

# REPLACEMENT OF BRIDGE S-18-021 (CK8)

PEARL STREET OVER ELMER BROOK · SOUTH HADLEY · MASSACHUSETTS

## CONSTRUCTION DOCUMENTS

JUNE 30, 2024

### PROJECT TEAM

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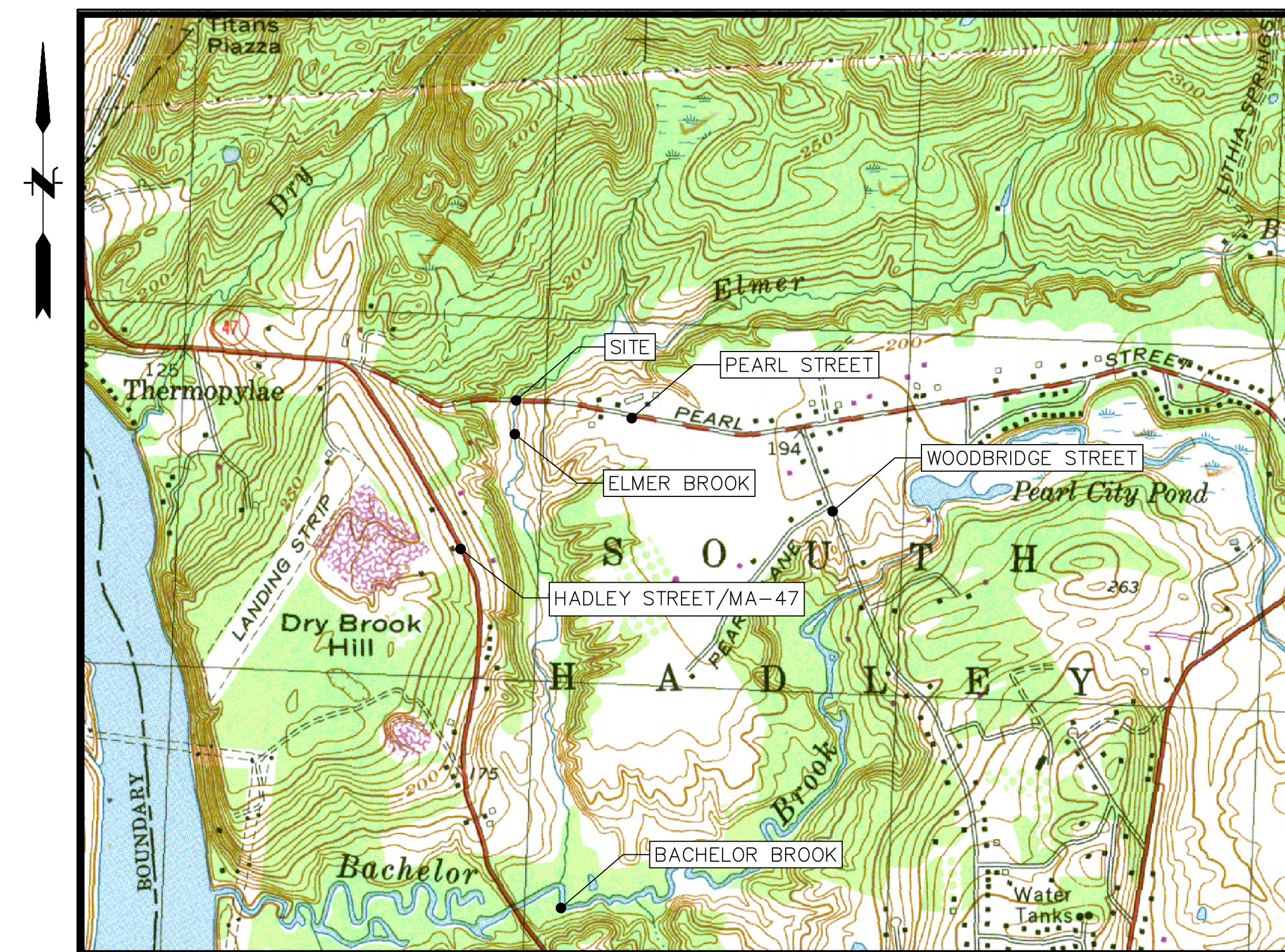


### PROJECT FUNDING BY



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LOCATION MAP

SCALE: 1" = 200'

PREPARED BY

**FUSS & O'NEILL**

1550 MAIN STREET, SUITE 400  
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PREPARED FOR

**TOWN OF SOUTH HADLEY**  
116 MAIN STREET  
SOUTH HADLEY, MA 01075

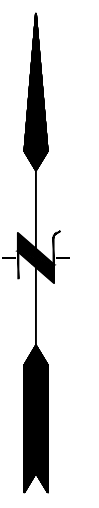
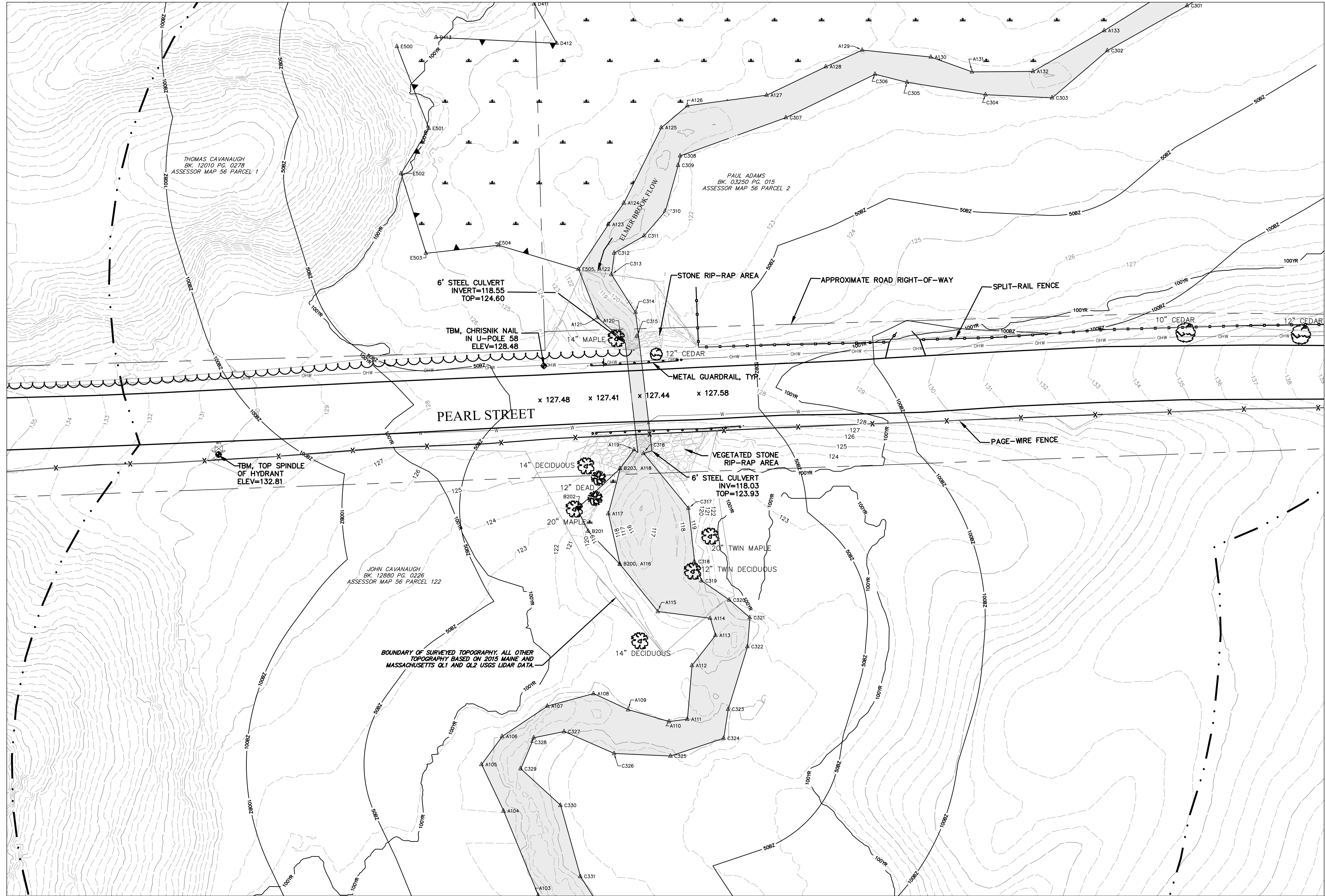


6/20/24

PROJ. No.: 20150214.B50  
DATE: 06/30/2024

GI-001





No.	DATE	DESCRIPTION	DESIGNER/REVIEWER



SCALE: HORIZ: 1"=20'  
 VERT: 1"=20'

DATUM: HORIZ: NAD83  
 VERT: NAVD88

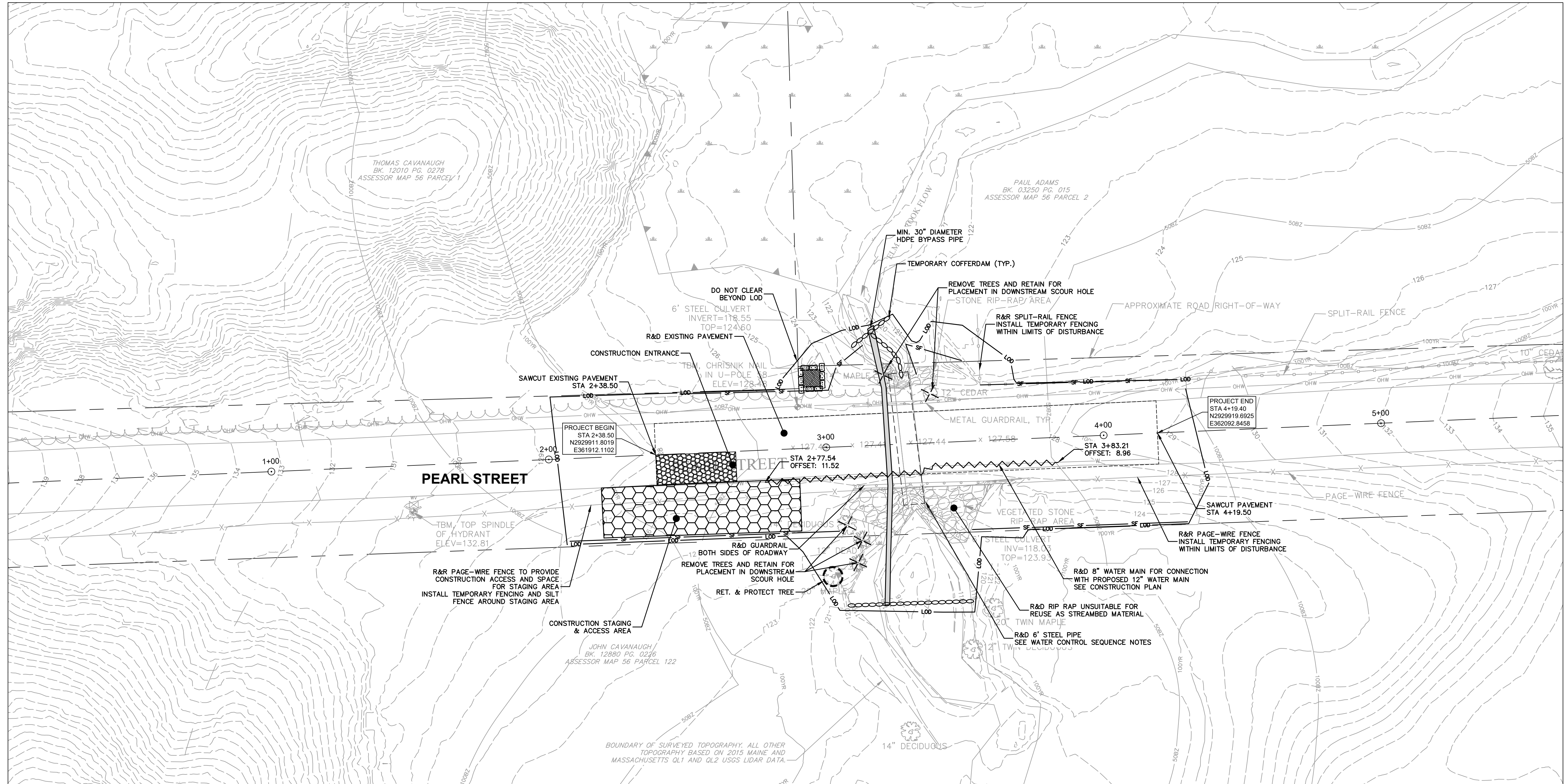
GRAPHIC SCALE

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TOWN OF SOUTH HADLEY  
 EXISTING CONDITIONS  
 PEARL STREET CULVERT  
 REPLACEMENT  
 SOUTH HADLEY, MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: 06/30/2024

EX-101



**GENERAL WATER CONTROL SYSTEM NOTES:**

- PRIOR TO ANY LAND DISTURBANCE ACTIVITIES, THE CONTRACTOR MUST PHYSICALLY MARK THE LIMITS OF DISTURBANCE IN ACCORDANCE WITH THE APPROVED PLANS.
  - THE TEMPORARY COFFERDAMS MUST BE INSTALLED DURING THE LOW FLOW PERIOD (I.E., THE PERIOD BETWEEN JULY 1 THROUGH OCTOBER 31). COFFERDAMMED AREAS, WHERE APPLICABLE, SHALL BE MAINTAINED TO ALLOW A DRY WORKING CONDITION (NO SEDIMENT PLUME) IN THE WATERCOURSE. SOIL DISTURBANCE IN COFFERDAMMED AREAS OR THE WATERCOURSE MUST TEMPORARILY CEASE IN THE EVENT OF ANY ABNORMALLY HIGH STORMWATER RUNOFF EVENT THAT OVERTOPS THE COFFERDAMS OR TEMPORARY RIVER CROSSINGS.
  - CONFIRM ELEVATIONS OF THE CHANNEL BOTTOM ALONG THE PROPOSED ALIGNMENTS OF THE TEMPORARY COFFERDAMS TO VERIFY EXISTING CONDITIONS AND ACTUAL COFFERDAM HEIGHTS PRIOR TO INSTALLATION.
  - THIS PLAN ILLUSTRATES ONE CONCEPTUAL APPROACH TO WATER CONTROL FOR THE PROJECT. THE CONTRACTOR SHALL SUBMIT A FINAL WATER CONTROL PLAN TO FUSS & O'NEILL, AND THE MASSDEP FOR REVIEW WITH ADEQUATE TIME FOR THEIR REVIEW AND ACCEPTANCE PRIOR TO THE INITIATION OF CONSTRUCTION.
  - TEMPORARY COFFERDAMS AND BYPASS PROVISIONS SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD TO ENSURE RESPECTIVE COMPONENTS FUNCTION AS INTENDED TO PROTECT ADJACENT PROPERTIES, WETLAND RESOURCES AND DOWNSTREAM WORK AREAS.
- 2-YEAR PRESENT DAY FLOW = 49.28 CFS  
 2-YEAR PRESENT DAY WSE AT INLET FOR EXISTING CONDITIONS = 121.47

**WATER CONTROL SEQUENCE NOTES**

- INSTALL TEMPORARY EROSION CONTROL MEASURES AND DEFINE/STABILIZE CONSTRUCTION STAGING AREAS.
- INSTALL TEMPORARY COFFERDAM FROM EXISTING CULVERT INLET TO LOCATION OF UPSTREAM COFFERDAM TO DIVERT FLOWS TO EASTERN SIDE OF STREAM.
- INSTALL TEMPORARY BYPASS PIPE (MIN. 30" DIAMETER) ALONG WESTERN STREAMBANK AND EXCAVATE TRENCH ADJACENT TO EXISTING 6" STEEL PIPE FOR PLACEMENT OF BYPASS PIPE THROUGH ROADWAY AREA. PROTECT AND SUPPORT EXISTING UTILITIES THROUGHOUT CONSTRUCTION OR UNTIL REPLACEMENT WHERE PROPOSED.
- INSTALL DOWNSTREAM COFFERDAM AND DIVERT FLOWS TO BYPASS PIPE TO CREATE DRY CONDITION IN WORKING AREA. MAINTAIN DRY CONDITION BY PUMPING AS NECESSARY.
- EXCAVATE AND REMOVE EXISTING 6" STEEL PIPE. EXCAVATE AS NECESSARY TO ACCOMMODATE METAL ARCH, CONCRETE FOOTINGS, AND HEADWALLS/WINGWALLS.
- INSTALL CONCRETE FOOTINGS FOR OPEN-BOTTOM METAL ARCH.
- BACKFILL AND GRADE PROPOSED STREAM BED IN ACCORDANCE WITH PROPOSED CONTOURS. REPOSITION HDPE BYPASS AND PUMPING EQUIPMENT AS NECESSARY TO ACCOMMODATE WORK IN DRY AREAS.
- INSTALL OPEN-BOTTOM METAL ARCH AND PRECAST CONCRETE HEADWALLS/WINGWALLS.
- REMOVE TEMPORARY COFFERDAMS AND OTHER WATER DIVERSION EQUIPMENT.
- BACKFILL AND GRADE ABOVE OPEN-BOTTOM METAL ARCH AND SURROUNDING AREA INCLUDING ROADWAY EMBANKMENT IN ACCORDANCE WITH PROPOSED CONTOURS.
- STABILIZE DISTURBED AREAS AND SLOPES IN ACCORDANCE WITH EROSION & SEDIMENT CONTROL PLAN AND RESTORATION & PLANTING PLAN.

DATE	6/20/24
DESCRIPTION	
DESIGNER REVIEWER	
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DESCRIPTION	
DESIGNER REVIEWER	

SCALE: HORIZ.: 1"=20'  
 VERT.: 1"=20'  
 DATUM: NAD83  
 HORIZ.: NAVD83  
 VERT.: NAVD83  
 GRAPHIC SCALE

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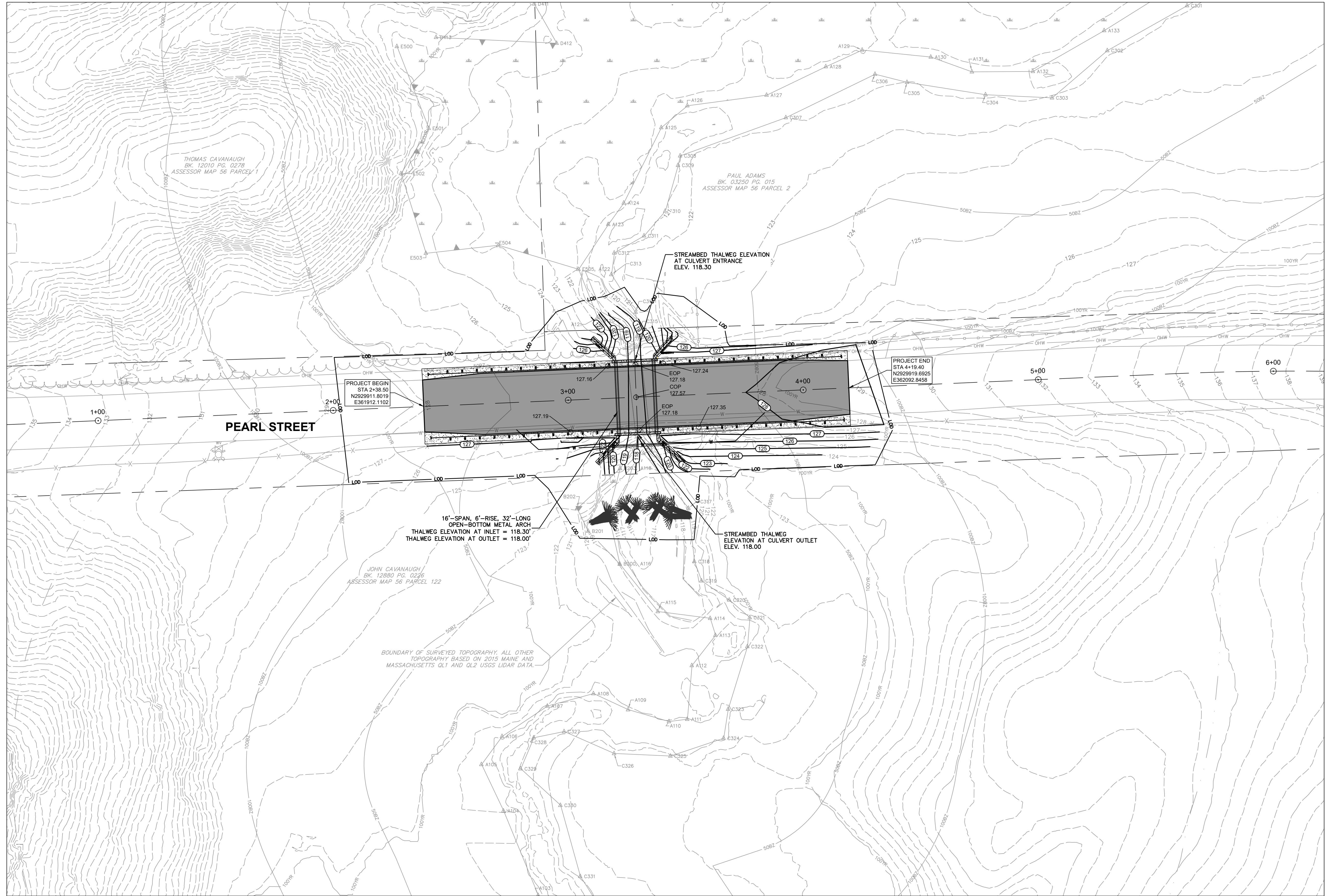
TOWN OF SOUTH HADLEY  
 DEMOLITION, SITE  
 PREPARATION & WATER  
 CONTROL PLAN  
 PEARL STREET CULVERT  
 REPLACEMENT  
 SOUTH HADLEY, MASSACHUSETTS

PROJ. No.: 20150214.B50  
 DATE: 06/30/2024

**CP-101**



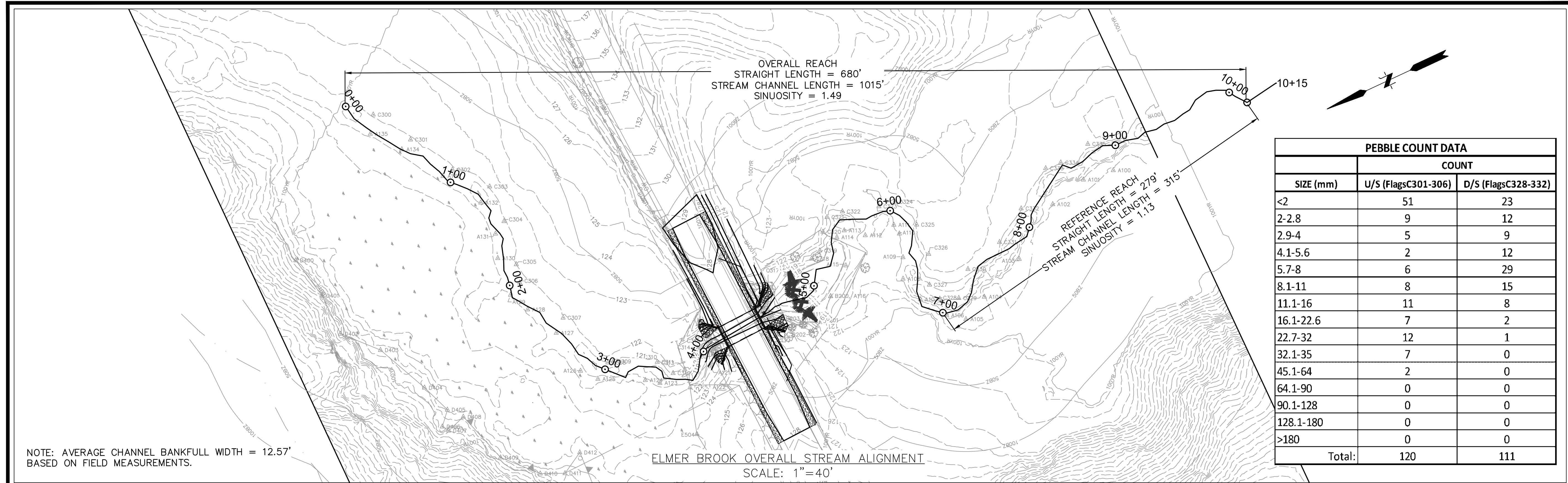




<p><b>FUSS &amp; O'NEILL</b>                  1550 MAIN STREET, SUITE 400                  SOUTH HADLEY, MA 01103                  413.452.0445                  www.fossandoneill.com</p>	<p><b>TOWN OF SOUTH HADLEY</b>                  GRADING PLAN                  PEARL STREET CULVERT                  REPLACEMENT                  SOUTH HADLEY, MASSACHUSETTS</p>
<p>SCALE: HORIZ.: 1"=20'                  VERT.: 1"=20'                  DATUM: NAD83                  HORIZ.: NAVD83                  VERT.: NAVD83</p>	<p>6/20/24</p> <p>DESIGNER REVIEWER</p>
<p>PROJECT BEGIN                  STA 2+38.50                  N2929911.8019                  E361912.1102</p>	<p>PROJECT END                  STA 4+19.40                  N2929919.6925                  E362092.8458</p>
<p>16'-SPAN, 6'-RISE, 32'-LONG                  OPEN-BOTTOM METAL ARCH                  THALWEG ELEVATION AT INLET = 118.30'                  THALWEG ELEVATION AT OUTLET = 118.00'</p>	
<p>STREAMBED THALWEG ELEVATION                  AT CULVERT ENTRANCE                  ELEV. 118.30</p>	
<p>STREAMBED THALWEG ELEVATION                  AT CULVERT OUTLET                  ELEV. 118.00</p>	
<p>BOUNDARY OF SURVEYED TOPOGRAPHY. ALL OTHER                  TOPOGRAPHY BASED ON 2015 MAINE AND                  MASSACHUSETTS Q1 AND Q2 USGS LIDAR DATA.</p>	
<p>THOMAS CAVANAUGH                  BK. 12010 PG. 0278                  ASSESSOR MAP 56 PARCEL 1</p>	
<p>PAUL ADAMS                  BK. 03250 PG. 015                  ASSESSOR MAP 56 PARCEL 2</p>	
<p>JOHN CAVANAUGH                  BK. 12880 PG. 0226                  ASSESSOR MAP 56 PARCEL 122</p>	
<p>PEARL STREET</p>	

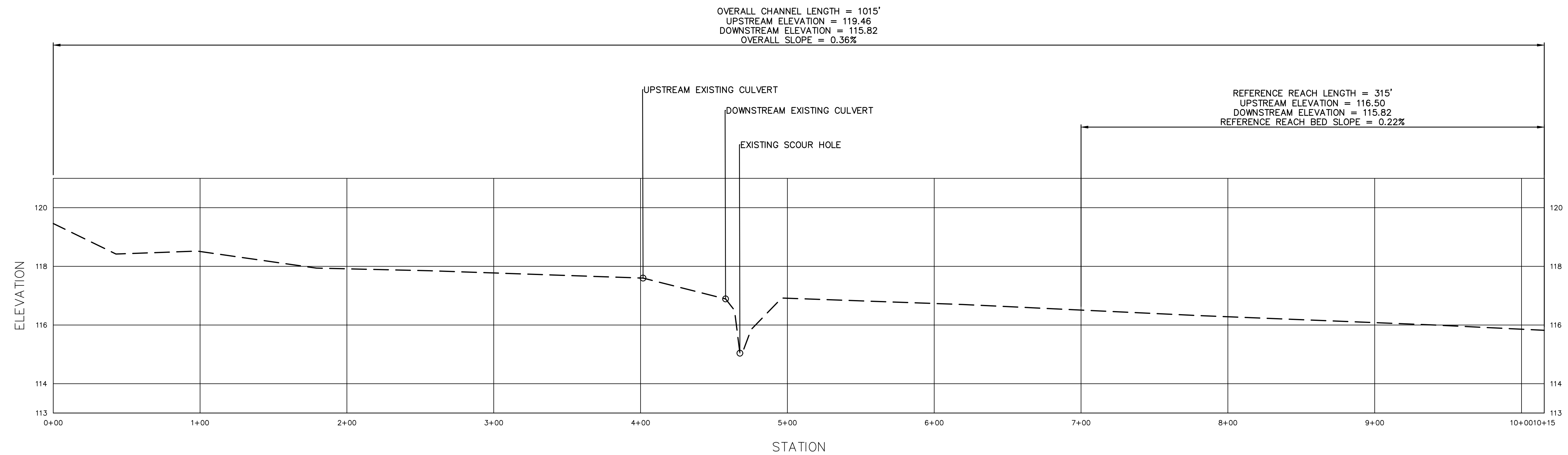






NOTE: AVERAGE CHANNEL BANKFULL WIDTH = 12.57'  
 BASED ON FIELD MEASUREMENTS.

PEBBLE COUNT DATA		
SIZE (mm)	COUNT	
	U/S (FlagsC301-306)	D/S (FlagsC328-332)
<2	51	23
2-2.8	9	12
2.9-4	5	9
4.1-5.6	2	12
5.7-8	6	29
8.1-11	8	15
11.1-16	11	8
16.1-22.6	7	2
22.7-32	12	1
32.1-35	7	0
45.1-64	2	0
64.1-90	0	0
90.1-128	0	0
128.1-180	0	0
>180	0	0
<b>Total:</b>	<b>120</b>	<b>111</b>



ELMER BROOK EXISTING STREAM PROFILE STA 0+00 - 10+15  
 SCALE: H: 1" = 40'  
 V: 1" = 2'

No.	DATE	DESCRIPTION	DESIGNER/REVIEWER



SCALE: HORZ.: 1"=40'  
 VERT.: AS NOTED

DATUM: HORZ.: NAD83  
 VERT.: NAVD83

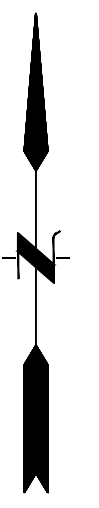
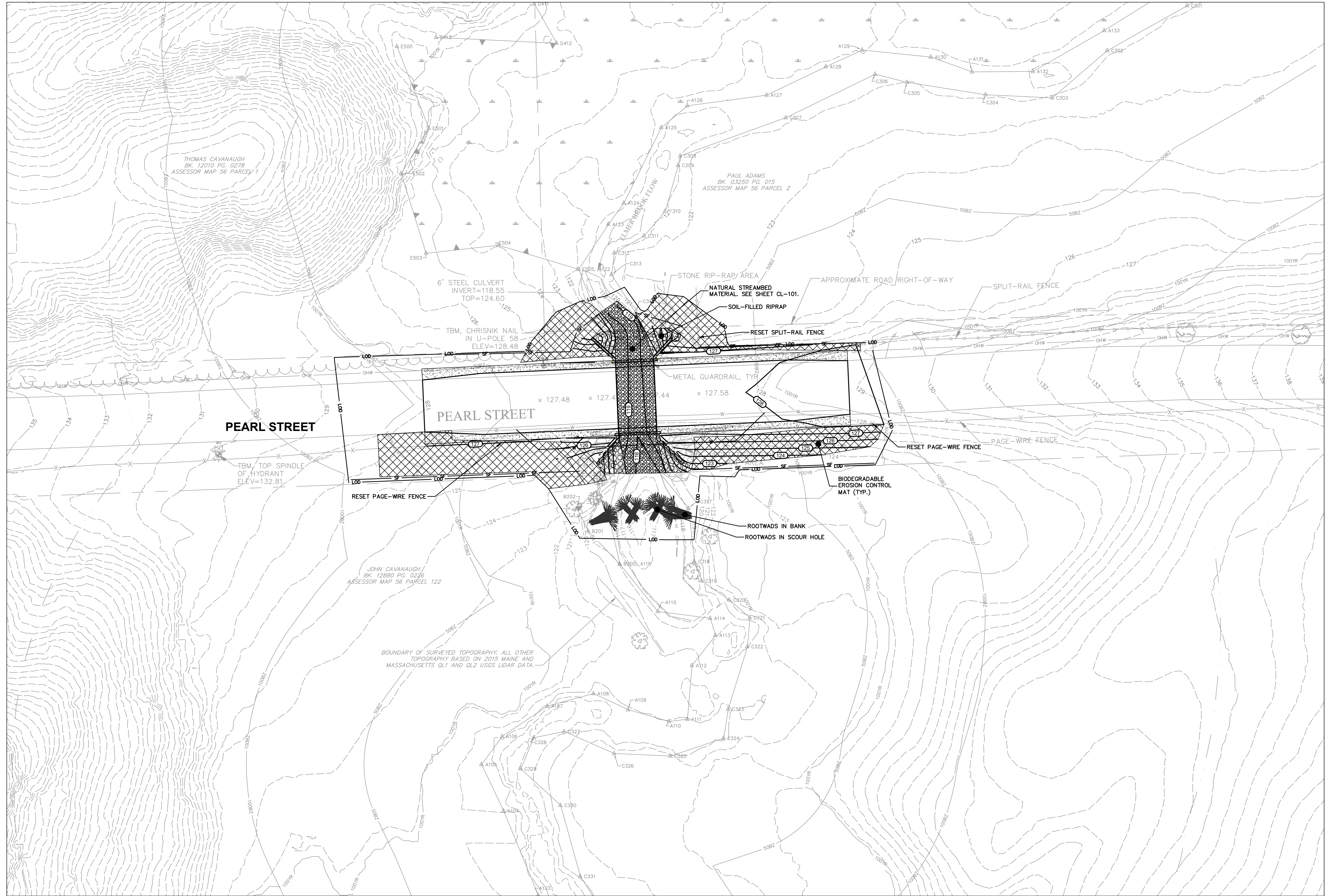
GRAPHIC SCALE

**FUSS & O'NEILL**  
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TOWN OF SOUTH HADLEY  
 OVERALL STREAM PROFILE  
 PEARL STREET CULVERT  
 REPLACEMENT  
 SOUTH HADLEY, MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: 06/30/2024

CL-102



No.	DATE	DESCRIPTION	DESIGNER/REVIEWER



SCALE: HORIZ.: 1"=20'  
 VERT.: 1"=20'

DATUM: HORIZ.: NAD83  
 VERT.: NAVD88

GRAPHIC SCALE

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TOWN OF SOUTH HADLEY  
 RESTORATION PLAN  
 PEARL STREET CULVERT  
 REPLACEMENT  
 SOUTH HADLEY, MASSACHUSETTS

PROJ. No.: 20150214.B50  
 DATE: 06/30/2024

**CR-101**

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PC3: AUTOCAD PDF (GENERAL DOCUMENTATION) PC3: STB/CTB: FO STB  
MS VIEW: PLOT

**NOTES:**

- TEMPORARY TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND THE MASSACHUSETTS AMENDMENTS TO THE MUTCD.
- TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- REMOVE OR COVER ALL TEMPORARY DEVICES WHEN THEY ARE NO LONGER REQUIRED FOR CONTROL OF TRAFFIC.
- ABUTTERS SHALL BE NOTIFIED AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS TO THEIR BUSINESS, RESIDENCE, AND/OR PROPERTY.
- THE FIRST TEN PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH SEQUENTIALLY FLASHING LIGHTS WHEN USED FOR NIGHT WORK BETWEEN DUSK AND DAWN.
- DISTANCES SHOWN IN THIS DOCUMENT MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER DUE TO SITE CONSTRAINTS.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.

**LEGEND:**


A "STOP/SLOW" PADDLE SHOULD BE THE PRIMARY HAND-SIGNALING DEVICE. IT SHALL HAVE AN OCTAGONAL SHAPE ON A RIGID HANDLE.

**PROPERLY TRAINED FLAGGERS**

- GIVE CLEAR MESSAGES TO DRIVERS.
- ALLOW DISTANCE FOR DRIVERS TO REACT.
- COORDINATE WITH OTHER FLAGGERS.
- USE STANDARD SIGNALING METHODS.

**FLAGGER EQUIPMENT**

- MUTCD COMPLIANT STOP/SLOW PADDLES.
- RETROREFLECTIVE EQUIPMENT.
- HAND-HELD RADIOS, AS NEEDED.
- SAFETY APPAREL THAT MEETS ANSI CLASS 3 REQUIREMENTS. THE COMBINATION OF VEST AND PANTS IS REQUIRED.

**PROPER FLAGGING STATIONS**

TABLE 6E-1. STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

SPEED*	DISTANCE
20 MPH	115 FEET
25 MPH	155 FEET
30 MPH	200 FEET
35 MPH	250 FEET
40 MPH	305 FEET
45 MPH	360 FEET
50 MPH	425 FEET
55 MPH	495 FEET
60 MPH	570 FEET
65 MPH	645 FEET
70 MPH	730 FEET
75 MPH	820 FEET

Source: Table 6E-1 MUTCD LATEST EDITION

**ONE LANE ALTERNATING SIGN TRAFFIC WITH STOP SIGN**

**GENERAL NOTES**

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-1

**FLAGGING GUIDANCE**

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-10

**massDOT** Highway Division  
WORK ZONE SAFETY STANDARD DETAILS AND DRAWINGS

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-1

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WORK ZONE SAFETY STANDARD DETAILS AND DRAWINGS

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-10

**CONES & DRUMS**

**CHANNELIZING DEVICE PLACEMENT WITH TRAFFIC CARRIED ON BOTH SIDES**

**NOTE:**

- CONES OR DRUMS SHALL BE OFFSET AT LEAST 2' FROM THE MARKING LINE (MEASURED FROM THE CENTER OF MARKING TO EDGE OF CONE/DRUM WEIGHT).

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-12

**GENERIC TYPE III BARRICADE**

**NOTES:**

- THE MINIMUM LENGTH FOR TYPE III BARRICADES SHALL BE 48 INCHES. EACH BARRICADE RAIL SHALL BE 8 TO 12 INCHES WIDE. BARRICADES USED ON FREEWAYS, EXPRESSWAYS, AND OTHER HIGH-SPEED ROADWAYS SHALL HAVE A MINIMUM OF 270 SQUARE INCHES OF RETROREFLECTIVE AREA FACING ROAD USERS.
- STRIPES ON BARRICADE RAILS SHALL BE ALTERNATING ORANGE AND WHITE RETROREFLECTIVE STRIPES SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION ROAD USERS ARE TO PASS. STRIPES SHALL BE 6 INCHES WIDE.
- WHERE BARRICADES EXTEND ENTIRELY ACROSS A ROADWAY, THE STRIPES SHOULD SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH ROAD USERS MUST TURN.
- WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED, THE BARRICADE STRIPES SHOULD SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE OR BARRICADES.
- WHERE NO TURNS ARE INTENDED, THE STRIPES SHOULD BE POSITIONED TO SLOPE DOWNWARD TOWARD THE CENTER OF THE BARRICADE OR BARRICADES.

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-13

**TWO LANE UNDIVIDED ROADWAY**

**HALF OF ROADWAY CLOSED (FLAGGER)**

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: TL-2

**TAPER AND TANGENT LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES**

TYPE	LENGTH*
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	50 FT MIN. 100 FT MAX.
DOWNSTREAM TAPER	50 FT MIN. 100 FT MAX. PER LANE
TANGENT LENGTH**	AT LEAST 2L

Source: Table 6C-3 MUTCD LATEST EDITION  
\* Use Table 6C-4 to calculate L  
\*\* Tangent Length Measured Between Two Tapers

**FORMULAS FOR DETERMINING TAPER LENGTHS**

SPEED (S) IN MPH	TAPER LENGTH (L) IN FEET
40 MPH OR LESS	L = WS <sup>2</sup> / 60
45 MPH OR MORE	L = WS

WHERE: L = TAPER LENGTH IN FEET  
W = WIDTH OF OFFSET IN FEET  
S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH

Source: Table 6C-4 MUTCD LATEST EDITION

**TYPICAL TAPER LENGTHS (L)**

SPEED (S) IN MPH	WIDTH OF OFFSET (W) IN FT.			
	9	10	11	12
25 OR BELOW	95	105	115	125
30	135	150	165	180
35	185	205	225	245
40	240	270	295	320
45	405	450	495	540
50	450	500	550	600
55	495	550	605	660
60	540	600	660	720
65	585	650	715	780
70	630	700	770	840

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-6

**massDOT** Highway Division  
WORK ZONE SAFETY STANDARD DETAILS AND DRAWINGS

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-12

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WORK ZONE SAFETY STANDARD DETAILS AND DRAWINGS

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-13

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DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: TL-2

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WORK ZONE SAFETY STANDARD DETAILS AND DRAWINGS

DATE OF ISSUE: 07/01/2023  
REVISIONS:  
FIGURE NO.: GEN-6



NO.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE: HORIZ.: 1" = 4'  
VERT.: 1" = 4'  
D.A.T.U.M.:  
HORIZ.:  
VERT.:  
GRAPHIC SCALE: 0 2 4

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TOWN OF SOUTH HADLEY  
TRAFFIC CONTROL DETAILS  
PEARL STREET CULVERT REPLACEMENT  
SOUTH HADLEY MASSACHUSETTS

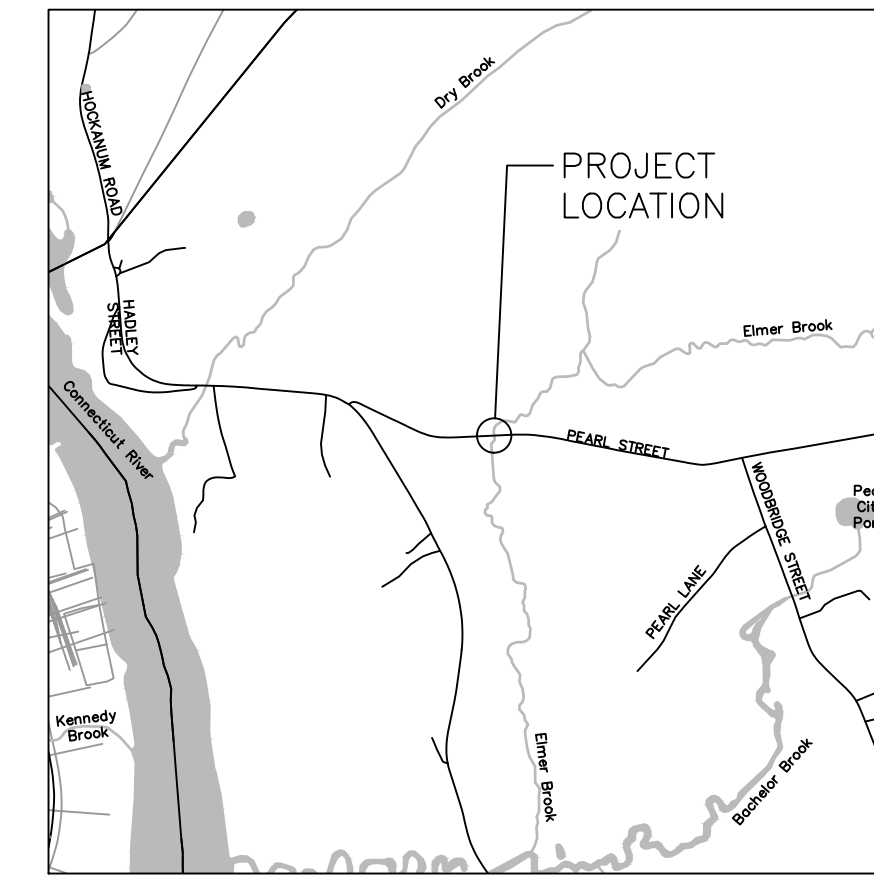
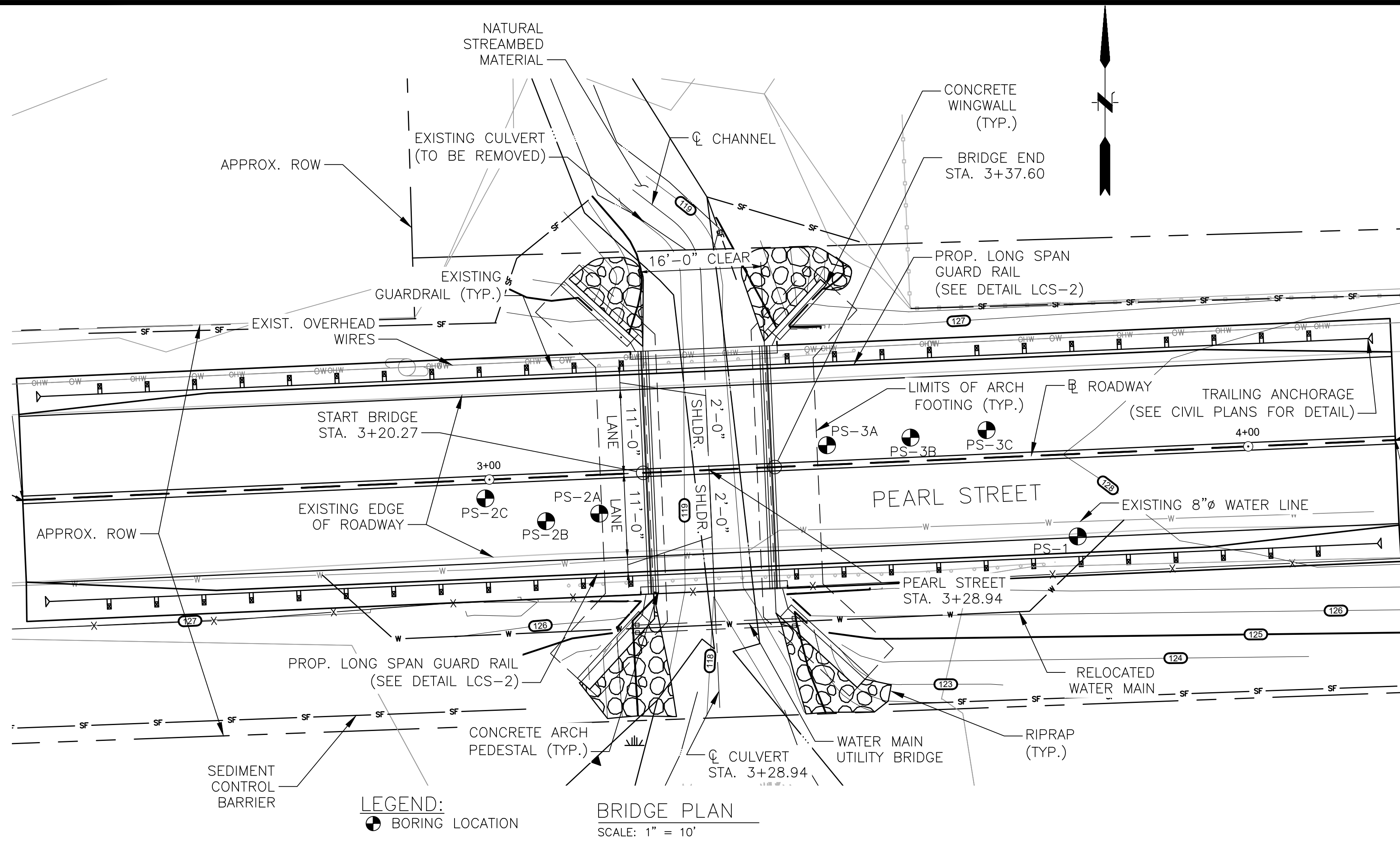
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DATE: 06/30/2024

**TMP-101**

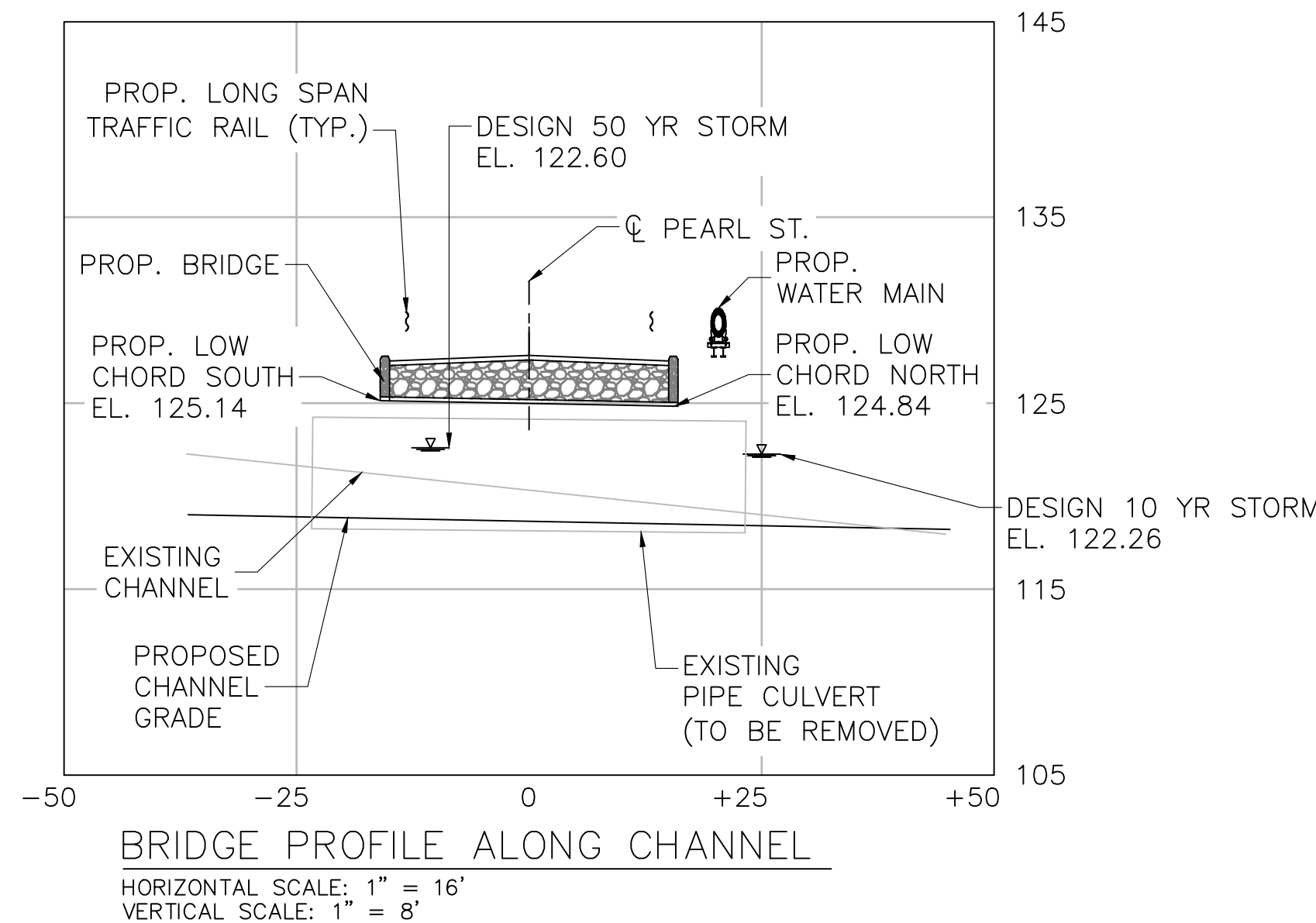
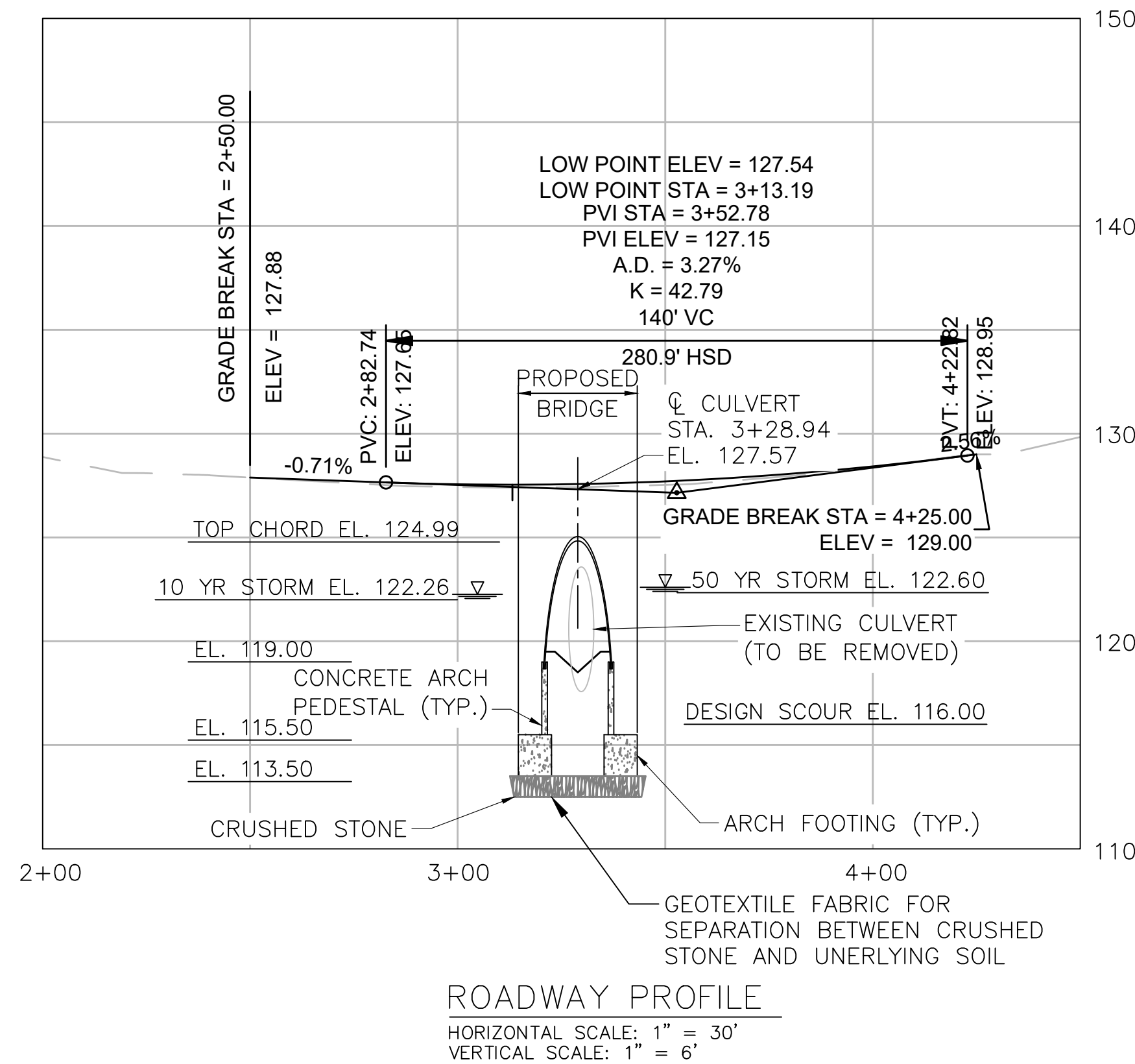




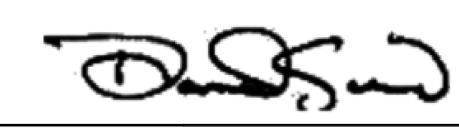
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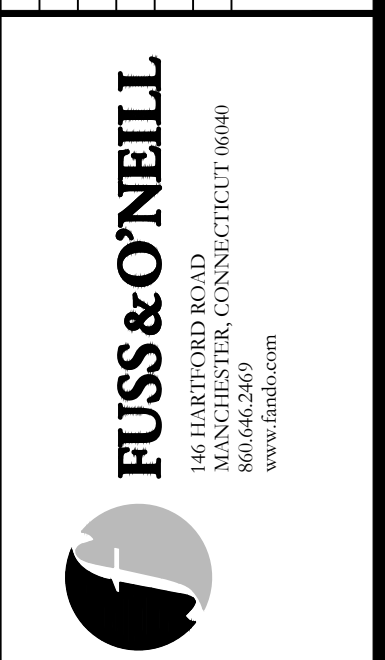
ESTIMATED QUANTITIES (NOT GUARANTEED)	
ITEM	QNTY
BRIDGE EXCAVATION WITHIN COFFERDAM	1530 C.Y.
CHANNEL EXCAVATION	220 C.Y.
GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	486 C.Y.
CRUSHED STONE	70 TON
GEOTEXTILE FABRIC FOR SEPARATION	170 S.Y.
4000 PSI, 1 1/2", 565 CEMENT CONCRETE	130 C.Y.
STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED	27000 LBS
STRUCTURAL STEEL - COATED STEEL	720 LBS
BITUMINOUS DAMP-PROOFING	147 S.Y.
RIPRAP	90 TON
COFFERDAM STRUCTURE NO. S-18-021	L.S.
CONTROL OF WATER - BRIDGE NO. S-18-021	L.S.
ALUMINUM ARCH FRAME	L.S.
DEMOLITION OF EXISTING STRUCTURE	L.S.



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14	ROADWAY DETAILS

**COMMONWEALTH OF MASSACHUSETTS**  
**MassDOT, Highway Division**  
**CONCEPTUAL DESIGN IS ACCEPTABLE**  
**TO MASSDOT FOR CONTRACTING**  
  
 DISTRICT TWO BRIDGE ENGINEER      DATE: 6/13/2024

No.	DATE	DESCRIPTION	DESIGNER/REVIEWER



TOWN OF SOUTH HADLEY  
**STRUCTURE PLAN, PROFILE AND INDEX**  
**PEARL ST. CULVERT REPLACEMENT**  
**S-18-021 (CK8)**  
 SOUTH HADLEY, MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: AUGUST 2023

**STR-01**

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 PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB\CTB: MADOT-D-STB  
 LAYER STATE:

**GENERAL NOTES:**

**DESIGN REVIEW AND APPROVALS – CHAPTER 85 SECTION 35:**

IN ACCORDANCE AND COMPLIANCE WITH THE REQUIREMENTS OF CHAPTER 85 SECTION 35 OF MASSACHUSETTS GENERAL LAWS, THE 2024 MASSDOT STANDARD SPECIFICATIONS, AND THE 2024 SUPPLEMENTAL SPECIFICATIONS AND CODES. THE CONTRACTOR SHALL SUBMIT TO THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION ALL CONSTRUCTION DRAWINGS AND DESIGN CALCULATIONS THAT SHALL BE USED TO FABRICATE AND CONSTRUCT THE ALUMINUM PLATE STRUCTURE DENOTED ON THESE PLANS FOR REVIEW AND APPROVAL. THIS APPROVAL SHALL CONSTITUTE THE FINAL APPROVAL AS STIPULATED BY CHAPTER 85 SECTION 35 OF THE MASSACHUSETTS GENERAL LAWS.

REVISIONS TO THE APPROVED PLANS SHALL ALSO BE SUBMITTED TO MASSDOT FOR APPROVAL.

**DESIGN:**

IN ACCORDANCE WITH THE 2020 (9TH EDITION) AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIAL LRFD BRIDGE DESIGN SPECIFICATIONS WITH CURRENT INTERIM SPECIFICATIONS, FOR HL-93 LOADING.

**BENCHMARK:**

VERTICAL DATUM IS BASED AND PROVIDED BY SURVEY PERFORMED BY SHERMAN AND FRYDRYK IS 1988 NAVD SYSTEM. TEMPORARY BENCHMARKS WERE ESTABLISHED ON SITE. TBM, SPIKE UTILITY POLE, EL. 748.27. TBM, SPIKE UTILITY POLE, EL. 742.24.

**FOUNDATIONS:**

FOUNDATIONS MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION, WITH THE APPROVAL OF THE DESIGN ENGINEER OF RECORD.

**UNSUITABLE MATERIAL:**

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE DESIGN ENGINEER OF RECORD.

**CONSTRUCTION SPECIFICATIONS:**

ALL CONSTRUCTION WORK TO BE PERFORMED IN ACCORDANCE WITH THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 2024 EDITION.

**CONSTRUCTION REQUIREMENTS AND PROCEDURES:**

THE EXISTING BRIDGE TO BE REPLACED IS TO REMAIN CLOSED DURING CONSTRUCTION OF THE NEW BRIDGE REPLACEMENT. ADDITIONALLY THE CONTRACTOR SHALL TAKE THE PROPER PRECAUTIONS TO ENSURE THE STABILITY AND SAFE PERFORMANCE OF ALL STRUCTURAL ELEMENTS DURING DEMOLITION AND CONSTRUCTION. REFER TO APPROVED DEMOLITION/ERECTION PLANS.

**EXISTING CONSTRUCTION:**

DIMENSIONS SHOWN ARE TAKEN FROM SURVEY AND VARIOUS FIELD MEASUREMENTS AND ARE NOT GUARANTEED. THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENT AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE AND NOT ORDER ANY MATERIAL OF COMMENCE ANY FABRICATION UNTIL HE HAS MADE THE REQUIRED MEASUREMENTS ON THE ACTUAL STRUCTURE AND THE EXTENT OF THE PROPOSED WORK HAS BEEN APPROVED BY THE ENGINEER.

**UTILITIES:**

AS ENCOUNTERED THE CONTRACTOR SHALL LOCATE, NOT DAMAGE AND PROTECT ALL UTILITIES, POLES WTC. WHEN LOCATING, TEMPORARILY RELOCATING AND PERMANENTLY RECONSTRUCTING ALL EXISTING AND NEWLY CONSTRUCTED UTILITIES AS NOTED HEREIN THROUGHOUT CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE WITH RESPECTIVE UTILITY OWNERS ALL UTILITIES THAT ARE TO BE TEMPORARILY OR PERMANENTLY RELOCATED DURING ALL PHASES OF BRIDGE REPLACEMENT CONSTRUCTION.

AREAS SURROUNDING THE CONSTRUCTION SITE AND UTILITIES OUTSIDE THE LIMITS OF PROPOSED WORK DISRUPTED BY THE CONTRACTORS OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AT THE CONTRACTORS EXPENSE.

**DOWEL BAR SPLICERS:**

DOWEL BAR SPLICERS SHALL HAVE THE SAME COATINGS AS THE REINFORCING BARS THEY ARE SPLICING.

**ADDITIONAL NOTES:**

**CONCRETE:  
CONCRETE MIXES**

(1) (2) (3) TO BE USED IN CONSTRUCTION OF:

4000 1½" 565 FOOTINGS, HEADWALL, RETAINING WALLS

- (1) 28 DAY COMPRESSIVE STRENGTH (PSI)
- (2) MAXIMUM AGGREGATE SIZE (IN)
- (3) CEMENTITIOUS CONTENT (POUND/CY)

THE USE OF REMAIN-IN-PLACE FORMS ON THIS STRUCTURE IS NOT ALLOWED.

EXPOSED EDGES OF CONCRETE SHALL BE BEVELED 1" x 1" UNLESS DIMENSIONED OTHERWISE.

**REINFORCEMENT:**

REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 31 GRADE 60 AND SHALL BE EPOXY COATED. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION	#4 BARS	#5 BARS	#6 BARS
1. NONE	16"	19"	23"
2. 12" OF CONCRETE BELOW BAR	20"	25"	30"
3. EPOXY COATED BARS, COVER <3d OR CLEAR SPACING <6d	23"	29"	34"
4. COATED BARS, ALL OTHER CASES	18"	23"	27"
5. CONDITION 2 AND 3	26"	32"	39"
6. CONDITION 2 AND 4	24"	30"	36"

ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

ALL REINFORCEMENT SHALL HAVE 3" COVER AT BOTTOM OF FOOTINGS AND 2" COVER ELSEWHERE UNLESS DIMENSIONED OTHERWISE.

**GEOTECHNICAL NOTES:**

- 1. SEE GEOTECHNICAL REPORT, DATED FEBRUARY 28, 2023.
- 2. SEE HYDRAULIC REPORT, DATED MAY 16, 2023.
- 3. NATIONAL VERTICAL DATUM NAVD 88 IS USED THROUGHOUT.

**BACKFILL MATERIALS:**

- A. GRAVEL BORROW (MASSDOT M1.03.0, TYPE B) SHALL BE USED BEHIND CULVERT WALLS AND WINGWALLS.
- B. PROCESSED GRAVEL FOR SUBBASE (M1.03.1) SHALL BE USED IMMEDIATELY BELOW PAVEMENT.
- C. CRUSHED STONE (M2.01.4) SHALL BE USED BELOW FOOTINGS, AND IN DRAINAGE STRUCTURES IN PLACE OF GRAVEL BORROW.
- D. SPECIAL BORROW (M1.02.0) SHALL BE USED AS MISCELLANEOUS FILL.

**CONSTRUCTION JOINTS**

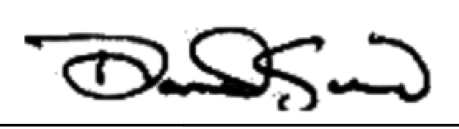
CONSTRUCTION JOINTS, OTHER THAN SHOWN ON THE PLANS, WILL NOT BE PERMITTED WITHOUT PRIOR APPROVAL OF THE ENGINEER.

SEISMIC DESIGN CRITERIA	
DESIGN RETURN PERIOD:	1000-YR
DESIGN SPECTRA	
As	0.093
SDs	0.208
SD1	0.094
SITE CLASS	D
SEISMIC DESIGN CATEGORY (SDC)	A

TEMPORARY WATER CONTROL DESIGN DATA	
DESIGN FLOOD DISCHARGE (C.F.S.)	49.3
DESIGN FLOOD FREQUENCY (YEARS)	2
DESIGN FLOOD VELOCITY (F.P.S.)	3.2
DESIGN FLOOD ELEVATION (FEET, NAVD)	121.3

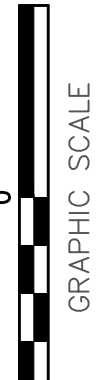
TRAFFIC DATA		
	ROADWAY OVER	ROADWAY UNDER
DESIGN YEAR	2044	N/A
AVERAGE DAILY TRAFFIC – PRESENT	424	N/A
AVERAGE DAILY TRAFFIC – DESIGN YEAR	468	N/A
DESIGN HOURLY VOLUME	48	N/A
DIRECTIONAL DISTRIBUTION	N/A	N/A
TRUCK PERCENTAGE – AVERAGE DAY	1.5	N/A
TRUCK PERCENTAGE – PEAK HOUR	1.3	N/A
DESIGN SPEED	30	N/A
DIRECTIONAL DESIGN HOURLY VOLUME	N/A	N/A

HYDRAULIC DESIGN DATA	
DRAINAGE AREA (SQ. MILES)	3.76
DESIGN FLOOD DISCHARGE (C.F.S.)	179.53
DESIGN FLOOD FREQUENCY (YEARS)	10
DESIGN FLOOD VELOCITY (F.P.S.)	3.62
DESIGN FLOOD ELEVATION (FEET, NAVD)	122.26
BASE (100-YEAR) FLOOD DATA	
BASE FLOOD DISCHARGE (C.F.S.)	479.65
BASE FLOOD ELEVATION (FEET, NAVD)	122.99
DESIGN AND CHECK SCOUR DATA	
DESIGN SCOUR FLOOD EVENT RETURN FREQUENCY (YEARS)	25
DESIGN FLOOD ABUTMENT SCOUR DEPTH (FEET)	2
DESIGN FLOOD PIER SCOUR DEPTH (FEET)	N/A
CHECK SCOUR FLOOD EVENT RETURN FREQUENCY (YEARS)	50
CHECK FLOOD ABUTMENT SCOUR DEPTH (FEET)	4.2
CHECK FLOOD PIER SCOUR DEPTH (FEET)	N/A
FLOOD OF RECORD	
DISCHARGE (C.F.S.)	N/A
FREQUENCY (IF KNOWN, YEARS)	N/A
MAXIMUM ELEVATION (FEET, NAVD)	N/A
DATE (MM/YYYY)	N/A
HISTORY OF ICE FLOES	N/A
EVIDENCE OF SCOUR AND EROSION	N/A

**COMMONWEALTH OF MASSACHUSETTS**  
**MassDOT, Highway Division**  
**CONCEPTUAL DESIGN IS ACCEPTABLE**  
**TO MASSDOT FOR CONTRACTING**  
  
 DISTRICT TWO BRIDGE ENGINEER      6/13/2024      DATE

No.	DATE	DESCRIPTION	DESIGNER/REVIEWER



SCALE:      HORZ.: AS NOTED      VERT.: AS NOTED  
 DATUM:      HORZ.:      VERT.:  
 GRAPHIC SCALE

**FUSS & O'NEILL**  
 146 HARTFORD ROAD  
 SUITE 200, HARTFORD, CT 06108  
 860.642.2400  
 www.fandoc.com

TOWN OF SOUTH HADLEY  
**GENERAL STRUCTURE NOTES**  
 PEARL ST. CULVERT REPLACEMENT  
 S-18-021 (CK8)  
 SOUTH HADLEY MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: AUGUST 2023  
**STR-02**

**BORING NOTES:**

1. LOCATION OF BORINGS SHOWN ON THE PLANS, SEE SHEET STR-01. **THIS:**
2. BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
5. BORINGS WERE PERFORMED BY SEABOARD DRILLING, INC.
6. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.



**LOG OF BORING PS-1** Page 1 of 1

PROJECT	Pearl Street Culvert Replacement		CONTRACTOR	Seaboard Environmental Drilling	
JOB NUMBER	2950-22-01	FINAL DEPTH (ft)	6.0	DRILLING EQUIPMENT	B-53 Truck Mounted Rig
LOCATION	South Hadley, MA	SURFACE ELEV (ft)	127	FOREMAN	Jeff N.
START DATE	11/10/2022	DISTURBED SAMPLES	3	HELPER	Joe N.
FINISH DATE	11/10/2022	UNDISTURBED SAMPLES	0	BIT TYPE	Hollow Stem Auger
ENGINEER/SCIENTIST	Caren Irgang		WATER LEVEL	ROD TYPE	N (2 3/8" O.D.)
BORING LOCATION	East of culvert, southern shoulder of road		FIRST (ft)	SAMPLER	2" O.D. Split Spoon
			LAST (ft)	HAMMER TYPE	Automatic
			TIME (hr)	HAMMER WGT/DROP	140 lb / 30"
				SIZE	N/A

DEPTH (ft) / SAMPLES	PENETR. RESIST. (bl / 6 in)	REC. (ft)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV.	REMARKS/ WELL CONSTRUCTION
0	95/94	1424	S-1 (0-2)		Top 3": Medium dense, dark brown to brown, medium SAND, little fine sand, trace silt, trace organics (roots), damp (TOPSOIL). Next 6": Medium dense, very dark brown, medium SAND, some gravel, little fine sand, little coarse sand, little silt, damp. Bottom 9": Medium dense, light brown, medium SAND, little coarse sand, little gravel, trace fine sand, trace silt, damp.	TOPSOIL GRAVELLY SAND 12.3 + 123.2 MEDIUM SAND	
14	14/23	724	S-2 (2-4)		Loose, light brown, medium SAND, little coarse sand, little gravel, trace fine sand, trace silt, damp.		
24	24/12	1104	S-3 (4-8)		Top 2": Loose, light brown, medium SAND, little coarse sand, little gravel, trace fine sand, trace silt, damp. Bottom 6": Medium stiff, brown, SILT and CLAY, trace medium sand, damp (fabric at bottom). End of exploration at 6'	5.5 + 121.5 SILT AND CLAY 8.0 + 121.0	

Remarks:  
1. Geosynthetic fabric layer encountered at depth of 6 feet. Boring location terminated.

PROJECT NO. 2950-22-01  
LOG OF BORING PS-1



**LOG OF BORING PS-2A** Page 1 of 1

PROJECT	Pearl Street Culvert Replacement		CONTRACTOR	Seaboard Environmental Drilling	
JOB NUMBER	2950-22-01	FINAL DEPTH (ft)	6.0	DRILLING EQUIPMENT	B-53 Truck Mounted Rig
LOCATION	South Hadley, MA	SURFACE ELEV (ft)	127.5	FOREMAN	Jeff N.
START DATE	11/10/2022	DISTURBED SAMPLES	3	HELPER	Joe N.
FINISH DATE	11/10/2022	UNDISTURBED SAMPLES	0	BIT TYPE	Hollow Stem Auger
ENGINEER/SCIENTIST	Caren Irgang		WATER LEVEL	ROD TYPE	N (2 3/8" O.D.)
BORING LOCATION	West of culvert		FIRST (ft)	SAMPLER	2" O.D. Split Spoon
			LAST (ft)	HAMMER TYPE	Automatic
			TIME (hr)	HAMMER WGT/DROP	140 lb / 30"
				SIZE	N/A

DEPTH (ft) / SAMPLES	PENETR. RESIST. (bl / 6 in)	REC. (ft)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV.	REMARKS/ WELL CONSTRUCTION
0	121/109	1424	S-1 (0-2)		6.5" ASPHALT Top 2": Medium dense, black, medium to coarse SAND and GRAVEL, damp (BASE COURSE, fabric at bottom). Bottom 12": Medium dense, light brown, medium SAND, some gravel, little coarse sand, little fine sand, trace silt, damp.	ASPHALT BASE GRAVELLY SAND	
5	58/9/14	1024	S-2 (2-4)		Top 6": Medium dense, light brown, medium SAND, some gravel, little coarse sand, little fine sand, trace silt, damp. Bottom 4": Medium dense, light red brown, medium SAND, some gravel, little coarse sand, trace fine sand, trace silt, damp.		1
15	15/8/6/8	724	S-3 (4-8)		Medium dense, light red brown, medium SAND, some gravel, little coarse sand, trace fine sand, trace silt, damp (0.25" black seam). Auger refusal at 6'	6.0 + 121.5	2

Remarks:  
1. Auger grinding from 3.5 to 4.5 feet.  
2. Offset boring approximately 7 feet west.

PROJECT NO. 2950-22-01  
LOG OF BORING PS-2A



**LOG OF BORING PS-2B** Page 1 of 1

PROJECT	Pearl Street Culvert Replacement		CONTRACTOR	Seaboard Environmental Drilling	
JOB NUMBER	2950-22-01	FINAL DEPTH (ft)	4.5	DRILLING EQUIPMENT	B-53 Truck Mounted Rig
LOCATION	South Hadley, MA	SURFACE ELEV (ft)	127.5	FOREMAN	Jeff N.
START DATE	11/10/2022	DISTURBED SAMPLES	0	HELPER	Joe N.
FINISH DATE	11/10/2022	UNDISTURBED SAMPLES	0	BIT TYPE	Hollow Stem Auger
ENGINEER/SCIENTIST	Caren Irgang		WATER LEVEL	ROD TYPE	N (2 3/8" O.D.)
BORING LOCATION	West of culvert		FIRST (ft)	SAMPLER	2" O.D. Split Spoon
			LAST (ft)	HAMMER TYPE	Automatic
			TIME (hr)	HAMMER WGT/DROP	140 lb / 30"
				SIZE	N/A

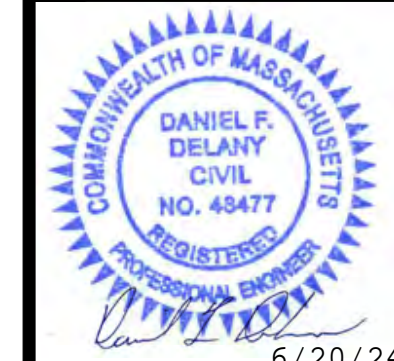
DEPTH (ft) / SAMPLES	PENETR. RESIST. (bl / 6 in)	REC. (ft)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV.	REMARKS/ WELL CONSTRUCTION
0					6.5" ASPHALT (fabric at bottom) From cuttings: Light brown, medium to coarse SAND, some gravel, trace silt, damp.	ASPHALT GRAVELLY SAND	
3					From cuttings (3-4.5"): Light red brown, medium SAND, some gravel, little fine sand, little coarse sand, trace silt, damp.		1
4					Auger refusal at 4.5'	4.5 + 123.0	2

Remarks:  
1. Auger grinding from 2.5 to 4.5 feet.  
2. Offset boring approximately 11 feet west.

PROJECT NO. 2950-22-01  
LOG OF BORING PS-2B

File: J:\DWG\20150214\B40\Structures\STR02\_20150214\_B40\_BRNG.dwg Layout: BORINGS 1 Plotted: 2024-06-20 2:21 PM Saved: 2024-06-20 11:11 AM User: Jacob Tatar  
LAYER STATE: PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB:CTB: MADOT-D-STB

No.	DATE	DESCRIPTION	DESIGNER REVIEWER



6/20/24

SCALE: HORIZ.: AS NOTED  
VERT.: AS NOTED

DATUM: HORIZ.:  
VERT.: 0

GRAPHIC SCALE

**FUSS & O'NEILL**  
146 HARTFORD ROAD  
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TOWN OF SOUTH HADLEY  
BORING LOGS I  
PEARL ST. CULVERT REPLACEMENT  
S-18-021 (CK8)  
SOUTH HADLEY MASSACHUSETTS

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

*[Signature]* 6/13/2024  
DISTRICT TWO BRIDGE ENGINEER DATE

PROJ. No.: 20150214.B40  
DATE: AUGUST 2023

**STR-03**





**LOG OF BORING PS-2C** Page 1 of 2

PROJECT	Pearl Street Culvert Replacement	CONTRACTOR	Seaboard Environmental Drilling
JOB NUMBER	2950-22-01	FINAL DEPTH (ft)	43.3
LOCATION	South Hadley, MA	SURFACE ELEV (ft)	127.5
START DATE	11/10/2022	DISTURBED SAMPLES	8
FINISH DATE	11/10/2022	UNDISTURBED SAMPLES	0
ENGINEER/SCIENTIST	Caren Irgang	WATER LEVEL	RCD TYPE
BORING LOCATION	West of culvert	FIRST (ft)	8.3
		LAST (ft)	N/E
		TIME (hr)	N/E

DEPTH (ft) / SAMPLES	PENETR. RESIST. (bl / 6 in)	REC. (in)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV	REMARKS/ WELL CONSTRUCTION
					6.5" ASPHALT From cuttings: Red brown, medium to coarse SAND and GRAVEL, trace silt	ASPHALT SAND & GRAVEL	
					From cuttings (3-5): Red brown, medium SAND, little coarse sand, little fine gravel, little fine sand, trace silt, damp	3.0 → 124.5 MEDIUM SAND	1
3/0/2	0/24	S-1 (8-9)	-	(NO RECOVERY; likely pushing gravel)	APPROX. GROUNDWATER EL. 119.20 (OBSERVED NOV. 10, 2022)	119.2	1
1/1/11	14/24	S-2 (8-10)	-	Very loose, red brown, medium SAND, little coarse sand, little fine sand, trace silt, trace fine gravel, wet (top 3" damp to moist)			2
2/1/2	9/24	S-3 (10-12)	-	Very loose, brown, medium SAND, little coarse sand, little fine sand, little silt, trace gravel (bottom 5" light orange to dark orange with rust staining)			2
					B.O.F. EL. 113.50	113.5 115.0 116.5 VARVED CLAY	3
4/3/4	15/24	S-4 (15-17)	w = 36%	Medium stiff, red brown and gray, varved fine SAND and SILT, trace fine sand (4-5" sand, 1" clayey silt)			4
W/OH for 12"	24/24	S-5 (20-22)	TV = 0.10 PP = 0.75 w = 45%	Very soft, gray, varved SILT and CLAY, trace fine sand (1/2" clay, 1" silt)			5, 6, 7, 8
1/2/3/4	14/24	S-6 (22-24)	TV = 0.50 PP = 0.25 w = 46%	Medium stiff, gray, varved clayey SILT, trace fine sand (1/8" clay, 1/2" silt)			
2/3/3/4	20/24	S-7 (25-27)	w = 56%	Medium stiff, red gray, varved fine SAND and SILT, little silty clay (few 1/2 to 1" silty clay layers)			

Remarks:  
 1. Augerbit grinding from 2 to 4.5 feet and at 8 feet.  
 2. Drive casing and begin drilling with wash after sampling S-2.  
 3. Silt pieces and wood fragments in wash water at 12'.  
 4. In-situ moisture content (w) determined according to ASTM D2216.  
 5. Open-hole drilling at 20 feet.  
 6. WOH = Weight of rods and 140 lb. hammer.  
 7. Undrained shear strength estimated in field using E285 Pocket Torvane (TV). Values in tons/ft<sup>2</sup>.  
 8. Unconfined compressive strength estimated in field using Pocket Penetrometer (PP). Values in tons/ft<sup>2</sup>.  
 9. Blr grinding at 33". Dark gray angular sand in wash water.  
 10. See report for definitions of Rock Quality Designation (RQD) and Rock Mass Quality (RMQ).  
 11. Core barrel jammed.

PROJECT NO.  
**2950-22-01**  
 LOG OF BORING  
**PS-2C**



**LOG OF BORING PS-2C** Page 2 of 2

DEPTH (ft) / SAMPLES	PENETR. RESIST. (bl / 6 in)	REC. (in)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV	REMARKS/ WELL CONSTRUCTION
33/3/4	19/24	S-8 (30-32)	-	TV = 0.10 PP = 0.75 w = 45%	Top 12": Medium stiff, brown gray, SILT, some fine sand (1/8" clay seam near center) Bottom 7": Medium stiff, brown gray, varved clayey SILT, trace fine sand (1/8 to 1/4" clay, 1/2 to 1" silt)	33.0 → 34.5 VARVED CLAY (Continued)	
4.45	32/60	C-1 (34-39)	-		Slightly weathered, slightly fractured, dark purple gray, BASALTIC LAHAR Recovery = 53% RQD = 48% RMQ = Poor Total Run Time = 21.7 minutes	33.0 → 34.5 FRACTURED BEDROCK	9
5.73							10
3.23							
3.22							
5.07							
5.43	51/51	C-2 (39-43.3)	-		Top 13": Slightly weathered, intensely fractured, dark purple gray, BASALTIC LAHAR Next 18": Slightly weathered, slightly fractured, dark green gray, DIORITE Bottom 20": Slightly weathered, moderately fractured, very dark gray, BASALT Recovery = 100% RQD = 65% RMQ = Fair Total Run Time = 39.2 minutes	43.3 → 84.2	11
9.23							
7.72							
10.68							
6.13					End of Exploration at 43.3'		



**LOG OF BORING PS-3A** Page 1 of 1

PROJECT	Pearl Street Culvert Replacement	CONTRACTOR	Seaboard Environmental Drilling
JOB NUMBER	2950-22-01	FINAL DEPTH (ft)	2.0
LOCATION	South Hadley, MA	SURFACE ELEV (ft)	127.5
START DATE	11/10/2022	DISTURBED SAMPLES	1
FINISH DATE	11/10/2022	UNDISTURBED SAMPLES	0
ENGINEER/SCIENTIST	Caren Irgang	WATER LEVEL	RCD TYPE
BORING LOCATION	East of culvert	FIRST (ft)	N/A
		LAST (ft)	N/E
		TIME (hr)	N/E

DEPTH (ft) / SAMPLES	PENETR. RESIST. (bl / 6 in)	REC. (in)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV	REMARKS/ WELL CONSTRUCTION
					6.5" ASPHALT Top 2": Very dense, black, fine to medium SAND, some gravel, little silt, little coarse sand, dry (BASE COURSE) Bottom 10": Very dense, red brown, medium SAND, some gravel, some coarse sand, little fine sand, trace silt, damp (2" rock pieces at bottom) Auger refusal at 2'	ASPHALT BASE GRAVELLY SAND	
						2.0 → 125.5	1, 2
					B.O.F. EL. 113.50		

Remarks:  
 1. Auger grinding at 2 feet.  
 2. Offset approximately 10 feet east.

PROJECT NO.  
**2950-22-01**  
 LOG OF BORING  
**PS-3A**

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

6/13/2024

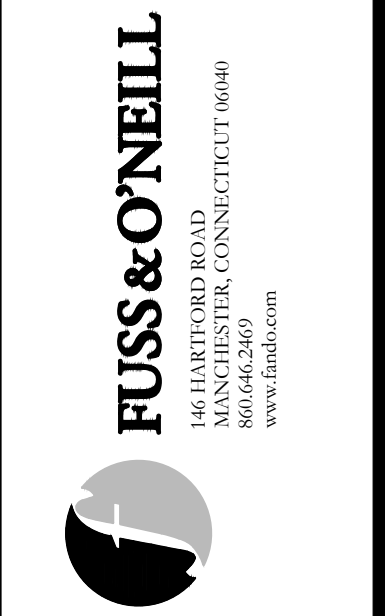
DISTRICT TWO BRIDGE ENGINEER

DATE



6/20/24

SCALE:  
 HORIZ.: AS NOTED  
 VERT.: AS NOTED  
 DATUM:  
 HORIZ.:  
 VERT.:  
 GRAPHIC SCALE



TOWN OF SOUTH HADLEY  
**BORING LOGS II**  
**PEARL ST. CULVERT REPLACEMENT**  
**S-18-021 (CK8)**  
 SOUTH HADLEY MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: AUGUST 2023

**STR-04**

No. DATE DESCRIPTION DESIGNER REVIEWER



LOG OF BORING PS-3B Page 1 of 1

PROJECT	Pearl Street Culvert Replacement	CONTRACTOR	Seaboard Environmental Drilling
JOB NUMBER	2950-22-01	DRILLING EQUIPMENT	8-53 Truck Mounted Rig
LOCATION	South Hadley, MA	SURFACE ELEV (ft)	127.5
START DATE	11/11/2022	DISTURBED SAMPLES	2
FINISH DATE	11/11/2022	UNDISTURBED SAMPLES	0
ENGINEER/SCIENTIST	Caren Irgang	WATER LEVEL	
BORING LOCATION	East of culvert	ROD TYPE	N (2 3/8" O.D.)
		FIRST (ft)	N/A
		LAST (ft)	N/A
		TIME (hr)	N/A

DEPTH (ft) SAMPLES	PENETR. RESIST. (bl / ft)	REC. (ft)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV.	REMARKS/ WELL CONSTRUCTION
0-2	14/18/12	15/24	S-1 (0-2)		6" ASPHALT Top 2" Dense, black, fine to medium SAND, some gravel, little silt, little coarse sand, dry (BASE COARSE) Bottom 14" Dense, red brown, medium SAND, some gravel, some coarse sand, little fine sand, trace silt, damp	ASPHALT/BASE GRAVELLY SAND	1
2-4	14/42	0/24	S-2 (0-4)		NO RECOVERY (likely pushing gravel)		2
Auger refusal at 3'							
APPROX. GROUNDWATER EL. 119.00 (OBSERVED NOV. 10, 2022)							
B.O.F. EL. 113.50							

Remarks:  
 1. Auger gridding at 2.5 feet.  
 2. Offset approximately 11 feet east.

PROJECT NO. 2950-22-01  
 LOG OF BORING PS-3B



LOG OF BORING PS-3C Page 1 of 2

PROJECT	Pearl Street Culvert Replacement	CONTRACTOR	Seaboard Environmental Drilling
JOB NUMBER	2950-22-01	DRILLING EQUIPMENT	8-53 Truck Mounted Rig
LOCATION	South Hadley, MA	SURFACE ELEV (ft)	127.5
START DATE	11/11/2022	DISTURBED SAMPLES	8
FINISH DATE	11/11/2022	UNDISTURBED SAMPLES	0
ENGINEER/SCIENTIST	Caren Irgang	WATER LEVEL	
BORING LOCATION	East of culvert	ROD TYPE	N (2 3/8" O.D.)
		FIRST (ft)	6.5
		LAST (ft)	N/A
		TIME (hr)	N/A

DEPTH (ft) SAMPLES	PENETR. RESIST. (bl / ft)	REC. (ft)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV.	REMARKS/ WELL CONSTRUCTION
0-1					6" ASPHALT From cuttings: Red brown, medium SAND, some gravel, some coarse sand, little fine sand, trace silt, damp	ASPHALT GRAVELLY SAND	1
1-3	42/22	10/24	S-1 (3-5)		Top 3": Loose, red brown, medium SAND, some gravel, some coarse sand, little fine sand, trace silt, damp (0.25" diagonal black seam 1/2" from top) Bottom 7": Loose, dark brown, medium SAND, little silt, little coarse sand, trace fine sand, damp		2
3-8	23/43	22/24	S-2 (8-9)		Top 13": Medium stiff, brown, SILT, trace fine sand, trace fine gravel, trace organics (tree leaves near top; trace red clay in bottom half), moist Next 4": Loose, brown, fine SAND, little to some silt, moist Bottom 5": Loose, brown, fine to medium SAND, some silt, moist	6.0 121.5 SILTY SAND	3
8-10	44/32	10/24	S-3 (8-10)		Loose, brown, fine to medium SAND, some coarse sand in bottom half, little silt, moist (bottom 5" wet)	17 119.0	4
10-12	12/36	8/24	S-4 (10-12)		Top 1": Loose, gray brown, medium SAND, little fine sand, little silt, little coarse sand, trace organics (wood fragments) Next 8": Loose, orange, ORGANICS (wood) (1-2" pieces, spongy) Bottom 1": Loose, gray brown, medium SAND, little fine sand, little silt, little coarse sand, trace organics (wood fragments)	10.3 117.2 ORGANICS MEDIUM SAND	5
B.O.F. EL. 113.50							
12-17	43/32	9/24	S-5 (15-17)		NO RECOVERY (likely pushing gravel)		6
17-19	15/33	21/24	S-6 (17-19)	TV = 0.60 PP = 0.40 w = 41%	Top 7": Medium stiff, red brown and gray, varved fine SAND and SILT (1-2" diagonal to horizontal layers) Next 8": Medium stiff, brown gray, varved clayey SILT, trace fine sand, trace coarse sand (14" clay layers) Bottom 6": Medium stiff, red, gray, varved SILT, some fine sand		7
19-22	WOH for 12"	15/24	S-7 (20-22)	TV = 0.10 PP = 0.75 w = 37%	Soft, gray, varved clayey SILT, little fine sand (14" clay, 1/2 to 1" silt)		8
22-27	22/23	8/24	S-8 (25-27)	TV = 0.15 PP = 1.00 w = 32%	Medium stiff, gray, varved clayey SILT and fine SAND (1" silt and clay layers)	13.5 114.0 VARVED CLAY	9, 10

Remarks:  
 1. Auger gridding at 1 foot.  
 2. Rod sunk from 5 to 8 feet.  
 3. Drove casing and began drilling with wash after sampling S-3.  
 4. Silt and clay pieces in wash water at 10 feet.  
 5. Wash water color changed to gray at 13.5'.  
 6. Undrained shear strength estimated in field using E285 Pocket Torvane (TV). Values in bold.  
 7. Unconfined compressive strength estimated in field using Pocket Penetrometer (PP). Values in bold.  
 8. In-situ moisture content (w) determined according to ASTM D2216.  
 9. Began open hole drilling at 20'.  
 10. WOH = Weight of rods and 140 lb. hammer.

PROJECT NO. 2950-22-01  
 LOG OF BORING PS-3C



LOG OF BORING PS-3C Page 2 of 2

DEPTH (ft) SAMPLES	PENETR. RESIST. (bl / ft)	REC. (ft)	TYPE/ NO.	FIELD TEST DATA	SAMPLE DESCRIPTION (MODIFIED BURMISTER)	PROFILE DEPTH (ft) ELEV.	REMARKS/ WELL CONSTRUCTION
32-33	23/22	14/24	S-9 (30-32)	w = 30%	Medium stiff, red gray, SILT and fine SAND		VARVED CLAY (Continued)
35-37	22/22	20/24	S-10 (35-37)		Medium stiff, red gray, fine SAND and varved clayey SILT (1" clayey silt, 7" fine sand)		
40-42	49/50 for 2"	8/8	S-11 (40-42)		Hard, very dark gray, ROCK (weathered)	40.0 87.5 FRACTURED BEDROCK	11
43-48	Gen. Bls. (moist)	18/90	C-1 (43-48)		Slightly weathered, moderately to intensely fractured, dark purple gray, BASALTIC LAHAR Recovery = 27% RQD = 7% RMQ = Poor Total Run Time = 18.1 minutes	43.0 84.5 BEDROCK	12, 13, 14
49-50	23.5/30	23.5/30	C-2 (48-50.5)		Slightly weathered, moderately to intensely fractured, dark purple gray, BASALTIC LAHAR Recovery = 26% RQD = 3% RMQ = Poor Total Run Time = 13.8 minutes End of exploration at 50.5'	50.5 77.0	15

Remarks:  
 11. Roller bit "jumping" at 40'.  
 12. Lost approximately one tub volume of water while coring rock.  
 13. Rock Quality Designation (RQD) is determined by summing the length of all rock core pieces longer than 4", then dividing by the length of the coring run.  
 14. Rock Mass Quality (RMQ) is determined based upon the RQD %.

No.	DATE	DESCRIPTION	DESIGNER/REVIEWER



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**FUSS & O'NEILL**  
 146 HARTFORD ROAD  
 SOUTH HADLEY, MA 01049  
 413-526-3400  
 www.fuss.com

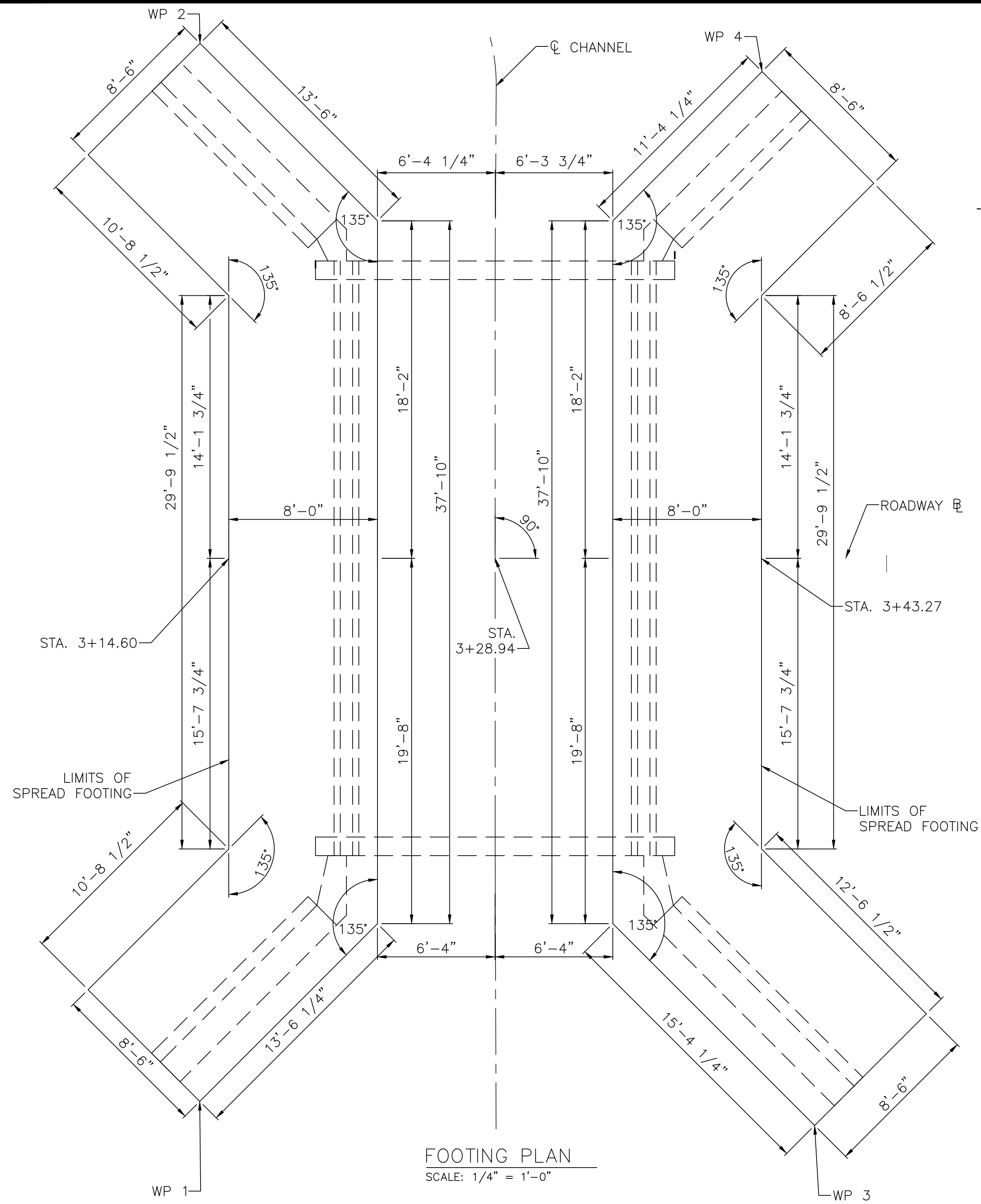
TOWN OF SOUTH HADLEY  
 BORING LOGS III  
 PEARL ST. CULVERT REPLACEMENT  
 S-18-021 (CK8)  
 MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: AUGUST 2023

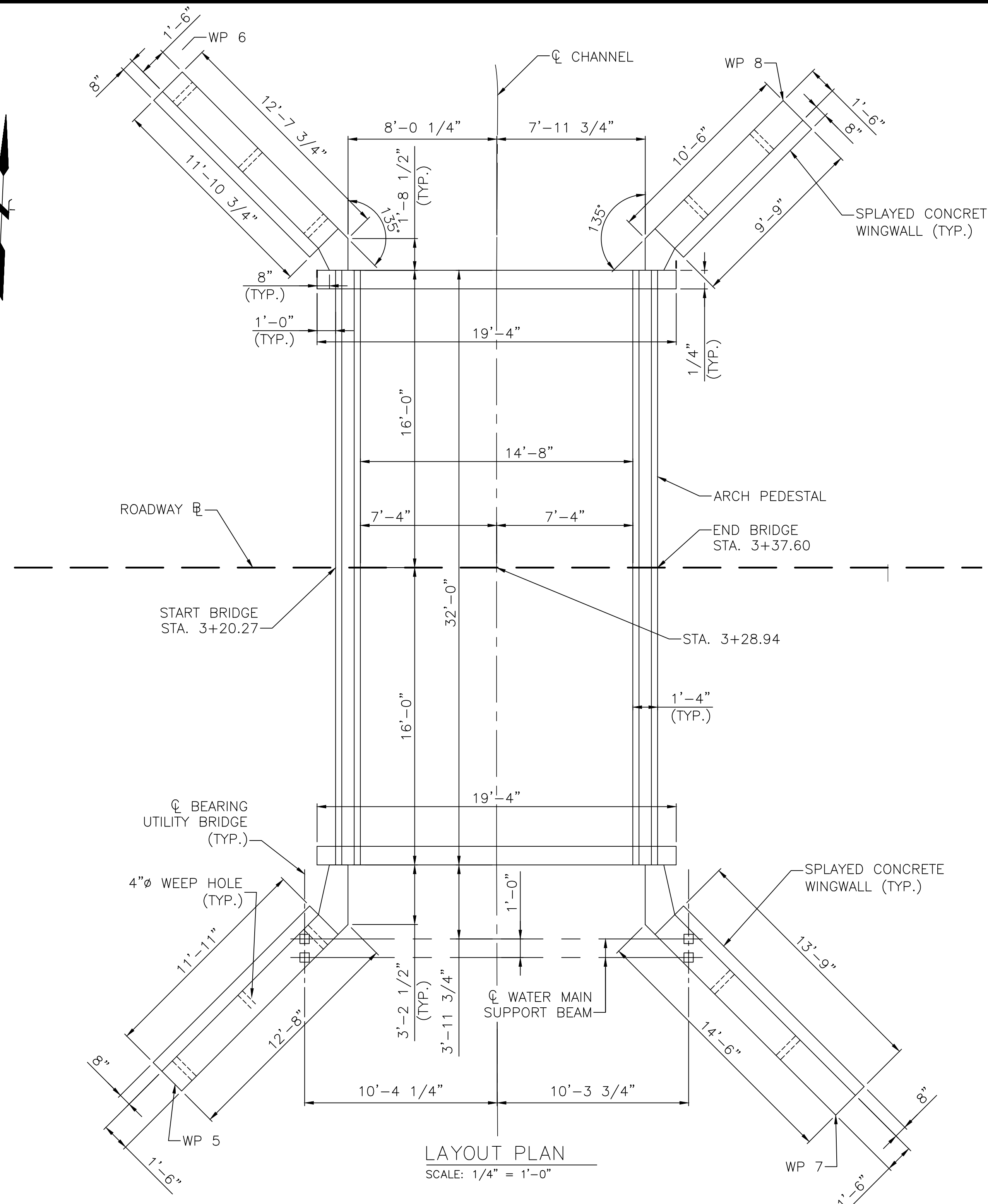
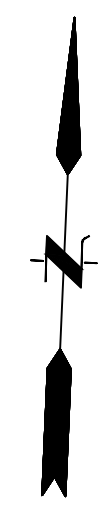
STR-05

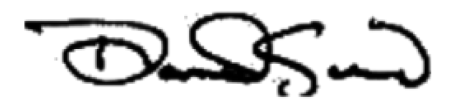
COMMONWEALTH OF MASSACHUSETTS  
 MassDOT, Highway Division  
 CONCEPTUAL DESIGN IS ACCEPTABLE  
 TO MASSDOT FOR CONTRACTING  
  
 DISTRICT TWO BRIDGE ENGINEER  
 DATE: 6/13/2024



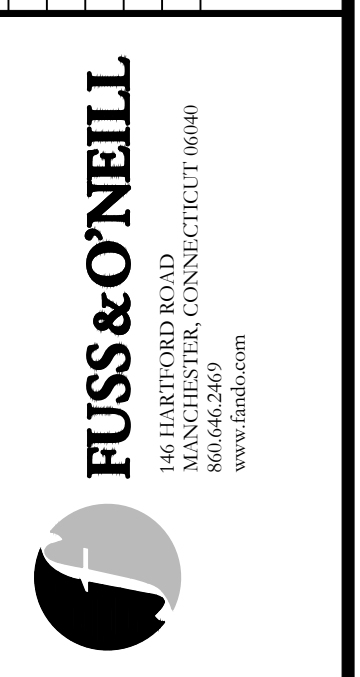
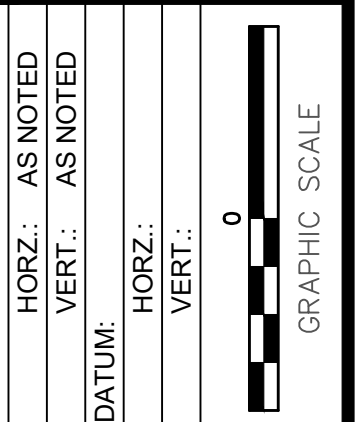
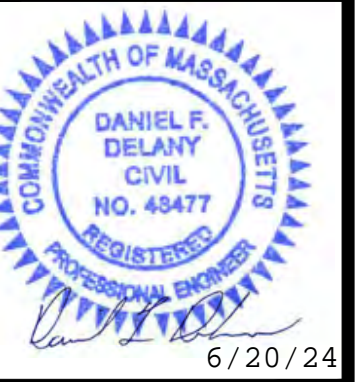


WP	STA.	OFFSET
1	3+13.04	29.22
2	3+13.06	-27.71
3	3+46.13	30.52
4	3+43.30	-26.19
5	3+11.63	27.81
6	3+11.66	-26.32
7	3+47.54	29.11
8	3+44.72	-24.78



**COMMONWEALTH OF MASSACHUSETTS**  
**MassDOT, Highway Division**  
 CONCEPTUAL DESIGN IS ACCEPTABLE  
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 DISTRICT TWO BRIDGE ENGINEER      DATE: 6/13/2024

No.	DATE	DESCRIPTION	DESIGNER/REVIEWER

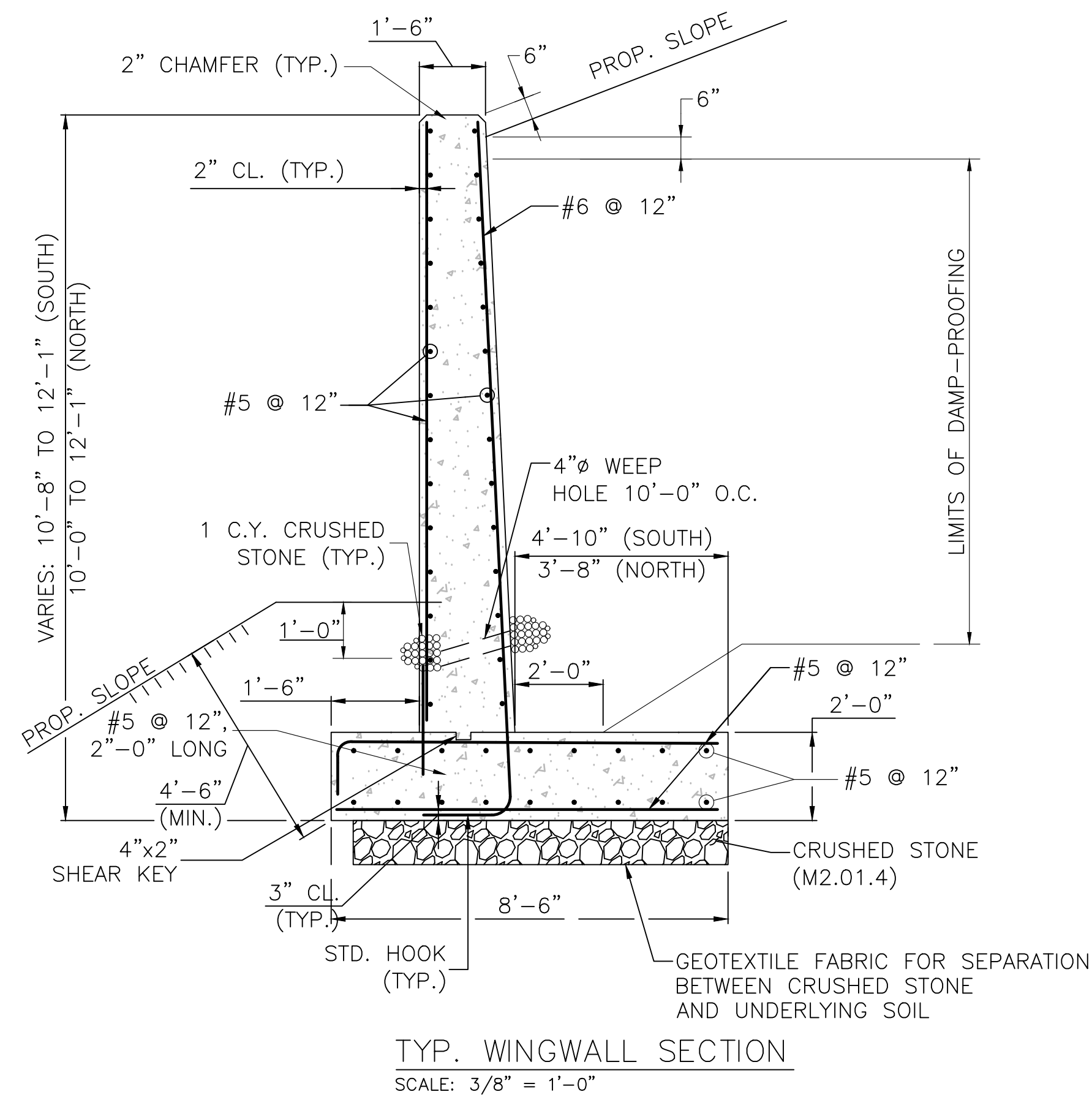


TOWN OF SOUTH HADLEY  
**FOOTING AND WALL PLAN**  
 PEARL ST. CULVERT REPLACEMENT  
 S-18-021 (CK8)  
 SOUTH HADLEY MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: AUGUST 2023  
**STR-07**

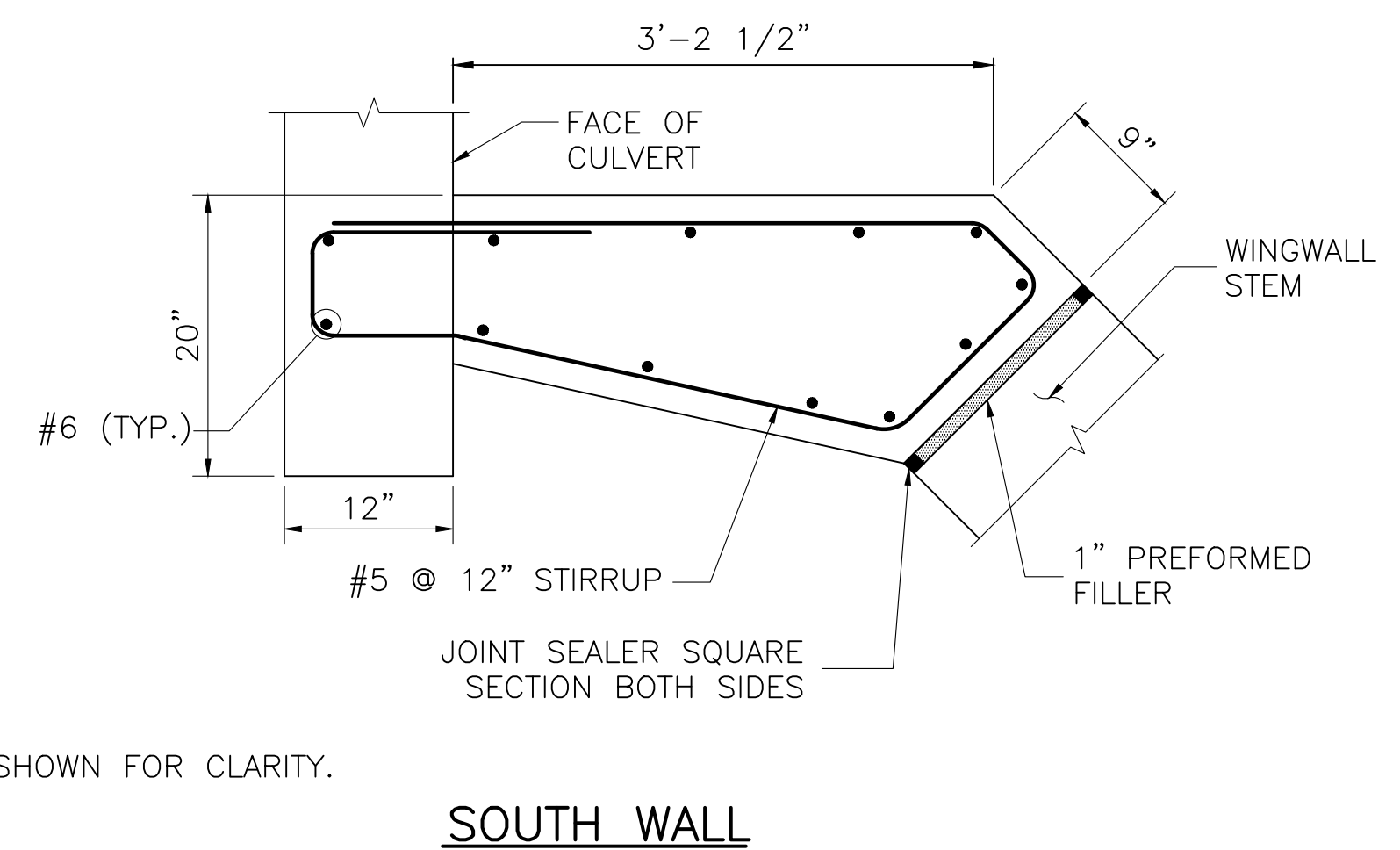
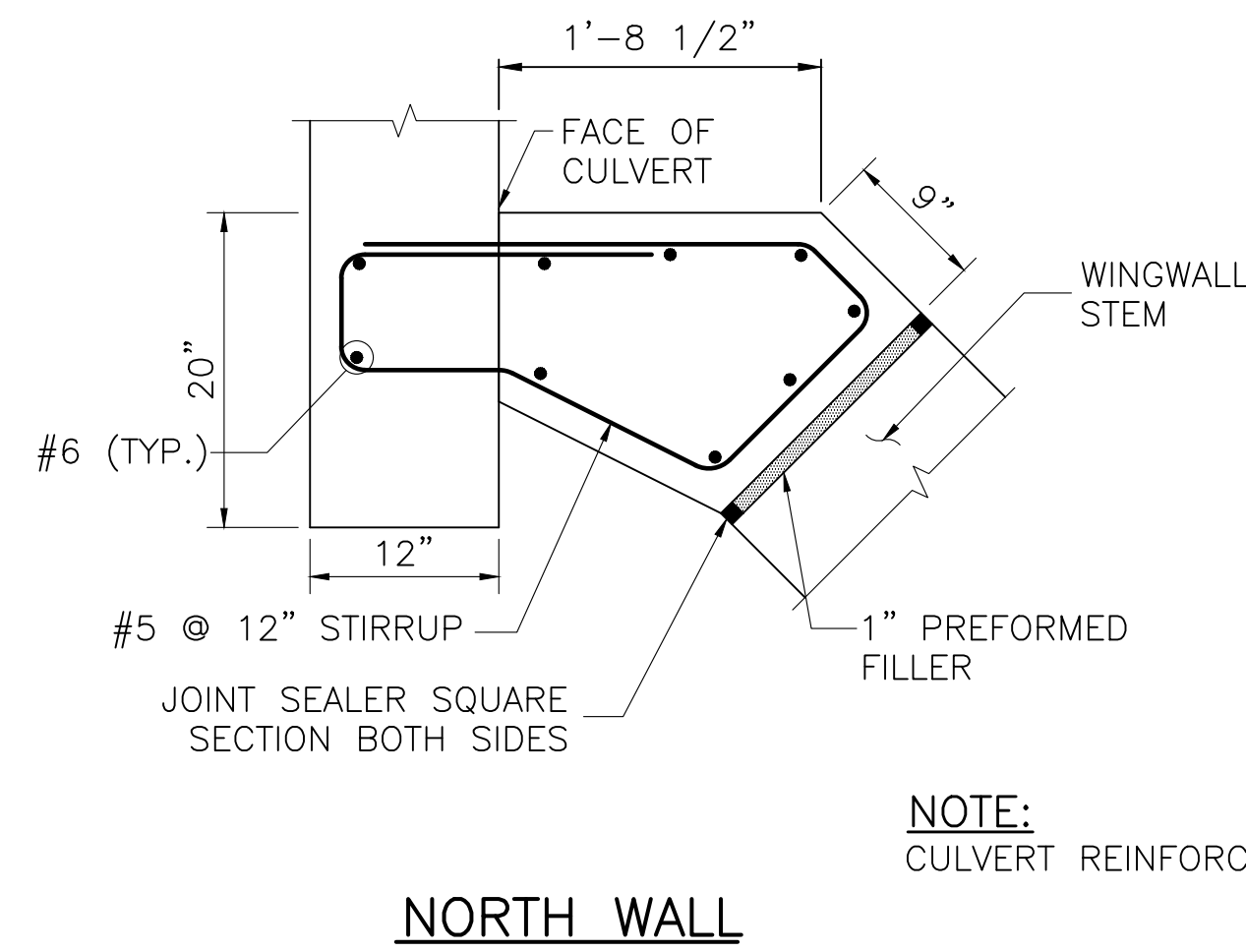


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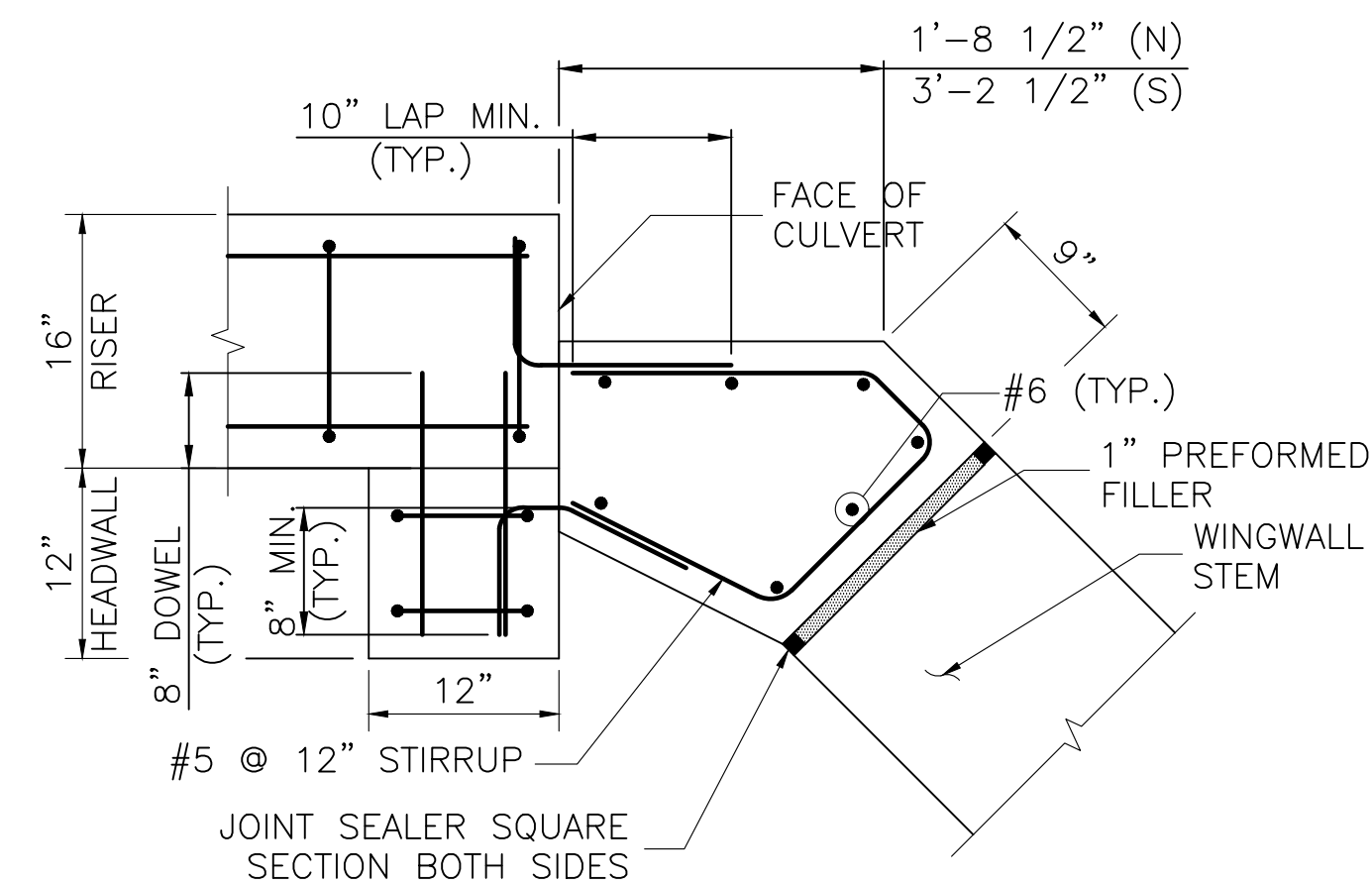
**NOTES:**

- ALL CONCRETE ON THIS SHEET SHALL BE 4000 PSI, 1 1/2 IN, 565 CEMENT CONCRETE.
  - THE FACTORED BEARING PRESSURE = 2.2 KSF AS PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD COMBINATION.
- FACTORED BEARING RESISTANCE = 2.7 KSF. FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE AND A RESISTANCE FACTOR OF 0.45.



**NOTE:**  
 CULVERT REINFORCEMENT IS NOT SHOWN FOR CLARITY.

(A) CULVERT END WALL EXTENSION  
 1" = 1'-0"



(B) WALL EXTENSION AT RISER  
 1" = 1'-0"

**COMMONWEALTH OF MASSACHUSETTS**  
**MassDOT, Highway Division**  
 CONCEPTUAL DESIGN IS ACCEPTABLE  
 TO MASSDOT FOR CONTRACTING  
 DISTRICT TWO BRIDGE ENGINEER  
 DATE: 6/13/2024



SCALE:	HORIZ.: AS NOTED	VERT.: AS NOTED
DATUM:	HORIZ.:	VERT.:
	GRAPHIC SCALE	



TOWN OF SOUTH HADLEY  
 WINGWALL DETAILS  
 PEARL ST. CULVERT REPLACEMENT  
 S-18-021 (CK8)  
 MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: AUGUST 2023

STR-09

No.	DATE	DESCRIPTION	DESIGNER/REVIEWER

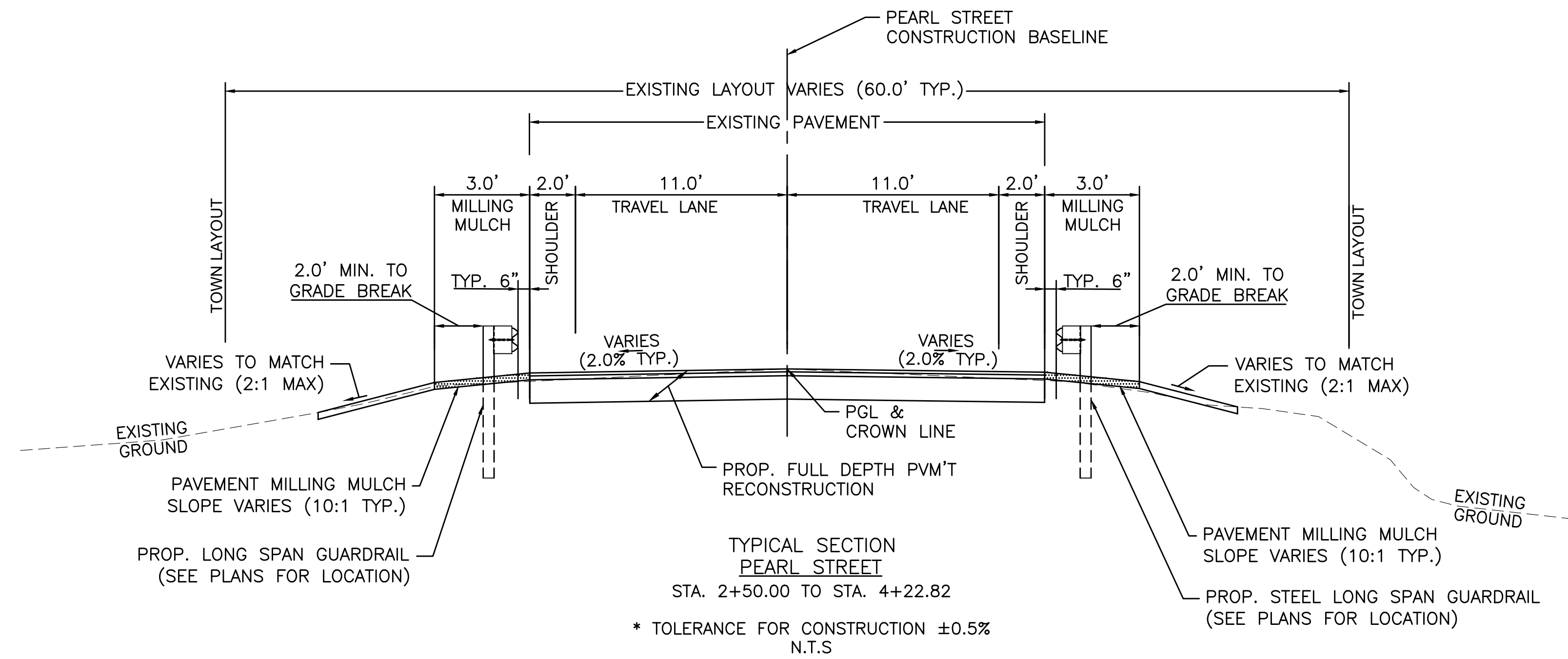











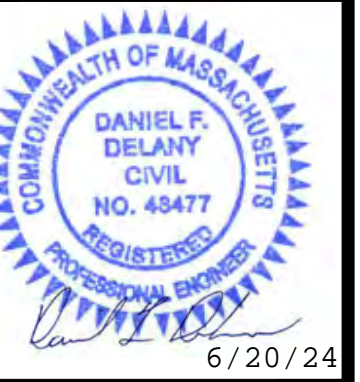


## PEARL STREET PAVEMENT NOTES

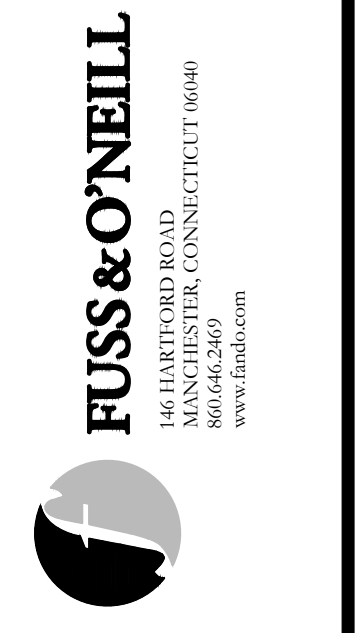
### PROPOSED FULL DEPTH CONSTRUCTION

SURFACE: 1 1/2" SUPERPAVE SURFACE COURSE - 9.5 OVER  
 INTERMEDIATE: 2 1/2" SUPERPAVE INTERMEDIATE COURSE - 12.5 OVER  
 BASE: 12" GRAVEL BORROW, TYPE B. (M1.03.0)

**COMMONWEALTH OF MASSACHUSETTS**  
**MassDOT, Highway Division**  
 CONCEPTUAL DESIGN IS ACCEPTABLE  
 TO MASSDOT FOR CONTRACTING  
  
 DISTRICT TWO BRIDGE ENGINEER      DATE 6/13/2024



SCALE:	HORZ.: AS NOTED	VERT.: AS NOTED
DATUM:	HORZ.:	VERT.:
	GRAPHIC SCALE	



TOWN OF SOUTH HADLEY  
 ROADWAY DETAILS  
 PEARL ST. CULVERT REPLACEMENT  
 S-18-021 (CK8)  
 SOUTH HADLEY MASSACHUSETTS

PROJ. No.: 20150214.B40  
 DATE: AUGUST 2023  
**STR-14**

No.	DATE	DESCRIPTION	DESIGNER REVIEWER