LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL · MASSACHUSETTS

CONSTRUCTION PLANS

FEBRUARY 10, 2026

PREPARED FOR

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

PREPARED BY

FUSS & O'NEILL
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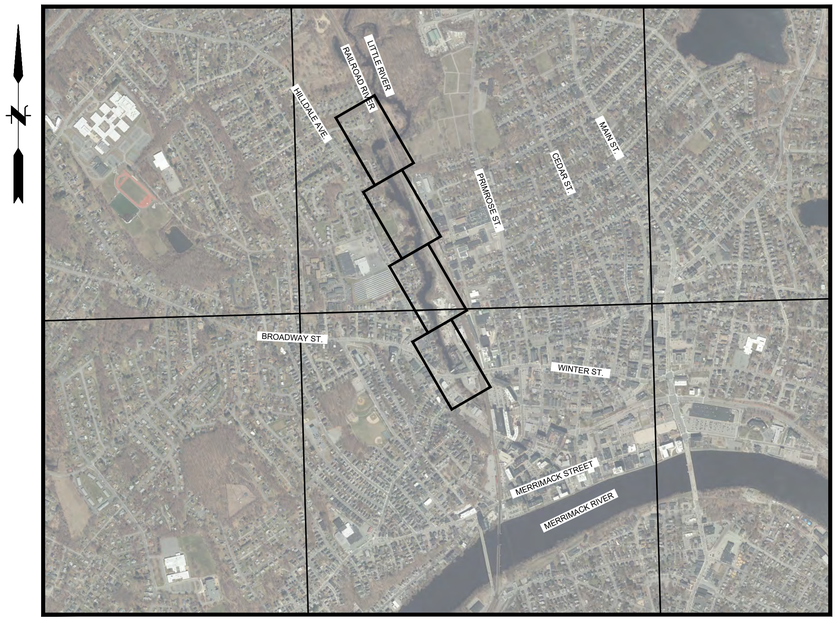
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PROJECT TEAM

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LOCATION MAP
SCALE: 1" = 1000'

COMMONWEALTH OF MASSACHUSETTS
DANIEL L. MCNEILL
No. 53854
REGISTERED PROFESSIONAL ENGINEER

PROJ. No.: 20170390.U40
DATE: FEBRUARY 10, 2026

GI-001

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LEGEND

EXIST	PROP	
		PROPERTY LINE/RIGHT-OF-WAY
		CENTERLINE
	LOD	LIMIT OF DISTURBANCE
		EASEMENT
10+00	10+00	BASELINE
		GRAVEL ROAD
		EDGE OF PAVEMENT
		VERT. GRAN. CURB
		SAW CUT
	MATCH LINE SEE SHEET 2 OF 2	MATCH LINE
FLOODWAY	FLOODWAY	FEMA FLOODWAY
A100	A100	WETLAND DELINEATION FLAG
		BANK/MEAN ANNUAL HIGH WATER
		BORDERING VEGETATED WETLANDS
		BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
		LITTLE RIVER DAM
		GUARD RAIL
		WIRE FENCE
		CHAIN LINK FENCE
		TREE LINE
		SHRUB LINE
		STONE WALL
		RETAINING WALL
2	4	MINOR CONTOUR
10	20	MAJOR CONTOUR
		BUILDING
		BOLLARD
		SIGN
		CONC. PAVEMENT
		NORMAL PAVEMENT
		HEAVY DUTY PAVEMENT
		ADA OR ACCESSIBLE RAMP
		HANDICAP PARKING
VAN	VAN	VAN-ACCESSIBLE HANDICAP PARKING
x21.25x	x21.25x	SPOT ELEVATION
		TREE
		IRON PIPE
		DRILL HOLE
	IP	IRON PIN
		MONUMENT
		CONTROL POINT

EXIST	PROP	
		DRAIN/CSO LINE
S	S	SEWER LINE
OHW	OHW	OVERHEAD ELECTRIC, TELEPHONE & FIRE ALARM
W	W	WATER LINE
G	G	GAS LINE
E	E	UNDERGROUND ELECTRIC
T	T	TELEPHONE LINE
C	C	CABLE TV
E/T/C	E/T/C	ELECTRIC, TELEPHONE & CABLE TV LINES
CB	CB	CATCH BASIN
DCB	DCB	DOUBLE CATCH BASIN
DI	DI	DRAIN INLET
DMH	DMH	DRAIN MANHOLE
		HEADWALL
SMH	SMH	SEWER MANHOLE
CO	CO	CLEAN OUT
WMH	WMH	WATER MANHOLE
WG	WG	WATER GATE
		FIRE HYDRANT
WM	WM	WATER METER
PIV	PIV	POST INDICATOR VALVE
W	W	WELL
GG	GG	GAS GATE
GM	GM	GAS METER
E	E	ELECTRIC MANHOLE
EB	EB	ELECTRIC BOX
EM	EM	ELECTRIC METER
T	T	TRANSFORMER
		LIGHT POST
TMH	TMH	TELEPHONE MANHOLE
TS	TS	TRAFFIC SIGNAL
SB	SB	SIGNAL BOX
FACP	FACP	FIRE ALARM CONTROL PANEL
FB	FB	FIRE ALARM BOX
		UTILITY POLE
		GUY POLE
HH	HH	HAND HOLE
PB	PB	PULL BOX
SF	SF	SILT FENCE
		TEMPORARY COFFERDAM
		STABILIZED CONSTRUCTION ACCESS/ENTRANCE
		STAGING AREA
		TEMPORARY GRAVEL WALKWAY
		ROCK SCOUR PROTECTION
		GRAVEL WALKING TRAIL
		ASPHALT PAVEMENT
		STREAMBED MATERIAL A
		STREAMBED MATERIAL B
		CONSERVATION SEED MIX AND TUBELINGS
		CONSERVATION SEED MIX
		SEMI-SHADE SEED MIX
		SHOWY WILDFLOWER SEED MIX
		UPLAND/PARK SEED MIX
		CONCRETE BLOCK RETAINING WALL
		SILT SOCK

ABBREVIATIONS

GENERAL	
APPROX	APPROXIMATE
BIT	BITUMINOUS PAVEMENT
BW	BOTTOM OF WALL
CC	CONCRETE CURB
CFS	CUBIC FEET PER SECOND
CLF	CHAIN LINK FENCE
CP	CONTROL POINT
EL./ELEV	ELEVATION
EXIST	EXISTING
FES	FABRIC ENCAPSULATED SOIL
GC	GRANITE CURB
HP	HIGH POINT
INV.	INVERT
MAX	MAXIMUM
MBTA	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
MIN	MINIMUM
NTS	NOT TO SCALE
PCC	PRECAST CONCRETE CURB
PROP	PROPOSED
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
TOS	TOP OF SLOPE
TW	TOP OF WALL
TYP.	TYPICAL
VGC	VERTICAL GRANITE CURB
UTILITY	
CB	CATCH BASIN
CMP	CORRUGATED METAL PIPE
CPP	CORRUGATED POLYETHYLENE PIPE
CSO	COMBINED SEWER OVERFLOW
DCB	DOUBLE CATCH BASIN
DI	DUCTILE IRON PIPE
F&G	FRAME AND GRATE
F&C	FRAME AND COVER
HDPE	HIGH DENSITY POLYETHYLENE
HYD	HYDRANT
INV	INVERT ELEVATION
PVC	POLYVINYL CHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
SMH	SEWER MANHOLE
TSV	TAPPING SLEEVE, VALVE AND BOX
UP	UTILITY POLE

LEGEND NOTE

SYMBOLS AND LEGENDS OF PROJECT FEATURES ARE GRAPHIC REPRESENTATIONS AND ARE NOT NECESSARILY SHOWN ON THE DRAWINGS TO SCALE OR TO THEIR ACTUAL DIMENSION OR LOCATION. COORDINATE DETAIL SHEET DIMENSIONS, MANUFACTURERS' LITERATURE, SHOP DRAWINGS, AND FIELD MEASUREMENTS OF SUPPLIED PRODUCTS FOR LAYOUT OF THE PROJECT FEATURES.

MAP NOTES AND REFERENCES

1. REFERENCES:
   A. COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES, 2024 EDITION, REVISIONS AND ALL CURRENT ADDENDA, ARE MADE A PART HEREOF, AS IF ATTACHED HERETO. ALL REFERENCES TO "STATE STANDARD SPECIFICATIONS" SHALL REFER TO THE LATEST EDITION OF THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES CONSTRUCTION.
   B. THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION CONSTRUCTION STANDARD DETAILS, 2017 EDITION, AND ALL CURRENT REVISIONS, ARE MADE A PART HEREOF, AS IF ATTACHED HERETO.
   C. THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, 2003 EDITION, REVISIONS AND ALL CURRENT ADDENDA, ARE MADE A PART HEREOF, AS IF ATTACHED HERETO. ALL REFERENCES TO "SOIL EROSION AND SEDIMENT CONTROL HANDBOOK" SHALL REFER TO THE LATEST EDITION OF THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS.

2. EXISTING CONDITIONS:
   A. SURVEY CONTROL AND ELEVATIONS AT WINTER STREET WERE OBTAINED FROM FIELD SURVEY PERFORMED BY FUSS & O'NEILL FROM SEPTEMBER 12, 2021 TO FEBRUARY 11, 2022.
   B. SURVEY CONTROL AND TREE LOCATIONS WITHIN CASHMAN PARK WERE OBTAINED FROM AN EXISTING CONDITIONS SURVEY PLAN OF CASHMAN PARK, DATED JUNE 1, 2017, AND PREPARED BY SMC SURVEYING AND MAPPING CONSULTANTS. CONTRACTOR TO ESTABLISH ADDITIONAL SURVEY CONTROL AS REQUIRED.
   C. CONTOURS SHOWN ON THIS PLAN THAT ARE OUTSIDE OF THE RIVER AND CASHMAN PARK AREA ARE APPROXIMATE ONLY AND WERE OBTAINED FROM 2013-2014 USGS LIDAR DATA OBTAINED FROM NOAA'S ONLINE DATA ACCESS VIEWER.
   D. BATHYMETRY AND SEDIMENT DEPTHS WITHIN THE RIVER WERE OBTAINED FROM THE FOLLOWING COMBINATION OF FIELD INVESTIGATIONS:
      D.A. APPROXIMATE ELEVATIONS WITHIN RIVER WERE OBTAINED ON NOVEMBER 6, 2020 AND ON NOVEMBER 17, 2020 FROM DEPTH MEASUREMENTS TAKEN BY BOAT BY FUSS & O'NEILL AND TG&B MARINE SERVICES, INC.
      D.B. TOP AND BOTTOM OF SEDIMENT ELEVATIONS WITHIN RIVER WERE OBTAINED FROM FIELD SURVEY PERFORMED BY FUSS & O'NEILL FROM SEPTEMBER 12, 2021 TO FEBRUARY 11, 2022.
   E. WETLAND FLAGGING ALONG LITTLE RIVER WITHIN THE LIMIT OF DISTURBANCE WAS PERFORMED BY FUSS & O'NEILL, INC. (MICHAEL SOARES, WETLAND SCIENTIST) ON SEPTEMBER 27, 2021 AND APRIL 29, 2022. THE WETLAND FLAGS WERE THEN LOCATED VIA SUB-METER GPS. DUE TO SPECIFIC SITE RESTRICTIONS OR SAFETY CONCERNS, IT WAS NOT POSSIBLE TO ACCESS AND FIELD-DELINEATE SOME SEGMENTS OF RIVERBANK AND BORDERING WETLANDS. IN LOCATIONS WHERE A TYPICAL FIELD DELINEATION OF THE BANK, LUWW, AND/OR BVW WAS NOT PRACTICABLE, BOUNDARIES OF RESOURCE AREAS BETWEEN FIELD DELINEATED SEGMENTS WERE COMPLETED IN GIS THROUGH A REVIEW OF AERIAL IMAGERY (2014-2021, SPRING AND SUMMER), FEDERAL AND STATE WETLANDS MAPPING (NATIONAL WETLANDS INVENTORY AND MASS DEP, RESPECTIVELY), AND 1-FOOT CONTOURS (DERIVED FROM 2013-2014 LIDAR). STATE-REGULATED RIVERFRONT AREA IS MEASURED HORIZONTALLY FROM BANK OF LITTLE RIVER, AND STATE-REGULATED BUFFER ZONE IS MEASURED HORIZONTALLY FROM THE BOUNDARIES OF BVW IDENTIFIED AT THE SITE.
   F. ASSESSOR'S PARCELS, WETLAND BOUNDARIES (UPSTREAM OF THE MBTA BRIDGE AND THE LIMIT OF DISTURBANCE), POTENTIAL & CERTIFIED VERNAL POOLS, AND BUILDING FOOTPRINTS (OUTSIDE THE LIMIT OF DISTURBANCE) WERE OBTAINED FROM MASSACHUSETTS GEOGRAPHIC INFORMATION SYSTEM (MASSGIS).
3. FLOOD ZONE:
   A. FLOODWAY INFORMATION SHOWN ON THIS PLAN WAS OBTAINED FROM FEMA FLOOD INSURANCE RATE MAP (FIRM) PANEL NUMBER 25009C0089G WITH AN EFFECTIVE DATE OF JULY 19, 2018 AND FIRM PANEL NUMBERS 25009C0087F, 25009C0086F, AND 25009C0078F WITH AN EFFECTIVE DATE OF JULY 3, 2012 FOR ESSEX COUNTY, MASSACHUSETTS.
4. NATURAL HERITAGE DATA:
   THERE ARE NO NHESP PRIORITY HABITATS OF RARE SPECIES, ESTIMATED HABITATS OF RARE WILDLIFE, OR NATURAL COMMUNITIES LOCATED ALONG THE LITTLE RIVER. THERE ARE ALSO NO AREAS OF CRITICAL ENVIRONMENTAL CONCERN ALONG LITTLE RIVER. THERE ARE, HOWEVER, POTENTIAL VERNAL POOLS LOCATED ALONG LITTLE RIVER TO THE SOUTH OF THE RIVER'S CROSSING WITH I-495 AND NORTH OF THE RIVER'S RAILROAD BRIDGE CROSSING.
5. UTILITIES:
   UTILITIES SHOWN ON THIS PLAN WERE APPROXIMATED FROM FIELD OBSERVATIONS AND A COLLECTIVE REVIEW OF THE FOLLOWING DOCUMENTS: (1) WINTER STREET AND HALE STREET SEWER DIVERSION PLAN PREPARED BY METCALF & EDDY (DATED JULY 1937), (2) FLOOD PROTECTION SYSTEM IMPROVEMENT PLANS (CWSRF-3662, IFB020-13) PREPARED BY AECOM (DATED FEBRUARY 14, 2013), (3) PENTUCKET MILLS EXISTING CONDITIONS PLAN OF LAND PREPARED BY VHB (DATED APRIL 2016) AND (4) INTEGRATED FINAL COMBINED SEWER OVERFLOW LONG-TERM CONTROL PLAN AND SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT PREPARED BY CDM SMITH (DATED FEBRUARY 2017).
6. SEDIMENT SAMPLING
   SELECT SEDIMENT SAMPLING LOCATIONS ARE REPRESENTED ON THE PLANS. DOCUMENTATION OF ALL SEDIMENT SAMPLING AND RESULTS OBTAINED PRIOR TO FEBRUARY 2024 IS PROVIDED IN THE REPORT TITLED "SEDIMENT SAMPLING REPORT COMPILATION, LITTLE RIVER DAM REMOVAL" PREPARED BY FUSS & O'NEILL DATED FEBRUARY 2024.
7. ACTIVITY AND USE LIMITATION AREAS AND UNDERGROUND STORAGE TANKS:
   ALL PROPERTIES WHERE WORK IS PROPOSED DO NOT HAVE UNDERGROUND STORAGE TANKS. HOWEVER, PARCEL 516-304-1 (93 LAFAYETTE SQUARE) IS CONSIDERED AN AUL (ACTIVITY AND USE LIMITATION) PROPERTY.

GENERAL CONSTRUCTION AND COORDINATION REQUIREMENTS

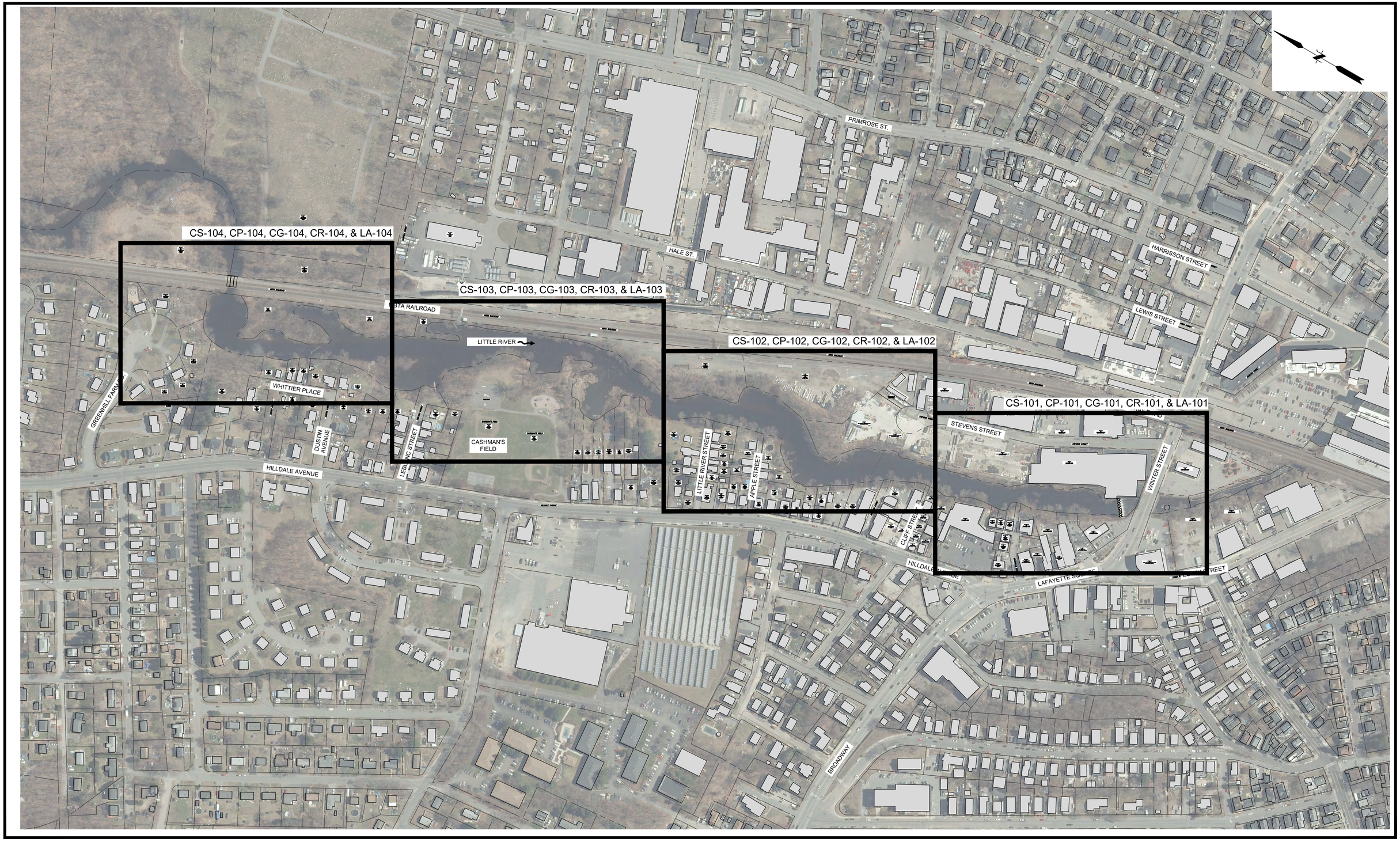
1. THE CONTRACTOR SHALL VERIFY THE LOCATION OF THE EXISTING DAM TO BE REMOVED, EXISTING ADJACENT STRUCTURES, AND THE PROPOSED LAYOUT OF THE RIVER CHANNEL IMPROVEMENTS WITH ITS RELATIONSHIP TO THE EXISTING SITE SURVEY. THE CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS, SITE CONDITIONS, AND MATERIAL SPECIFICATIONS AND SHALL NOTIFY THE OWNER AND ENGINEER OF ANY ERRORS, OMISSIONS, OR DISCREPANCIES BEFORE COMMENCING OR PROCEEDING WITH WORK. THE CONTRACTOR SHALL STAKE OUT THE LIMIT OF DISTURBANCE.
2. THE CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AS REQUIRED TO FIT THE WORK PROPERLY. RECHECK MEASUREMENTS BEFORE CONSTRUCTING EACH WORK ITEM. WHERE PORTIONS OF THE WORK ARE INDICATED TO FIT TO OTHER CONSTRUCTION, VERIFY DIMENSIONS OF OTHER CONSTRUCTION BY FIELD MEASUREMENTS BEFORE FABRICATION. COORDINATE FABRICATION SCHEDULE WITH CONSTRUCTION PROGRESS TO AVOID DELAYING THE WORK.
3. THE LOCATION OF EXISTING UTILITIES ARE APPROXIMATE, HAVE BEEN PLOTTED FROM THE LATEST AVAILABLE INFORMATION, AND MAY NOT BE ALL INCLUSIVE. THE CONTRACTOR SHALL CHECK AND VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES, BOTH OVERHEAD AND UNDERGROUND, AND "DIG-SAFE" MUST BE NOTIFIED PRIOR TO COMMENCING ANY CONSTRUCTION OPERATIONS. RESTORATION AND REPAIR OF DAMAGE TO EXISTING UTILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER. NO EXCAVATION SHALL COMMENCE UNTIL ALL INVOLVED UTILITY COMPANIES AND/OR TOWN WHOSE FACILITIES MIGHT BE AFFECTED BY ANY WORK TO BE PERFORMED BY THE CONTRACTOR ARE NOTIFIED AT LEAST 72 HOURS IN ADVANCE. RELOCATION OF ANY UTILITIES SHALL BE AT THE OWNER'S EXPENSE AND COMPLETED WITH THE UTILITY WORK. THE OWNER SHALL BE NOTIFIED AS TO THE RELOCATIONS REQUIRED PRIOR TO THE START OF CONSTRUCTION.
4. DEVIATIONS OR CHANGES FROM THESE PLANS WILL NOT BE ALLOWED UNLESS APPROVED BY THE ENGINEER/CONTRACT OWNER.
5. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AND LOCATE ANY EXISTING UTILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF NECESSARY. HOWEVER, EXPLORATORY EXCAVATIONS AND OTHER ACTIVITIES INVOLVING SOIL DISTURBANCES WITHIN THE RIVER OR OTHER ADJACENT WATERCOURSES SHALL BE LIMITED TO THE LOW-FLOW PERIOD (I.E. THE PERIOD FROM JULY 1 TO OCTOBER 31 OF ANY CALENDAR YEAR).
6. THE EXISTENCE AND/OR LOCATION OF UTILITIES SHOWN ON THESE PLANS MAY BE ONLY APPROXIMATELY CORRECT AND THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN HEREON AND ANY OTHER UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING, AT HIS/HER EXPENSE, ANY EXISTING UTILITIES DAMAGED DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING, WITH MATCHING MATERIALS, ANY PAVEMENT, WALKS, CURBS, WALLS, FENCES, ETC., THAT MUST BE CUT OR THAT ARE DAMAGED DURING CONSTRUCTION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REMAINING NECESSARY PERMITS, INSPECTIONS, BONDS, ETC. AND OTHER APPROVAL RELATED ITEMS WITH THE LOCAL AND STATE/FEDERAL MUNICIPALITIES. NO CONSTRUCTION SHALL COMMENCE UNTIL SUCH PERMITS HAVE BEEN SECURED AND THE CONTRACTOR HAS SUPPLIED THE REQUIRED NOTICES.
9. WORK ON MBTA PROPERTY CAN ONLY BE UNDERTAKEN UPON RECEIPT OF A LICENSE FROM MBTA.
10. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE SITE THROUGH THE ENTIRE PERIOD OF CONSTRUCTION WHEN WORK IS ACTIVELY OCCURING.
11. CONTRACTOR AGREES THAT HE/SHE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE CONTRACT OWNER (CITY OF HAVERHILL), PROPERTY OWNERS AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL AND ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM "THE SOLE NEGLIGENCE OF THE CONTRACT OWNER, PROPERTY OWNER OR THE ENGINEER."
12. PHOTOGRAPHS, VIDEOTAPING, AND SKETCHES (AS NECESSARY) MUST BE TAKEN OF ADJOINING CONSTRUCTION AND SITE IMPROVEMENTS WITHIN 200 FEET OF EXCAVATION LIMITS ASSOCIATED WITH DEMOLITION AND RIVER CHANNEL IMPROVEMENTS PRIOR TO EXCAVATION AND THE INSTALLATION OF EXCAVATION SUPPORT SYSTEMS. SUCH DOCUMENTATION SHALL ILLUSTRATE EXISTING SURFACES THAT MAY BE MISCONSTRUED AS DAMAGE CAUSED BY THIS PROJECT CONSTRUCTION OPERATIONS.
13. METHODS AND MATERIALS USED IN THE CONSTRUCTION OF IMPROVEMENTS FOR THIS PROJECT SHALL CONFORM TO THE CURRENT CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION AND THE CONTRACT DOCUMENTS.
14. VERIFY SPACE REQUIREMENTS AND DIMENSIONS OF ITEMS SHOWN ON DRAWINGS. CHECK THE LOCATION, LEVEL AND GRADE, OF EVERY MAJOR ELEMENT AS THE WORK PROGRESSES.
15. ESTABLISH BENCHMARKS AND CONTROL POINTS IN ADDITION TO THOSE INDICATED TO SET LINES, GRADES, AND LEVELS AT EACH STAGE OF CONSTRUCTION. LOCATE THE WORK AND COMPONENTS OF THE WORK ACCURATELY, IN CORRECT ALIGNMENT AND ELEVATION, AS INDICATED BOUNDS OR MONUMENTATION DISTURBED DURING CONSTRUCTION SHALL BE SET OR RESET BY A PROFESSIONAL LICENSED SURVEYOR AT NO COST TO THE OWNER.
16. COMPLY WITH MANUFACTURERS' WRITTEN INSTRUCTIONS AND RECOMMENDATIONS FOR INSTALLING MATERIALS AND PRODUCTS. INSTALL PRODUCTS AT THE TIME AND UNDER CONDITIONS THAT WILL ENSURE THE BEST POSSIBLE RESULTS. MAINTAIN CONDITIONS REQUIRED FOR PRODUCT PERFORMANCE UNTIL SUBSTANTIAL COMPLETION.
17. USE PRODUCTS, CLEANERS, AND INSTALLATION MATERIALS THAT ARE NOT CONSIDERED HAZARDOUS.
18. CONTRACTOR SHALL IDENTIFY TREES TO BE REMOVED PRIOR TO CONSTRUCTION AND MARK THEM WITH CONSTRUCTION TAPE FOR REVIEW BY THE OWNER/ENGINEER. TREES AND OTHER EXISTING VEGETATION SHALL BE RETAINED WHEREVER FEASIBLE. CONTRACTOR SHALL NOT REMOVE TREES UNTIL REVIEWED AND APPROVED BY THE OWNER/ENGINEER.
19. TREES AND OTHER EXISTING VEGETATION NOT WITHIN THE LIMITS OF DISTURBANCE SHALL BE PROTECTED FROM DAMAGE. VEGETATED AREAS AND/OR TREES DAMAGED THAT ARE NOT PLANNED FOR REMOVAL SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CITY.
20. THE CONTRACTOR SHALL RESTORE DISTURBED LANDSCAPE AREAS TO ORIGINAL CONDITION (I.E. SEEDED, SODDED, PLANTED), UNLESS OTHERWISE DIRECTED WITHIN CONTRACT DOCUMENTS.
21. TRASH AND DEBRIS OF EVERY NATURE SHALL BE COLLECTED AND REMOVED FROM WITHIN THE LIMITS OF DISTURBANCE AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS.
22. ALL EXCESS EXCAVATED MATERIALS, EXCESS FILL, EXCESS CONSTRUCTION MATERIALS, DEBRIS, AND WASTE (INCLUDING IDENTIFIED CONTAMINATED SOILS WITHIN RIVER) SHALL BE REMOVED FROM THE SITE AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS.
23. DO NOT CLOSE OR OBSTRUCT ROADWAYS, SIDEWALKS, FIRE HYDRANTS, AND UTILITIES WITHOUT APPROPRIATE PERMITS.
24. WORK IS RESTRICTED TO THE HOURS OF 7 AM TO 5 PM ON MONDAY THROUGH FRIDAY, EXCLUDING HOLIDAYS, UNLESS OTHERWISE APPROVED BY THE OWNER.
25. PRIOR TO CONSTRUCTION, ADDITIONAL CONSTRUCTION ACCESSES AND/OR CONSTRUCTION EASEMENTS NOT SHOWN ON THIS PLAN (AGREED UPON THROUGH COORDINATION BETWEEN CONTRACTOR AND PROPERTY OWNER) MUST BE GRANTED IN WRITING BY PROPERTY OWNERS.
26. STOP WORK IN THE VICINITY OF SUSPECTED CONTAMINATED SOIL, GROUNDWATER, OR OTHER MEDIA OUTSIDE OF THE AREA OF CONTAMINATED SOIL AREA IDENTIFIED WITHIN. IMMEDIATELY NOTIFY THE ENGINEER AND OWNER SO THAT APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN. RESUME WORK IN THE IMMEDIATE VICINITY ONLY UPON DIRECTION BY THE OWNER.

PROTECTION OF WORK REQUIREMENTS

1. THE WORK AND SITE SHALL BE PROTECTED AT ALL TIMES UNTIL FINAL ACCEPTANCE BY THE OWNER. CARE SHALL BE EXERCISED WHILE OPERATING EQUIPMENT ON, AND ADJACENT TO, THE WORK AREA. THE CONTRACTOR SHALL BE RESPONSIBLE TO ASSURE THE UTILIZED EQUIPMENT DOES NOT CAUSE DAMAGE TO EXISTING AND ADJACENT FEATURES NOT SCHEDULED FOR DEMOLITION OR REMOVAL.
2. ACCESS TO VARIOUS PORTIONS OF THE SITE SHALL BE UNDERTAKEN IN SUCH A MANNER THAT THE WORK AND SITE ARE PROTECTED AT ALL TIMES. ACCESS WAYS SHALL BE CONSTRUCTED, MAINTAINED, AND PROTECTED WITH SEDIMENT CONTROLS TO PREVENT DAMAGE FROM EROSION DURING MAJOR STORM EVENTS.
3. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND IN SUCH A MANNER THAT THE WORK AND ADJACENT PROPERTIES ARE PROTECTED FROM DAMAGE AT ALL TIMES.
4. CONSTRUCT IN-RIVER IMPROVEMENTS AND MAINTAIN IN-RIVER WORK AREAS IN ACCORDANCE WITH THE PROJECT'S APPROVED WATER CONTROL & CONSTRUCTION SEQUENCING PLANS. IN THE EVENT THAT FLOOD FLOWS ARE EXPECTED TO EXCEED THE CAPACITIES OF WATER CONTROL SYSTEMS; PROTECT ANY NON-STABLE OR ERODIBLE IMPROVEMENTS AND REMOVE ALL EQUIPMENT AND PERSONNEL FROM IN-RIVER LOCATIONS.

EROSION AND SEDIMENT CONTROL

1. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES, INSTALL ALL EROSION AND SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLAN OR AS REQUIRED BY SITE CONDITIONS. ALL EROSION CONTROL DEVICES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
2. INSTALL, INSPECT, AND MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES THROUGHOUT CONSTRUCTION. REMOVE ALL SUCH MEASURES AND RESTORE ALL DISTURBED AREAS FOLLOWING CONSTRUCTION.
3. EROSION AND SEDIMENT CONTROL SHALL COMPLY WITH THE SPECIFICATIONS AND ALL PERMIT REQUIREMENTS.
4. REFER TO SITE RESTORATION AND LANDSCAPE AND PLANTING PLANS FOR POST-CONSTRUCTION RESTORATION MEASURES.
5. REFER TO WATER CONTROL AND CONSTRUCTION SEQUENCING PLAN FOR CONTROL OF WATER.
6. REFER TO SITE LAYOUT AND GRADING PLAN FOR DAM REMOVAL, SEDIMENT MANAGEMENT, AND PERMANENT CHANNEL STABILIZATION MEASURES.
7. DISTURBANCE OF SOIL SURFACES IS REGULATED BY STATE LAW AND LOCAL ORDINANCE. ALL WORK SHALL COMPLY WITH THESE EROSION AND SEDIMENT CONTROL NOTES AND OTHER PERMIT CONDITIONS TO PREVENT OR MINIMIZE SOIL EROSION AND SEDIMENTATION TO OFF-SITE AREAS.
8. THE CONTRACTOR SHALL COMPLY WITH THE LATEST EDITION OF THE "MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS" IN CONSTRUCTING THE EROSION AND SEDIMENT CONTROLS INDICATED ON THE PLANS. ALL EROSION AND SEDIMENT CONTROL MEASURES OR WORKS AND REHABILITATION MEASURES MUST CONFORM TO OR EXCEED THE SPECIFICATIONS OR STANDARDS SET OUT IN THE CONTRACT DOCUMENTS AND ENVIRONMENTAL PERMITS.
9. THE CONTRACTOR IS RESPONSIBLE FOR THE TIMELY INSTALLATION, INSPECTION, MAINTENANCE, AND/OR REPLACEMENT OF ALL TEMPORARY AND PERMANENT EROSION CONTROL DEVICES SHOWN ON THESE PLANS TO ENSURE PROPER OPERATION THROUGHOUT THE LIFE OF THE PROJECT. REMOVE EROSION AND SEDIMENTATION CONTROLS AFTER STABLE VEGETATIVE GROWTH IS ESTABLISHED BY THE OWNER, ENGINEER OR LANDSCAPE ARCHITECT.
10. THE CONTRACTOR SHALL INSPECT EROSION AND SEDIMENT CONTROL DEVICES ON A DAILY BASIS, AFTER EACH STORM EVENT, AND AT LEAST DAILY DURING PROLONGED RAINFALL. CLEAN OUT ACCUMULATED SEDIMENT BEHIND CONTROLS. REPAIR OR REPLACE CONTROLS PROMPTLY AS NEEDED. REMOVE ACCUMULATED SEDIMENT FROM BEHIND PERIMETER CONTROLS WHEN ONE-THIRD OF THE ORIGINAL HEIGHT OF THE CONTROLS BECOME FILLED WITH SEDIMENT. DISPOSE OF REMOVED SEDIMENT IN ON-SITE FILL AREAS OR LAWFULLY OFF-SITE.
11. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CLEAN ROADS, CONTROL DUST, AND TAKE ALL NECESSARY MEASURES TO ENSURE THAT THE SITE AND ALL ADJACENT ROADS AND PARKING AREAS BE MAINTAINED IN A MUD- AND DUST-FREE CONDITION AT ALL TIMES THROUGHOUT THE LIFE OF THE CONTRACT. DUST CONTROL SHALL INCLUDE, BUT IS NOT LIMITED TO, WATER AND/OR CRUSHED STONE OR COARSE GRAVEL.
12. ALL PROPOSED TEMPORARY CONSTRUCTION ENTRANCES SHALL BE CONSTRUCTED AS SHOWN ON THE PLANS AND DETAILS. ALL VEHICLE TRAFFIC ENTERING OR EXITING THE PROJECT SITE SHALL PASS OVER THE CONSTRUCTION ENTRANCES TO REDUCE THE TRACKING OR FLOWING OF SEDIMENT ONTO THE SURROUNDING ROADWAYS. ENTRANCES SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE SURROUNDING ROADWAYS. THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO THE SURROUNDING ROADWAYS AND PARKING AREAS MUST BE REMOVED IMMEDIATELY. ADDITIONAL ENTRANCES FOR CONSTRUCTION PHASING SHALL BE INSTALLED AS REQUIRED TO PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO ROADWAYS.
13. THE CONTRACTOR SHALL INSTALL ALL PERIMETER SEDIMENT CONTROL BARRIERS (I.E. SILT FENCE) AS SHOWN ON THE PLANS. A SILT FENCE SHALL ALSO BE INSTALLED AROUND ANY SOIL STOCKPILE AREAS.
14. TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED IMMEDIATELY IN ANY DISTURBED AREAS THAT HAVE NOT YET REACHED FINISHED GRADE AND CONSTRUCTION IS NOT EXPECTED TO RESUME FOR MORE THAN 14 DAYS. TEMPORARY VEGETATIVE COVER SHALL CONSIST OF SHORT-TERM EROSION CONTROL SEED (SUBSECTION M6.03.1 OF THE MASSDOT STANDARD SPECIFICATIONS) FROM APRIL 1 TO JUNE 1 AND AUGUST 15 TO OCTOBER 15. MAY ALSO BE INSTALLED BETWEEN OCTOBER 15 TO MARCH 31 IF COVERED WITH TEMPORARY MULCHING. SEED AT A RATE OF 75 LBS/ACRE BY HAND.
15. PERMANENT VEGETATIVE COVER SHALL BE ESTABLISHED TO ALL DISTURBED AREAS THAT HAVE REACHED FINISHED GRADE AS SOON AS POSSIBLE, BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS PERMANENTLY CEASED. RECOMMENDED PERMANENT SEEDING DATES ARE APRIL 1 TO JUNE 1 AND AUGUST 15 TO OCTOBER 15. REFER TO SITE RESTORATION PLANS FOR PERMANENT VEGETATIVE COVER SEED MIXTURES AND APPLICATION RATES. ALL PLANTINGS AND SEED SHALL BE COVERED BY A WARRANTY PERIOD AS DESCRIBED IN THE SPECIFICATIONS; RESEEDING/RE-PLANTING SHALL BE COMPLETED TO ENSURE STABLE VEGETATIVE COVER IS ESTABLISHED OVER ALL DISTURBED AREAS.
16. IF PERMANENT SEEDING CANNOT BE COMPLETED WITHIN 14 DAYS OF THE COMPLETION OF CONSTRUCTION OR WITHIN THE RECOMMENDED SEEDING DATES, TEMPORARY BIODEGRADABLE EROSION CONTROL BLANKETING (CONTAINING NO PLASTIC COMPONENTS) OR MULCHING SHALL BE SPREAD/INSTALLED OVER ALL DISTURBED AREAS TO PROTECT THE SITE UNTIL ARRIVAL OF THE NEXT RECOMMENDED SEEDING PERIOD. MULCHING OR BLANKETING SHOULD BE INSTALLED AS SOON AS POSSIBLE IF SEEDING IS INSTALLED BETWEEN OCTOBER 15 AND MARCH 31, BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY CEASED. IF PERMANENT SEEDING IS INSTALLED IN JULY AND AUG



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE A. NADEAU
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 150'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
150 75 0 150
GRAPHIC SCALE

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

CITY OF HAVERHILL

INDEX PLAN

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

GI-003

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_IND01.dwg Layout: GI-003 Plotted: 2024-12-11 5:45 PM Saved: 2024-09-06 11:10 AM User: claire.nauman
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

MATCH LINE SEE SHEET CS-102

N/F
G&C CONCRETE CONSTRUCTION, INC.
#31 STEVENS STREET

307-2-6
N/F
SHAIN REALTY TRUST
STEVENS STREET

307-2-5
N/F
KENNEBEC REALTY TRUST
#265 WINTER STREET

STEVENS STREET

4" G

307-2-10
N/F
G&C CONCRETE CONSTRUCTION, INC.
#30 STEVENS STREET

307-2-9
N/F
SHAIN REALTY TRUST
#14 STEVENS STREET

307-2-01
N/F
HAFFNER REALTY TRUST
#284 WINTER STREET

WINTER STREET

POTENTIAL STORMWATER OUTFALL

12" STORMWATER OUTFALL

CONCRETE WALL

54" RCP CSO OUTFALL (NPDES 021H)

PROPERTY CONTAINS UST ID No. 5252

BENCHMARK 302

12" VITRIFIED CLAY PIPE STORMWATER OUTFALL (LR0932)

STORMWATER OUTFALL (LR0931)

STONE MASONRY RETAINING WALL

FORMER/ABANDONED 12" WIDE MILL RACEWAY CHANNEL

16'Wx8'H STONE MASONRY ARCH CULVERT

ENTRANCE TO LITTLE RIVER CONDUIT APPROXIMATELY 550' DOWNSTREAM OF WINTER STREET BRIDGE

LITTLE RIVER

SED-4

MASSDOT RIGHT-OF-WAY

MASSDOT RIGHT-OF-WAY

LITTLE RIVER DAM SPILLWAY CREST EL.=18.6±

STONE MASONRY RETAINING WALL

SCOUR HOLE

BENCHMARK 301

48" RCP CSO OUTFALL (NPDES 038) INV. 11.39

24" CAST IRON STORMWATER OUTFALL (LR0934)

WINTER STREET BRIDGE 30'Wx14'H STONE MASONRY ARCH CULVERT

CONTINUITY AND CONDITION OF EXISTING WALLS UNKNOWN

STONE MASONRY WALL AND FENCE

GUARDRAIL

GRANITE CURB ALONG BITUMINOUS SIDEWALK

AREA OF KNOWN SEDIMENT CONTAMINATION (SED-4)

AUL PROPERTY WITH CLASS B2 RAO

GRANVILLE STREET

516-305-10
N/F
MARIA MACEX ETAL
#17 HILLDALE AVENUE

516-305-9
N/F
CASMO REALTY TRUST
#7 HILLDALE AVENUE

516-305-17
N/F
SHAWN DUPUIS
#9 GRANVILLE COURT

516-305-16
N/F
JUAN BALLISTAS JR., ETAL
#7 GRANVILLE COURT

516-305-15
N/F
EDWARD G. ALCANTARA
#5 GRANVILLE COURT

516-305-13
N/F
HELEN R. TAYLOR LIFE ESTATE
#8 GRANVILLE STREET

516-305-12
N/F
PEDRO ALVARO RONQUILLO

516-304-10
N/F
PETA REALTY TRUST
#8 GRANVILLE STREET

516-304-6
N/F
MAUREEN E. RYAN TRUST
#19 LAFAYETTE SQUARE

516-304-1
N/F
K BROTHERS, LLC
#89 LAFAYETTE SQUARE

516-304-5
N/F
OCP REALTY, LLC
#107 LAFAYETTE SQUARE

516-304-7
N/F
PETER J. PHANEUF
#123 LAFAYETTE SQUARE

516-304-8
N/F
133-135 LAFAYETTE SQUARE, LLC
#135 LAFAYETTE SQUARE

516-304-6A
N/F
NEDCO 117, LLC
#117 LAFAYETTE SQUARE

515-296-11
N/F
VICTOR VON VASTA REVOCABLE TRUST
#25 LAFAYETTE SQUARE

515-296-05
N/F
KENNETH H. SHIFF
#235 ESSEX STREET

LEGEND:

FLOODWAY	FEMA FLOODWAY
AA100	WETLAND DELINEATION FLAG
	BANK/MEAN ANNUAL HIGH WATER
	BORDERING VEGETATED WETLANDS
	BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
	SEDIMENT SAMPLE LOCATION / TRANSECT
	PARCEL BOUNDARY
D	DRAIN/CSO LINE
W	WATER LINE
G	GAS LINE
E/T	ELECTRIC/TELEPHONE LINE
	GUARDRAIL
	CHAIN LINK FENCE
	CATCH BASIN
2	EXISTING GROUND OR BOTTOM OF RIVER CHANNEL CONTOUR
WG GG	WATER GATE / GAS GATE
	TREE LINE

BENCHMARKS

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

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
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No. 45977
REGISTERED PROFESSIONAL ENGINEER

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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

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_EXC01.dwg Layout: CS-101 Plotted: 2024-12-11 5:46 PM Saved: 2024-09-11 11:01 AM User: claire.nauman
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

MBTA RAILROAD

600-453-1
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HALE STREET

600-452-1
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HALE STREET

AREA OF KNOWN SEDIMENT CONTAMINATION (TRANSECT 2)

TRANSECT 2

LITTLE RIVER

FLOODWAY

AA143
AA142
AA141
AA140
AA139
AA138
AG741
AG740
AG739
AG738
AG737
AG736
AG735
AG732
AG731
AG730
AG729
AG727
AG726
AG725
AG724
AG723
AG722
AA137
AA136
AA135
AA134
AA133
AA132
AA131
AA130
AA129
AA128
AA127
AA126
AA125

AREA OF KNOWN SEDIMENT CONTAMINATION (SED-19). CONDUCT ADDITIONAL TESTING TO REFINE LIMITS OF OFF-SITE DISPOSAL. SEE SPECIFICATIONS AND WATER CONTROL & CONSTRUCTION SEQUENCING PLAN.

SED-19

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY EASEMENT

307-2-10
N/F
G&C CONCRETE CONSTRUCTION, INC.
#30 STEVENS STREET

STEVENS STREET

CONCRETE WALL

12" CPP OUTFALL

CONCRETE WALL

Flowline Invert 12" CPP EL 20.98±

24" VITRIFIED CLAY PIPE STORMWATER OUTFALL (LR1752)

MATCH LINE SEE SHEET CS-103

MATCH LINE SEE SHEET CS-101

LITTLE RIVER STREET

APPLE STREET

BENJAMIN STREET

CLIFF STREET

523-325-1
N/F
GEORGE RAYMOND GIRARD
#4 LITTLE RIVER STREET

523-324-11
N/F
NICHOLAS R. CEFALO ETUX
#9 LITTLE RIVER STREET

523-324-10
N/F
JUDINE A. MELLO
#2 LITTLE RIVER STREET

523-324-9
N/F
JUAN HERNANDEZ
#3 LITTLE RIVER STREET

523-324-8
N/F
BERT N. LANGLOIS
#5 LITTLE RIVER STREET

523-324-7
N/F
LLOYD E. JENNINGS
#3 LITTLE RIVER STREET

523-324-6
N/F
ALEXANDRA SCOTT
#1 LITTLE RIVER STREET

523-325-3
N/F
THE J&T REALTY TRUST
#2 LITTLE RIVER STREET

523-325-2
N/F
THE J&T REALTY TRUST
#111 HILLDALE AVENUE

523-324-1
N/F
YLANDER DILONE
#8 APPLE STREET

523-317-4
N/F
JOSE ESTRADA ETAL
#1 APPLE STREET

523-324-2
N/F
HELEN MCLAUGHLIN
#4 APPLE STREET

523-317-3
N/F
JOHN ROUTIER ETAL
#6 APPLE STREET

523-324-3
N/F

523-324-3A
N/F
GREGORY C. JOHNSON
57 HILLDALE AVENUE

523-317-8
N/F
A.G. REAL ESTATE TRUST
#77 HILLDALE AVENUE

523-317-1
N/F
MIGUEL A. BERROA
#83 HILLDALE AVENUE

521-317-7
N/F
71-73 HILLDALE AVENUE R.T.
#71 HILLDALE AVENUE

521-317-6
N/F
ARTHUR M. RICHARD
#69 HILLDALE AVENUE

521-317-5
N/F
BOUCHER FAMILY TRUST
#65 HILLDALE AVENUE

521-317-4
N/F
EDUARDO FERNANDEZ
#59 HILLDALE AVENUE

521-317-3
N/F
K&S LEBLANC REALTY CO., INC.
#53 HILLDALE AVENUE

521-317-2
N/F
K&S LEBLANC REALTY CO., INC.
#45 HILLDALE AVENUE

512-316-4
N/F
JOHN P. ROGERS
#5-7 BENJAMIN STREET

516-305-11
N/F
JOHN P. ROGERS
#4 CLIFF STREET

LEGEND:

FLOODWAY	FEMA FLOODWAY
AA100	WETLAND DELINEATION FLAG
	BANK/MEAN ANNUAL HIGH WATER
	BORDERING VEGETATED WETLANDS
	BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
	SEDIMENT SAMPLE LOCATION / TRANSECT
	PARCEL BOUNDARY
D	DRAIN/CSO LINE
W	WATER LINE
G	GAS LINE
E/T	ELECTRIC/TELEPHONE LINE
	GUARDRAIL
	CHAIN LINK FENCE
	CATCH BASIN
	EXISTING GROUND OR BOTTOM OF RIVER CHANNEL CONTOUR
WG GG	WATER GATE / GAS GATE
	TREE LINE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE M. WINSLOW
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL

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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LAYER STATE:
MS VIEW:

MBTA RAILROAD

MBTA RAILROAD

LITTLE RIVER

LITTLE RIVER

MATCH LINE SEE SHEET CS-104

MATCH LINE SEE SHEET CS-102

602-461-5
N/F
JAMES LEO
SERRATORE
0 NORFOLK
STREET

TIMBER HEADWALL
TIMBER WALL
36"W X 48"H
STORMWATER
OUTFALL (LR1260)

CONCRETE WALL

CHAIN LINK FENCE

CONCRETE STEPS

SKATE PARK

PLAYGROUND

LEBLANC STREET

524-327-1
N/F
LAWRENCE L.
CONCAU
#0 LEBLANC
STREET

524-326-6
N/F
JAMES R.
CHRISTOFFERSON
#8 LEBLANC
STREET

524-326-5
N/F
JUNE M. CHILDS
#6 LEBLANC
STREET

CASHMAN'S FIELD

523-326-1
N/F
CITY OF
HAVERHILL
#175 HILLDALE
AVENUE

CASHMAN'S FIELD

523-326-1
N/F
CITY OF
HAVERHILL
#175 HILLDALE
AVENUE

GRAVEL PATH

24" RCP STORMWATER
OUTFALL (LR1764)

48" RCP STORMWATER
OUTFALL (LR0952)

BUILDING NOT PRESENT
DURING WETLAND
DELINEATION ON 9/27/21

48" BOX CULVERT STORMWATER
OUTFALL (LR39152)

523-325-11
N/F
JANE E.
MCLAUGHLIN
#142 HILLDALE
AVENUE

523-325-10
N/F
CLARA OSPINA
#145 HILLDALE
AVENUE

523-325-9
N/F
JOHN T. AUDET
ETUX
#141 HILLDALE
AVENUE

523-325-8
N/F
135 HILLDALE
AVENUE REALTY
TRUST
#135 HILLDALE
AVENUE

523-325-7A
N/F
CARLOS R.
MEDINA
#131 HILLDALE
AVENUE

523-325-6
N/F
BOSTON GAS CO.
#125 HILLDALE
AVENUE

LEGEND:

FLOODWAY	FEMA FLOODWAY
AA100	WETLAND DELINEATION FLAG
	BANK/MEAN ANNUAL HIGH WATER
	BORDERING VEGETATED WETLANDS
	BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
	SEDIMENT SAMPLE LOCATION / TRANSECT
	PARCEL BOUNDARY
D	DRAIN/CSO LINE
W	WATER LINE
G	GAS LINE
E/T	ELECTRIC/TELEPHONE LINE
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	CHAIN LINK FENCE
	CATCH BASIN
	EXISTING GROUND OR BOTTOM OF RIVER CHANNEL CONTOUR
WG / GG	WATER GATE / GAS GATE
	TREE LINE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE A. AUDET, JR.
CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

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30 15 0 30
GRAPHIC SCALE

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SPRINGFIELD, MA 01103
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CITY OF HAVERHILL

EXISTING CONDITIONS PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CS-103

File: J:\DWG\P2017\03900\U30\Civil\Plan\20170390U30_EXC01.dwg Layout: CS-103 Plotted: 2024-12-11 5:47 PM Saved: 2024-09-11 11:01 AM User: claire.nauman
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PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

526-2-4
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HILLDALE AVENUE

649-611-6
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 PRIMROSE STREET

RAILROAD BRIDGE SUPPORTED ON 12" TIMBER PIERS FORMING THREE BAYS
LEFT BAY WIDTH – 11.0' WIDE
CENTER BAY WIDTH – 12.0' WIDE
RIGHT BAY WIDTH – 10.9' WIDE
BOTTOM BEAM EL.=22.7±

EXISTING SCOUR PROTECTION. LIMITS APPROXIMATE

MBTA RAILROAD

526-18-7-21
N/F
HUSAM MOUSSA
#23 GREENHILL FARM ROAD

AREA OF KNOWN SEDIMENT CONTAMINATION (TRANSECT 7)

TRANSECT 7

649-611-7
N/F
CITY OF HAVERHILL
0 HALE STREET

526-18-8-17
N/F
LAWRENCE M. LAPLANTE ETUX
#17 GREENHILL FARM ROAD

8" VITRIFIED CLAY PIPE STORMWATER OUTFALL (LR0844)

524-328A-8
N/F
THOMAS A. KLINGH
#15 WHITTIER PLACE

524-328A-9
N/F
D. LATERELLA ETAL
#13 WHITTIER PLACE

524-328A-10
N/F
KATINA M. MORTNER ETAL
#11 WHITTIER PLACE

524-328A-13
N/F
ERNEST H. FOUNTAINE ETUX
#3 WHITTIER PLACE

524-328A-13A
N/F
BRITTANY HAY
#1 WHITTIER PLACE

WHITTIER PLACE

524-329-3
N/F
JUSTIN PALMISANO ETUX
#241 HILLDALE AVENUE

524-328-23
N/F
THOMAS A. KLINGH
#0 WOOLF AVENUE

MATCH LINE SEE SHEET CS-103

LEGEND:

- FLOODWAY — FEMA FLOODWAY
- AA100 — WETLAND DELINEATION FLAG
- BANK/MEAN ANNUAL HIGH WATER
- BORDERING VEGETATED WETLANDS
- BASE CONDITION FLOW LIMITS / MEAN ANNUAL LOW WATER
- SEDIMENT SAMPLE LOCATION / TRANSECT
- PARCEL BOUNDARY
- D — DRAIN/CSO LINE
- W — WATER LINE
- G — GAS LINE
- E/T — ELECTRIC/TELEPHONE LINE
- GUARDRAIL
- CHAIN LINK FENCE
- CATCH BASIN
- EXISTING GROUND OR BOTTOM OF RIVER CHANNEL CONTOUR
- WG / GG — WATER GATE / GAS GATE
- TREE LINE

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

COMMONWEALTH OF MASSACHUSETTS
DEANE M. DIXIT, CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

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CITY OF HAVERHILL

EXISTING CONDITIONS PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CS-104

MATCH LINE SEE SHEET CP-102

N/F
G&C CONCRETE CONSTRUCTION, INC.
#31 STEVENS STREET

307-2-6
N/F
SHAIN REALTY TRUST
STEVENS STREET

307-2-5
N/F
KENNEBEC REALTY TRUST
#265 WINTER STREET

STEVENS STREET

307-2-10
N/F
G&C CONCRETE CONSTRUCTION, INC.
#30 STEVENS STREET

307-2-9
N/F
SHAIN REALTY TRUST
#14 STEVENS STREET

WINTER STREET

307-2-01
N/F
HAFFNER REALTY TRUST
#284 WINTER STREET

LIMIT OF DISTURBANCE (TYP.)

516-305-10
N/F
MARIA MACEK ETAL
#17 HILLDALE AVENUE

516-305-9
N/F
CASMO REALTY TRUST
#7 HILLDALE AVENUE

516-305-17
N/F
SHAWN DUPUIS
#9 GRANVILLE COURT

516-305-16
N/F
JOHN BALLESTRA JR., ETAL
#7 GRANVILLE COURT

516-305-15
N/F
EDWARD G. ALCANTARA
#1 GRANVILLE COURT

516-304-10
N/F
PETA REALTY TRUST
#9 GRANVILLE STREET

516-304-6
N/F
MAUREEN M. RYAN TRUST
#119 LAFAYETTE SQUARE

516-304-1
N/F
K BROTHERS, LLC
#89 LAFAYETTE SQUARE

516-305-13
N/F
HELEN R. TAYLOR LIFE ESTATE
#8 GRANVILLE STREET

516-305-12
N/F
PEDRO ALVARO RONQUILLO
#6 GRANVILLE STREET

516-304-5
N/F
DCP REALTY, LLC
#107 LAFAYETTE SQUARE

516-304-7
N/F
PETER J. PHANEUF
#123 LAFAYETTE SQUARE

516-304-8
N/F
133-135 LAFAYETTE SQUARE, LLC
#135 LAFAYETTE SQUARE

516-304-4A
N/F
NEDCO 117, LLC
#117 LAFAYETTE SQUARE

516-305-5
N/F
ELIE BOURAPHAEL
#141 LAFAYETTE SQUARE

GRANVILLE STREET

AVENUE

515-296-05
N/F
KENNETH H. SHIFF
#235 ESSEX STREET

515-296-11
N/F
VICTOR VON VASTA REVOCABLE TRUST
#25 LAFAYETTE SQUARE

FLOATING TYPE 3 PERMEABLE TURBIDITY BARRIER

REMOVE EXISTING FENCE (TYP.) SEE LANDSCAPE PLANS FOR PROPOSED FENCE MATERIALS AND LOCATIONS.

REMOVE EXISTING GUARDRAIL (TYP.) SEE LANDSCAPE PLANS FOR PROPOSED GUARDRAIL MATERIALS AND LOCATIONS.

INSTALL CATCH BASIN INLET PROTECTION

STABILIZED CONSTRUCTION ACCESS/ENTRANCE RAMP

CONSTRUCTION EQUIPMENT AND STAGING AREA. SEE SITE PLAN FOR PROPOSED SITE PLAN AND RESTORATION IN THIS AREA.

INSTALL 6' HIGH TEMPORARY CHAINLINK CONSTRUCTION FENCE

INSTALL SILT FENCE FOR TEMPORARY CONSTRUCTION ENTRANCE AND STAGING AREA. INSTALL OTHER EROSION CONTROL BARRIER IN PAVED AREAS.

File: J:\DWG\P20170390\U30\Civil\Plan\20170390U30_ERO01.dwg Layout: CP-101 Plotted: 2026-02-10 2:49 PM Saved: 2026-02-10 1:27 PM User: claire.nauman

PC3: NONE STB/CTB: FO.STB

LAYER STATE:

MS VIEW:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

COMMONWEALTH OF MASSACHUSETTS
DANIEL L. MCNEILL
No. 53854
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:

DATUM:
HORZ.: NAD83
VERT.: NAVD88

30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL

SITE PREPARATION AND EROSION CONTROL PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 6, 2026

CP-101

MBTA RAILROAD

600-453-1
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HALE STREET

600-452-1
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HALE STREET

ADD ALTERNATE: SILT SOCK (TYP.)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY EASEMENT

STEVENS STREET

307-2-10
N/F
G&C CONCRETE CONSTRUCTION, INC.
#30 STEVENS STREET

LIMIT OF DISTURBANCE (TYP.)

307-2-10
N/F
G&C CONCRETE CONSTRUCTION, INC.
#30 STEVENS STREET

MATCH LINE SEE SHEET CP-103

MATCH LINE SEE SHEET CP-101

LITTLE RIVER STREET

STABILIZED CONSTRUCTION ACCESS/ENTRANCE

APPLE STREET

523-325-1
N/F
GEORGE RAYMOND GIRARD
#4 LITTLE RIVER STREET

523-324-11
N/F
NICHOLAS R. CEFALO ETUX
#0 LITTLE RIVER STREET

523-324-10
N/F
JUDINE A. MELLO
#2 LITTLE RIVER STREET

523-324-9
N/F
JUAN HERNANDEZ
#3 LITTLE RIVER STREET

523-324-8
N/F
BERT N. LANGLOIS
#5 LITTLE RIVER STREET

523-324-7
N/F
LLOYD E. JENNINGS
#3 LITTLE RIVER STREET

523-324-6
N/F
ALEXANDRA SCOTT
#1 LITTLE RIVER STREET

523-325-3
N/F
THE J&T REALTY TRUST
#2 LITTLE RIVER STREET

523-325-2
N/F
THE J&T REALTY TRUST
#111 HILLDALE AVENUE

523-325-3A
N/F
BOUCHER REALTY TRUST
#107 HILLDALE AVENUE

523-324-5
101 HILLDALE AVENUE LLC
#101 HILLDALE AVENUE

523-324-4
N/F
SHERMAN P. MCCUTCHEON LIFE EST.
#95 HILLDALE AVENUE

523-324-3
N/F
GREGORY C. EDWARDS
#83 HILLDALE AVENUE

523-324-3A
N/F
GREGORY C. EDWARDS
#83 HILLDALE AVENUE

523-324-2
N/F
HELEN MCLAUGHLIN
#4 APPLE STREET

523-324-1
N/F
YLANDER DILONE
#8 APPLE STREET

523-317-4
N/F
JOSE ESTRADA ET.AL
#7 APPLE STREET

523-317-3
N/F
JOHN ROUTIER ETAL
#5 APPLE STREET

523-317-2
N/F
MIGUEL A. BERROA
#83 HILLDALE AVENUE

521-317-8
N/F
A.G. REAL ESTATE TRUST
#77 HILLDALE AVENUE

523-317-1
N/F
MIGUEL A. BERROA
#83 HILLDALE AVENUE

521-317-7
N/F
71-73 HILLDALE AVENUE R.T.
#71 HILLDALE AVENUE

521-317-6
N/F
ARTHUR M. RICHARD
#69 HILLDALE AVENUE

521-317-5
N/F
BOUCHER FAMILY TRUST
#65 HILLDALE AVENUE

521-317-4
N/F
EDUARDO FERNANDEZ
#59 HILLDALE AVENUE

521-317-3
N/F
K&S LEBLANC REALTY CO., INC.
#53 HILLDALE AVENUE

521-317-2
N/F
K&S LEBLANC REALTY CO., INC.
#45 HILLDALE AVENUE

512-316-4
N/F
JOHN P. ROGERS
#0 - 1 BENJAMIN STREET

516-305-11
N/F
JOHN P. ROGERS
#4 CLIFF STREET

BENJAMIN STREET

CLIFF STREET

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AMDEN
CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL

SITE PREPARATION AND EROSION CONTROL PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CP-102

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_ERO01.dwg Layout: CP-102 Plotted: 2024-12-11 5:49 PM Saved: 2024-12-11 5:33 PM User: claire.nauman
PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

MBTA RAILROAD

MBTA RAILROAD

602-461-5
N/F
JAMES LEO
SCRIVATORE
0 NORFOLK
STREET

LIMIT OF DISTURBANCE (TYP.)

ADD ALTERNATE: SILT SOCK (TYP.)

TEMPORARY STONE CONSTRUCTION ACCESS

SKATE PARK TO REMAIN OPEN DURING CONSTRUCTION. MAINTAIN SAFE ACCESS AT ALL TIMES.

SKATE PARK

PLAYGROUND TO REMAIN OPEN DURING CONSTRUCTION EXCEPT WHILE KAYAK/CANOE LAUNCH PATH IS BEING BUILT. SEQUENCE PATH WORK TO MINIMIZE CLOSURE TIME. MAINTAIN SAFE ACCESS AT ALL TIMES.

LEBLANC STREET

524-327-1
N/F
LAWRENCE L. COMEAU
#10 LEBLANC STREET

524-326-6
N/F
JAMES R. CHRISTOFFERSON
#8 LEBLANC STREET

524-326-5
N/F
JUNE M. CHILDS
#6 LEBLANC STREET

CASHMAN'S FIELD

523-326-1
N/F
CITY OF HAVERHILL
#175 HILLDALE AVENUE

CASHMAN'S FIELD

523-326-1
N/F
CITY OF HAVERHILL
#175 HILLDALE AVENUE

REMOVE EXISTING FENCE WITHIN LIMIT OF DISTURBANCE (TYP.)

PORTION OF EXISTING FENCE TO REMAIN (TYP.)

PROTECT EXISTING TREES TO REMAIN

CONSTRUCTION EQUIPMENT, STAGING, AND STOCKPILING / DEWATERING AREAS (TYP.)

SILT FENCE AND 6' HIGH TEMPORARY CHAINLINK CONSTRUCTION FENCE TO ENCOMPASS TEMPORARY CONSTRUCTION ACCESS ROUTE AND STAGING AREA (TYP.)

TEMPORARY 5' WIDE COMPACTED GRAVEL PEDESTRIAN WALKWAY (FOR SKATE PARK ACCESS)

TEMPORARY 5' WIDE COMPACTED GRAVEL PEDESTRIAN WALKWAY (FOR SKATE PARK ACCESS)

TEMPORARY 5' WIDE COMPACTED GRAVEL PEDESTRIAN WALKWAY (FOR PLAYGROUND ACCESS). CONNECT TO EXISTING GRAVEL WALK AT PLAYGROUND

REMOVE SECTION OF WOOD GUARDRAIL AND CONNECT TEMPORARY GRAVEL PEDESTRIAN WALKWAY TO EXISTING BITUMINOUS SIDEWALK; FOLLOWING CONSTRUCTION, REMOVE WALKWAY AND RESTORE DISTURBED LAWN AREAS

523-325-11
N/F
JANE E. MCLAUGHLIN
#140 HILLDALE AVENUE

523-325-10
N/F
CLARA OSPINA
#145 HILLDALE AVENUE

523-325-9
N/F
JOHN T. AUDET ETUX
#141 HILLDALE AVENUE

523-325-8
N/F
135 HILLDALE AVENUE REALTY TRUST
#135 HILLDALE AVENUE

SILT FENCE AND 6' HIGH TEMPORARY CHAINLINK CONSTRUCTION FENCING TO SURROUND TEMPORARY CONSTRUCTION ACCESS ROUTE (TYP.)

TEMPORARY 5' WIDE COMPACTED GRAVEL PEDESTRIAN WALKWAY (FOR PLAYGROUND ACCESS)

GATED ENTRANCE TO CONSTRUCTION ACCESS ROUTE; SECURE/LOCK GATES AT END OF WORK DAY

TEMPORARY CONSTRUCTION ACCESS

REMOVE SECTION OF CURBING, GATE, AND WOOD GUARDRAIL; FOLLOWING CONSTRUCTION, RESTORE SIDEWALK, CURBING, GATE, GUARDRAIL, GRAVEL WALKWAY, AND DRIVEWAY TO PREVIOUS CONDITION OR BETTER

HILLDALE AVENUE

MATCH LINE SEE SHEET CP-104

MATCH LINE SEE SHEET CP-102

INSET 2

MATCH LINE SEE INSET 2

MATCH LINE SEE INSET 1

INSET 1

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_ERO01.dwg Layout: CP-103 Plotted: 2024-12-11 5:51 PM Saved: 2024-12-11 5:33 PM User: claire.nauman

PC3: NONE STB/CTB: FO.STB

LAYER STATE:

MS VIEW:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AUDET
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL

SITE PREPARATION AND EROSION CONTROL PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CP-103

526-2-4
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HILLDALE AVENUE

649-611-6
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 PRAIRIE STREET

MBTA RAILROAD

LIMIT OF DISTURBANCE (TYP.)

649-611-7
N/F
CITY OF HAVERHILL
0 HALE STREET

526-18-7-21
N/F
HUSAM MOUSSA
#23 GREENHILL FARM ROAD

526-18-8-17
N/F
LAWRENCE W. LAPLANTE, ETUX
#17 GREENHILL FARM ROAD

526-18-9-13
N/F
SEAN GALVIN
#13 GREENHILL FARM ROAD

526-18-10-11
N/F
ERIC RICCIO
#11 GREENHILL FARM ROAD

526-1-2C-3A

524-329-3
N/F
JUSTIN PALMISANO, ETUX
#241 HILLDALE AVENUE

524-328A-8
N/F
THOMAS A. KUNOW
#15 WHITTIER PLACE

524-328A-9
N/F
BRUCE R. LATERELLA ETAL
#13 WHITTIER PLACE

524-328A-10
N/F
KATINA M. MORTIMER ETAL
#11 WHITTIER PLACE

524-328A-13
N/F
ERNEST FOURNIER, ETUX
#3 WHITTIER PLACE

524-328A-13A
N/F
BRITTANY HAY
#1 WHITTIER PLACE

524-328-23
N/F
THOMAS A. KUNOW
#0 WOODY AVENUE

WHITTIER PLACE

MATCH LINE SEE SHEET CP-103

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE M. ANDERSON
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL
SITE PREPARATION AND EROSION CONTROL PLAN NO. 4
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION
HAVERHILL MASSACHUSETTS

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

CP-104

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_ERO01.dwg Layout: CP-104 Plotted: 2024-12-11 5:52 PM Saved: 2024-12-11 5:33 PM User: claire.nauman
MS VIEW: LAYER STATE: PC3: NONE STB/CTB: FO.STB

MATCH LINE SEE SHEET CG-102

STEVENS STREET

WINTER STREET

INSTALL SCOUR PROTECTION FOR 12" OUTFALL. EXTEND DOWNSLOPE TO ROCK TOE. SEE OUTFALL SCOUR PROTECTION DETAIL FOR DIMENSIONS.

INSTALL SCOUR PROTECTION FOR 12" OUTFALL. EXTEND DOWNSLOPE TO ROCK TOE. SEE OUTFALL SCOUR PROTECTION DETAIL FOR DIMENSIONS.

INSTALL DANGER SIGN. FINAL LOCATION TO BE DETERMINED ON SITE IN COORDINATION WITH THE ENGINEER

PLACE HABITAT BOULDERS (TYP.) PLACEMENT OF HABITAT BOULDERS IS A FIELD SET ITEM. FINAL PLACEMENT TO BE DETERMINED IN THE FIELD BY THE ENGINEER

PLACE STREAMBED MATERIAL TO CONSTRUCT CHANNEL BED

EXCAVATE 1.5'-DEEP POOL (TYP.) SEE TYPICAL CHANNEL CROSS SECTIONS AND PROFILES FOR BANK CONSTRUCTION ADJACENT TO POOLS.

INSTALL FLOATING SAFETY BOOM

AREA OF KNOWN SEDIMENT CONTAMINATION (SED-4). DISPOSE OF EXCAVATED MATERIAL OFF-SITE.

CONSTRUCT FLOODPLAIN CUTOFF EXTENDING FROM WEIR TO FLOODPLAIN EDGE (TYP.)

CONSTRUCT NATURE-LIKE FISHWAY BOULDER WEIR #3
TOP OF WEIR EL.=8.92
LOW-FLOW NOTCH INV. EL.=7.92

TOP OF WALL EL.=18.50

PORTION OF EXISTING DAM TO REMAIN IN PLACE ADJACENT TO BUILDING. PROTECT EXISTING BUILDING FOUNDATION AS REQUIRED.

INSTALL 28" THICKNESS OF TYPE B RIPRAP DOWN 1.5H:1V SLOPE FROM EL. 18.5 TO EXISTING GRADE ~ EL. 9+/-

TOP OF WALL EL.=12.50

CONSTRUCT NEW CONCRETE RETAINING WALL B. SEE STRUCTURAL PLANS AND DETAILS.

CONSTRUCT ENERGY DISSIPATION/ RESTING POOL #3
CHANNEL BOTTOM EL.=5.00

RESTORE TO EXISTING GRADE AFTER WALL INSTALLATION

INSTALL 6' HEIGHT CHAIN LINK FENCE

INSTALL 24" REINFORCED CONCRETE PIPE WITH FLARED END, INLET INV. MATCHING EXISTING GRADE (APPROX. EL. 8.4+/-), AND 1% SLOPE (MASSDOT 2025 STANDARD SPECIFICATIONS SUBSECTION 200)

TOP OF WALL EL.=12.50

INSTALL 28" THICKNESS OF TYPE B RIPRAP TO PROVIDE SCOUR PROTECTION

INSTALL 36" THICKNESS OF TYPE A RIPRAP, AFTER PLACEMENT, FILL VOIDS BY WASHING IN SALVAGED STREAMBED MATERIAL.

TIE INTO EXISTING BRIDGE. SEE RETAINING WALL DETAILS.

CONSTRUCT ENERGY DISSIPATION/ RESTING POOL #2. CHANNEL BOTTOM EL.=5.25

REMOVE EXISTING STONE MASONRY WALL AND FENCE AND CONSTRUCT NEW CONCRETE RETAINING WALL A. SEE STRUCTURAL PLANS AND DETAILS.

CONSTRUCT NATURE-LIKE FISHWAY BOULDER WEIR #2
TOP OF WEIR EL.=9.67
LOW-FLOW NOTCH INV. EL.=8.67

CONSTRUCT ENERGY DISSIPATION/ RESTING POOL #1
CHANNEL BOTTOM EL.=5.50

CONSTRUCT NATURE-LIKE FISHWAY BOULDER WEIR #1
TOP OF WEIR EL.=10.37
LOW-FLOW NOTCH INV. EL.=9.37

REMOVE DAM AND RECONSTRUCT CHANNEL. SEE CHANNEL SECTION AT DAM ON RETAINING WALL PLAN SHEET.

END CHAIN LINK FENCE

PROTECT PORTION OF EXISTING WALL TO REMAIN

ADD ALTERNATE: CONSTRUCT NEW CONCRETE SIDEWALK AND GRANITE CURB

ADD ALTERNATE: CONSTRUCT OVERLOOK

307-2-10 N/F G&C CONCRETE CONSTRUCTION, INC. #30 STEVENS STREET

307-2-9 N/F SHAIN REALTY TRUST #14 STEVENS STREET

307-2-01 N/F HAFFNER REALTY TRUST #284 WINTER STREET

516-305-10 N/F MARIA MACEK ETAL #17 HILLDALE AVENUE

516-305-9 N/F CASINO REALTY TRUST #7 HILLDALE AVENUE

516-305-17 N/F SHAWN DUPUIS #9 GRANVILLE COURT

516-305-16 N/F IVAN BALLESTER JR., ETAL #7 GRANVILLE COURT

516-305-15 N/F EDWARD G. ALCANTARA #5 GRANVILLE COURT

516-304-10 N/F PETA REALTY TRUST #9 GRANVILLE STREET

516-305-13 N/F HELEN R. TAYLOR LIFE ESTATE #8 GRANVILLE STREET

516-305-12 N/F PEDRO ALVARO RONQUILLO #6 GRANVILLE STREET

516-304-6 N/F MAUREEN E. RYAN TRUST #119 LAFAYETTE SQUARE

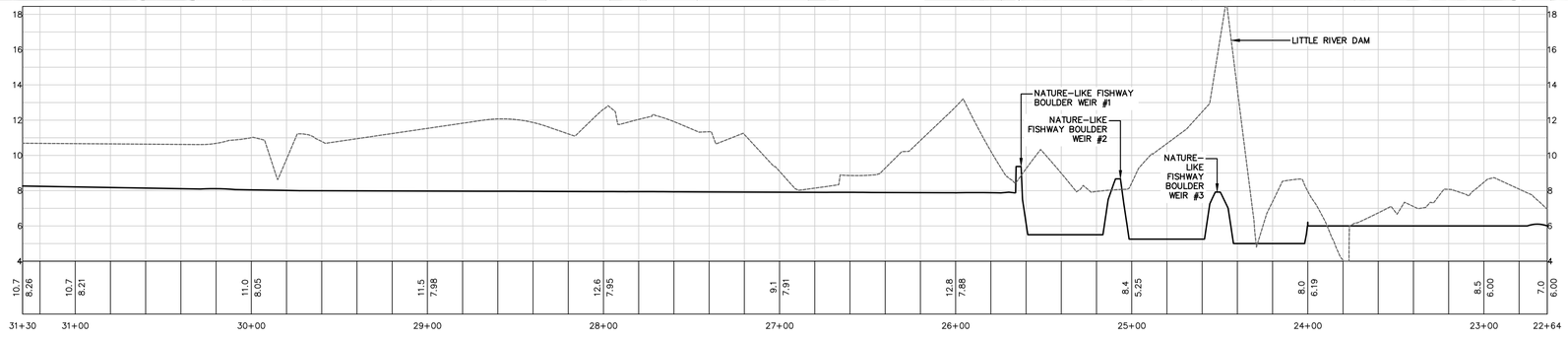
516-304-1 N/F K BROTHERS, LLC #89 LAFAYETTE SQUARE

516-304-5 N/F OCP REALTY, LLC

515-296-05 N/F KENNETH H. SHIFF #235 ESSEX STREET

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



PROFILE STA 22+64 – 31+30
SCALE: H: 1"=40'
V: 1"=4'

NOTES:

1. EXISTING SURFACE WAS CREATED FROM SPARSE TOPOGRAPHIC DATA. ELEVATIONS SHOWN ARE APPROXIMATE.
2. 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 FILL IS REQUIRED TO ACHIEVE FINISH GRADE AND USE SURFACE FABRIC WITH A ROCK TOE WHERE BANK CUT IS REQUIRED TO ACHIEVE FINISH GRADE.
3. TRAIL SHOWN ON THESE PLANS IS CONCEPTUAL IN NATURE AND GRAPHICALLY DISPLAYS INTENT. THE TRAIL SHALL MEET ADA ACCESSIBILITY REQUIREMENTS. CONTRACTOR TO STAKE OUT AND VERIFY FINAL TRAIL LOCATION IN FIELD WITH OWNER AND ENGINEER.
4. 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.
5. FINISHED GRADE WITHIN FLOODPLAIN SHALL BE LEFT ROUGHLY GRADED. SEE FLOODPLAIN MICROTOPOGRAPHY DETAIL.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

COMMONWEALTH OF MASSACHUSETTS
DANIEL L. MONETTE
No. 53854
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL

SITE LAYOUT AND GRADING PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 10, 2026

CG-101

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_STP01.dwg Layout: CG-101 Plotted: 2026-02-10 2:50 PM Saved: 2026-02-10 1:56 PM User: claire.nauman
PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

CONSTRUCT SCOUR POOL #5
POOL BOTTOM EL.=8.70

CONSTRUCT FLOODPLAIN CUTOFF EXTENDING FROM WEIR TO FLOODPLAIN EDGE (TYP.)

CONSTRUCT GRADE CONTROL BOULDER WEIR #5
TOP OF WEIR EL.= 11.22
3.5' WIDE NOTCH INV. EL.=10.22

AREA OF KNOWN SEDIMENT CONTAMINATION (TRANSECT 2). DISPOSE OF EXCAVATED MATERIAL OFF-SITE.

600-452-1
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HALE STREET

ADD ALTERNATE: CONSTRUCT ASPHALT WALKING TRAIL WITH SILT SOCK, CONCRETE BLOCK RETAINING WALL, AND 6' HEIGHT BLACK VINYL COATED CHAIN LINK FENCE

ADD ALTERNATE: VERIFY CONNECTION TO STEVENS STREET IN FIELD. END ASPHALT TRAIL AT EXISTING PAVEMENT. TIE CHAIN LINK FENCE INTO EXISTING GATE.

ADD ALTERNATE: DASHED LINE FOR TWO-WAY TRAFFIC

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY EASEMENT

STEVENS STREET

307-2-10
N/F
G&C CONCRETE CONSTRUCTION, INC.
#30 STEVENS STREET

CONSTRUCT GRADE CONTROL BOULDER WEIR #6
TOP OF WEIR EL.= 11.22
3.5' WIDE NOTCH INV. EL.=10.22

CONSTRUCT SCOUR POOL #6
POOL BOTTOM EL.=8.00

INSTALL SCOUR PROTECTION FOR 12" OUTFALL. EXTEND DOWNSLOPE TO ROCK TOE. SEE OUTFALL SCOUR PROTECTION DETAIL FOR DIMENSIONS.

EXCAVATE 1.5'-DEEP POOL (TYP.) SEE TYPICAL CHANNEL CROSS SECTIONS AND PROFILES FOR BANK CONSTRUCTION ADJACENT TO POOLS.

LITTLE RIVER STREET

APPLE STREET

523-325-1 N/F GEORGE RAYMOND GRARD #4 LITTLE RIVER STREET

523-324-11 N/F MICHAELAS R. CEFALO ETUX #9 LITTLE RIVER STREET

523-324-10 N/F JUDINE A. MELLO #7 LITTLE RIVER STREET

523-324-9 N/F JUAN HERNANDEZ #5 LITTLE RIVER STREET

523-324-8 N/F BERT N. LANGLOIS #3 LITTLE RIVER STREET

523-324-7 N/F LEONIDAS LAMBROS #3 LITTLE RIVER STREET

523-324-6 N/F ALEXANDRA SCOTT #1 LITTLE RIVER STREET

523-324-1 N/F YLANDER DILONE #8 APPLE STREET

523-317-4 N/F JOSE ESTRADA ETAL #7 APPLE STREET

523-324-2 N/F ALLEN MCLAUGHLIN #4 APPLE STREET

523-317-3 N/F JOHN ROUTIER ETAL #5 APPLE STREET

523-324-3 N/F GREGORY C. JOHNSON #93 HILLDALE AVENUE

523-324-3A N/F GREGORY C. JOHNSON #87 HILLDALE AVENUE

521-317-8 N/F A.G. REAL ESTATE

ADD ALTERNATE: INSTALL 14" THICKNESS OF FHWA CLASS I SCOUR PROTECTION FOR TRAIL RUNOFF. EXTEND DOWNSLOPE TO STORMWATER BASIN.

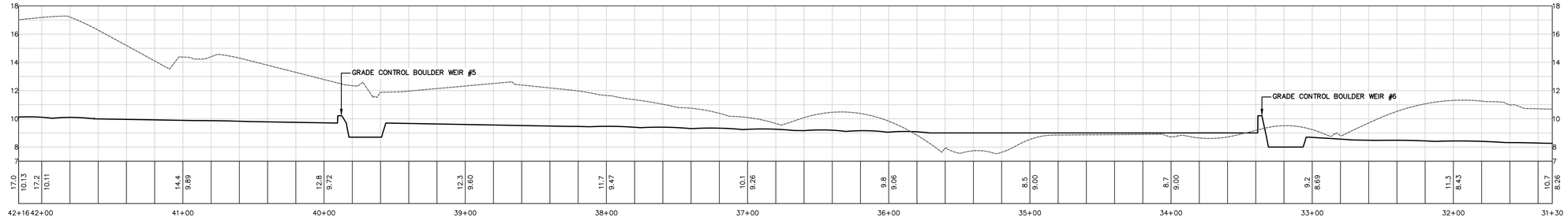
AREA OF KNOWN SEDIMENT CONTAMINATION (SED-19). CONDUCT ADDITIONAL TESTING TO REFINE LIMITS OF OFF-SITE DISPOSAL. SEE SPECIFICATIONS AND WATER CONTROL & CONSTRUCTION SEQUENCING PLAN.

INSTALL SCOUR PROTECTION FOR 24" OUTFALL. EXTEND DOWNSLOPE TO ROCK TOE. SEE OUTFALL SCOUR PROTECTION DETAIL FOR DIMENSIONS. RIPRAP EXTENTS TO BE REFINED IN THE FIELD UNDER THE DIRECTION OF THE ENGINEER.

MATCH LINE SEE SHEET CG-103

MATCH LINE SEE SHEET CG-101

TRAIL CENTERLINE CONTROL POINTS		
POINT NO.	EASTING	NORTHING
CP1	766525.99	3109555.33
CP2	766529.20	3109605.23
CP3	766532.41	3109655.12
CP4	766535.61	3109705.02
CP5	766535.43	3109710.75
CP6	766493.25	3109723.44
CP7	766472.63	3109729.30
CP8	766444.64	3109723.65
CP9	766395.66	3109713.63
CP10	766346.67	3109703.61
CP11	766297.68	3109693.60
CP12	766271.62	3109688.27
CP13	766253.98	3109703.64
CP14	766252.92	3109705.20
CP15	766254.32	3109753.21
CP16	766254.64	3109761.37
CP17	766280.71	3109793.50
CP18	766310.70	3109833.78
CP19	766321.22	3109847.62
CP20	766321.78	3109864.24
CP21	766317.01	3109879.23
CP22	766321.49	3109892.08
CP23	766330.09	3109906.05
CP24	766330.19	3109925.86
CP25	766330.71	3109966.51
CP26	766337.46	3109972.73
CP27	766346.37	3109986.61
CP28	766346.88	3109990.73
CP29	766343.67	3110006.40
CP30	766337.73	3110017.99
CP31	766330.10	3110061.19
CP32	766326.68	3110066.22
CP33	766315.11	3110088.18
CP34	766300.33	3110108.18
CP35	766270.50	3110148.28
CP36	766249.63	3110193.35
CP37	766230.33	3110216.09
CP38	766214.38	3110228.40
CP39	766198.60	3110241.42
CP40	766192.73	3110252.73
CP41	766189.32	3110269.11
CP42	766180.80	3110285.87
CP43	766163.52	3110289.27
CP44	766160.87	3110302.40



PROFILE STA 31+30 – 42+16
SCALE: H: 1"=40'
V: 1"=4'

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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE M. ODELL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL

SITE LAYOUT AND GRADING PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CG-102

ADD ALTERNATE: CONSTRUCT PEDESTRIAN BRIDGE AND ABUTMENTS. SEE STRUCTURAL PLAN AND DETAILS. MAINTAIN REQUIRED OFFSET FROM MBTA RAILROAD. REFER TO LATEST MBTA BOOK OF STANDARD PLANS– TRACK AND ROADWAY. TEMPORARY SUPPORT OF EXCAVATION MAY BE REQUIRED.

ADD ALTERNATE: CONSTRUCT PEDESTRIAN WALKWAY. MAINTAIN REQUIRED OFFSET FROM MBTA RAILROAD. REFER TO LATEST MBTA BOOK OF STANDARD PLANS– TRACK AND ROADWAY. TEMPORARY SUPPORT OF EXCAVATION MAY BE REQUIRED.

ADD ALTERNATE: 42" HT DECORATIVE METAL FENCE MOUNTED ON CONC. WALL

ADD ALTERNATE: CONSTRUCT FISHING PLATFORM AND RIVER ACCESS

CONSTRUCT GRADE CONTROL BOULDER WEIR #4
TOP OF WEIR EL.= 12.80
3.5' WIDE NOTCH INV. EL.=11.80

CONSTRUCT SCOUR POOL #4
POOL BOTTOM EL.=9.70

CONSTRUCT FLOODPLAIN CUTOFF EXTENDING FROM WEIR TO FLOODPLAIN EDGE (TYP.)

CONSTRUCT GRADE CONTROL BOULDER WEIR #3
TOP OF WEIR EL.= 13.59
3.5' WIDE NOTCH INV. EL.=12.59

CONSTRUCT SCOUR POOL #3
POOL BOTTOM EL.= 10.40

MBTA RAILROAD

602–461–5
N/F
JAMES LEO SERRATORE
0 NORFOLK STREET

ADD ALTERNATE: CONSTRUCT TRAIL CROSSING FOR STORMWATER OUTFALL

INSTALL SCOUR PROTECTION FOR 36" OUTFALL. EXTEND DOWNSLOPE TO ROCK TOE. SEE OUTFALL SCOUR PROTECTION DETAIL FOR DIMENSIONS.

EXCAVATE 1.5'–DEEP POOL (TYP.) SEE TYPICAL CHANNEL CROSS SECTIONS AND PROFILES FOR BANK CONSTRUCTION ADJACENT TO POOLS.

CONSTRUCT ROCK TOE USING STREAMBED MATERIAL TYPE A PRIOR TO PLACING OUTLET SCOUR PROTECTION

ADD ALTERNATE: CONSTRUCT ASPHALT WALKING TRAIL WITH SILT SOCK, CONCRETE BLOCK RETAINING WALL, AND 6' HEIGHT BLACK VINYL COATED CHAIN LINK FENCE

ADD ALTERNATE: INSTALL 6" THICKNESS OF PROCESSED GRAVEL (TYP.)

STORMWATER OUTLETS, HEADWALL, AND FENCE ON HEADWALL DESIGNED AND CONSTRUCTED BY OTHERS

ADD ALTERNATE: EXPOSED AGGREGATE KAYAK LAUNCH

LIMIT OF STREAMBED MATERIAL PLACEMENT

LIMIT OF STREAMBED MATERIAL PLACEMENT

INSTALL 10" THICKNESS OF STREAMBED MATERIAL TYPE B TO PROVIDE SCOUR PROTECTION AT STORMWATER CHANNEL

LIMIT OF STREAMBED MATERIAL PLACEMENT

ADD ALTERNATE: CONSTRUCT ASPHALT WALKING TRAIL TO PEDESTRIAN BRIDGE

ADD ALTERNATE: CONSTRUCT REINFORCED GRAVEL WALKWAY/ACCESS PATH TO FISHING AREA

ADD ALTERNATE: TIMBER HANDRAIL

ADD ALTERNATE: CONSTRUCT KAYAK/CANOE LAUNCH DENSE GRADED CRUSHED GRAVEL SURFACE

INSTALL 10" THICKNESS OF STREAMBED MATERIAL TYPE B TO PROVIDE SCOUR PROTECTION AT STORMWATER CHANNEL

CONSTRUCT ROCK TOE USING STREAMBED MATERIAL TYPE A PRIOR TO PLACING OUTLET SCOUR PROTECTION

INSTALL 28" THICKNESS OF RIPRAP TYPE B OVER FILTER FABRIC TO PROVIDE SCOUR PROTECTION AT STORMWATER OUTFALL

ADD ALTERNATE: BOULDER PLACEMENT FOR RETAINAGE (TYP.)

INSTALL INTERPRETIVE SIGN

SKATE PARK

CASHMAN'S FIELD

LEBLANC STREET

524–327–1
N/F
LAWRENCE L. COMEAU
#10 LEBLANC STREET

524–326–6
N/F
JAMES R. CHRISTOPHERSON
#9 LEBLANC STREET

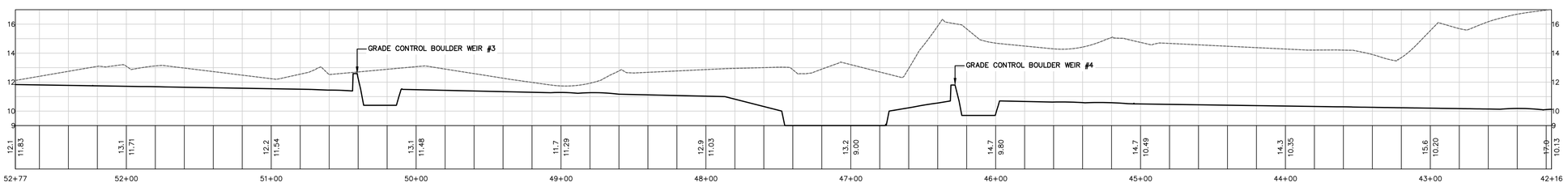
524–326–5
N/F
JUNE M. CHILDS
#8 LEBLANC STREET

523–326–1
N/F
CITY OF HAVERHILL
#175 HILLDALE

MATCH LINE SEE SHEET CG–104

MATCH LINE SEE SHEET CG–102

TRAIL CENTERLINE CONTROL POINTS		
POINT NO.	EASTING	NORTHING
CP45	766151.65	3110351.55
CP46	766147.70	3110375.42
CP47	766164.23	3110409.99
CP48	766171.60	3110414.56
CP49	766175.52	3110422.42
CP50	766181.43	3110451.45
CP51	766178.00	3110461.69
CP52	766164.52	3110483.40
CP53	766163.16	3110491.20
CP54	766172.13	3110522.21
CP55	766174.85	3110536.31
CP56	766170.67	3110563.88
CP57	766173.50	3110585.87
CP58	766176.98	3110614.22
CP59	766169.24	3110634.16
CP60	766154.19	3110681.78
CP61	766140.52	3110729.87
CP62	766124.20	3110777.06
CP63	766106.57	3110823.72
CP64	766096.89	3110848.67



PROFILE STA 42+16 – 52+77
SCALE: H: 1"=40'
V: 1"=4'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE A. MODY
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL

SITE LAYOUT AND GRADING PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CG-103

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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

IMMEDIATELY AFTER THE FIRST PHASE OF DRAWDOWN, INSPECT THE EXISTING SCOUR PROTECTION BENEATH THE MBTA BRIDGE AND EXTENT OF UNDERMINING OF THE SOUTHWEST WINGWALL IN THE PRESENCE OF THE ENGINEER. ADD ALTERNATE: INSTALL 36" THICKNESS OF TYPE A RIPRAP AS DIRECTED BY ENGINEER. AFTER PLACEMENT, FILL VOIDS BY WASHING IN SALVAGED STREAMBED MATERIAL.

649-611-6
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 PRIMROSE STREET

MBTA RAILROAD

526-18-7-21
N/F
HUSAM MOUSSA
#23 GREENHILL FARM ROAD

AREA OF KNOWN SEDIMENT CONTAMINATION (TRANSECT 7). DISPOSE OF EXCAVATED MATERIAL OFF-SITE.

LIMIT OF GRADING AND STREAMBED MATERIAL PLACEMENT

649-611-7
N/F
CITY OF HAVERHILL
0 HALE STREET

INSTALL 28" THICKNESS OF SOIL-FILLED RIPRAP TYPE B

TOP OF RIPRAP AT EL. 20. VERIFY IN THE FIELD WITH ENGINEER.

CONSTRUCT FLOODPLAIN CUTOFF EXTENDING FROM WEIR TO FLOODPLAIN EDGE (TYP.)

649-611-7
N/F
CITY OF HAVERHILL
0 HALE STREET

INSTALL 28" THICKNESS OF SOIL-FILLED RIPRAP TYPE B

526-18-8-17
N/F
LAWRENCE W. LAPLANTE ETUX
#17 GREENHILL FARM ROAD

CONSTRUCT GRADE CONTROL BOULDER WEIR #1
TOP OF WEIR EL.= 15.00
3.5' WIDE NOTCH INV. EL.=14.00

CONSTRUCT SCOUR POOL #1
POOL BOTTOM EL.=11.75

524-328A-8
N/F
THOMAS A. KUNCH
#15 WHITTIER PLACE

524-328A-9
N/F
BRUCE R. LATERELLA ETAL
#13 WHITTIER PLACE

524-328A-10
N/F
KAIHA M. MORTIMER ETAL
#11 WHITTIER PLACE

INSTALL SCOUR PROTECTION FOR 8" OUTFALL. BEGIN PLACEMENT AT LIMIT OF DISTURBANCE. EXTEND DOWNSLOPE TO ROCK TOE. SEE OUTFALL SCOUR PROTECTION DETAIL FOR DIMENSIONS.

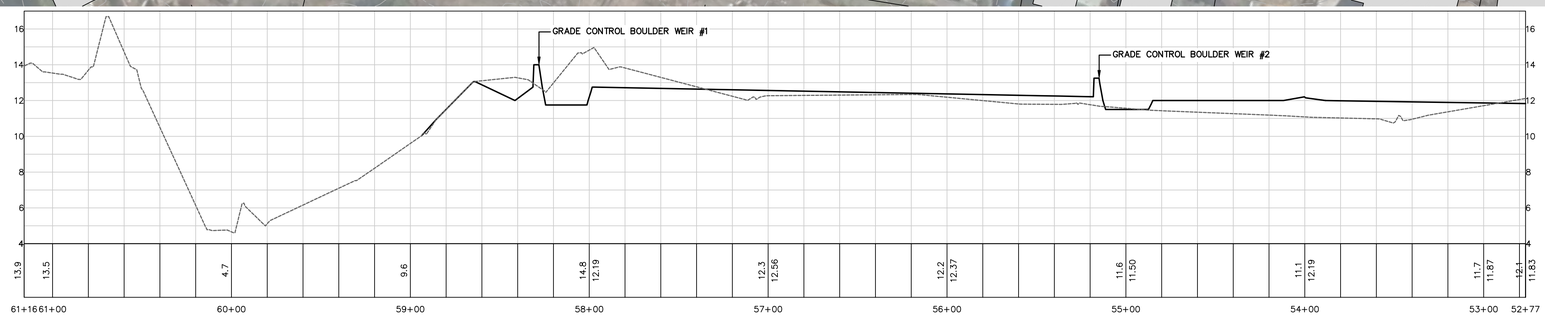
524-328A-13
N/F
ERNEST H. FOUNTAINE ETUX
#3 WHITTIER PLACE

CONSTRUCT SCOUR POOL #2
POOL BOTTOM EL.=11.21

CONSTRUCT GRADE CONTROL BOULDER WEIR #2
TOP OF WEIR EL.= 14.25
3.5' WIDE NOTCH INV. EL.=13.25

MATCH LINE SEE SHEET CG-103

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



PROFILE STA 52+77 – 61+16
SCALE: H: 1"=40'
V: 1"=4'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE E. ANDERSON
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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SPRINGFIELD, MA 01103
413.452.0445
www.fando.com

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

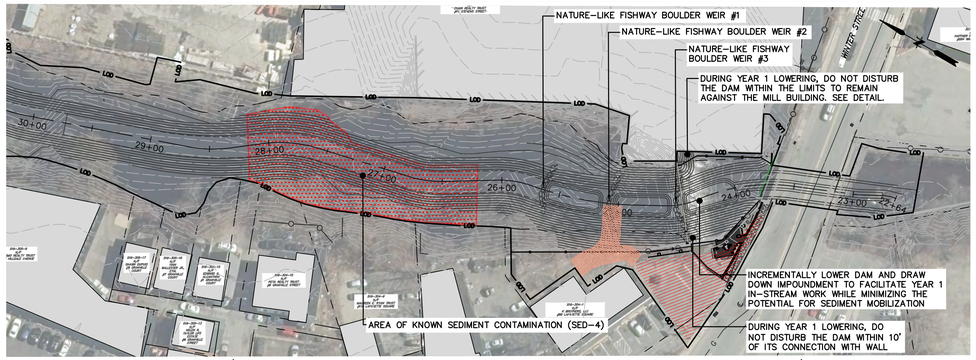
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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

GENERAL WATER CONTROL SYSTEM NOTES:

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 SILT-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 (I.E., JULY 1 TO OCTOBER 31).
3. IT IS ANTICIPATED THAT THE WORK WILL BE CONDUCTED IN PHASES SPANNING TWO CONSECUTIVE LOW-FLOW PERIODS.
4. DEMOLITION OF THE DAM SHALL BE SEQUENCED SUCH THAT DRAWDOWN OF THE IMPOUNDMENT OCCURS AT A RATE OF 12 INCHES PER DAY OR LESS AND SHALL BE COMPLETED IN INCREMENTS TO ALLOW FOR PHASED CONSTRUCTION.
5. INCREMENTALLY LOWER A 50-FOOT-WIDE CENTRAL SECTION OF THE DAM. DO NOT DISTURB THE DAM STRUCTURE WITHIN THE LIMITS TO REMAIN AGAINST THE MILL BUILDING ON RIVER LEFT OR WITHIN 10 FEET OF ITS CONNECTION WITH THE WALL ON RIVER RIGHT. INCREMENTAL LOWERING SHALL BE PLANNED TO FACILITATE THE WORK WHILE MINIMIZING THE POTENTIAL FOR SEDIMENT MOBILIZATION.
6. CONSTRUCTION OF RETAINING WALL B SHALL BE COMPLETE BEFORE GRADE IS RESTORED ADJACENT TO THE MILL BUILDING.
7. THE CONTRACTOR SHALL INSTALL AND OPERATE A WATER CONTROL SYSTEM THAT ALLOWS WORK TO PROGRESS UPSTREAM TO DOWNSTREAM ALONG ONE OR BOTH BANKS.
8. TEMPORARY COFFERDAMS SHALL BE USED TO SEPARATE THE WORKING AREA FROM THE REST OF THE RIVER. SOIL DISTURBANCE IN COFFERDAMMED AREAS OR THE WATERCOURSE SHALL CEASE IN THE EVENT OF HIGH FLOWS THAT OVERTOP THE COFFERDAMS.
9. THE CONTRACTOR SHALL MONITOR WEATHER FORECASTS, STREAM FLOWS, AND WATER LEVELS AND SHALL REMOVE EQUIPMENT AND PERSONNEL FROM THE RIVER IF HIGH WATER LEVELS ARE EXPECTED.
10. THE CONTRACTOR SHALL MONITOR AND MANAGE TURBIDITY IN COMPLIANCE WITH THE PROJECT PERMITS.
11. THE CONTRACTOR SHALL PREPARE AND SUBMIT COFFERDAM DESIGNS, A WATER CONTROL AND DIVERSION PLAN, AND A FLOOD RESPONSE PLAN FOR ACCEPTANCE BY THE ENGINEER PRIOR TO THE START OF WORK AND ACCORDING TO THE TIMELINES IN THE PROJECT PERMITS.
12. OTHER SUBMITTALS SHALL BE PREPARED AND SUBMITTED AS INDICATED IN THE SPECIFICATIONS AND PROJECT PERMITS.

SUGGESTED CONSTRUCTION SEQUENCE (YEAR 1):

1. INSTALL EROSION AND SEDIMENT CONTROL MEASURES.
2. ESTABLISH TEMPORARY ACCESS ENTRANCES AND ROUTES AS REQUIRED TO CONDUCT YEAR 1 WORK.
3. COMPLETE INITIAL DRAWDOWN AND DAM LOWERING FACILITATE IN-STREAM WORK FROM THE MBTA BRIDGE TO APPROXIMATELY STATION 57+60.
4. FOLLOWING INITIAL DRAWDOWN, INSPECT EXISTING MBTA BRIDGE SCOUR PROTECTION IN THE PRESENCE OF THE ENGINEER. ADD ALTERNATE: INSTALL RIP RAP BENEATH THE MBTA BRIDGE AT THE DIRECTION OF THE ENGINEER.
5. PERFORM SEDIMENT REMOVAL OPERATIONS WITHIN LIMITS OF GRADING (INCLUDING AREA OF KNOWN SEDIMENT CONTAMINATION AT TRANSECT 7), INSTALL RIP RAP, AND CONSTRUCT GRADE CONTROL BOULDER WEIR #1, SCOUR POOL #1, AND BED AND BANK TREATMENTS FROM THE MBTA BRIDGE TO APPROXIMATELY STATION 57+60.
6. FURTHER DRAW DOWN THE IMPOUNDMENT AND LOWER THE DAM TO FACILITATE IN-STREAM WORK FROM APPROXIMATELY STATION 57+60 TO STATION 38+00 (SEE SHEET CW-102).
7. PERFORM SEDIMENT REMOVAL OPERATIONS WITHIN THE AREA OF KNOWN SEDIMENT CONTAMINATION AT TRANSECT 2 (SEE SHEET CW-102).
8. CONSTRUCT GRADE CONTROL BOULDER WEIRS #2-5, SCOUR POOLS #2-5, AND BED AND BANK TREATMENTS AND INSTALL SCOUR PROTECTION AT DRAINAGE OUTLETS FROM APPROXIMATELY STATION 57+60 TO STATION 38+00.
9. ADD ALTERNATE: CONSTRUCT RIVER ACCESS IMPROVEMENTS AT CASHMAN PARK (I.E., RIVER ACCESS STEPS AND KAYAK LAUNCH).
10. ADD ALTERNATE: CONSTRUCT PEDESTRIAN BRIDGE AND ABUTMENTS AND WALKWAY STRUCTURE. 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 FLOODWAY.
12. RESTORE AND SEED DISTURBED AREAS AS DESCRIBED IN THE SPECIFICATIONS.



WATER CONTROL – YEAR 1 (INCREMENTAL REMOVAL OF THE DAM AND LOWERING OF THE HEADPOND)
SCALE: 1"= 60'



WATER CONTROL – YEAR 1 (CONSTRUCTION OF TEMPORARY UPSTREAM HAUL ROAD, REMOVAL OF CONTAMINATED SEDIMENT, AND CONSTRUCTION OF UPSTREAM RIVER CHANNEL IMPROVEMENTS)
SCALE: 1"= 60'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

COMMONWEALTH OF MASSACHUSETTS
DANIEL L. MCNEITT
No. 53854
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 60'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
60 30 0 60
GRAPHIC SCALE

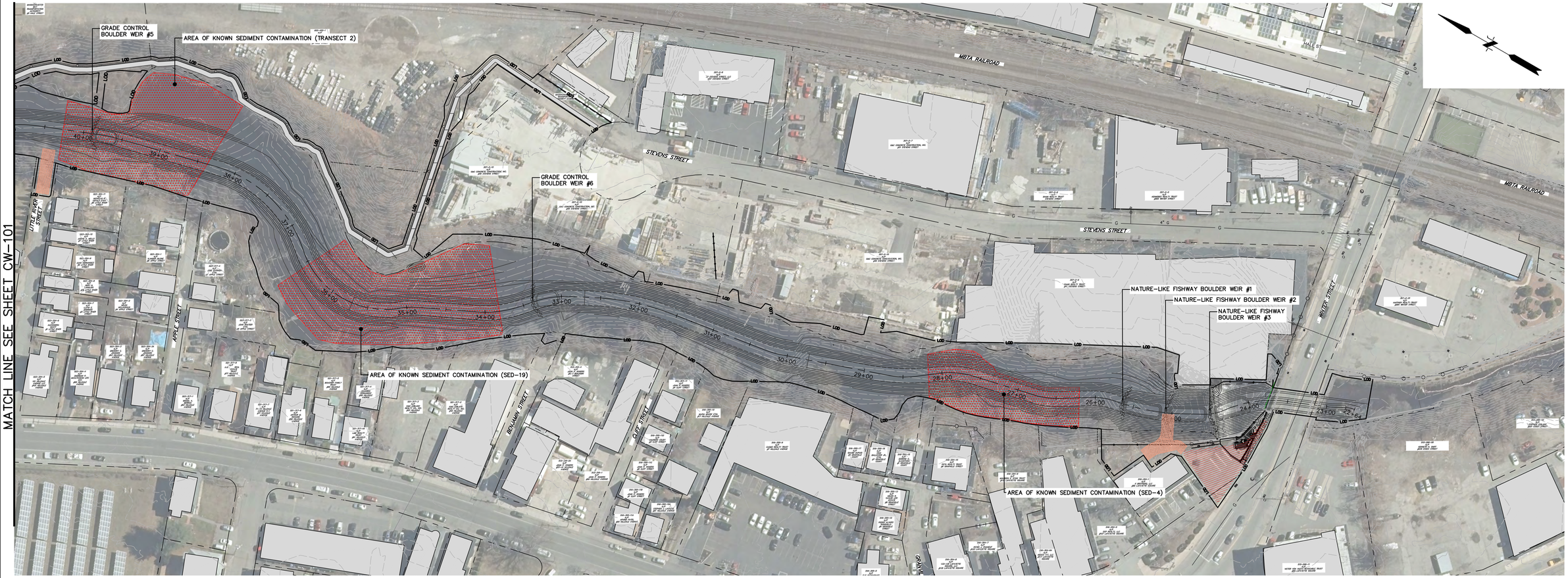
FUSS & O'NEILL
1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
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CITY OF HAVERHILL
CONSTRUCTION SEQUENCING PLAN
NO. 1
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 10, 2026

CW-101

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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:



WATER CONTROL – YEAR 2
SCALE: 1"= 60'

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 AERA 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 REFINE 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 AND 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 WALLS A AND B.
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

SEAL

COMMONWEALTH OF MASSACHUSETTS
DANIEL L. MONETTE
Civil
No. 53854
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 60'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
60 30 0 60
GRAPHIC SCALE

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

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

PROJ. No.: 20170390.U40
DATE: FEBRUARY 10, 2026

CW-102

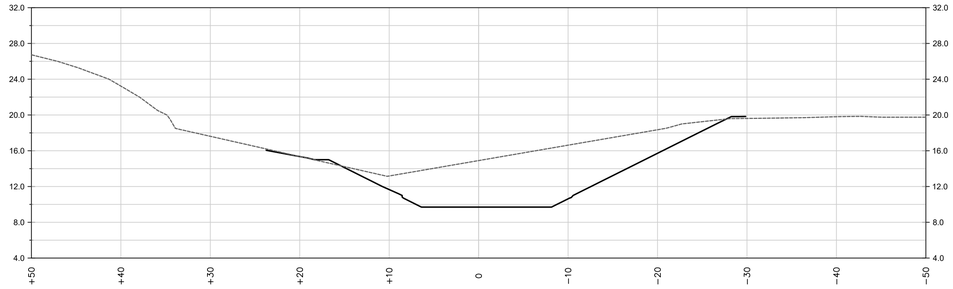
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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

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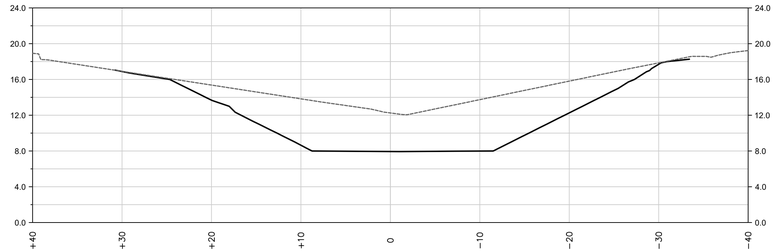
FINISH GRADE

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

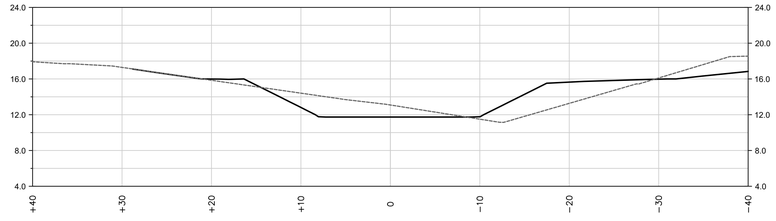
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No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AMDET
CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 8'
VERT.: 1"=8'
DATUM:
HORZ.: NAD83
VERT.: NAVD88
8 4 0 8
GRAPHIC SCALE

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

CITY OF HAVERHILL

GRADING CROSS SECTIONS

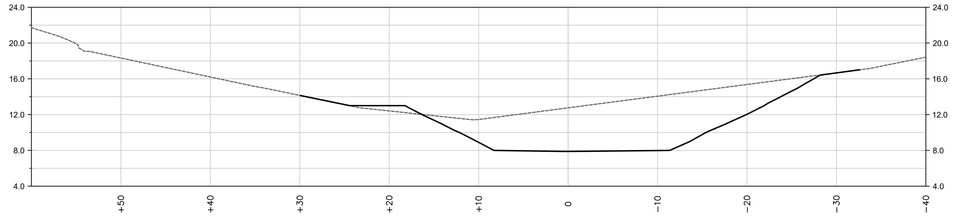
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

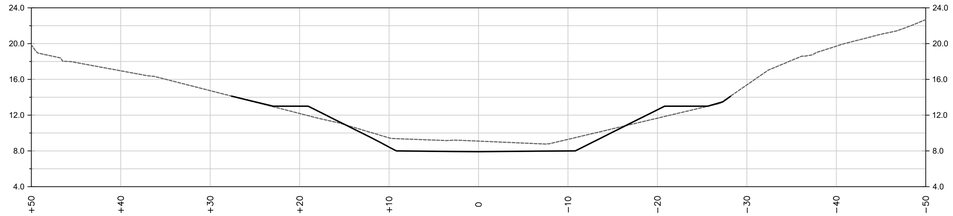
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DATE: DECEMBER 16, 2024

CX-301

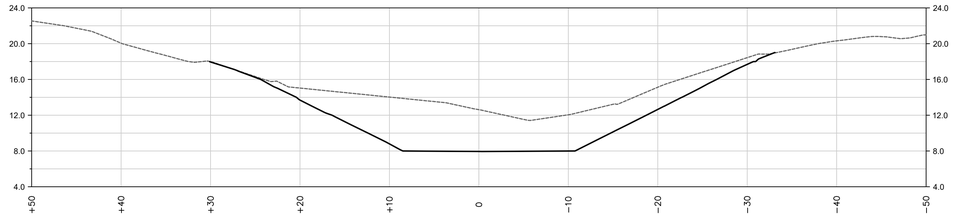
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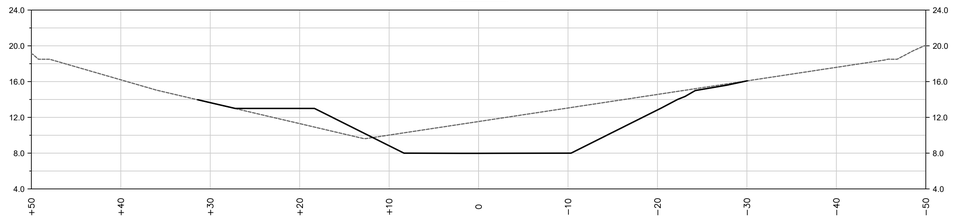
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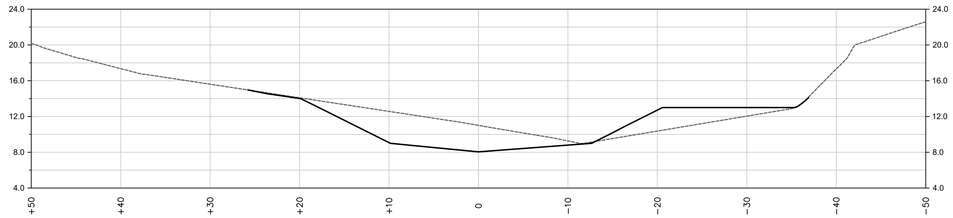
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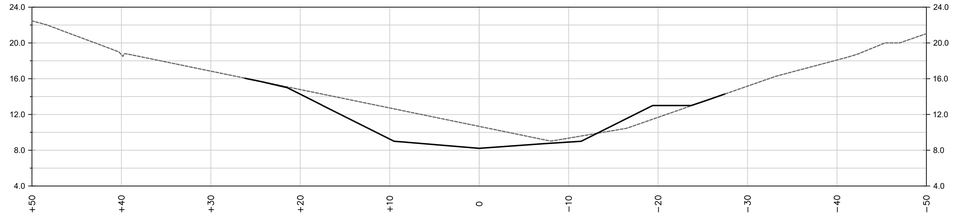
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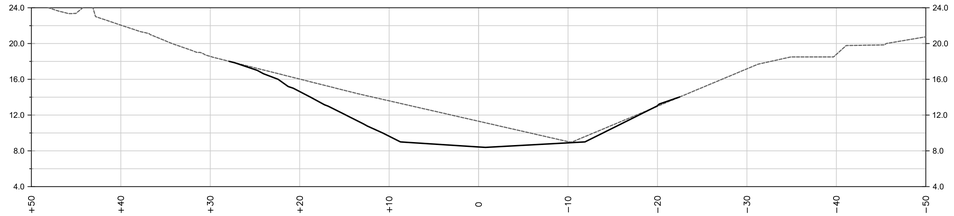
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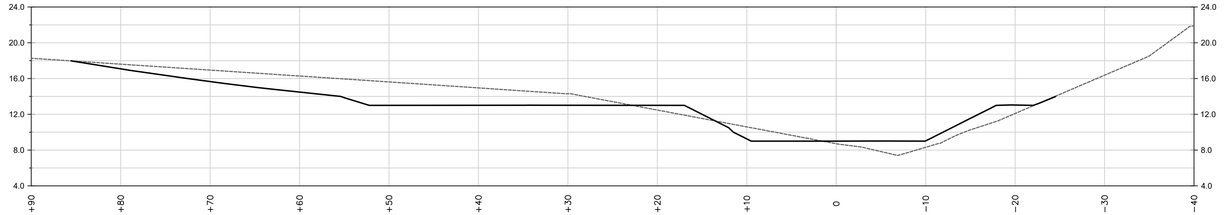
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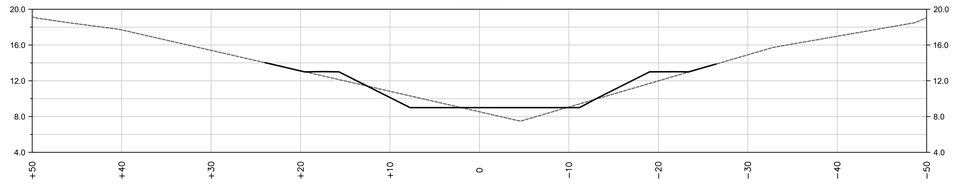
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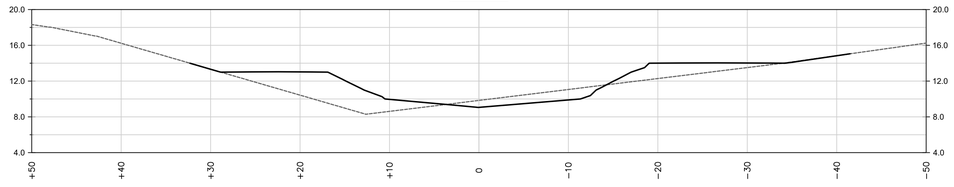
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35+00.00



36+00.00



EXISTING GRADE

FINISH GRADE

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

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

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE M. DESET
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 8'
VERT.: 1"=8'
DATUM:
HORZ.: NAD83
VERT.: NAVD88
8 4 0 8
GRAPHIC SCALE

FUSS & 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

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

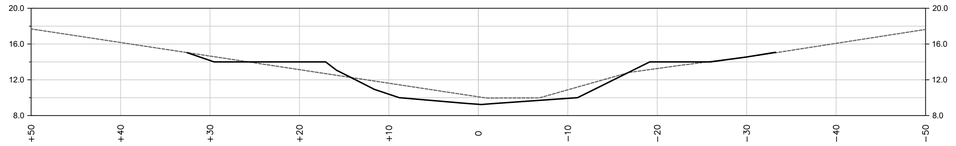
CX-302

EXISTING GRADE

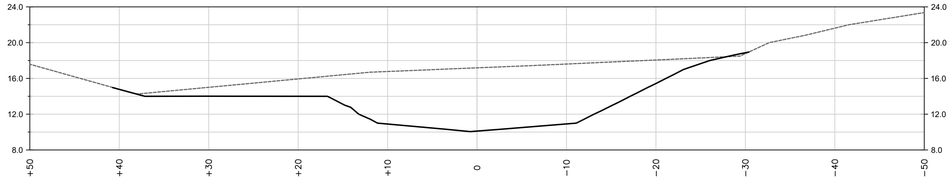
FINISH GRADE

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

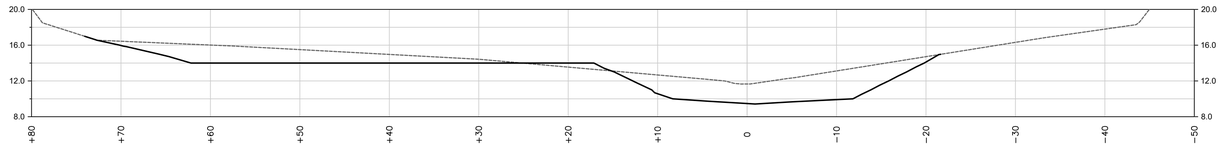
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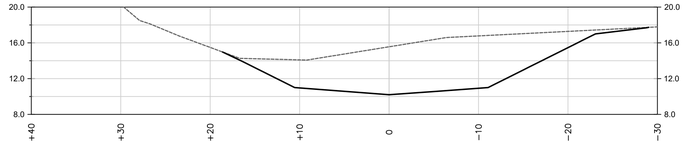
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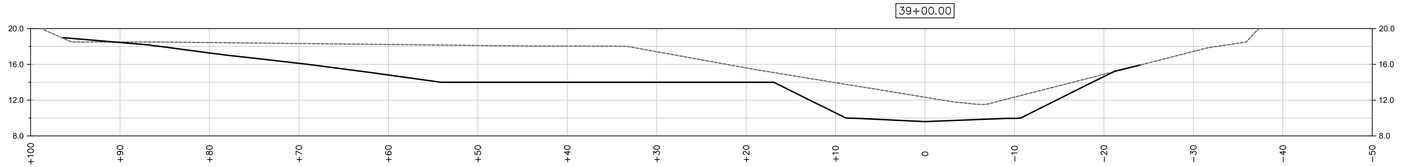
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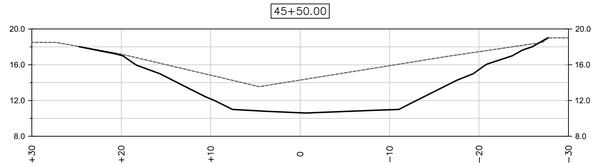
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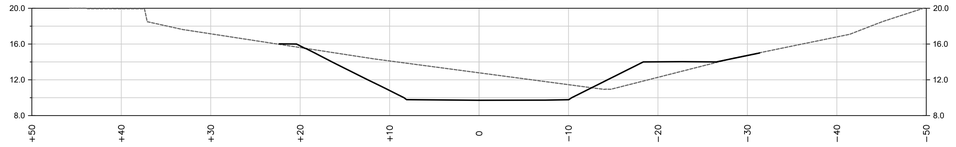
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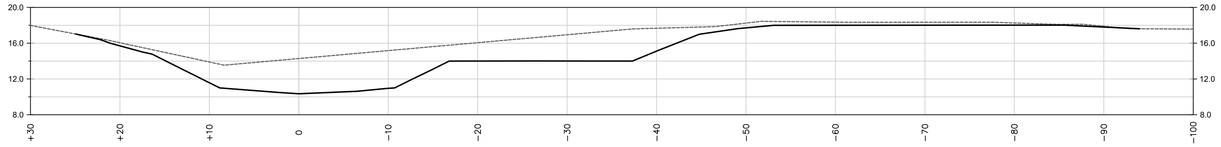
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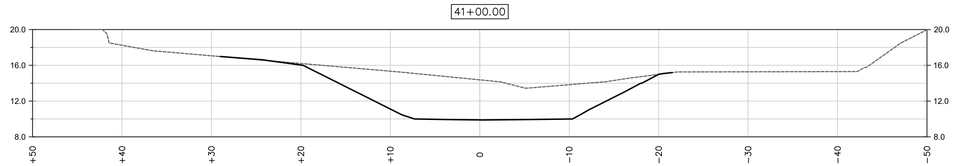
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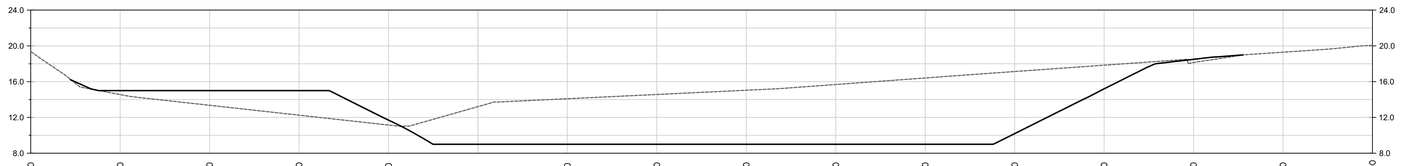
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41+00.00



47+00.00



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AMDET
CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 8'
VERT.: 1"=8'
DATUM:
HORZ.: NAD83
VERT.: NAVD88
8 4 0 8
GRAPHIC SCALE

FUSS & 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

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

CX-303

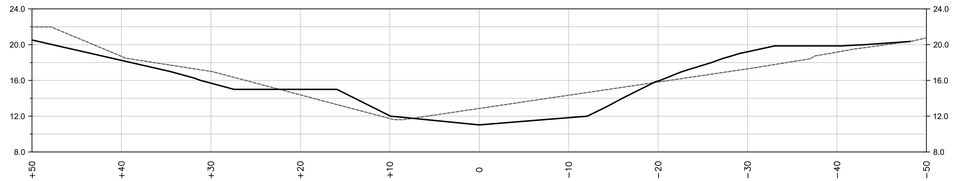
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LAYER STATE:
MS VIEW:

EXISTING GRADE

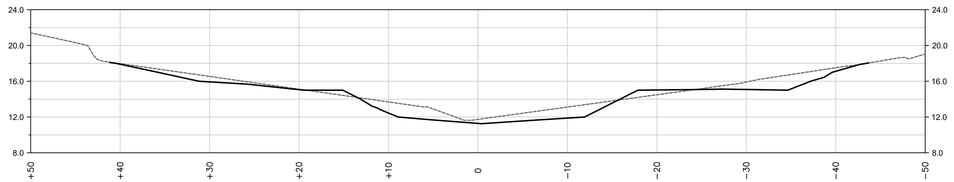
FINISH GRADE

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

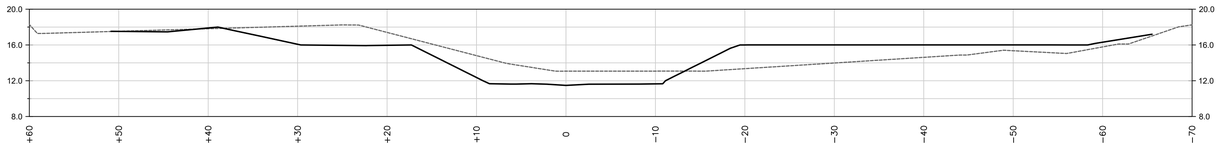
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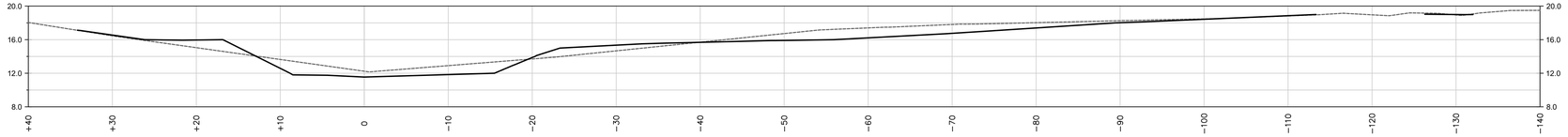
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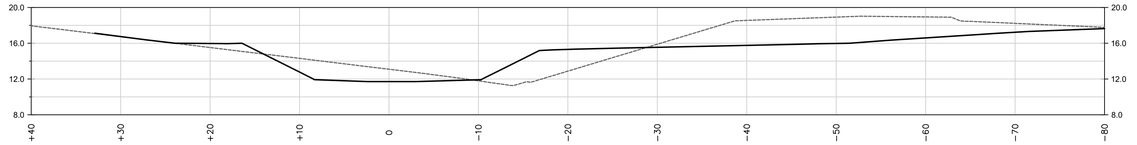
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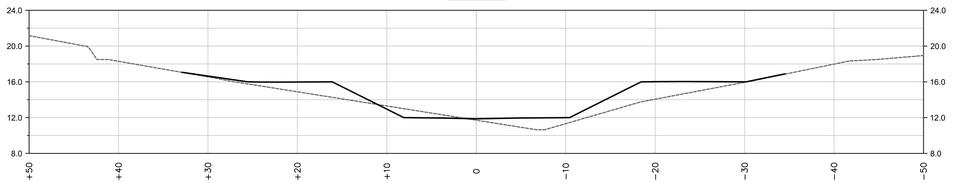
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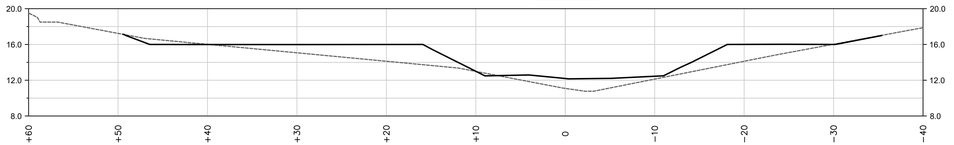
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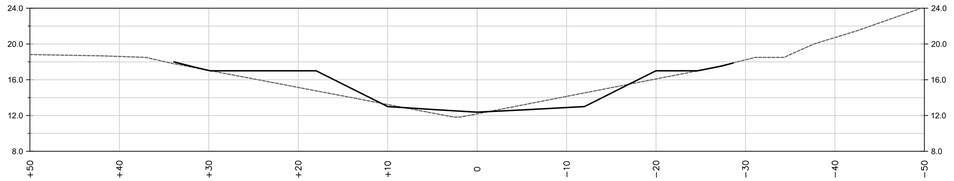
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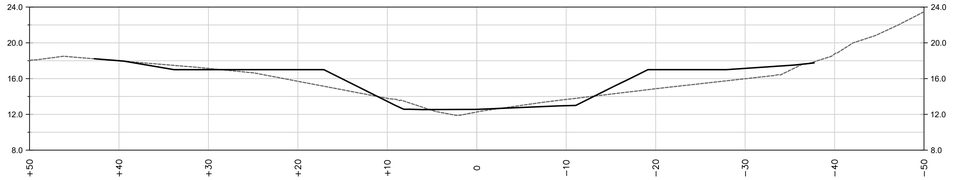
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PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AMORY
CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 8'
VERT.: 1"=8'
DATUM:
HORZ.: NAD83
VERT.: NAVD88
8 4 0 8
GRAPHIC SCALE

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

CITY OF HAVERHILL

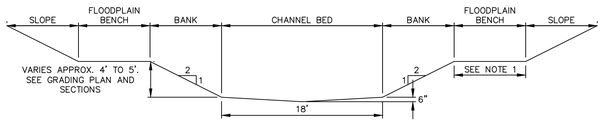
GRADING CROSS SECTIONS

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

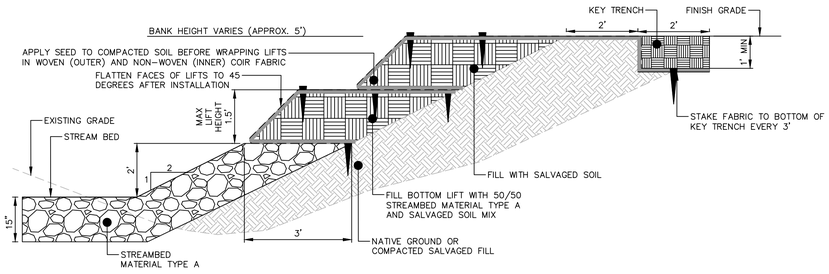
CX-304



NOTES:
1. PRESENCE AND WIDTH OF FLOODPLAIN BENCH VARIES. SEE GRADING PLAN AND SECTION.

TYPICAL CHANNEL SECTION

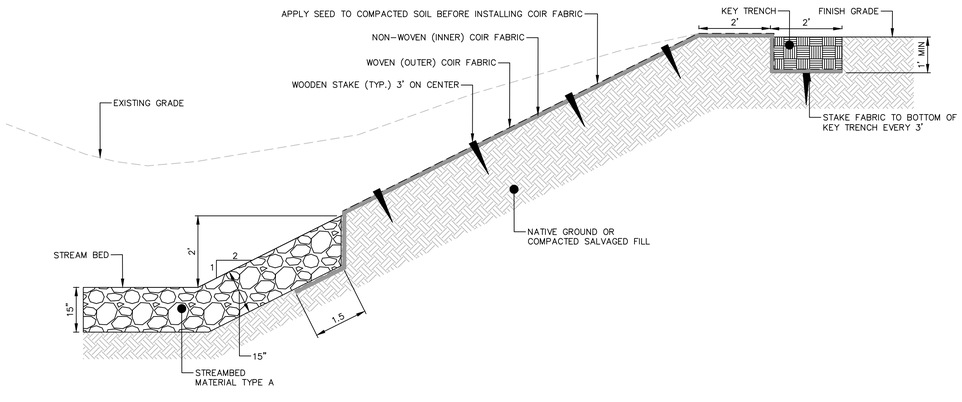
NOT TO SCALE



NOTES:
1. PREPARE LEVEL SUBGRADE AND USE FORMS TO CONSTRUCT FES LIFTS. STAGGER FORMS FOR CONSTRUCTION OF UPPER AND LOWER LIFTS BY 15'.
2. BUTT INNER FABRIC ENDS TOGETHER. JOIN OUTER FABRIC ENDS BY OVERLAPPING A MINIMUM OF 3' IN THE DIRECTION OF FLOW (UPSTREAM OVER DOWNSTREAM). STAGGER OVERLAPS BY 15' FROM LIFT TO LIFT.
3. STAKE FABRIC BREAKING A MINIMUM NUMBER OF STRANDS. DO NOT PRE-CUT HOLES. DRIVE STAKES IN LEAVING 2" OF THE TOPS OF STAKE EXPOSED.
4. BOX ENDS OF FABRIC TO FULLY ENCASE SOIL AT LATERAL TIE-INS.
5. FILL KEY TRENCH WITH SALVAGED SOIL AND COMPACT OVER STAKED FABRIC.

TYPICAL SECTION: FABRIC ENCAPSULATED SOIL (FES) LIFTS WITH ROCK TOE (NOT ADJACENT TO POOL)

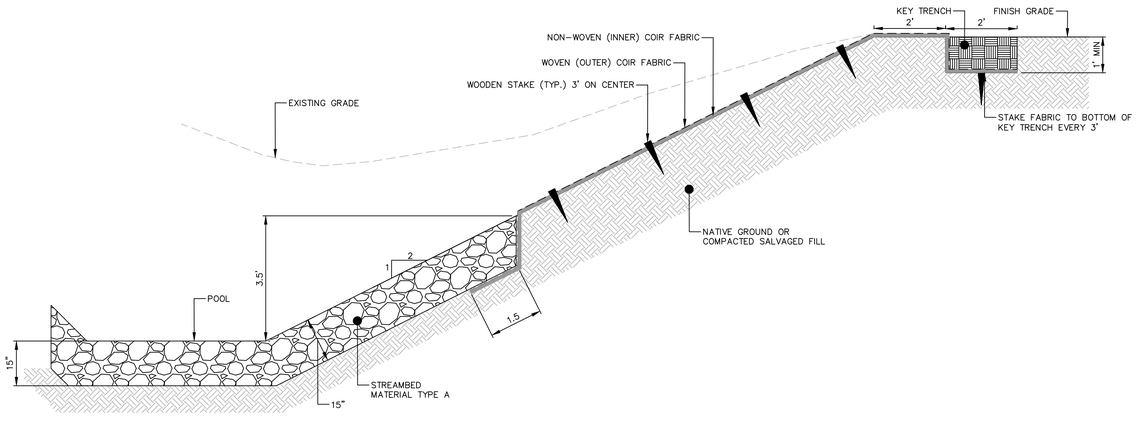
NOT TO SCALE



NOTES:
1. BUTT INNER FABRIC ENDS TOGETHER. JOIN OUTER FABRIC ENDS BY OVERLAPPING A MINIMUM OF 3' IN THE DIRECTION OF FLOW (UPSTREAM OVER DOWNSTREAM). STAGGER OVERLAPS BY 15'.
2. STAKE FABRIC BREAKING A MINIMUM NUMBER OF STRANDS. DO NOT PRE-CUT HOLES. DRIVE STAKES IN LEAVING 2" OF THE TOPS OF STAKE EXPOSED.
3. BOX ENDS OF FABRIC TO FULLY ENCASE SOIL AT LATERAL TIE-INS.
4. FILL KEY TRENCH WITH SALVAGED SOIL AND COMPACT OVER STAKED FABRIC.
5. THE TOP 6" OF NATIVE GROUND OR SALVAGED FILL BENEATH THE COIR FABRIC SHALL MEET THE REQUIREMENTS OF SALVAGED SOIL.

TYPICAL SECTION: SURFACE FABRIC TREATMENT WITH ROCK TOE (NOT ADJACENT TO POOL)

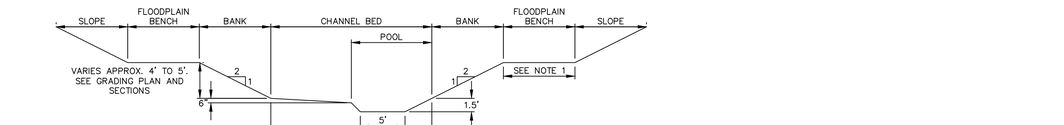
NOT TO SCALE



NOTES:
1. BUTT INNER FABRIC ENDS TOGETHER. JOIN OUTER FABRIC ENDS BY OVERLAPPING A MINIMUM OF 3" IN THE DIRECTION OF FLOW (UPSTREAM OVER DOWNSTREAM). STAGGER OVERLAPS BY 15".
2. STAKE FABRIC BREAKING A MINIMUM NUMBER OF STRANDS. DO NOT PRE-CUT HOLES. DRIVE STAKES IN LEAVING 2" OF THE TOPS OF STAKE EXPOSED.
3. BOX ENDS OF FABRIC TO FULLY ENCASE SOIL AT LATERAL TIE-INS.
4. FILL KEY TRENCH WITH SALVAGED SOIL AND COMPACT OVER STAKED FABRIC.
5. THE TOP 6" OF NATIVE GROUND OR SALVAGED FILL BENEATH THE COIR FABRIC SHALL MEET THE REQUIREMENTS OF SALVAGED SOIL.

TYPICAL SECTION: SURFACE FABRIC TREATMENT WITH ROCK TOE (ADJACENT TO POOL)

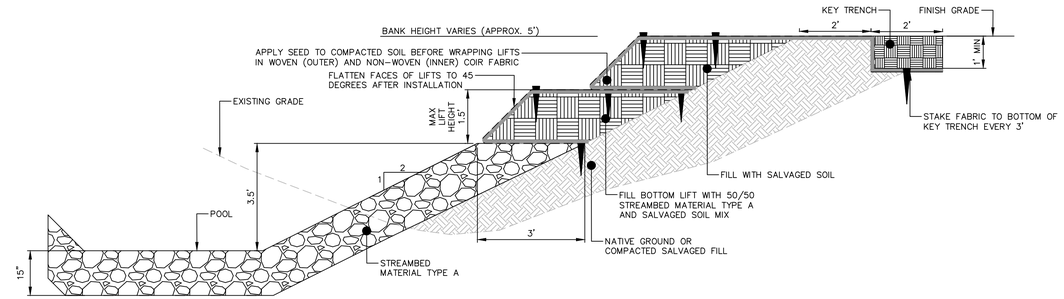
NOT TO SCALE



NOTES:
1. PRESENCE AND WIDTH OF FLOODPLAIN BENCH VARIES. SEE GRADING PLAN AND SECTION.

TYPICAL POOL SECTION

NOT TO SCALE



NOTES:
1. PREPARE LEVEL SUBGRADE AND USE FORMS TO CONSTRUCT FES LIFTS. STAGGER FORMS FOR CONSTRUCTION OF UPPER AND LOWER LIFTS BY 15'.
2. BUTT INNER FABRIC ENDS TOGETHER. JOIN OUTER FABRIC ENDS BY OVERLAPPING A MINIMUM OF 3' IN THE DIRECTION OF FLOW (UPSTREAM OVER DOWNSTREAM). STAGGER OVERLAPS BY 15' FROM LIFT TO LIFT.
3. STAKE FABRIC BREAKING A MINIMUM NUMBER OF STRANDS. DO NOT PRE-CUT HOLES. DRIVE STAKES IN LEAVING 2" OF THE TOPS OF STAKE EXPOSED.
4. BOX ENDS OF FABRIC TO FULLY ENCASE SOIL AT LATERAL TIE-INS.
5. FILL KEY TRENCH WITH SALVAGED SOIL AND COMPACT OVER STAKED FABRIC.

TYPICAL SECTION: FABRIC ENCAPSULATED SOIL (FES) LIFTS WITH ROCK TOE (ADJACENT TO POOL)

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

SEAL
COMMONWEALTH OF MASSACHUSETTS
DEANE M. MIDDY
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
1 0 1
GRAPHIC SCALE

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1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
www.fando.com

CITY OF HAVERHILL

TYPICAL CHANNEL CROSS SECTIONS AND PROFILES

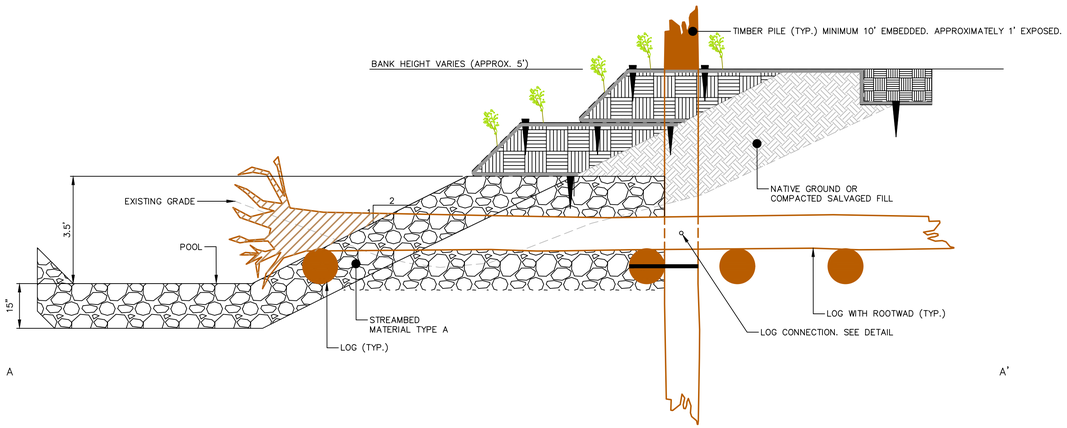
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CT-301

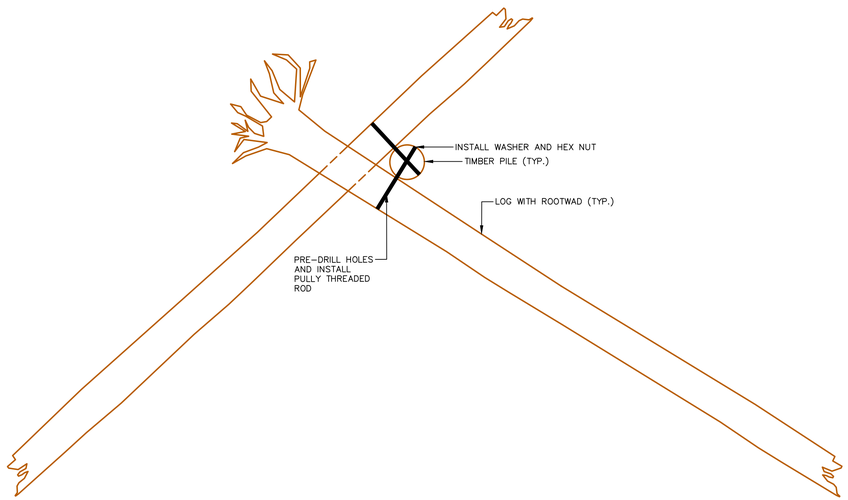
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PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:



NOTES:
1. PREPARE LEVEL SUBGRADE AND USE FORMS TO CONSTRUCT FES LIFTS. STAGGER FORMS FOR CONSTRUCTION OF UPPER AND LOWER LIFTS BY 15'.
2. BUTT INNER FABRIC ENDS TOGETHER. JOIN OUTER FABRIC ENDS BY OVERLAPPING A MINIMUM OF 3' IN THE DIRECTION OF FLOW (UPSTREAM OVER DOWNSTREAM). STAGGER OVERLAPS BY 15' FROM LIFT TO LIFT.
3. STAKE FABRIC BREAKING A MINIMUM NUMBER OF STRANDS. DO NOT PRE-CUT HOLES. DRIVE STAKES IN LEAVING 2" OF THE TOPS OF STAKE EXPOSED.
4. BOX ENDS OF FABRIC TO FULLY ENCASE SOIL AT LATERAL TIE-INS.
5. FILL KEY TRENCH WITH SALVAGED SOIL AND COMPACT OVER STAKED FABRIC.

TYPICAL SECTION: LARGE WOOD BANK TREATMENT

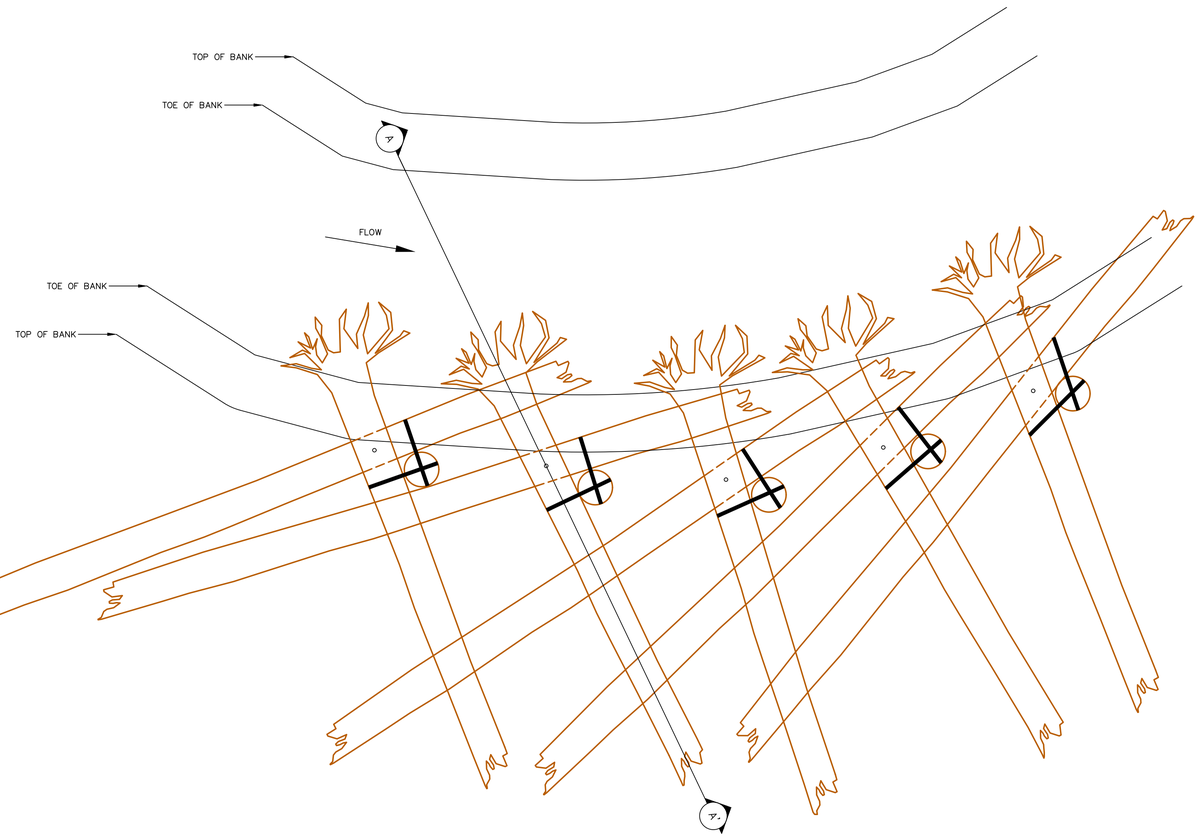
NOT TO SCALE



NOTES:
1. INSTALL WASHER HEX NUT AT BOTH ENDS OF FULLY THREADED ROD INSERTED THROUGH LOGS.
2. HAMMER (MUSHROOM) THE ENDS OF THE RODS TO SECURE THE NUTS.
3. FILE ANY SHARP EDGES OF EXPOSED RODS.

LOG CONNECTION DETAIL

NOT TO SCALE



NOTES:
1. LARGE WOOD PLACEMENT IS A FIELD SET ITEM. LARGE WOOD SHALL BE PLACED AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION.
2. LARGE WOOD BANK TREATMENT AND EXTENTS MAY VARY FROM THOSE SHOWN ON THE PLANS AS A RESULT OF SITE CONDITIONS AND MATERIAL AVAILABILITY.
3. EACH 10-FOOT LENGTH OF LARGE WOOD BANK TREATMENT SHALL COMPRISE 2 LOGS, 2 LOG WITH ROOTWADS, AND 2 TIMBER PILES. THIS ASSUMES A 5' FLARED END ON EACH ROOTWAD.
4. ALL LOGS SHALL BE ACHORED TO A MINIMUM OF ONE TIMBER PILE. ONE ADDITIONAL ANCHOR POINT MAY BE NEEDED TO ADJACENT LOGS AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION.

LARGE WOOD BANK TREATMENT TYPICAL LAYOUT

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AUDET
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

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

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413.452.0445
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CITY OF HAVERHILL

TYPICAL CHANNEL CROSS SECTIONS AND PROFILES

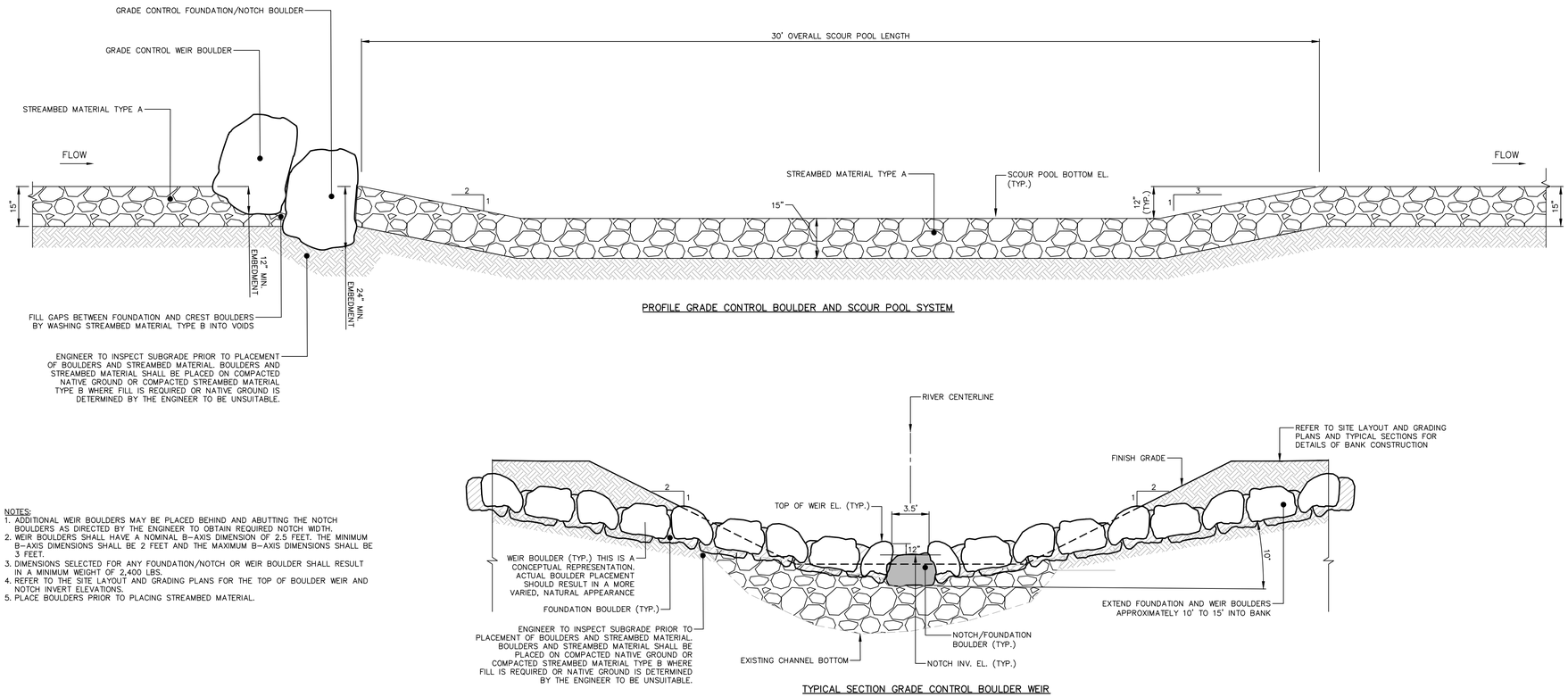
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

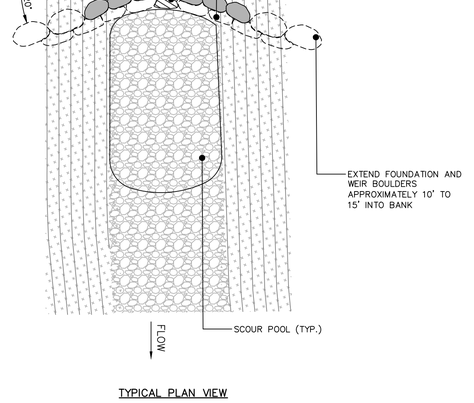
CT-302

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



PROFILE GRADE CONTROL BOULDER AND SCOUR POOL SYSTEM

TYPICAL SECTION GRADE CONTROL BOULDER WEIR



TYPICAL PLAN VIEW

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.

TYPICAL GRADE CONTROL BOULDER AND SCOUR POOL SYSTEM

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE E. AUDET
CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
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GRAPHIC SCALE

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1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
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CITY OF HAVERHILL

TYPICAL CHANNEL CROSS SECTIONS AND PROFILES

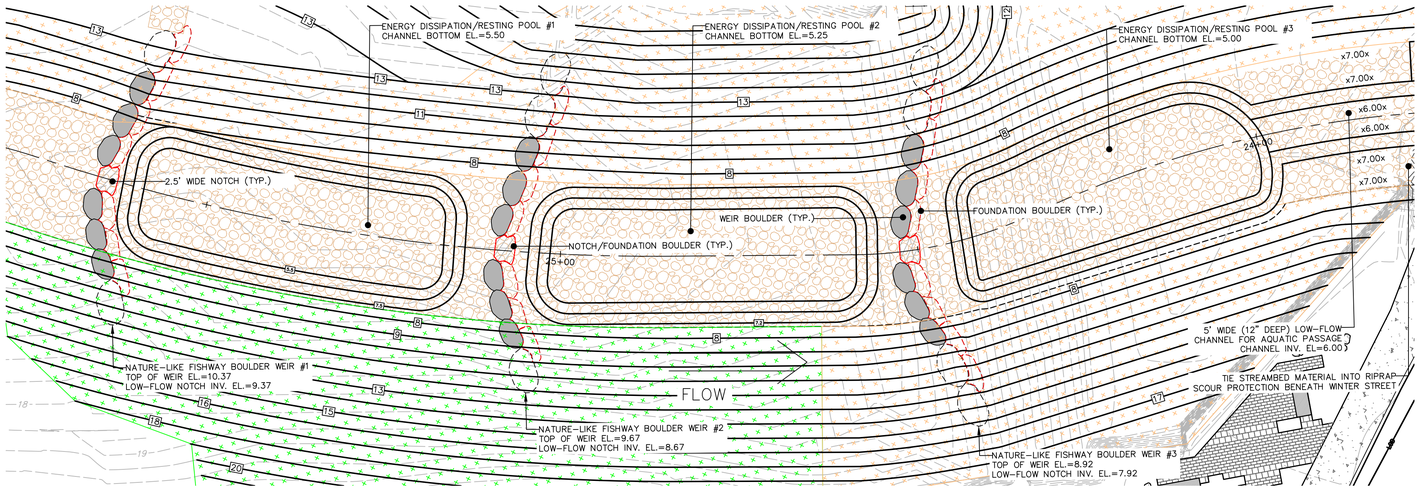
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CT-303

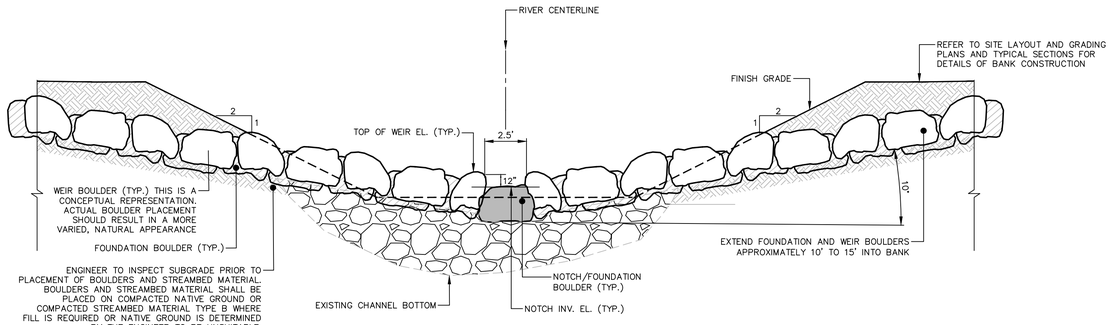
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LAYER STATE:
MS VIEW:



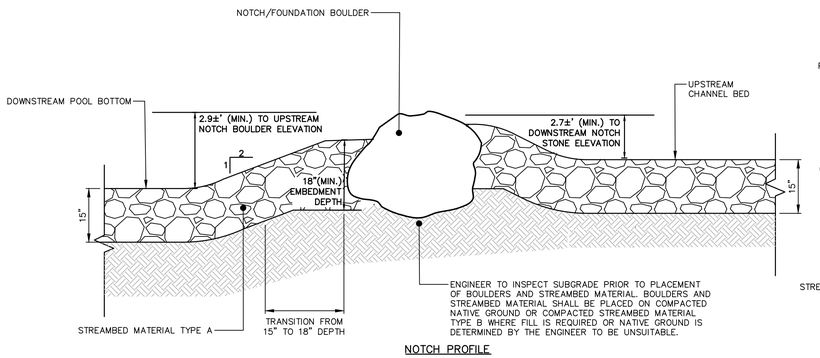
NATURE-LIKE FISHWAY LAYOUT

SCALE 1"=10'

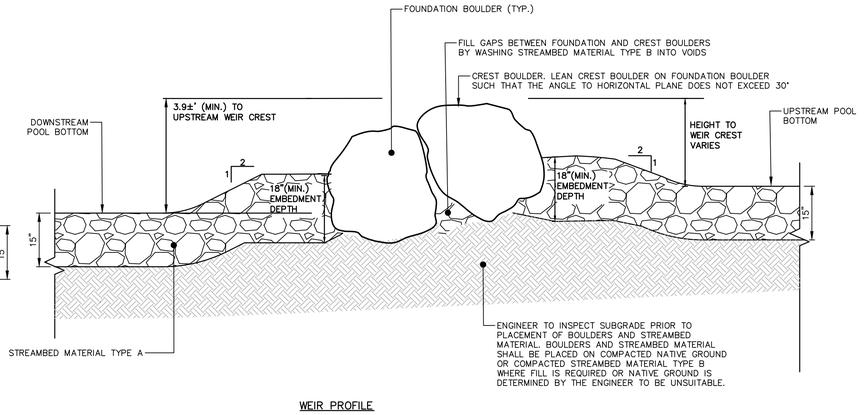
NOTES:
1. ADDITIONAL WEIR BOULDERS MAY BE PLACED BEHIND AND ABUTTING THE NOTCH BOULDERS AS DIRECTED BY THE ENGINEER TO OBTAIN REQUIRED NOTCH WIDTH.
2. WEIR BOULDERS SHALL HAVE A NOMINAL B-AXIS DIMENSION OF 2.5 FEET. THE MINIMUM B-AXIS DIMENSIONS SHALL BE 2 FEET AND THE MAXIMUM B-AXIS DIMENSIONS SHALL 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.



TYPICAL SECTION GRADE CONTROL BOULDER WEIR



NOTCH PROFILE



WEIR PROFILE

TYPICAL NATURE-LIKE FISHWAY WEIR AND RESTING POOL PROFILE

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

DANIEL L. MONETTE No. 53854 — COMMONWEALTH OF MASSACHUSETTS — REGISTERED PROFESSIONAL ENGINEER

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: FEBRUARY 10, 2026

CT-304

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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:



LEGEND:

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

LANDSCAPE GRADE PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE
	LARGE SHADE TREES			
AR	ACER RUBRUM	RED MAPLE	8	2"–2 ½" CAL.
AS	ACER SACHARINUM	SILVER MAPLE	2	2"–2 ½" CAL.
BA	BETULA ALLEGHANIENSIS	YELLOW BIRCH	1	2"–2 ½" CAL.
PO	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	3	2"–2 ½" CAL.
PS	PRUNUS SEROTINA	BLACK CHERRY	2	2"–2 ½" CAL.
UA	ULMUS AMERICANA 'PRINCETON'	PRINCETON AMERICAN ELM	11	2"–2 ½" CAL.
	ORNAMENTAL TREES			
AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	9	6–8' HT.
BP	BETULA POPULIFOLIA	GRAY BIRCH	27	1"–1 ½" CAL.
CA	CORNUS ALTERNIFOLIA	PAGODA DOGWOOD	2	1"–1 ½" CAL.
CC	CARPINUS CAROLINIANA	AMERICAN HORNBEAM	7	1"–1 ½" CAL.

CONSERVATION GRADE PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE
	LARGE SHADE TREES			
AR	ACER RUBRUM	RED MAPLE	35	4'–6'
AS	ACER SACHARINUM	SILVER MAPLE	35	4'–6'
BA	BETULA ALLEGHANIENSIS	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'
BG	NYSSA SYLVATICA	BLACK GUM	15	4'–6'
	ORNAMENTAL TREES			
AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	75	4'–6'
BP	BETULA POPULIFOLIA	GRAY 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
	SHRUBS			
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.
HV	HAMAMELIS VIRGINIANA	WITCH HAZEL	85	1 GAL.
IV	ILEX VERTICILLATA	WINTERBERRY HOLLY	100	1 GAL.
KA	KALMIA ANGUSTIFOLIA	SHEEP LAUREL	60	1 GAL.
SD	SALIX DISCOLOR	PUSSY WILLOW	100	1 GAL.
VC	VACCINIUM 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:

1. ALL PLANTING MATERIAL TO BE NURSERY GROWN STOCK SUBJECT TO ANSI Z60.1 STANDARDS
2. 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.
3. 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.
4. ALL SHRUB MASSINGS AND TREE PITS SHALL BE MULCHED TO A DEPTH OF 3" WITH SHREDDED PINE BARK MULCH.
5. TREES SHALL NOT BE STAKED UNLESS OTHERWISE NOTED.
6. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGED VEGETATION AND SHALL REPLACE OR REPAIR ANY DAMAGED MATERIAL, AT HIS OWN EXPENSE
7. ALL SHRUB AND GROUNDCOVER PLANTING AREAS SHALL HAVE CONTINUOUS BEDS OF TOPSOIL 12" DEEP. ALL SOD AND HYDROSEED AREAS SHALL HAVE A MINIMUM TOPSOIL BED OF 6".
8. 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.
9. FOR PLANTING SOIL MIX, SEE SPECIFICATIONS OR PLANTING DETAILS.
10. 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.
11. 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.
12. 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.
13. PLANTINGS INSTALLED IN THE DRY SUMMER MONTHS AND / OR LAWN SEEDED 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.
14. 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.
15. 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.
16. CONTRACTOR TO RESEED ALL DISTURBED AREAS.
17. LOCATIONS OF TREE AND SHRUB PLANTINGS TO BE VERIFIED IN THE FIELD AND CONFIRMED BY LANDSCAPE ARCHITECT.
18. SEE RESTORATION PLANS FOR SEED MIX AND TUBELING PLANTING.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

COMMONWEALTH OF MASSACHUSETTS — DANIEL L. MONETTE — Civil — No. 53854 — REGISTERED PROFESSIONAL ENGINEER

SEAL

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HORZ.: 1"= 30'
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DATUM:
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CITY OF HAVERHILL

LANDSCAPE AND PLANTING PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 6, 2026

LA-101

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_LND01.dwg Layout: LA-101 Plotted: 2026-02-10 2:52 PM Saved: 2026-02-10 2:42 PM User: claire.nauman
PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

MBTA RAILROAD

SEE RESTORATION PLANS FOR SEED MIX AND TUBELING PLANTING (TYP.)

LARGE CONSERVATION GRADE SHADE TREE (TYP.)

CONSERVATION GRADE ORNAMENTAL TREE (TYP.)

CONSERVATION GRADE SHRUB BED (TYP.)

LITTLE RIVER STREET

APPLE STREET

STEVENS STREET

MATCH LINE SEE SHEET LA-103

MATCH LINE SEE SHEET LA-101

File: J:\DWG\P20170390\U30\Civil\Plan\20170390U30_LND01.dwg Layout: LA-102 Plotted: 2024-12-11 6:22 PM Saved: 2024-12-11 6:20 PM User: claire.nauman
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LAYER STATE:
MS VIEW:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE E. ANDREWS III
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
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CITY OF HAVERHILL

LANDSCAPE AND PLANTING PLAN NO. 2

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

LA-102

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_LND01.dwg Layout: LA-103 Plotted: 2024-12-11 6:22 PM Saved: 2024-12-11 6:20 PM User: claire.nauman
PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

MBTA RAILROAD

MBTA RAILROAD

MATCH LINE SEE SHEET LA-104

MATCH LINE SEE SHEET LA-102

SEE RESTORATION PLANS FOR SEED MIX AND TUBELING PLANTING (TYP.).

SEE ENLARGEMENT SHEETS LA-105 & LA-106

LARGE LANDSCAPE GRADE SHADE TREE (TYP.)

LANDSCAPE GRADE ORNAMENTAL TREE (TYP.)

SKATE PARK

EXISTING TREE TO REMAIN AND BE PROTECTED DURING CONSTRUCTION (TYP.)

EXISTING TREE TO BE REMOVED

LARGE CONSERVATION SHADE TREE (TYP.)

CONSERVATION GRADE ORNAMENTAL TREE (TYP.)

CONSERVATION GRADE SHRUB BED (TYP.)

CASHMAN'S FIELD

CASHMAN'S FIELD

LEBLANC STREET

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AMORE
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
60 30 0 60
GRAPHIC SCALE

FUSS & O'NEILL
1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
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CITY OF HAVERHILL

LANDSCAPE AND PLANTING PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

LA-103

MBTA RAILROAD

SEE RESTORATION PLANS FOR SEED MIX AND TUBELING PLANTING (TYP.).

CONSERVATION GRADE ORNAMENTAL TREE (TYP.)

LARGE CONSERVATION GRADE SHADE TREE (TYP.)

CONSERVATION GRADE SHRUB PLANTING BED (TYP.)

WHITTIER PLACE

MATCH LINE SEE SHEET LA-103

File: J:\DWG\P2017\03900\U30\Civil\Plan\20170390U30_LND01.dwg Layout: LA-104 Plotted: 2024-12-11 6:22 PM Saved: 2024-12-11 6:20 PM User: claire.nauman
PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AMDEN
CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
60 30 0 60
GRAPHIC SCALE

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CITY OF HAVERHILL

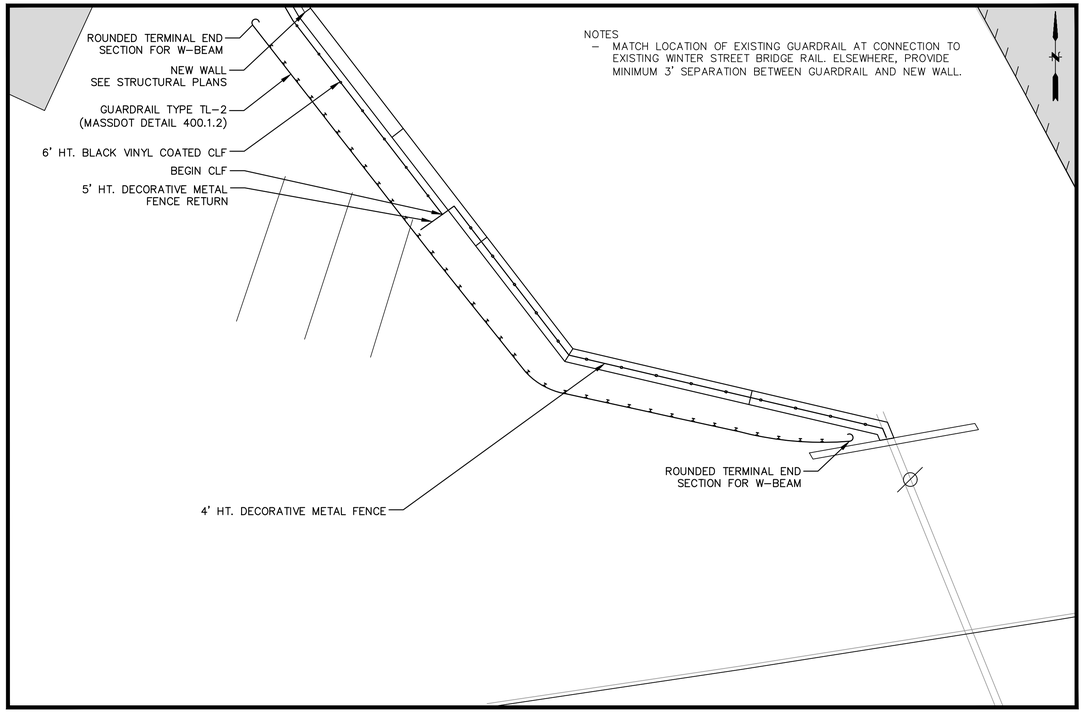
LANDSCAPE AND PLANTING PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

LA-104



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

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE E. AMORY
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

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

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413.452.0445
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CITY OF HAVERHILL

SITE PLAN ENLARGEMENTS

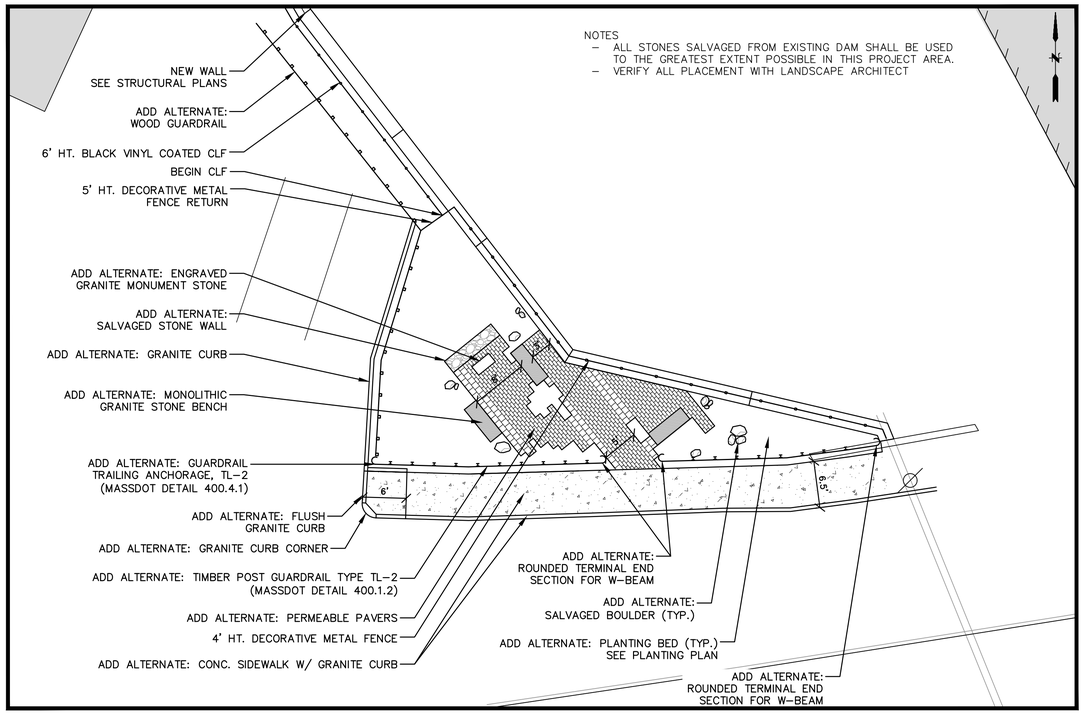
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

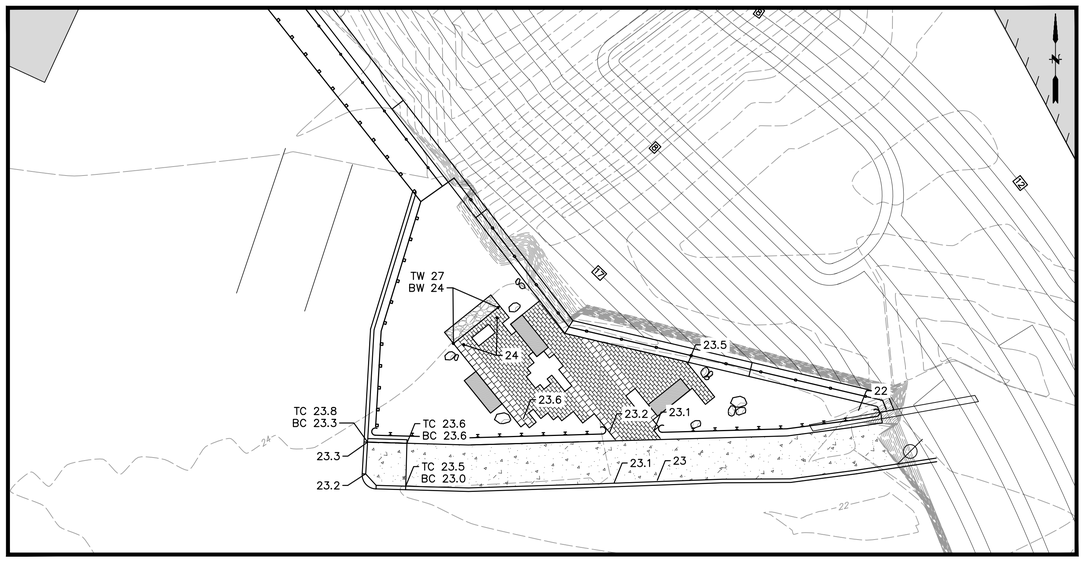
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DATE: DECEMBER 16, 2024

LA-105

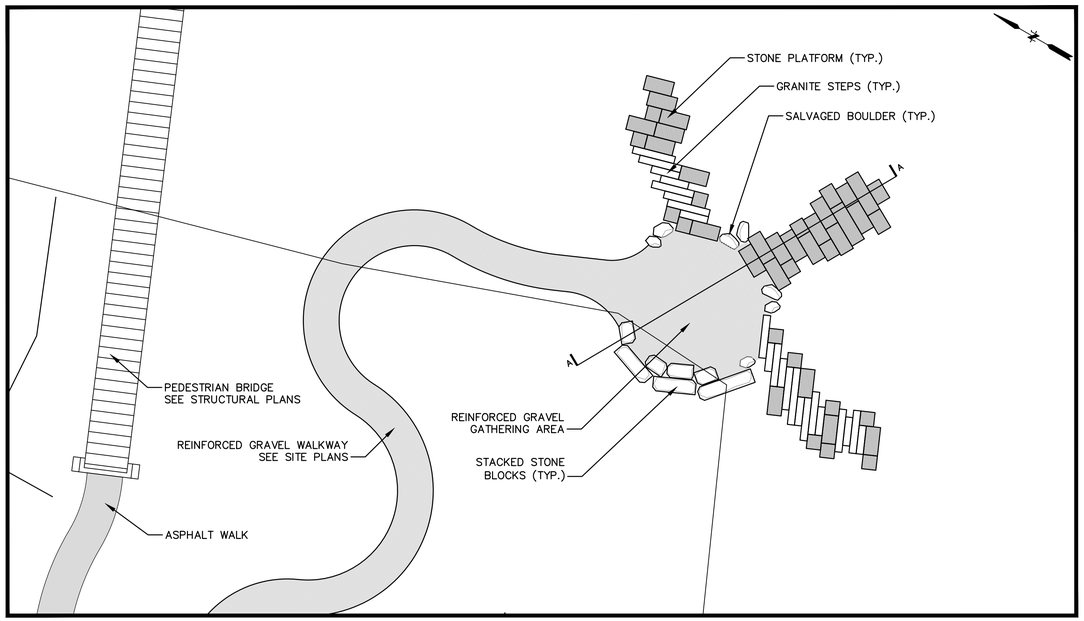
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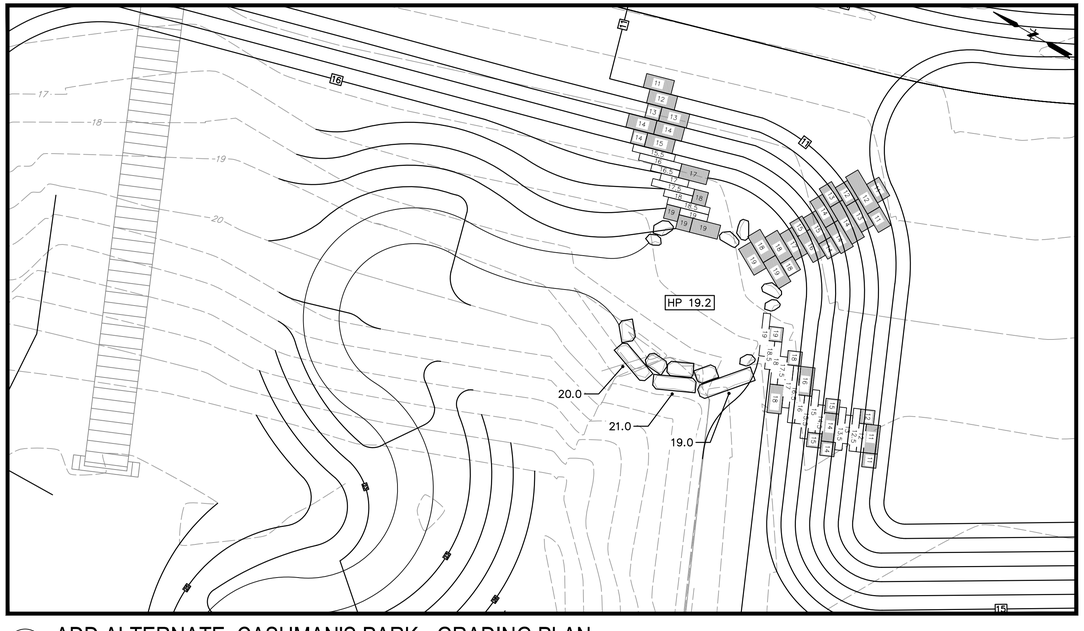
1 ADD ALTERNATE: OVERLOOK - SITE PLAN ENLARGEMENT
SCALE: 1" = 10'



2 ADD ALTERNATE: OVERLOOK - GRADING PLAN ENLARGEMENT
SCALE: 1" = 10'



3 ADD ALTERNATE: CASHMAN'S PARK - SITE PLAN
SCALE: 1" = 10'



4 ADD ALTERNATE: CASHMAN'S PARK - GRADING PLAN
SCALE: 1" = 10'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEAN E. AMDET
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

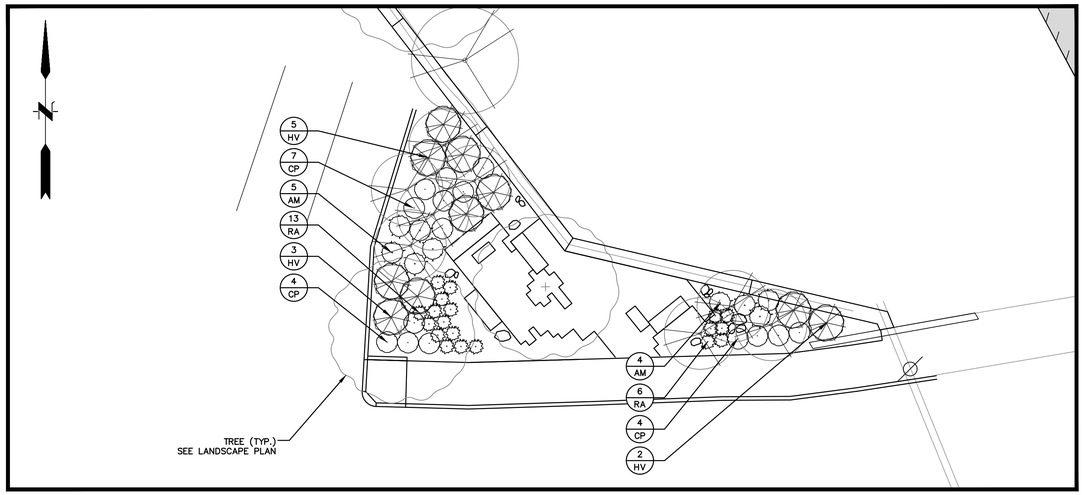
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DATUM:
HORZ.: NAD83
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GRAPHIC SCALE

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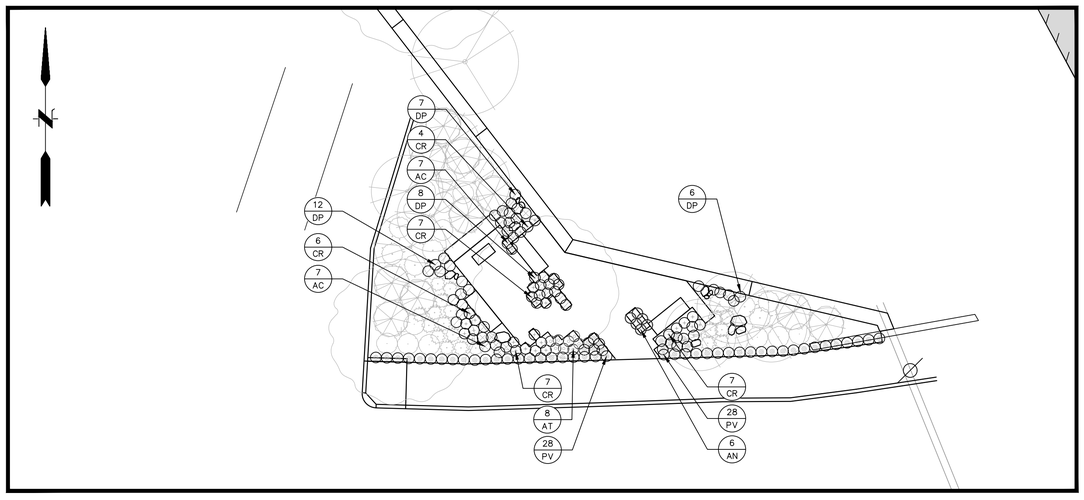
CITY OF HAVERHILL
SITE PLAN ENLARGEMENTS
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024
LA-106

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LAYER STATE:
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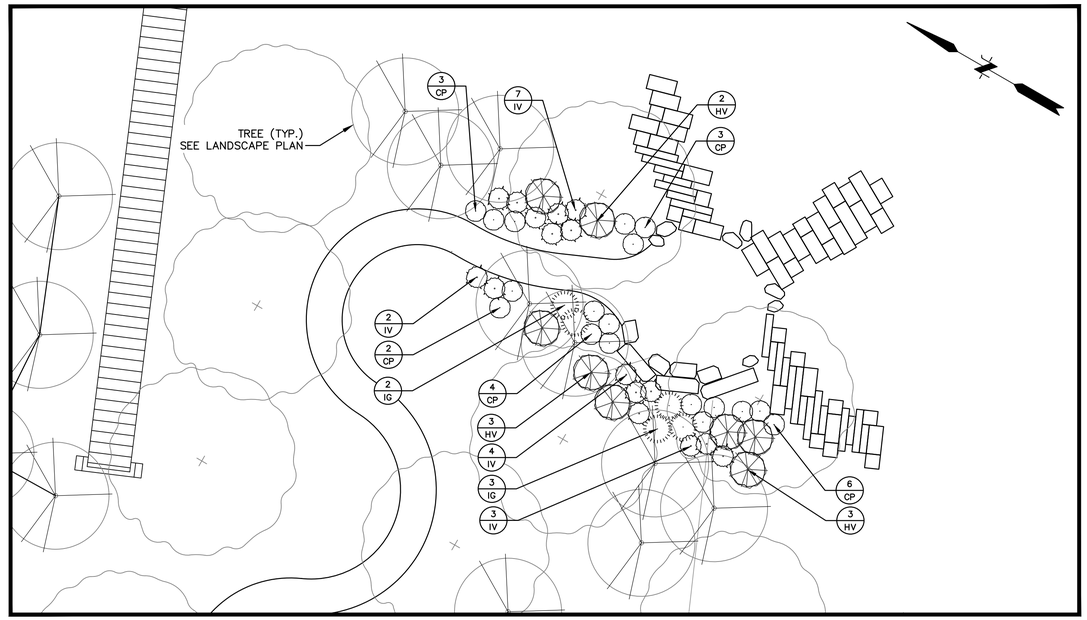
1 OVERLOOK - SHRUB PLANTING ENLARGEMENT
SCALE: 1" = 10'



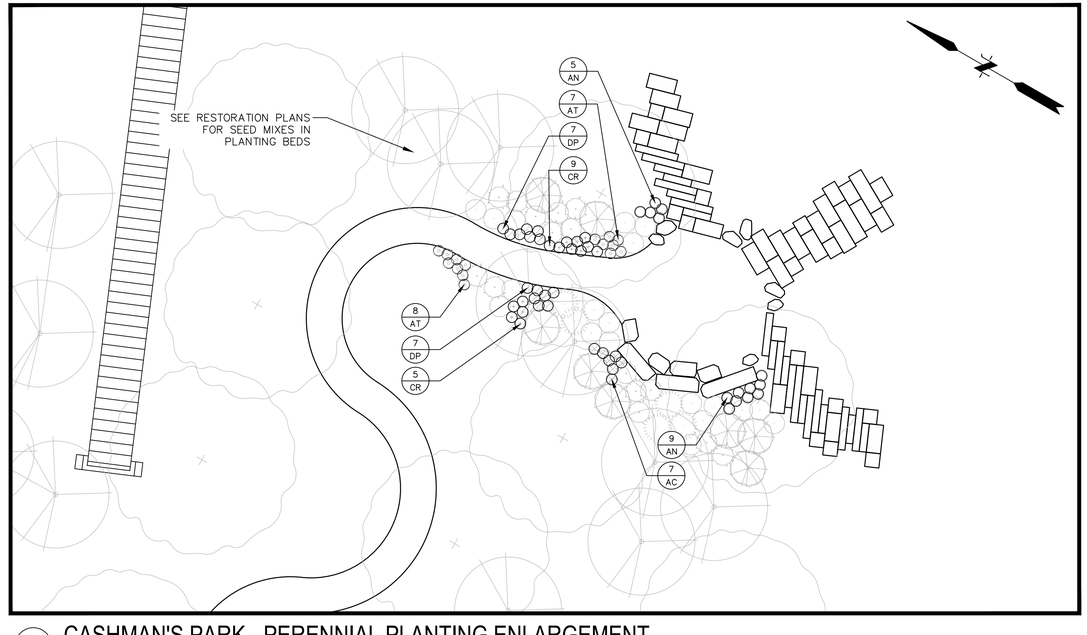
2 OVERLOOK - PERENNIAL PLANTING ENLARGEMENT
SCALE: 1" = 10'

LANDSCAPE GRADE PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE
	SHRUBS			
AM	ARONIA MELANOCARPA	BLACK CHOKEBERRY	9	3 GAL.
CP	CLETHRA ALNIFOLIA	SWEET PEPPERBUSH	33	3 GAL.
HV	HAMAMELIS VIRGINIANA	WITCH HAZEL	18	5–6' HT.
IG	ILEX GLABRA	INKBERRY	5	5 GAL.
IV	ILEX VERTICILLATA 'RED SPRITE'	RED SPRITE WINTERBERRY	16	3 GAL.
RA	RHUS AROMATICA 'GRO LOW'	GRO LOW SUMAC	19	3 GAL.
	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.



3 CASHMAN'S PARK - SHRUB PLANTING ENLARGEMENT
SCALE: 1" = 10'



4 CASHMAN'S PARK - PERENNIAL PLANTING ENLARGEMENT
SCALE: 1" = 10'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS — DEAN E. AMDET — No. 45977 — REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 10'
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HORZ.: NAD83
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GRAPHIC SCALE

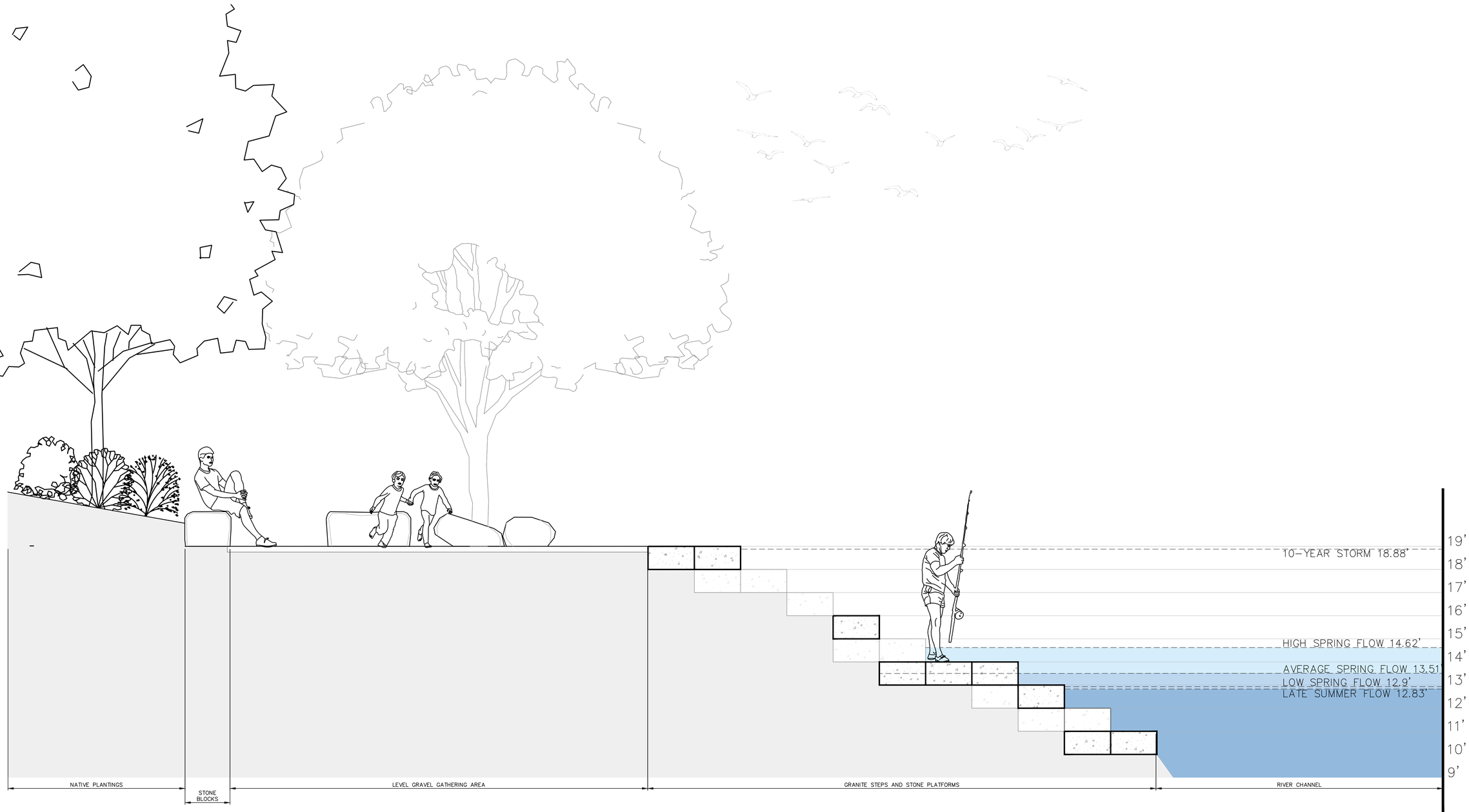
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1550 MAIN STREET, SUITE 400
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CITY OF HAVERHILL
ADD ALTERNATE: PLANTING PLAN ENLARGEMENTS
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION
HAVERHILL MASSACHUSETTS

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

LA-107

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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:



TYPICAL PROFILE OF CASHMAN'S PARK REINFORCED GRAVEL FISHING AREA, GRANITE STEPS, AND STONE PLATFORM

NOT TO SCALE

File: J:\DWG\P20170390\U30\Civil\Plan\20170390U30_DET01.dwg Layout: LA-108 Plotted: 2024-12-11 6:05 PM Saved: 2024-12-11 3:40 PM User: claire.nauman
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No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS — DEANE A. MIDGLEY — No. 45977 — REGISTERED PROFESSIONAL ENGINEER

SEAL

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

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CITY OF HAVERHILL

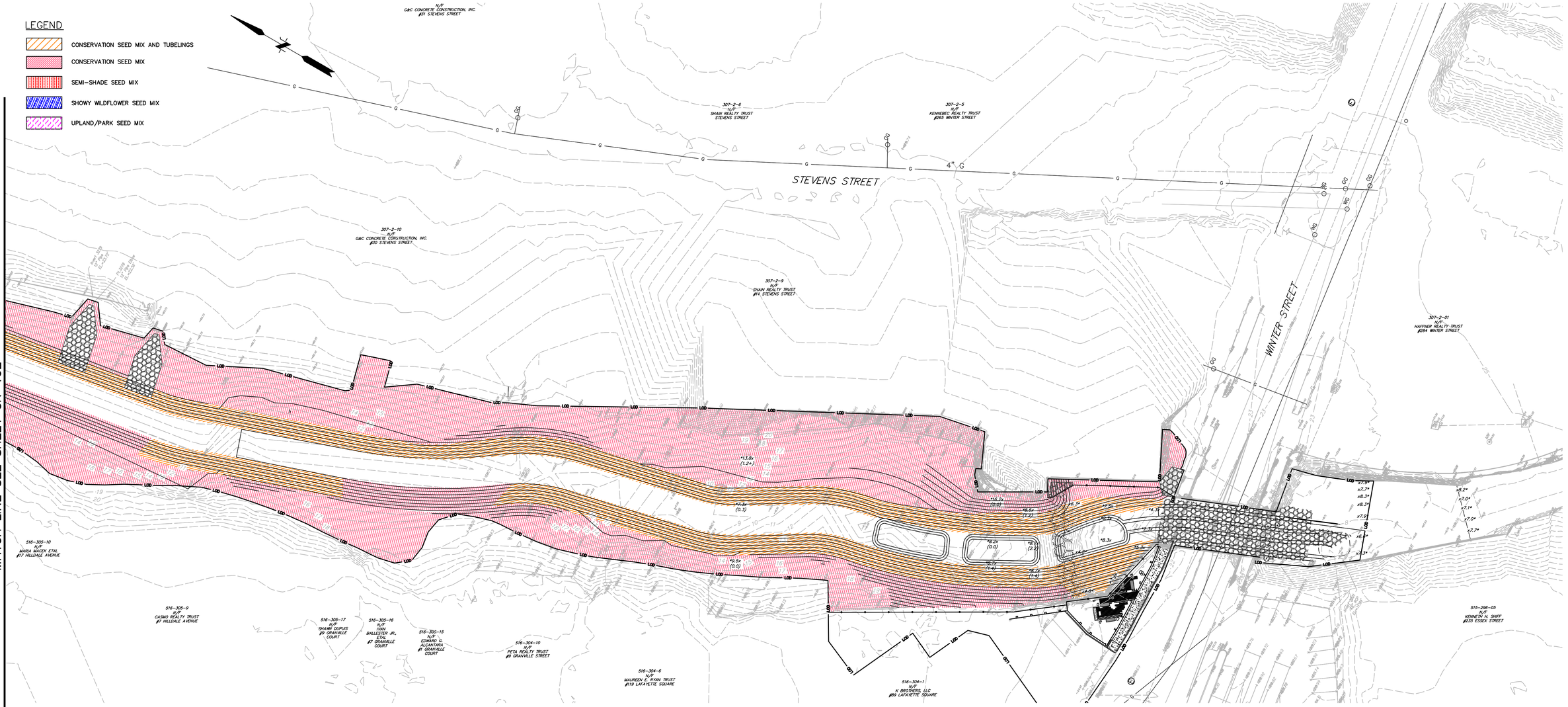
ADD ALTERNATE: FISHING AREA TYPICAL PROFILE

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

LA-108



NEW ENGLAND CONSERVATION/WILDLIFE MIX (CONSERVATION SEED MIX)

KEY	BOTANICAL NAME	COMMON NAME	IND.
	ELYMUS VIRGINICUS	VIRGINIA WILD RYE	FACW
	SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	FACU
	ANDROPOGON GERARDII	BIG BLUESTEM	FAC
	FESTUCA RUBRA	RED FESCUE	FACU
	PANICUM VIRGATUM	SWITCH GRASS	FAC
	CHAMAECRISTA FASCICULATA	PARTRIDGE PEA	FACU
	DESMODIUM CANADENSE	SHOWY TICK TREFOIL	FAC
	SORGHASTRUM NUTANS	INDIAN GRASS	UPL
	ASCLEPIAS TUBEROSA	BUTTERFLY MILKWEED	NI
	BIDENS FRONDOSA	BEGGAR TICKS	FACW
	RUDBECKIA HIRTA	BLACK EYED SUSAN	FACU
	EUPATORIUM PURPUREUM	PURPLE JOE PYE WEED	FAC
	ASTER PILOSUS	HEATH OR HAIRY ASTER	UPL
	SOLIDAGO JUNCEA	EARLY GOLDENROD	NI

CONSERVATION SEED MIX
APPLICATION RATE: CONSERVATION SEED MIX = 25 LBS/ACRE
AREA: CONSERVATION SEED MIX = 6.07-ACRES

NEW ENGLAND SHOWY WILDFLOWER MIX (SHOWY WILDFLOWER SEED MIX)

KEY	BOTANICAL NAME	COMMON NAME	IND.
	SCHIZACHYRIUM SCOPARIUM	LITTLE BLUESTEM	FACU
	CHAMAECRISTA FASCICULATA	PARTRIDGE PEA	FACU
	SORGHASTRUM NUTANS	INDIAN GRASS	UPL
	FESTUCA RUBRA	RED FESCUE	FACU
	ELYMUS CANADENSIS	CANADA WILD RYE	FACU
	ELYMUS RIPARIUS	RIVERBANK WILD RYE	FACW
	HELIOPSIS HELIANTHOIDES	OX EYE SUNFLOWER	UPL
	COREOPSIS LANCEOLATA	LANCE LEAVED COREOPSIS	FACU
	RUDBEKIA HIRTA	BLACK EYED SUSAN	FACU
	LIATRIS SPICATA	SPIKED GAYFEATHER/MARSH BALZING STAR	FAC
	ASCLEPIAS SYRIACA	COMMON MILKWEED	FACU
	VERONIA NOVEBORANCENSIS	NEW YORK IRONWEED	FACW
	ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	FACW
	EUPATORIUM PURPUREUM	PURPLE JOE PYE WEED	FAC
	ASCLEPIAS TUBEROSA	BUTTERFLY MILKWEED	NI
	SOLIDAGO JUNCEA	EARLY GOLDENROD	NI
	EUPATORIUM PERFORLIATUM	BONESET	FACW

SHOW WILDFLOWER SEED MIX
APPLICATION RATE: SHOWY WILDFLOWER SEED MIX = 23 LBS/ACRE
AREA: SHOWY WILDFLOWER SEED MIX = 0.005-ACRES

NEW ENGLAND SEMI-SHADE GRASS AND FORBS MIX (SEMI-SHADE SEED MIX)

KEY	BOTANICAL NAME	COMMON NAME	IND.
	ELYMUS VIRGINICUS	VIRGINIA WILD RYE	FACW
	ELYMUS CANADENSIS	CANADA WILD RYE	FACU
	FESTUCA RUBRA	RED FESCUE	FACU
	CHAMAECRISTA FASCICULATA	PARTRIDGE PEA	FACU
	LIATRIS SPICATA	SPIKED GAYFEATHER/MARSH BLAZING STAR	FAC
	ONOCLEA SENSIBILIS	SENSITIVE FERN	FACW
	ASTER PRENANTHOIDES	ZIGZAG ASTER	FAC
	EUPATORIUM FISTULOSUM	HOLLOW-STEM JOE PYE WEED	FACW
	EUPATORIUM PERFOLIATUM	BONESET	FACW
	JUNCUS TENUIS	PATH RUSH	FAC

SEMI-SHADE SEED MIX
APPLICATION RATE: SEMI-SHADE SEED MIX = 30 LBS/ACRE
AREA: SEMI-SHADE SEED MIX = 0.4-ACRES

KEY — UPLAND/PARK SEED MIX
MIXTURE: SHALL BE IN ACCORDANCE WITH SECTION M.6.03.0-1 OF THE MASSDOT STANDARD SPECIFICATIONS FOR FLAT LAWN GRASS AREAS AND M6.03.0-2 FOR SLOPED LAWN GRASS AREAS.
APPLICATION RATE: 25 LBS/ACRE
AREA: UPLAND/PARK SEED MIX 0.07-ACRES

CONSERVATION SEED MIX AND TUBELINGS

KEY	BOTANICAL NAME	COMMON NAME	IND.	QTY.
	ALNUS INCANA	SPECKLED ALDER	FACW	21,115
	CORNUS SERICEA	RED-OSIER DOGWOOD	NI	21,115
	SALIX DISCOLOR	PUSSY WILLOW	FACW	21,115
	SALIX SERICEA	SILKY WILLOW	OBL	21,115

CONSERVATION SEED MIX
APPLICATION RATE: CONSERVATION SEED MIX = 25 LBS/ACRE
AREA: CONSERVATION SEED MIX = 1.9-ACRES

TUBELING
PLANTING DENSITY: 1 TUBELING EVERY 1' ON CENTER

RESTORATION NOTES:

1. CONSTRUCTION ACCESS ROUTES AND STAGING AREAS WITHIN CASHMAN'S PARK AREA THAT WERE PREVIOUSLY MAINTAINED AS LAWN AREA SHALL BE COVERED WITH TOPSOIL PRIOR TO SEEDING.
2. DISTURBED AREAS SHALL BE RESTORED WITHIN 7 DAYS AFTER GRADING OR CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED.
3. AREAS TO BE RESTORED BETWEEN SEPTEMBER THROUGH NOVEMBER SHALL BE OVERSEEDED WITH WINTER RYE (SECALE CEREALE) AT THE RATE OF 36LBS/ACRE IN ADDITION TO THE SPECIFIED NATIVE SEED MIX.
4. APPLY SEED USING HAND BROADCAST OR SEED BROADCASTER AT SPECIFIED RATES.
5. RESTORATION AREAS ALONG THE ASPHALT WALKING TRAIL SHALL BE MULCHED USING HYDROMULCH. ALL OTHER RESTORATION AREAS SHALL BE MULCHED WITH STRAW.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

COMMONWEALTH OF MASSACHUSETTS
DANIEL L. MONETTE
No. 53854
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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

CITY OF HAVERHILL

SITE RESTORATION PLAN NO. 1

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 6, 2026

CR-101

File: J:\DWG\P20170390\U30\Civil\Plan\20170390U30_RES01.dwg Layout: CR-101 Plotted: 2026-02-05 12:19 PM Saved: 2026-02-05 11:38 AM User: claire.nauman
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

MATCH LINE SEE SHEET CR-103

MATCH LINE SEE SHEET CR-101

MBTA RAILROAD

STEVENS STREET

LITTLE RIVER STREET

APPLE STREET

600-453-1
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HALE STREET

600-452-1
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HALE STREET

307-2-10
N/F
G&C CONCRETE CONSTRUCTION, INC.
#30 STEVENS STREET

523-325-1
N/F
GEORGE RAYMOND GIRARD
#4 LITTLE RIVER STREET

523-324-11
N/F
NICHOLAS R. CEFALO ETUX
#9 LITTLE RIVER STREET

523-324-10
N/F
JUDINE A. MELLO
#2 LITTLE RIVER STREET

523-324-9
N/F
JUAN HERNANDEZ
#5 LITTLE RIVER STREET

523-324-8
N/F
BERT N. LANGLOIS
#15 LITTLE RIVER STREET

523-324-7
N/F
LLOYD E. JENNINGS
#3 LITTLE RIVER STREET

523-324-6
N/F
ALEXANDRA SCOTT
#1 LITTLE RIVER STREET

523-325-3
N/F
THE J&T REALTY TRUST
#111 HILLDALE AVENUE

523-325-2
N/F
THE J&T REALTY TRUST
#2 LITTLE RIVER STREET

523-325-3A
N/F
BOUCHER REALTY TRUST
#107 HILLDALE AVENUE

523-324-5
N/F
101 HILLDALE AVENUE LLC
#101 HILLDALE AVENUE

523-324-4
N/F
SHERMAN P. MCCUTCHEON LIFE EST.
#95 HILLDALE AVENUE

523-324-3
N/F
GREGORY C. JOHNSON
#93 HILLDALE AVENUE

523-324-3A
N/F
GREGORY C. JOHNSON
#97 HILLDALE AVENUE

523-324-2
N/F
HELEN MCLAUGHLIN
#4 APPLE STREET

523-324-1
N/F
YLANDER DILONE
#8 APPLE STREET

523-317-4
N/F
JOSE ESTRADA ETAL
#7 APPLE STREET

523-317-3
N/F
JOHN ROUTIER ETAL
#5 APPLE STREET

523-317-1
N/F
MIGUEL A. BERRIOS
#83 HILLDALE AVENUE

521-317-8
N/F
A.G. REAL ESTATE TRUST
#77 HILLDALE AVENUE

521-317-7
N/F
71-73 HILLDALE AVENUE R.T.
#71 HILLDALE AVENUE

521-317-6
N/F
ARTHUR M. RICHARD
#69 HILLDALE AVENUE

521-317-5
N/F
BOUCHER FAMILY TRUST
#65 HILLDALE AVENUE

521-317-4
N/F
EDUARDO FERNANDEZ
#59 HILLDALE AVENUE

521-317-3
N/F
K&S LEBLANC REALTY CO., INC.
#53 HILLDALE AVENUE

521-317-2
N/F
K&S LEBLANC REALTY CO., INC.
#45 HILLDALE AVENUE

512-316-4
N/F
JOHN P. ROGERS
#5-7 BENJAMIN STREET

516-326-11
N/F
JOHN P. ROGERS
#4 CLIFF STREET

*16.2x (2.0)
*10.3x (0.6)
*11.8x (0.8)
*12.2x (2.5)
*10.4x (0.2)
*12.4x (2.5)
*15.0x (2.9)
*14.7x (0.5)
*16.9x (2.6)
*16.1x (2.6)
*8.2x (0.4)
*12.5x (2.0)
*11.8x (0.8)
*11.6x (2.0)

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE ANDREW GUIDI
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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1550 MAIN STREET, SUITE 400
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CITY OF HAVERHILL

SITE RESTORATION PLAN NO. 2

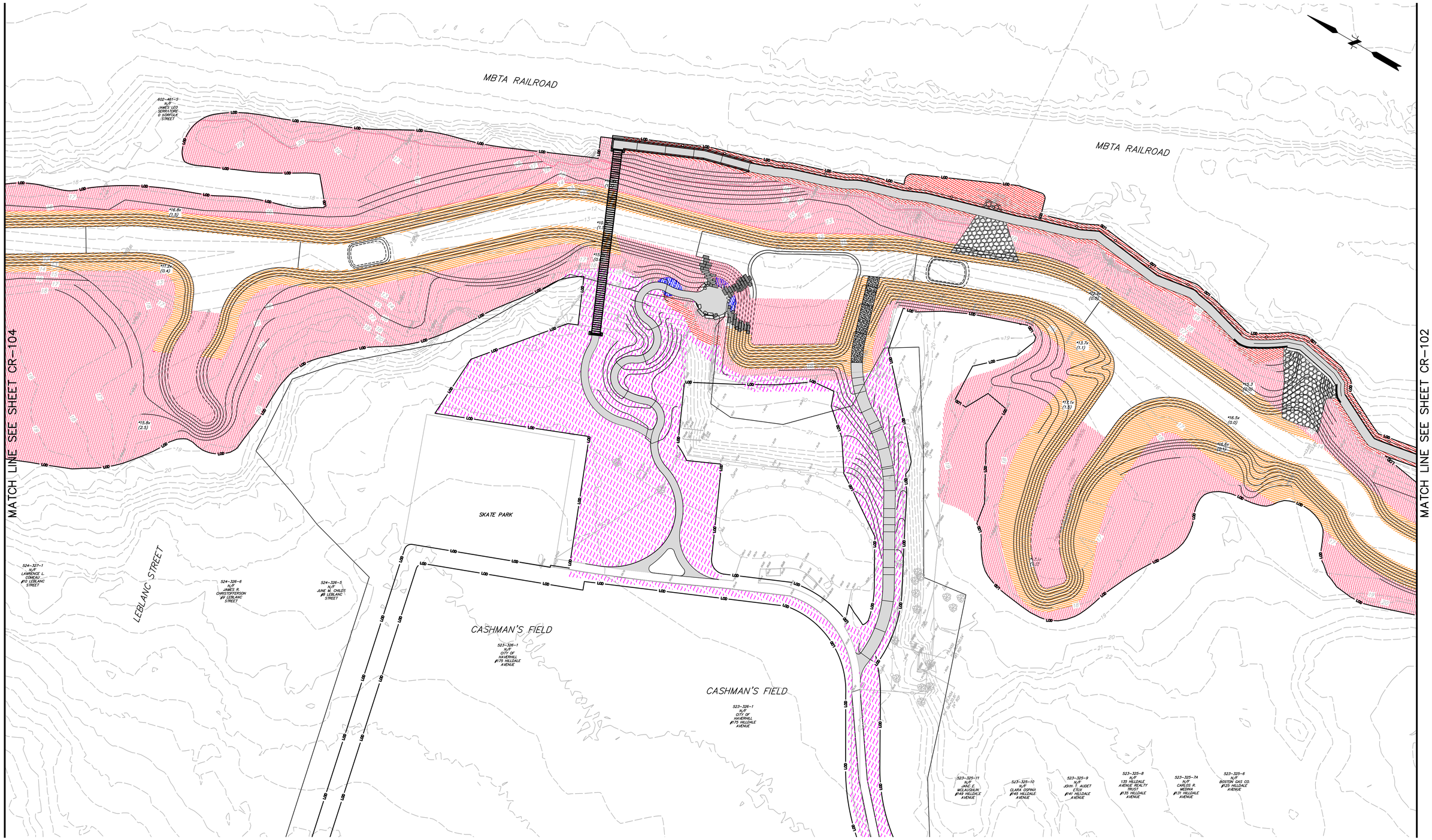
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CR-102

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_RES01.dwg Layout: CR-102 Plotted: 2024-12-11 6:26 PM Saved: 2024-12-11 6:20 PM User: claire.nauman
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LAYER STATE:
MS VIEW:



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE M. AUDET
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: 1"= 30'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
30 15 0 30
GRAPHIC SCALE

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413.452.0445
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CITY OF HAVERHILL

SITE RESTORATION PLAN NO. 3

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CR-103

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_RES01.dwg Layout: CR-103 Plotted: 2024-12-11 6:26 PM Saved: 2024-12-11 6:20 PM User: claire nauman
PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

MBTA RAILROAD

WHITTIER PLACE

526-2-4
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 HILLSALE AVENUE

526-19-7-21
N/F
HUSAM MOUSSA
#23 GREENHILL FARM ROAD

649-611-6
N/F
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
#0 PRIMROSE STREET

649-611-7
N/F
CITY OF HAVERHILL
0 HALE STREET

526-18-8-17
N/F
LAWRENCE W. LAPLANTE ETUX.
#17 GREENHILL FARM ROAD

526-18-9-13
N/F
SEAN GALVIN
#13 GREENHILL FARM ROAD

524-328A-8
N/F
THOMAS A. KUNOH
#15 WHITTIER PLACE

524-328A-9
N/F
BRUCE R. LATERELLA ETAL
#13 WHITTIER PLACE

524-328A-10
N/F
KATINA M. MORTIMER ETAL
#11 WHITTIER PLACE

524-328A-13
N/F
ERNEST H. FOUNTAINE ETUX
#3 WHITTIER PLACE

524-328A-13A
N/F
BRITTANY HAY
#1 WHITTIER PLACE

524-328-23
N/F
THOMAS A. KUNOH
#0 WOODY AVENUE

524-329-3
N/F
JUSTIN PALMISANO ETUX.
#241 HILLDALE AVENUE

MATCH LINE SEE SHEET CR-103

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CITY OF HAVERHILL

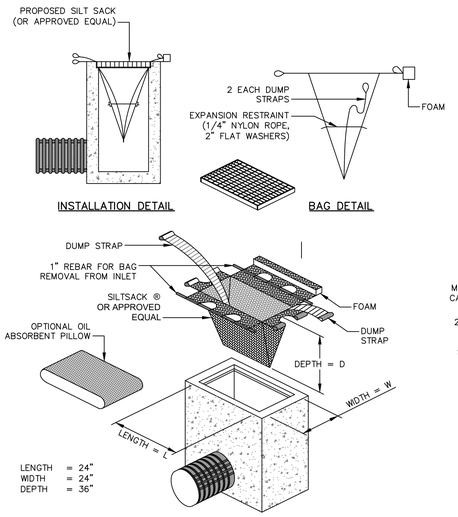
SITE RESTORATION PLAN NO. 4

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

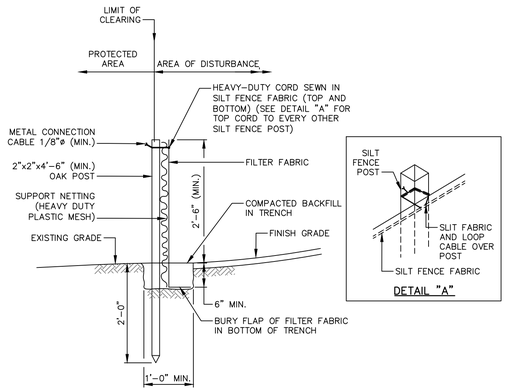
PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

CR-104



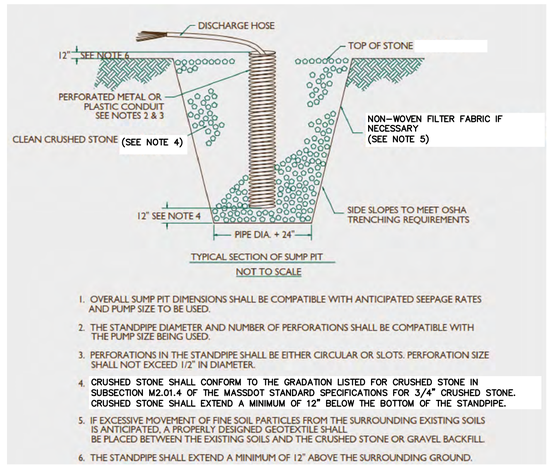
CATCH BASIN INLET PROTECTION

NOT TO SCALE



SILT FENCE

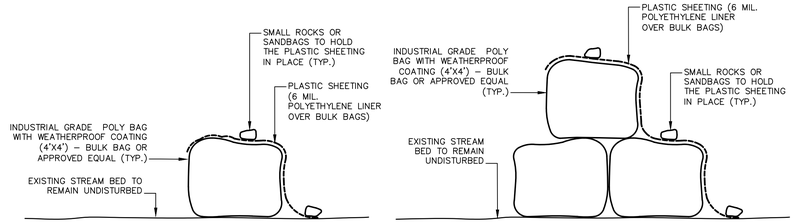
NOT TO SCALE



1. OVERALL SUMP PIT DIMENSIONS SHALL BE COMPATIBLE WITH ANTICIPATED SEEPAGE RATES AND PUMP SIZE TO BE USED.
2. THE STANDPIPE DIAMETER AND NUMBER OF PERFORATIONS SHALL BE COMPATIBLE WITH THE PUMP SIZE BEING USED.
3. PERFORATIONS IN THE STANDPIPE SHALL BE EITHER CIRCULAR OR SLOTS. PERFORATION SIZE SHALL NOT EXCEED 1/2" IN DIAMETER.
4. **CRUSHED STONE SHALL CONFORM TO THE GRADATION LISTED FOR CRUSHED STONE IN SUBSECTION M2.01.4 OF THE MASSDOT STANDARD SPECIFICATIONS FOR 3/4" CRUSHED STONE. CRUSHED STONE SHALL EXTEND A MINIMUM OF 12" BELOW THE BOTTOM OF THE STANDPIPE.**
5. IF EXCESSIVE MOVEMENT OF FINE SOIL PARTICLES FROM THE SURROUNDING EXISTING SOILS IS ANTICIPATED, A PROPERLY DESIGNED GEOTEXTILE SHALL BE PLACED BETWEEN THE EXISTING SOILS AND THE CRUSHED STONE OR GRAVEL BACKFILL.
6. THE STANDPIPE SHALL EXTEND A MINIMUM OF 12" ABOVE THE SURROUNDING GROUND.
7. **WHEN USED FOR WATER CONTROL DURING THE CONSTRUCTION OF THE LOWER SLOPE AND TOE PROTECTION ASSOCIATED WITH BIOENGINEERED SLOPE STABILIZATION, TREE REVETMENT SYSTEM, AND THE OUTFALL HEADWALL AND ASSOCIATED CHANNEL BOTTOM SCOUR PROTECTION; PUMP DISCHARGE MAY NEED TO BE DIVERTED THROUGH A DEWATERING BAG PRIOR TO BEING DIRECTED INTO THE BROOK IF IT IS DETERMINED BY THE ENGINEER THAT THE DISCHARGE IS TURBID OR CLOUDY.**

CRUSHED STONE SUMP DETAIL (FOR CONSTRUCTION DEWATERING PUMPS)

NOT TO SCALE

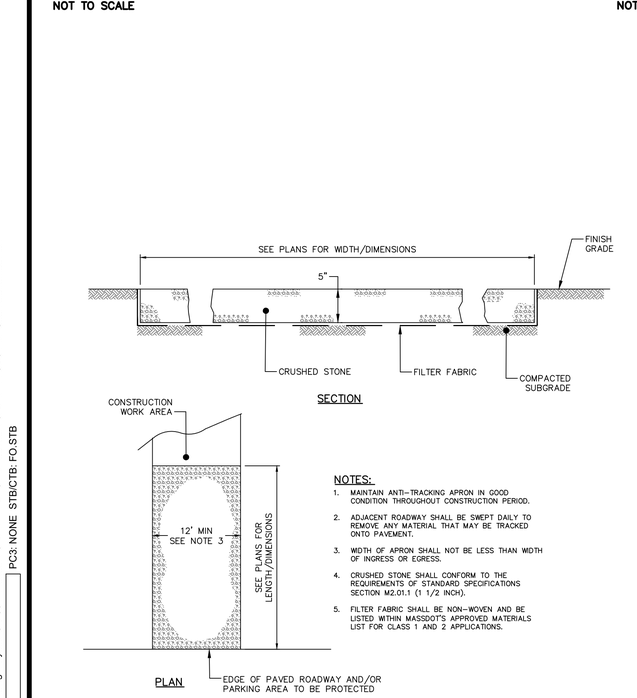


WATER CONTROL NOTES:

1. TEMPORARY SANDBAGS SHALL CONSIST OF POLYPROPYLENE LARGE SANDBAGS, BULK BAGS OR APPROVED EQUAL, AND SHALL BE FILLED WITH SAND CONFORMING TO SUBSECTION M1.04.0 (TYPE B) OF THE MASSDOT STANDARD SPECIFICATIONS.
2. INSTALL DURING PERIOD OF LOW-FLOW IN BROOK. MONITOR WATER CONTROL SYSTEM DAILY. PROMPTLY CORRECT SEEPAGE, BREAKAGE, OR OTHER EVIDENCE OF MOVEMENT TO ENSURE THAT TEMPORARY COFFERDAM(S) AND WATER BYPASS CONVEYANCES REMAIN STABLE AND FUNCTIONING AS INTENDED.
3. MAINTAIN CRUSHED STONE STUMP AND PUMPS AS NECESSARY TO MAINTAIN DEWATERED CONDITIONS WITHIN COFFERDAMMED AREAS SUFFICIENT FOR COMPLETION OF WORK AND PLACEMENT PROPOSED MATERIALS UNDER SAFE, CONTROLLED CONDITIONS.
4. REMOVE ALL SANDBAGS, ACCUMULATED SEDIMENT, AND OTHER COFFERDAM MATERIALS AFTER IN-RIVER CONSTRUCTION IN RESPECTIVE PHASE IS COMPLETE

TEMPORARY LARGE SANDBAG COFFERDAM (BULK BAGS OR APPROVED EQUAL)

NOT TO SCALE

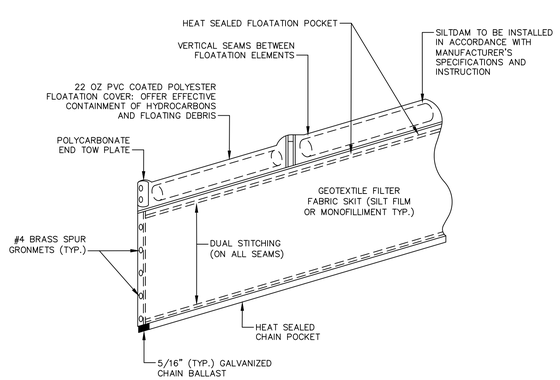


NOTES:

1. MAINTAIN ANTI-TRACKING APRON IN GOOD CONDITION THROUGHOUT CONSTRUCTION PERIOD.
2. ADJACENT ROADWAY SHALL BE SWEPT DAILY TO REMOVE ANY MATERIAL THAT MAY BE TRACKED ONTO PAVEMENT.
3. WIDTH OF APRON SHALL NOT BE LESS THAN WIDTH OF INGRESS OR EGRESS.
4. CRUSHED STONE SHALL CONFORM TO THE REQUIREMENTS OF STANDARD SPECIFICATIONS SECTION M2.01.1 (1 1/2 INCH).
5. FILTER FABRIC SHALL BE NON-WOVEN AND BE LISTED WITHIN MASSDOT'S APPROVED MATERIALS LIST FOR CLASS 1 AND 2 APPLICATIONS.

CONSTRUCTION ACCESS/ENTRANCE

NOT TO SCALE

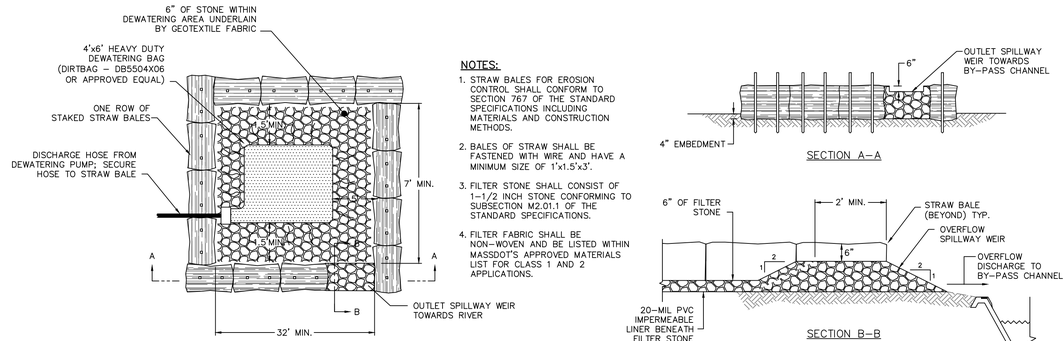


NOTES:

1. CURTAIN SHALL BE A TYPE III HEAVY DUTY CURTAIN THAT IS SUITABLE FOR INSTALLATION WITH FLOWS UP TO 5 FEET PER SECOND (FPS).
2. FLOATATION SIZE (6", 8" OR 12" DIA.) DETERMINED BY SKIRT DEPTH/SITE VARIABLES.
3. OTHER END TYPES AVAILABLE SUCH AS ALUMINUM UNIVERSAL SLIDE OR SLOTTED TUBE.
4. OPTIONAL TOP TENSION CABLE (5/16" TYP.) AVAILABLE FOR INCREASED STRENGTH.

TYPE III FLOATING TURBIDITY CURTAIN

NOT TO SCALE



NOTES:

1. STRAW BALES FOR EROSION CONTROL SHALL CONFORM TO SECTION 767 OF THE STANDARD SPECIFICATIONS INCLUDING MATERIALS AND CONSTRUCTION METHODS.
2. BALES OF STRAW SHALL BE FASTENED WITH WIRE AND HAVE A MINIMUM SIZE OF 1'x1.5'x3'.
3. FILTER STONE SHALL CONSIST OF 1-1/2 INCH STONE CONFORMING TO SUBSECTION M2.01.1 OF THE STANDARD SPECIFICATIONS.
4. FILTER FABRIC SHALL BE NON-WOVEN AND BE LISTED WITHIN MASSDOT'S APPROVED MATERIALS LIST FOR CLASS 1 AND 2 APPLICATIONS.

NOTES:

1. THE DEWATERING BAG, DIRTBAG® DB5504X06 OR APPROVED EQUAL, SHALL BE HEAVY DUTY AND CONSIST OF A NONWOVEN BAG SEWN WITH A DOUBLE NEEDLE MATCHING USING A HIGH STRENGTH THREAD.
2. EACH DEWATERING BAG SHALL HAVE A FILL SPOUT LARGE ENOUGH TO ACCOMMODATE A 4" DISCHARGE HOSE. THE BAG SHALL BE PROVIDED WITH STRAPS TO SECURE THE HOSE AND PREVENT PUMPED WATER FROM ESCAPING WITHOUT BEING FILTERED.
3. MAINTAIN DEWATERING BAG(S) AS NECESSARY TO EFFICIENTLY FILTER SEDIMENT OR PASS WATER AT A REASONABLE RATE. USE OF EXCESSIVE FLOW RATES OR OVERFILLING DIRTBAG® WITH SEDIMENT WILL CAUSE RUPTURES OF THE BAGS OR FAILURE OF THE HOSE ATTACHMENT STRAPS.
4. DISPOSE OF DEWATERING BAG AND CONTENTS AT OFF-SITE DISPOSAL FACILITY IN ACCORDANCE WITH THE APPROVED SOIL MANAGEMENT PLAN OR AS DIRECTED BY ENGINEER.
5. INSTALL DEWATERING BAG AND CRUSHED STONE BEDDING WITH A SLOPE SO INCOMING WATER FLOWS DOWNHILL THROUGH THE BAG WITHOUT CREATING MORE EROSION. STRAP THE NECK OF DEWATERING BAG TIGHTLY TO THE DISCHARGE HOSE.

TEMPORARY DEWATERING BASIN WITH FILTER BAG

NOT TO SCALE

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PC3: NONE STB/CTB: FO.STB
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No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS — DEAN E. AMDEN — No. 45977 — REGISTERED PROFESSIONAL ENGINEER

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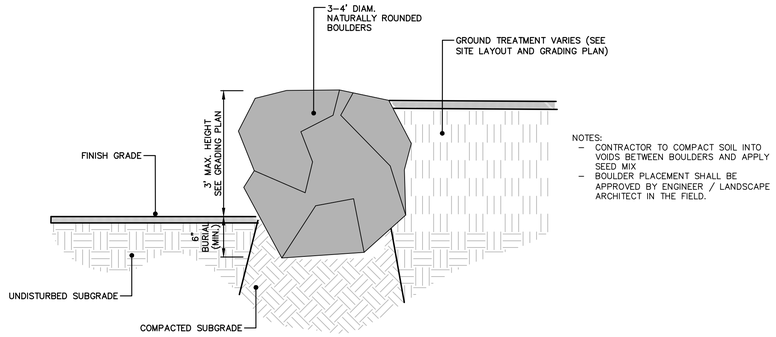
CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

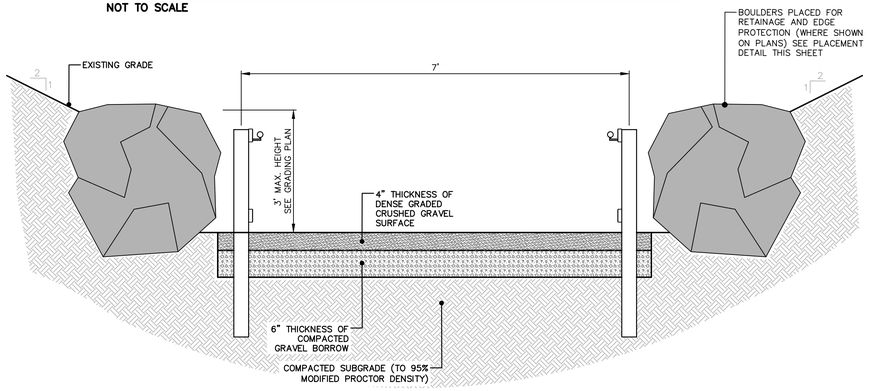
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DATE: DECEMBER 16, 2024

CD-501



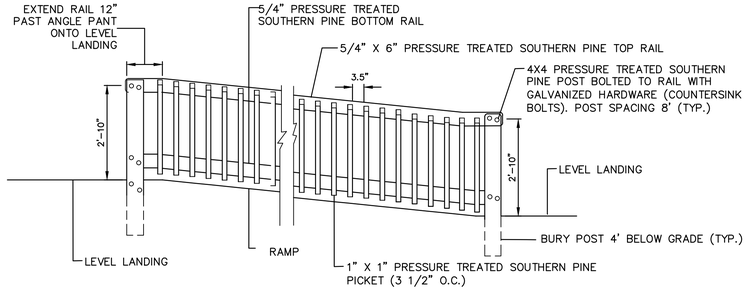
ADD ALTERNATE: BOULDER PLACEMENT (FOR RETAINAGE)

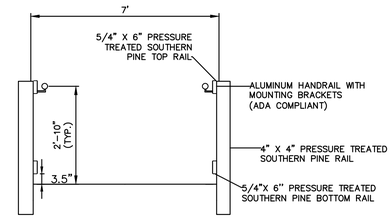
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ADD ALTERNATE: KAYAK/CANOE ACCESS PATH (AT CASHMAN PARK)

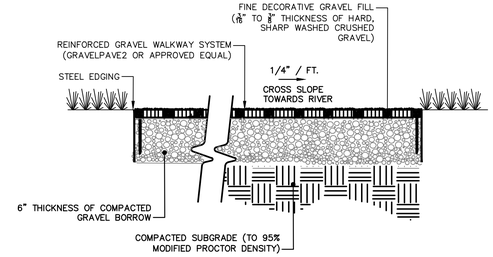
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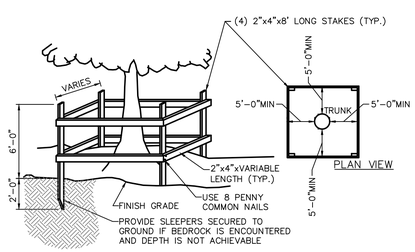
ADD ALTERNATE: TIMBER HANDRAIL (AT KAYAK/CANOE ACCESS)

NOT TO SCALE



ADD ALTERNATE: REINFORCED GRAVEL FOR WALKWAY AND GATHERING AREA

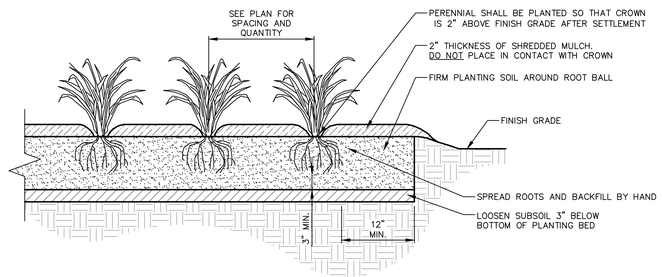
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NOTES:
SEE LANDSCAPING PLAN FOR ADDITIONAL TREE PROTECTION NOTES.

TEMPORARY TREE PROTECTION

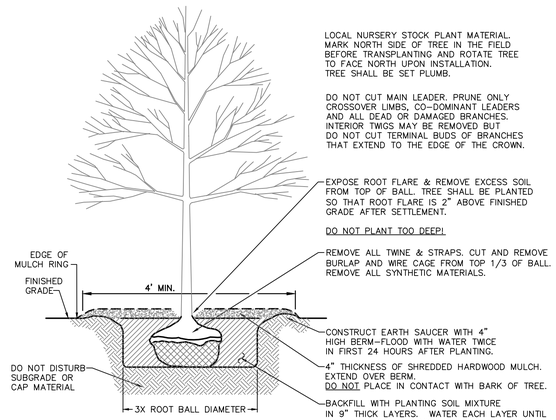
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NOTES:
- SPADED PLANTING SOIL MIX SHALL BE PLACED 3" BELOW ROOT BALL AND BE MIXED WITH FERTILIZER. DO NOT COMPACT AFTER PLANTING.
- WATER THOROUGHLY AFTER PLANTING.
- PROVIDE WELL DRAINING SUBSOIL WHEN SOIL IS HEAVY OR COMPACTED.
- FOR CONTAINER GROWN PLANTS, USE FINGERS OR SMALL HAND TOOLS TO PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER.

PERENNIAL PLANT BED

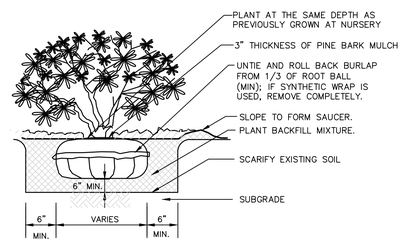
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NOTES:
1. STAKES & GUYS SHALL NOT BE USED.
2. SPRAY WITH ANTIDESICCANT IN ACCORDANCE WITH MFG'S INSTRUCTIONS IF FOLIGAE IS PRESENT.

TREE PLANTING DETAIL

NOT TO SCALE



SHRUB PLANTING

NOT TO SCALE

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COMMONWEALTH OF MASSACHUSETTS — DEAN E. AUDET — No. 45977 — REGISTERED PROFESSIONAL ENGINEER

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CITY OF HAVERHILL

CONSTRUCTION DETAILS

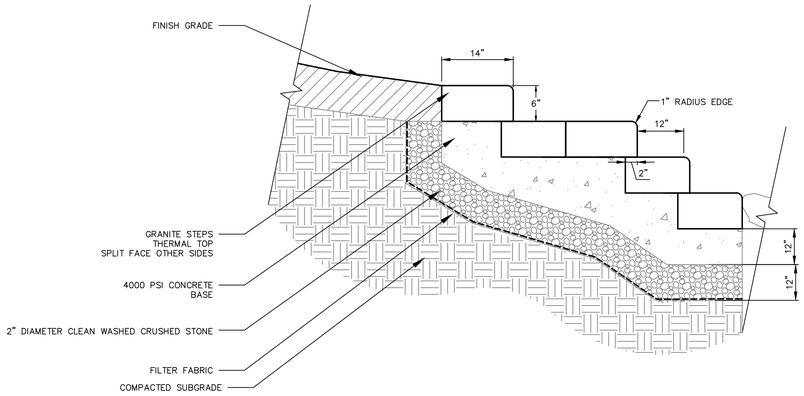
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
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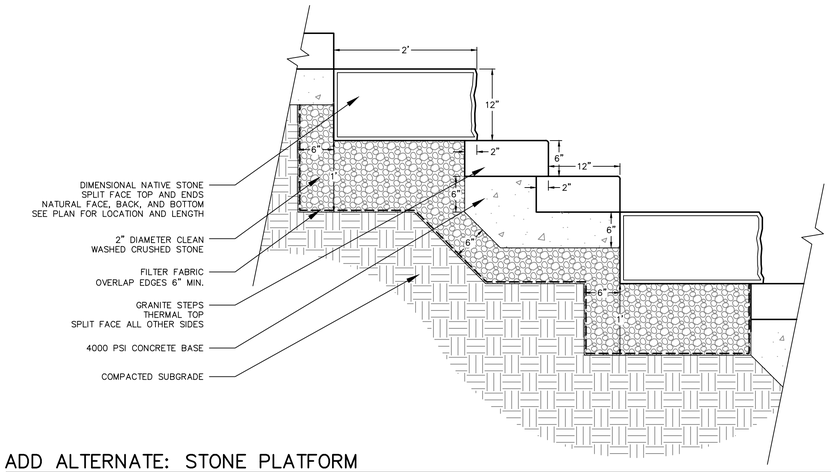
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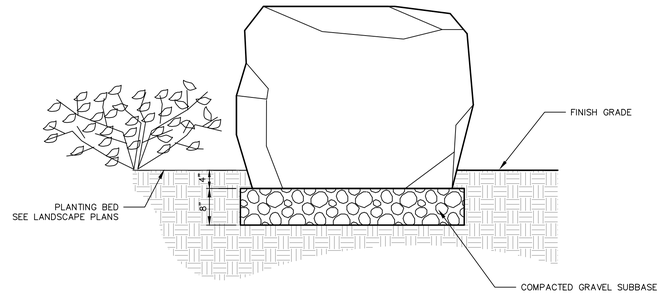
ADD ALTERNATE: GRANITE STEPS

NOT TO SCALE



ADD ALTERNATE: STONE PLATFORM

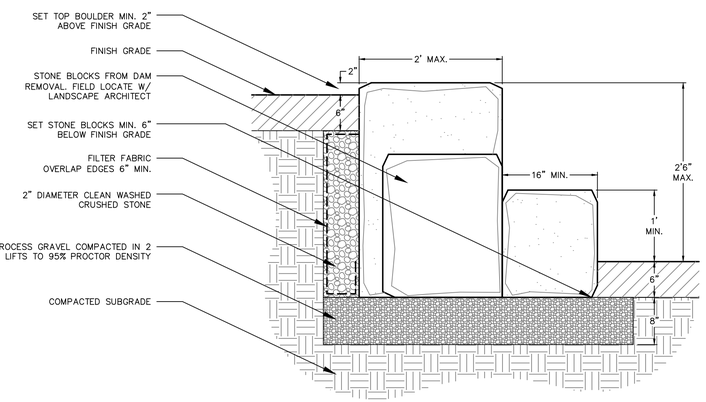
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NOTES:
1. LOCATIONS SHALL BE APPROVED BY ENGINEER / LANDSCAPE ARCHITECT IN THE FIELD.

ADD ALTERNATE: SALVAGED BOULDER

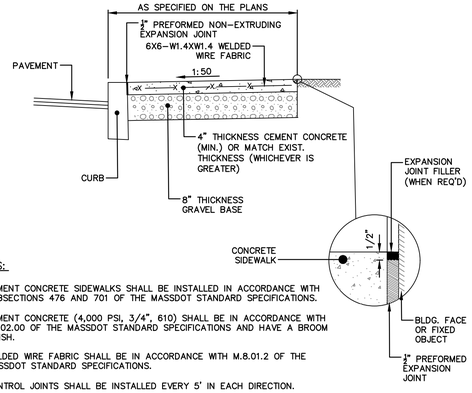
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NOTE: LOCATIONS SHALL BE APPROVED BY ENGINEER OR LANDSCAPE ARCHITECT IN THE FIELD

ADD ALTERNATE: STACKED STONE BLOCKS

NOT TO SCALE

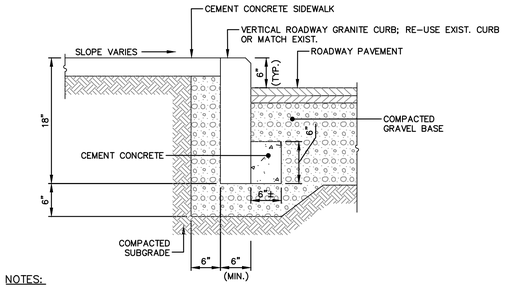


NOTES:

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 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 PREMOLDED 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 M9.04.1, M9.04.5, AND M9.04.6 OF THE MASSDOT STANDARD SPECIFICATIONS, RESPECTIVELY.
3. CEMENT CONCRETE (3,000 PSI, 3/4", 520) 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

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DEAN E. ANDERSON
No. 45977
REGISTERED PROFESSIONAL ENGINEER

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CITY OF HAVERHILL

CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

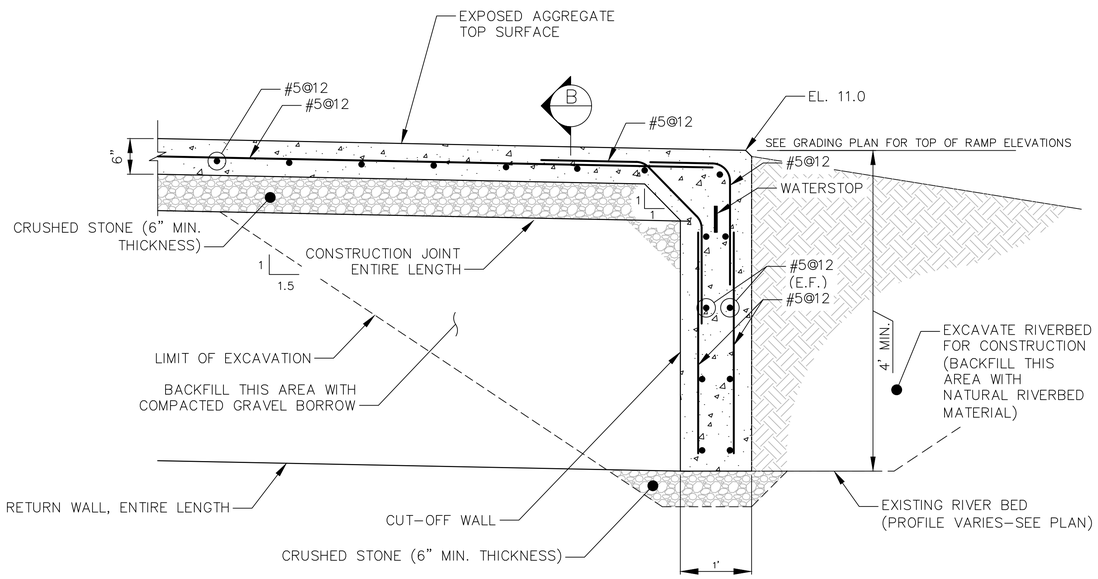
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DATE: DECEMBER 16, 2024

CD-503

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_DET01.dwg Layout: CD-503 Plotted: 2024-12-16 12:04 PM Saved: 2024-12-11 3:40 PM User: claire.nauman
PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

CONCRETE NOTES:

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 IN 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 KEYED 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 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.

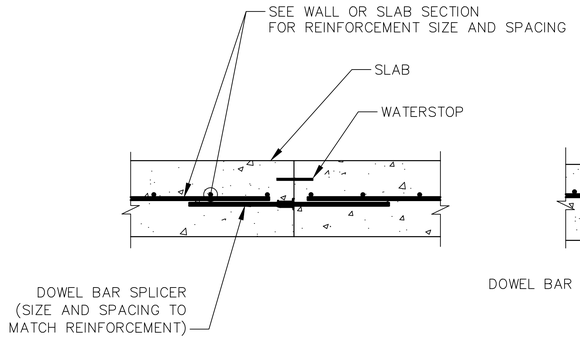


A ADD ALTERNATE: EXPOSED AGGREGATE LAUNCH

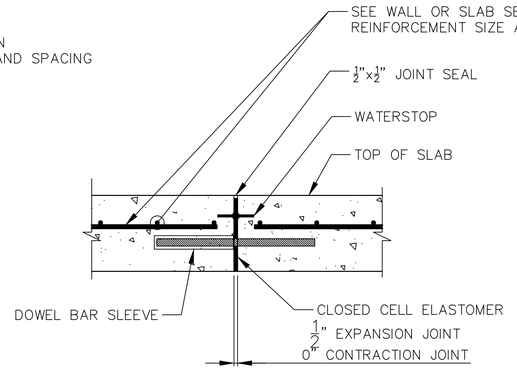
SCALE: NOT TO SCALE

NOTES:

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 $\frac{3}{4}$"ø 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 $\frac{1}{2}$" CLOSED CELL ELASTOMER AND A $\frac{1}{2}$"x$\frac{1}{2}$" JOINT SEAL. CONTRACTION JOINTS SHALL USE ONLY A $\frac{1}{2}$"x$\frac{1}{2}$" 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 6". EXPANSION AND CONTRACTION JOINTS SHALL USE A WATERSTOP WITH A CENTER BULB TO ALLOW FOR MOVEMENT.



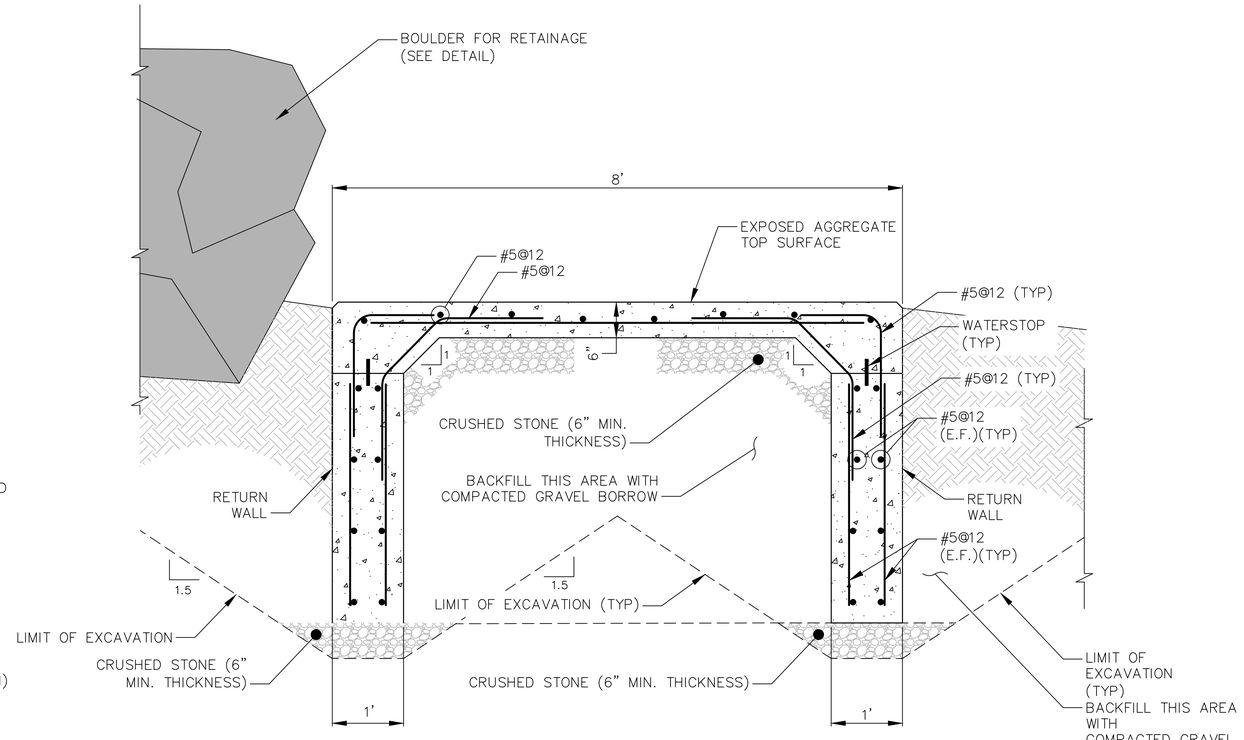
CONSTRUCTION JOINT



SLAB EXPANSION/CONTRACTION JOINT

JOINT DETAILS

NOT TO SCALE



B ADD ALTERNATE: SECTION THROUGH RETURN WALLS

SCALE: NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

COMMONWEALTH OF MASSACHUSETTS
JASON J. LEDOUX
CIVIL
No. 58868
PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
1 0 1
GRAPHIC SCALE

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

CITY OF HAVERHILL

CONSTRUCTION DETAILS

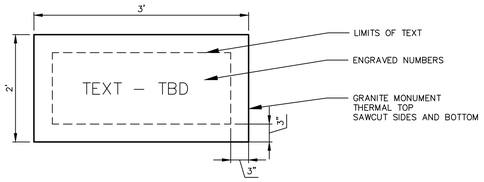
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

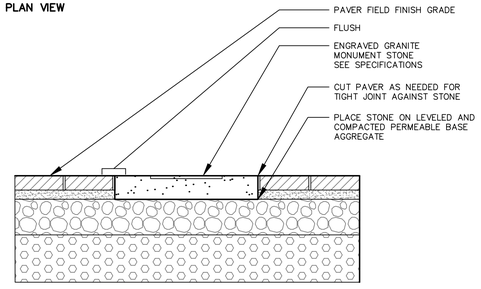
PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

CD-504

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MS VIEW:

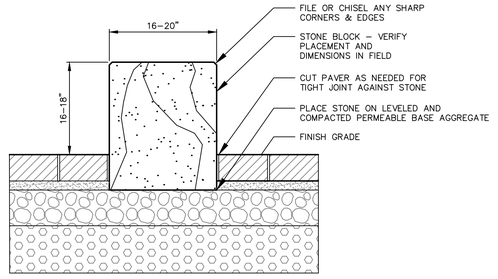


PLAN VIEW



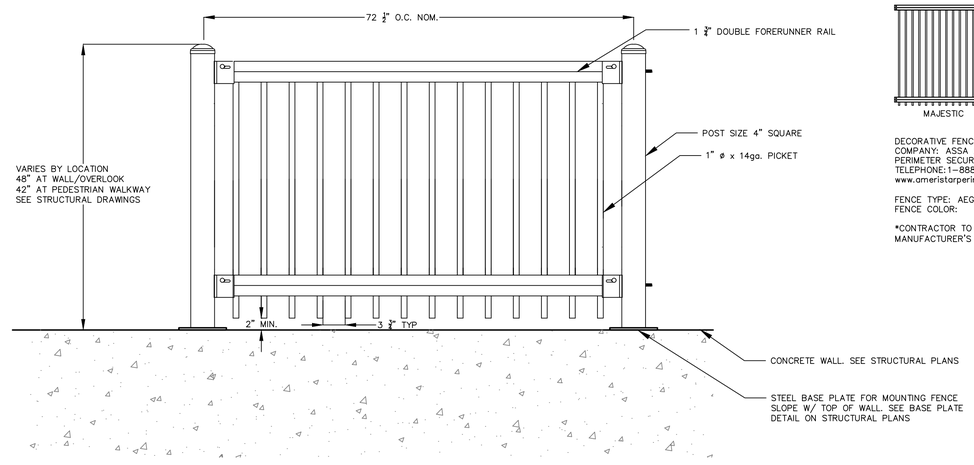
ADD ALTERNATE: ENGRAVED GRANITE MONUMENT STONE

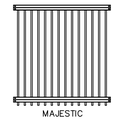
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ADD ALTERNATE: MONOLITHIC GRANITE STONE BENCH IN PERMEABLE PAVERS

SCALE: NOT TO SCALE





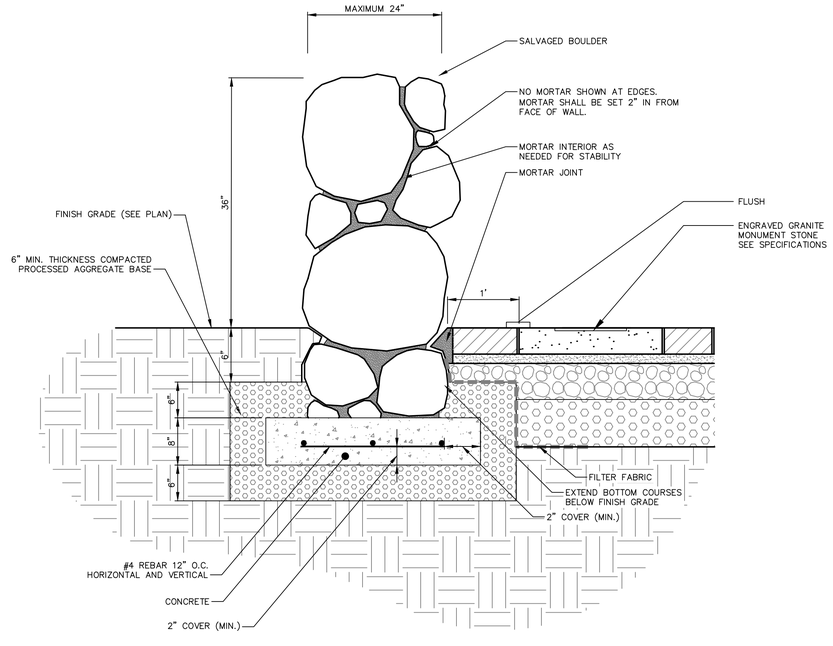
DECORATIVE FENCE
COMPANY: ASSA ABLOY, AMERISTAR PERIMETER SECURITY USA INC.
TELEPHONE: 1–888–333–3422
www.ameristarperimeter.com

FENCE TYPE: AEGIS II ®XTREME 6'W
FENCE COLOR:

*CONTRACTOR TO INSTALL PRODUCT PER MANUFACTURER'S RECOMMENDATIONS

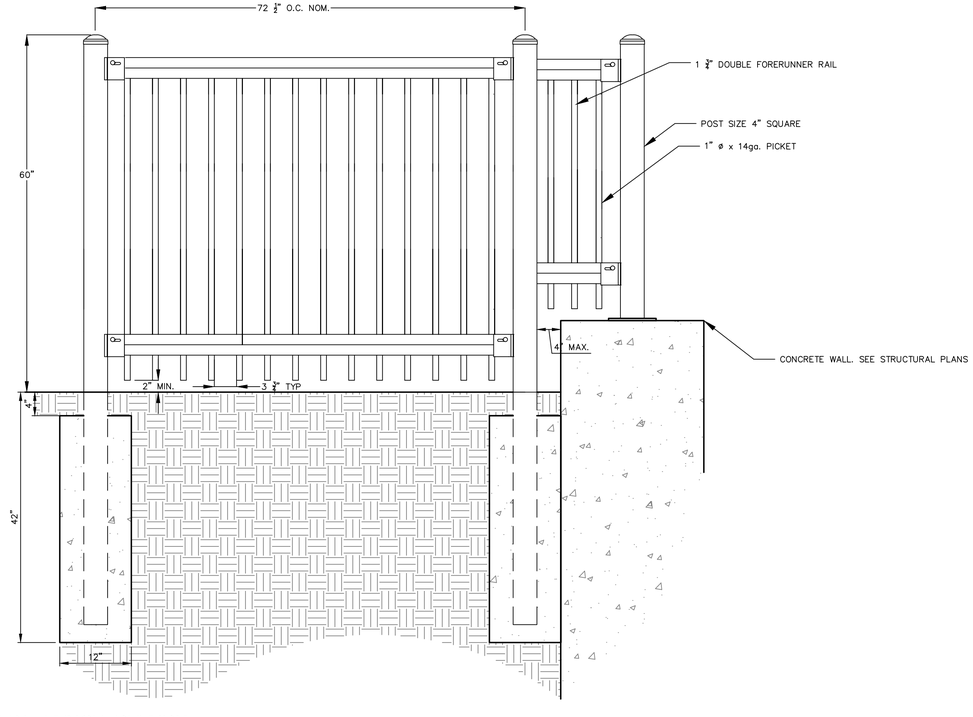
DECORATIVE METAL FENCE

SCALE: NOT TO SCALE



ADD ALTERNATE: SALVAGED STONE WALL AND GRANITE MONUMENT STONE

NOT TO SCALE



DECORATIVE METAL FENCE RETURN

SCALE: NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE A. MORTL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
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FUSS & O'NEILL
1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
www.fando.com

CITY OF HAVERHILL

CONSTRUCTION DETAILS

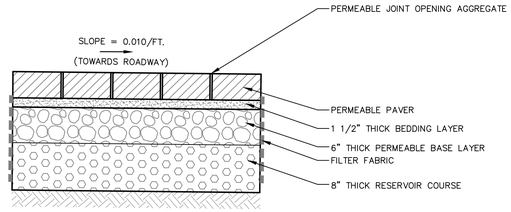
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CD-505

File: J:\DWG\P20170390U30\Civil\Plan\20170390U30_DET01.dwg Layout: CD-505 Plotted: 2024-12-11 4:24 PM Saved: 2024-12-11 3:40 PM User: claire.nauman
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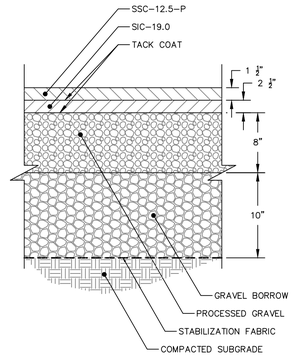


NOTES:

1. THICKNESS OF PERMEABLE CONCRETE PAVERS SHALL VARY BASED ON PRODUCT AND MANUFACTURER SELECTED.
2. THE MINIMUM THICKNESSES OF THE BEDDING LAYER, PERMEABLE BASE LAYER, AND RESERVOIR COURSE LAYER AS SPECIFIED ABOVE REPRESENT MINIMUM THICKNESSES AFTER COMPACTION.
3. PROTECT PERMEABLE PAVERS AND AGGREGATES FROM CONSTRUCTION VEHICLE TRAFFIC, RUNOFF FROM ADJACENT AREAS, AND SEDIMENTATION.

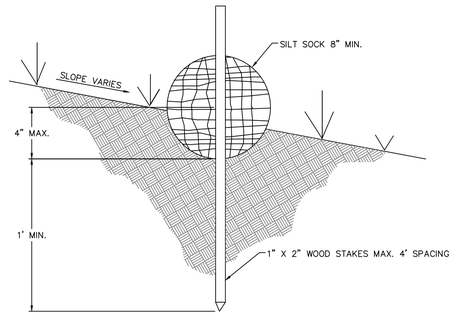
ADD ALTERNATE: PERMEABLE PAVER SYSTEM

NOT TO SCALE



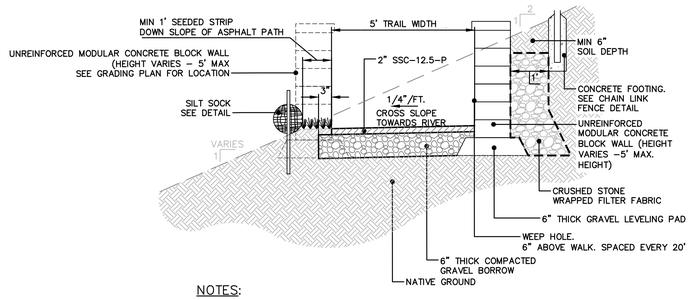
FULL DEPTH ASPHALT PAVEMENT

NOT TO SCALE



ADD ALTERNATE: SILT SOCK ENTRENCHMENT DETAIL

NOT TO SCALE

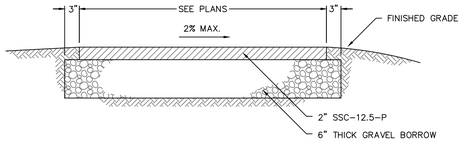


NOTES:

1. ALIGNMENT OF TRAIL MAY VARY SLIGHTLY WITHIN LIMIT OF DISTURBANCE (AS FIELD DIRECTED BY ENGINEER OR LANDSCAPE ARCHITECT).
2. PROVIDE MODULAR BLOCK WALL SHOP DRAWINGS FOR APPROVAL. TO BE SIGNED AND SEALED BY MA LICENSED ENGINEER.
3. REPLACE FILTER SOCK AND HYDROSEED STRIP WITH 6" THICKNESS OF PROCESSED GRAVEL ON EITHER SIDE OF HEADWALL AS SHOWN ON SITE LAYOUT AND GRADING PLAN AT RIVER STATION 43+50.

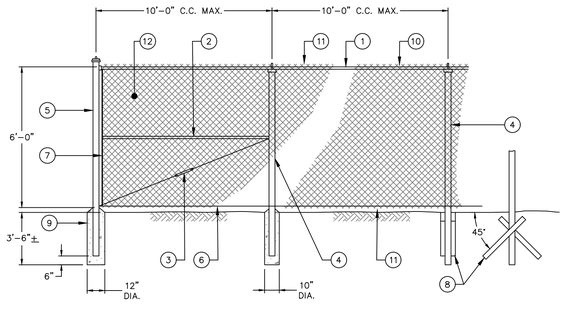
ADD ALTERNATE: ASPHALT WALKING TRAIL WITH SILT SOCK

NOT TO SCALE



ADD ALTERNATE: ASPHALT WALKING TRAIL TO PEDESTRIAN BRIDGE

NOT TO SCALE



ELEVATION

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

1. 1 5/8" O.D. TOP RAIL ATTACH FABRIC WITH 9 GUAGE WIRE CLIP EVERY 24"
2. 1 5/8" O.D. BRACE FOR RAIL FENCES OVER 6 FEET HIGH AND ALL FENCES WITHOUT TOP RAIL
3. 5/16" TRUSS ROD AND TURNBUCKLE
4. INTERMEDIATE POST

FENCE HEIGHT	SQUARE POST	ROUND POST
6' AND LESS	1 7/8"	2"
OVER 6'	2 1/4"	2 1/2"

ATTACH TO C.L. FABRIC WITH CLIPS EVERY 15"

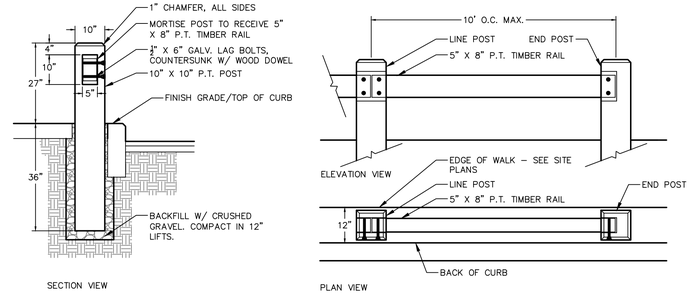
5. END OR CORNER POST

FENCE HEIGHT	SQUARE POST	ROUND POST
6' AND LESS	2"	2 1/2"
OVER 6'	2 1/2"	3"

6. 6 GAUGE BOTTOM TENSION WIRE ATTACH TO FABRIC WITH HOG RING AT 24" C.C.
7. TENSION ROD ATTACHED TO END OR CORNER POST
8. FOR COMPACT SOIL CONDITIONS, TWO 30" MIN. LENGTH DRIVE ANCHORS DRIVEN THROUGH FITTINGS AT 90° TO FENCE LINE INTO EARTH AT 45° (TO BE USED IN PLACE OF CONCRETE FOOTING).
9. CONCRETE FOOTING 42" DEEP WITH 12" DIA. AT END POST AND 10" DIA. AT INTERMEDIATE POST. HOLE CORE IN UNDISTURBED OR COMPACTED SOIL. (SEE NOTE NO. 1)
10. 6 GAUGE TENSION WIRE WHEN TOP RAIL IS NOT USED.
11. FABRIC SELVAGE:
    UNDER 6' SHALL BE KNUCKLED TOP AND BOTTOM
    6' AND OVER SHALL BE KNUCKLED BOTTOM AND TWISTED ON THE TOP
    RECREATIONAL FENCING, REGARDLESS OF HEIGHT, SHALL BE KNUCKLED TOP AND BOTTOM
12. 9 GAUGE 2" WIRE MESH FABRIC (COMMERCIAL) BLACK VINYL COATED.

CHAIN LINK FENCE

NOT TO SCALE



ADD ALTERNATE: WOOD GUARDRAIL

SCALE: NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
1 0 1
GRAPHIC SCALE

FUSS & O'NEILL
1550 MAIN STREET, SUITE 400
SPRINGFIELD, MA 01103
413.452.0445
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CITY OF HAVERHILL

CONSTRUCTION DETAILS

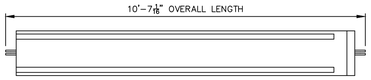
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

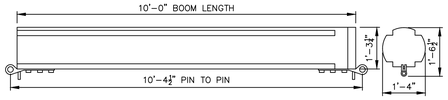
PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

CD-506

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MS VIEW:

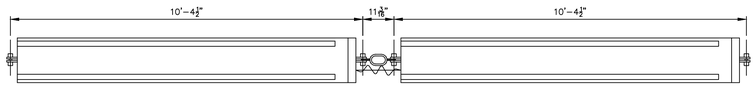


PLAN

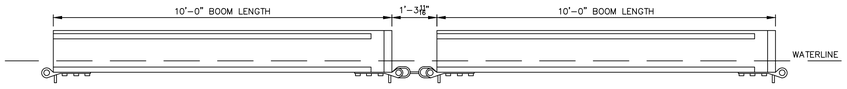


BOOM ELEVATION END

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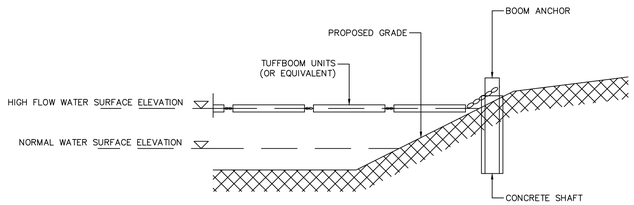


PLAN



BOOM CONNECTIONS ELEVATION

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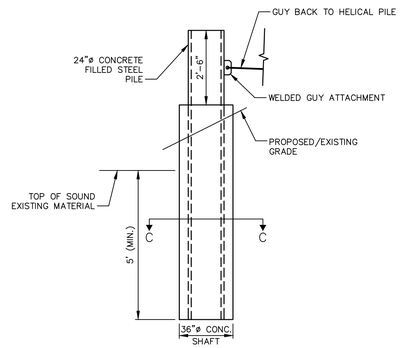


NOTES:

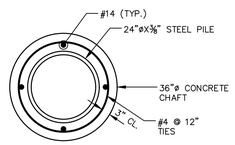
1. FLOATING SAFETY BOOM SHALL BE TUFFBOOM BY WORTHINGTON WATERWAY BARRIERS, OR EQUIVALENT. CONTRACTOR SHALL PURSUE TIER ONE DESIGN WITH WORTHINGTON USING DESIGN PARAMETERS PROVIDED IN SPECIFICATIONS TO DETERMINE REQUIRED BOOM TENSION.
2. THE BOOM SHALL BE SUPPLIED WITH ALL COMPONENTS REQUIRED TO COMPLETE 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

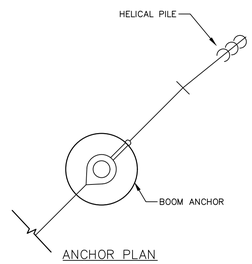
NOT TO SCALE



BOOM ANCHOR ELEVATION

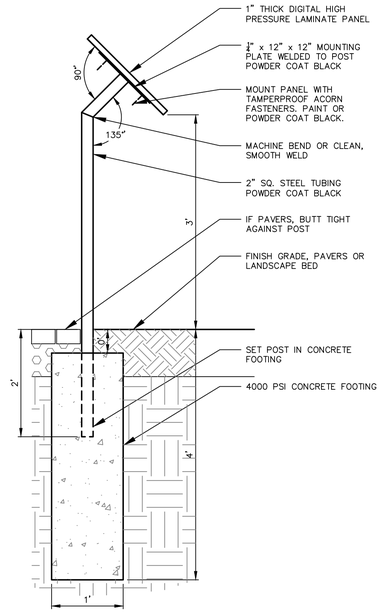


SECTION C – C



ANCHOR PLAN

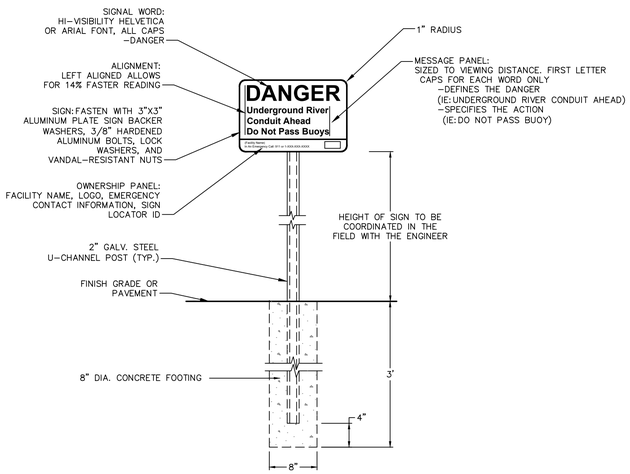




NOTES:
GRAPHIC TO BE PROVIDED BY DESIGNER.
GRAPHIC TO BE APPROVED BY OWNER BEFORE INSTALLATION.
SEE LAYOUT PLAN FOR LOCATIONS.

INTERPRETIVE SIGN

SCALE: NOT TO SCALE



DANGER SIGN

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE A. MIDDLETON
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
1 0 1
GRAPHIC SCALE

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

CITY OF HAVERHILL

CONSTRUCTION DETAILS

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

CD-507

File: J:\DWG\P2017\0390\U30\Civil\Plan\20170390U30_DET01.dwg Layout: CD-507 Plotted: 2024-12-11 4:26 PM Saved: 2024-12-11 3:40 PM User: claire.nauman
PC3: NONE STB/CTB: FO.STB
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MS VIEW:

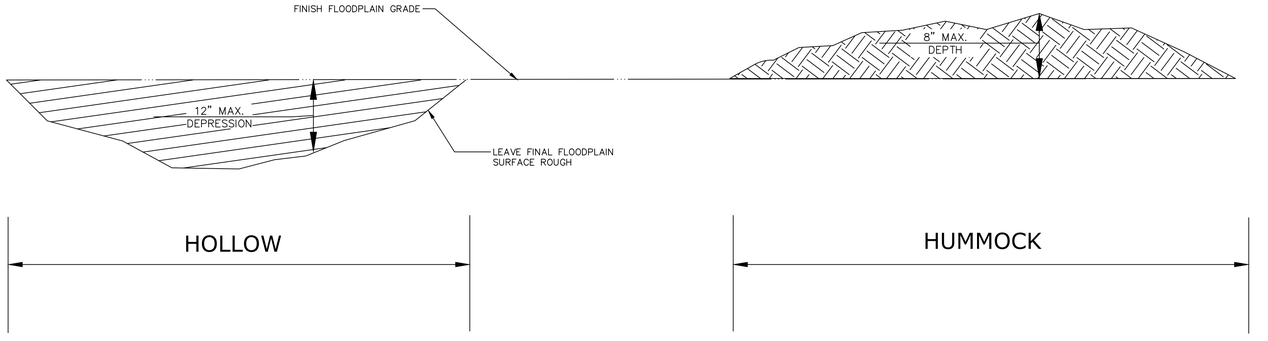


NOTES:

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

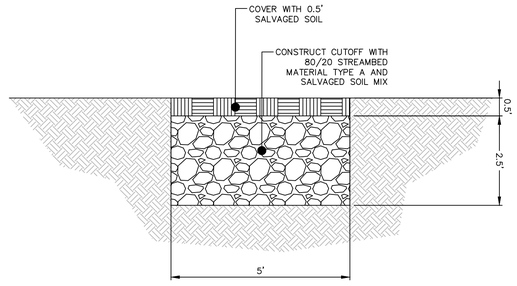
ADD ALTERNATE: TRAIL CROSSING FOR STORMWATER OUTFALL GENERAL CONFIGURATION AND STYLE

NOT TO SCALE



FLOODPLAIN MICROTOPOGRAPHY

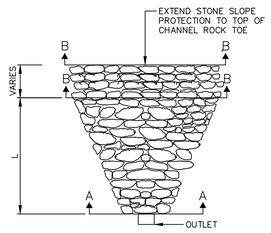
SCALE: N.T.S.



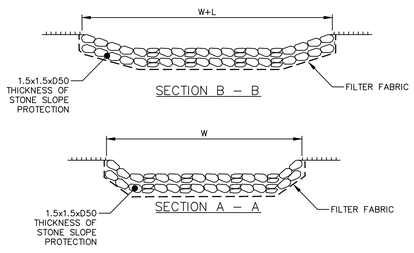
FLOODPLAIN CUTOFF

NOT TO SCALE

SCOUR PROTECTION DIMENSIONS				
OUTLET DIAMETER/WIDTH	W	L	D50	FHWA CLASS RIPRAP
8"	3'	17'	6"	I
12"	5'	17'	6"	I
24"	6'	28'	12"	III
36"	9'	40'	18"	IV



PLAN

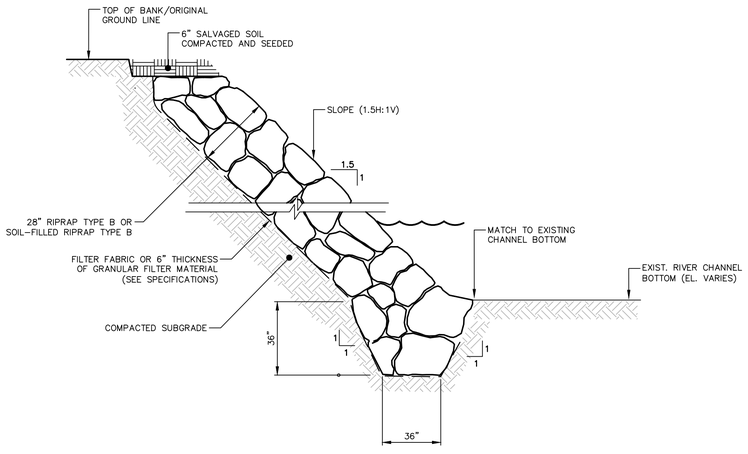


NOTES:

1. REFER TO SCOUR PROTECTION DIMENSIONS TABLE ABOVE FOR FEDERAL HIGHWAY ADMINISTRATION (FHWA) CLASS RIPRAP TO BE USED.
2. DIMENSIONS MAY BE MODIFIED BY ENGINEER TO MEET FIELD CONDITIONS.

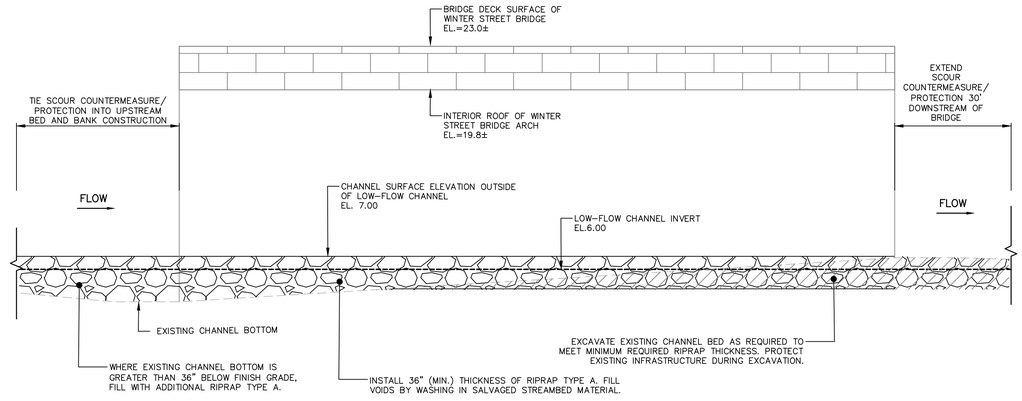
OUTFALL SCOUR PROTECTION

NOT TO SCALE



RIPRAP SLOPE PROTECTION

NOT TO SCALE



WINTER STREET BRIDGE SCOUR COUNTERMEASURE/PROTECTION

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

COMMONWEALTH OF MASSACHUSETTS
DEANE A. AUDET
CIVIL
No. 45977
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
1 0 1
GRAPHIC SCALE

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

CITY OF HAVERHILL

CONSTRUCTION DETAILS

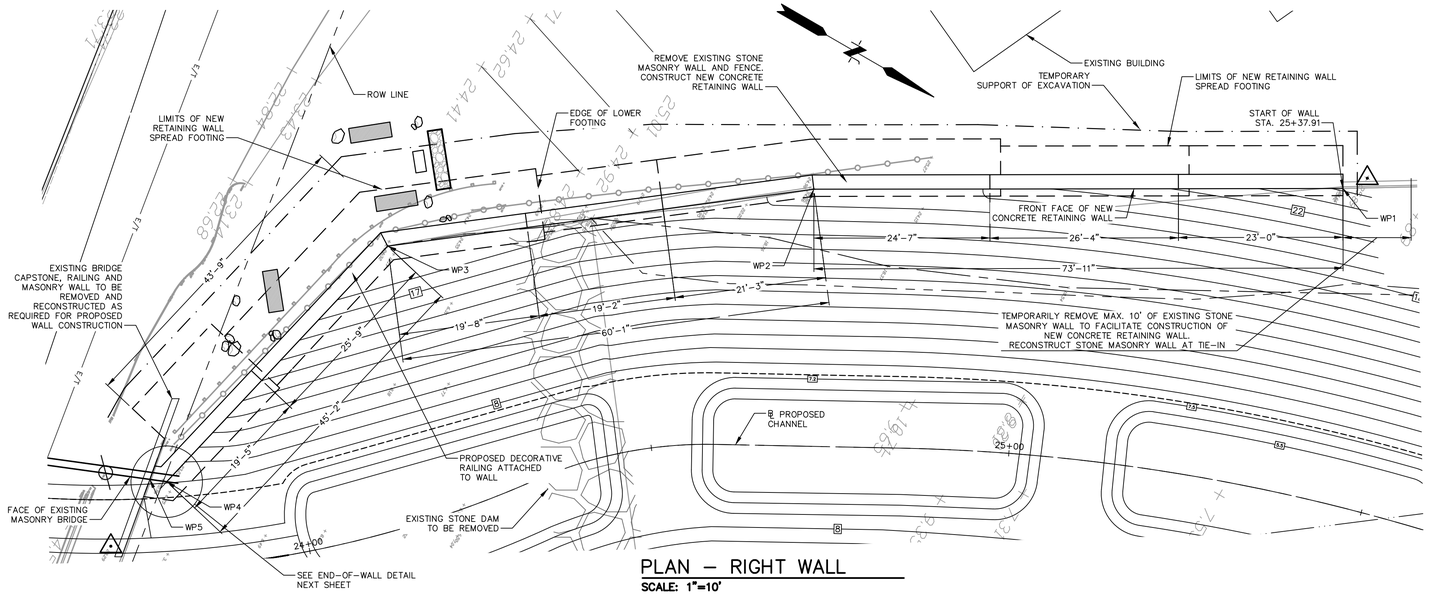
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

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

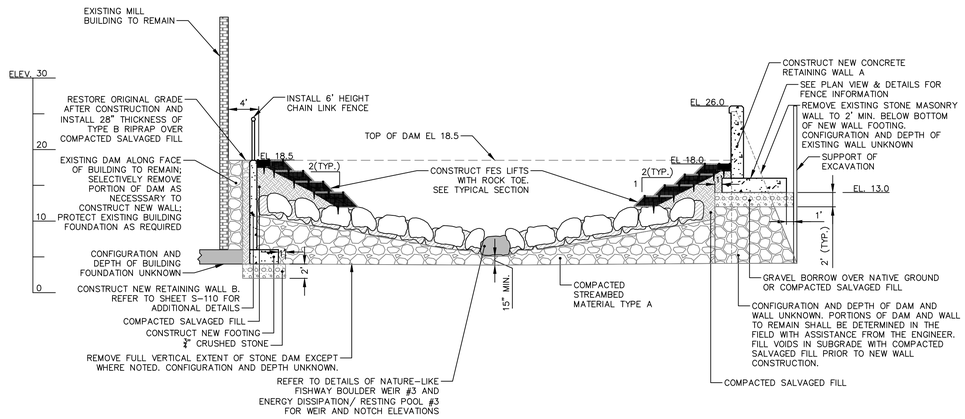
CD-508

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LAYER STATE:
MS VIEW:



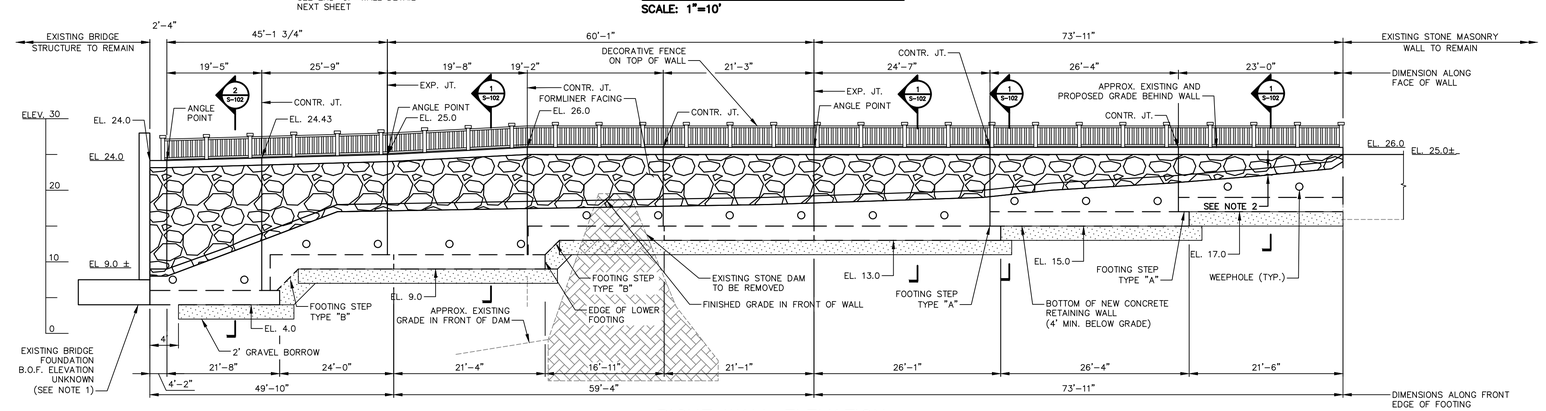
PLAN – RIGHT WALL

SCALE: 1"=10'



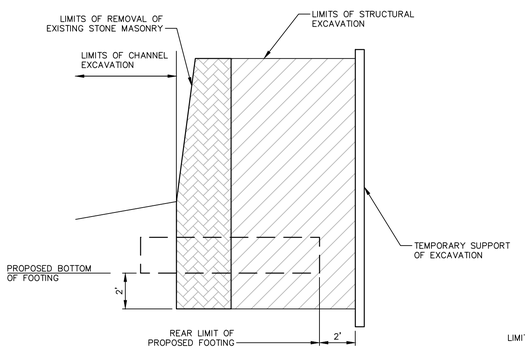
CHANNEL SECTION AT DAM (LOOKING DOWNSTREAM)

SCALE: 1"=10'



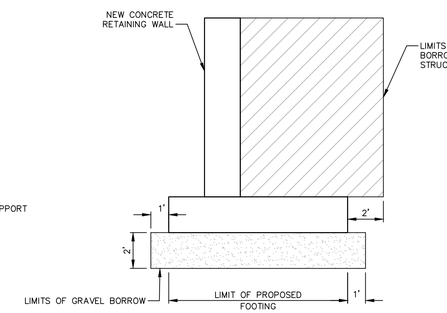
RIGHT WALL ELEVATION

SCALE: 1"=10'



PAY LIMITS – DEMO

SCALE: NTS



PAY LIMITS – PROPOSED

SCALE: NTS

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

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 KEYED 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

SEAL

COMMONWEALTH OF MASSACHUSETTS
JASON J. LEDOUX
CIVIL
No. 58868
PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.:
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

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

CITY OF HAVERHILL

RETAINING WALL A PLAN AND ELEVATION

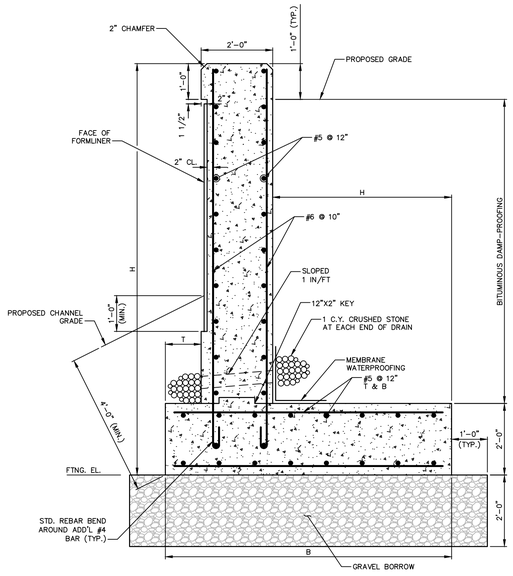
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 6, 2026

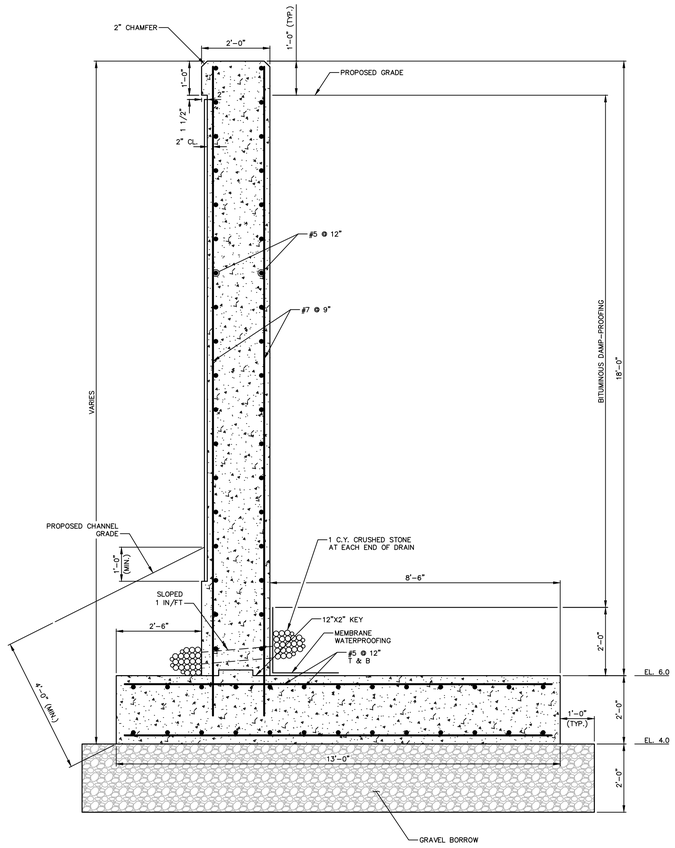
S-101

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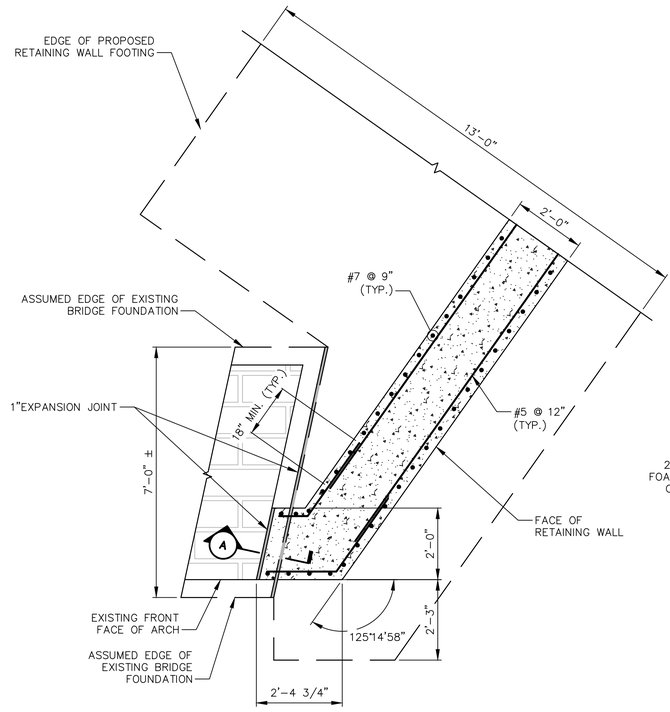


1 SECTION
1/2" = 1'-0"

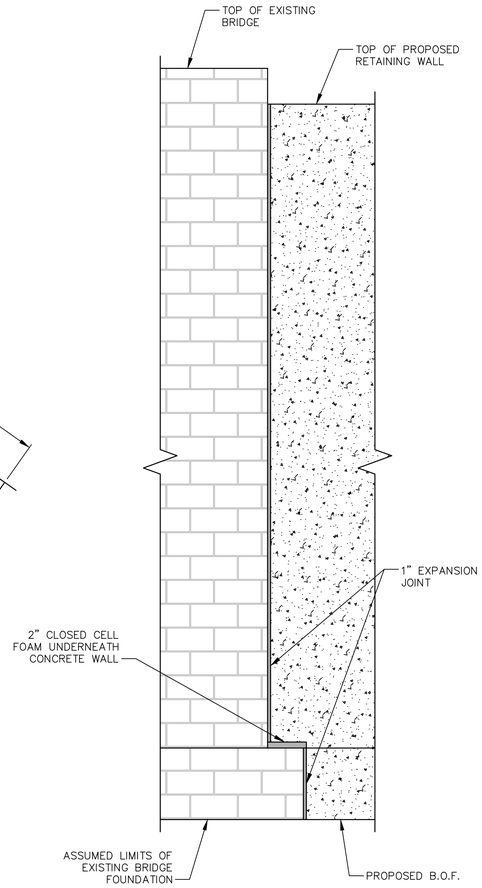
SECTION 1 RETAINING WALL DIMENSIONS BASED ON BOTTOM OF FOOTING ELEVATION AND WALL HEIGHT			
FTNG. EL.	H	B	T
17.0	9'-0"	7'-0"	1'-0"
15.0	11'-0"	7'-0"	1'-0"
13.0	13'-0"	8'-0"	1'-0"
9.0	VARIES (17'-0" MAX)	10'-0"	2'-0"



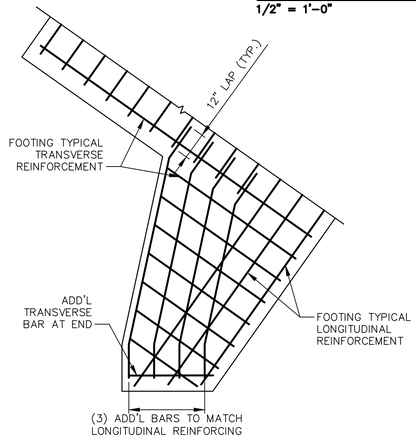
2 SECTION
1/2" = 1'-0"



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:

1. 4" DIA. WEEP 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 WEEP HOLE.
2. 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.
3. MAXIMUM SERVICE BEARING PRESSURE = 4.20 KSF.
4. 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
####	####	####	####	####

SEAL
COMMONWEALTH OF MASSACHUSETTS
JASON J. LEDOUX
CIVIL
No. 58868
PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
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0
GRAPHIC SCALE

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

CITY OF HAVERHILL

RETAINING WALL A SECTION AND DETAILS

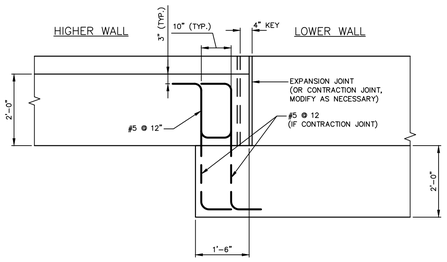
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

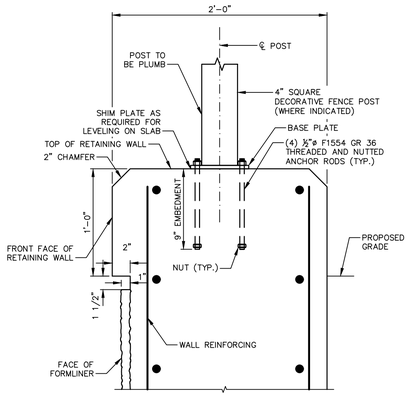
PROJ. No.: 20170390.U40
DATE: FEBRUARY 6, 2026

S-102

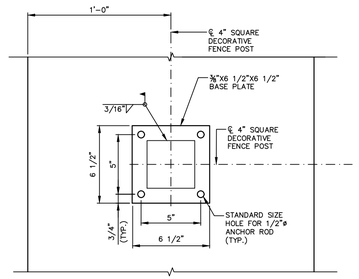
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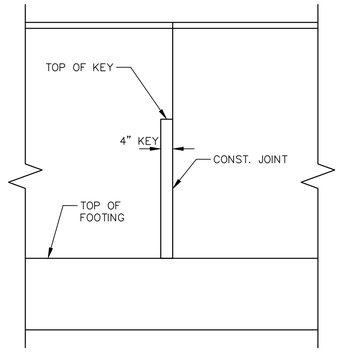
FOOTING STEP TYPE "A"
1/2" = 1'-0"



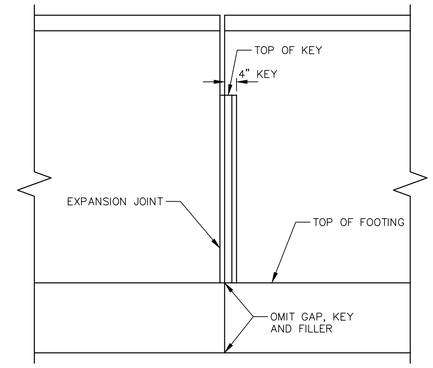
COPING DETAIL
1 1/2" = 1'-0"



BASE PLATE DETAIL
2" = 1'-0"

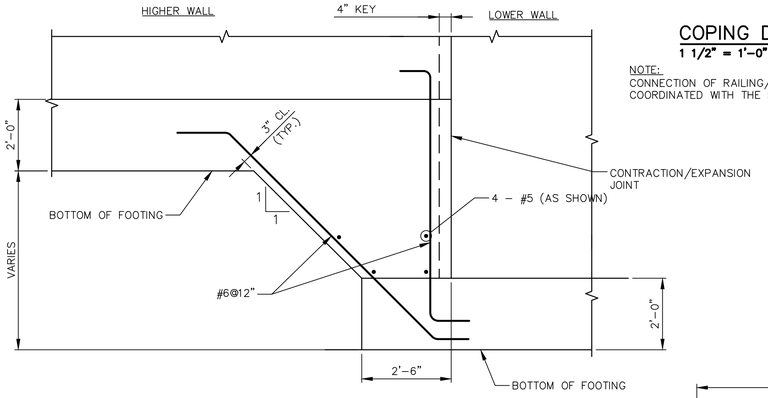


CONTRACTION JOINT ELEVATION
1/2" = 1'-0"

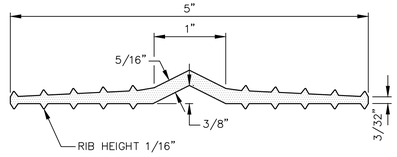


EXPANSION JOINT ELEVATION
1/2" = 1'-0"

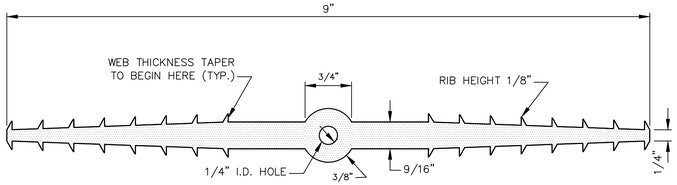
NOTE:
CONNECTION OF RAILING/FENCE AS SHOWN IS GENERIC OR FOR VISUAL REPRESENTATION. ACTUAL ATTACHMENT TO BE COORDINATED WITH THE FENCING MANUFACTURER TO FIT THE ACTUAL PRODUCT.



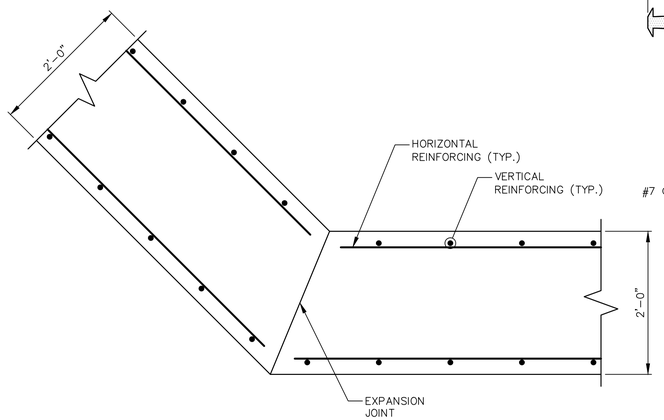
FOOTING STEP TYPE "B"
1/2" = 1'-0"



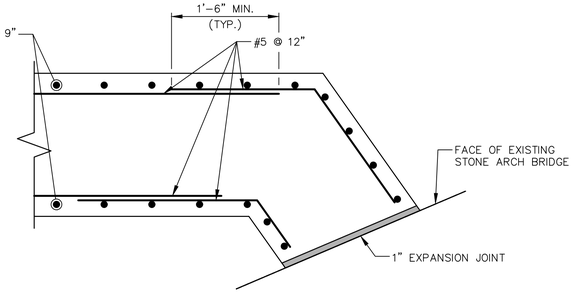
5" WATERSTOP
N.T.S



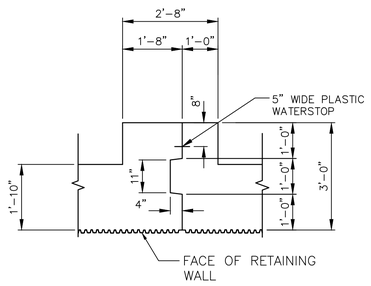
9" WATERSTOP
N.T.S



WALL REINFORCING AT CORNER DETAIL
1" = 1'-0"

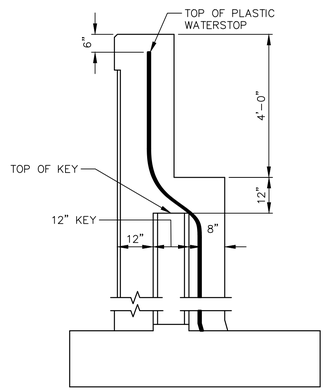


WALL REINFORCING AT END DETAIL
1" = 1'-0"



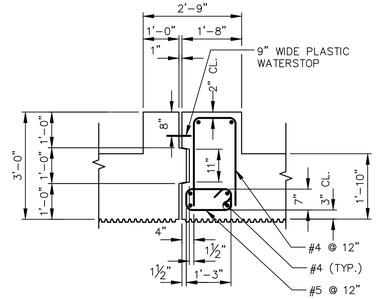
CONTRACTION JOINT DETAILS
1/2" = 1'-0"

NOTE:
TYPICAL REINFORCEMENT NOT SHOWN FOR CLARITY



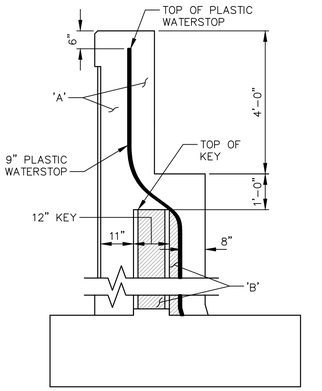
CONTRACTION JOINT DETAILS
1/2" = 1'-0"

NOTE:
REINFORCEMENT SHALL END 2" CLEAR OF CONTRACTION JOINT.



EXPANSION JOINT DETAILS
1/2" = 1'-0"

NOTE:
1. INCLUDE EXTRA REINFORCEMENT FOR WALLS 13'-6" OR MORE IN HEIGHT.
2. TYPICAL REINFORCEMENT NOT SHOWN FOR CLARITY



EXPANSION JOINT DETAILS
1/2" = 1'-0"

NOTES:
1. LONGITUDINAL REINFORCMENT SHALL END 2" CLEAR OF EXPANSION JOINT.
2. 'A' – PREFORMED FILLER (IN ACCORDANCE WITH M9.14.0).
   'B' – PREFORMED FILLER (IN ACCORDANCE WITH M3.05.3 BITUMINOUS JOINT FILLER).
3. FILLER MATERIAL SHALL BE FASTENED SECURELY TO ONE SIDE OF JOINT.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
####	####	####	####	####
####	####	####	####	####
####	####	####	####	####
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####	####	####	####	####
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SEAL
COMMONWEALTH OF MASSACHUSETTS
JASON J. LEDOUX
CIVIL
No. 58868
PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

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CITY OF HAVERHILL

RETAINING WALL A MISC. DETAILS

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

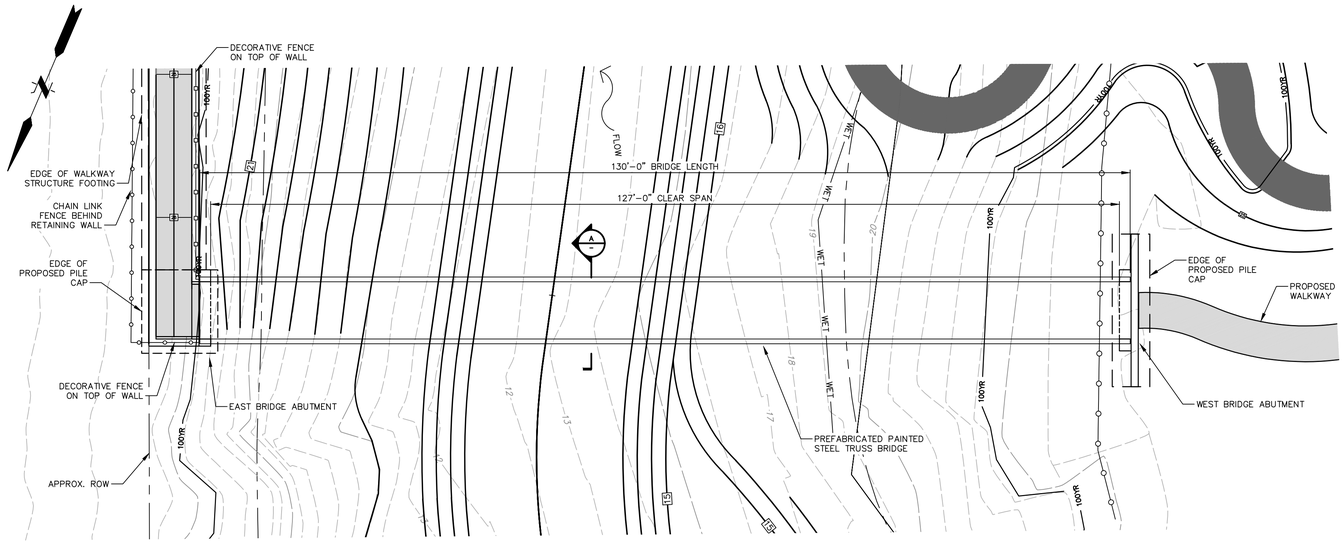
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 6, 2026

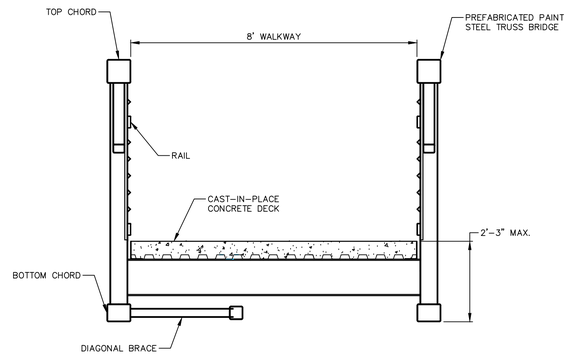
S-103

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

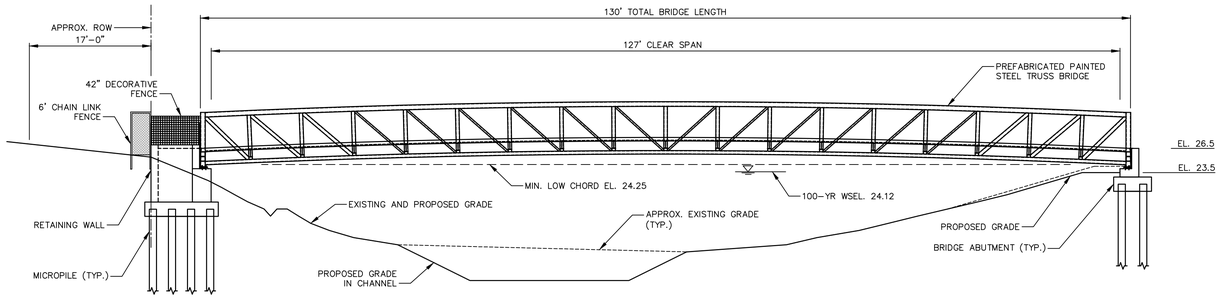
MBTA RAILROAD



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), fy = 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 ACCOMODATE 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 FOLLOWIGN 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

SEAL

SEAL

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

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CITY OF HAVERHILL

ADD ALTERNATE: PEDESTRIAN BRIDGE PLAN AND ELEVATION

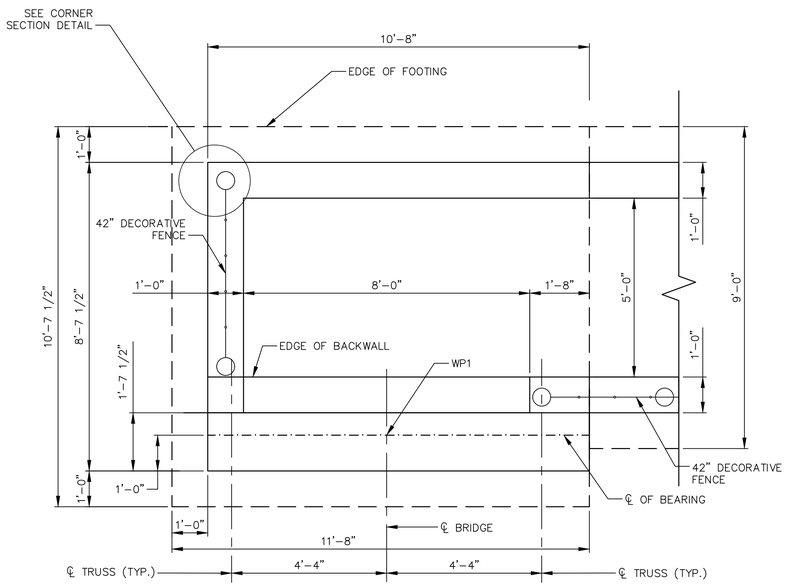
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

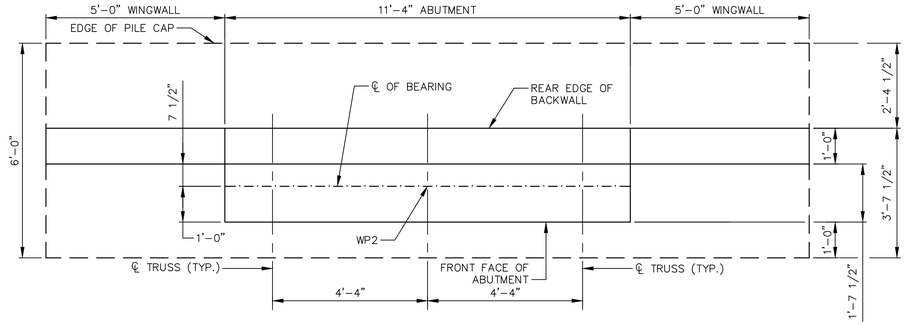
PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

S-104

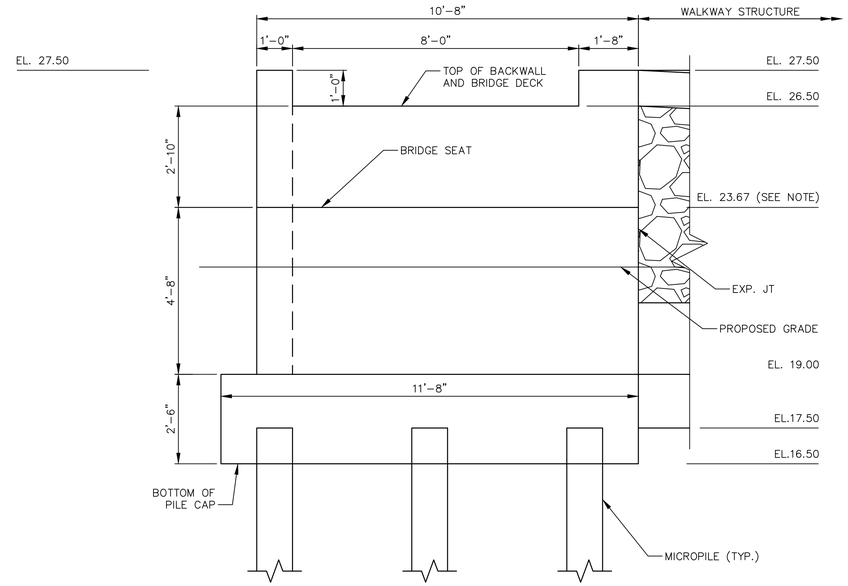
File: J:\DWG\P2017\03390\U30\Structural\20170390U30_BRIDGE_PLAN_ELEVATION.dwg Layout: S-104 Plotted: 2024-12-11 4:31 PM Saved: 2024-11-26 6:44 PM Usr: claire.nauman
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:



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

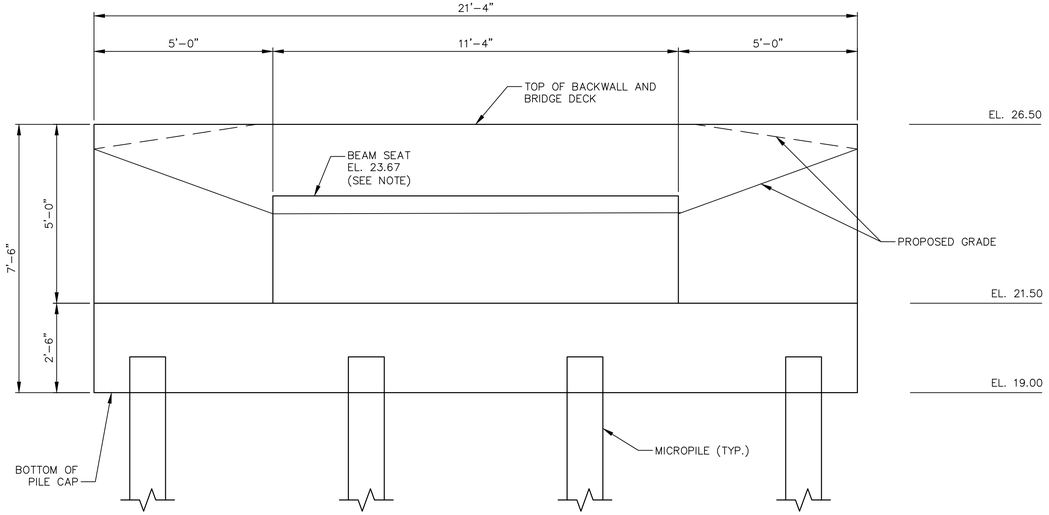


WEST ABUTMENT PLAN
1/2" = 1'-0"



NOTE: BEAM SEAT ELEVATION IS BASED ON A DISTANCE FROM TOP OF BRIDGE DECK TO BOTTOM OF BEARING OF 2'-10". THIS ELEVATION SHALL BE ADJUSTED AS NEEDED TO ALIGN WITH THE FINAL PEDESTRIAN BRIDGE DIMENSIONS AND BEARING DETAILS.

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



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

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
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SEAL

COMMONWEALTH OF MASSACHUSETTS
STUART R. [illegible]
No. [illegible]
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

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ADD ALTERNATE: ABUTMENT PLAN AND ELEVATION

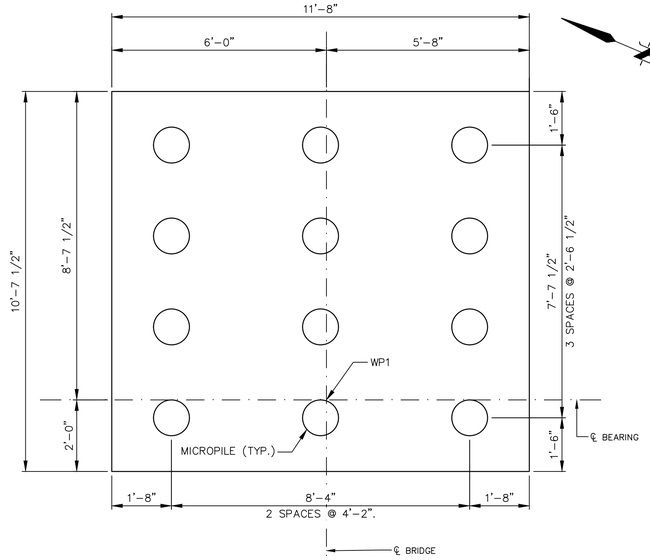
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

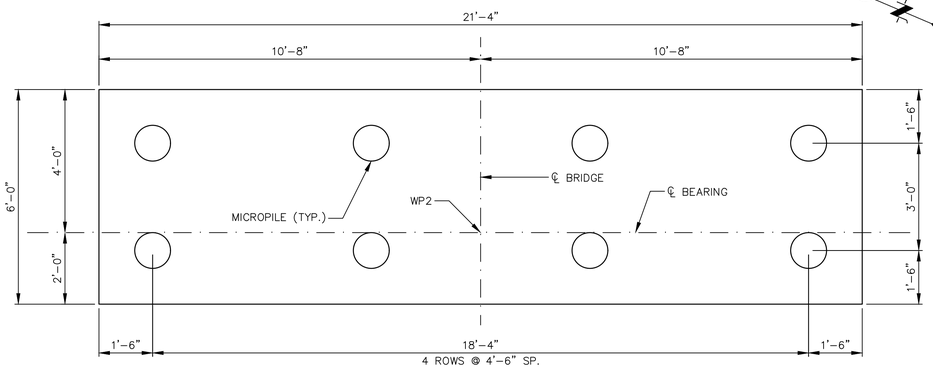
PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

S-105

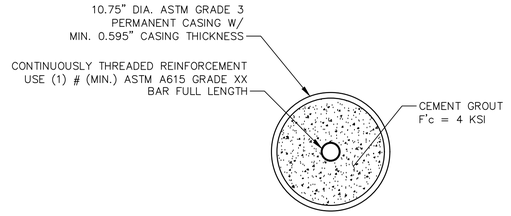
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MS VIEW:



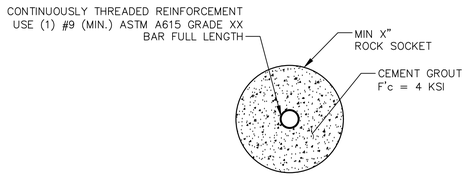
EAST ABUTMENT MICROPILE LAYOUT
1/2" = 1'–0"



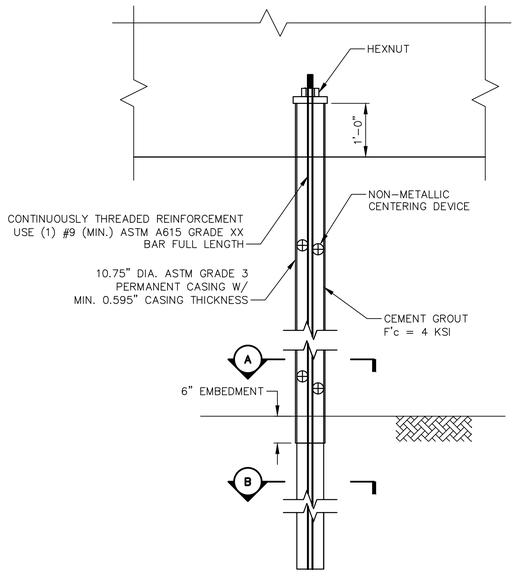
WEST ABUTMENT MICROPILE LAYOUT
1/2" = 1'–0"



SECTION A
3" = 1'–0"



SECTION B
3" = 1'–0"



TYPICAL MICROPILE DETAILS
3/4" = 1'–0"

MICROPILE DESIGN TABLE EAST ABUTMENT	
NOMINAL PILE RESISTANCE	126.7
RESISTANCE FACTOR	0.55
FACTORED PILE RESISTANCE	69.7

MICROPILE DESIGN TABLE WEST ABUTMENT	
NOMINAL PILE RESISTANCE	126.7
RESISTANCE FACTOR	0.55
FACTORED PILE RESISTANCE	69.7

PEDESTRIAN BRIDGE REACTION LOADINGS:

ABUTMENTS WERE DESIGNED BASED ON THE FOLLOWING MAXIMUM VERTICAL REACTIONS (MAX VERTICAL PER SUBSTRUCTURE UNIT):

DEAD LOAD (DC): 23.05 KIPS
LIVE LOAD (LL): 46.80 KIPS
WIND LOAD (WS): 17.56 KIPS

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
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SEAL

COMMONWEALTH OF MASSACHUSETTS
STUART W. FUSS
No. 19523
REGISTERED PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

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CITY OF HAVERHILL

ADD ALTERNATE: ABUTMENT MICROPILE DETAILS

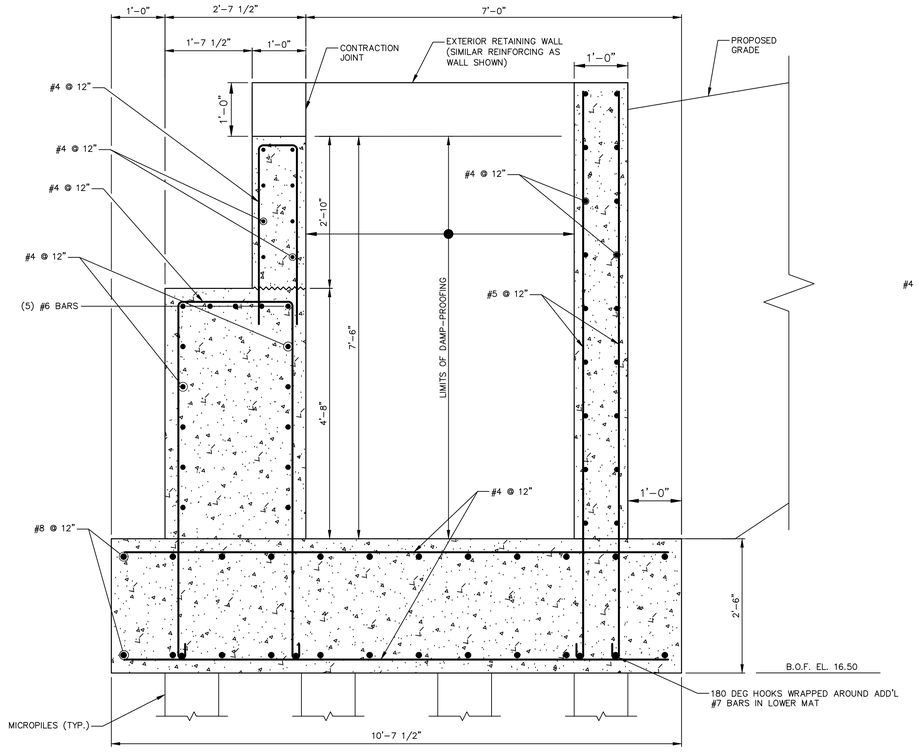
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

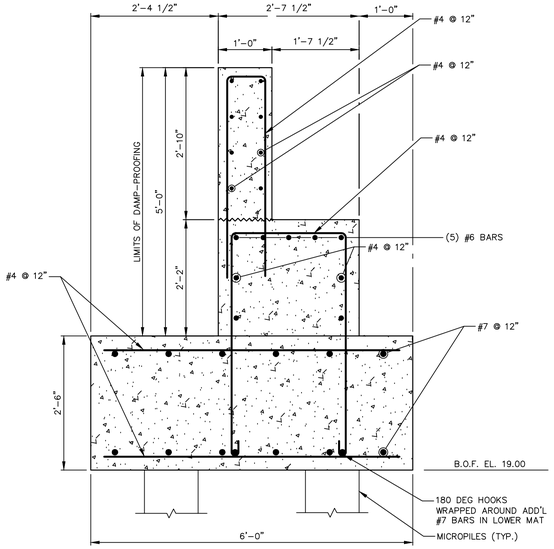
PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

S-106

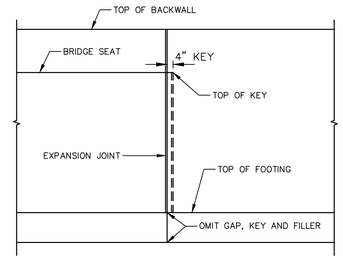
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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:



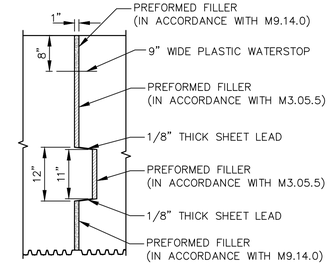
EAST ABUTMENT SECTION DETAILS
3/4" = 1'-0"



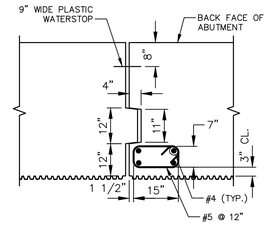
WEST ABUTMENT SECTION DETAILS AT BEAM SEAT
3/4" = 1'-0"



ABUTMENT EXPANSION JOINT ELEVATION
1/2" = 1'-0"

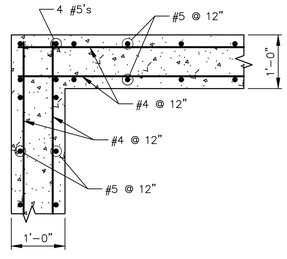


LIMITS OF PREFORMED JOINT FILLER
3/4" = 1'-0"

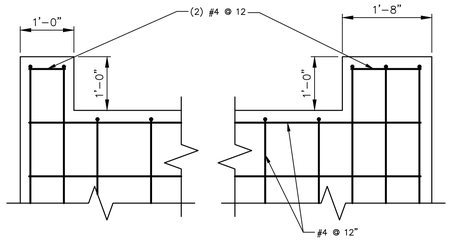


ABUTMENT EXPANSION JOINT DETAILS
1/2" = 1'-0"

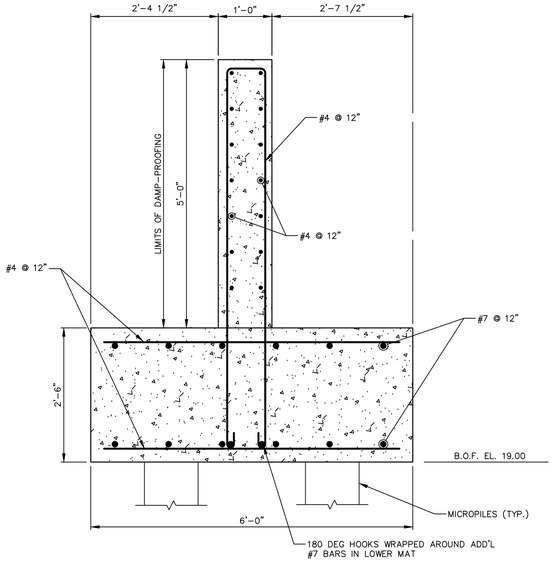
NOTE:
1. INCLUDE EXTRA REINFORCEMENT FOR WALLS 13'-6" OR MORE IN HEIGHT.
2. TYPICAL REINFORCEMENT NOT SHOWN FOR CLARITY



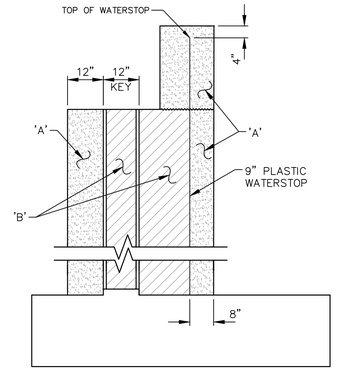
CORNER SECTION DETAILS
3/4" = 1'-0"



BACKWALL REINFORCING DETAIL
3/4" = 1'-0"



WEST ABUTMENT SECTION DETAILS AT WINGWALL
3/4" = 1'-0"



ABUTMENT EXPANSION JOINT DETAILS
1/2" = 1'-0"

NOTES:

1. LONGITUDINAL REINFORCMENT SHALL END 2" CLEAR OF EXPANSION JOINT.
2. 'A' – PREFORMED FILLER (IN ACCORDANCE WITH M9.14.0).
   'B' – PREFORMED FILLER (IN ACCORDANCE WITH M3.05.3 BITUMINOUS JOINT FILLER).
3. FILLER MATERIAL SHALL BE FASTENED SECURELY TO ONE SIDE OF JOINT.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
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SEAL

SEAL

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

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CITY OF HAVERHILL

ADD ALTERNATE: ABUTMENT AND RETAINING WALL DETAILS

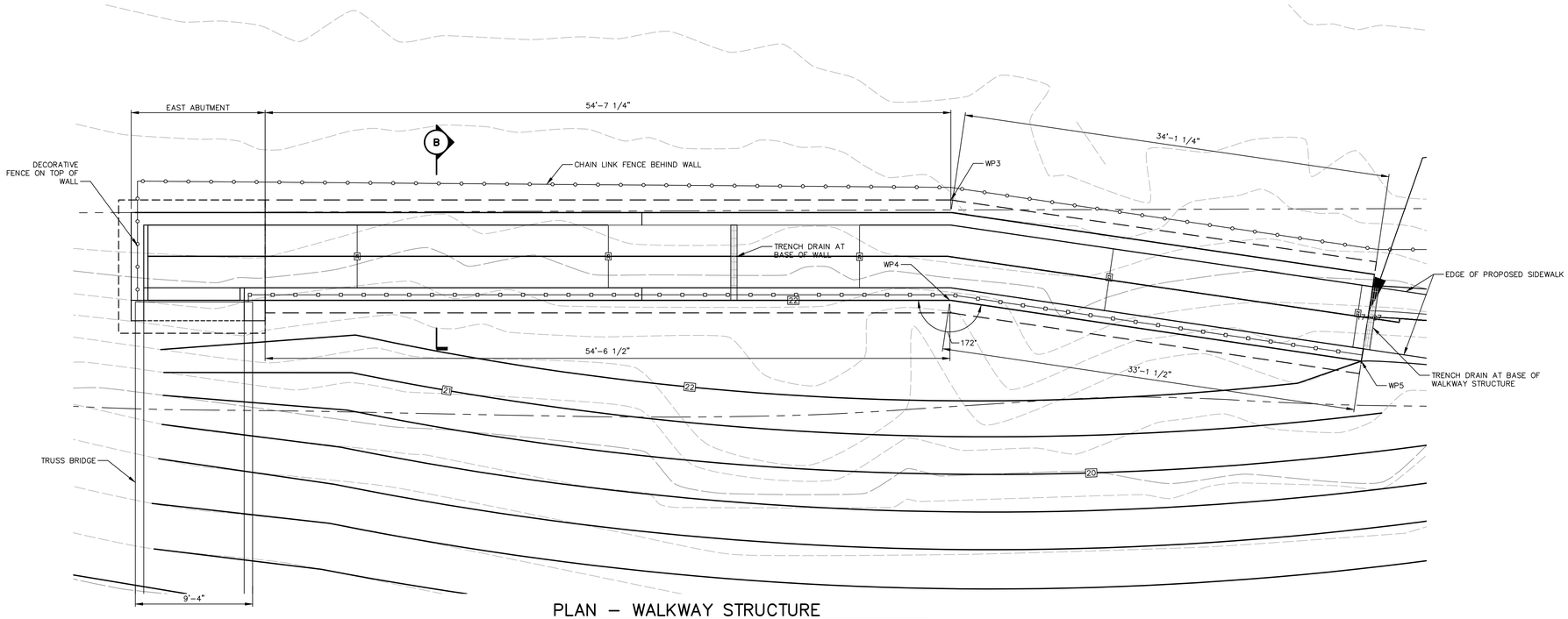
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

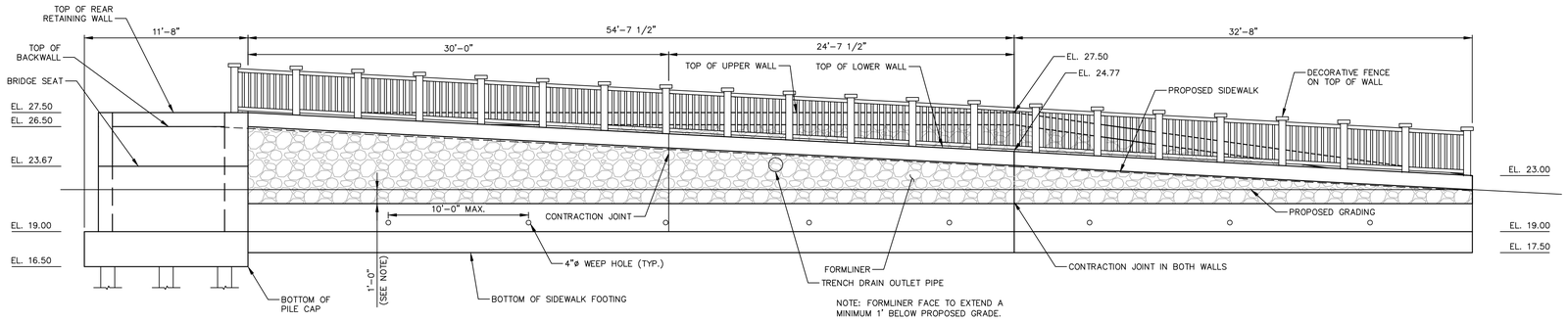
PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

S-107

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PC3: NONE STB/CTB: FO.STB
LAYER STATE:
MS VIEW:



PLAN – WALKWAY STRUCTURE
1" = 5'-0"



ELEVATION – WALKWAY STRUCTURE
1" = 5'-0"

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SEAL

SEAL

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

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413.452.0445
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CITY OF HAVERHILL

ADD ALTERNATE: PEDESTRIAN WALKWAY PLAN AND ELEVATION

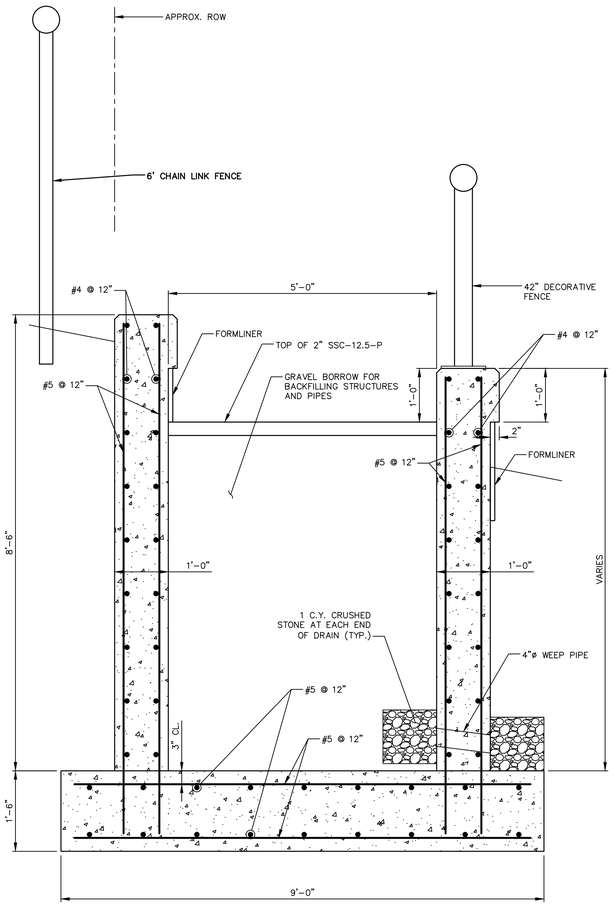
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

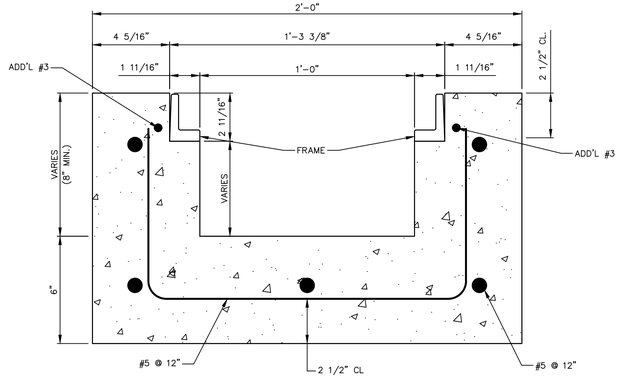
PROJ. No.: 20170390.U40
DATE: DECEMBER 16, 2024

S-108

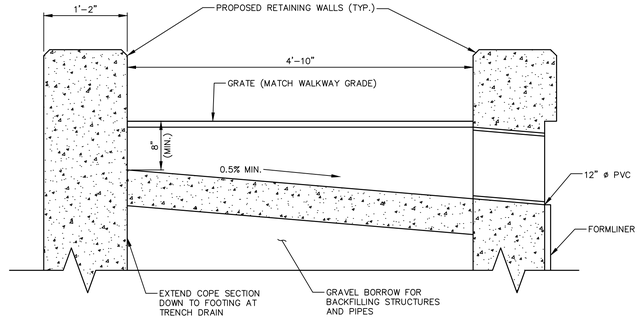
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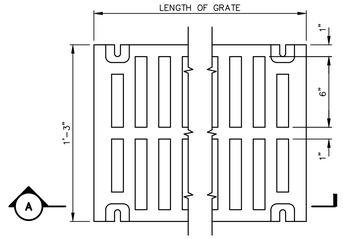
SECTION B – WALL DETAILS AT WALKWAY
3/4" = 1'-0"



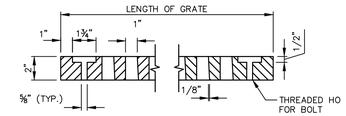
TRENCH DRAIN TYPICAL SECTION
3" = 1'-0"



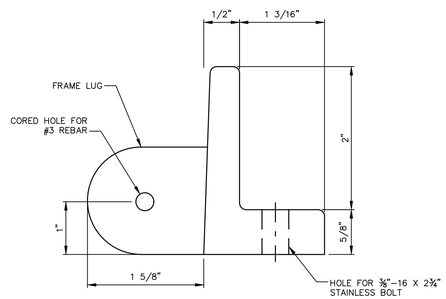
TRENCH DRAIN ELEVATION
1" = 1'-0"



GRATE PLAN
2" = 1'-0"



A TYPICAL GRATE SECTION
2" = 1'-0"



FRAME DETAIL SHOWING LUG
2" = 1'-0"

File: J:\DWG\P2017\0390U30\Structural\20170390U30_PEDESTRIAN_WALLS.dwg Layout: S-109 Plotted: 2026-02-05 12:22 PM Saved: 2026-02-05 11:40 AM User: claire.nauman
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
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SEAL

JASON J. LEDOUX
CIVIL
No. 58868
COMMONWEALTH OF MASSACHUSETTS
PROFESSIONAL ENGINEER

SEAL

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

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CITY OF HAVERHILL

ADD ALTERNATE: PEDESTRIAN WALKWAY RETAINING WALL DETAILS

LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION

HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 6, 2026

S-109

GENERAL STRUCTURAL NOTES:

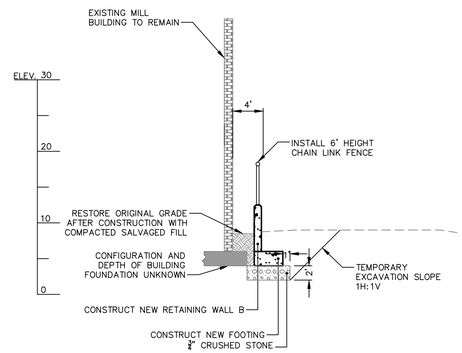
1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE MASSACHUSETTS STATE BUILDING CODE AND ITS APPLICABLE REFERENCED STANDARDS.
2. EXISTING STRUCTURAL SYSTEM IS SHOWN FOR INFORMATION ONLY. ALL EXISTING STRUCTURE LOCATIONS MUST BE FIELD VERIFIED.
3. THE CONTRACTOR SHALL COORDINATE ALL DIMENSIONS AND ELEVATIONS 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 SPECIAL 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 BY 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 AT THE CONTRACTOR'S EXPENSE.
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 INDICATED IN THE DESIGN DATA. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ALLOWABLE CONSTRUCTION LOADS AND TO PROVIDE 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, SPECIFICATIONS, AND SECTIONS.

CONCRETE NOTES:

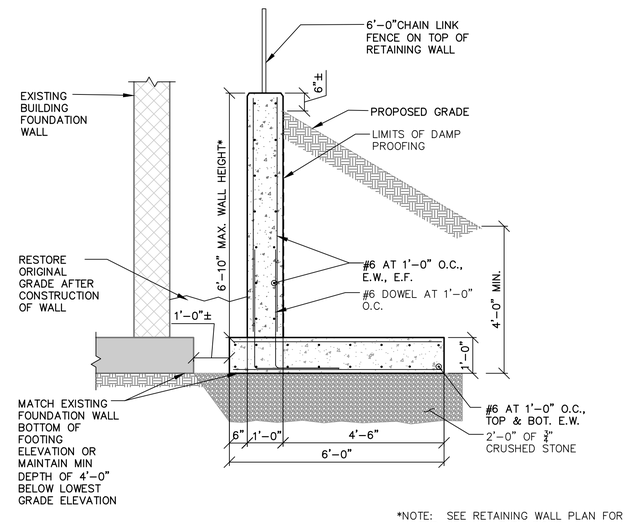
1. ALL CONCRETE WORK SHALL CONFORM TO ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS".
2. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60 AND BE DETAILED IN ACCORDANCE WITH ACI 315 "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
3. REBARS SHALL HAVE A MINIMUM CONCRETE COVER AS FOLLOWS:
   CONCRETE DEPOSITED AGAINST GROUND.....3 IN.
   CONCRETE EXPOSED TO WEATHER OR IN CONTACT WITH GROUND:
   FOR BARS #5 AND LARGER.....2 IN..
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. CONCRETE PROTECTION FOR REINFORCEMENT SHALL IN ALL CASES BE AT LEAST EQUAL TO THE DIAMETER OF THE BAR EXCEPT FOR CONCRETE SLABS.
7. CONCRETE FOR WALLS, PIERS, AND FOOTINGS SHALL BE NORMAL WEIGHT CONCRETE AND SHALL DEVELOP A COMPRESSIVE STRENGTH OF 4,000 PSI IN 28 DAYS, UNLESS OTHERWISE NOTED. CONCRETE SHALL HAVE A MAXIMUM AGGREGATE SIZE OF 3/4 INCH, A MINIMUM CEMENT CONTENT OF 560 LBS/CU YD., AND A MAXIMUM SLUMP OF 4 INCHES.
8. ALL EXPOSED EDGES OF CONCRETE SHALL HAVE A 3/4 INCH CHAMFER UNLESS NOTED OTHERWISE.
9. ALL CONCRETE EXPOSED TO THE WEATHER SHALL BE AIR-ENTRAINED.
10. SIZES AND LOCATIONS OF ALL REQUIRED EMBEDDED ITEMS FOR ALL TRADES SUCH AS ANCHOR BOLTS, PIPING SLEEVES, HOLDOWN ANCHORS, ETC., SHALL BE COORDINATED BY THE CONTRACTOR WITH OTHER TRADES.
11. CONSTRUCTION JOINTS SHALL BE DETAILED AND LOCATED ON SHOP DRAWINGS AND APPROVED BY THE ENGINEER. UNLESS SHOWN OTHERWISE, CONSTRUCTION JOINTS ARE TO BE KEYED AND PROVIDE FOR CONTINUITY OF REINFORCING STEEL. CONSTRUCTION JOINTS ARE TO BE LOCATED WHERE CONSTRUCTION OPERATIONS ARE SUSPENDED FOR 30 MINUTES OR MORE.
12. CONSTRUCTION JOINTS IN WALLS SHALL BE LOCATED AT THE CONVENIENCE OF THE CONTRACTOR MID-WAY BETWEEN BUTTRESSES, BUT NOT LESS THAN 4'-0" FROM ANY OPENING, EXCEPT WHERE SPECIFICALLY SHOWN ON PLAN OR APPROVED BY THE ENGINEER. IN NO EVENT SHALL A STRAIGHT RUN LONGER THAN 80'-0" BE PLACED WITHOUT A JOINT.
13. NO HORIZONTAL CONSTRUCTION JOINTS ARE PERMITTED IN WALLS, OTHER THAN SHOWN IN DETAILS.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIMITING POURS TO MINIMIZE SHRINKAGE CRACKING. IN GENERAL, WALLS SHALL NOT BE POURED IN CONTINUOUS LENGTHS EXCEEDING 30 FEET WITHOUT CONTRACTION (CONTROL) JOINTS. THE LOCATION AND CONFIGURATION OF JOINTS EXPOSED TO VIEW SHALL BE COORDINATED WITH THE ARCHITECT. CONTRACTION JOINTS IN SLAB-ON-GRADE SHOULD NOT EXCEED 20 FEET IN ANY DIRECTION. TYPICAL CONTRACTION JOINT PATTERNS ARE INDICATED ON FOUNDATION PLANS.

FOUNDATION NOTES:

1. ALL EARTHWORK FOR RETAINING WALL SHOWN ON CONTRACT DOCUMENTS SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS NOTED IN THE PRELIMINARY GEOTECHNICAL ENGINEERING REPORT DATED MAY 31, 2022 PREPARED BY O'REILLY, TALBOT & OKUN ENGINEERING ASSOCIATES, INC.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING, OPERATING AND MAINTAINING ALL EQUIPMENT NECESSARY TO DEWATER SITE EXCAVATIONS.
3. ALL BEARING MATERIAL SHALL BE INSPECTED BY A QUALIFIED TECHNICIAN PRIOR TO CONCRETE PLACEMENT. A QUALIFIED TECHNICIAN SHALL BE THE SOLE JUDGE AS TO THE SUITABILITY OF THE BEARING MATERIAL. FOOTING ELEVATIONS SHALL BE ADJUSTED AS REQUIRED.

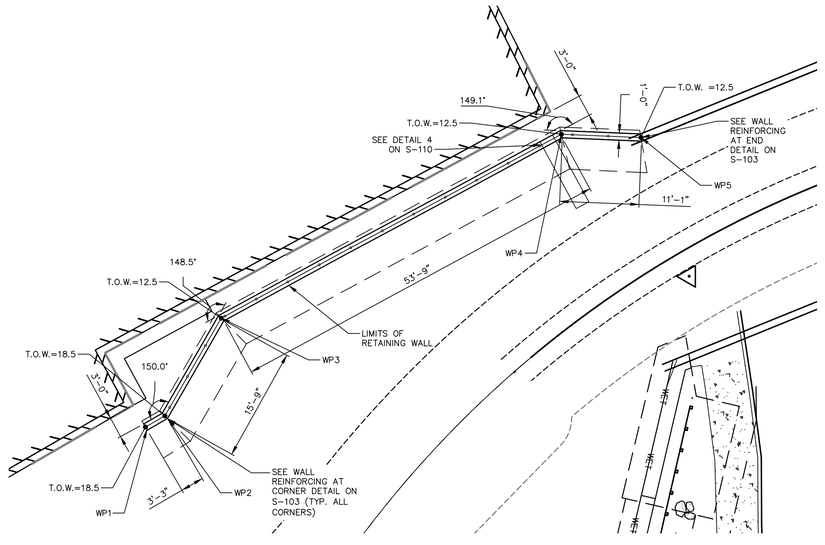


1 TYPICAL PAY LIMITS FOR RETAINING WALL B
1"=10'

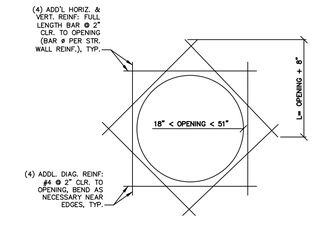


*NOTE: SEE RETAINING WALL PLAN FOR TOP OF WALL ELEVATIONS

2 RETAINING WALL B SECTION
1/2"=1'-0"



3 RETAINING WALL B PLAN
1"=10'



4 REINFORCING AT OPENING
NOT TO SCALE

RETAINING WALL B WORKING POINT COORDINATES

WP	NORTHING	EASTING
1	3108712.15	766629.07
2	3108709.32	766630.70
3	3108701.45	766644.35
4	3108654.15	766669.92
5	3108643.07	766669.46

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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COMMONWEALTH OF MASSACHUSETTS
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RETAINING WALL B PLAN, ELEVATION, AND DETAILS
LITTLE RIVER DAM REMOVAL AND RIVER RESTORATION
HAVERHILL MASSACHUSETTS

PROJ. No.: 20170390.U40
DATE: FEBRUARY 6, 2026

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