MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION

DCR ASHLAND STATE PARK
ASHLAND RESERVOIR HIKING TRAIL

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	10
DATE		08/04/2023	
PROJECT NO.		11896	

TITLE SHEET & INDEX

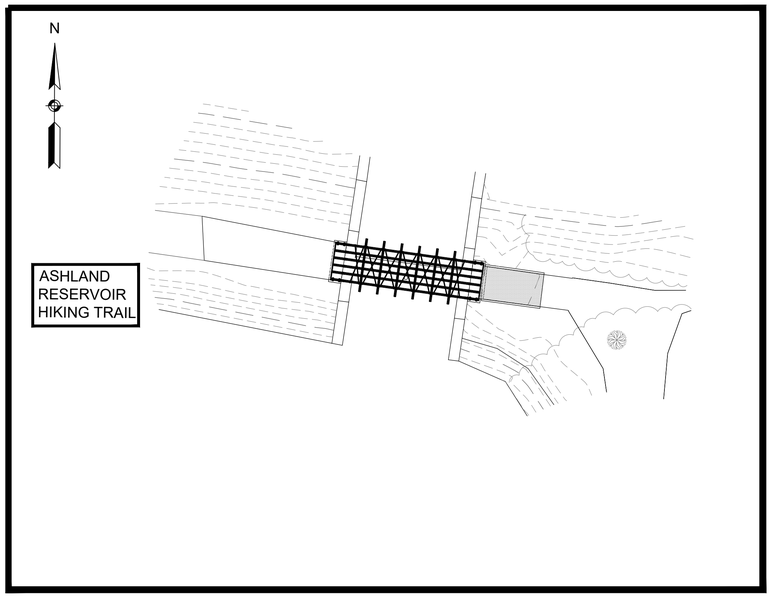
ASHLAND STATE PARK

IN THE TOWN OF

ASHLAND

MIDDLESEX COUNTY

BRIDGE DESIGN



INDEX

0 20 40 60 80

SCALE: 1" = 20'

ENGINEER:
KEVIN E. MCHUGH, P.E.
CONECO ENGINEERS & SCIENTISTS, INC.
WESTFORD, MA 01886

COMMONWEALTH OF MASSACHUSETTS KEVIN E. MCHUGH ENVIRONMENTAL NO.:45196 REGISTERED PROFESSIONAL ENGINEER

MASSACHUSETTS REGISTERED PROFESSIONAL ENGINEER #45196

08/21/2023
DATE:

SURVEYOR:
TIMOTHY S. BODAH, P.L.S.
CONECO ENGINEERS & SCIENTISTS, INC.
BRIDGEWATER, MA 02324

COMMONWEALTH OF MASSACHUSETTS TIMOTHY S. BODAH #46110 PROFESSIONAL LAND SURVEYOR

MASSACHUSETTS REGISTERED PROFESSIONAL LAND SURVEYOR #46110

08/21/2023
DATE:

DATE	DESCRIPTION	REV #

dcr Massachusetts

APPROVED

DCR ADMINISTRATOR **DATE**

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
CB	CB	CATCH BASIN
		FENCE GATE POST
GG	GG	GAS GATE
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
		GPS POINT
D	D	DRAINAGE MANHOLE
E	E	ELECTRIC MANHOLE
G	G	GAS MANHOLE
T	T	TELEPHONE MANHOLE
W	W	WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
x		CHAIN LINK OR METAL FENCE
	x	WOOD FENCE
		HAY BALES/SILT FENCE
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		EDGE OF PAVEMENT
		LIMIT OF MICROMILLING AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY

ABBREVIATIONS (cont.)

GENERAL

R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WCR	WHEEL CHAIR RAMP
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

DCR ASHLAND STATE PARK
ASHLAND RESERVOIR HIKING TRAIL

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MA	-	2	10
DATE		08/04/2023	
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LEGEND & ABBREVIATIONS

ENGINEER:
KEVIN E. MCHUGH, P.E.
CONECO ENGINEERS & SCIENTISTS, INC.
WESTFORD, MA 01886

COMMONWEALTH OF MASSACHUSETTS
KEVIN E. MCHUGH
ENVIRONMENTAL
NO. 45196
REGISTERED PROFESSIONAL ENGINEER

MASSACHUSETTS REGISTERED PROFESSIONAL ENGINEER #45196

08/21/2023
DATE:

DCR ASHLAND STATE PARK
ASHLAND RESERVOIR HIKING TRAIL

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MA	-	3	10
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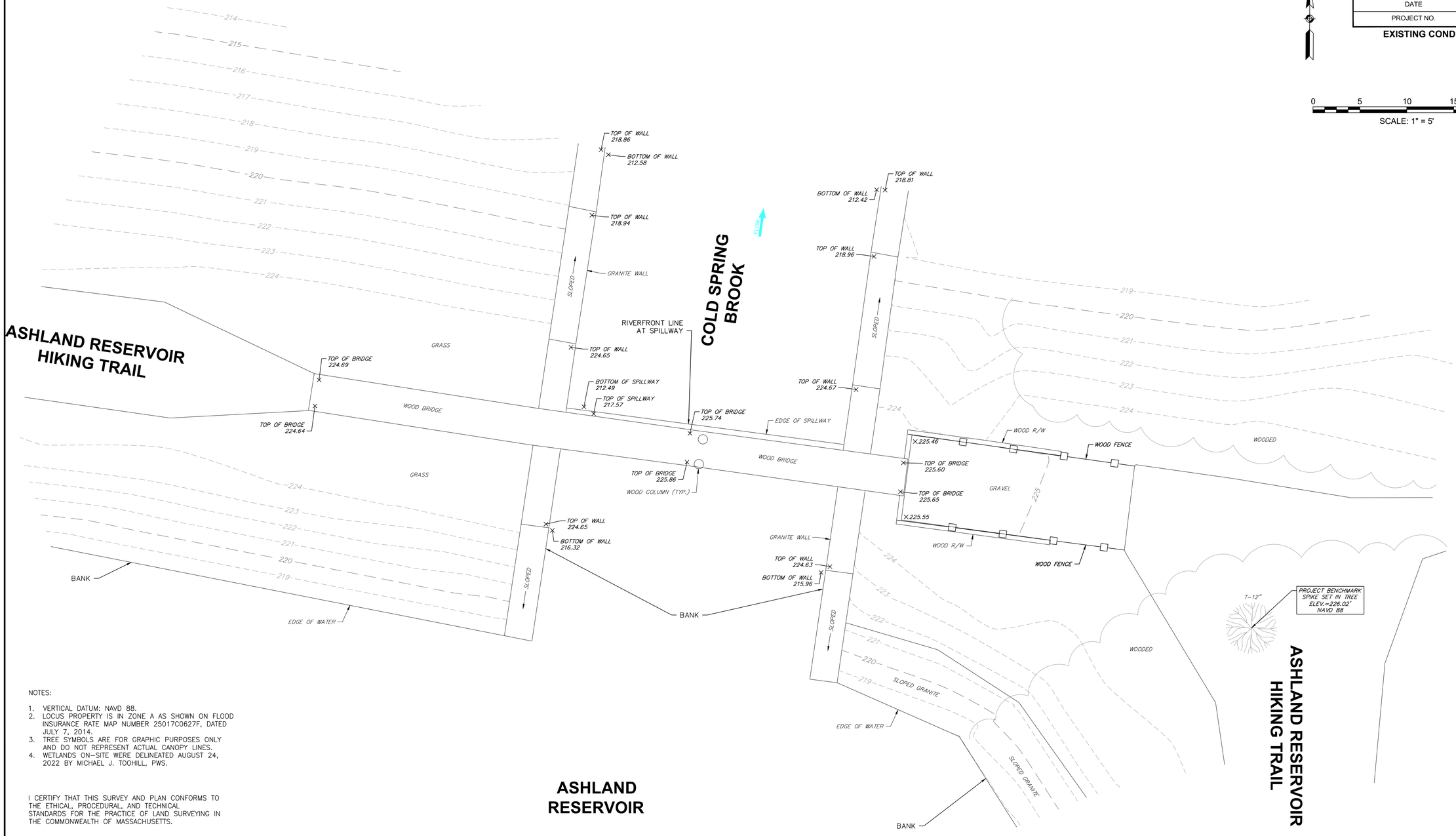
EXISTING CONDITION

N

0 5 10 15 20

SCALE: 1" = 5'



ASHLAND RESERVOIR

ASHLAND RESERVOIR HIKING TRAIL

NOTES:

1. VERTICAL DATUM: NAVD 88.
2. LOCUS PROPERTY IS IN ZONE A AS SHOWN ON FLOOD INSURANCE RATE MAP NUMBER 25017C0627F, DATED JULY 7, 2014.
3. TREE SYMBOLS ARE FOR GRAPHIC PURPOSES ONLY AND DO NOT REPRESENT ACTUAL CANOPY LINES.
4. WETLANDS ON-SITE WERE DELINEATED AUGUST 24, 2022 BY MICHAEL J. TOOHILL, PWS.

I CERTIFY THAT THIS SURVEY AND PLAN CONFORMS TO THE ETHICAL, PROCEDURAL, AND TECHNICAL STANDARDS FOR THE PRACTICE OF LAND SURVEYING IN THE COMMONWEALTH OF MASSACHUSETTS.

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY S. BODAH #46110
REGISTERED LAND SURVEYOR

TIMOTHY S. BODAH, PLS

GENERAL DEMOLITION NOTES:

DEFINITIONS

Remove: Detach items from existing construction and legally dispose of them offsite, unless indicated to be removed and salvaged or removed and reinstalled.

Remove and Salvage: Detach items from existing construction, store and protect until reinstalled in the new work.

Remove and Reinstall: Detach items from existing construction, prepare them for reuse and reinstall them where indicted.

Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicted to be removed, removed and salvaged, or removed and reinstalled.

Demolition Drawings define demolition (work) to be performed by the General Contractor. Keyed notes DX.X indicates demolition work by the General Contractor.

DEMOLITION KEYED NOTES:

MARK: DX.XX

D-1.0 Remove the existing wooden bridge.

D-2.0 Remove wooden walk.

D-3.0 Remove wooden posts.

D-4.0 Remove existing wooden railings.

D-5.0 Remove and salvage existing 4"x4" wooden approach. Material to be reused to construct approach for new bridge.

D-6.0 Remove and salvage crushed stone from approach. material to be reused to create new approach.

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DEMOLITION

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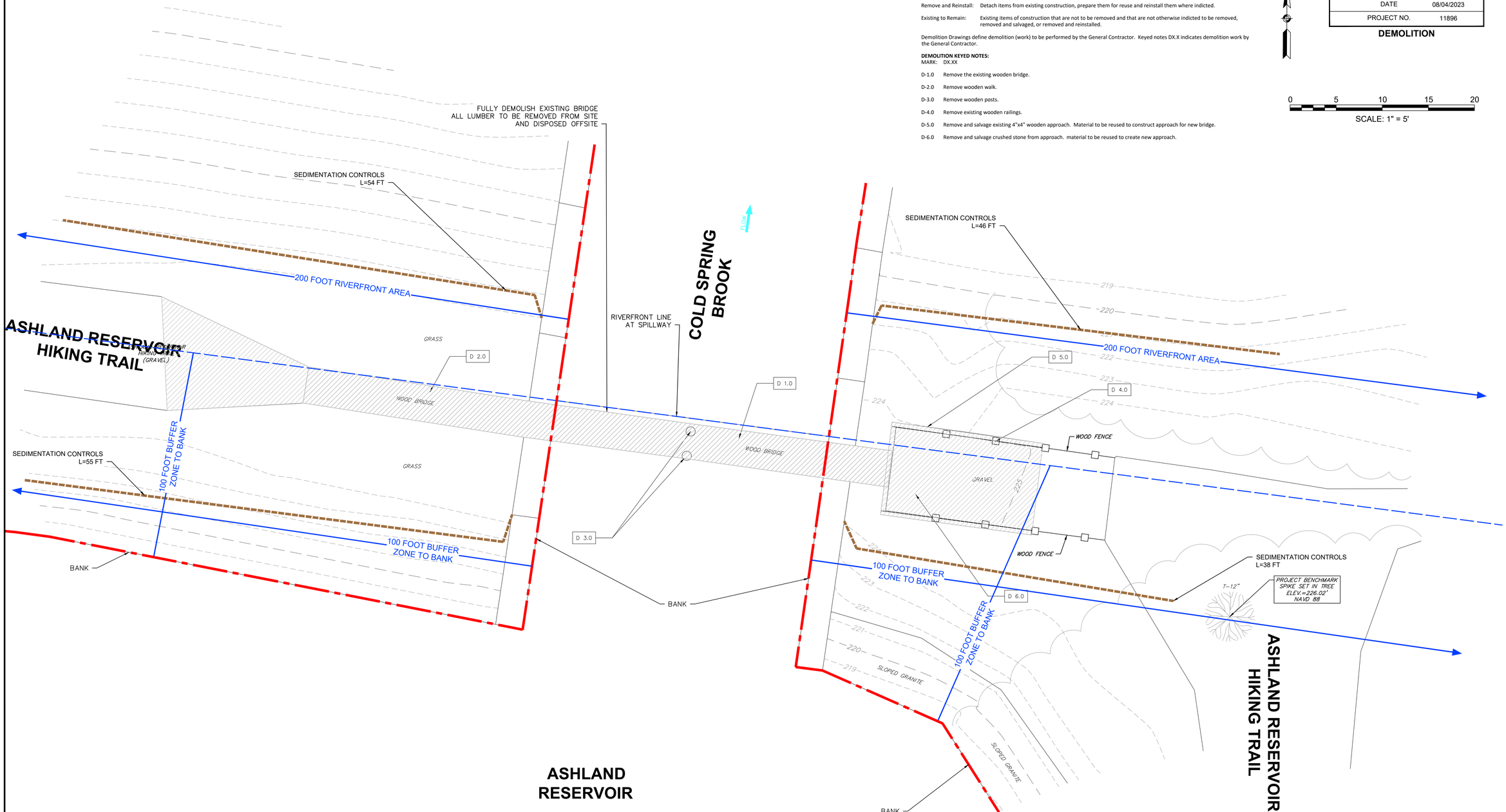
0 5 10 15 20

SCALE: 1" = 5'



LEGEND

BANK

END OF BUFFER TO BANK, START OF RFA

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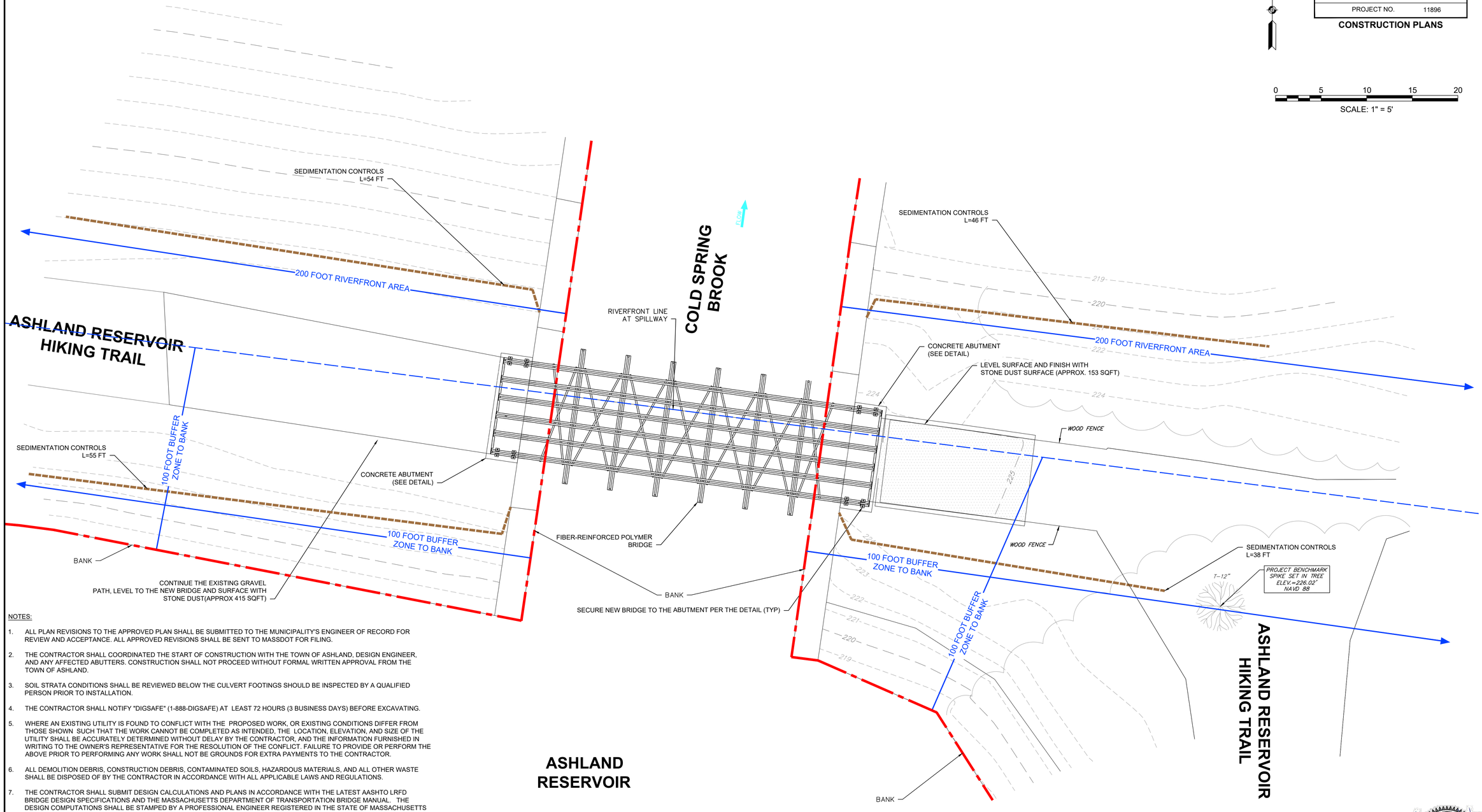
CONSTRUCTION PLANS

N

0 5 10 15 20

SCALE: 1" = 5'



NOTES:

1. ALL PLAN REVISIONS TO THE APPROVED PLAN SHALL BE SUBMITTED TO THE MUNICIPALITY'S ENGINEER OF RECORD FOR REVIEW AND ACCEPTANCE. ALL APPROVED REVISIONS SHALL BE SENT TO MASSDOT FOR FILING.
2. THE CONTRACTOR SHALL COORDINATED THE START OF CONSTRUCTION WITH THE TOWN OF ASHLAND, DESIGN ENGINEER, AND ANY AFFECTED ABUTTERS. CONSTRUCTION SHALL NOT PROCEED WITHOUT FORMAL WRITTEN APPROVAL FROM THE TOWN OF ASHLAND.
3. SOIL STRATA CONDITIONS SHALL BE REVIEWED BELOW THE CULVERT FOOTINGS SHOULD BE INSPECTED BY A QUALIFIED PERSON PRIOR TO INSTALLATION.
4. THE CONTRACTOR SHALL NOTIFY "DIGSAFE" (1-888-DIGSAFE) AT LEAST 72 HOURS (3 BUSINESS DAYS) BEFORE EXCAVATING.
5. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, OR EXISTING CONDITIONS DIFFER FROM THOSE SHOWN SUCH THAT THE WORK CANNOT BE COMPLETED AS INTENDED, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED IN WRITING TO THE OWNER'S REPRESENTATIVE FOR THE RESOLUTION OF THE CONFLICT. FAILURE TO PROVIDE OR PERFORM THE ABOVE PRIOR TO PERFORMING ANY WORK SHALL NOT BE GROUNDS FOR EXTRA PAYMENTS TO THE CONTRACTOR.
6. ALL DEMOLITION DEBRIS, CONSTRUCTION DEBRIS, CONTAMINATED SOILS, HAZARDOUS MATERIALS, AND ALL OTHER WASTE SHALL BE DISPOSED OF BY THE CONTRACTOR IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS.
7. THE CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS AND PLANS IN ACCORDANCE WITH THE LATEST AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION BRIDGE MANUAL. THE DESIGN COMPUTATIONS SHALL BE STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF MASSACHUSETTS AND CONSIDER ALL LOADING AS APPROPRIATE DURING FABRICATION, SHIPMENT, ERECTION, AND CONSTRUCTION BASED ON THESE CONSTRUCTION DRAWINGS. THESE CALCULATIONS SHALL BE MADE USING ENGLISH UNITS AND FOR HL-93 LOADING. ALL DESIGN DOCUMENTS SHALL BE REVIEWED AND APPROVED BY THE DESIGN ENGINEER.
8. THE CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS AND PLANS FOR WATER RETAINING AND DEWATERING MEASURES INTENDED TO BE USED BY THE CONTRACTOR. PLANS SHALL BE STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS AND SUBMITTED FOR THE REVIEW AND APPROVAL OF THE DESIGN ENGINEER.
9. THE CONTRACTOR SHALL SUBMIT SITE-SPECIFIC PLANS DEPICTING ALL CONSTRUCTION EROSION AND SEDIMENTATION CONTROLS FOR THE CONSTRUCTION OF THE CULVERT AND THE TEMPORARY STREAM BYPASS. THE CONTRACTOR SHALL SUBMIT THE INSTALLATION METHODS AND MAINTENANCE TO THE MUNICIPALITY'S ENGINEER OF RECORD FOR REVIEW AND ACCEPTANCE.

LEGEND

BANK

END OF BUFFER TO BANK, START OF RFA

ENGINEER:
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CONECO ENGINEERS & SCIENTISTS, INC.
WESTFORD, MA 01886

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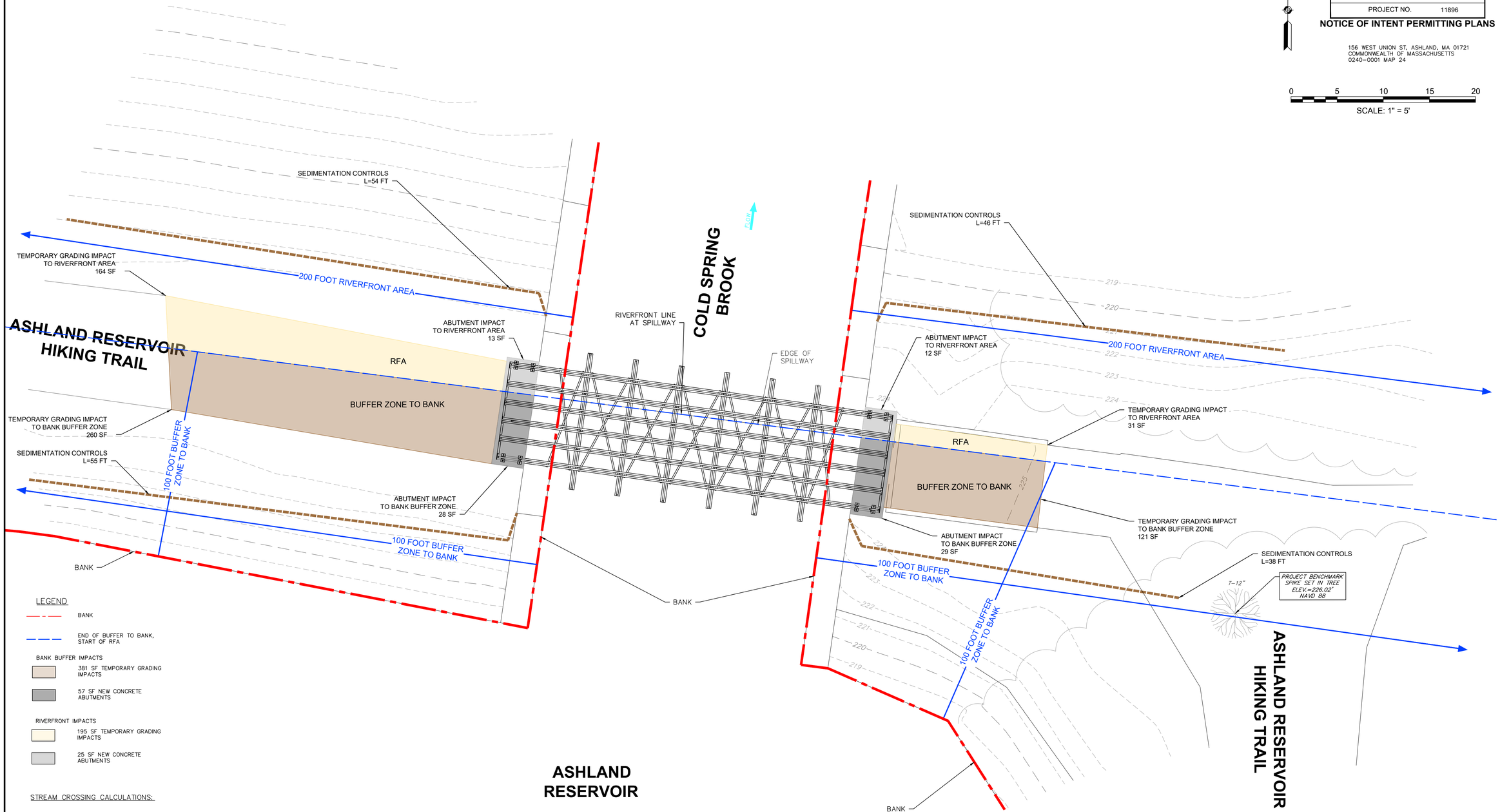
NOTICE OF INTENT PERMITTING PLANS

156 WEST UNION ST, ASHLAND, MA 01721
COMMONWEALTH OF MASSACHUSETTS
0240-0001 MAP 24

N

0 5 10 15 20

SCALE: 1" = 5'



LEGEND

- BANK
- END OF BUFFER TO BANK, START OF RFA

BANK BUFFER IMPACTS
- 381 SF TEMPORARY GRADING IMPACTS
- 57 SF NEW CONCRETE ABUTMENTS

RIVERFRONT IMPACTS
- 195 SF TEMPORARY GRADING IMPACTS
- 25 SF NEW CONCRETE ABUTMENTS

STREAM CROSSING CALCULATIONS:

BANKFULL WIDTH:
=AVERAGE WIDTH OF THREE STREAM SECTIONS
=(29.85 FT + 29.83 FT + 29.82 FT)/3 = 29.83 FT

MINIMUM SPAN WIDTH:
=BANKFULL WIDTH x 1.2
=29.83 FT x 1.2 = 35.8 FT

OPENNESS:
=CROSS SECTIONAL AREA / LENGTH
=195.09 FT^2 / 10 FT = 19.51 FT

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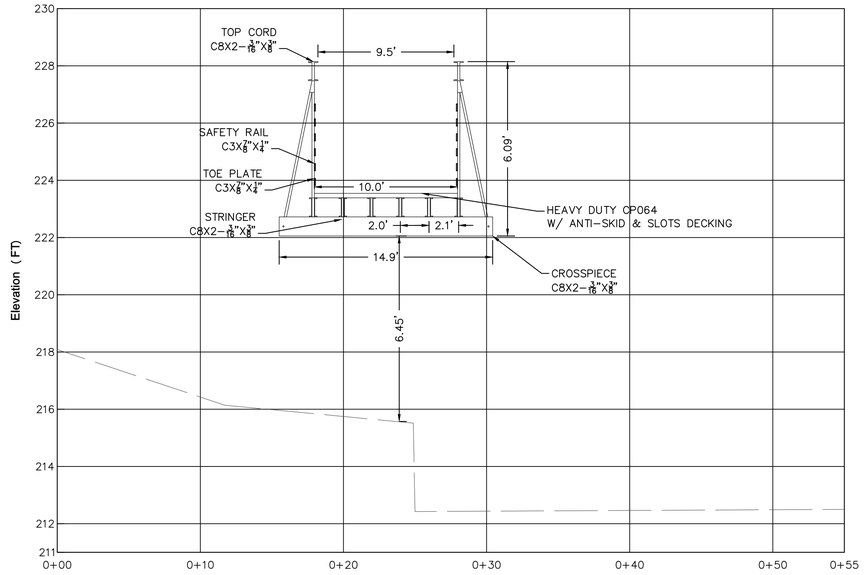
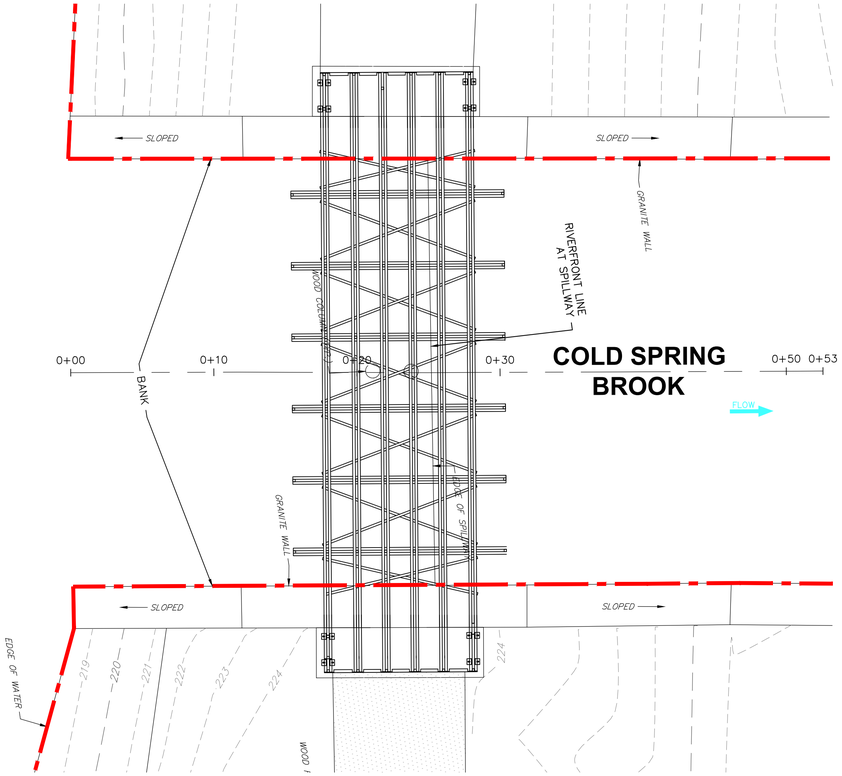
BROOK PROFILE



PROFILE
Alignment - Brook
HORIZONTAL SCALE: 1" = 5'
VERTICAL SCALE: 1" = 2'

HOR. SCALE IN FEET
5 0 5 10
VER. SCALE IN FEET



ASHLAND RESERVOIR

BAN

N

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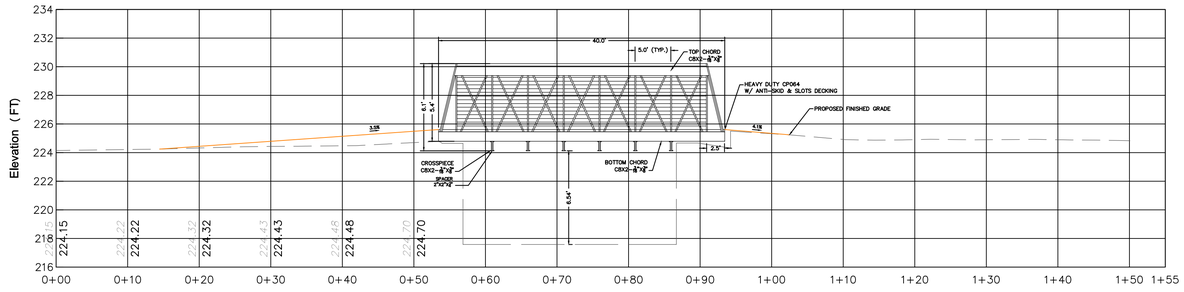
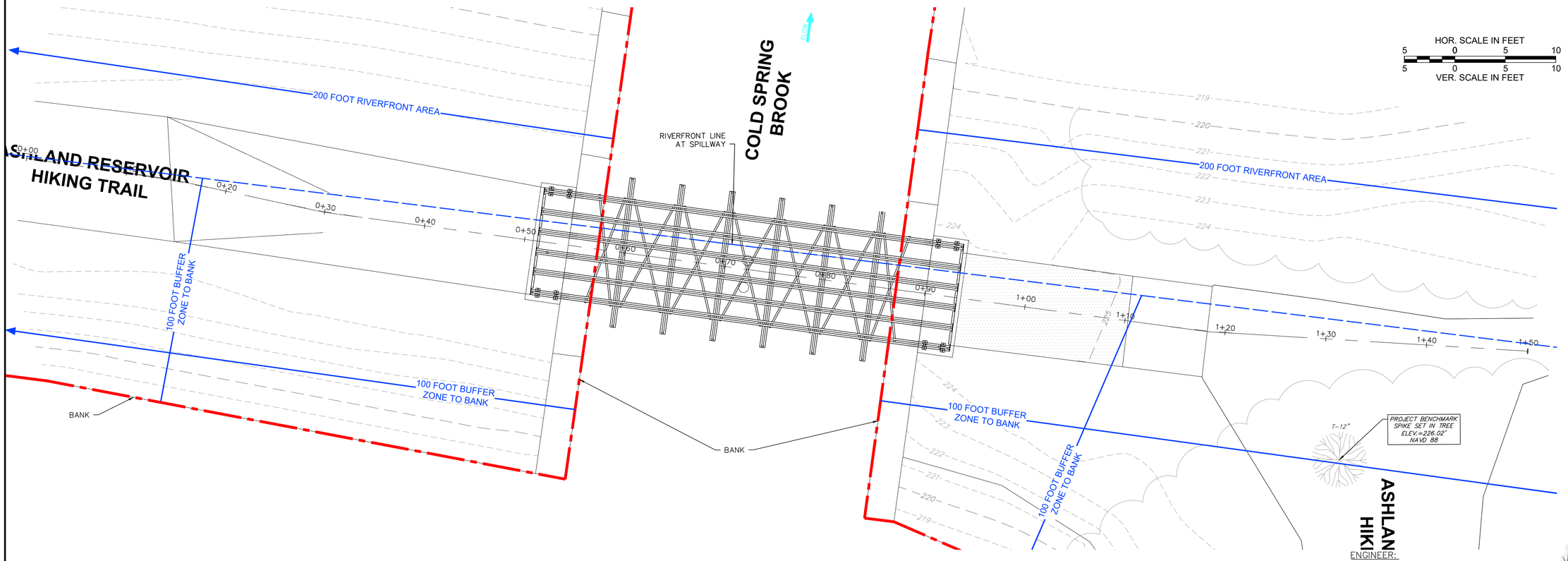
PATH PROFILE



PROFILE
Alignment - Path
HORIZONTAL SCALE: 1" = 5'
VERTICAL SCALE: 1" = 2'



HOR. SCALE IN FEET
5 0 5 10
VER. SCALE IN FEET
5 0 5 10

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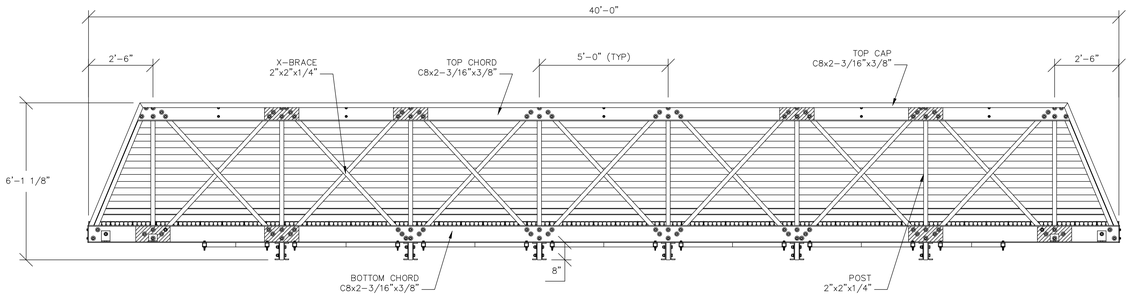
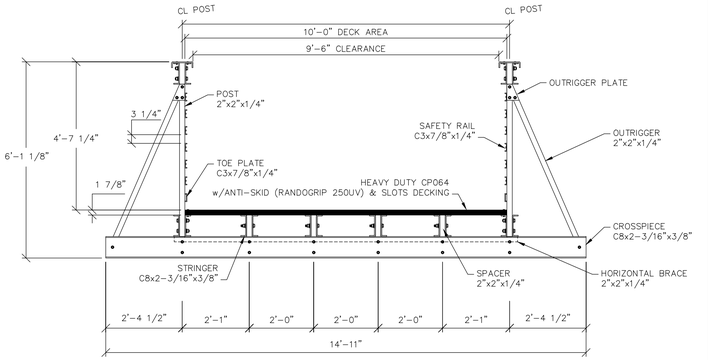
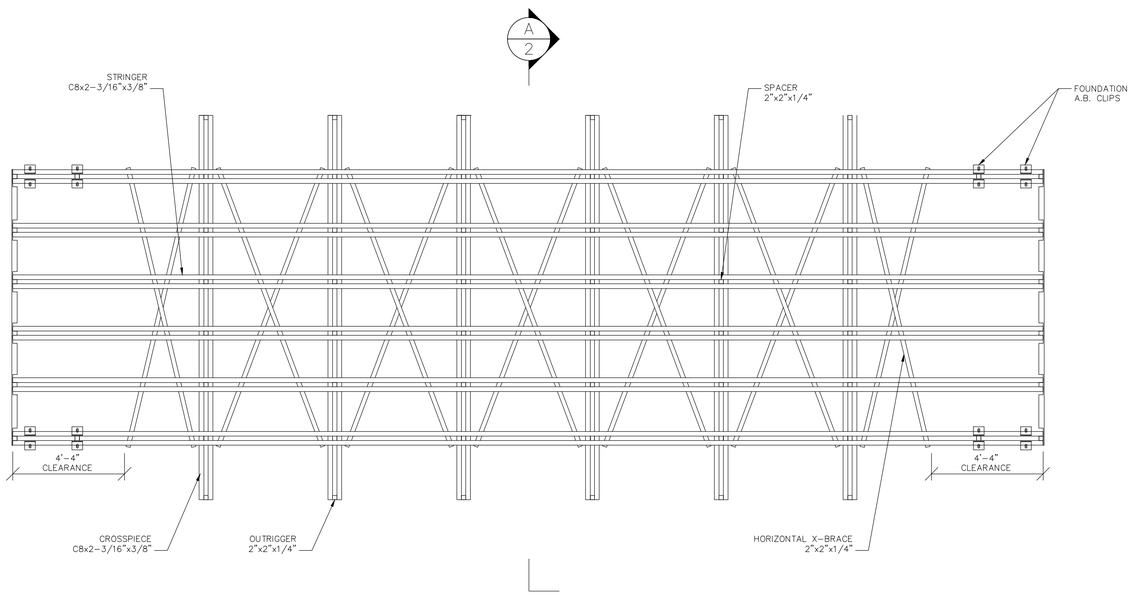
DETAILS
SHEET 1 OF 2



ELEVATION



SECTION A-A
TYPICAL TRUSS



BRIDGE PLAN AT BOTTOM CHORDS

ENGINEER:
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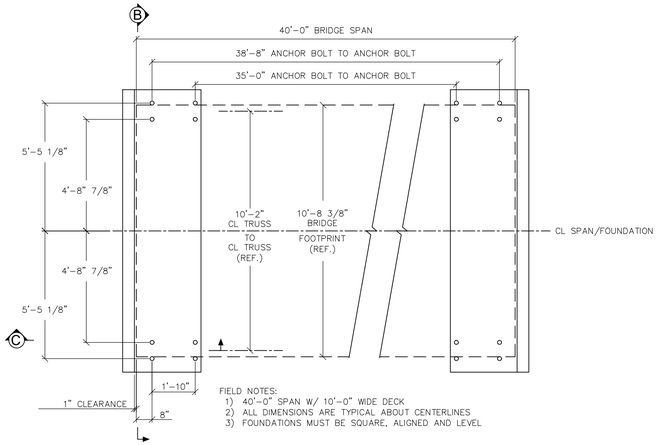
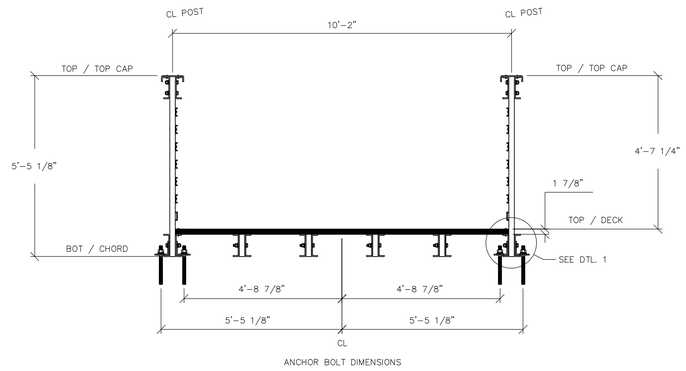
DETAILS
SHEET 2 OF 2



FIELD NOTES:
1) 40'-0" SPAN W/ 10'-0" WIDE DECK
2) ALL DIMENSIONS ARE TYPICAL ABOUT CENTERLINES
3) FOUNDATIONS MUST BE SQUARE, ALIGNED AND LEVEL

ANCHOR BOLT LAYOUT



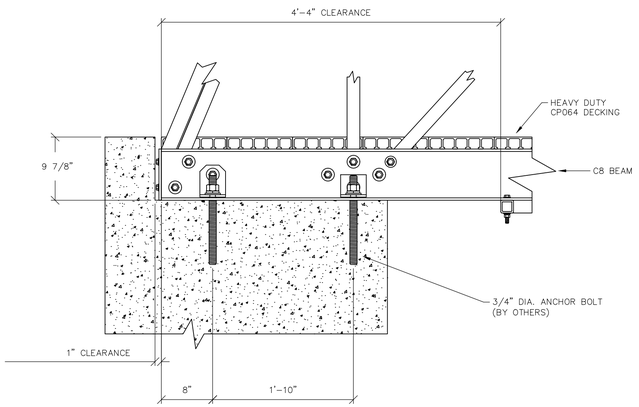
ANCHOR BOLT DIMENSIONS

SECTION B-B
TYPICAL AT FOUNDATION

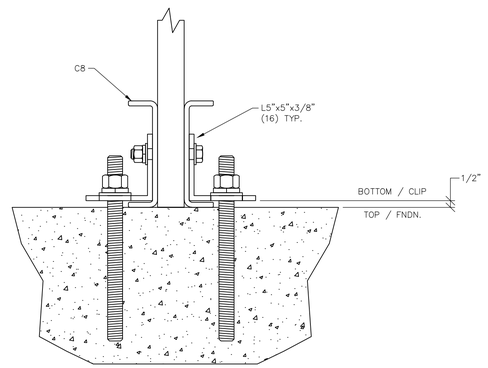
WEIGHT OF ASSEMBLED BRIDGE: 8,000.0 LBS

MAXIMUM DESIGN REACTIONS AT EACH ANCHOR BOLT GROUP			
	(X) LONGITUDINAL (LBS)	(Y) VERTICAL (LBS)	(Z) TRANSVERSE (LBS)
DEAD	0	2,000	0
LIVE	0	9,000	0
VEHICLE	0	5,000	0
SNOW	0	2,500	0
WIND X	8,705	0	0
WIND Y	0	-2,832	0
WIND Z	0	0	4,493
EQ X	262	0	0
EQ Y	0	± 53	0
EQ Z	0	0	262

NOTES:
1) LOADS ARE APPLIED AT THE ANCHOR BOLT GROUP AT THE END OF EACH BOTTOM CHORD MEMBER
2) ANCHOR BOLT GROUP = (4) ANCHOR BOLTS
3) VERTICAL LOAD AT THE END OF EACH STRINGER MEMBER IS < 700 LBS.
4) LOADS SHOWN ARE UNFACTORED
5) LONGITUDINAL = PARALLEL TO BRIDGE SPAN
6) TRANSVERSE = PERPENDICULAR TO BRIDGE SPAN
7) EQ X & EQ Z = Cs * BRIDGE WEIGHT, Cs = 0.131
8) EQ Y = 0.2*Sds*W. EQ Y = 0 WHEN Sds < 0.125



SECTION C-C
CURB DETAIL



FIELD NOTES:
1) GROUT BETWEEN BOTTOM OF CLIP AND FOUNDATION AFTER INSTALLATION
2) 3/4" DIA. ANCHOR BOLT REQUIRED (TYP) BY OTHERS
3) FOUNDATION DESIGN BY OTHERS

DETAIL 1
TYPICAL ANCHOR BOLT PROJECTION

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NO. 45196
REGISTERED PROFESSIONAL ENGINEER

MASSACHUSETTS REGISTERED PROFESSIONAL ENGINEER #45196

08/21/2023
DATE: