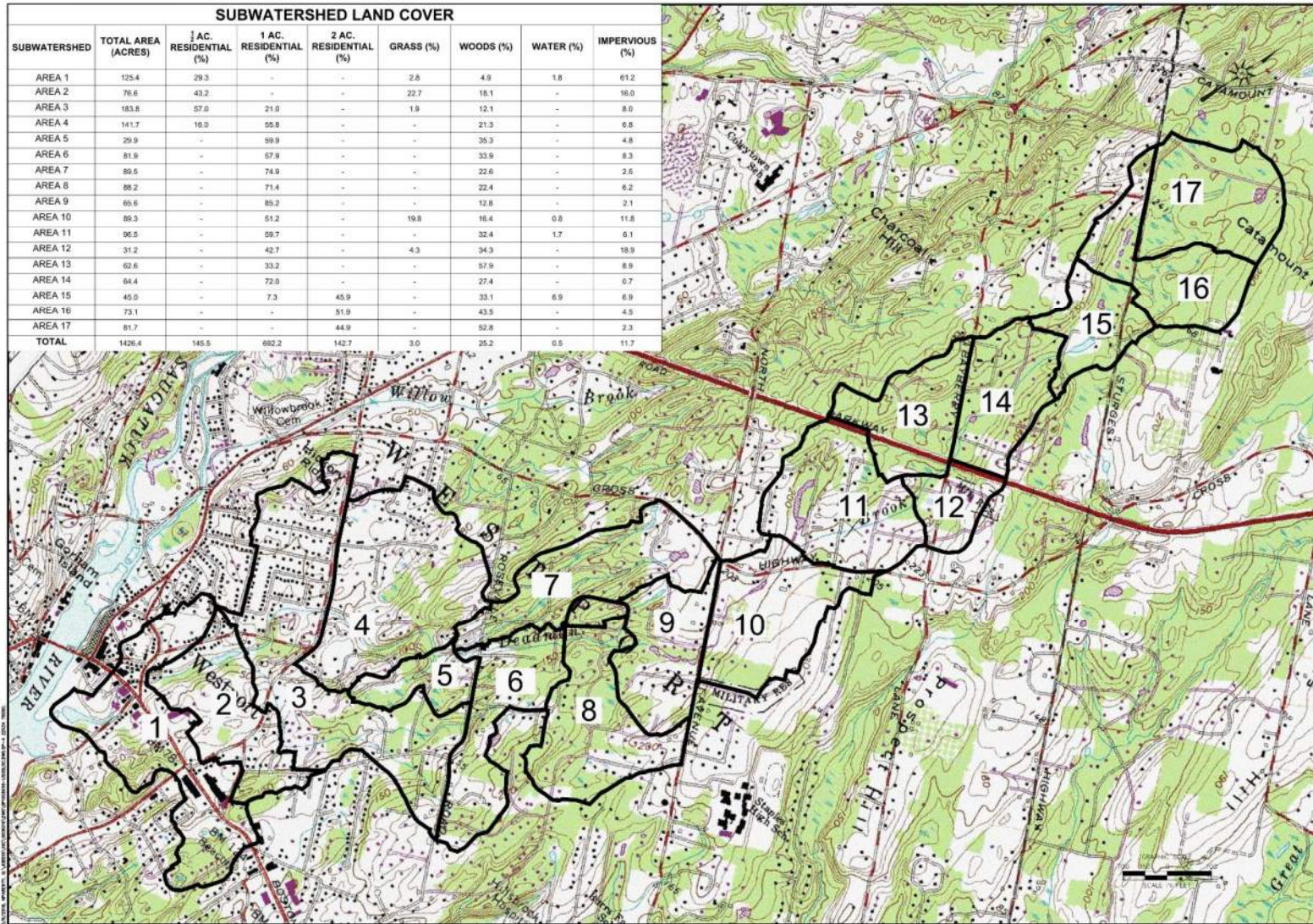
**CROSSING
 STRUCTURE
 MAP**


Sheet No. 0000000000

FIGURE 4

Deadman Brook Subwatershed Boundary Map

SUBWATERSHED LAND COVER								
SUBWATERSHED	TOTAL AREA (ACRES)	1 AC. RESIDENTIAL (%)	2 AC. RESIDENTIAL (%)	3 AC. RESIDENTIAL (%)	GRASS (%)	WOODS (%)	WATER (%)	IMPERVIOUS (%)
AREA 1	125.4	29.3	-	-	2.8	4.9	1.8	61.2
AREA 2	76.6	43.2	-	-	22.7	15.1	-	16.0
AREA 3	183.8	57.0	21.0	-	1.9	12.1	-	8.0
AREA 4	141.7	16.9	95.8	-	-	21.3	-	6.5
AREA 5	29.9	-	99.9	-	-	35.3	-	4.8
AREA 6	81.9	-	57.9	-	-	33.9	-	8.3
AREA 7	89.5	-	74.9	-	-	22.6	-	2.5
AREA 8	85.2	-	71.4	-	-	22.4	-	6.2
AREA 9	85.6	-	85.2	-	-	12.8	-	2.1
AREA 10	80.3	-	51.2	-	19.8	16.4	0.8	11.8
AREA 11	95.5	-	59.7	-	-	32.4	1.7	6.1
AREA 12	31.2	-	42.7	-	4.3	34.3	-	18.9
AREA 13	62.6	-	33.2	-	-	57.9	-	8.9
AREA 14	84.4	-	72.0	-	-	27.4	-	0.7
AREA 15	45.0	-	7.3	45.9	-	33.1	6.9	6.9
AREA 16	73.1	-	-	51.9	-	43.5	-	4.5
AREA 17	81.7	-	-	44.9	-	52.8	-	2.3
TOTAL	1426.4	145.5	692.2	142.7	3.0	25.2	0.5	11.7





BL Companies
ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING

101 Pleasant Parkway
Meriden, CT 06460
203.634.1000
DCE 0001015 Fax

DEADMAN BROOK WATERSHED STUDY
WESTPORT, CONNECTICUT

DESIGNED BY: E.C.R.
DRAWN BY: E.C.R.
REVIEWED BY: D.M.C.

Scale: 1"=100'
Project No.: 1020016
Date: MARCH 2018
CAD File: 1020016-01

THE SUBWATERSHED
BOUNDARY
MAP

Sheet No.:

FIGURE 5

Deadman Brook – Flooding During Lower Storm Events

- During 2-Year Storm

- Sturges Highway
- Tupelo Road Culverts (2)
- Highland Road Culvert
- Bayberry Lane Culverts
- Roseville Road Culverts
- Myrtle Avenue Bridge
- Jesup Road Bridge



- Between 2-Year and 10-Year Storm Events

- Cardinal Lane Culverts
- Deerwood Lane Bridge
- Vineyard Lane Culverts
- Half Mile Common Culverts
- Silent Grove North Culverts
- Cross Highway Box Culvert
- Melon Patch Lane Culverts
- Pumpkin Hill Road Culverts
- Leslie Lane Culverts



Tributaries – Flooding During Lower Storm Events

- During 2-Year Storm

- Lehn Farm Road Culvert
- Abbotts Lane Culvert
- Joann Circle Culvert (Lower)
- Sturges Highway Culvert



- Between 2-Year and 10-Year Storm Events

- Compo Road North Culvert
- Roseville Road Culvert
- Clover Lane Culvert
- Joann Circle Arch Culvert (Upper)

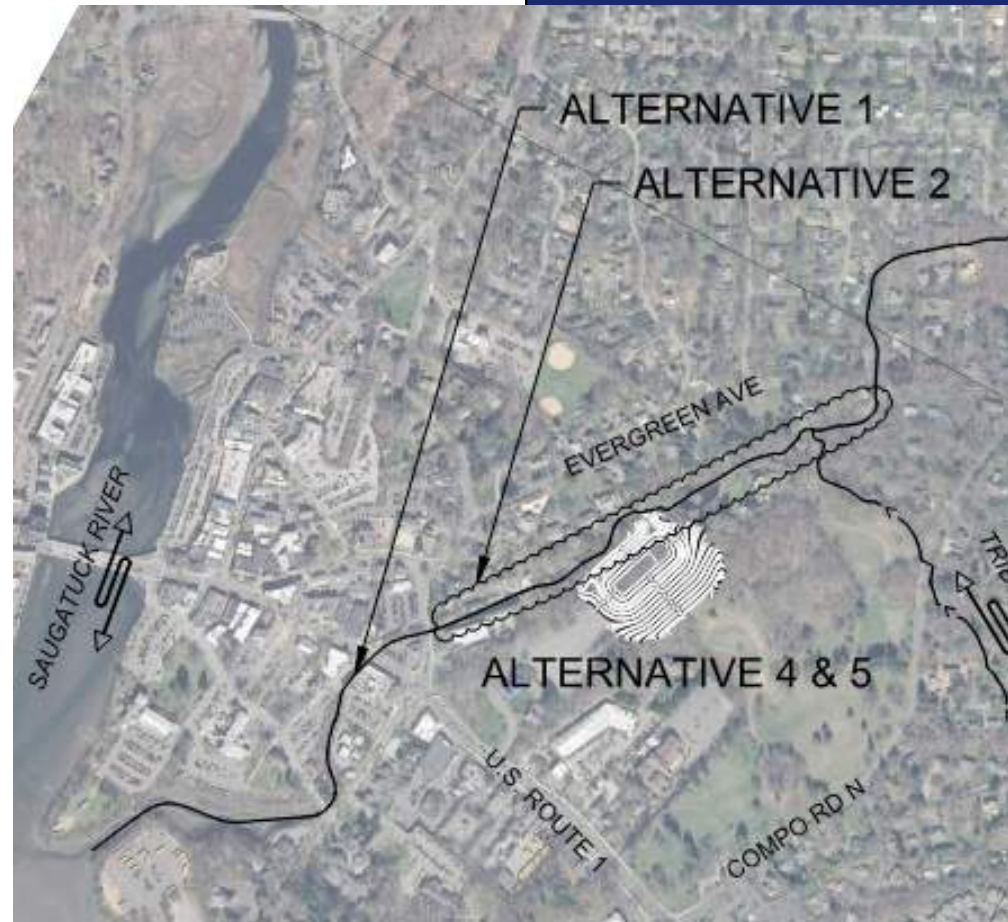


Potential Improvement Projects

- **Alternative 1: Channel Widening from Myrtle Avenue to U.S. Route 1**
- Alternative 2: Channel Widening from Evergreen Avenue to Myrtle Avenue
- Alternative 3: Channel Widening from Silent Grove North to Bayberry Lane
- Alternative 4: Underground Flood Storage Basin, Winslow Dog Park
- Alternative 5: Flood Storage Basin, Winslow Dog Park
- **Alternative 6: Storage Areas within Tributary 1**
- **Alternative 7: Storage Area downstream of Roseville Road**
- Alternative 8: Storage Area near Leslie Drive
- Alternative 9: Storage Area adjacent to Silent Grove North
- **Alternative 10: Storage Area between Highland Road and Merritt Parkway**
- **Alternative 11: Storage Area at Tupelo Road**
- Alternative 12: Storage Area near Sturges Highway

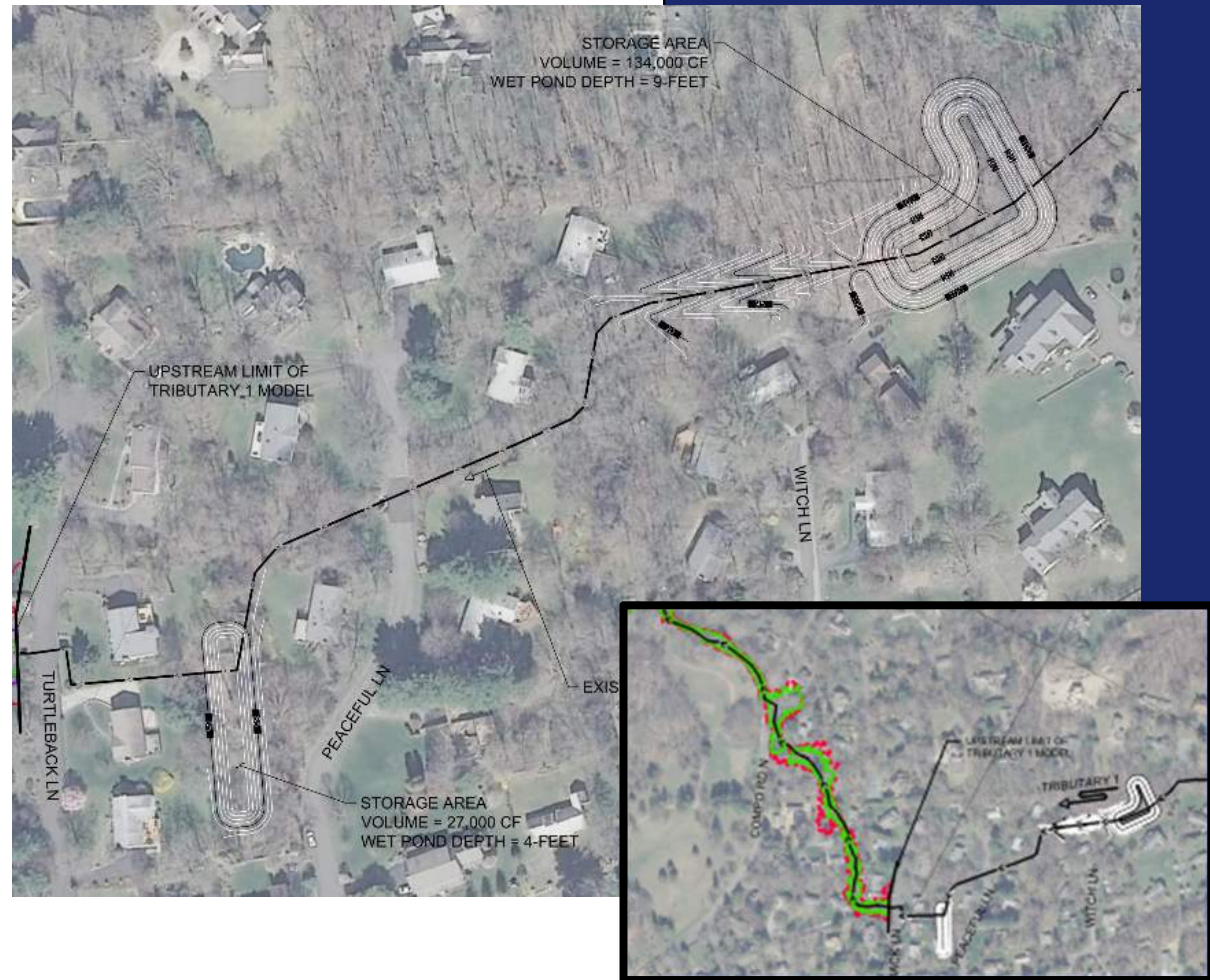
Alternative 1: Channel Widening from Myrtle Avenue to U.S. Route 1

- Existing channel begins to overtop during the two-year storm event
- Proposed channel widened to 25-feet to contain the 2-year storm event within its banks
- 10-year and 100-year water surface elevations are slightly reduced or remain the same



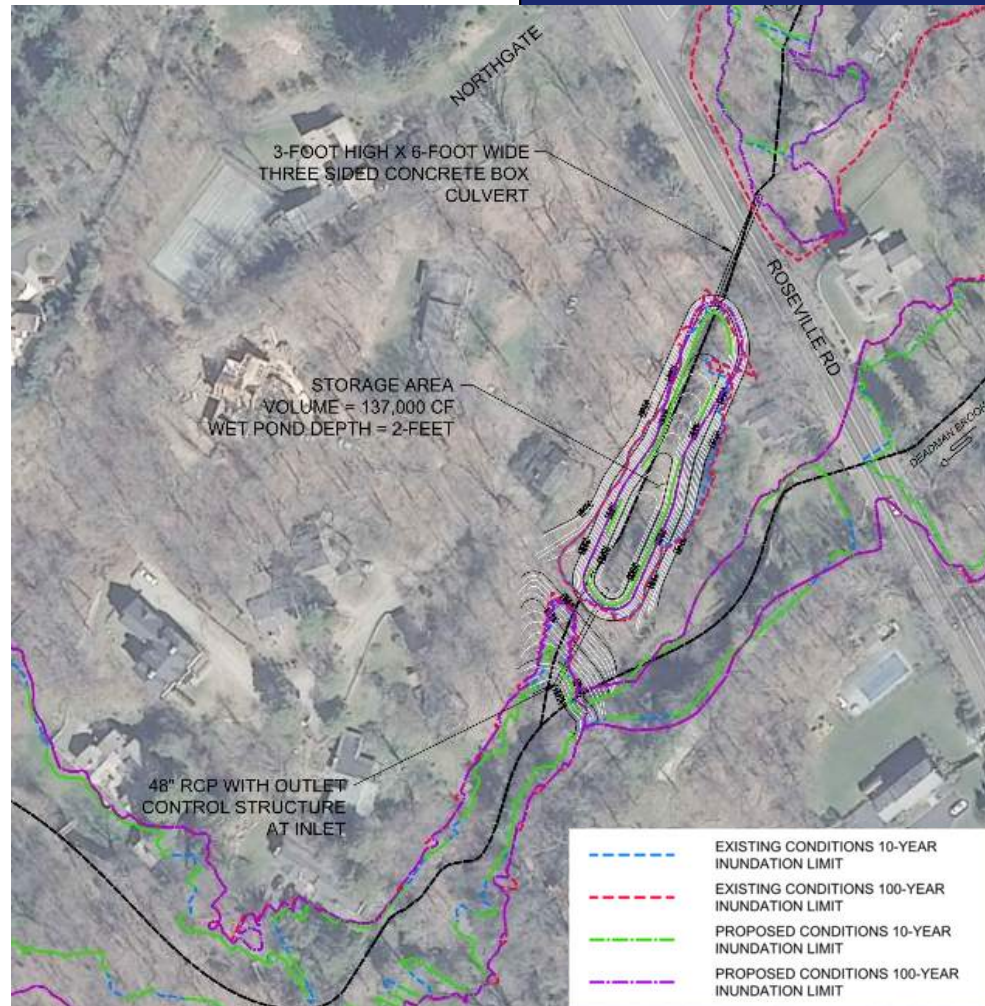
Alternative 6: Storage Areas within Tributary 1

- Located within wooded areas
- Total storage capacity of approximately 160,000 cubic feet
- Reduces flow rates for all studied storm events (over 50% decrease for 2-year through 100-year events)
- Along modeled Tributary 1, five residences removed from 100-year floodplain



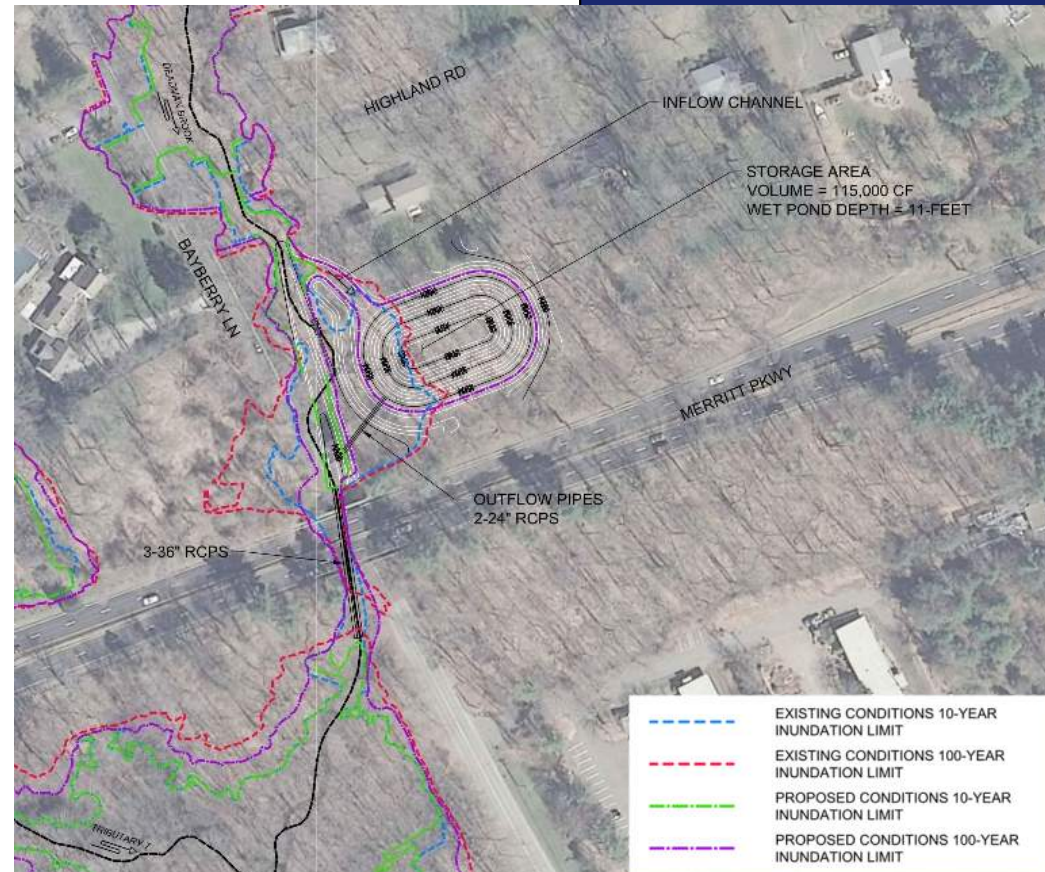
Alternative 7: Storage Area downstream of Roseville Road

- Existing area is currently undeveloped, consisting mainly of a large swampy area
- Proposed flood storage basin has a designed storage capacity of approximately 137,000 cubic feet
- Replaces existing Tributary 3 crossing below Roseville Road
- Reduces tributary flow rates for all studied storm events (approximate 20% decrease)
- Prevents overtopping of Roseville Road for all events



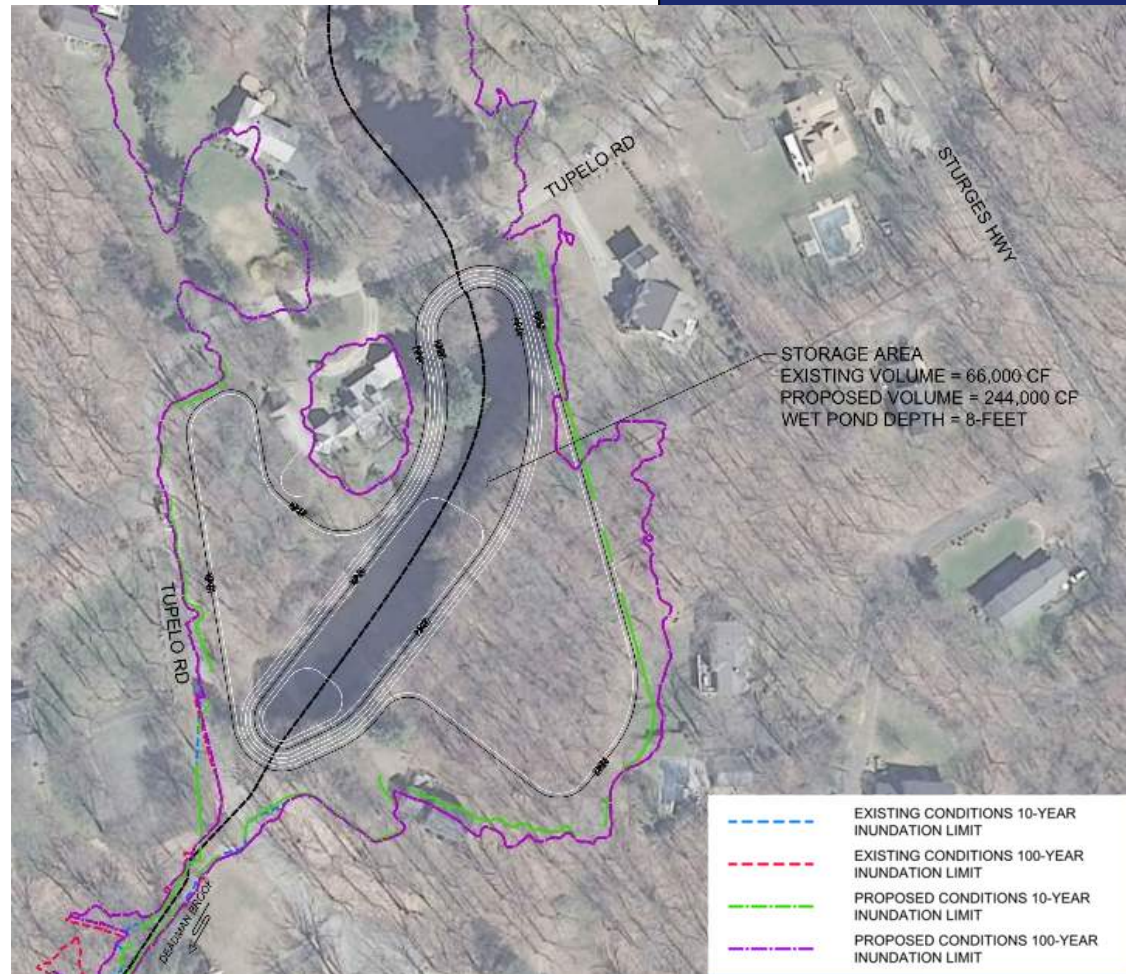
Alternative 10: Storage Area between Highland Road and Merritt Parkway

- Existing area currently undeveloped, mainly consisting of forest
- Proposed flood storage basin has a designed storage capacity of approximately 115,000 cubic feet
- Replaces existing Bayberry Lane crossing with three 36" RCP's
- Overtopping between 10-year and 50-year events (existing overtops at 2-year storm)
- Downstream, one residence removed from 100-year floodplain



Alternative 11: Storage Area at Tupelo Road

- Existing pond has storage capacity of approximately 66,000 cubic feet
- Proposed pond has a designed storage capacity of approximately 244,000 cubic feet
- Reduction in 10-year and 100-year water surface elevations upstream and downstream
- Three residences removed from 10-year inundation



Recommended Alternatives for Design

- Recommended Alternatives chosen for
 - Decrease flows within Deadman Brook
 - Reduce flooding limits on residential properties
 - Reduce water surface elevations on residential properties
- Recommended Alternatives discussed with CT DEEP
- 2-year storm impact reduction
- 9 residences removed from 100-year inundation limit



Questions & Answers

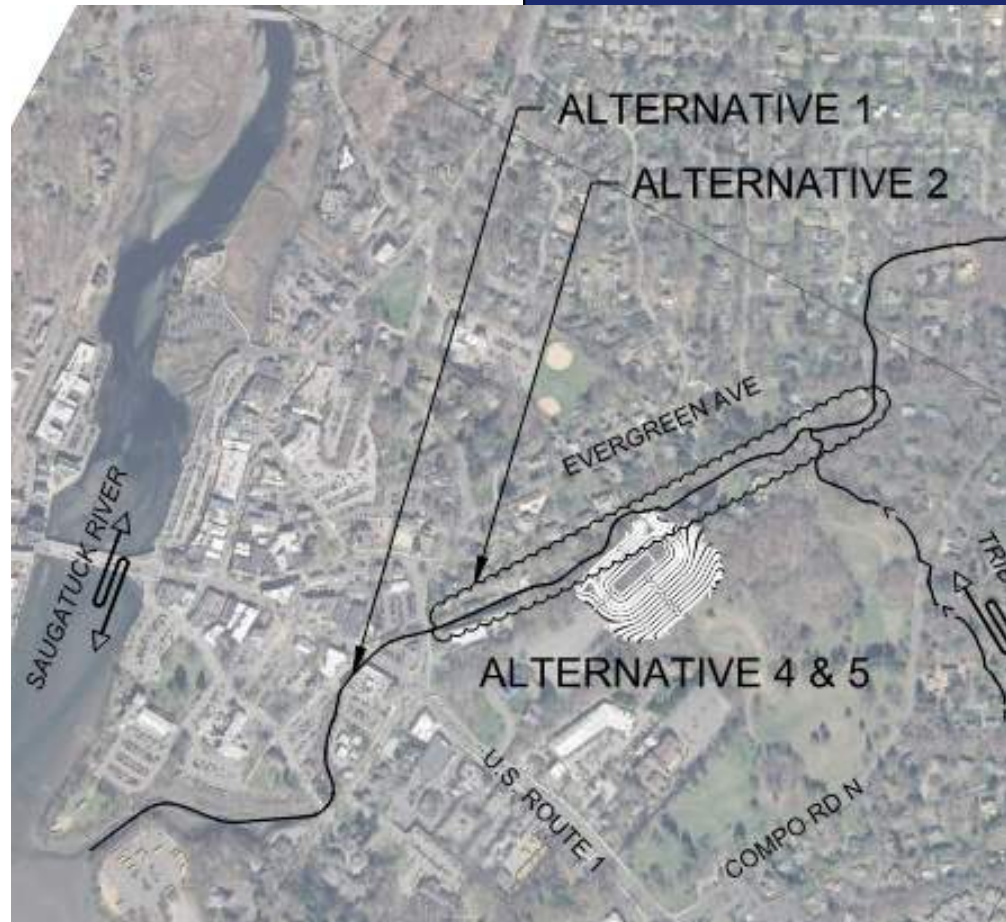
Employee owned. Client driven.

Connecticut | Maryland | Massachusetts | New Jersey | New York | Ohio | Pennsylvania | Texas



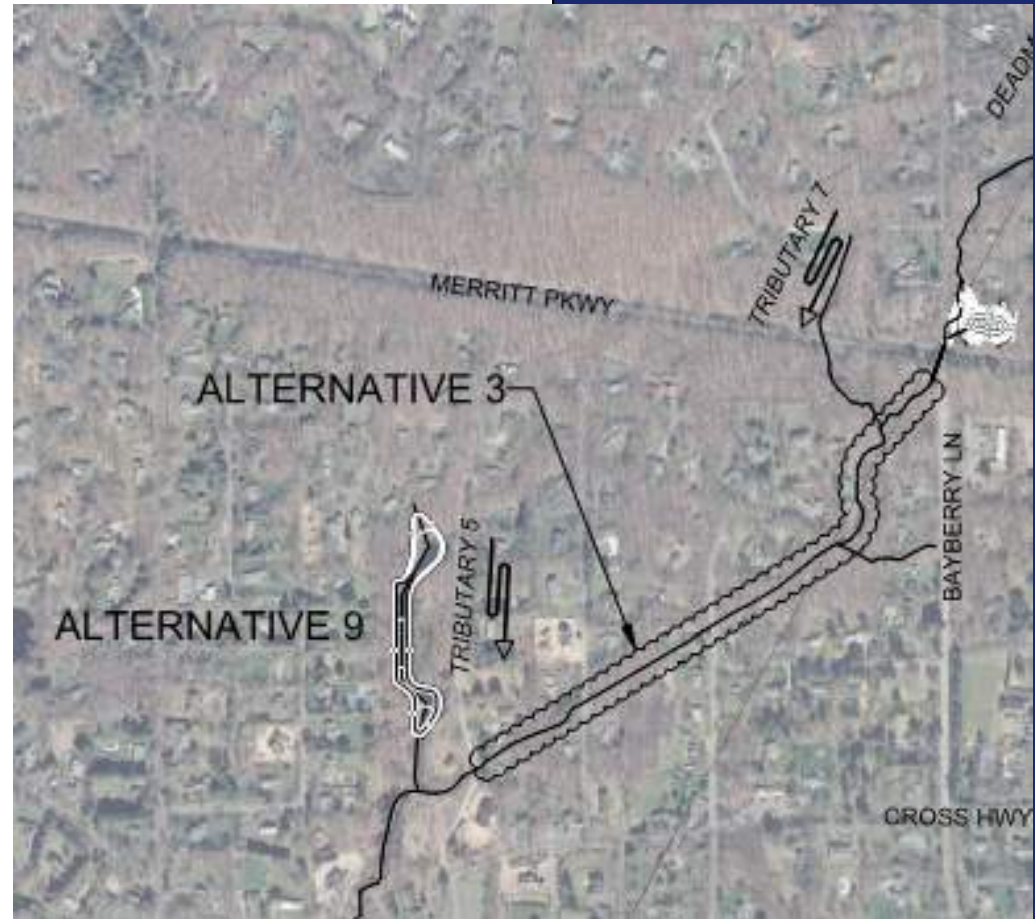
Alternative 2: Channel Widening from Evergreen Avenue to Myrtle Avenue

- Existing channel begins to overtop during the 2-year storm event
- Proposed channel widened to a uniform width of 10-feet
- 2-year contained within the widened channel (until Myrtle Avenue approach)
- 10-year and 100-year water surface elevations are reduced slightly or remain the same



Alternative 3: Channel Widening from Silent Grove North to Bayberry Lane

- Existing channel begins to overtop during the 2-year storm event
- Proposed channel widened by approximately 4-feet to a 10-foot width
- Proposed channel contains 10-year storm event, but overtops during 50-year storm event
- 17 residential homes remain within the 100-year inundation



Alternative 4: Underground Flood Storage Basin, Winslow Dog Park

- Existing area within Winslow Dog Park
- Proposed system consists of nine, 310-foot long 48" RCPs
- Storage capacity of 35,000 cubic feet
- Very small reduction in peak flows for all studied storm events
- 2-year event continues to overtop Myrtle Avenue



Alternative 5: Flood Storage Basin, Winslow Dog Park

- Existing area is currently undeveloped, mainly consisting of forest
- The proposed basin has a storage capacity of approximately 365,000 cubic feet
- Reduces peak flows (~8%) for all studied storm events
- 2-year event continues to overtop Myrtle Avenue
- Five residences continue to be within 100-year floodplain



Alternative 8: Storage Area near Leslie Lane

- Existing area is currently undeveloped, mainly consisting of forest
- Proposed flood storage basin has a designed storage capacity of approximately 56,000 cubic feet
- Decreases flows (~5%), minimal reduction in 10-year and 100-year water surface elevations



Alternative 9: Storage Area adjacent to Silent Grove North

- Existing pond has storage capacity of approximately 49,500 cubic feet
- Proposed pond has a designed storage capacity of approximately 400,000 cubic feet
- Fully contains 2-year and 10-year storm events
- Reduces peak flow rates for all storm events studied
- Minimal effect downstream



Alternative 12: Storage Area near Sturges Highway

- Existing area is currently undeveloped, mainly consisting of forest
- Proposed storage basin has a design capacity of approximately 113,000 cubic feet
- 5% reduction in downstream flows
- Downstream (Tupelo Road) area not improved



Myrtle Avenue over Deadman Brook – Roadway Plan



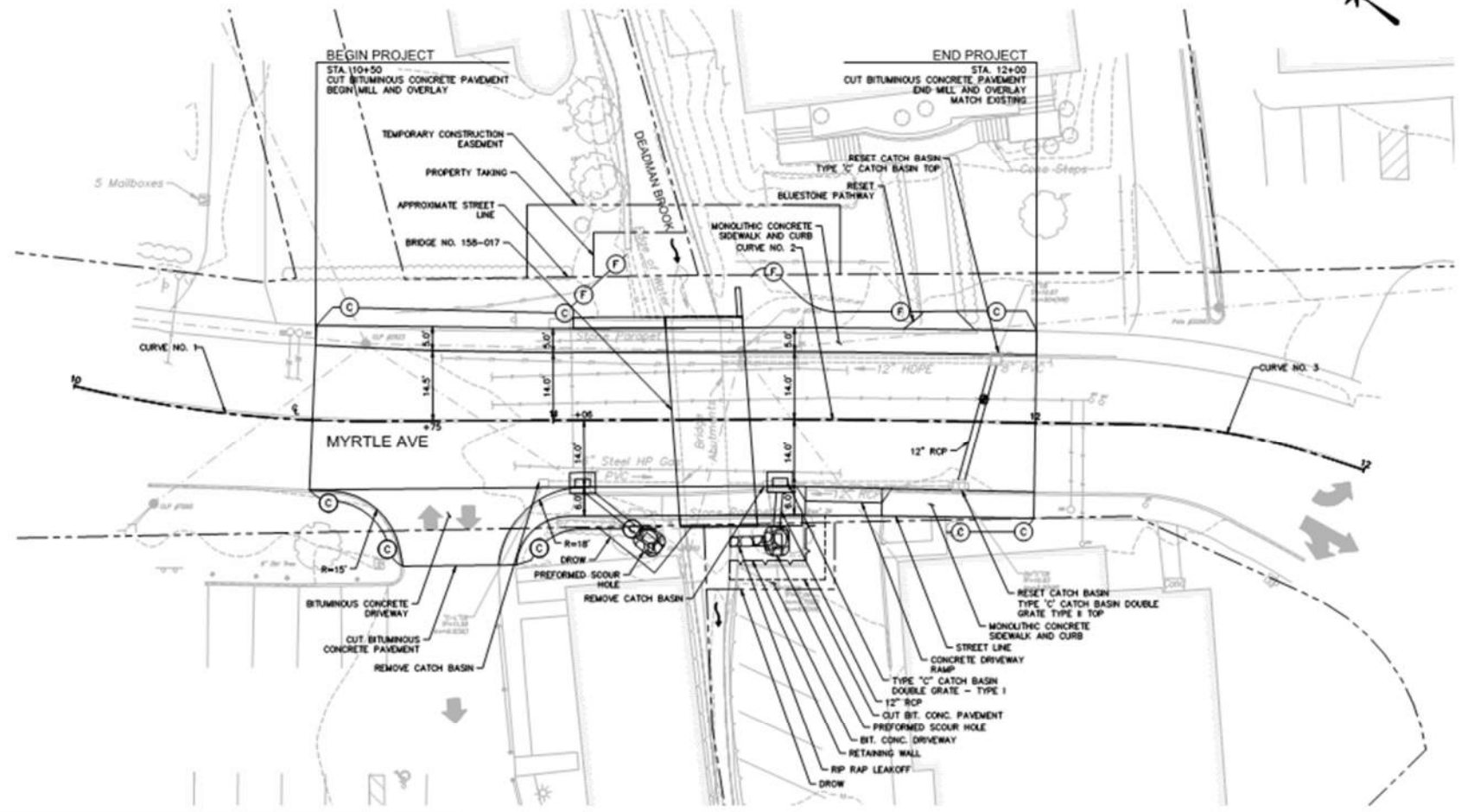
132 River St., Suite 200
Westport, CT 06894
Tel: 203.261.1234
Fax: 203.261.1235

REPLACEMENT OF BRIDGE NO. 158-017
MYRTLE AVENUE OVER DEADMAN BROOK
WESTPORT, CONNECTICUT

Project: CLM
Drawn: CLM
Checked: M.J.
Approved:
Scale: 1"=10'
Project No.: 100018
Date: 10/10/14
CADD File: 10010204-01

Title: ROADWAY CONSTRUCTION PLAN

Sheet No.: HWY-1



CURVE DATA

CURVE NO.	STATION	NORTHING	EASTING	Δ	RADIUS	TANGENT	LENGTH
CURVE NO. 1	PC	10+02.03	813162.17	832358.92	53° 10' 03.59"E	250.0'	30.04'
	PI	10+61.82	813134.59	832371.81			
	PT	11+310.60	813110.60	832389.90			
CURVE NO. 2	PC	11+43.39	813045.47	832439.01	53° 25' 04.99"E	1000.0'	10.50'
	PI	11+64.36	813027.09	832445.33			
	PT	11+64.36	813028.58	832451.47			
CURVE NO. 3	PC	12+20.24	812983.29	832484.16	52° 09' 06.56"E	130.0'	19.81'
	PI	12+59.56	812967.23	832495.75			
	PT	12+59.56	812948.44	832502.03			

LEGEND

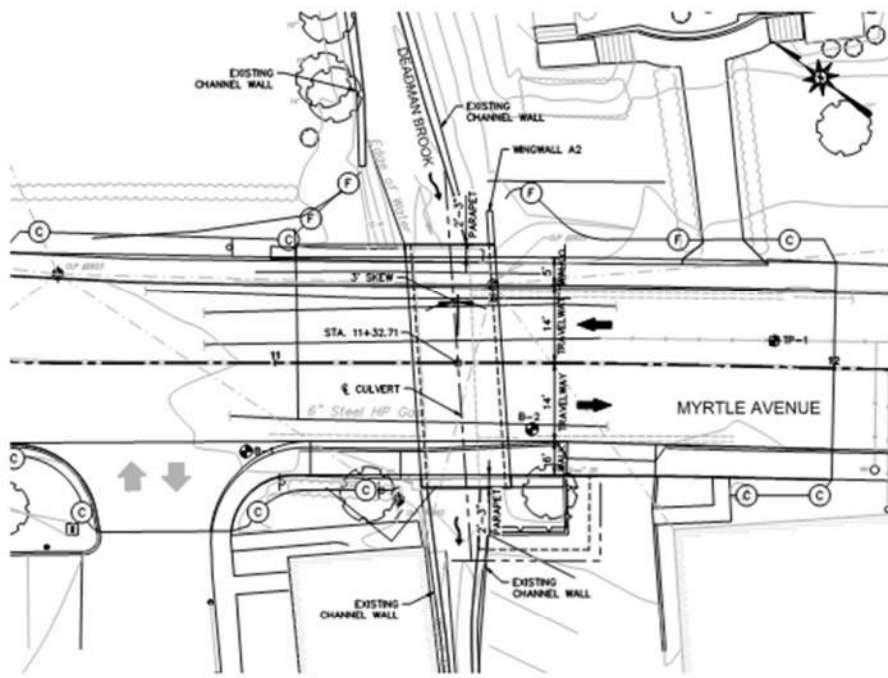
○—○ FILL/OUT APPROXIMATE SLOPE LIMITS

⊕ TEST PIT



BL AND ITS COMPANIES, INC. MAY BE LIABLE FOR ANY DAMAGES, INCLUDING REASONABLE ATTORNEY'S FEES, ARISING FROM THE NEGLIGENCE OF ANY OF ITS ENGINEERS OR ARCHITECTS.

Myrtle Avenue over Deadman Brook – Bridge Plan



PLAN
SCALE: 1" = 10'-0"

UTILITY NOTES

1. THE CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES LOCATED WITHIN THE VICINITY OF THE SITE DURING CONSTRUCTION. THE METHOD OF SUPPORTING AND PROTECTING UTILITIES SELECTED BY THE CONTRACTOR MUST BE APPROVED BY THE UTILITY COMPANY. UTILITY RELOCATIONS SHALL BE MADE BY THE CONTRACTOR EXCEPT WHERE NOTED OTHERWISE.

GENERAL NOTES

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

DESIGN SPECIFICATIONS: AASHTO LRFD SPECIFICATIONS FOR HIGHWAY BRIDGES, 7TH EDITION (2014) AS SUPPLEMENTED BY THE CONNECTICUT DEPARTMENT OF TRANSPORTATION BRIDGE MANUAL (2003) EDITION WITH REVISIONS UP TO AND INCLUDING 2013.

ALLOWABLE DESIGN STRESSES

CLASS 'A' CONCRETE: $f_c = 3,000$ psi
 CLASS 'F' CONCRETE: $f_c = 4,000$ psi
 CLASS '50' CONCRETE: $f_c = 5,000$ psi
 REINFORCEMENT (ASTM 615 GRADE 60): $f_y = 60,000$ psi

USE LOAD:

STANDARD DESIGN VEHICLE: AASHTO HS-20
 PERMIT (OVERLOAD) VEHICLES: CONDOOT P204 (8-AXLE)

SALVAGE: NONE

DIMENSIONS AND ELEVATIONS: WHEN DECIMAL DIMENSIONS AND ELEVATIONS ARE GIVEN TO LESS THAN THREE DECIMAL PLACES, THE OMITTED DIGITS SHALL BE ASSUMED TO BE ZERO. ALL ELEVATIONS ARE GIVEN IN DECIMAL FEET AND ARE BASED ON NAVD 83.

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

UTILITIES: THE CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES LOCATED WITHIN THE VICINITY OF THE SITE DURING CONSTRUCTION. THE METHOD OF SUPPORTING AND PROTECTING UTILITIES SELECTED BY THE CONTRACTOR MUST BE APPROVED BY THE UTILITY COMPANY. UTILITY MODIFICATIONS SHALL BE MADE BY THE RESPECTIVE UTILITY COMPANIES EXCEPT WHERE NOTED OTHERWISE.

LEGEND

- ⊕B-X APPROXIMATE BORING LOCATION
- ⊕TP-X APPROXIMATE TEST PIT LOCATION

**HYDRAULIC DATA
DEADMAN BROOK**

DRAINAGE AREA	2.0 sq mi
DESIGN STORM FREQUENCY	100-yr
DESIGN DISCHARGE	1,430 cfs
UPSTREAM DESIGN WSEL	13.90 ft
DOWNSTREAM DESIGN WSEL	13.89 ft

CONCRETE NOTES

CLASS 'A' CONCRETE: CLASS 'A' CONCRETE SHALL BE USED FOR THE CUT-OFF WALLS, RETURN WALLS, WINGWALL FOOTINGS, AND ENDWALL STEMS.

CLASS 'F' CONCRETE: CLASS 'F' CONCRETE SHALL BE USED FOR THE HEADWALLS/PARAPETS, WINGWALL STEMS, AND ENDWALL STEMS.

CLASS '50' CONCRETE: CLASS '50' CONCRETE SHALL BE USED FOR THE PRECAST CONCRETE BOX CULVERT.

REINFORCEMENT: ALL REINFORCEMENT SHALL BE ASTM A615 GRADE 60.

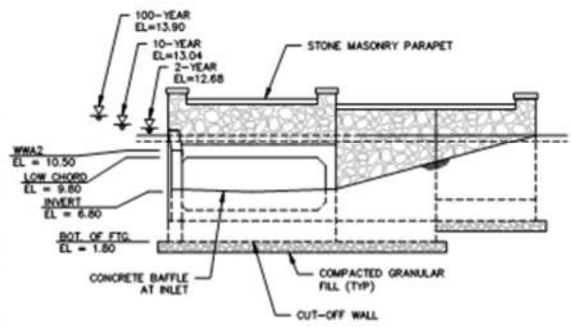
EXPOSED EDGES: EXPOSED EDGES OF CONCRETE SHALL BE BEVELED 1" X 1", UNLESS DIMENSIONED OTHERWISE.

EPOXY COATED REINFORCEMENT BARS: ALL REINFORCEMENT IN THE PRECAST CONCRETE BOX CULVERT SHALL BE EPOXY COATED AND INCLUDED IN THE PAY ITEM "14"x21" PRECAST CONCRETE BOX CULVERT". ALL REINFORCEMENT IN THE PARAPETS SHALL ALSO BE EPOXY COATED AND SHALL BE PAID FOR UNDER THE PAY ITEM "DEFORMED STEEL BARS (EPOXY COATED)".

CONCRETE COVER: ALL REINFORCEMENT FOR CAST-IN-PLACE CONCRETE SHALL HAVE TWO INCHES COVER, UNLESS DIMENSIONED OTHERWISE.

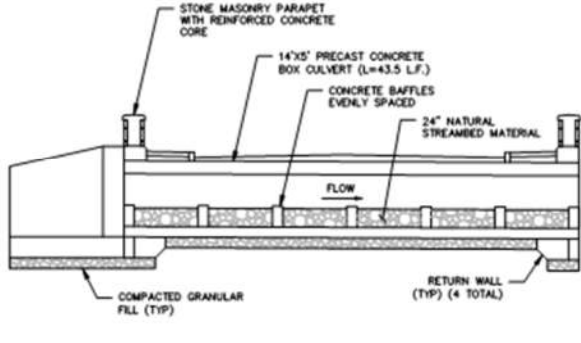
PREFORMED EXPANSION JOINT FILLER: THE COST OF FURNISHING AND INSTALLING PREFORMED EXPANSION JOINT FILLERS SHALL BE INCLUDED IN THE ITEM(S) "PRECAST CONCRETE BOX CULVERT".

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



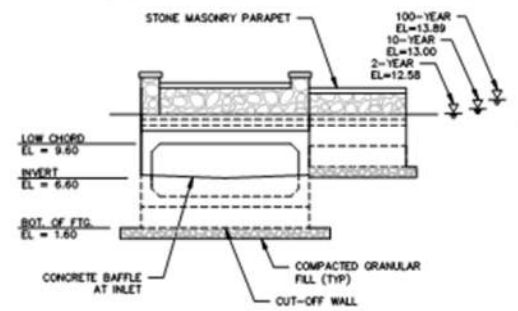
UPSTREAM ELEVATION

SCALE: 3/4" = 1'-0"
NOTE: CHANNEL WALLS NOT SHOWN FOR CLARITY



SECTION

SCALE: 3/4" = 1'-0"
NOTE: CHANNEL WALLS NOT SHOWN FOR CLARITY



DOWNSTREAM ELEVATION

SCALE: 3/4" = 1'-0"
NOTE: CHANNEL WALLS NOT SHOWN FOR CLARITY

NOT FOR CONSTRUCTION



BL
Companies
ARCHITECTURE
ENGINEERING
LAND SURVEYING

1000 Main Street
Westport, CT 06890
203-261-8000

REPLACEMENT OF BRIDGE No. 158-017
MYRTLE AVENUE OVER DEADMAN BROOK
WESTPORT, CONNECTICUT

Checked by: [Signature]
Designed by: [Signature]

K.G.L.
C.L.K.
C.E.A.
C.E.A.
AS SHOWN
10/09/19
02/09/20

GENERAL PLAN,
ELEVATION, AND
SECTION

Myrtle Avenue over Deadman Brook – Roadway Section



ADVANCED
TECHNICAL
ENVIRONMENTAL
LAND SERVICES

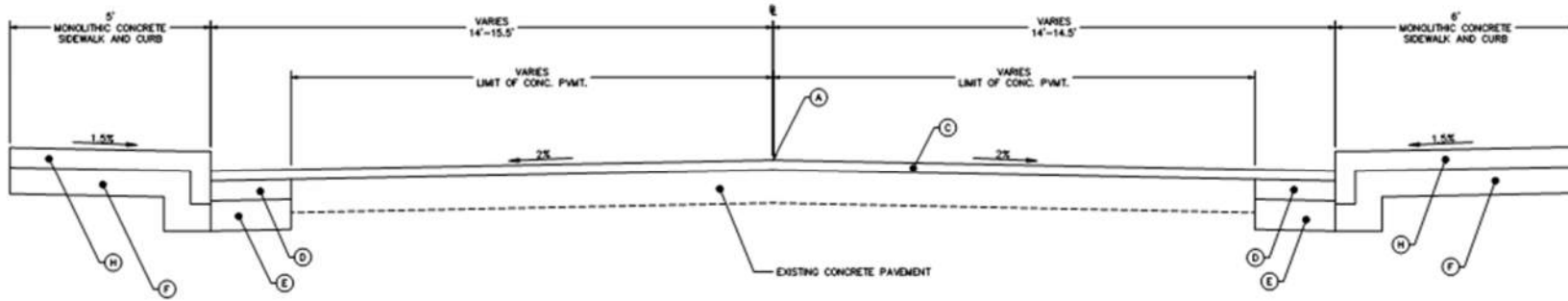
100 State of Finance
Road, CT 06105
TEL: 860.261.1200
WWW.BLCS.COM

REPLACEMENT OF BRIDGE No. 158-017
MYRTLE AVENUE OVER DEADMAN BROOK
WESTPORT, CONNECTICUT

Project No. 158-017
Drawn: C.L.M.
Checked: C.L.M.
Approved: M.F.
Scale: N.T.S.
Project No. 158-017
Date: 05/16/18
CAG File: 158-017-01

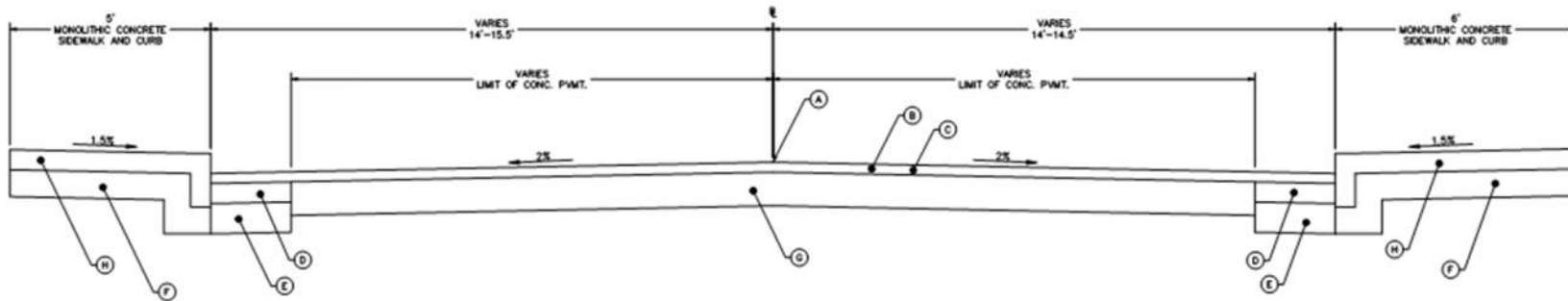
TYPICAL
ROADWAY
SECTION

Sheet No. TYP-1



MYRTLE AVENUE TYPICAL SECTION

NOT TO SCALE
STA. 10+50 TO 11+04
STA. 11+04 TO 12+00



MYRTLE AVENUE APPROACH SLAB SECTION

NOT TO SCALE
STA. 11+04 TO 11+62

LEGEND

- (A) POINT OF APPLICATION OF GRADE
- (B) 3" FINE MILLING OF HMA (0-4")
- (C) 3" HMA 50.375
- (D) 6" HMA 51.0
- (E) 5" PROCESSED AGGREGATE BASE
- (F) 8" GRANULAR FILL
- (G) 10" CONCRETE PAVEMENT
- (H) MONOLITHIC CONCRETE SIDEWALK AND CURB