

# LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL · MASSACHUSETTS  
CONSTRUCTION PLANS

DECEMBER 16, 2024

PREPARED FOR  
**CITY OF HAVERHILL**  
DEPT. OF PUBLIC WORKS  
500 PRIMROSE STREET  
HAVERHILL, MA 01830-2660



PREPARED BY  
**FUSS & O'NEILL**  
1550 MAIN STREET, SUITE 400  
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## PROJECT TEAM

MUNICIPAL VULNERABILITY  
PREPAREDNESS PROGRAM  
(MVP)  
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P.O. BOX 767  
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LOCATION MAP  
SCALE: 1" = 1000'

PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024

GI-001








No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAI

SCALE:	
HORZ.:	1"= 150'
VERT.:	
DATUM:	
HORZ.:	NAD83
VERT.:	NAVD88
	
GRAPHIC SCALE	

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CITY OF HAVERHILL

INDEX PLAN

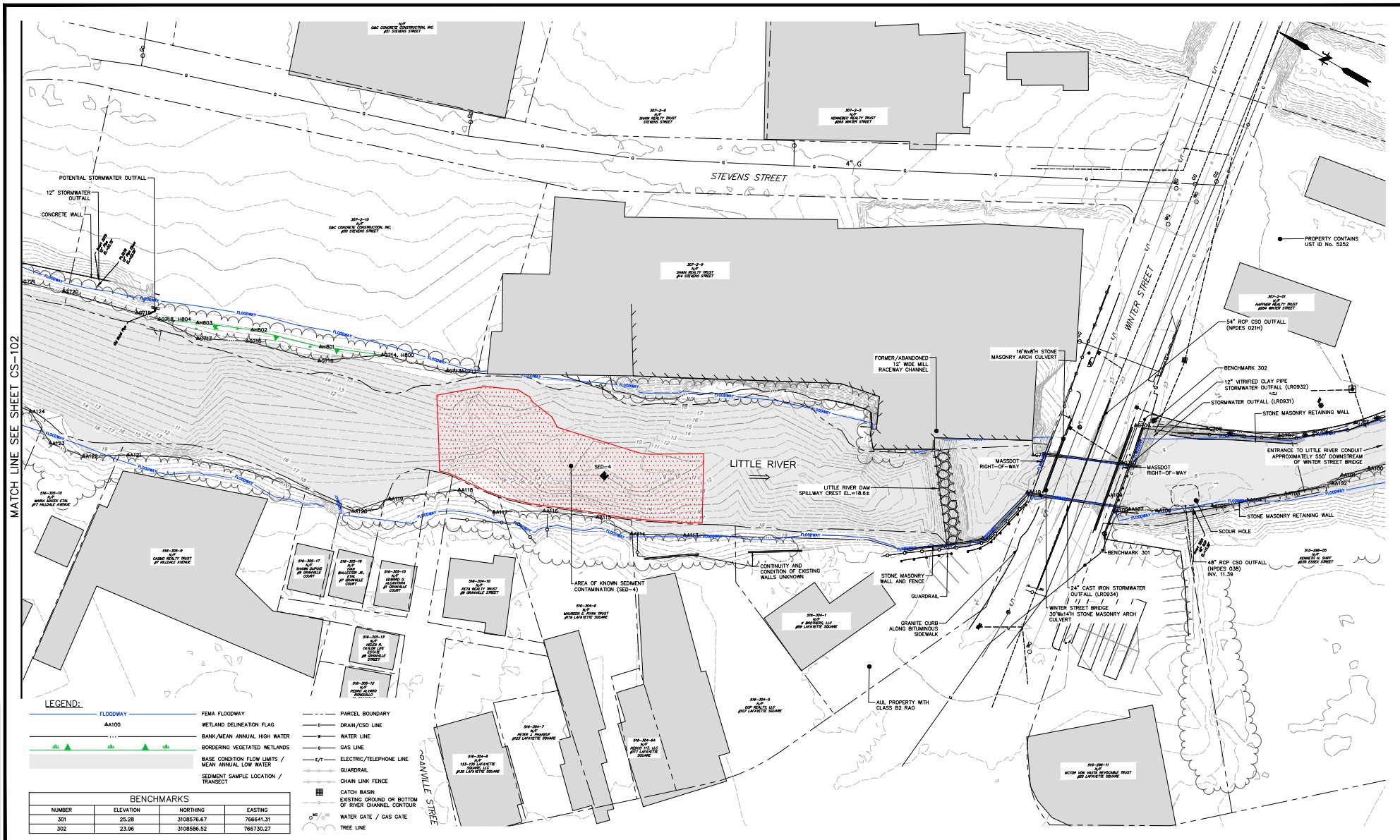
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390 U40  
DATE: DECEMBER 16, 2024

GI-003






BENCHMARKS			
NUMBER	ELEVATION	NORTHING	EASTING
301	25.28	3108576.67	766641.31
302	23.96	3108586.52	766730.27

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE:	HORZ.: 1"= 30'
	VERT.:
DATUM:	HORZ.: NAD83
	VERT.: NAVD88
	
GRAPHIC SCALE	

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CITY OF HAVERHILL

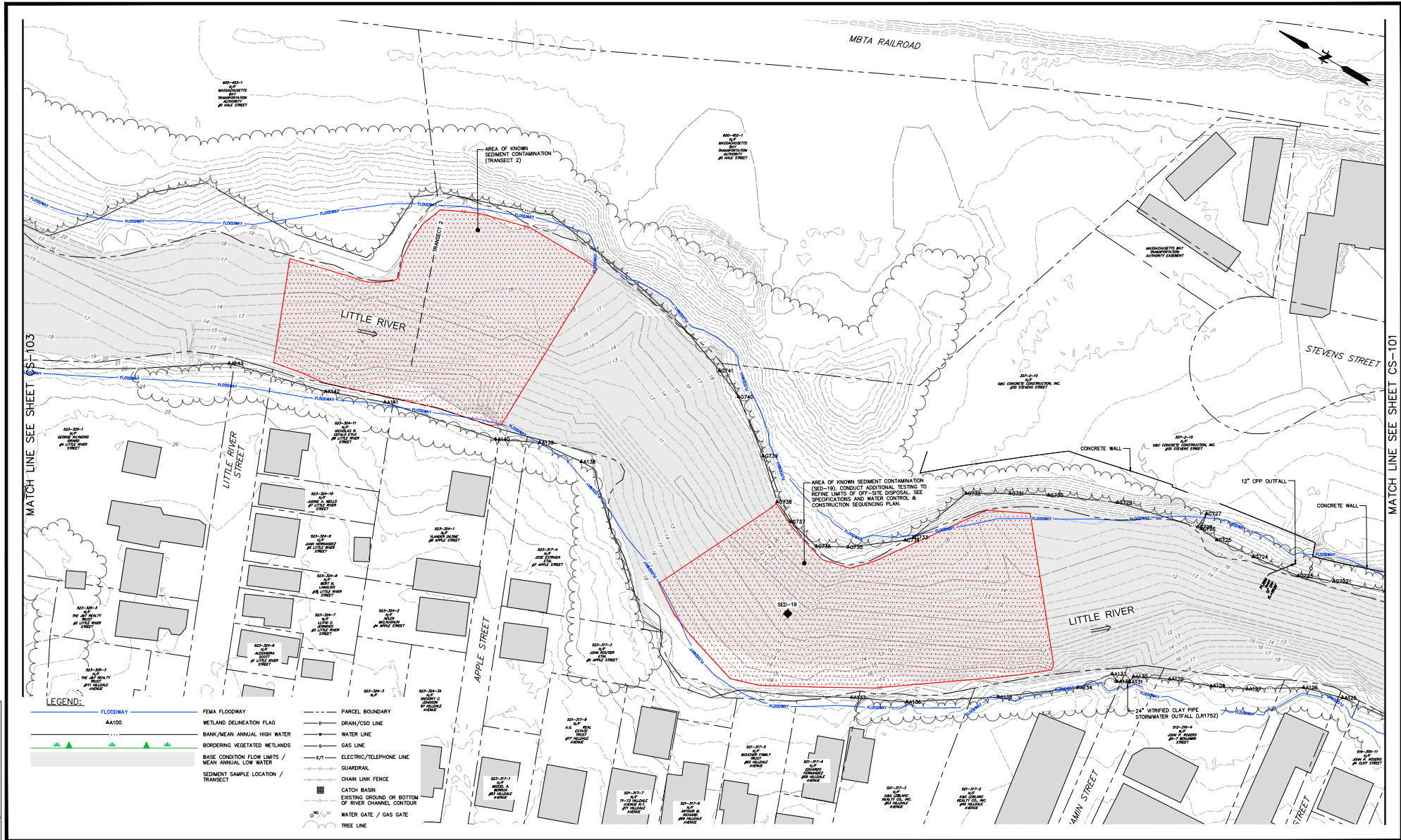
EXISTING CONDITIONS PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

CS-101



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE

HORIZ: 1"= 30'

VERT: 1"= 10'

DATUM: NAD83

HORIZ: NAVD88

VERT: NAVD88

30 15 0 15 30

GRAPHIC SCALE

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EXISTING CONDITIONS PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

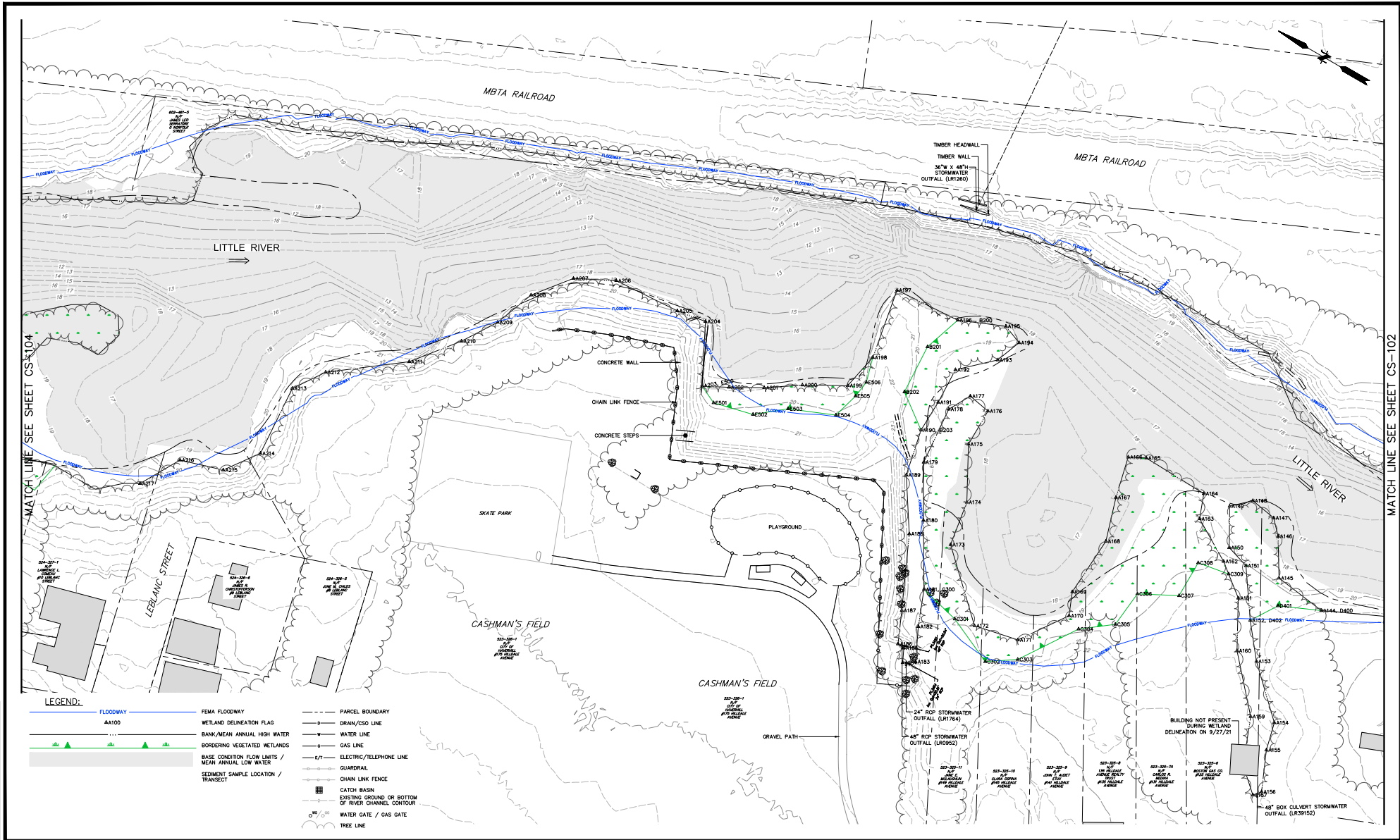
PROJ No.: 20170390.U40

DATE: DECEMBER 16, 2024

**CS-102**



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L3S VIEW: PCS AUTOCAD PDF (GENERAL DOCUMENTATION) PCS STBCTB: FO STB



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

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VERT.:	
DATUM:	HORIZ.: NAD83
VERT.: NAVD88	
GRAPHIC SCALE	30 15 0 15 30

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CITY OF HAVERHILL  
EXISTING CONDITIONS PLAN NO. 3  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL, MASSACHUSETTS

PROJ. No.: 201703090.U40  
DATE: DECEMBER 16, 2024  
**CS-103**













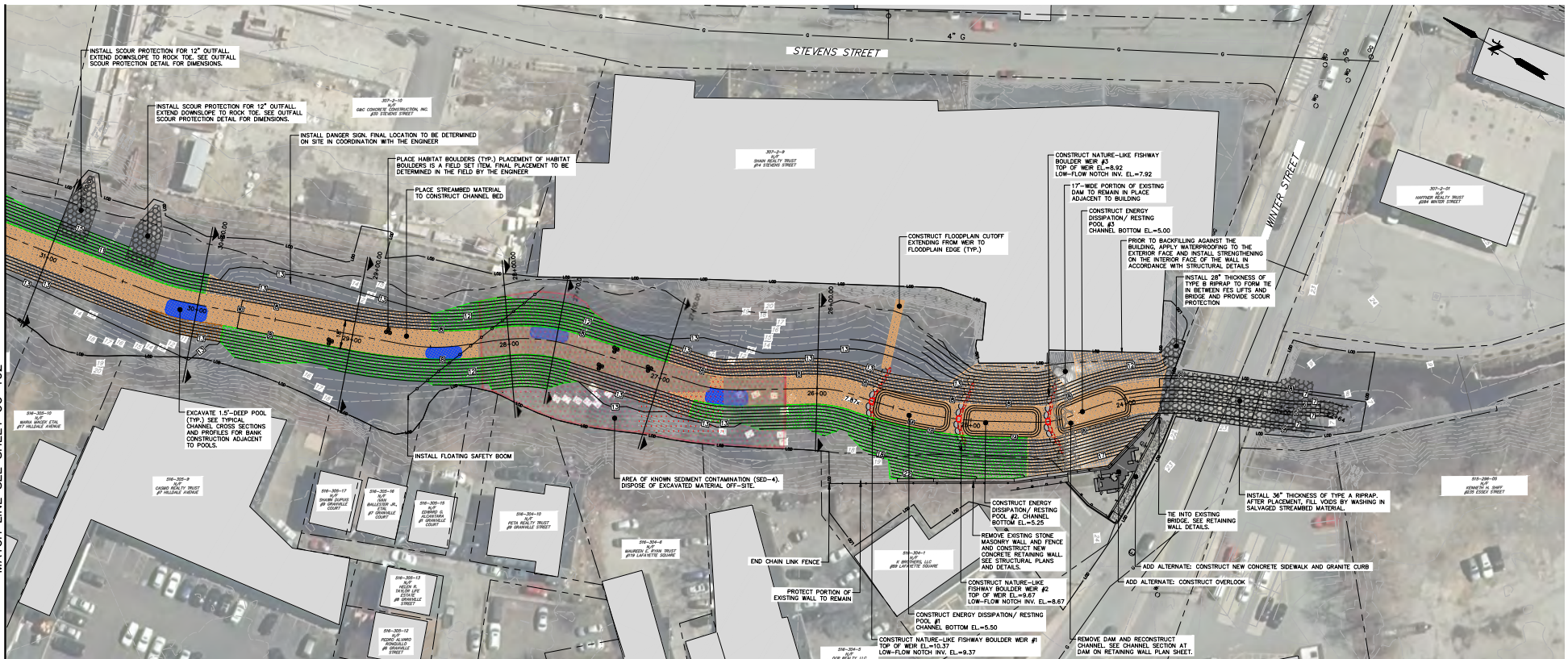








MATCH LINE SEE SHEET CG-102



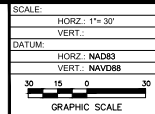
- BANK TREATMENTS (SEE TYPICAL CHANNEL CROSS SECTIONS AND PROFILES):
- SURFACE FABRIC TREATMENT WITH ROCK TOE
  - FABRIC ENCAPSULATED SOIL (FES) LIFTS WITH ROCK TOE
  - LARGE WOOD BANK TREATMENT
  - SURFACE FABRIC TREATMENT
  - POOL



- NOTES:
- EXISTING SURFACE WAS CREATED FROM SPARSE TOPOGRAPHIC DATA. ELEVATIONS SHOWN ARE APPROXIMATE.
  - EXTENTS OF BANK TREATMENT TYPES ARE BASED ON AVAILABLE TOPOGRAPHIC DATA AND SHALL BE VERIFIED IN THE FIELD WITH ENGINEER. THE INTENT IS TO CONSTRUCT FABRIC ENCAPSULATED SOIL LIFTS WITH A ROCK TOE WHERE BANK FULL IS REQUIRED TO ACHIEVE FINISH GRADE AND USE SURFACE FABRIC WITH A ROCK TOE WHERE BANK CUT IS REQUIRED TO ACHIEVE FINISH GRADE.
  - TRAIL SHOWN ON THESE PLANS IS CONCEPTUAL IN NATURE AND GRAPHICALLY DISPLAYS INTENT. LONGITUDINAL SLOPE SHALL NOT EXCEED ONE CONTRACTOR TO STAKE OUT AND VERIFY FINAL TRAIL LOCATION IN FIELD WITH OWNER AND ENGINEER.
  - BOULDERS SALVAGED FROM DAM AND WALL DEMOLITION SHALL BE STOCKPILED FOR REVIEW BY THE ENGINEER FOR INCORPORATION INTO THE PROJECT. BOULDERS NOT SUITABLE FOR RE-USE SHALL BE DISPOSED OFF-SITE.
  - FINISH FLOODPLAIN SURFACES SHALL BE LEFT ROUGHLY GRADED. SEE FLOODPLAIN MICROTOPOGRAPHY DETAIL.



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CITY OF HAVERHILL  
SITE LAYOUT AND GRADING PLAN NO. 1  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL  
MASSACHUSETTS

PROJ No.: 20170309.040  
DATE: DECEMBER 16, 2024  
**CG-101**



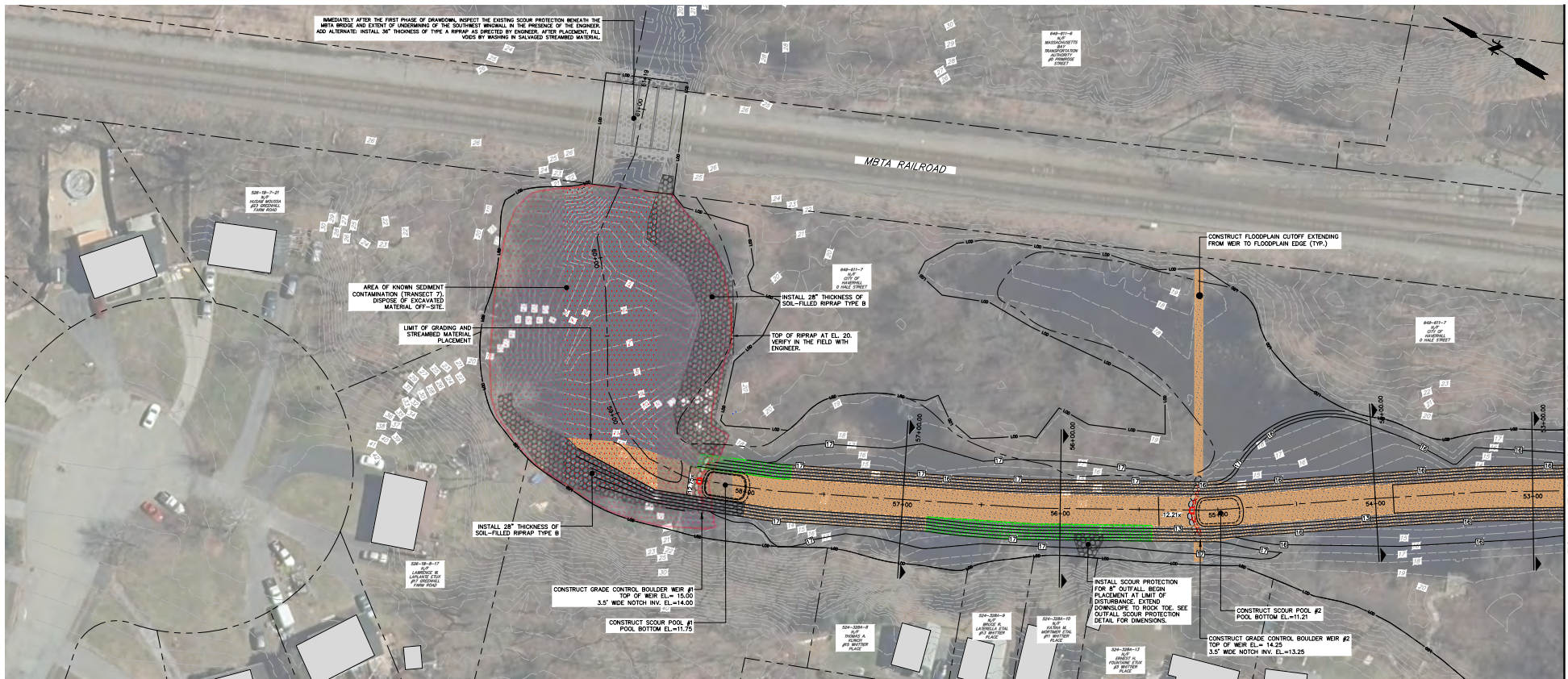




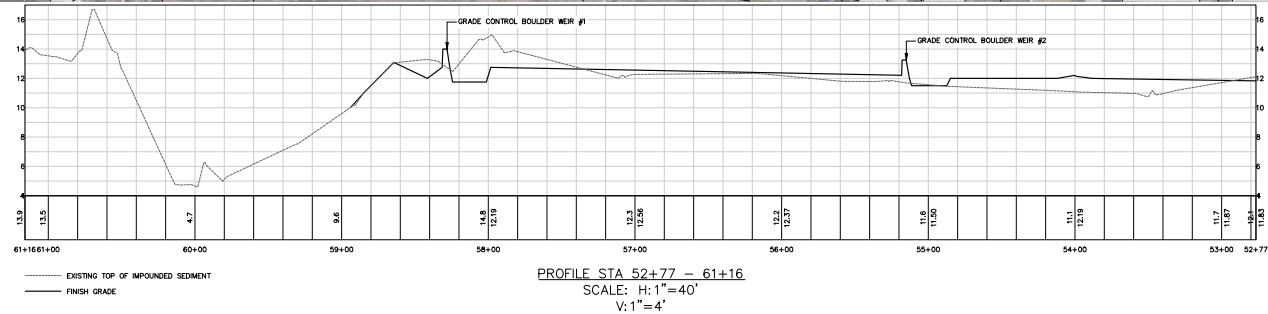




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LAYER: STATE



NOTE: POTENTIAL ELECTRICAL LINE CROSSING RIVER NEAR MBTA RAIL LINE. CONTRACTOR TO CONTACT DIG SAFE TO CONFIRM PRESENCE OR ABSENCE AND LOCATION.



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE  
HORZ.: 1"=30'  
VERT.:  
DATUM: NAD83  
VERT.: NAVD88  
GRAPHIC SCALE

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CITY OF HAVERHILL  
SITE LAYOUT AND GRADING PLAN NO. 4  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

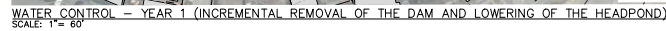
PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024  
**CG-104**

MATCH LINE SEE SHEET CG-103



1. PRIOR TO ANY LAND DISTURBANCE ACTIVITIES, THE CONTRACTOR MUST PHYSICALLY MARK THE LIMITS OF DISTURBANCE IN ACCORDANCE WITH THE APPROVED PLANS.
2. ALL IN-WATER CUT-PRODUCING WORK SHALL OCCUR OUTSIDE OF A TIME OF YEAR RESTRICTION PERIOD OF MARCH 1 TO JUNE 30, ALL IN-WATER WORK SHALL BE SEQUENCED TO OCCUR DURING THE LOW-FLOW PERIOD (E.G., JULY 1 TO OCTOBER 31).
3. IT IS ANTICIPATED THAT THE WORK WILL BE CONDUCTED IN PHASES FOLLOWING TWO CONSECUTIVE LOW-FLOW PERIODS.
4. REMOVAL OF THE DAM SHALL BE SEQUENCED SUCH THAT DRAINDOWN OF THE IMPONDMENT OCCURS AT A RATE OF 12 INCHES PER DAY OR MORE AND THERE BE NO SIGNIFICANT INCREASES TO THE DOWNSTREAM CHANNEL.
5. INCREASINGLY LOWER A 50-FOOT-DEEP CENTRAL SECTION OF THE DAM, DO NOT DISTURB THE DAM STRUCTURE WITHIN THE LIMITS TO REMAIN AND DO NOT DISTURB THE DAM STRUCTURE WITHIN THE LIMITS TO REMAIN TO THE RIGHT, IMMEDIATELY LOWERING SHALL BE PLANNED TO FACILITATE THE WORK WHILE MINIMIZING THE POTENTIAL FOR SEDIMENT MOBILIZATION.
6. MILL BUILDING STRENGTHENING WORK SHALL CONSIST OF WATERPROOFING TO EXTERIOR FACE AND STRENGTHENING ON INTERIOR FACE OF THE DAM. MILL WALL AND MILL BUILDING SHALL BE SEPARATELY WORKED WITH STRUCTURAL DETAILS.
7. MILL BUILDING STRENGTHENING WORK SHALL BE COMPLETE BEFORE FILL IS PLACED AGAINST TO THE MILL BUILDING.
8. THE CONTRACTOR SHALL INSTALL AND OPERATE A WATER CONTROL SYSTEM THAT ALLOWS WORK TO PROGRESS UPSTREAM TO DOWNSTREAM ALONG THE RIVER WITHIN THE PERMITTED TIME FRAME.
9. TEMPORARY OFFROADS SHALL BE USED TO SEPARATE THE WORKING AREA FROM THE REST OF THE RIVER, SOIL DISTURBANCE IN OFFROADED AREAS ON THE WATERCOURSE SHALL CEASE IN THE EVENT OF HIGH FLOWS THAT OVERTOP THE OFFROADS.
10. THE CONTRACTOR SHALL MONITOR WEATHER FORECASTS, STREAM FLOWS, AND WATER LEVELS AND SHALL REMOVE EQUIPMENT AND PERSONNEL FROM THE SITE IF HIGH FLOWS ARE ANTICIPATED OR WHEN DIRECTED.
11. THE CONTRACTOR SHALL MONITOR AND MANAGE TURBIDITY IN COMPLIANCE WITH THE PROJECT PERMITS.
12. THE CONTRACTOR SHALL PREPARE AND SUBMIT COORDINATION DESIGNS, A WATER CONTROL AND DIVERSION PLAN, AND A FLOOD RESPONSE ACTION PLAN TO THE STATE OF CALIFORNIA AND THE PROJECT PERMITS.
13. OTHER SUBMITTALS SHALL BE PREPARED AND SUBMITTED AS INDICATED IN THE SPECIFICATIONS AND PROJECT PERMITS.

1. INSTALL EROSION AND SEDIMENT CONTROL MEASURES.
2. ESTABLISH TEMPORARY ACCESS ENTRANCES AND ROUTES AS REQUIRED TO CONDUCT YEAR 1 WORK.
3. COMPLETE INITIAL DRAINOWIN AND DAM LOWERING FACILITATE IN-STREAM WORK FROM THE WEIR BRIDGE TO APPROPRIATELY STATION 57+60.
4. FOLLOWING INITIAL DRAINOWIN, INSPECT EXISTING WEIR BRIDGE SCOUR PROTECTION IN THE PRESENCE OF THE ENGINEER. ADJUST ALTERNATE: INSTALL ROCK OR BRUSHPILE WITH BRIDGE SCOUR PROTECTION TO BE DOWNSIDE OF THE BRIDGE.
5. PERFORM SEDIMENT REMOVAL OPERATIONS WITHIN LIMITS OF GRADING, INITIAL RIP RAP, AND CONSTRUCT GRADE CONTROL, BOULDER WEIR #1, SCOUR POOL, #1, AND BED AND BANK TREATMENTS FROM THE WEIR TO APPROPRIATELY STATION 57+70.
6. FURTHER DRAIN DOWN THE IMPROVEMENT AND LOWER THE DAM OF FACILITATE IN-STREAM WORK FROM APPROPRIATELY STATION 57+60 TO STATION 58+00.
7. PERFORM SEDIMENT REMOVAL OPERATIONS WITHIN THE AREA OF KNOWN SEDIMENT CONTAMINATION AT TRANSECT 2.
8. COMPLETE WEIR BRIDGE AND YEAR 2 RIP RAP, BED AND BANK TREATMENTS AND INITIAL SCOUR PROTECTION AT DRAINAGE OUTLETS FROM APPROPRIATELY STATION 57+60 TO STATION 58+00.
9. ADJUST ALTERNATE: CONSTRUCT RIVER ACCESS IMPROVEMENTS AT CASHMAN PARK (I.E., RIVER JUMPES AND KAYAK LAUNCH).
10. ADJUST ALTERNATE: CONSTRUCT PEDESTRIAN BRIDGE AND ABUTMENTS AND WALKWAY STRUCTURES, BEGIN WORK ON ASPHALT WALKING TRAIL.
11. SHUT DOWN IN-RIVER WORK NO LATER THAN OCTOBER 31; REMOVE ALL EQUIPMENT, WATER CONTROL, AND EROSION AND SEDIMENT CONTROL FROM THE FLOODPLAIN.
12. RESTORE AND SECURE DISTURBED AREAS AS DESCRIBED IN THE SPECIFICATIONS.
13. COMPLETE MILL BUILDING STRENGTHENING WORK ADJACENT TO THE DAM AND ADJUST ALTERNATE: UPGRADE IMPROVEMENTS AT CASHMAN PARK

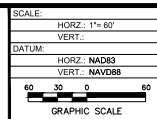


WATER CONTROL - YEAR 1 (CONSTRUCTION OF TEMPORARY UPSTREAM HAUL ROAD, REMOVAL OF CONTAMINATED SEDIMENT, AND CONSTRUCTION OF UPSTREAM RIVER CHANNEL IMPROVEMENTS)

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



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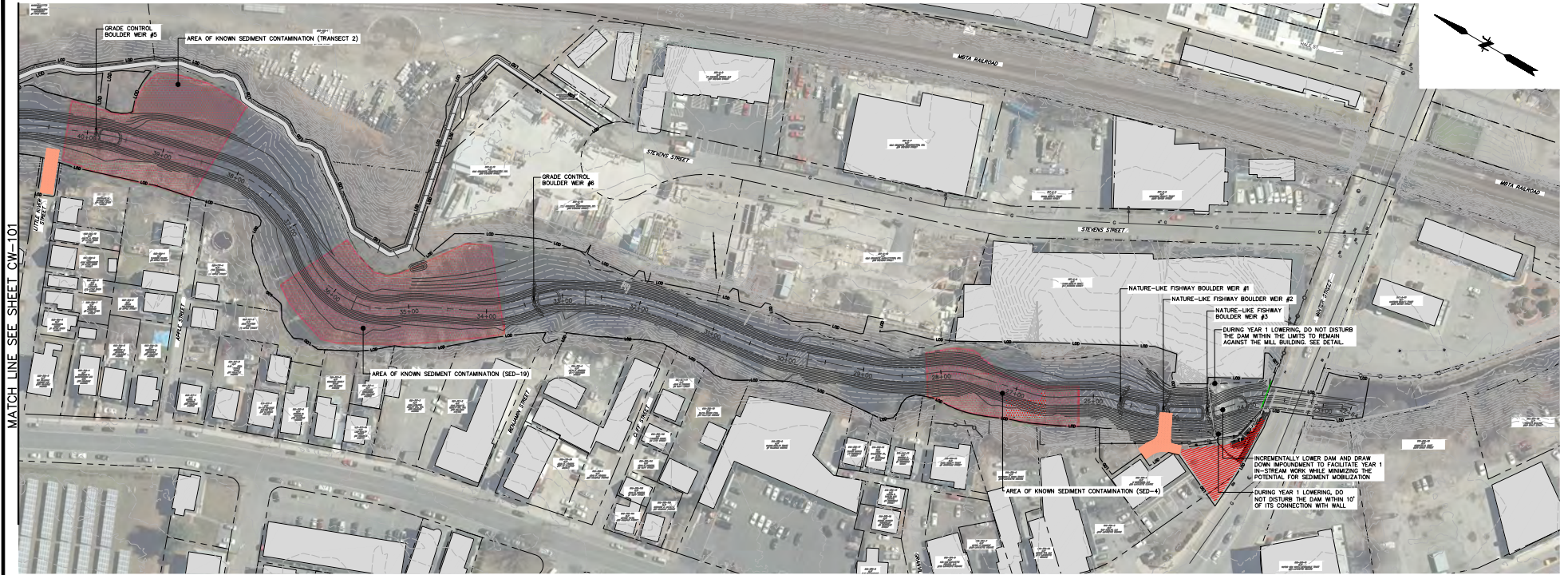
CITY OF HAVERHILL  
CONSTRUCTION SEQUENCING PLAN  
NO. 1  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2017

CW-101



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LAYER: 033 NONE STUCT(B: FO:8)



WATER CONTROL — YEAR 2  
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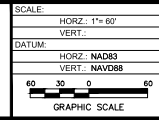
**SUGGESTED CONSTRUCTION SEQUENCE (YEAR 2):**

1. INSTALL EROSION AND SEDIMENT CONTROL MEASURES.
2. ESTABLISH TEMPORARY ACCESS ENTRANCES AND ROUTES AS REQUIRED TO CONDUCT YEAR 2 WORK.
3. FURTHER DRAW DOWN THE IMPOUNDMENT AND LOWER THE DAM TO FACILITATE IN-STREAM WORK FROM APPROXIMATELY STATION 38+00 TO STATION 33+50.
4. PERFORM ADDITIONAL SEDIMENT SAMPLING IN THE AREA OF KNOWN SEDIMENT CONTAMINATION AT SED-19. SAMPLING SHALL COMPLY WITH THE REQUIREMENTS OF THE COMBINED 401 WATER QUALITY CERTIFICATION AND MASSDEP PROTOCOLS. CONTRACTOR SHALL SUBMIT SAMPLING DATA, INCLUDING A PLAN OF THE SAMPLE LOCATIONS, SAMPLING METHODS AND DEPTHS, AND LABORATORY QA/QC DATA TO MASSDEP. THE RESULTS SHALL BE USED BY THE ENGINEER TO REFINED THE LIMITS OF THE OF THE LEAD AND PAHS-IMPACTED SEDIMENT IN THAT AREA.
5. PERFORM SEDIMENT REMOVAL OPERATIONS WITHIN THE REFINED AREA OF KNOWN SEDIMENT CONTAMINATION AT SED-19.
6. CONSTRUCT BED AND BANK TREATMENTS FROM APPROXIMATELY STATION 38+00 TO STATION 33+50.
7. COMPLETE DRAWDOWN OF THE IMPOUNDMENT AND REMOVE THE CENTRAL SECTION OF THE DAM TO STREAMBED LEVEL.
8. PERFORM SEDIMENT REMOVAL OPERATIONS WITHIN THE AREA OF KNOWN SEDIMENT CONTAMINATION AT SED-4.
9. CONSTRUCT GRADE CONTROL BOULDER WEIR #6, SCOUR POOL #6, AND BED AND BANK TREATMENTS AND INSTALL SCOUR PROTECTION AT DRAINAGE OUTLETS FROM APPROXIMATELY STATION 33+50 TO STATION 25+75.
10. INSTALL FLOATING SAFETY BOOM.
11. CONSTRUCT NATURE-LIKE FISHWAY BOULDER WEIR #1, ENERGY DISSIPATION/RESTING POOL #1, AND ASSOCIATED BED AND BANK TREATMENTS.
12. REMOVE FULL VERTICAL EXTENT OF THE DAM AND EXISTING STONE MASONRY WALL AT WINTER STREET WITHIN THE LIMITS SHOWN ON THE DRAWINGS. PORTIONS OF DAM AND WALL TO REMAIN ON RIVER RIGHT SHALL BE DETERMINED IN THE FIELD WITH THE ASSISTANCE OF THE ENGINEER.
13. CONSTRUCT NEW CONCRETE RETAINING WALL.
14. CONSTRUCT NATURE-LIKE FISHWAY BOULDER WEIRS #2 AND 3, ENERGY DISSIPATION/RESTING POOLS #2 AND 3, AND COMPLETE BED AND BANK TREATMENTS.
15. RELOCATE TURBIDITY CURTAIN TO DOWNSTREAM LIMIT OF DISTURBANCE.
16. INSTALL RIP RAP BENEATH WINTER STREET.
17. SHUT DOWN IN-RIVER WORK NO LATER THAN OCTOBER 31. REMOVE ALL EQUIPMENT, WATER CONTROL, AND EROSION AND SEDIMENT CONTROL FROM THE FLOODWAY.
18. RESTORE AND SEED DISTURBED AREAS AS DESCRIBED IN THE SPECIFICATIONS.
19. ADD ALTERNATE: CONSTRUCT UPLAND IMPROVEMENTS AT THE OVERLOOK.
20. ADD ALTERNATE: COMPLETE ASPHALT WALKING TRAIL.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



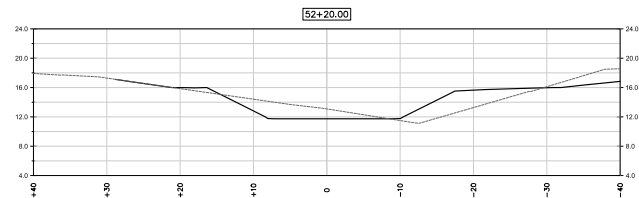
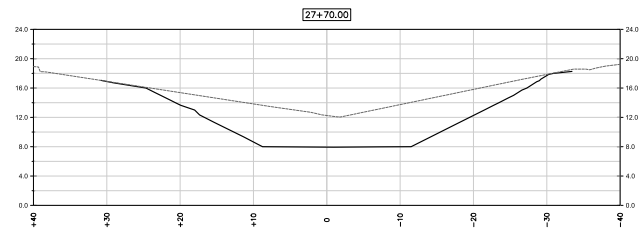
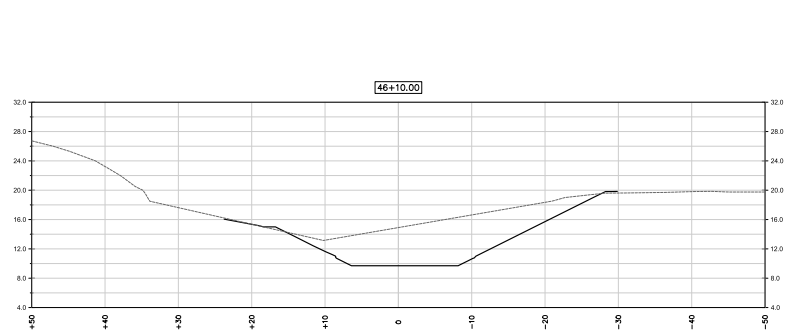
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CITY OF HAVERHILL  
CONSTRUCTION SEQUENCING PLAN  
NO. 2  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

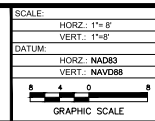
PROJ. No.: 201703090.U40  
DATE: DECEMBER 16, 2024  
**CW-102**



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CITY OF HAVERHILL

GRADING CROSS SECTIONS

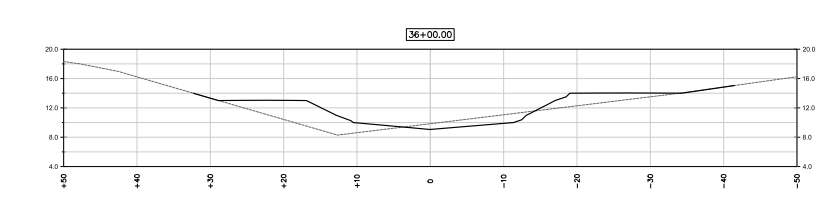
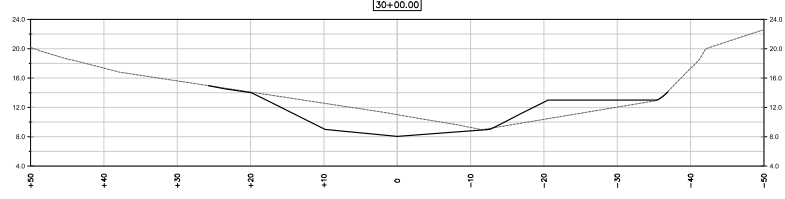
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

ROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024

CX-301





----- EXISTING GRADE  
 \_\_\_\_\_ FINISH GRADE


NOTE: EXISTING SURFACE WAS CREATED  
 FROM SPARSE TOPOGRAPHIC DATA.  
 ELEVATIONS SHOWN ARE APPROXIMATE.

MS VIEW:  LAYER STATE:  PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB

HAS VIEW 				
No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



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	VERT.: 1"=8'
DATUM:	HORZ.: NAD83
	VERT.: NAVD88
	
GRAPHIC SCALE	

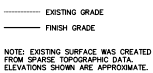
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CITY OF HAVERHILL  
GRADING CROSS SECTIONS  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

ROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024

CX-302





SCALE:	HORZ.: 1"= 8'
	VERT.: 1"=8'
DATUM:	HORZ.: NAD83
	VERT.: NAVD88
GRAPHIC SCALE	

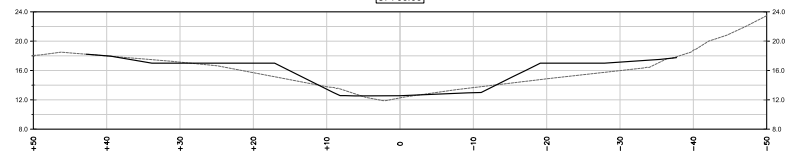
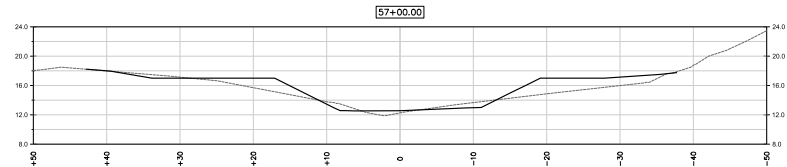
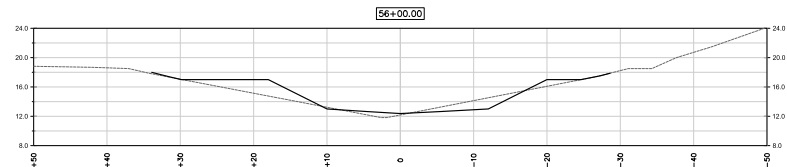
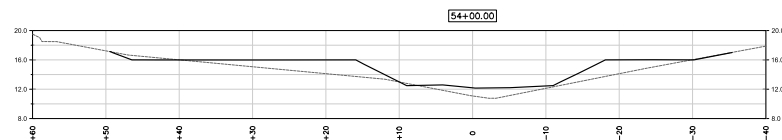
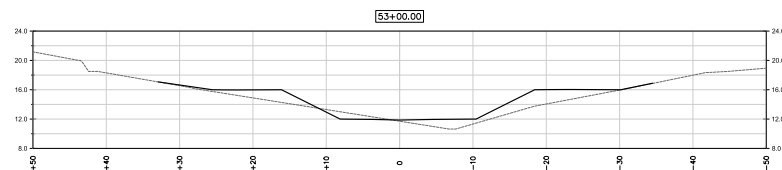
CITY OF HAVERHILL

GRADING CROSS SECTIONS


LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

CX-303



NOTE: EXISTING SURFACE WAS CREATED  
FROM SPARSE TOPOGRAPHIC DATA.  
ELEVATIONS SHOWN ARE APPROXIMATE.

SCALE:	HORZ.: 1"= 8'
	VERT.: 1"=8'
DATUM:	HORZ.: NAD83
	VERT.: NAVD88
	
GRAPHIC SCALE	

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O'NEILL**  
1550 MAIN STREET, SUITE 400  
SPRINGFIELD, MA 01103  
413.452.0445  
www.fando.com

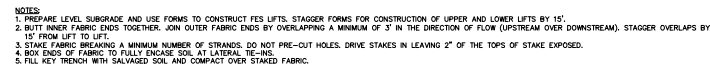
CITY OF HAVERHILL  
GRADING CROSS SECTIONS  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

CX-304

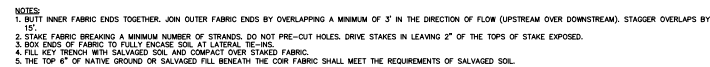




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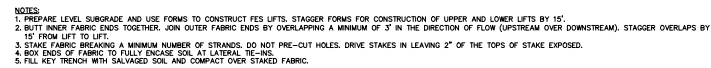
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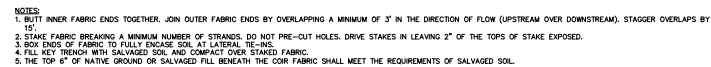
NOT TO SCALE



NOT TO SCALE



NOT TO SCALE




NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER	



SEAL

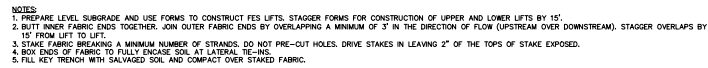
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	VERT.:
DATUM:	HORZ.: NAD83
	VERT.: NAVD88
	
GRAPHIC SCALE	

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O'NEILL**  
1550 MAIN STREET, SUITE 400  
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[www.fando.com](http://www.fando.com)

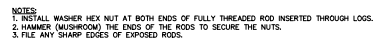
CITY OF HAVERHILL  
TYPICAL CHANNEL CROSS SECTIONS AND  
PROFILES  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024

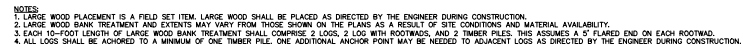
CT-301



TYPICAL SECTION: LARGE WOOD BANK TREATMENT  
NOT TO SCALE



LOG CONNECTION DETAIL  
NOT TO SCALE



LARGE WOOD BANK TREATMENT TYPICAL LAYOUT  
NOT TO SCALE

SEAL

**FUSS &  
O'NEILL**

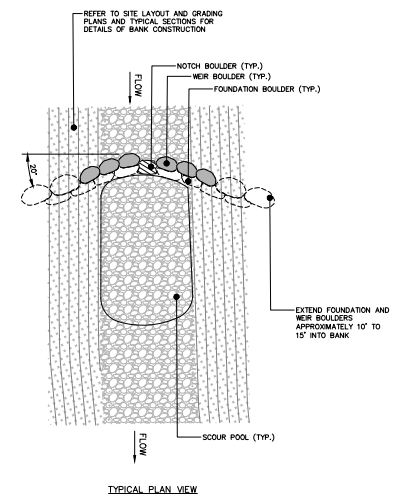
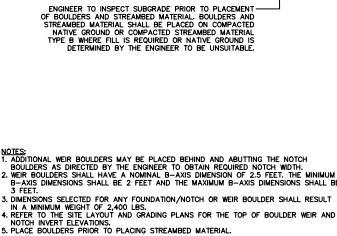
1550 MAIN STREET, SUITE 400  
SPRINGFIELD, MA 01103  
413.452.0445  
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CITY OF HAVERHILL  
TYPICAL CHANNEL CROSS SECTIONS AND  
PROFILES  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

ROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024

CT-302

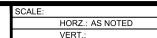




No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL



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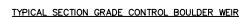
CITY OF HAVERHILL  
TYPICAL CHANNEL CROSS SECTIONS AND  
PROFILES  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

CT-303



SCALE 1"=10'



**NOTES:**

1. ADDITIONAL WEIR BOULDERS MAY BE PLACED BEHIND AND ABUTTING THE NOTCH BOULDERS AS DIRECTED BY THE ENGINEER TO OBTAIN REQUIRED NOTCH WIDTH.
2. WEIR BOULDERS SHALL HAVE A NOMINAL B-Axis DIMENSION OF 2.5 FEET. THE MINIMUM B-Axis DIMENSIONS SHALL BE 2 FEET AND THE MAXIMUM B-Axis DIMENSIONS SHALL BE 3 FEET.
3. DIMENSIONS SELECTED FOR ANY FOUNDATION/NOTCH OR WEIR BOULDER SHALL RESULT IN A MINIMUM WEIGHT OF 2,400 LBS.
4. REFER TO THE SITE LAYOUT AND GRADING PLANS FOR THE TOP OF BOULDER WEIR AND NOTCH INVERT ELEVATIONS.
5. PLACE BOULDERS PRIOR TO PLACING STREAMBED MATERIAL.

ENGINEER TO INSPECT SUBGRADE PRIOR TO  
PLACEMENT OF BOULDERS AND STREAMBED MATERIAL.  
BOULDERS AND STREAMBED MATERIAL SHALL BE  
PLACED ON COMPACTED NATIVE GROUND OR  
COMPACTED STREAMBED MATERIAL TYPE B WHERE  
FILL IS REQUIRED OR NATIVE GROUND IS DETERMINED  
BY THE ENGINEER TO BE UNSUITABLE.



NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE:

HOR.: AS NOTED

VERT.:

DATUM:

HOR.: NAD83

VERT.: NAVD88

1 0 1

GRAPHIC SCALE

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CITY OF HAVERHILL  
TYPICAL CHANNEL CROSS SECTIONS AND  
PROFILES  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024





CT-304



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DWS VIEW: PC3 NONE STBCTB: FOSTB LAYER STATE: 0



#### LEGEND:

-  LARGE CONSERVATION GRADE SHADE TREE
-  CONSERVATION GRADE ORNAMENTAL TREE
-  CONSERVATION GRADE SHRUB BED
-  EXISTING TREE TO REMAIN

#### LANDSCAPE GRADE PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE
<b>LARGE SHADE TREES</b>				
AR	ACER RUBRUM	RED MAPLE	8	2'-2 1/2' CAL.
AS	ACER SACCHARINUM	SILVER MAPLE	2	2'-2 1/2' CAL.
BA	BETULA ALLEGHANENSIS	YELLOW BIRCH	1	2'-2 1/2' CAL.
PO	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	3	2'-2 1/2' CAL.
PS	PRUNUS SEROTINA	BLACK CHERRY	2	2'-2 1/2' CAL.
UA	ULMUS AMERICANA	AMERICAN ELM	11	2'-2 1/2' CAL.
<b>ORNAMENTAL TREES</b>				
AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	9	6'-8' HT.
BP	BETULA POPULIFOLIA	GREY BIRCH	27	1'-1 1/2' CAL.
CA	CORNUS ALTERNIFOLIA	PAGODA DOGWOOD	2	1'-1 1/2' CAL.
CC	CARPINUS CAROLINIANA	AMERICAN HORNBEAM	7	1'-1 1/2' CAL.

#### CONSERVATION GRADE PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE
<b>LARGE SHADE TREES</b>				
AR	ACER RUBRUM	RED MAPLE	35	4'-6"
AS	ACER SACCHARINUM	SILVER MAPLE	35	4'-6"
BA	BETULA ALLEGHANENSIS	YELLOW BIRCH	25	4'-6"
PO	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	30	4'-6"
PD	POPULUS DELTOIDES	COTTONWOOD	15	4'-6"
PS	PRUNUS SEROTINA	BLACK CHERRY	30	4'-6"
QP	QUERCUS PALUSTRIS	PIN OAK	15	4'-6"
UA	ULMUS AMERICANA	AMERICAN ELM	15	4'-6"
<b>ORNAMENTAL TREES</b>				
AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	75	4'-6"
BP	BETULA POPULIFOLIA	GREY BIRCH	65	4'-6"
CA	CORNUS ALTERNIFOLIA	PAGODA DOGWOOD	28	4'-6"
CC	CARPINUS CAROLINIANA	AMERICAN HORNBEAM	70	4'-6"

#### CONSERVATION GRADE PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE
<b>SHRUBS</b>				
AA	ARONIA ARBUTIFOLIA	RED CHOKEBERRY	45	1 GAL.
AI	ALNUS INCANA	SPECKLED ALDER	100	1 GAL.
AM	ARONIA MELANOCARPA	BLACK CHOKEBERRY	30	1 GAL.
CP	CLETHRA ALNIFOLIA	SWEET PEPPERBUSH	65	1 GAL.
CS	CORNUS SERICEA	RED-OSIER DOGWOOD	100	1 GAL.
CV	HAMAMELIS VIRGINIANA	WITCH HAZEL	85	1 GAL.
IV	ILEX VERTICILLATA	WINTERBERRY HOLLY	100	1 GAL.
KA	KALMA ANGUSTIFOLIA	SHEEP LAUREL	60	1 GAL.
SD	SALIX DISCOLOR	FUSSY WILLOW	100	1 GAL.
VO	VACONUM CORYMBOSUM	HIGHBUSH BLUEBERRY	75	1 GAL.
VL	VIBURNUM LENTAGO	NANNYBERRY	80	1 GAL.

NOTE: SHRUBS TO BE PLANTED APPROXIMATELY 6" ON CENTER, MINIMUM OF THREE (3) DIFFERENT SPECIES PER SHRUB BED.

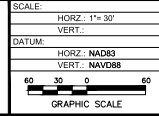
#### PLANTING NOTES:

- ALL PLANTING MATERIAL TO BE NURSERY GROWN STOCK SUBJECT TO A.A.N. STANDARDS
- THE CONTRACTOR SHALL SUPPLY ALL PLANTS IN QUANTITIES SUFFICIENT TO COMPLETE THE WORK, SHOWN ON THE DRAWINGS AND LISTED IN THE PLANT LIST. IN THE EVENT OF A DISCREPANCY BETWEEN QUANTITIES SHOWN IN THE PLANT LIST AND THOSE REQUIRED BY THE DRAWINGS, THE LARGER NUMBER SHALL APPLY.
- PRECISE LOCATION OF ITEMS NOT DIMENSIONED ON THE PLAN ARE TO BE FIELD STAKED BY THE CONTRACTOR AND SHALL BE SUBJECT TO THE REQUIREMENTS SPECIFIED IN THE PREVIOUS NOTE.
- ALL SHRUB MASSINGS AND TREE PITS SHALL BE MULCHED TO A DEPTH OF 3" WITH SHREDDED PINE BARK MULCH.
- TREES SHALL NOT BE STAKED UNLESS OTHERWISE NOTED.
- THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGED VEGETATION AND SHALL REPLACE OR REPAIR ANY DAMAGED MATERIAL AT HIS OWN EXPENSE.
- ALL SHRUB AND GROUND COVER PLANTING AREAS SHALL HAVE CONTINUOUS BEDS OF TOPSOIL 12" DEEP. ALL SOIL AND HYDROSEED AREAS SHALL HAVE A MINIMUM TOPSOIL BED OF 6".
- THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES IN THE FIELD, WHERE PLANT MATERIAL MAY INTERFERE WITH UTILITIES, THE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT TO COORDINATE THEIR INSTALLATION.
- FOR PLANTING SOIL MIX, SEE SPECIFICATIONS OR PLANTING DETAILS.
- ALL EXISTING RILL, GULLY OR CHANNEL EROSION SHALL BE FILLED WITH APPROPRIATE BACKFILL MATERIAL, FINE RAKED, SCARIFIED AND STABILIZED WITH APPROPRIATE VEGETATIVE MATERIAL AND / OR APPROPRIATE SEDIMENTATION AND EROSION CONTROL MEASURES.
- ADJUSTMENTS IN THE LOCATION OF THE PROPOSED PLANT MATERIAL AS A RESULT OF EXISTING VEGETATION TO REMAIN SHALL BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL MAINTENANCE REPAIR AND REPLACEMENT OF PLANT MATERIAL, AS REQUIRED, FOR THE DURATION OF THE PROJECT AND SUBSEQUENT WARRANTY PERIOD.
- PLANTINGS INSTALLED IN THE DRY SUMMER MONTHS AND / OR LAWN SEEDS OUT OF SPRING OR FALL PERIODS, IF ALLOWED BY OWNER, WILL REQUIRE AGGRESSIVE IRRIGATION PROGRAMS AT THE CONTRACTOR'S EXPENSE, UNLESS OTHERWISE DIRECTED BY THE OWNER.
- UPON COMPLETION OF PLANTING, REMOVE FROM SITE ALL EXCESS SOIL, MULCH, AND MATERIALS AND DEBRIS RESULTING FROM WORK OPERATIONS. CLEAN UP SHOULD BE COMPLETED AT THE END OF EACH WORKING DAY. RESTORE TO ORIGINAL CONDITIONS ALL DAMAGED PAVEMENTS, PLANTING AREAS, STRUCTURES AND LAWN AREAS RESULTING FROM LANDSCAPING OPERATIONS.
- CONTRACTOR SHALL SURVEY, LOCATE, AND PROTECT ALL TREES WITHIN AREAS SHOWN AS 'EXISTING VEGETATION TO REMAIN' WITHIN THE DEVELOPMENT ENVELOPE FOR REVIEW BY THE LANDSCAPE ARCHITECT PRIOR TO CLEARING OPERATIONS.
- CONTRACTOR TO RESEED ALL DISTURBED AREAS.
- LOCATIONS OF TREE AND SHRUB PLANTINGS TO BE VERIFIED IN THE FIELD AND CONFIRMED BY LANDSCAPE ARCHITECT.
- SEE RESTORATION PLANS FOR SEED MIX AND TUBELING PLANTING.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

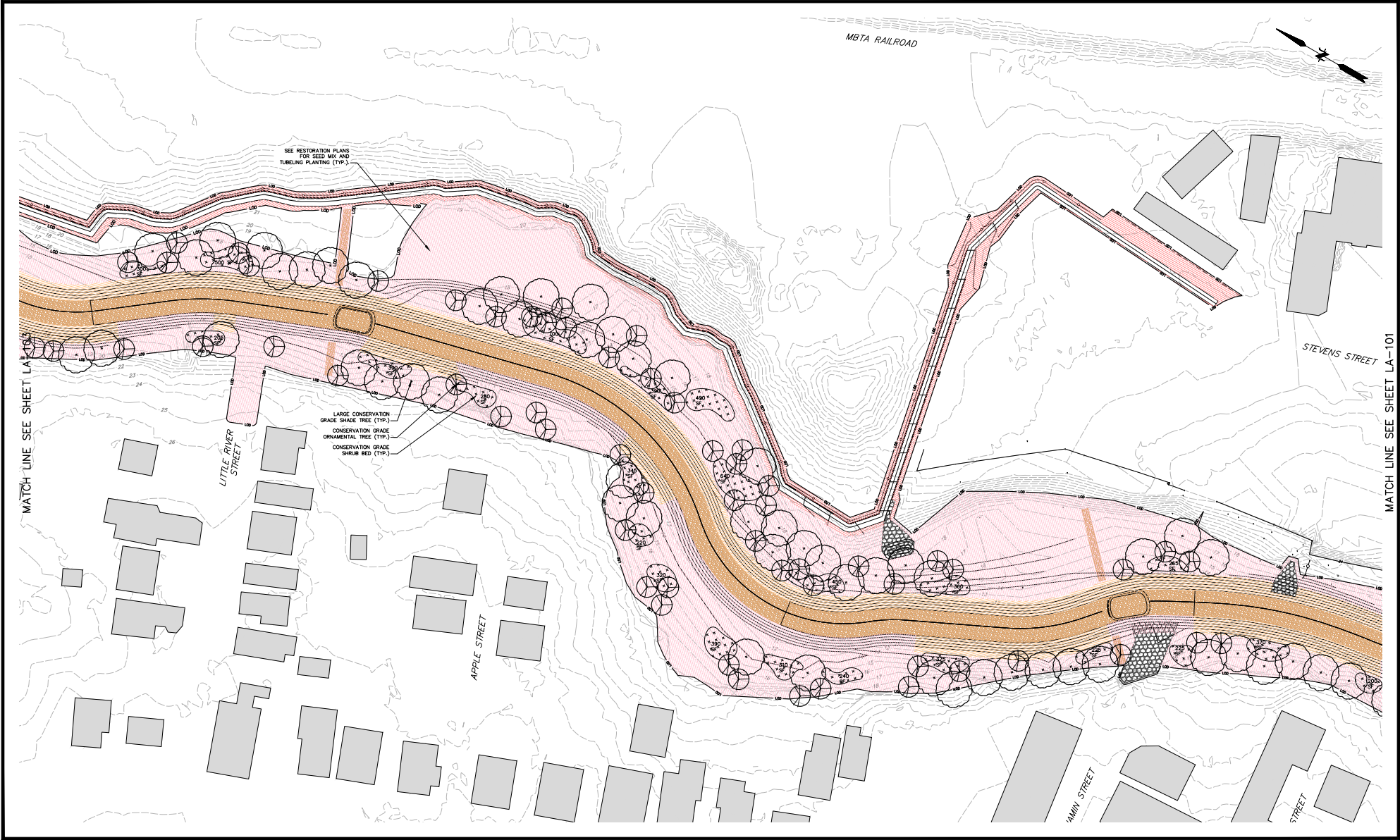


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CITY OF HAVERHILL  
LANDSCAPE AND PLANTING  
PLAN NO. 1  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL, MASSACHUSETTS

PROJ. No.: 20170309.040  
DATE: DECEMBER 16, 2024  
**LA-101**

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LWS VIEW: LAYER STATE: PC3 NONE STBCTB: FOSTB



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE

HORIZ.: 1" = 30'

VERT.: 1" = 10'

DATUM: NAD83

VERT.: NAVD88

GRAPHIC SCALE

60 30 0 30 60

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CITY OF HAVERHILL  
LANDSCAPE AND PLANTING  
PLAN NO. 2  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

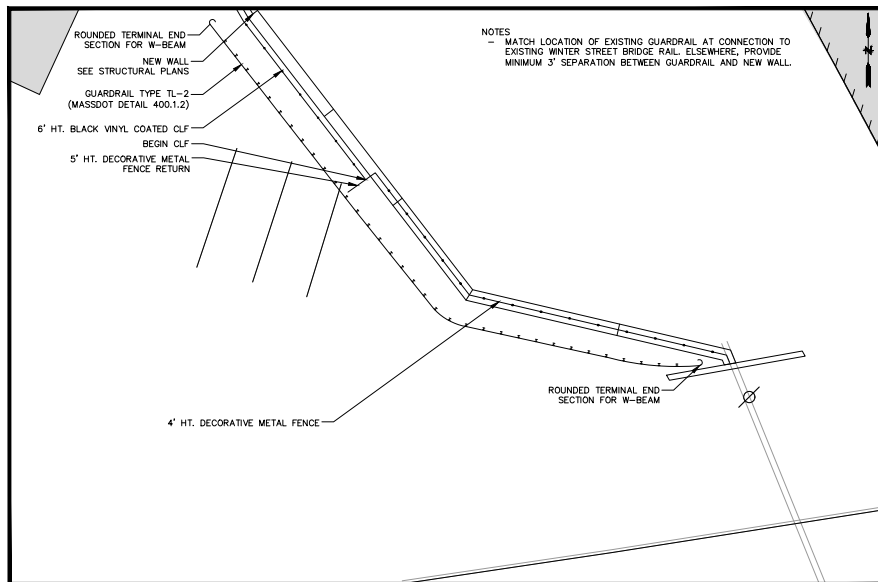
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DATE: DECEMBER 16, 2024  
**LA-102**











1 BASE BID: RETAINING WALL - SITE PLAN ENLARGEMENT  
SCALE: 1" = 10'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE:

HORZ.: 1"= 10'

VERT.:

DATUM:

HORZ.: NAD83

VERT.: NAVD88

10 5 0 10

GRAPHIC SCALE

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[www.fando.com](http://www.fando.com)

CITY OF HAVERHILL

SITE PLAN ENLARGEMENTS

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS







PERENNIALS AND GRASSES

CR	CAREX ROSEA	ROSY SEDGE	45	1 GAL.
PV	PANICUM VIRGATUM	SWITCHGRASS	56	1 GAL.
DP	DENNSTAEDIA PUNCTLOBULA	HAY-SCENTED FERN	47	1 GAL.
AC	AQUILEGIA CANADENSIS	RED COLUMBINE	21	1 GAL.
AT	ASCLEPIAS TUBEROSA	BUTTERFLY MILKWEED	23	1 GAL.
AN	ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	20	1 GAL.

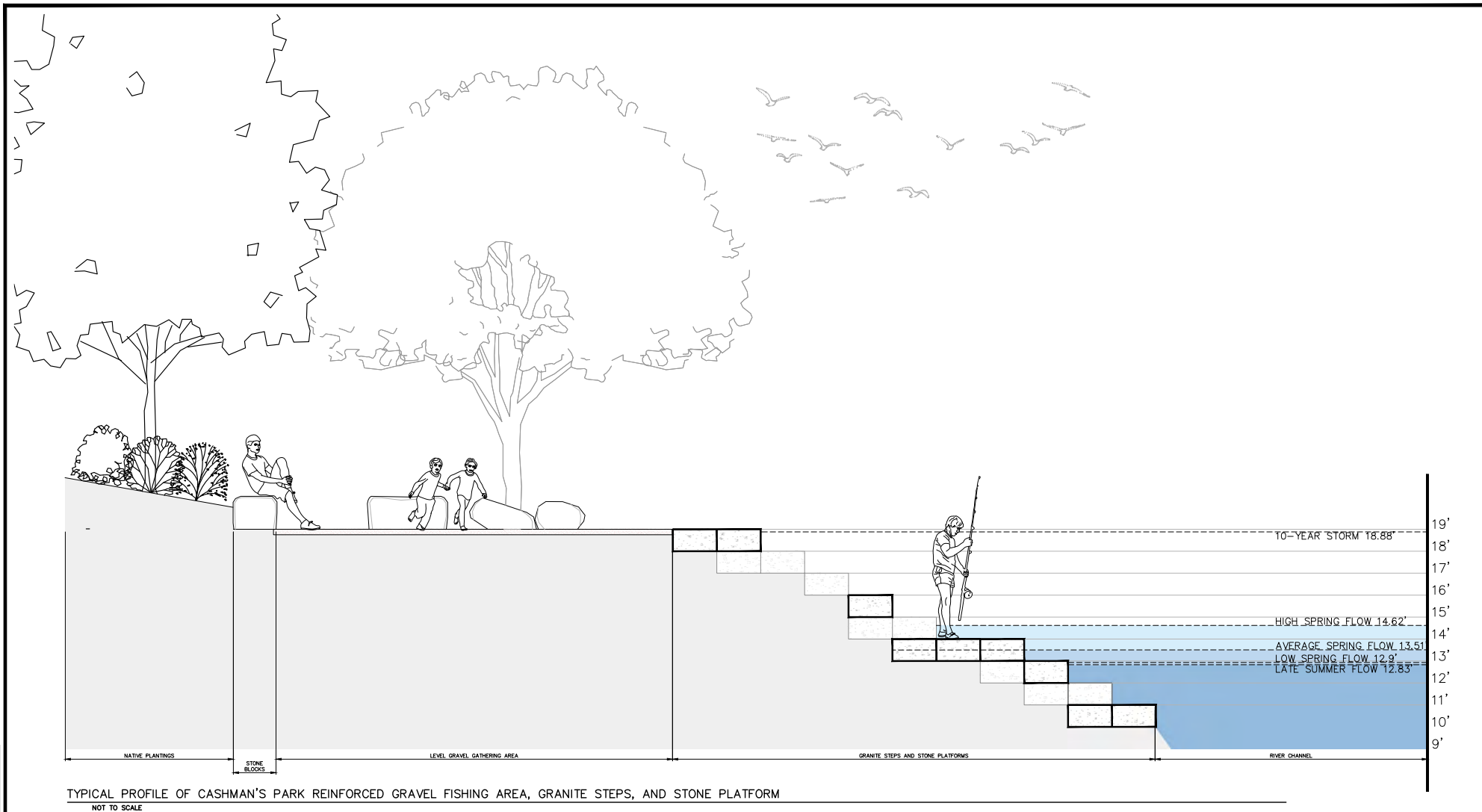


SEAL




PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024

LA-107



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

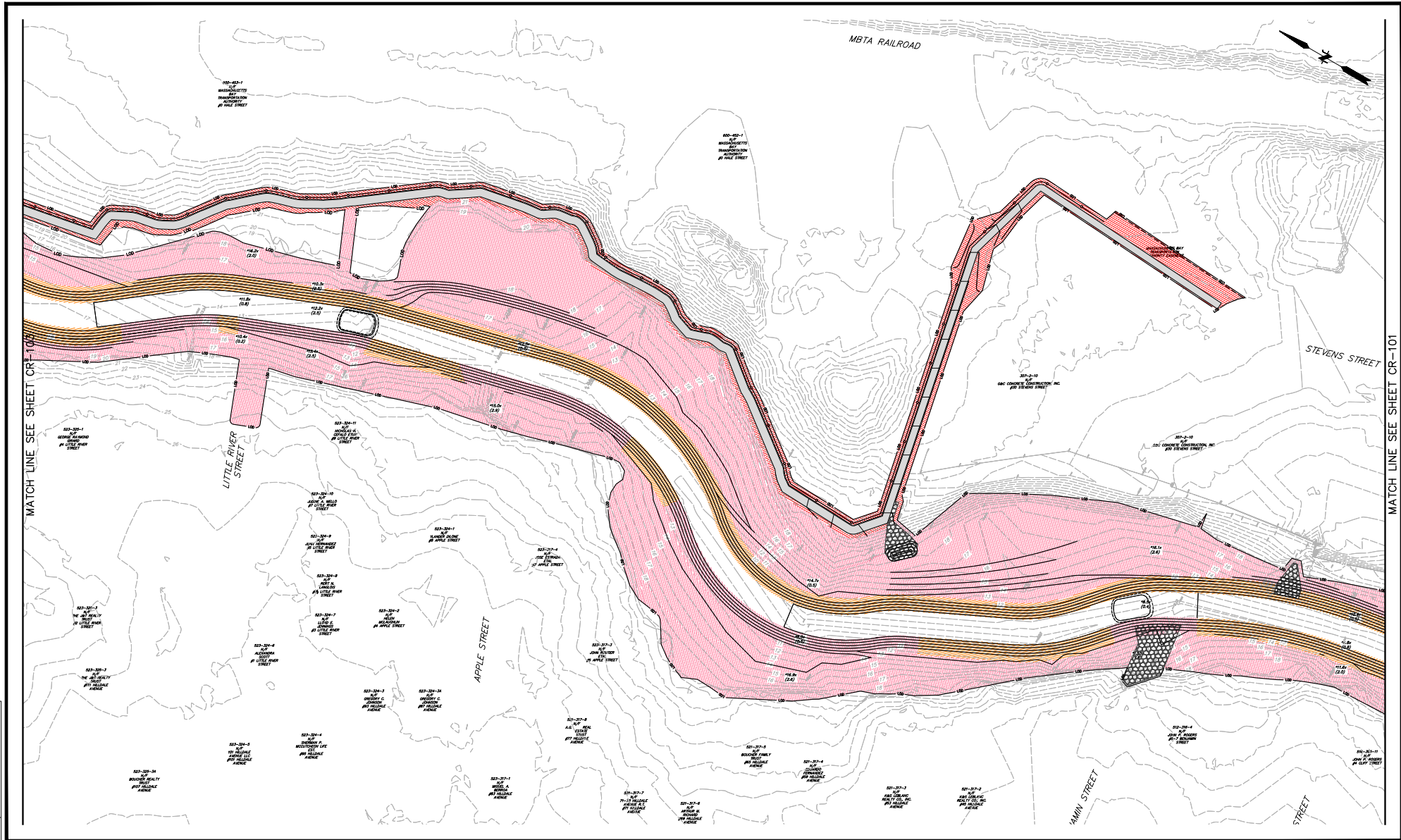
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SCALE:	HORZ.: AS NOTED
	VERT.:
DATUM:	HORZ.: NAD83
	VERT.: NAVD88
	
GRAPHIC SCALE	

CITY OF HAVERHILL  
ADD ALTERNATE: FISHING AREA TYPICAL  
PROFILE  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS



CR-101



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE

HORIZ.: 1"= 30'

VERT.: 1"= 10'

DATUM: NAD83

HORIZ.: NAVD88

VERT.: NAVD88

30 15 0 15 30

GRAPHIC SCALE

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CITY OF HAVERHILL

SITE RESTORATION PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

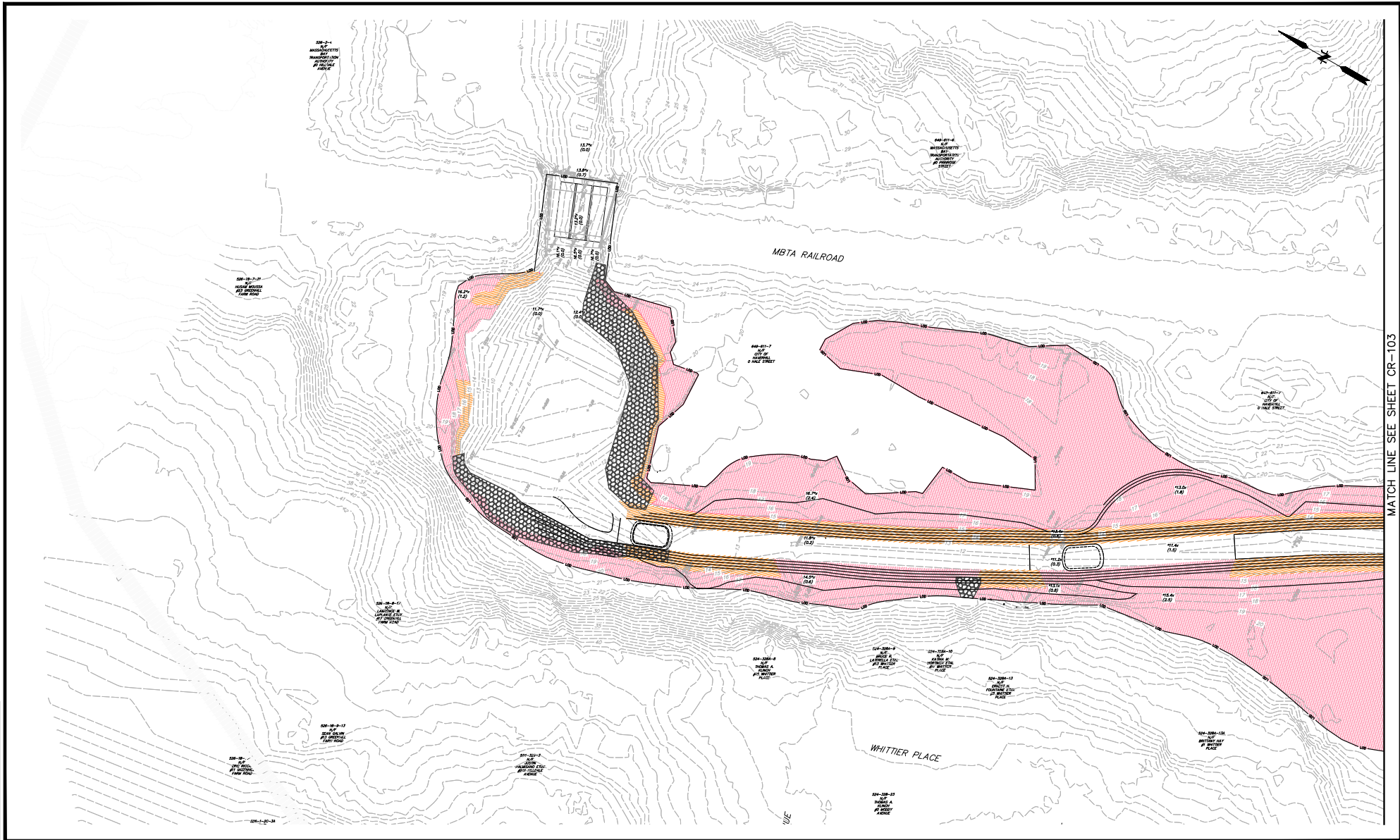
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DATE: DECEMBER 16, 2024

**CR-102**







No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE:

HORZ.: 1"= 30'

VERT.:

DATUM:

HORZ.: NAD83

VERT.: NAVD88

30 15 0 30

GRAPHIC SCALE

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CITY OF HAVERHILL

SITE RESTORATION PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

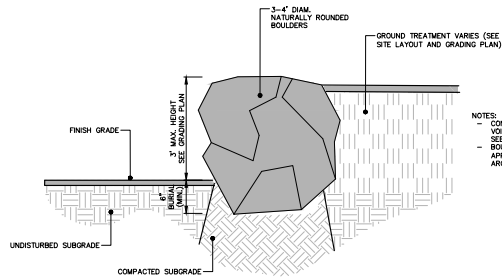
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DATE: DECEMBER 16, 2024

CR-104

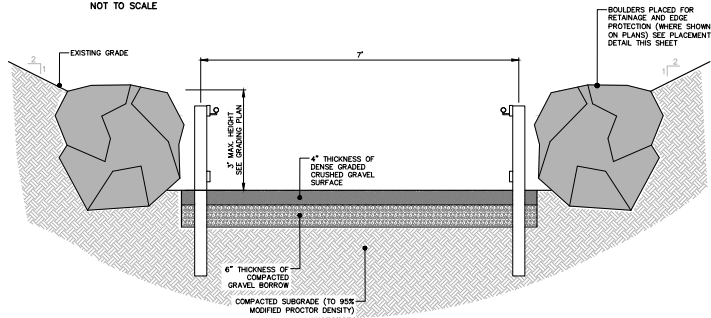




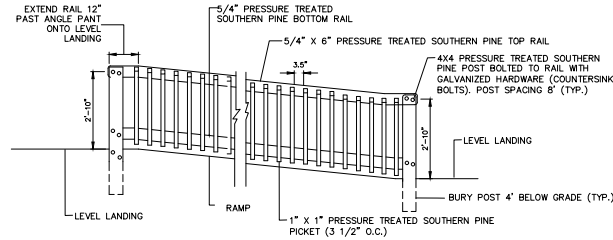
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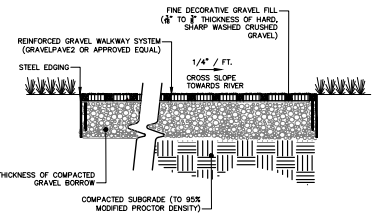
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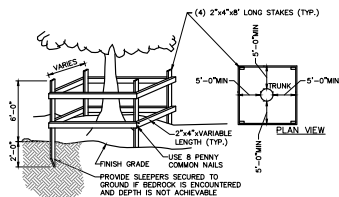
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NOT TO SCALE



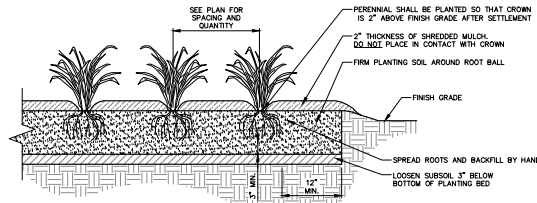
ADD ALTERNATE: TIMBER HANDRAIL (AT KAYAK/CANOE ACCESS)  
NOT TO SCALE



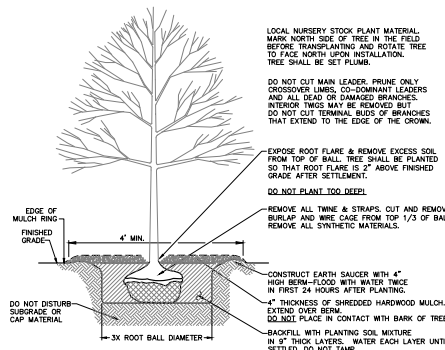
ADD ALTERNATE: REINFORCED GRAVEL FOR WALKWAY AND GATHERING AREA  
NOT TO SCALE



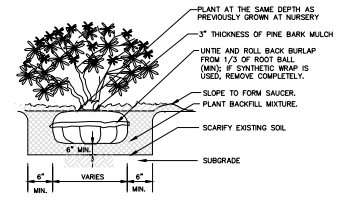
TEMPORARY TREE PROTECTION  
NOT TO SCALE



PERENNIAL PLANT BED  
Scale: N.T.S.



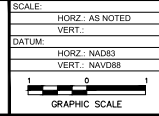
TREE PLANTING DETAIL  
NOT TO SCALE



SHRUB PLANTING  
NOT TO SCALE



SEAL



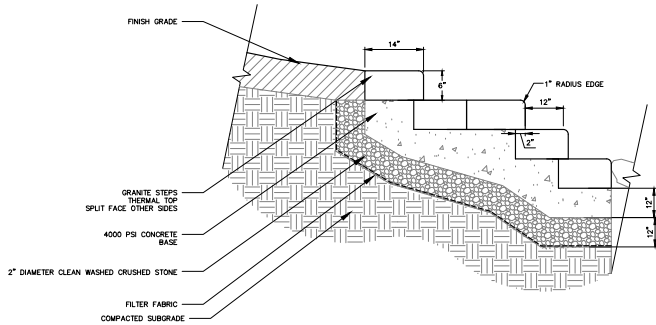
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CITY OF HAVERHILL  
CONSTRUCTION DETAILS  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

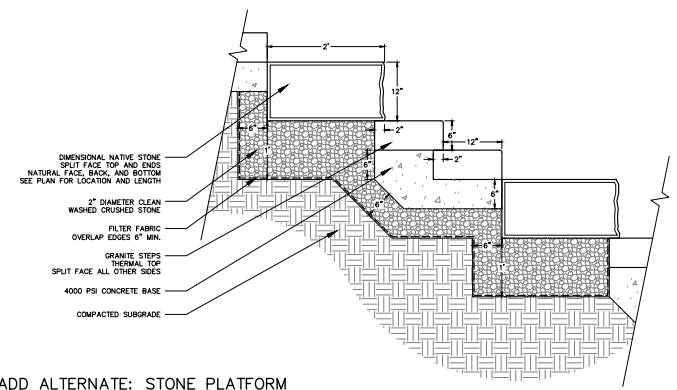
PROJ No.: 20170390.U40  
DATE: DECEMBER 16, 2024  
**CD-502**



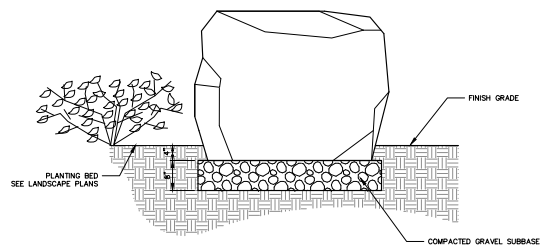
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LAYER VIEW: PC3 NONE STB/CTB: FOSTB



ADD ALTERNATE: GRANITE STEPS  
NOT TO SCALE

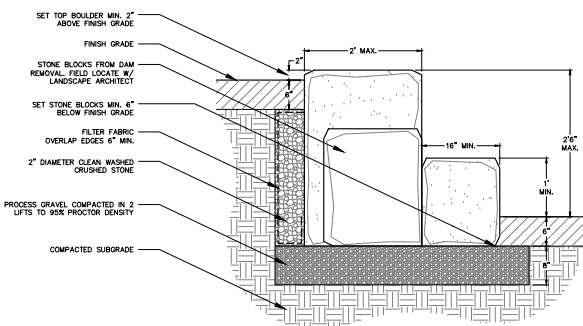


ADD ALTERNATE: STONE PLATFORM  
NOT TO SCALE



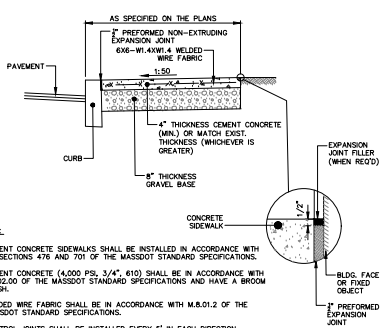
NOTES:  
1. LOCATIONS SHALL BE APPROVED BY ENGINEER / LANDSCAPE ARCHITECT IN THE FIELD.

ADD ALTERNATE: SALVAGED BOULDER  
NOT TO SCALE



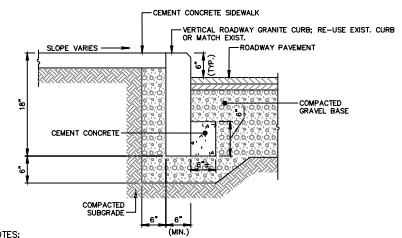
NOTE: LOCATIONS SHALL BE APPROVED BY ENGINEER OR LANDSCAPE ARCHITECT IN THE FIELD

ADD ALTERNATE: STACKED STONE BLOCKS  
NOT TO SCALE



- NOTES:
1. CEMENT CONCRETE SIDEWALKS SHALL BE INSTALLED IN ACCORDANCE WITH SUBSECTIONS 476 AND 701 OF THE MASSDOT STANDARD SPECIFICATIONS.
  2. CEMENT CONCRETE (4,000 PSI, 3/4", 610) SHALL BE IN ACCORDANCE WITH M4.02.00 OF THE MASSDOT STANDARD SPECIFICATIONS AND HAVE A BROOM FINISH.
  3. WELDED WIRE FABRIC SHALL BE IN ACCORDANCE WITH M.8.01.2 OF THE MASSDOT STANDARD SPECIFICATIONS.
  4. CONTROL JOINTS SHALL BE INSTALLED EVERY 5' IN EACH DIRECTION.
  5. EXPANSION JOINTS SHALL BE INSTALLED EVERY 20' IN EACH DIRECTION AT FOUNDATIONS AND WALLS IN A SQUARE PATTERN AROUND MANHOLE COVERS, HYDRANTS, SIGN POSTS AND UTILITY POLES. THE EXPANSION JOINT SHALL BE THE FULL DEPTH OF THE SIDEWALK AND FILLED WITH AN APPROVED TYPE OF PREMOULD EXPANSION JOINT FILLER IN ACCORDANCE WITH M.9.14.0 OF THE MASSDOT STANDARD SPECIFICATIONS.

ADD ALTERNATE: CEMENT CONCRETE SIDEWALK  
NOT TO SCALE



- NOTES:
1. CURBING SHALL BE INSTALLED IN ACCORDANCE WITH SUBSECTION 501 OF THE MASSDOT STANDARD SPECIFICATIONS.
  2. GRANITE CURB, GRANITE CURB INLETS, AND GRANITE CURB CORNERS SHALL BE IN ACCORDANCE WITH M4.04.1, M4.04.5, AND M4.04.8 OF THE MASSDOT STANDARD SPECIFICATIONS, RESPECTIVELY.
  3. CEMENT CONCRETE (3,000 PSI, 3/4", 550) SHALL BE IN ACCORDANCE WITH M4.02.00 OF THE MASSDOT STANDARD SPECIFICATIONS AND INSTALLED IN ACCORDANCE WITH SUBSECTION 476 OF THE MASSDOT STANDARD SPECIFICATIONS.
  4. MORTAR FOR CURBING JOINTS SHALL BE IN ACCORDANCE WITH M4.02.15 OF THE MASSDOT STANDARD SPECIFICATIONS.

ADD ALTERNATE: VERTICAL ROADWAY GRANITE CURB  
NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE	HORIZ.: AS NOTED
	VERT.: 1"=10'
DATUM	HORIZ.: NAD83
	VERT.: NAVD88
	GRAPHIC SCALE

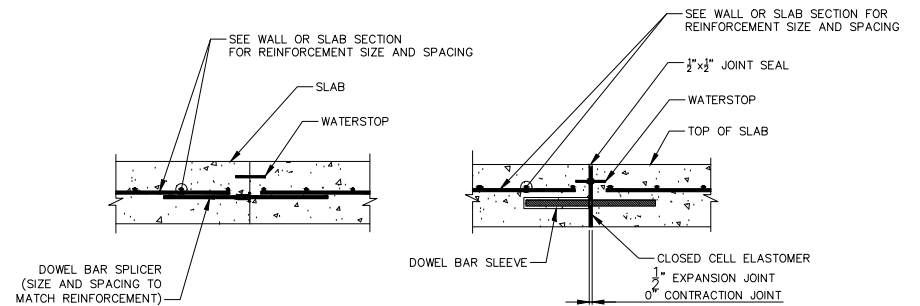
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CITY OF HAVERHILL  
CONSTRUCTION DETAILS  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ No.: 20170390.U40  
DATE: DECEMBER 16, 2024  
**CD-503**

1. ALL CONCRETE WORK SHALL CONFORM TO ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS".
2. ALL REINFORCING STEEL SHALL BE EPOXY COATED, CONFORM TO ASTM A615 GRADE 60, AND SHALL BE DETAILED IN ACCORDANCE WITH ACI 315 "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
3. REINFORCING STEEL SHALL HAVE A MINIMUM CONCRETE COVER AS FOLLOWS:
  - CONCRETE DEPOSITED AGAINST GROUND = 3 IN.
  - CONCRETE EXPOSED TO WEATHER OR IN CONTACT WITH GROUND = 2 IN.
4. ALL REINFORCING STEEL SHALL BE CONTINUOUS AND LAPPED A MINIMUM OF 48 BAR DIAMETERS AT ALL SPLICES, CORNERS, AND INTERSECTIONS UNLESS NOTED OTHERWISE.
5. ALL REINFORCEMENT SHALL BE SECURELY TIED IN ITS PROPOSED LOCATION PRIOR TO AND DURING PLACEMENT OF CONCRETE USING APPROVED CHAIRS, SPACERS AND TIE WIRE AS REQUIRED. NO BARS SHALL BE CUT OR OMITTED IN THE FIELD WITHOUT THE APPROVAL OF THE ENGINEER.
6. CAST-IN-PLACE CONCRETE SHALL BE NORMAL WEIGHT, TYPE II OR TYPE I/II CONCRETE AND SHALL DEVELOP A COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS. CONCRETE SHALL HAVE A MAXIMUM AGGREGATE SIZE OF 3/4 INCH, A MINIMUM CEMENTITIOUS CONTENT OF 575 LBS/CU YD, AND A MAXIMUM SLUMP OF 4 INCHES PRIOR TO THE USE OF A WATER REDUCING ADMIXTURES.
7. ALL EXPOSED EDGES OF CONCRETE SHALL HAVE A 1 INCH CHAMFER UNLESS NOTED OTHERWISE.
8. ALL CONCRETE SHALL BE AIR-ENTRAINED IN ACCORDANCE WITH THE SPECIFICATIONS.
9. CONSTRUCTION JOINTS SHALL BE DETAILED AND LOCATED ON SHOP DRAWINGS AND APPROVED BY THE ENGINEER. UNLESS SHOWN OTHERWISE, CONSTRUCTION JOINTS ARE TO BE KEPT AND PROVIDED FOR CONTINUITY OF REINFORCING STEEL. CONSTRUCTION JOINTS ARE TO BE LOCATED WHERE CONSTRUCTION OPERATIONS ARE SUSPENDED FOR 30 MINUTES OR MORE.
10. NO HORIZONTAL CONSTRUCTION JOINTS ARE PERMITTED IN WALLS, OTHER THAN THOSE SHOWN IN DETAILS.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIMITING POURS TO MINIMIZE SHRINKAGE CRACKING. IN GENERAL, THE CONCRETE SLAB TO BE USED AS THE CANOE LAUNCH SHALL NOT BE POURED IN CONTINUOUS LENGTHS EXCEEDING 20 FEET IN ANY DIRECTION WITHOUT CONTRACTION (CONTROL) JOINTS. THE LOCATION AND CONFIGURATION OF JOINTS EXPOSED TO VIEW SHALL BE COORDINATED WITH THE ENGINEER.
12. DOWELS: PROVIDE, PLACE, AND SPACE TO MATCH REINFORCING.
13. THE TOP SURFACE OF THE SLAB TO BE USED AS THE CANOE LAUNCH SHALL CONSIST OF EXPOSED AGGREGATE IN ACCORDANCE WITH RECOMMENDATIONS PRESENTED THE NATIONAL PARK SERVICE "DESIGN GUIDANCE FOR CANOE AND KAYAK LAUNCHES (SPRING 2004)".
14. AFTER FINISHING THE TOP OF THE SLAB TO ARCHIVE THE EXPOSED AGGREGATE FINISH A CHEMICAL HARDENER SHALL BE APPLIED.

1. JOINT SEAL TO EXTEND ALONG THE LENGTH OF THE JOINT AND DOWN THE SIDES OF THE SLAB.
2. NO REINFORCEMENT SHALL PASS THROUGH EXPANSION OR CONTRACTION JOINTS.
3. DOWEL BARS SHALL BE GALVANIZED  $\frac{3}{8}$ " SMOOTH DOWELS PLACED IN THE WALL OR SLAB AT 12" ON CENTER WITH SLEEVES ON ONE SIDE OF THE JOINT (DOWEL BAR LENGTH = 30" MIN.).
4. EXPANSION JOINTS SHALL USE 1" CLOSED CELL ELASTOMER AND A  $2 \times 2 \frac{1}{2}$ " JOINT SEAL. CONTRACTION JOINTS SHALL USE ONLY A  $2 \times 2 \frac{1}{2}$ " JOINT SEAL.
5. EXPANSION JOINTS ARE NOT REQUIRED. CONTRACTION JOINTS IN THE SHALL BE LOCATED AT THE ANGLE POINT BETWEEN THE APPROACH RAMP THE CANOE LAUNCH LANDING (BOTTOM OF THE LANDING).
6. CONSTRUCTION JOINTS SHALL BE LOCATED AND DETAILED ON THE SHOP DRAWINGS.
7. WATERSTOPS SHALL BE RIBBED PVC WATERSTOPS WITH A MINIMUM WIDTH OF EXPANSION AND CONTRACTION JOINTS SHALL USE A WATERSTOP WITH A CENTER BUILD TO ALLOW FOR MOVEMENT.



JOINT DETAILS  
NOT TO SCALE



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE:

HORZ.: AS NOTED

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DATUM:

HORZ.: NAD83

VERT.: NAVD88

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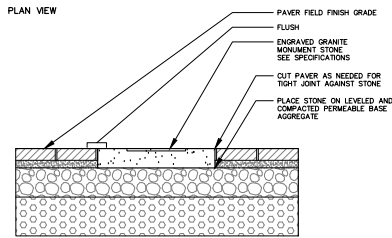
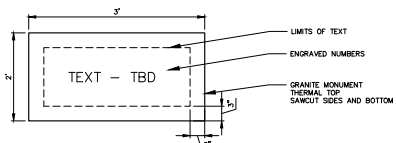
GRAPHIC SCALE

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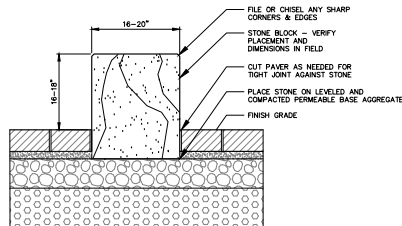
CITY OF HAVERHILL  
CONSTRUCTION DETAILS  
  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
  
HAVERHILL                      MASSACHUSETTS

CD-504

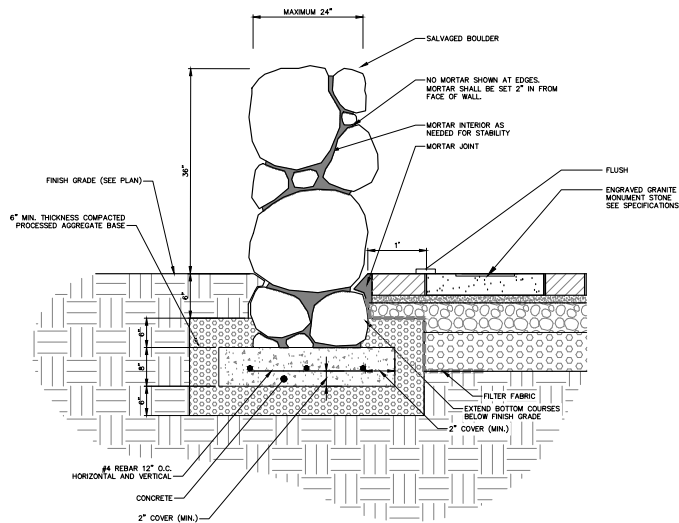




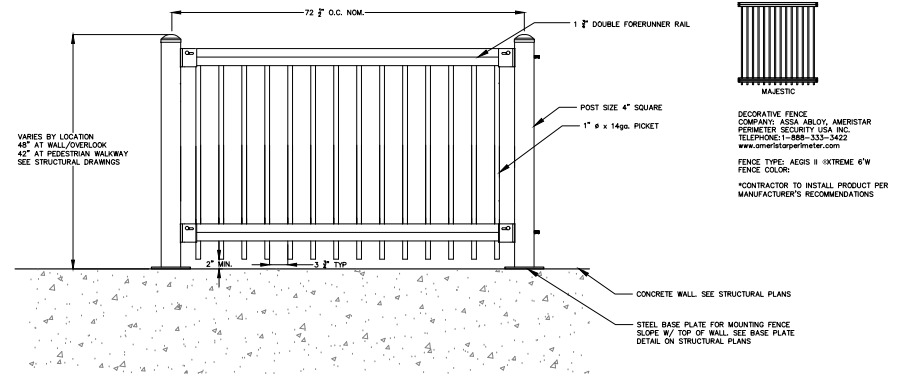
ADD ALTERNATE: ENGRAVED GRANITE MONUMENT STONE  
SCALE: NOT TO SCALE



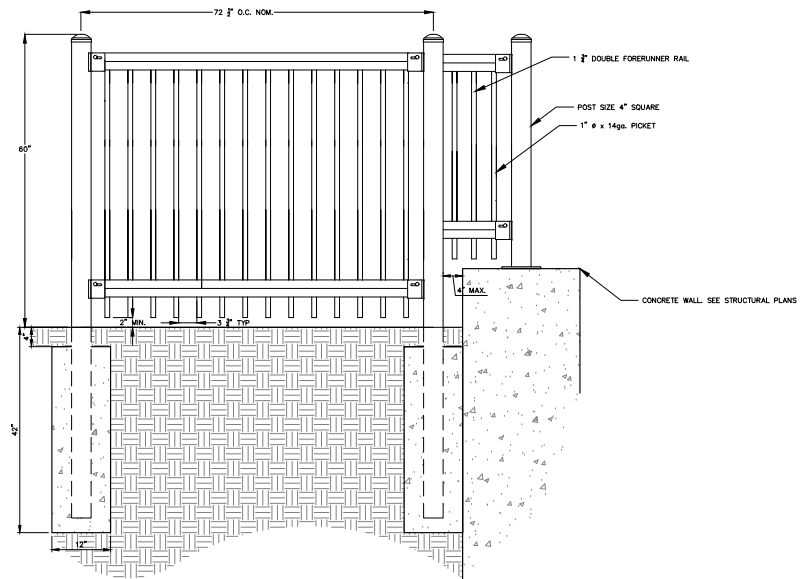
ADD ALTERNATE: MONOLITHIC GRANITE STONE BENCH IN PERMEABLE PAVERS  
SCALE: NOT TO SCALE



ADD ALTERNATE: SALVAGED STONE WALL AND GRANITE MONUMENT STONE  
NOT TO SCALE



DECORATIVE METAL FENCE  
SCALE: NOT TO SCALE



DECORATIVE METAL FENCE RETURN  
SCALE: NOT TO SCALE

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No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

SCALE	HORZ.: AS NOTED
	VERT.: 1"=10'
DATUM:	
	HORZ.: NAD83
	VERT.: NAVD88
GRAPHIC SCALE	1"=10'

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CITY OF HAVERHILL

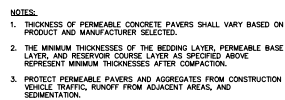
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LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

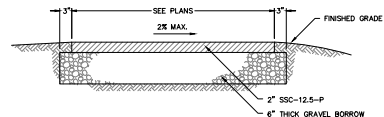
HAVERHILL MASSACHUSETTS

PROJ. No.: 201703090.U40  
DATE: DECEMBER 16, 2024

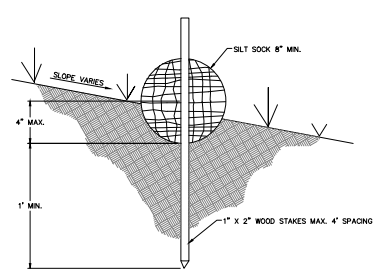
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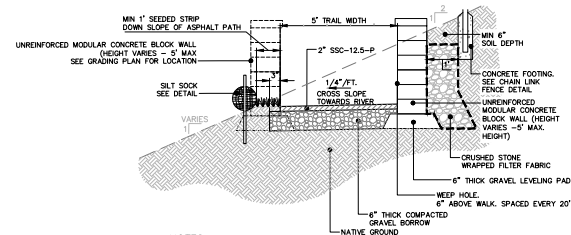
FULL DEPTH ASPHALT PAVEMENT  
NOT TO SCALE



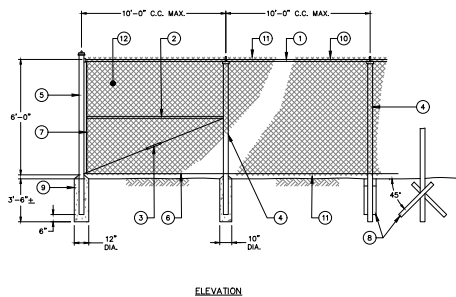
ADD ALTERNATE: ASPHALT WALKING TRAIL TO PEDESTRIAN BRIDGE  
NOT TO SCALE



ADD ALTERNATE: SILT SOCK ENTRENCHMENT DETAIL  
NOT TO SCALE



ADD ALTERNATE: ASPHALT WALKING TRAIL WITH SILT SOCK  
NOT TO SCALE



CHAIN LINK FENCE  
NOT TO SCALE

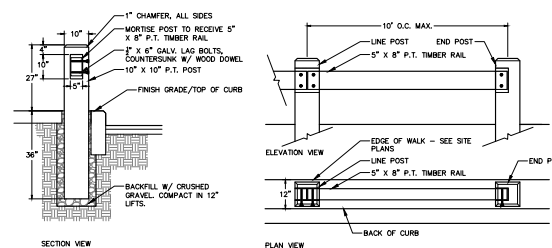
- NOTES:**
1. FOOTING DESIGN TO BE CHECKED BY AN ENGINEER FOR WIND LOADS IF SLATS ARE USED OR IF POOR SOIL CONDITIONS EXIST.
  2. STRAIGHT RUNS BETWEEN BRACED POSTS SHALL NOT EXCEED 500'.
  3. FENCE DETAILS ARE INTENDED AS A GUIDE ONLY. ALL FENCE MATERIALS AND CONSTRUCTION METHODS SHALL BE APPROVED BY THE ENGINEER AND FENCE MANUFACTURER.

## CHAIN LINK FENCE LEGEND

- ⑤ 1 5/8" O.D. TOP RAIL ATTACH FABRIC WITH 9 GAUGE WIRE CLIP EVERY 24"
- ⑥ 1 5/8" O.D. BRACE FOR RAIL FENCES OVER 6 FEET HIGH AND ALL FENCES WITHOUT TOP RAIL
- ⑦ 5/16" TRUSS ROD AND TURNBUCKLE
- ⑧ INTERMEDIATE POST
 

FENCE HEIGHT	SQUARE POST	ROUND POST
2' AND LESS	1 7/8"	2"
OVER 6'	2 1/4"	2 1/2"
- ⑨ END OR CORNER POST
 

FENCE HEIGHT	SQUARE POST	ROUND POST
2' AND LESS	2"	2 1/2"
OVER 6'	2 1/2"	3"
- ⑩ GAUGE BOTTOM TENSION WIRE ATTACH TO FABRIC WITH HOO RING AT 24" C.C.
- ⑪ TENSION ROD ATTACHED TO END OR CORNER POST
- ⑫ FOR COMPACT SOIL CONDITIONS, TWO 3/8" MIN. LENGTH DRIVE ANCHORS THROUGH TIGHTEN ROD TO FORCE LINE INTO FIRM MUD (TO BE USED IN PLACE OF COMPACTED FOOTING).
- ⑬ CONCRETE FOOTING 4" DEEP WITH 12" DIA. AT END POSTS AND 10" DIA. AT INTERMEDIATE POST. HOLE CORE IN UNDISTURBED OR COMPACTED SOIL. (SEE NOTE NO. 1)
- ⑭ TENSION WIRE WHEN TOP RAIL IS NOT USED
- ⑮ FABRIC SELVAGE:
  - ① END 6' SHALL BE KNUCKLED TOP AND BOTTOM
  - ② OVER SHALL BE KNUCKLED BOTTOM AND TWISTED ON TOP
  - ③ ENDING, REVERSELY, SHALL BE KNUCKLED TOP AND BOTTOM
- ⑯ GAUGE 2" WIRE MESH FABRIC (COMMERCIAL) BLACK VINYL COATED



ADD ALTERNATE: WOOD GUARDRAIL  
SCALE: NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEMI

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HORZ.: AS NOTED

VERT.:

DATUM:

HORZ.: NAD83

VERT.: NAVD88

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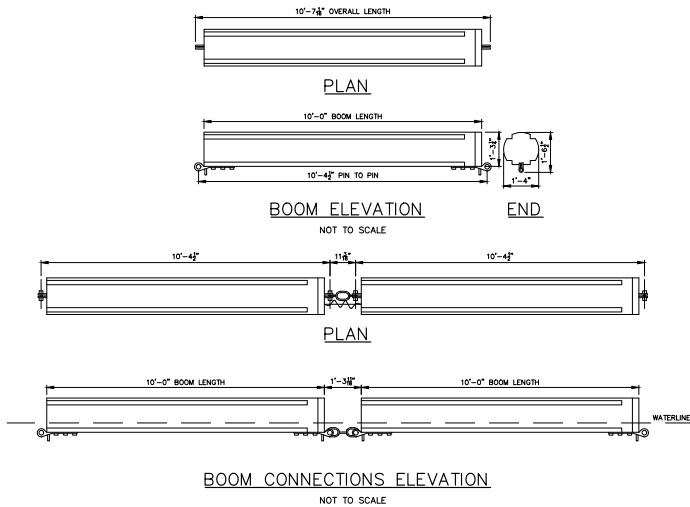
CITY OF HAVERHILL  
CONSTRUCTION DETAILS  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

CD-506

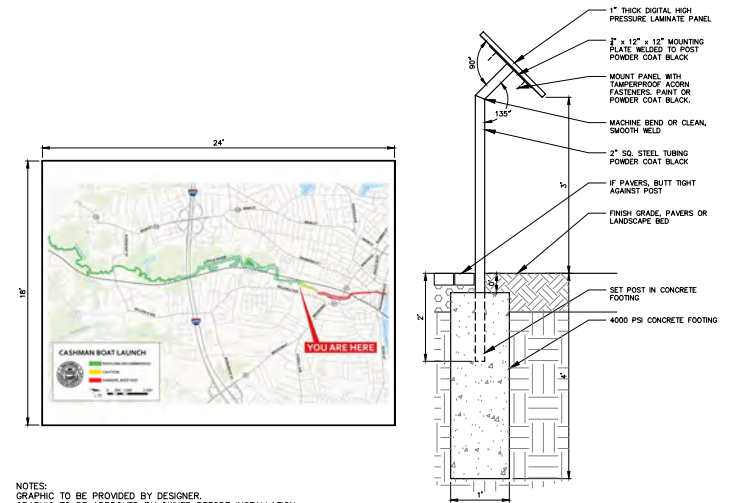
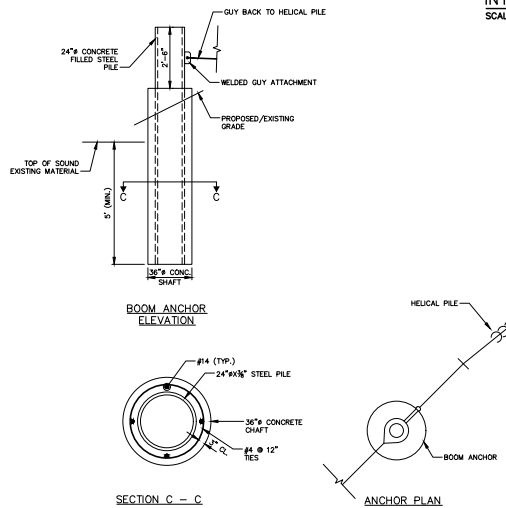


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DWS VIEW: LAYER STATE: PC3 NONE STB/C/TB: FOSTB



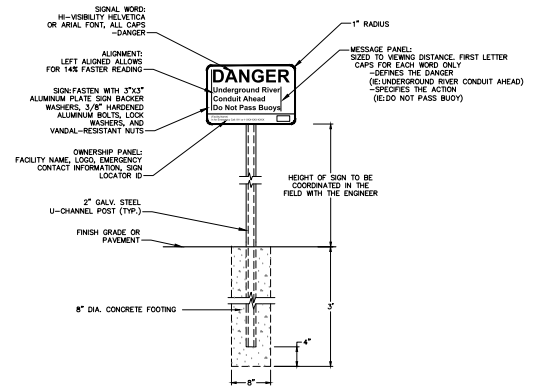
- NOTES:
1. FLOATING SAFETY BOOM SHALL BE TUFFBOOM BY WORTHINGTON WATERWAY BARRIERS, OR EQUIVALENT. CONTRACTOR SHALL PURSUE TIER ONE DESIGN WITH WORTHINGTON USING DESIGN PARAMETERS PROVIDED IN SPECIFICATIONS TO DETERMINE REQUIRED BOOM TENSION.
  2. THE BOOM SHALL BE SUPPLIED WITH ALL COMPONENTS REQUIRED TO COMPLETE THE INSTALLATION AND CONNECTION TO THE LAND ANCHORS.
  3. SHOP DRAWINGS AND SPECIFICATIONS SHALL BE PROVIDED FOR ALL COMPONENTS OF THE BOOM, ANCHORS, AND ANCHOR FOUNDATIONS.
  4. BOOM SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
  5. BOOM BUOY COLOR SHALL BE ALTERNATING RED AND WHITE.
  6. "DANGER - KEEP OUT" GRAPHICS SHALL BE PRINTED ON EACH BUOY.

FLOATING SAFETY BOOM AND ANCHOR  
NOT TO SCALE



NOTES:  
GRAPHIC TO BE PROVIDED BY DESIGNER.  
GRAPHIC TO BE APPROVED BY OWNER BEFORE INSTALLATION.  
SEE LAYOUT PLAN FOR LOCATIONS.

INTERPRETIVE SIGN  
SCALE: NOT TO SCALE



DANGER SIGN  
NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



SEAL

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	VERT.: NAVD88
DATUM:	HORZ.: NAD83
	VERT.: NAVD88
	GRAPHIC SCALE

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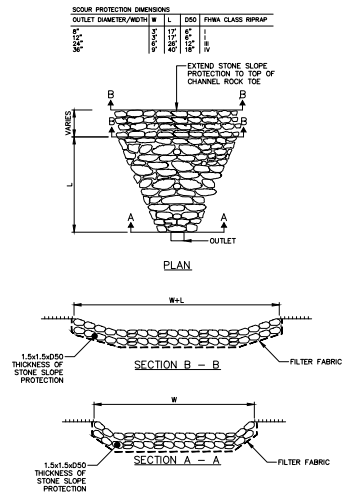
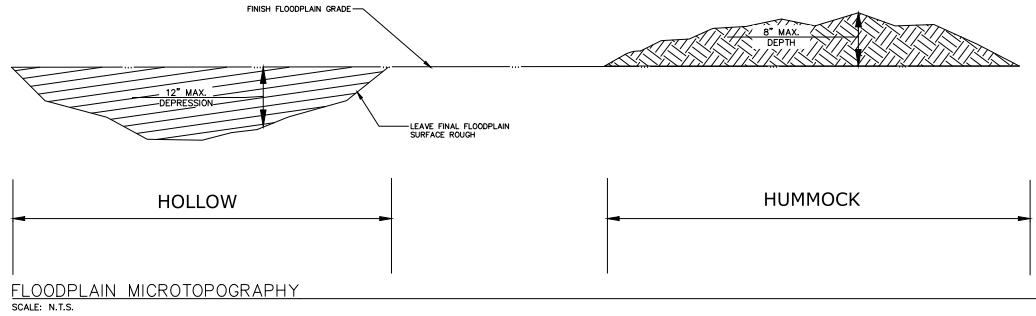
CITY OF HAVERHILL  
CONSTRUCTION DETAILS  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170300.U40  
DATE: DECEMBER 16, 2024  
**CD-507**

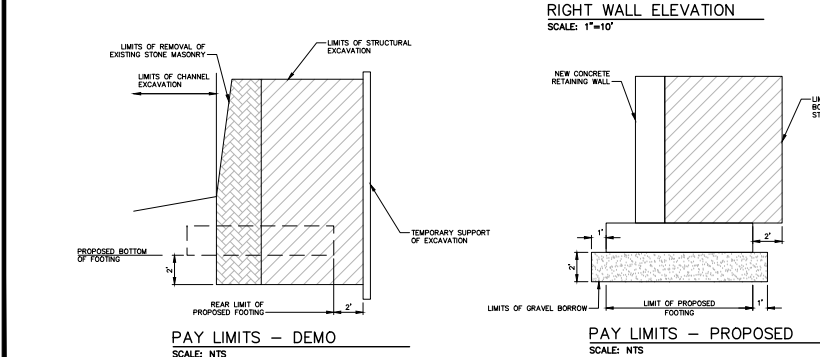
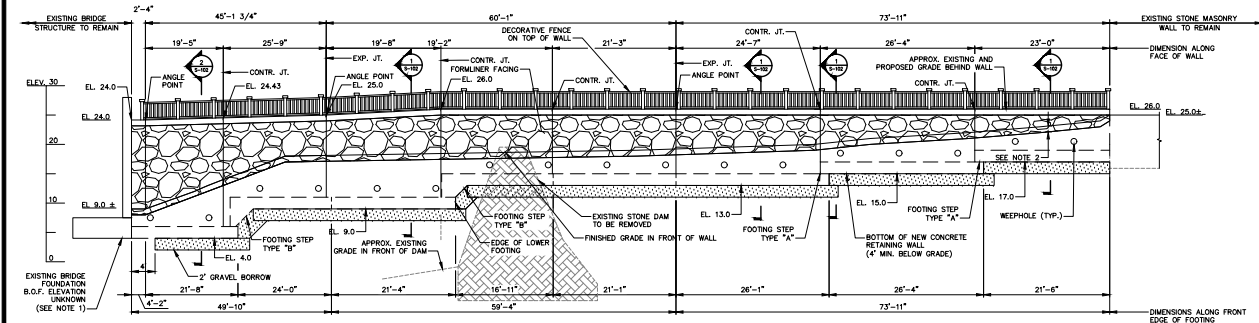
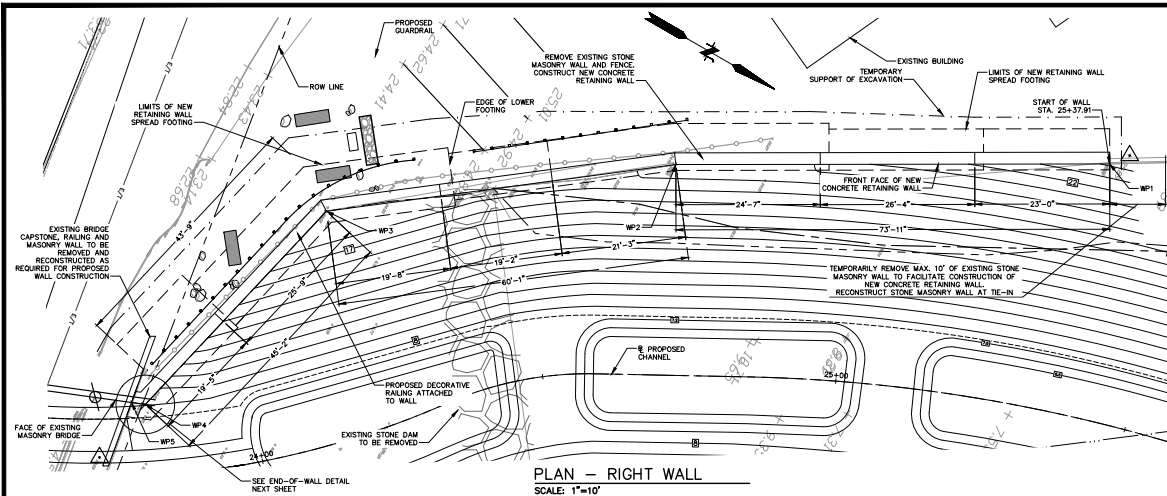


- NOTES:
1. CONTRACTOR TO SUBMIT SHOP DRAWING.
  2. 5' MINIMUM CROSSING TRAVEL WIDTH.

ADD ALTERNATE: TRAIL CROSSING FOR STORMWATER  
OUTFALL GENERAL CONFIGURATION AND STYLE  
NOT TO SCALE

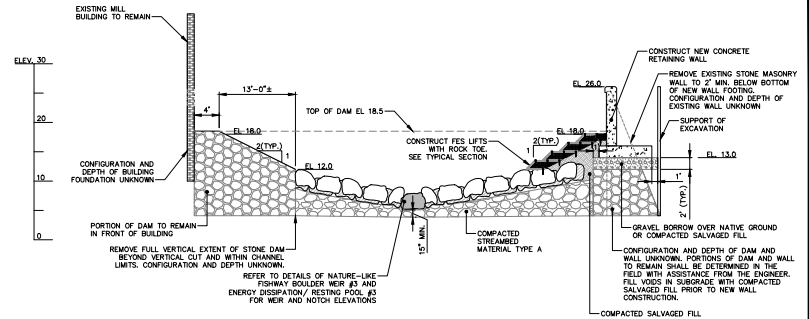






- NOTES:
1. EXCAVATION FOR PROPOSED BRIDGE SHALL NOT UNDERMINE THE EXISTING BRIDGE FOUNDATION. EXISTING MATERIAL SHALL REMAIN (GRAVEL BORROW SUBBASE OMITTED) FOR PROPOSED FOOTING WITHIN 4" OF EXISTING BRIDGE FOUNDATION. IF BOTTOM OF EXISTING BRIDGE FOUNDATION IS ENCOUNTERED ABOVE EL. 4.0, NOTIFY THE ENGINEER.
  2. FORMLINER FACING ON RETAINING WALL TO EXTEND A MINIMUM OF 1' BELOW PROPOSED GRADE.
  3. ELEVATION VIEW LINEWORK SHOWN REPRESENTS FRONT FACE OF WALL/FOOTING.

RETAINING WALL WORKING POINT COORDINATES				
WP	NORTHING	EASTING	STATION	OFFSET
1	3108760.54	766521.17	25+37.91	-43.47
2	3108696.56	766558.23	24+71.99	-35.94
3	3108648.96	766594.89	24+25.49	-38.10
4	3108638.68	766638.68	23+80.62	-12.23
5	3108636.48	766639.75	23+78.09	-12.69



- NOTES:
1. INSPECT SLOPED FACE OF DAM TO REMAIN IN THE PRESENCE OF THE ENGINEER. IF REQUIRED, RESHAPE AND STABILIZE (WITH GROUT OR SIMILAR) AS DIRECTED BY THE ENGINEER.

CHANNEL SECTION AT DAM (LOOKING DOWNSTREAM)  
SCALE: 1"=10'

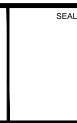
GENERAL NOTES:

1. THE WORK SHOWN ON THESE DRAWINGS HAS BEEN DESIGNED IN ACCORDANCE WITH THE STRUCTURAL REQUIREMENTS OF THE NINTH EDITION OF THE MASSACHUSETTS STATE BUILDING CODE, INCLUDING THE 2015 INTERNATIONAL BUILDING CODE, EXCEPT AS AMENDED, ALTERED OR DELETED BY THE ADDITIONAL PROVISIONS IN THE MASSACHUSETTS AMENDMENTS.
2. ALL STRUCTURAL WORK SHOWN OR SPECIFIED ON THESE DRAWINGS IS SUBJECT TO REVIEW BY THE STRUCTURAL ENGINEER OF RECORD. ASPECTS OF THE WORK FOUND NOT IN CONFORMANCE WITH THE STRUCTURAL DOCUMENTS SHALL BE CORRECTED AS DIRECTED BY THE ENGINEER.
3. DIMENSIONS OF EXISTING STRUCTURES SHOWN ON THESE PLANS ARE ASSUMED AND ARE NOT GUARANTEED. THE CONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS IN THE FIELD.
4. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF REINFORCING STEEL FOR REVIEW BEFORE PROCEEDING WITH WORK. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS AND ACCEPT FULL RESPONSIBILITY FOR DIMENSIONAL CORRECTNESS. SHOP DRAWINGS SHALL BEAR THE REVIEW AND APPROVAL STAMP FOR THE CONTRACTOR, IN ACCORDANCE WITH THE GENERAL CONDITIONS.
5. STRUCTURAL PLANS SHALL NOT BE REPRODUCED IN WHOLE OR IN PART FOR USE AS SHOP DRAWINGS OR ERECTION PLANS (THERE WILL BE NO RELAXATION OF THIS RESTRICTION FOR ANY TRADE).

CONCRETE NOTES:

1. ALL CONCRETE WORK SHALL CONFORM TO ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS".
2. ALL CONCRETE TO MEET THE REQUIREMENTS OF 03 30 00 - CAST-IN-PLACE CONCRETE. FOOTING CONCRETE SHALL MEET THE MIX REQUIREMENTS OF "FOOTING CONCRETE" AND CONCRETE FOR THE WALLS SHALL MEET THE REQUIREMENTS FOR "WALL CONCRETE".
3. REBAR SHALL HAVE A MINIMUM CONCRETE COVER AS FOLLOWS:
  - CONCRETE DEPOSITED AGAINST GROUND: 3"
  - FORMED CONCRETE EXPOSED TO WEATHER OR IN CONTACT WITH GROUND: 2"
4. ALL REINFORCING BARS SHALL BE CONTINUOUS AND LAPPED A MINIMUM OF 48 BAR DIAMETERS AT ALL SPLICES, CORNERS, AND INTERSECTIONS UNLESS NOTED OTHERWISE.
5. ALL REINFORCEMENT SHALL BE SECURELY TIED IN ITS PROPOSED LOCATION PRIOR TO AND DURING PLACEMENT OF CONCRETE USING APPROVED CHAIRS, SPACERS AND TIE WIRE AS REQUIRED. NO BARS SHALL BE CUT OR OMITTED IN THE FIELD WITHOUT THE APPROVAL OF THE ENGINEER.
6. ALL EXPOSED EDGES OF CONCRETE SHALL HAVE A 3/4" CHAMFER UNLESS NOTED OTHERWISE.
7. ALL CONCRETE SHALL BE AIR-ENTRAINED.
8. SIZES AND LOCATIONS OF ALL REQUIRED EMBEDDED ITEMS FOR ALL TRADES SUCH AS ANCHOR BOLTS, PIPING SLEEVES, ETC., SHALL BE COORDINATED BY THE CONTRACTOR WITH OTHER TRADES.
9. CONSTRUCTION JOINTS SHALL BE DETAILED AND LOCATED ON SHOP DRAWINGS AND APPROVED BY THE ENGINEER. UNLESS SHOWN OTHERWISE, CONSTRUCTION JOINTS ARE TO BE KEPT AND PROVIDE FOR CONTINUITY OF REINFORCING STEEL. CONSTRUCTION JOINTS ARE TO BE LOCATED WHERE CONSTRUCTION OPERATIONS ARE SUSPENDED FOR 30 MINUTES OR MORE.
10. NO HORIZONTAL CONSTRUCTION JOINTS ARE PERMITTED, OTHER THAN SHOWN IN DETAILS.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

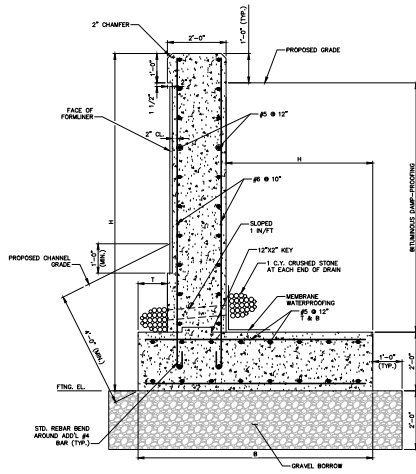


SCALE
HORIZ.: 1"=10'
VERT.: 1"=10'
DATUM
HORIZ.: NAD83
VERT.: NAVD88
GRAPHIC SCALE

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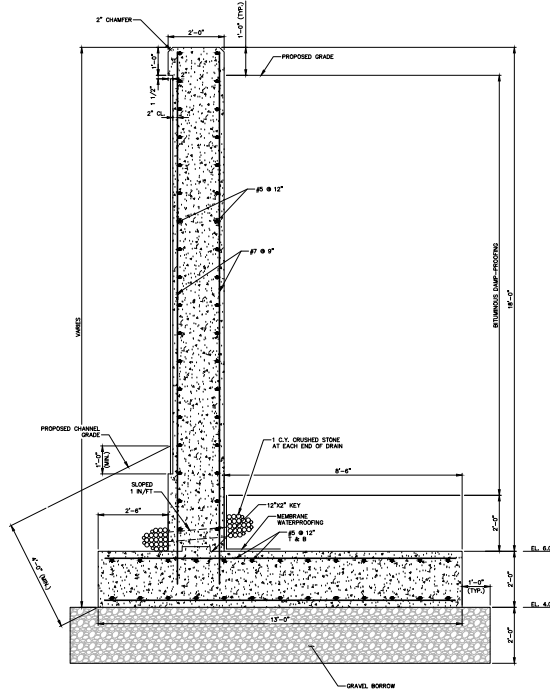
CITY OF HAVERHILL  
RETAINING WALL PLAN AND ELEVATION  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL, MASSACHUSETTS

PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024  
**S-101**

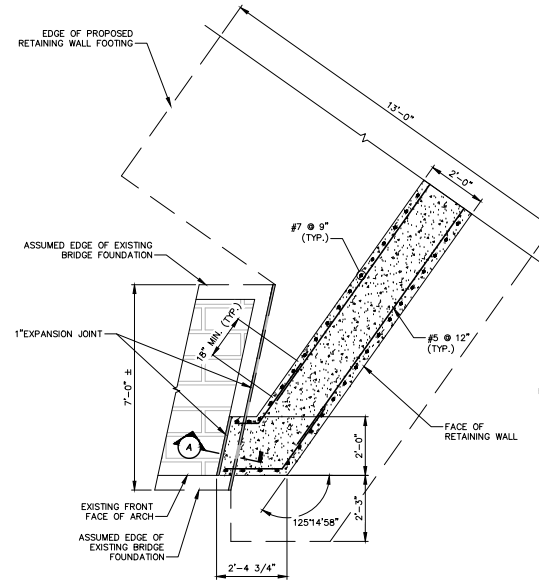


1 SECTION  
1/2" = 1'-0"

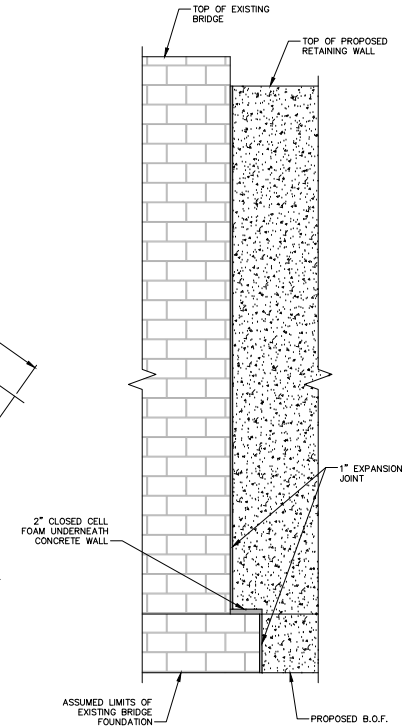
SECTION 1 RETAINING WALL DIMENSIONS BASED ON BOTTOM OF FOOTING ELEVATION AND WALL HEIGHT			
FTNG. EL.	H	B	T
17.0	9'-0"	7'-0"	1'-0"
15.0	11'-0"	7'-0"	1'-0"
13.0	13'-0"	8'-0"	1'-0"
9.0	VARIES (17'-0" MAX)	10'-0"	2'-0"



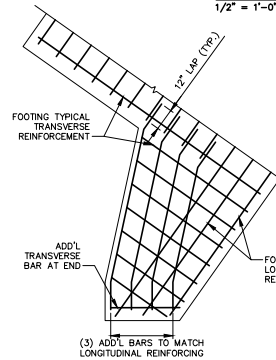
2 SECTION  
1/2" = 1'-0"



END-OF-WALL DETAIL  
1/2" = 1'-0"



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



END-OF-FOOTING REINFORCING DETAIL  
3/8" = 1'-0"

RETAINING WALL NOTES:

- 4" DIA. WEAP HOLES TO BE INSTALLED 10'-0" O.C. AND LOCATED 12" ABOVE THE HEEL OF THE FOOTING SLOPING 1" PER FOOT TOWARDS THE FRONT FACE. PROVIDE 1 CUBIC YARD OF CRUSHED STONE AT EACH END OF THE WEAP HOLE.
- GRAVEL BORROW SHALL MEET THE REQUIREMENTS OF THE 2023 MASSDOT STANDARD SPECIFICATIONS M.1.03.0, COMPACTED IN ACCORDANCE WITH SECTION 401.60 OF THE SAME.
- MAXIMUM SERVICE BEARING PRESSURE = 4.20 KSF.
- RETAINING WALLS WERE DESIGNED TO A MINIMUM SAFETY FACTOR OF 1.5 FOR SLIDING AND OVERTURNING IN ACCORDANCE WITH THE MASSACHUSETTS STATE BUILDING CODE.

NO.	DATE	DESCRIPTION	DESIGNER	REVIEWER
1	06/06/24	ISSUED FOR PERMIT	AS	AS
2	06/06/24	REVISED	AS	AS
3	06/06/24	REVISED	AS	AS
4	06/06/24	REVISED	AS	AS
5	06/06/24	REVISED	AS	AS
6	06/06/24	REVISED	AS	AS
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10	06/06/24	REVISED	AS	AS



SEAL

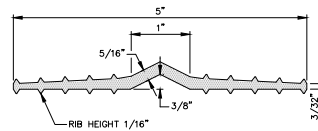
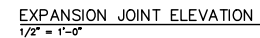
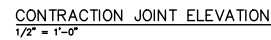
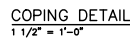
SCALE
HORIZ.: AS NOTED
VERT.: 1" = 10'-0"
DATUM
HORIZ.: NAD83
VERT.: NAVD88
GRAPHIC SCALE

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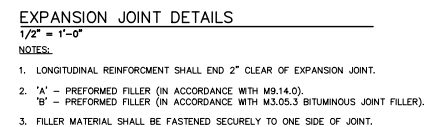
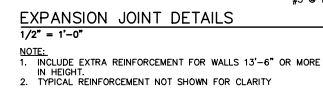
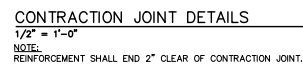
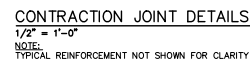
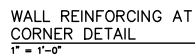
CITY OF HAVERHILL  
RETAINING WALL SECTION AND DETAILS  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL, MASSACHUSETTS


PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024  
**S-102**





5" WATERSTOP



SCALE:	HORZ.: AS NOTED
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GRAPHIC SCALE	

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CITY OF HAVERHILL

RETAINING WALL MISC. DETAILS

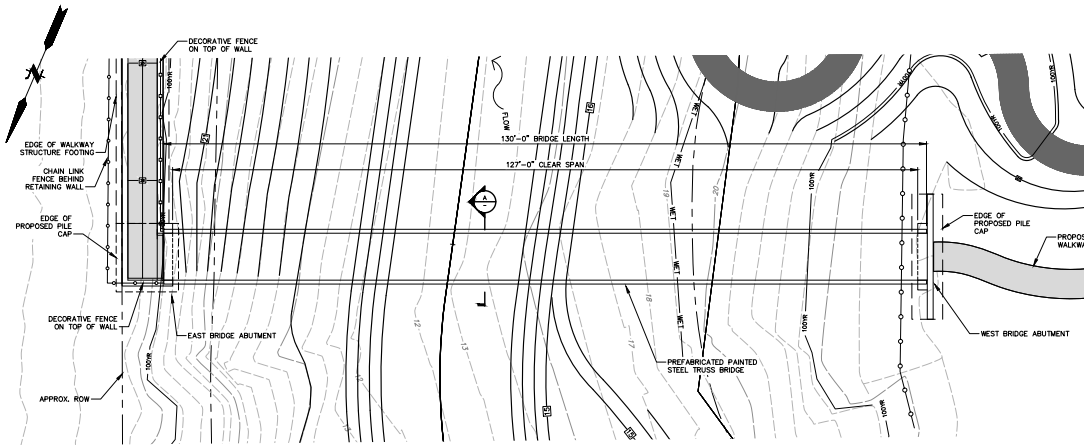
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

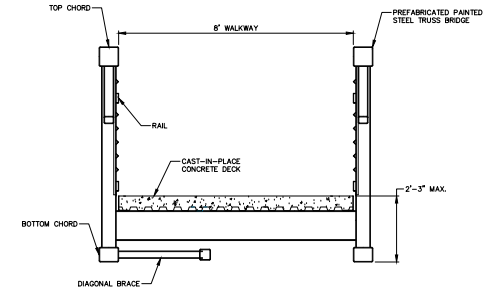
S-103

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DAS VIEW: PC3 AUTOCAD PDF (GENERAL DOCUMENTATION) PC3 STRUCTS: FO STB  
LAYER STATE:

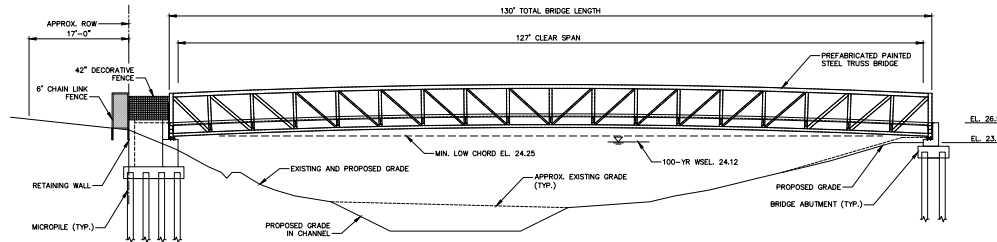
MBTA RAILROAD



PLAN - PEDESTRIAN BRIDGE  
SCALE: 1"=10'



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



PEDESTRIAN BRIDGE NORTH ELEVATION  
SCALE: 1"=10'

#### GENERAL NOTES:

**SPECIFICATIONS:** PROJECT SPECIFICATIONS, AND WHEN REFERENCED, THE MASSDOT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 2023 EDITION.

**DESIGN SPECIFICATIONS:** AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION - 2020. AASHTO LRFD GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES - DECEMBER 2009.

**MATERIALS:**  
CONCRETE DESIGN STRESSES, IN ACCORDANCE WITH THE PROJECT SPECIFICATION: 03 30 00 - CAST-IN-PLACE CONCRETE.

FOOTING CONCRETE:  $f_c = 3,000$  PSI  
WALL CONCRETE:  $f_c = 4,000$  PSI

REINFORCEMENT: (ASTM A615 GRADE 60),  $f_y = 60,000$  PSI. ALL REINFORCING SHALL BE EPOXY COATED.

STRUCTURAL STEEL: ALL STRUCTURAL STEEL FOR THE PREFABRICATED PEDESTRIAN BRIDGE SHALL BE PAINTED. SEE SPECIFICATIONS FOR BRIDGE STEEL REQUIREMENTS.

PAINT: SEE SPECIFICATIONS FOR REQUIREMENTS. PAINT COLOR SHALL BE SELECTED BY THE OWNER DURING THE BRIDGE SUBMITTAL PROCESS. PAINT COLOR SAMPLES TO BE PROVIDED AS REQUESTED.

PILE LOADS: THE PILE LOADS PROVIDED ON THE FOUNDATION SHEETS REFER TO FACTORED LOAD COMBINATIONS IN ACCORDANCE WITH THE AASHTO SPECIFICATIONS.

**DIMENSIONS:** WHEN DECIMAL DIMENSIONS ARE GIVEN TO LESS THAN THREE DECIMAL PLACES, THE OMITTED DIGITS SHALL BE ASSUMED TO BE ZEROS. PROPOSED DIMENSIONS ARE BASED ON ASSUMED PEDESTRIAN BRIDGE DIMENSIONS. CONTRACTOR IS RESPONSIBLE FOR ADJUSTING/MODIFYING THE DIMENSIONS AS REQUIRED TO ACCOMMODATE THE FINAL APPROVED PEDESTRIAN BRIDGE SHOP DRAWINGS.

**CONCRETE:** FOOTING CONCRETE SHALL BE USED FOR ALL FOOTINGS AND PILE CAPS. WALL CONCRETE SHALL BE USED FOR ALL OTHER CONCRETE.

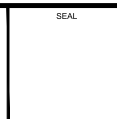
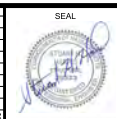
**EXPOSED EDGES:** EXPOSED EDGES OF CONCRETE SHALL BE BEVELED 1" X 1" UNLESS DIMENSIONS OTHERWISE.

**CONCRETE COVER:** ALL REINFORCEMENT SHALL MEET THE FOLLOWING COVER REQUIREMENTS:

- CONCRETE CAST AGAINST EARTH: 3"
- ALL OTHER CONCRETE: 2"

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

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



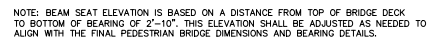
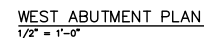
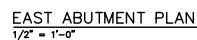
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	VERT.: 1"=10'
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	HORIZ.: NAD83
	VERT.: NAVD88
	GRAPHIC SCALE

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CITY OF HAVERHILL  
ADD ALTERNATE: PEDESTRIAN BRIDGE PLAN  
AND ELEVATION  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.040  
DATE: DECEMBER 16, 2024  
**S-104**





EAST ABUTMENT ELEVATION  
1/2" = 1'-0"

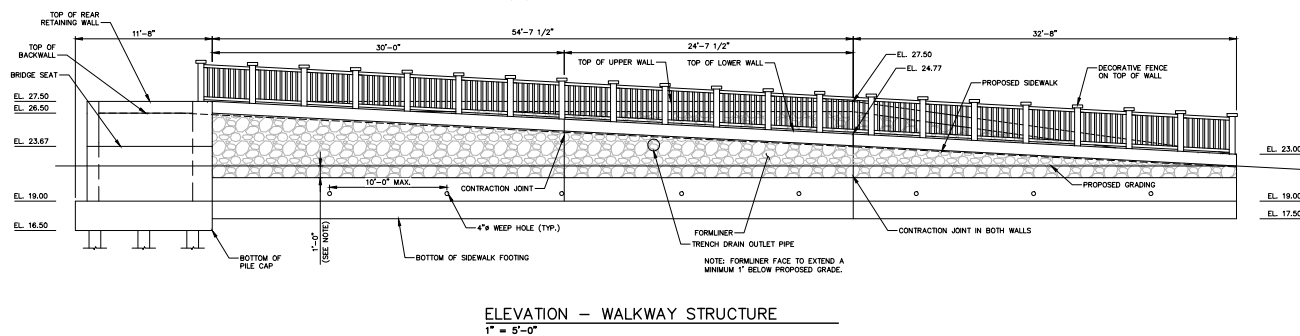
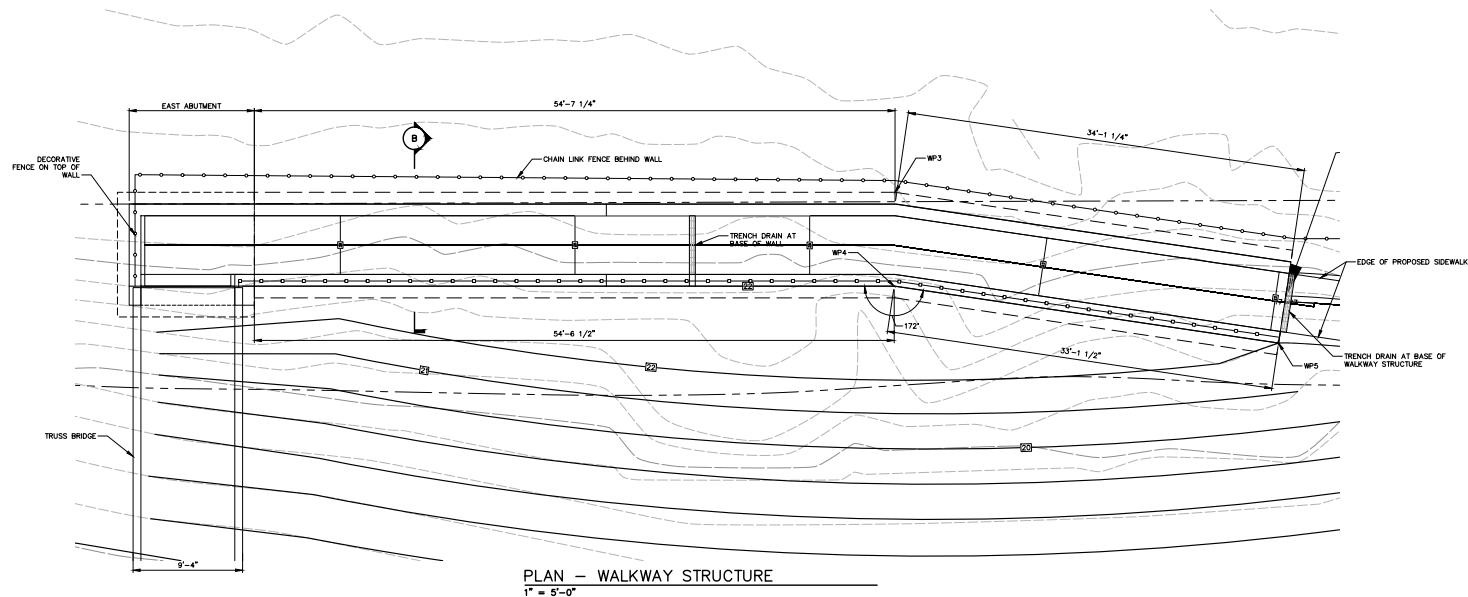


AND  
CORPORATION  
MASSACHUSETTS










No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



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DATUM:	HORZ.: NAD83
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GRAPHIC SCALE	

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DATUM: NAD83

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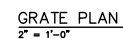
GRAPHIC SCALE

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CITY OF HAVERHILL  
ADD ALTERNATE: PEDESTRIAN WALKWAY PLAN  
AND ELEVATION  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40  
DATE: DECEMBER 16, 2024

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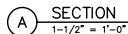
PROJ. No.: 20170390.U4  
DATE: DECEMBER 16, 2017

S-109



1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE MASSACHUSETTS STATE BUILDING CODE AND ITS APPLICABLE REFERENCED STANDARDS.
2. EXISTING STRUCTURAL SYSTEM IS SHOWN FOR INFORMATION ONLY. ALL EXISTING STRUCTURE MUST BE FIELD VERIFIED.
3. THE CONTRACTOR SHALL COORDINATE ALL DIMENSIONS AND ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ARCHITECT AND ENGINEER ON RECORD.
4. THE CONTRACTOR SHALL COORDINATE THE SIZE AND LOCATION OF ALL SLEEVES, OPENINGS AND ANCHORAGES (INCLUDING ANCHOR BOLTS) AS REQUIRED BY ALL TRADES. OPENINGS NOT SPECIFICALLY SHOWN SHALL BE APPROVED BY THE ARCHITECT AND STRUCTURAL ENGINEER.
5. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO PROVIDE FOR A SAFE AND EFFICIENT METHOD OF SHORING AND/OR BRACING THE STRUCTURE DURING CONSTRUCTION.
6. ALL WORK SHALL BE CONTINUOUSLY MONITORED AND INSPECTED BY AN INDEPENDENT TESTING AGENCY REFER TO AN INDEPENDENT INSPECTION NOTES ON THIS SHEET. SUBMIT ALL TEST AND INSPECTION REPORTS TO A/E FOR REVIEW.
7. STRUCTURAL MEMBERS SHALL NOT BE MODIFIED IN THE FIELD WITHOUT WRITTEN APPROVAL FROM THE STRUCTURAL ENGINEER. IN THE EVENT OF A CONSTRUCTION OR FABRICATION ERROR, THE CONTRACTOR SHALL PREPARE A SKETCH WITH A PROPOSED REPAIR AND SUBMIT IT TO THE ARCHITECT AND ENGINEER OF RECORD. FOR APPROVAL PRIOR TO PERFORMING ANY CORRECTIVE WORK.
8. SUBMIT SHOP DRAWINGS FOR APPROVAL - FOR ALL TRADES INDICATED HEREIN - PRIOR TO PROCEEDING WITH FABRICATION AND/OR CONSTRUCTION. CONTRACTOR SHALL ALLOW FOR A 2 WEEK REVIEW PERIOD FOR THE DESIGN TEAM.
9. IN ANY CASE OF CONFLICT BETWEEN THE NOTES, DETAILS AND SPECIFICATIONS, THE MOST RIGID REQUIREMENTS SHALL GOVERN. CONTRACTOR SHALL MAKE NO DEVIATION FROM CONTRACT DOCUMENTS WITHOUT WRITTEN APPROVAL OF THE ENGINEER.
10. JOB SAFETY AND CONSTRUCTION PROCEDURES ARE THE RESPONSIBILITY OF THE CONTRACTOR.
11. ALL COSTS OF INVESTIGATION AND/OR REDESIGN, DUE TO CONTRACTOR MISLOCATION OF STRUCTURAL ELEMENTS OR OTHER LACK OF CONFORMANCE WITH THE PROJECT DOCUMENTS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
12. THESE DRAWINGS REPRESENT THE COMPLETED PROJECT WHICH HAS BEEN DESIGNED FOR THE WEIGHTS OF THE MATERIALS INDICATED ON THE DRAWINGS AND FOR THE SUPERIMPOSED LOADS LOCATED IN THE DESIGN DATA. IT IS THE CONTRACTOR'S RESPONSIBILITY TO TO PROVIDE FOR PROPER CONSTRUCTION LOADS AND TO PROVIDE FOR PROPER DESIGN AND CONSTRUCTION OF FALSEWORK, FORMWORK, STAGINGS, BRACING, SHEETING AND SHORING, ETC.
13. TYPICAL DETAILS APPLY REPETITIVELY ON THE PROJECT. CONTRACTOR SHALL COORDINATE THE GENERAL REQUIREMENTS OF TYPICAL DETAILS WITH PROJECT CONDITIONS, PLANS, NOTES AND SPECIFICATIONS.

1. ALL STRUCTURAL STEEL SHALL BE NEW, CLEAN, AND STRAIGHT AND SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH THE A.I.S.C. CODE OF STANDARD PRACTICE (ADOPTED JUNE 2021), EXCEPT AS MODIFIED IN THESE NOTES AND THE PROJECT SPECIFICATIONS.
2. STRUCTURAL STEEL FABRICATION AND ERECTION SHALL COMPLY WITH THE BUILDING CODE OF THE SPECIFICATION, AND THE SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS (ADOPTED JUNE 11, 2021) OF AISC.
3. ALL WELDING SHALL CONFORM TO THE AMERICAN WELDING SOCIETY, D11-2020 STRUCTURAL WELDING CODE-STEEL.
4. ALL FILLET WELDING SHALL BE A MINIMUM OF  $\frac{3}{16}$  INCH WELD UNLESS NOTED OTHERWISE ON DRAWINGS. SEE THE SPECIFICATION FOR ADDITIONAL REQUIREMENTS.
5. ALL FIELD CONNECTIONS SHALL BE BOLTED EXCEPT WHERE WELDING IS SPECIFIED ON THE PLANS. BOLT SHALL BE  $\frac{3}{4}$  INCH DIAMETER MINIMUM. BOLT HOLES FOR STEEL ANCHORED TO CONCRETE, UTILIZING CAST-IN-PLACE ANCHORS, SHALL BE BOLT DIAMETER PLUS  $\frac{1}{8}$  INCH. CONNECTIONS NOT SPECIFICALLY DETAILED ON THE PLANS SHALL BE DESIGNED FOR THE INDICATED LOADS ON DRAWINGS OR THOSE STATED IN THE AISC UNIFORM LOAD TABLES, WHICHEVER IS GREATER.
6. PROVIDE HOLES, COPIES, ETC. REQUIRED IN STRUCTURAL STEEL MEMBERS FOR WORK OF OTHER TRADES. THEY SHALL BE SHOWN ON STRUCTURAL SHOP DRAWINGS AND SHALL BE THE RESPONSIBILITY OF THE SHOP. HOT TAP HOLES IN STEEL MEMBERS IN STRUCTURES WILL NOT BE PERMITTED EXCEPT WITH THE SPECIFIC WRITTEN APPROVAL OF THE ENGINEER.
7. ALL STRUCTURAL STEEL SHALL BE HOT-DIPPED GALVANIZED.



NOTE: EXISTING FOUNDATION AND BASEMENT SLAB CONFIGURATION UNKNOWN. THESE DETAILS REPRESENT PRESUMED GEOMETRY AND MATERIALS. ENGINEER TO PERFORM REVIEW OF EXISTING CONSTRUCTION BEFORE BRACING IS INSTALLED.



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JASON J. LEDOUX  
CIVIL  
No. 50868  
PROFESSIONAL REGISTRY

SEAL

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CITY OF HAVERHILL  
BUILDING FOUNDATION WALL BRACING  
DETAILS  
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION  
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

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