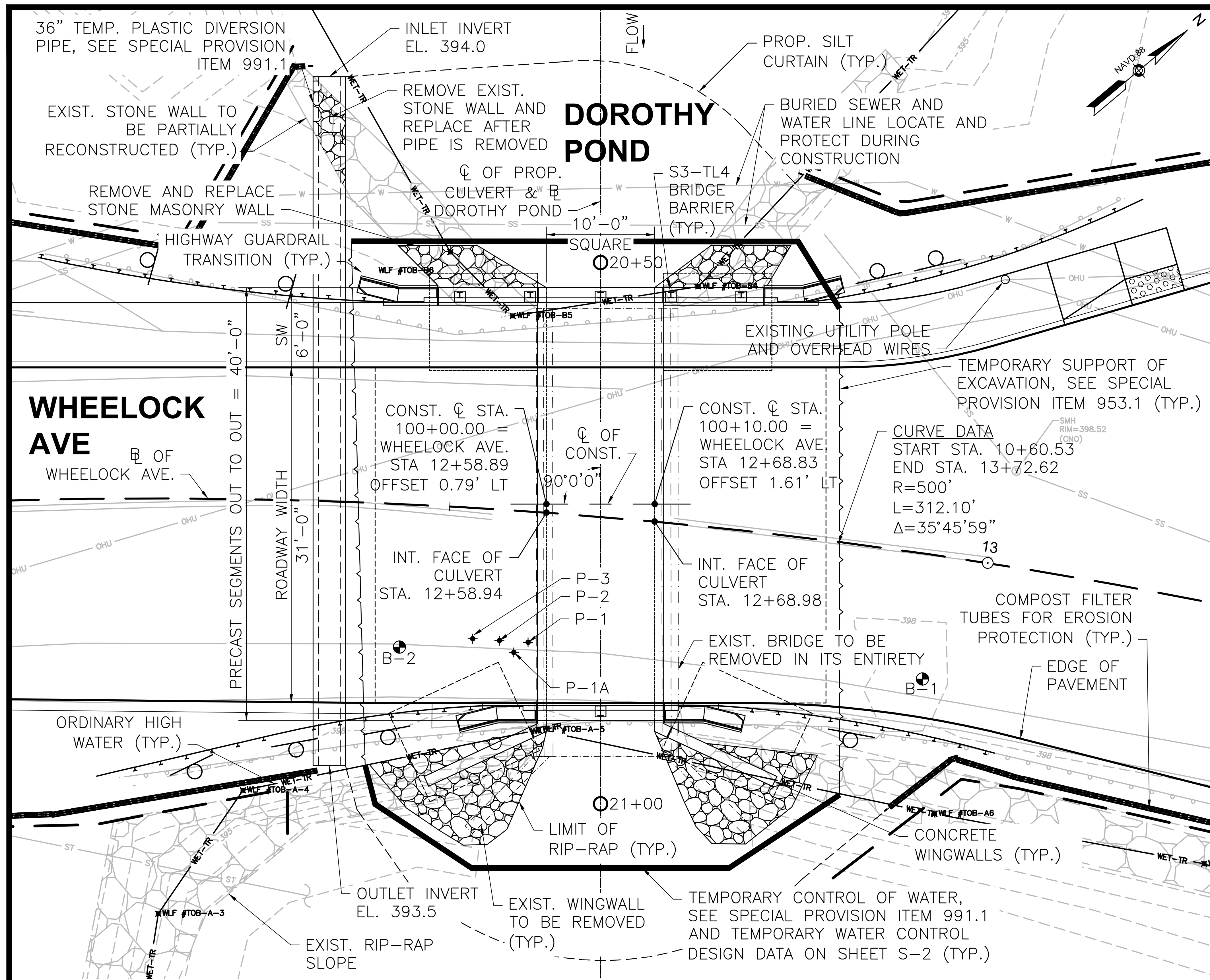
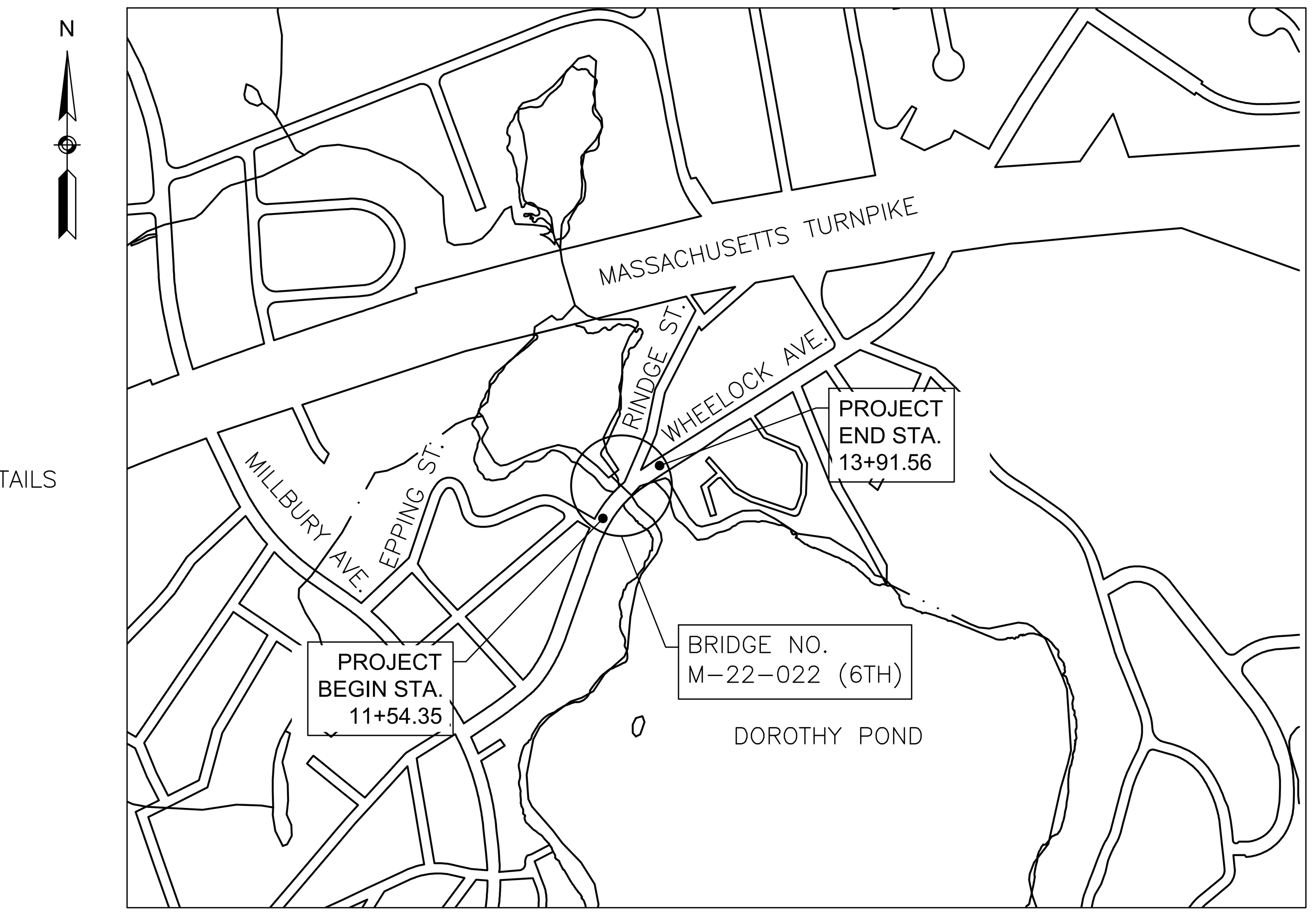


KEY PLAN

SCALE: 1" = 8'

SHEET LIST TABLE

SHEET NUMBER	SHEET TITLE
1	KEY PLAN & PROFILES
2	GENERAL NOTES
3	BORING LOGS
4	BORING LOGS
5	BORING LOGS
6	BORING LOGS
7	GENERAL PLAN
8	ELEVATIONS
9	CULVERT LONGITUDINAL SECTION & END DETAILS
10	CULVERT & WINGWALL DETAILS
11	PRECAST GUARDRAIL TRANSITION DETAILS
12	PRECAST GUARDRAIL TRANSITION DETAILS
13	RAILING DETAILS

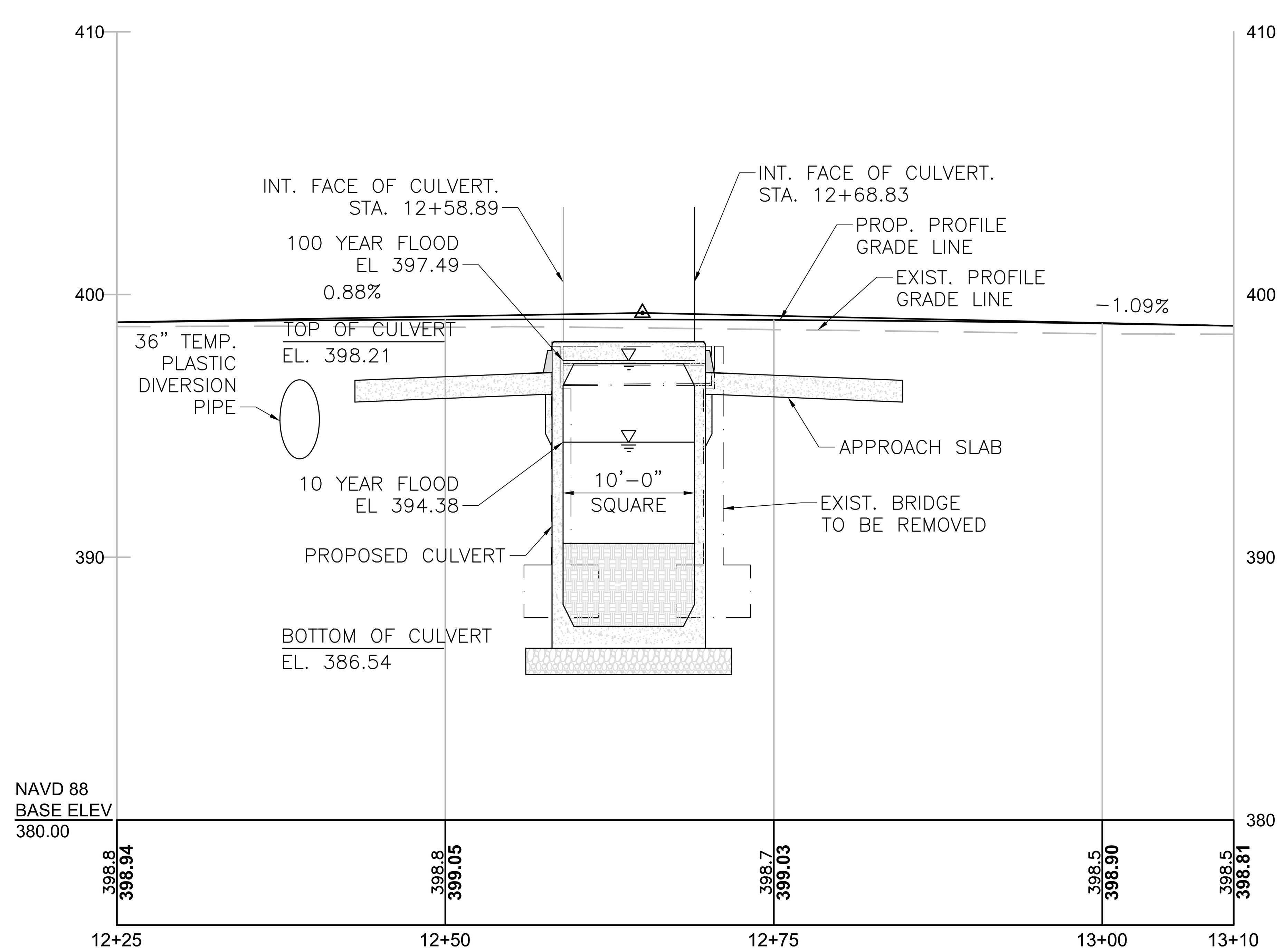


LOCUS

SCALE: 1" = 500'

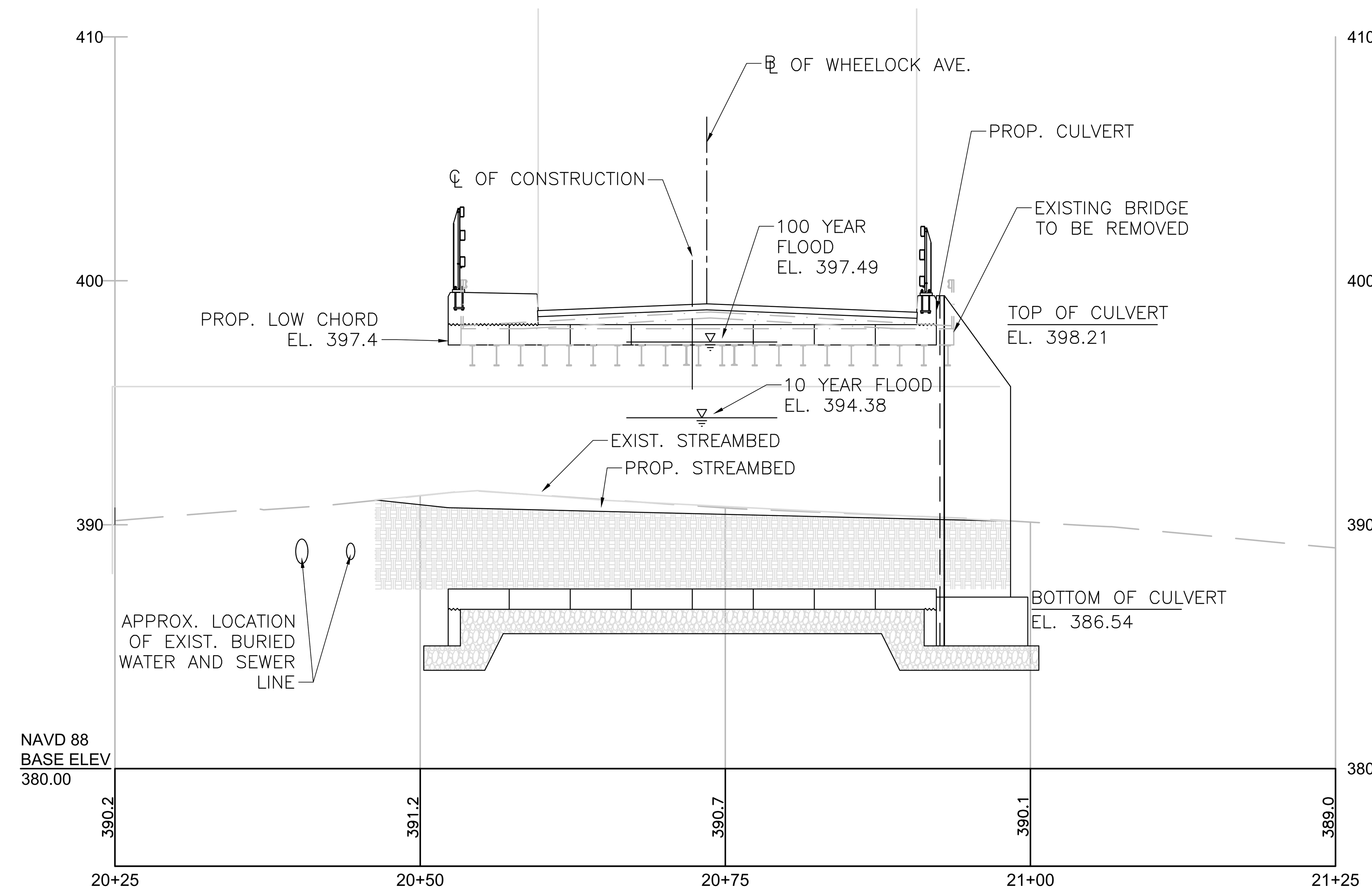
ESTIMATED QUANTITIES
(NOT GUARANTEED)

ITEM	QUANTITY	
DEMOLITION OF BRIDGE NO. M-22-022 (6TH)	1	LS
BRIDGE EXCAVATION	575	CY
CHANNEL EXCAVATION	110	CY
CLASS B ROCK EXCAVATION	30	CY
GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	245	CY
NATURAL STREAMBED MATERIAL	70	CY
CONTROLLED DENSITY FILL – NON-EXCAVATABLE	3	CY
CRUSHED STONE FOR BRIDGE FOUNDATIONS	95	TON
CRUSHED STONE FOR FILTER BLANKET	25	CY
SUPERPAVE BRIDGE SURFACE COURSE – 9.5 (SSC-B – 9.5)	95	TON
SUPERPAVE BRIDGE PROTECTIVE COURSE – 9.5 (SPC-B – 9.5)	4	TON
STONE MASONRY WALL REMOVED AND REBUILT IN CEMENT MORTAR	20	CY
TEMPORARY SUPPORT OF EXCAVATION	1	LS
RIPRAP	40	TON
CONTROL OF WATER – STRUCTURE NO. M-22-022 (CPC)	1	LS
BRIDGE STRUCTURE, BRIDGE NO. M-22-022 (CPC)	1	LS



PROFILE – ALONG CONST. ℄ & P.G.L. WHEELOCK AVE

HORIZONTAL SCALE: 1" = 8'
VERTICAL SCALE: 1'' = 4'



PROFILE – DOROTHY POND

HORIZONTAL SCALE: 1" = 8'
VERTICAL SCALE: 1'' = 4'

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
DISTRICT 3 BRIDGE ENGINEER | DATE

BRIDGE SHEET 1 OF 13 BRIDGE NO. M-22-022 (CPC)

Project:
TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER DOROTHY POND

CULVERT REPLACEMENT

Weston & Sampson
Weston & Sampson Engineers, Inc.
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal:
COMMONWEALTH OF MASSACHUSETTS
SCOTT R. BRUSO
STRUCTURAL
No. 48061
REGISTERED PROFESSIONAL ENGINEER

Issued For:

BIDDING

Scale: AS NOTED

Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title:

KEY PLAN & PROFILES

Sheet Number:

S-1

GENERAL NOTES

DESIGN

IN ACCORDANCE WITH THE 2020 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS, WITH CURRENT INTERIM SPECIFICATIONS THROUGH 2021, FOR HL-93 LOADING.

EXISTING CONDITIONS:

DIMENSIONS SHOWN AND DETAILS DEPICTED ARE BASED UPON THE ORIGINAL BRIDGE PLANS AND ARE NOT GUARANTEED. THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENT AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE AND NOT ORDER ANY MATERIAL OR COMMENCE ANY FABRICATION UNTIL HE/SHE HAS MADE THE REQUIRED MEASUREMENTS ON THE ACTUAL STRUCTURE AND THE EXTENT OF THE PROPOSED WORK HAS BEEN APPROVED BY THE ENGINEER.

BENCH MARK:

MAG NAIL IN UTILITY POLE ELEV. 399.51. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

DATE:

TO BE PLACED ON THE INSIDE FACE OF THE NORTHEAST AND SOUTHWEST HIGHWAY GUARDRAIL TRANSITIONS. A SHEET SHOWING SIZE AND CHARACTER OF NUMERALS WILL BE FURNISHED. THE DATE USED SHALL BE THE LATEST YEAR OF CONTRACT COMPLETION AS OF THE DATE THE FIRST HIGHWAY GUARDRAIL TRANSITION IS CONSTRUCTED. BOTH HIGHWAY GUARDRAIL TRANSITIONS SHALL FEATURE THE SAME DATE.

SURVEY:

TOPOGRAPHICAL INFORMATION BASED ON THE GROUND SURVEY PERFORMED BY WESTON & SAMPSON PE, LS, LA, PC. IN JANUARY 2019. COORDINATES, IN US SURVEY FEET, ARE REFERENCED TO THE NORTH AMERICAN DATUM (NAD) 1983, (2011), EPOCH 2010.00, BASED ON THE KeyNetGPS VIRTUAL REFERENCE SYSTEM.

SCALES:

SCALES NOTED ON THE PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS. DIVIDE SCALES BY 2 FOR HALF-SIZE PRINTS (A3).

FOUNDATIONS:

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

UNSUITABLE MATERIALS:

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

CONCRETE:

ALL CONCRETE SHALL BE 4000 PSI CONCRETE, EXCEPT AS NOTED BELOW:
CAST-IN-PLACE SIDEWALK, SAFETY CURB AND PRECAST HIGHWAY GUARDRAIL TRANSITIONS SHALL BE 5000 PSI HP CONCRETE.

4000 PSI, 1.5 IN, 565 CEMENT CONCRETE.....PRECAST CULVERT, CURTAIN WALLS, WINGWALLS, CAST-IN-PLACE WINGWALL CONNECTION, APPROACH SLAB

5000 PSI, 3/4 IN, 685 HP CEMENT CONCRETE.....PRECAST HIGHWAY GUARDRAIL TRANSITIONS, CAST-IN-PLACE SIDEWALK, SAFETY CURB

REINFORCEMENT:

REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M31 GRADE 60. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION	#4 BARS	#5 BARS	#6 BARS	#7 BARS
1. NONE	16"	19"	23"	27"
2. 12" OF CONCRETE BELOW BAR	20"	25"	30"	35"
3. EPOXY COATED BARS, COVER < $3d_b$, OR CLEAR SPACING < $6d_b$	23"	29"	34"	40"
4. COATED BARS, ALL OTHER CASES	18"	23"	27"	32"
5. CONDITION 2. AND 3.	26"	32"	39"	52"
6. CONDITION 2. AND 4.	24"	30"	36"	44"

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

EPOXY COATED BARS:

ALL REINFORCING BARS AND SUPPORTING DEVICES SHALL BE COATED UNLESS NOTED OTHERWISE.

UTILITIES:

THE CONTRACTOR SHALL LOCATE AND PROTECT FROM DAMAGE ALL EXISTING UTILITIES.

SUGGESTED CONSTRUCTION SEQUENCE:

1. INSTALL EROSION CONTROLS.
2. INSTALL THE DETOUR SIGNAGE AND CLOSE THE ROAD AND BRIDGE.
3. CLEAR AND GRUB, REMOVE TREES, AND INSTALL TREE PROTECTION AS INDICATED.
4. INSTALL 36" TEMPORARY PLASTIC DIVERSION PIPE.
5. INSTALL TEMPORARY COFFERDAM ON UPSTREAM AND DOWNSTREAM SIDES OF THE BRIDGE AND RELOCATE FLOW INTO THE TEMPORARY DIVERSION PIPE.
6. DEMOLISH AND REMOVE EXISTING BRIDGE SUPERSTRUCTURE AND GUARDRAIL.
7. EXCAVATE ALL AROUND THE EXISTING SUBSTRUCTURE.
8. DEMOLISH AND REMOVE THE EXISTING ABUTMENTS AND WINGWALLS.
9. PREPARE SUBGRADE FOR INSTALLATION OF BOX CULVERT.
10. INSTALL PRECAST BOX CULVERT AND PRECAST CURTAIN WALLS.
11. CONSTRUCT PRECAST WINGWALL FOOTINGS AND PRECAST WINGWALL STEMS.
12. BACKFILL BEHIND THE BOX CULVERT AND WINGWALLS TO THE BOTTOM OF THE APPROACH SLAB ELEVATION.
13. INSTALL RIPRAP AND NATURAL STREAMBED MATERIAL AROUND THE WINGWALLS AND INSIDE THE BOX CULVERT, AS INDICATED.
14. REMOVE TEMPORARY DIVERSION PIPE AND COFFERDAM AND DIVERT WATER THROUGH THE PROPOSED BOX CULVERT.
15. INSTALL REINFORCING AND CONSTRUCT CAST-IN-PLACE CONCRETE SIDEWALK AND SAFETY CURB.
16. INSTALL PRECAST HIGHWAY GUARDRAIL TRANSITIONS AND S3-TL4 BRIDGE RAILING.
17. INSTALL REINFORCING AND CONSTRUCT CAST-IN-PLACE APPROACH SLABS.
18. INSTALL SPRAY-APPLIED MEMBRANE WATERPROOFING AND PAVE PROTECTIVE COURSE ON BRIDGE.
19. PERFORM FULL-DEPTH ROADWAY RECONSTRUCTION, GRADING AND ESTABLISH VEGETATION ON BOTH SIDES OF THE BRIDGE.
20. PLACE HMA BASE COURSE, INSTALL GUARDRAIL, PAVE WEARING COURSE AND COMPLETE LINE STRIPING.
21. REMOVE EROSION CONTROLS AND DETOUR SIGNAGE AND OPEN ROADWAY AND BRIDGE TO TRAFFIC.

CHAPTER 85 SECTION 35 REVIEW AND APPROVAL:

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

TRAFFIC DATA	ROADWAY OVER	ROADWAY UNDER
DESIGN YEAR	2040	
AVERAGE DAILY TRAFFIC – PRESENT	3660	
AVERAGE DAILY TRAFFIC – DESIGN YEAR	4465	
DESIGN HOURLY VOLUME	401	
DIRECTIONAL DISTRIBUTION	69% SB	
TRUCK PERCENTAGE – AVERAGE DAY	6%	
TRUCK PERCENTAGE – PEAK HOUR	0.66%	
DESIGN SPEED	30 MPH	
DIRECTIONAL DESIGN HOURLY VOLUME	277	

SEISMIC DESIGN CRITERIA	
DESIGN RETURN PERIOD:	1000
DESIGN SPECTRA	
As	0.128
SDs	0.285
SD1	0.156
SITE CLASS	D
SEISMIC DESIGN CATEGORY (SDC)	B

HYDRAULIC DESIGN DATA	
DRAINAGE AREA (SQ. MILES)	2.81
DESIGN FLOOD DISCHARGE (C.F.S.)	155
DESIGN FLOOD FREQUENCY (YEARS)	10
DESIGN FLOOD VELOCITY (F.P.S.)	4.38
DESIGN FLOOD ELEVATION (FEET, NAVD)	394.38
BASE (100-YEAR) FLOOD DATA	
BASE FLOOD DISCHARGE (C.F.S.)	565
BASE FLOOD ELEVATION (FEET, NAVD)	397.49
DESIGN AND CHECK SCOUR DATA	
DESIGN SCOUR FLOOD EVENT RETURN FREQUENCY (YEARS)	25
DESIGN FLOOD ABUTMENT SCOUR DEPTH (FEET)	N/A
DESIGN FLOOD PIER SCOUR DEPTH (FEET)	N/A
CHECK SCOUR FLOOD EVENT RETURN FREQUENCY (YEARS)	50
CHECK FLOOD ABUTMENT SCOUR DEPTH (FEET)	N/A
CHECK FLOOD PIER SCOUR DEPTH (FEET)	N/A
FLOOD OF RECORD	
DISCHARGE (C.F.S.)	UNKNOWN
FREQUENCY (IF KNOWN, YEARS)	UNKNOWN
MAXIMUM ELEVATION (FEET, NAVD)	UNKNOWN
DATE (MM/YYYY)	UNKNOWN
HISTORY OF ICE FLOES	NONE
EVIDENCE OF SCOUR AND EROSION	MINOR*

* EVIDENCE OF SCOUR HOLE UNDER STRUCTURE. PROPOSED BOX CULVERT IS SCOUR RESISTANT.

TEMPORARY WATER CONTROL DESIGN DATA	
DESIGN FLOOD DISCHARGE (C.F.S.)	40
DESIGN FLOOD FREQUENCY (YEARS)	2
DESIGN FLOOD VELOCITY (F.P.S.)	4.7
DESIGN FLOOD ELEVATION (FEET, NAVD)**	397.23

** CONTRACTOR MUST HAVE CORRESPONDENCE WITH DOROTHY POND DAM OWNERS THROUGHOUT THE CONSTRUCTION TO MAINTAIN A POND LEVEL OF 394.0 OR LOWER. THE TEMPORARY DESIGN FLOOD ELEVATION OF 397.23 IS AT THE UPSTREAM LOCATION OF THE TEMPORARY WATER CONTROL SYSTEM.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi (Oct 7, 2024 13:50 EDT)
DISTRICT 3 BRIDGE ENGINEER — DATE

Project:

TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER DOROTHY POND

CULVERT REPLACEMENT

Weston & Sampson

Weston & Sampson Engineers, Inc.
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal:

COMMONWEALTH OF MASSACHUSETTS
SCOTT R. BRUSO
STRUCTURAL
No. 48061
REGISTERED PROFESSIONAL ENGINEER
2024.10.02 18:41:14-04'00'

Issued For:

BIDDING

Scale: AS NOTED

Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title:

GENERAL NOTES

Sheet Number:

S-2

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BORING NUMBER: B-1
PAGE 1 OF 2

Weston & Sampson

CLIENT: Town of Millbury
PROJECT NUMBER: 2180493
PROJECT NAME: Wheelock Avenue Bridge Replacement
PROJECT LOCATION: Millbury, Massachusetts

DRILLER: Darwin Newton - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi / C. Palmer, P.E.
RIG TYPE / DRILLING METHODS: Truck / hollow-stem auger (HSA)
CASING DIAMETER: 4.25 in. ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: 398 ft. +/- **DATUM:** NAVD88
DRILLING START DATE: 9/24/2018 **END DATE:** 9/24/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
9/24/2018	4.8 ft. +/-	Measured in borehole.

MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)
Mineral Soil: GRAVEL, SAND, SILT, CLAY: >50%; gravelly, sandy, silty, clayey: 35-50%; some: 20-35%; little: 10-20%; trace: 0-10%
Organic Soil: PEAT: 50-100%; organic (soil): 15-50%; with some organics: 5-15%

DEPTH (ft.) / Elevation	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
0 / 398										10" Asphalt Concrete Pavement	
	S-1	1.0	14/24	14 14 9 9	23				FILL	Medium dense, brown, gravelly fine to coarse SAND, trace silt; moist. [FILL]	
	S-2	3.0	9/24	20 14 10 12	24				FILL	Top 6" - Medium dense, brown, fine to coarse SAND, some fine gravel, trace silt; moist. [FILL] Bottom 3" - Gravel-sized rock fragments	- Auger grinding from approximately 4 ft. to 5 ft.
5 / 393	S-3	5.0	8/24	11 9 15 13	24				FILL	Medium dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt; wet. [FILL]	
	S-4	7.0	14/24	8 6 7 8	13				FILL	Medium dense, brown, fine to coarse GRAVEL, some fine to coarse sand, little silt; wet. [FILL]	
10 / 388	S-5	9.0	4/24	13 13 6 2	19				FILL / ORGANIC SILT	Top 1" - Medium dense, brown, fine to coarse GRAVEL, some fine to coarse sand, little silt; wet. [FILL] Bottom 3" - Dark brown, ORGANIC SILT, little fine to medium sand; wet.	
	S-6	11.0	13/24	12 9 6 3	15				ORGANIC SILT / GRAVEL	Top 7" - Stiff, dark brown, ORGANIC SILT, little fine to medium sand; wet. Bottom 6" - Gray, fine to coarse GRAVEL, little fine to coarse sand, little silt; wet.	
15 / 383	S-7	13.0	8/24	5 6 11 31	17				GRAVEL	Medium dense, gray, fine to coarse GRAVEL, some fine to coarse sand, trace silt; wet.	
20 / 378	S-8	20.0	8/24	10 13 20 20	33				GRAVEL	Dense, gray, fine to coarse GRAVEL, some fine to coarse sand, trace silt; wet.	
25											

EL. 393.2
(9/24/2018)

BOTTOM OF WINGWALL
EL. 385.04

SAMPLE SYMBOL	TYPE	GRANULAR SOILS N-Value	Density	COHESIVE SOILS N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:
1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-1**

W&S BORING LOG - DATA TEMPLATE - WSE STANDARD LOGS.GDT - 12/11/18 15:04 - P:\MA\MILLBURY MA\2180493 - WHEELOCK AVENUE\GEOTECHNICAL\FIELD\WHEELOCK AVE BRIDGE GINT LOGS.GPJ

375
370
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BORING NUMBER: B-1
PAGE 2 OF 2

Weston & Sampson

CLIENT: Town of Millbury
PROJECT NUMBER: 2180493
PROJECT NAME: Wheelock Avenue Bridge Replacement
PROJECT LOCATION: Millbury, Massachusetts

DEPTH (ft.) / Elevation	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION	COMMENTS
25 / 373	S-9	25.0	6/24	22 14 29 32	43				GRAVEL	Dense, gray, fine to coarse GRAVEL, little fine to coarse sand, trace silt; wet.	- Possible boulder at 26 ft. based on auger grinding.
30 / 368	S-10	30.0	14/24	66 73 43 27	116				GRAVEL	Very dense, gray, fine to coarse GRAVEL, some fine to coarse sand, little silt; wet.	- Possible boulder at 30 ft. based on auger grinding.

End of boring at 32 ft.

SAMPLE SYMBOL	TYPE	GRANULAR SOILS N-Value	Density	COHESIVE SOILS N-VALUE	CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:
1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **B-1**

BORING/PROBE NOTES:

1. LOCATION OF BORING SHOWN ON THE PLAN THUS BB
2. LOCATION OF PROBES SHOWN ON THE PLAN THUS P-1, P-2, ...
3. BORINGS AND PROBES ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS AND PROBE POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
4. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
5. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" I.D. SPLIT SPOON SAMPLER 24" USING A 140 POUND WEIGHT FALLING 30".
6. BORING SAMPLES ARE STORED AT A STORAGE FACILITY LOCATED ON ROUTE 114 (219 WINTHROP AVE.) LAWRENCE, MA. THE CONTRACTOR MAY EXAMINE THE SOIL AND SAMPLES BY CONTACTING THE MASSDOT GEOTECHNICAL SECTION AT 10 PARK PLAZA, BOSTON, MA.
7. ALL BORINGS WERE MADE IN SEPTEMBER 2018. ALL PROBES WERE MADE IN SEPTEMBER 2018.
8. BORINGS AND PROBES WERE MADE BY TECHNICAL DRILLING SERVICES. (2 PETER DRIVE STERLING, MA 01564)
9. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
DISTRICT 3 BRIDGE ENGINEER — DATE

Project:
TOWN OF MILLBURY
MILLBURY, MA
WHEELOCK AVENUE OVER DOROTHY POND
CULVERT REPLACEMENT

Weston & Sampson
Weston & Sampson Engineers, Inc.
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal: SCOTT R. BRUSO STRUCTURAL No. 48061 REGISTERED PROFESSIONAL ENGINEER, COMMONWEALTH OF MASSACHUSETTS
2024.10.02 18:40:44-04'00'

Issued For: BIDDING

Scale:	AS NOTED
Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title: BORING LOGS

Sheet Number: S-3

Weston & Sampson

BORING NUMBER: **B-2**
PAGE 1 OF 2

CLIENT: Town of Millbury
PROJECT NUMBER: 2180493
PROJECT NAME: Wheelock Avenue Bridge Replacement
PROJECT LOCATION: Millbury, Massachusetts

DRILLER: Darwin Newton - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi / C. Palmer, P.E.
RIG TYPE / DRILLING METHODS: Truck / hollow-stem auger (HSA)
CASING DIAMETER: 4.25 in. ID
SAMPLING METHODS: Standard penetration test (SPT)
SAMPLER TYPE: Standard 24" long x 2" OD (1-3/8" ID) split-spoon
SAMPLER HAMMER: 140-lb. automatic hammer
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: 398 ft. +/-
DATUM: NAVD88
DRILLING START DATE: 9/24/2018
END DATE: 9/24/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
9/24/2018	5.5 ft. +/-	Measured in borehole.

DEPTH (ft.) / Elevation	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0 / 398										8" Asphalt Concrete Pavement	
	S-1	1.0	11/24	7 13 25 13	38				FILL	Dense, brown, sandy fine to coarse GRAVEL, trace silt; moist. [FILL]	
	S-2	3.0	10/24	13 20 11 5	31					Dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt; moist. [FILL]	
5 / 393	S-3	5.0	11/24	6 5 6 7	11					Medium dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt; wet. [FILL]	
	S-4	7.0	14/24	8 8 8 7	16					Medium dense, brown, fine to coarse GRAVEL, some fine to coarse sand, little silt; wet. [FILL]	
	S-5	9.0	11/24	10 9 19 33	28					Top 6" - Medium dense, brown, sandy fine to coarse GRAVEL, little silt; wet. [FILL]	
10 / 388										Bottom 5" - Medium dense, dark brown, fine to coase GRAVEL, some fine to coarse sand, little silt; wet.	
	S-6	11.0	14/24	24 33 28 36	61					Very dense, white and brown, fine to coarse GRAVEL, some fine to coarse sand, trace silt; wet.	
15 / 383	S-7	15.0	20/24	22 36 52 61	88				GRAVEL	Very dense, gray, sandy fine to coarse GRAVEL, trace silt; wet.	
20 / 378	S-8	20.0	19/24	40 29 22 13	51					Very dense, gray, gravelly fine to coarse SAND, little silt; wet.	- Auger grinding on possible boulder from approximately 19 ft. to 20 ft.
25											

SAMPLE		GRANULAR SOILS		COHESIVE SOILS		GENERAL NOTES:
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY	1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
S	Split spoon	0-4	Very Loose	< 2	Very Soft	
ST	Shelby tube	4-10	Loose	2-4	Soft	2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff	
NX	Rock core	30-50	Dense	8-15	Stiff	
GP	Direct push	> 50	Very Dense	15-30	Very Stiff	
				> 30	Hard	

BORING NUMBER: **B-2**

400 395 390 385 380 375 370

375 370 365

EL. 392.5 (9/24/2018)

BOTTOM OF WINGWALL EL. 385.04

Weston & Sampson

BORING NUMBER: **B-2**
PAGE 2 OF 2

CLIENT: Town of Millbury
PROJECT NUMBER: 2180493
PROJECT NAME: Wheelock Avenue Bridge Replacement
PROJECT LOCATION: Millbury, Massachusetts

DEPTH (ft.) / Elevation	TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
25 / 373	S-9	25.0	18/24	8 15 21 50	36				GRAVEL	Dense, gray, fine to coarse GRAVEL, little fine to coarse sand, trace silt; wet.	
30 / 368	S-10	30.0	8/24	17 16 15 35	31					Dense, gray, fine to coarse GRAVEL, trace fine to coarse sand, trace silt; wet.	
										End of boring at 32 ft.	

SAMPLE		GRANULAR SOILS		COHESIVE SOILS		GENERAL NOTES:
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY	1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
S	Split spoon	0-4	Very Loose	< 2	Very Soft	
ST	Shelby tube	4-10	Loose	2-4	Soft	2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff	
NX	Rock core	30-50	Dense	8-15	Stiff	
GP	Direct push	> 50	Very Dense	15-30	Very Stiff	
				> 30	Hard	

BORING NUMBER: **B-2**

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi (Oct 1, 2024 13:57 EDT)
DISTRICT 3 BRIDGE ENGINEER — DATE

BRIDGE SHEET 4 OF 13 BRIDGE NO. M-22-022 (CPC)

Project:
TOWN OF MILLBURY
MILLBURY, MA
WHEELOCK AVENUE OVER DOROTHY POND
CULVERT REPLACEMENT

Weston & Sampson Engineers, Inc.
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal:
COMMONWEALTH OF MASSACHUSETTS
SCOTT R. BRUSO
STRUCTURAL
No. 48061
REGISTERED PROFESSIONAL ENGINEER
2024.10.02 18:40:13-04'00'

Issued For:
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Scale: AS NOTED

Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title:
BORING LOGS

Sheet Number:
S-4

Weston & Sampson

BORING NUMBER: P-1

PAGE 1 OF 1

CLIENT: Town of Millbury
PROJECT NUMBER: 2180493
PROJECT NAME: Wheelock Avenue Bridge Replacement
PROJECT LOCATION: Millbury, Massachusetts

DRILLER: Darwin Newton - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi / C. Palmer, P.E.
RIG TYPE / DRILLING METHODS: Truck / hollow-stem auger (HSA)
CASING DIAMETER: 4.25 in. ID
SAMPLING METHODS: No soil sampling conducted
SAMPLER TYPE:
SAMPLER HAMMER:
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: 398 ft. +/- **DATUM:** NAVD88
DRILLING START DATE: 9/24/2018 **END DATE:** 9/24/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
	5.5 ft. +/-	Measured in borehole.

DEPTH (ft.) / Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0 / *398*										8" Asphalt Concrete Pavement	
										Brown, sandy fine to coarse GRAVEL, trace silt; moist. [FILL]	- Soil description based on auger cuttings.
5 / *393*										▼	

Mineral Soil: GRAVEL, SAND, SILT, CLAY: >50%; gravelly, sandy, silty, clayey: 35-50%; some: 20-35%; little: 10-20%; trace: 0-10%

Organic Soil: PEAT: 50-100%; organic (soil): 15-50%; with some organics: 5-15%

End of probe at 9 ft.

SAMPLE SYMBOL	SAMPLE TYPE	GRANULAR SOILS N-Value	GRANULAR SOILS Density	COHESIVE SOILS N-VALUE	COHESIVE SOILS CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **P-1**

Weston & Sampson

BORING NUMBER: P-1A

PAGE 1 OF 1

CLIENT: Town of Millbury
PROJECT NUMBER: 2180493
PROJECT NAME: Wheelock Avenue Bridge Replacement
PROJECT LOCATION: Millbury, Massachusetts

DRILLER: Darwin Newton - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi / C. Palmer, P.E.
RIG TYPE / DRILLING METHODS: Truck / hollow-stem auger (HSA)
CASING DIAMETER: 4.25 in. ID
SAMPLING METHODS: No soil sampling conducted
SAMPLER TYPE:
SAMPLER HAMMER:
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: 398 ft. +/- **DATUM:** NAVD88
DRILLING START DATE: 9/24/2018 **END DATE:** 9/24/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
	5.5 ft. +/-	Measured in borehole.

DEPTH (ft.) / Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0 / *398*										8" Asphalt Concrete Pavement	
										Brown, sandy fine to coarse GRAVEL, trace silt; moist. [FILL]	- Soil description based on auger cuttings.
5 / *393*										▼	- Possible backside of battered concrete wall encountered between 5 ft. to 10 ft. Wall is causing augers to angle.
10 / *388*											
15 / *383*											

Mineral Soil: GRAVEL, SAND, SILT, CLAY: >50%; gravelly, sandy, silty, clayey: 35-50%; some: 20-35%; little: 10-20%; trace: 0-10%

Organic Soil: PEAT: 50-100%; organic (soil): 15-50%; with some organics: 5-15%

End of probe at 15 ft.

SAMPLE SYMBOL	SAMPLE TYPE	GRANULAR SOILS N-Value	GRANULAR SOILS Density	COHESIVE SOILS N-VALUE	COHESIVE SOILS CONSISTENCY
S	Split spoon	0-4	Very Loose	< 2	Very Soft
ST	Shelby tube	4-10	Loose	2-4	Soft
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff
NX	Rock core	30-50	Dense	8-15	Stiff
GP	Direct push	> 50	Very Dense	15-30	Very Stiff
				> 30	Hard

GENERAL NOTES:

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.

2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **P-1A**

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
Mohammed Nabulsi (Oct 7, 2024 13:50 EDT)
DISTRICT 3 BRIDGE ENGINEER — DATE

BRIDGE SHEET 5 OF 13 BRIDGE NO. M-22-022 (CPC)

Project:

TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER DOROTHY POND

CULVERT REPLACEMENT

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100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
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Revisions:

No.	Date	Description

Seal:

COMMONWEALTH OF MASSACHUSETTS
SCOTT R. BRUSO
STRUCTURAL
No. 48061
REGISTERED PROFESSIONAL ENGINEER
2024.10.01 08:39:34-04'00'

Issued For:

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Scale: AS NOTED

Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title:

BORING LOGS

Sheet Number:

S-5

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BORING NUMBER: P-2

PAGE 1 OF 1

CLIENT: Town of Millbury
PROJECT NUMBER: 2180493
PROJECT NAME: Wheelock Avenue Bridge Replacement
PROJECT LOCATION: Millbury, Massachusetts

DRILLER: Darwin Newton - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi / C. Palmer, P.E.
RIG TYPE / DRILLING METHODS: Truck / hollow-stem auger (HSA)
CASING DIAMETER: 4.25 in. ID
SAMPLING METHODS: No soil sampling conducted
SAMPLER TYPE:
SAMPLER HAMMER:
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: 398 ft. +/-
DATUM: NAVD88
DRILLING START DATE: 9/24/2018
END DATE: 9/24/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
	5.5 ft. +/-	Measured in borehole.

DEPTH (ft.) / Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0 *398*										8" Asphalt Concrete Pavement	
									FILL	Brown, sandy fine to coarse GRAVEL, trace silt; moist. [FILL]	- Soil description based on auger cuttings.
5 *393*										Possible Stone Block - Fragment of stone block recovered from auger plug; appears to be flat on top and bottom End of probe at 5.8 ft.	- Auger through 10 in. thick stone block from 5 ft to 5.8 ft.. Penetrate bottom side of stone block at 5.8 ft.

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

SAMPLE		GRANULAR SOILS		COHESIVE SOILS		GENERAL NOTES:
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY	1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
S	Split spoon	0-4	Very Loose	< 2	Very Soft	
ST	Shelby tube	4-10	Loose	2-4	Soft	2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff	
NX	Rock core	30-50	Dense	8-15	Stiff	
GP	Direct push	> 50	Very Dense	15-30	Very Stiff	
				> 30	Hard	

BORING NUMBER: **P-2**

Weston & Sampson

BORING NUMBER: P-3

PAGE 1 OF 1

CLIENT: Town of Millbury
PROJECT NUMBER: 2180493
PROJECT NAME: Wheelock Avenue Bridge Replacement
PROJECT LOCATION: Millbury, Massachusetts

DRILLER: Darwin Newton - Technical Drilling Services
LOGGED / CHECKED BY: M. Zanchi / C. Palmer, P.E.
RIG TYPE / DRILLING METHODS: Truck / hollow-stem auger (HSA)
CASING DIAMETER: 4.25 in. ID
SAMPLING METHODS: No soil sampling conducted
SAMPLER TYPE:
SAMPLER HAMMER:
OTHER:

BORING LOCATION: See attached plan.
GROUND ELEVATION: 398 ft. +/-
DATUM: NAVD88
DRILLING START DATE: 9/24/2018
END DATE: 9/24/2018

GROUNDWATER OBSERVATIONS

DATE	DEPTH	COMMENTS
	5.5 ft. +/-	Measured in borehole.

DEPTH (ft.) / Elevation	SAMPLE INFORMATION: TYPE - NO.	DEPTH (ft.)	REC./PEN. (in.)	SPT BLOWS/6"	SPT N-VALUE	% MOISTURE	% FINES (P200)	GRAPHIC LOG	STRATA NAME	MATERIAL DESCRIPTION (see guide below for soil classification based on constituent percentage)	COMMENTS
0 *398*										8" Asphalt Concrete Pavement	
										Brown, sandy fine to coarse GRAVEL, trace silt; moist. [FILL]	- Soil description based on auger cuttings.
5 *393*										End of probe at 9 ft.	

Mineral Soil
GRAVEL, SAND, SILT, CLAY: >50%
gravelly, sandy, silty, clayey: 35-50%
some: 20-35%
little: 10-20%
trace: 0-10%

Organic Soil
PEAT: 50-100%
organic (soil): 15-50%
with some organics: 5-15%

SAMPLE		GRANULAR SOILS		COHESIVE SOILS		GENERAL NOTES:
SYMBOL	TYPE	N-Value	Density	N-VALUE	CONSISTENCY	1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
S	Split spoon	0-4	Very Loose	< 2	Very Soft	
ST	Shelby tube	4-10	Loose	2-4	Soft	2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.
AG	Auger grab	10-30	Med. Dense	4-8	Med. Stiff	
NX	Rock core	30-50	Dense	8-15	Stiff	
GP	Direct push	> 50	Very Dense	15-30	Very Stiff	
				> 30	Hard	

BORING NUMBER: **P-3**

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
Mohammed Nabulsi (Oct 7, 2024 13:50 EDT)
DISTRICT 3 BRIDGE ENGINEER — DATE

Project:
TOWN OF MILLBURY
MILLBURY, MA
WHEELOCK AVENUE OVER DOROTHY POND
CULVERT REPLACEMENT

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100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
978.532.1900 800.SAMPSON
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Consultants:

Revisions:

No.	Date	Description

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SCOTT R. BRUSO
STRUCTURAL
No. 48061
REGISTERED PROFESSIONAL ENGINEER
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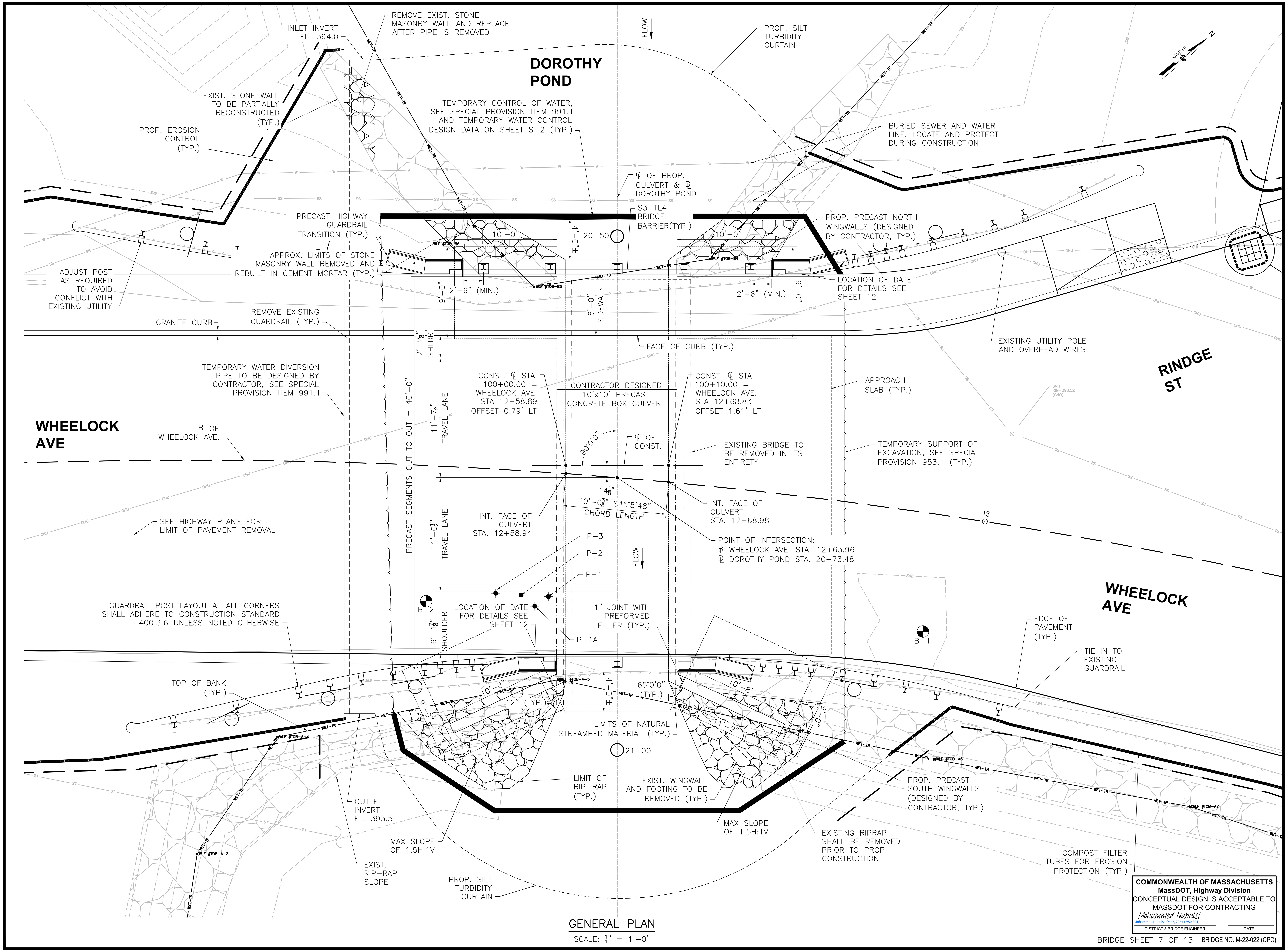
Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title:
BORING LOGS

Sheet Number:
S-6



COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
DISTRICT 3 BRIDGE ENGINEER — DATE

GENERAL PLAN

SCALE: ¼" = 1'-0"

Project:
TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER DOROTHY POND
CULVERT REPLACEMENT

Weston & Sampson
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978.532.1900 800.SAMPSON
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Revisions:

No.	Date	Description

Seal: COMMONWEALTH OF MASSACHUSETTS — SCOTT R. BRUSO — STRUCTURAL — No. 48061 — REGISTERED PROFESSIONAL ENGINEER

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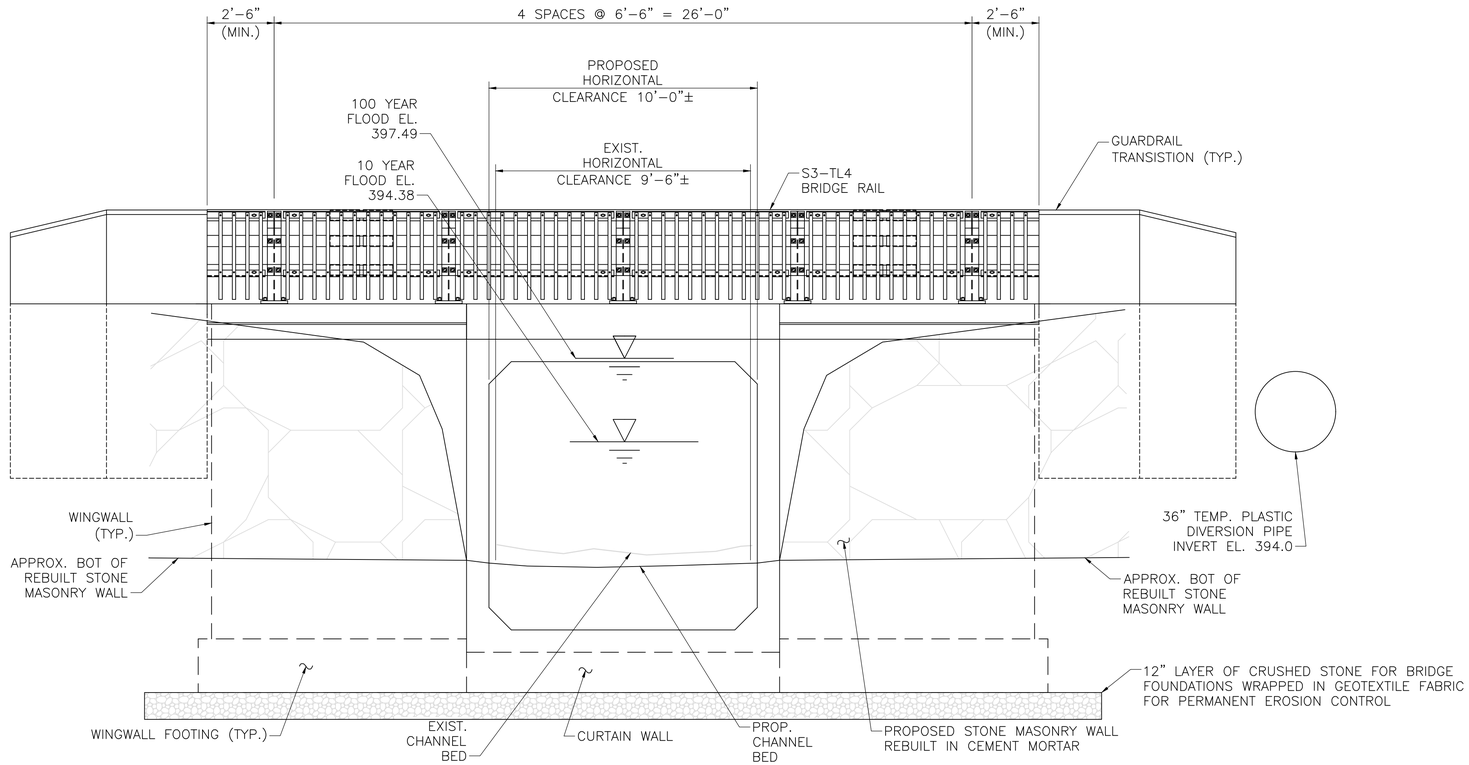
Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

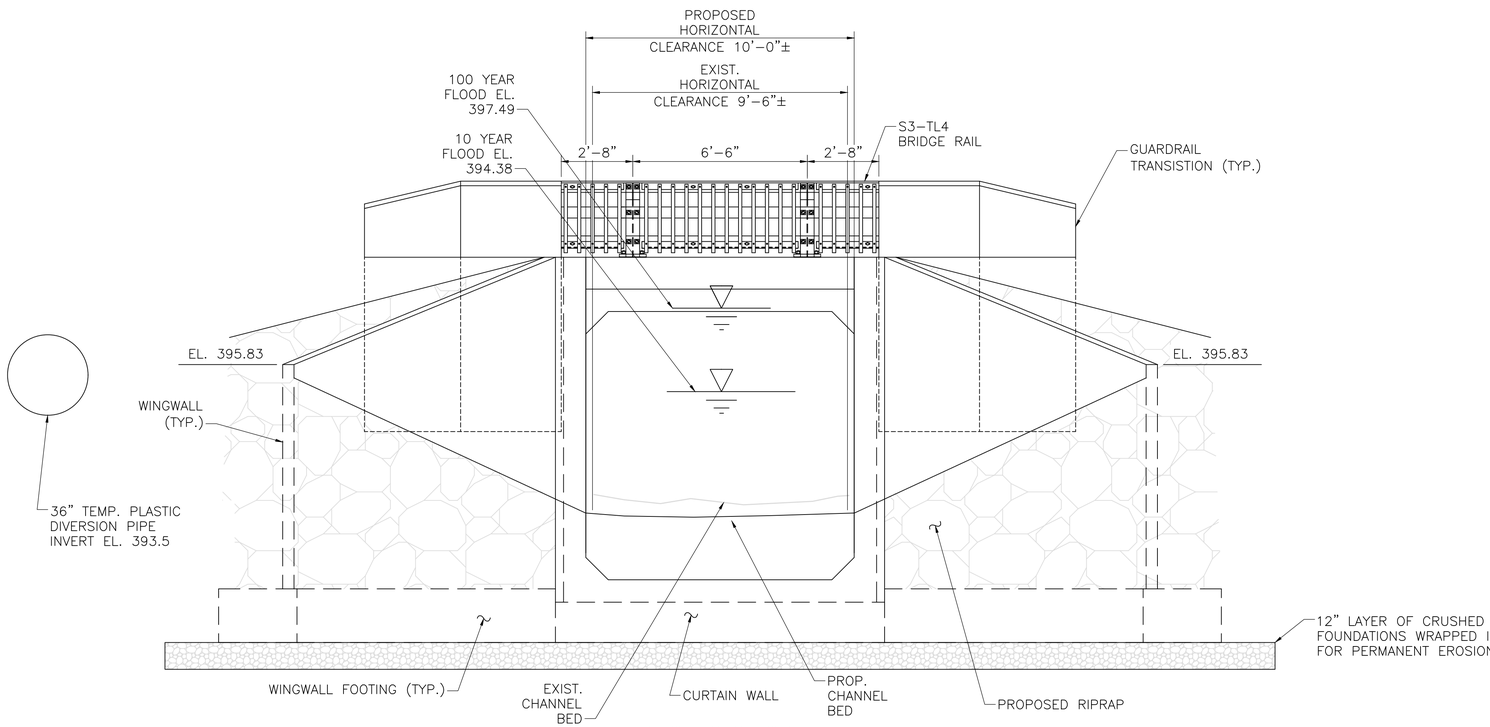
Drawing Title:
GENERAL PLAN

Sheet Number:
S-7



NORTH ELEVATION

SCALE: $\frac{3}{8}$" = 1'-0"



SOUTH ELEVATION

SCALE: $\frac{3}{8}$" = 1'-0"

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
Mohammed Nabulsi (Oct 7, 2024 13:50 EDT)
DISTRICT 3 BRIDGE ENGINEER — DATE

Project:

TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER DOROTHY POND

CULVERT REPLACEMENT

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Scale: AS NOTED

Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB

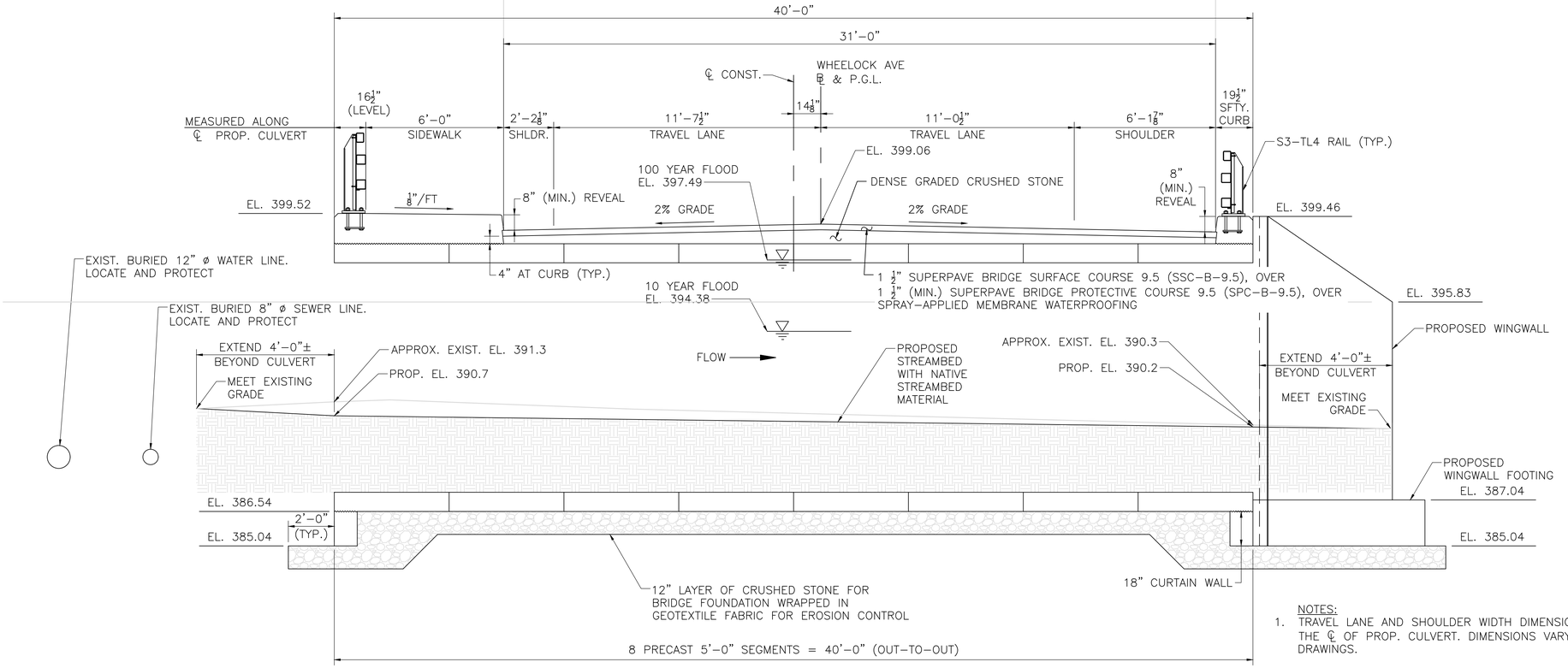
W&S Project No.: 2180493

Drawing Title:

ELEVATIONS

Sheet Number:

S-8

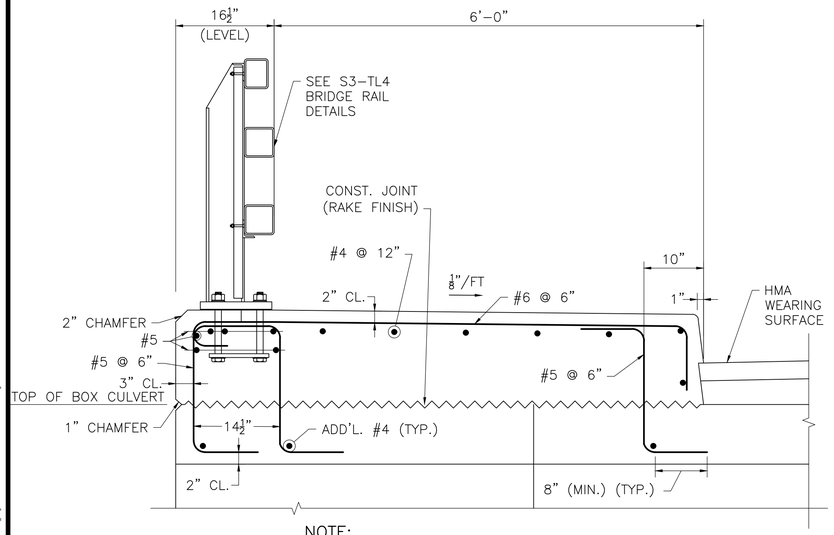


CULVERT LONGITUDINAL SECTION AT ℄ STA 12+63.96 AT ℄ WHEELOCK AVE.

SCALE: ⅜" = 1'-0"

NOTES:

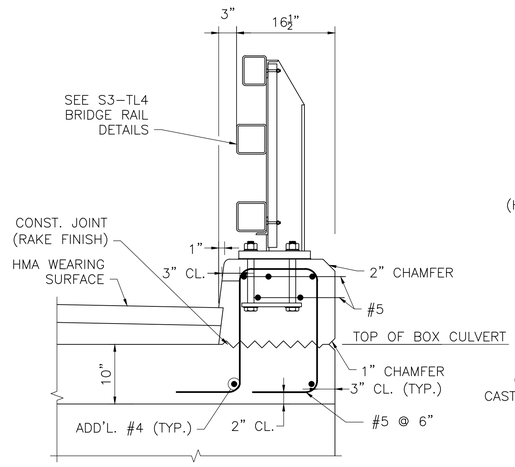
1. TRAVEL LANE AND SHOULDER WIDTH DIMENSIONS ARE TAKEN AT THE ℄ OF PROP. CULVERT. DIMENSIONS VARY, REFER TO HIGHWAY DRAWINGS.
2. THE CULVERT FACTORED BEARING PRESSURE = 1.62 KSF AS PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD COMBINATION. THE FACTORED CULVERT BEARING RESISTANCE FOR STRENGTH LIMIT STATE = 9.4 KSF. THE FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE AND A RESISTANCE FACTOR OF 0.45.
3. CONTRACTOR MAY ELECT TO REDUCE THE SIZE AND NUMBER OF PRECAST UNITS FOR EASIER SHIPPING AND HANDLING.



NOTE:
CULVERT REINFORCEMENT IS NOT SHOWN FOR CLARITY.

CULVERT SIDEWALK END DETAIL

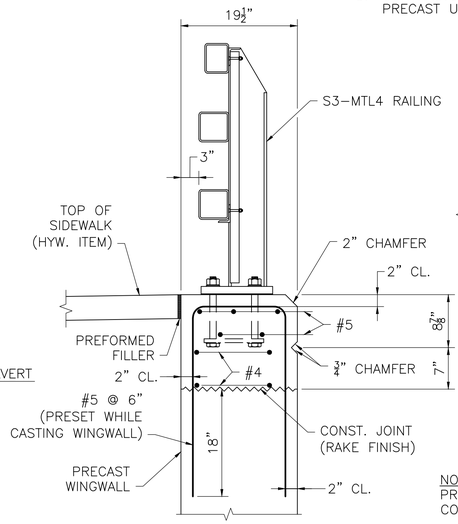
SCALE: 1" = 1'-0"



NOTE:
CULVERT REINFORCEMENT IS NOT SHOWN FOR CLARITY.

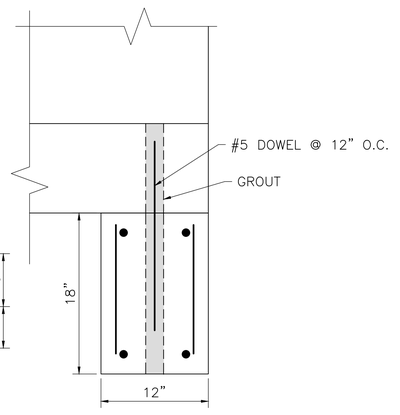
CULVERT SAFETY CURB END DETAIL

SCALE: 1" = 1'-0"



TOP OF NORTH WINGWALL AT SIDEWALK

SCALE: 1" = 1'-0"



NOTE:
PRECAST CONCRETE CURTAIN WALL SHALL BE DESIGNED BY CONTRACTOR.

PRECAST CURTAIN WALL DETAIL

SCALE: 1½" = 1'-0"

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
Mohammed Nabulsi (Oct 7, 2024 13:50 EDT)
DISTRICT 3 BRIDGE ENGINEER — DATE

BRIDGE SHEET 9 OF 13 BRIDGE NO. M-22-022 (CPC)

Project:

TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER DOROTHY POND

CULVERT REPLACEMENT

Weston & Sampson

Weston & Sampson Engineers, Inc.
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
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www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal:

COMMONWEALTH OF MASSACHUSETTS
SCOTT R. BRUSO
STRUCTURAL
No. 48061
REGISTERED PROFESSIONAL ENGINEER
Scott Bruso (Oct 7, 2024 15:15 EDT)

Issued For:

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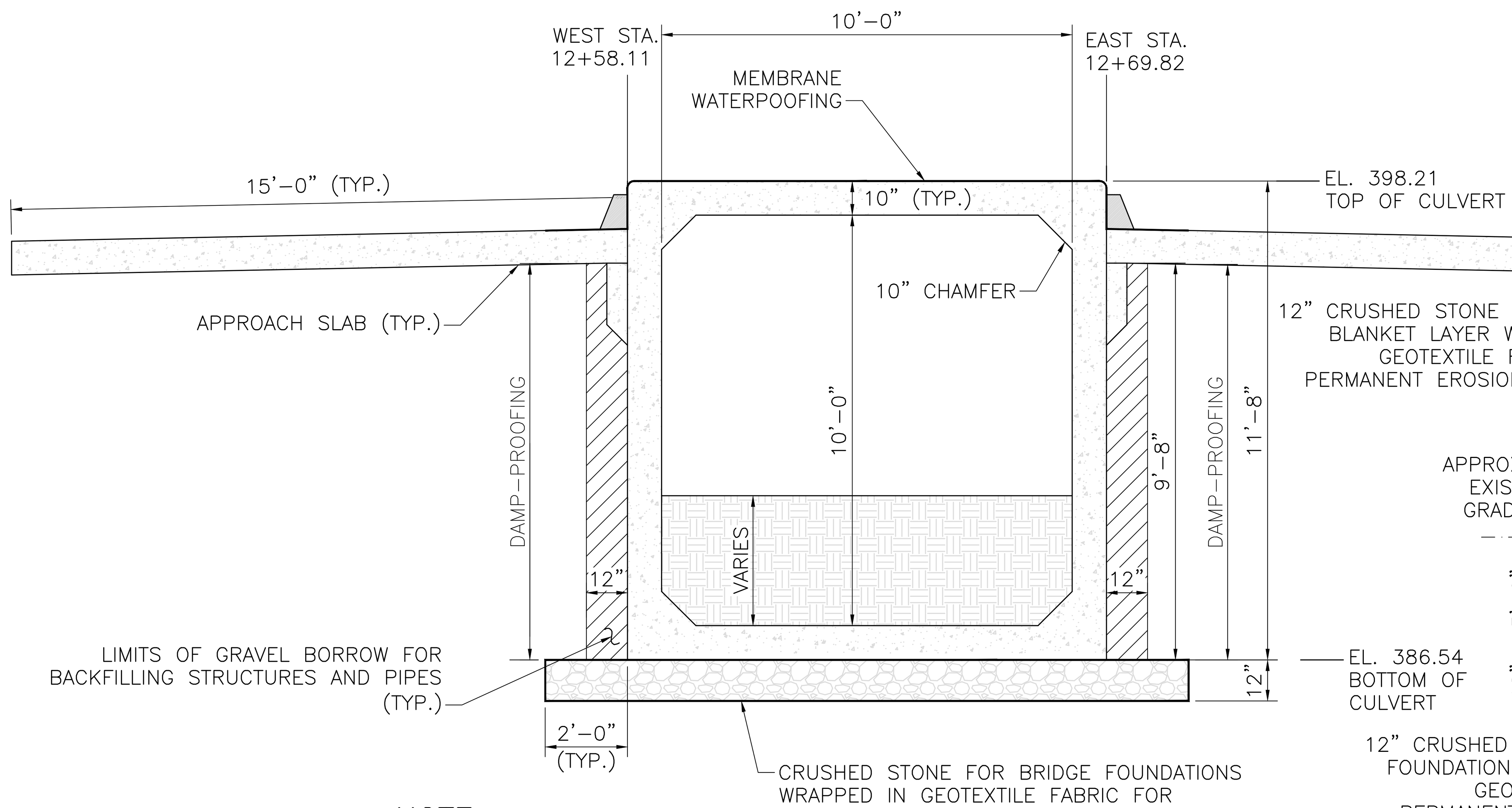
Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title:

CULVERT LONGITUDINAL SECTION & END DETAILS

Sheet Number:

S-9

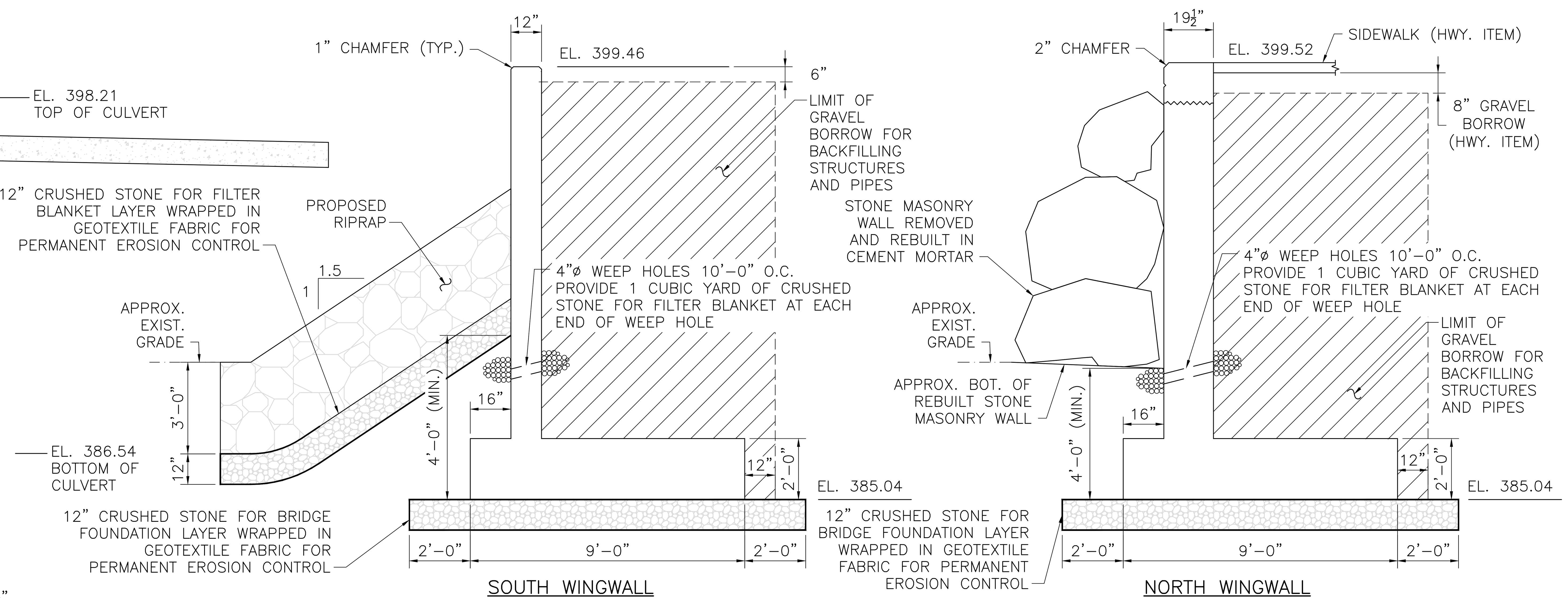


NOTE:

PRECAST CULVERT SECTION FABRICATION AND ERECTION TOLERANCES SHALL BE ±¼".

CULVERT CROSS SECTION

SCALE: 1" = 1'–0"

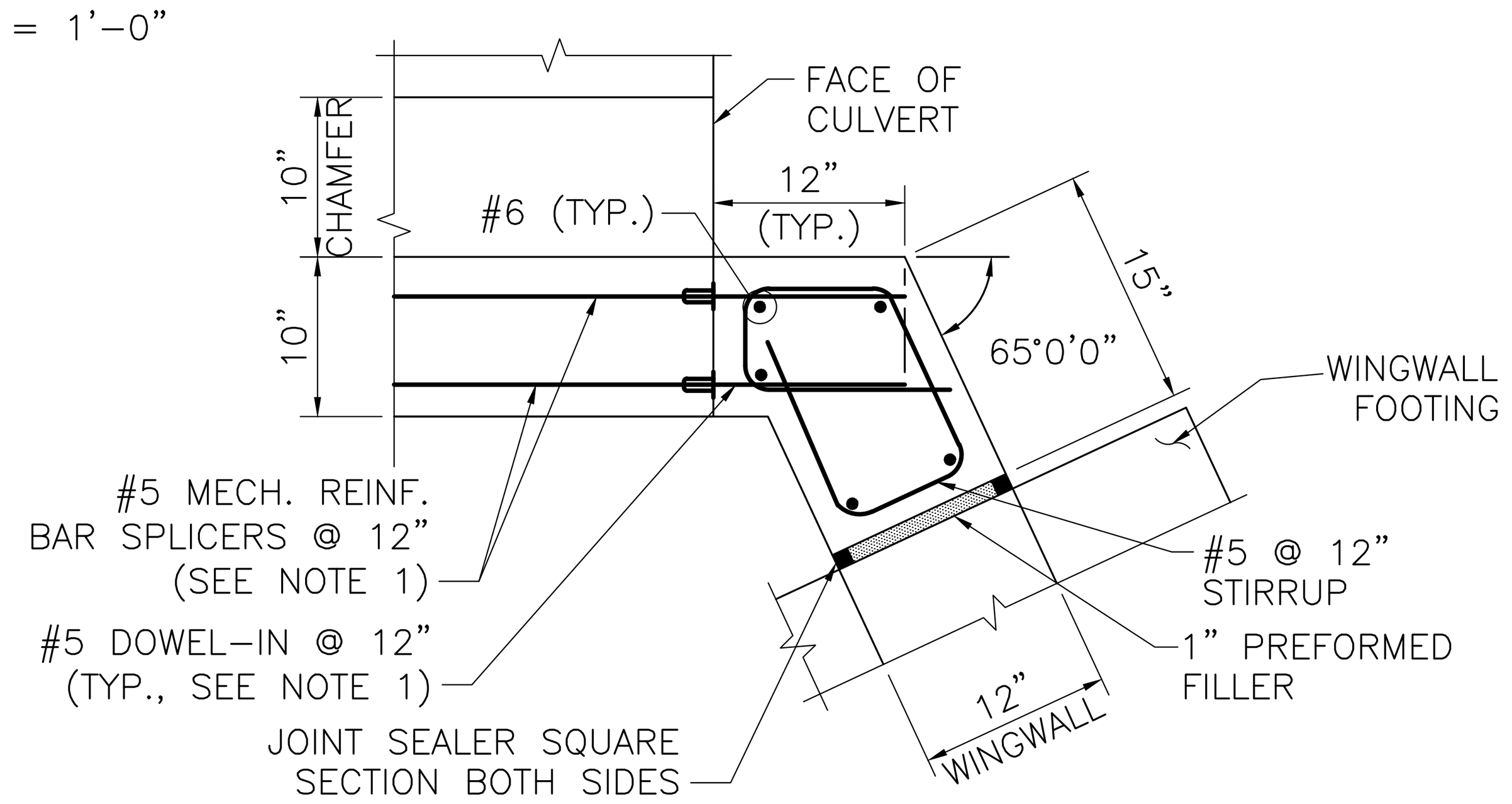


NOTE:

THE FACTORED WINGWALL BEARING PRESSURE = 3.15 KSF AS PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS STRENGTH I LOAD COMBINATION. THE FACTORED BEARING RESISTANCE FOR STRENGTH LIMIT STATE = 7.5 KSF. THE FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE AND A RESISTANCE FACTOR OF 0.45.

PRECAST WINGWALL TYPICAL SECTION

SCALE: ⅜" = 1'–0"

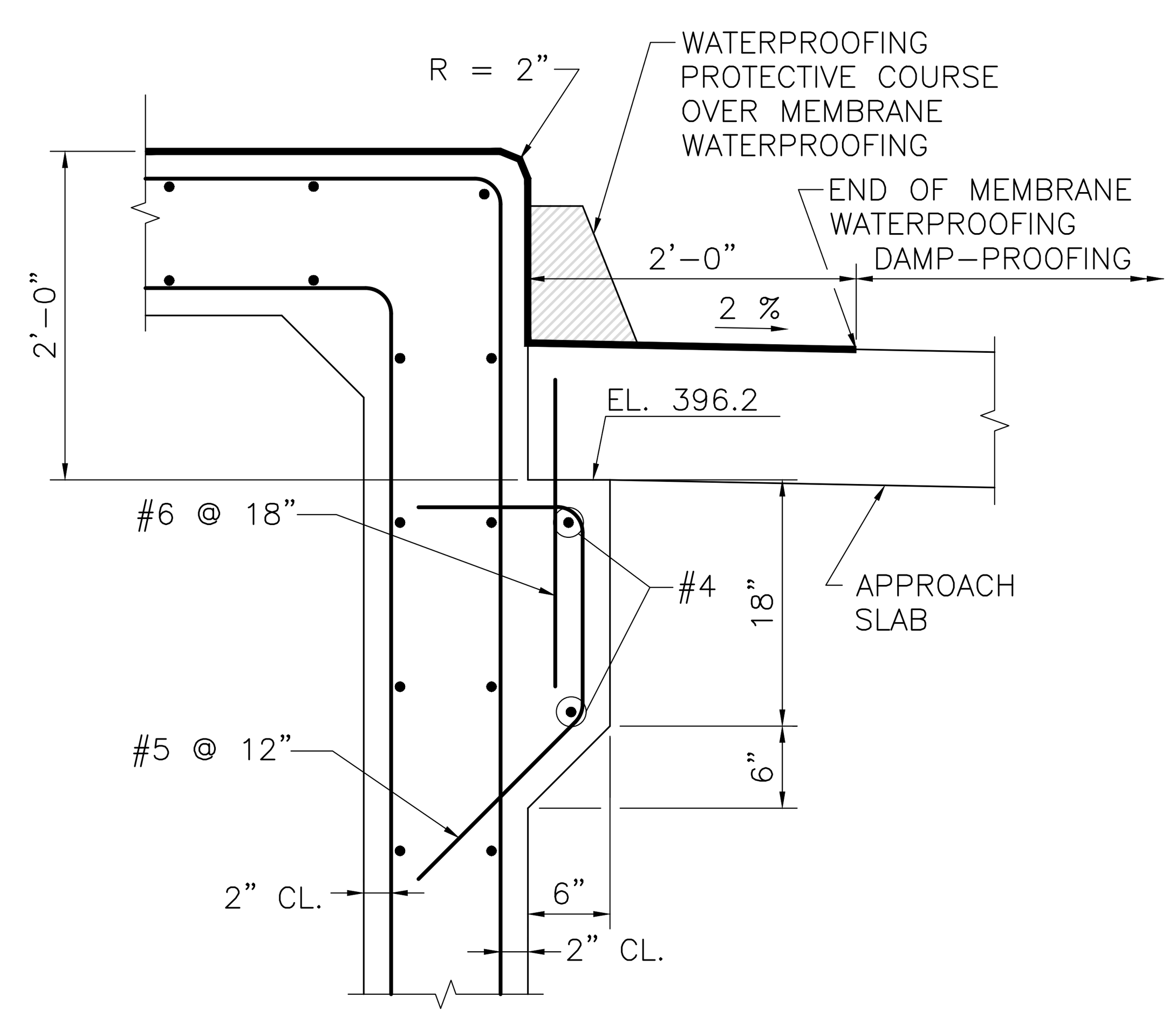


NOTES:

1. THE CONTRACTOR MAY SUBSTITUTE #5 DOWELS, 3'–0" LONG, FOR MECHANICAL REINFORCING BAR SPLICERS AND THREADED REBARS.
2. CULVERT REINFORCEMENT IS NOT SHOWN FOR CLARITY.
3. JOINT DETAILS ARE SIMILAR FOR NORTH WINGWALL.

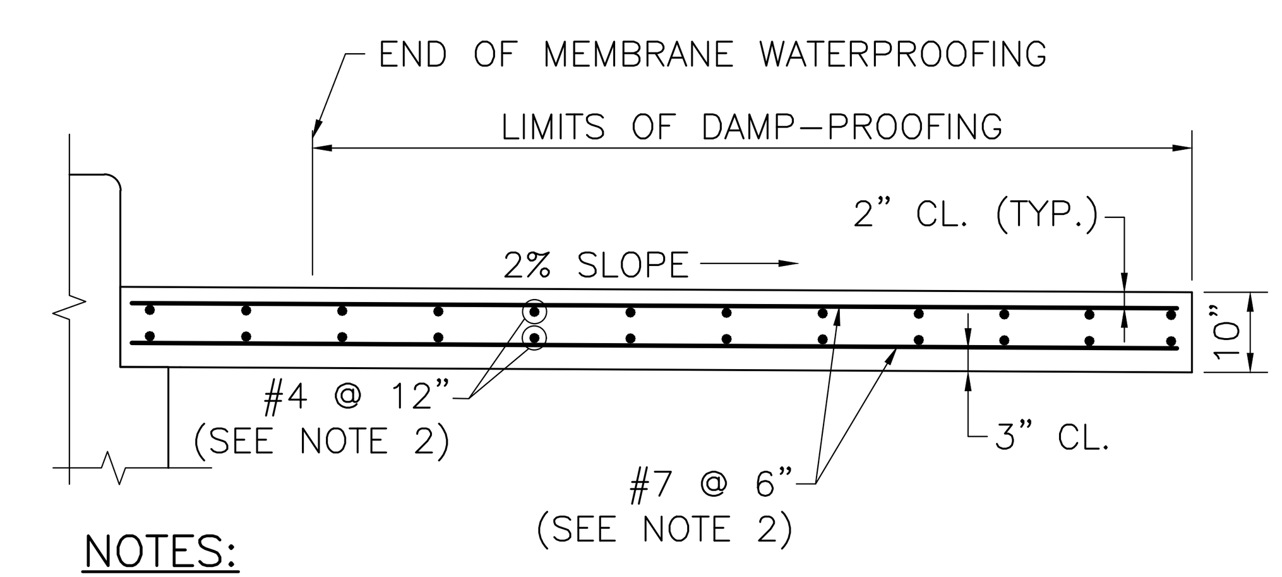
SECTION 2

SCALE: 1" = 1'–0"



PRECAST APPROACH SLAB SHELF – DETAILS

SCALE: 1" = 1'–0"

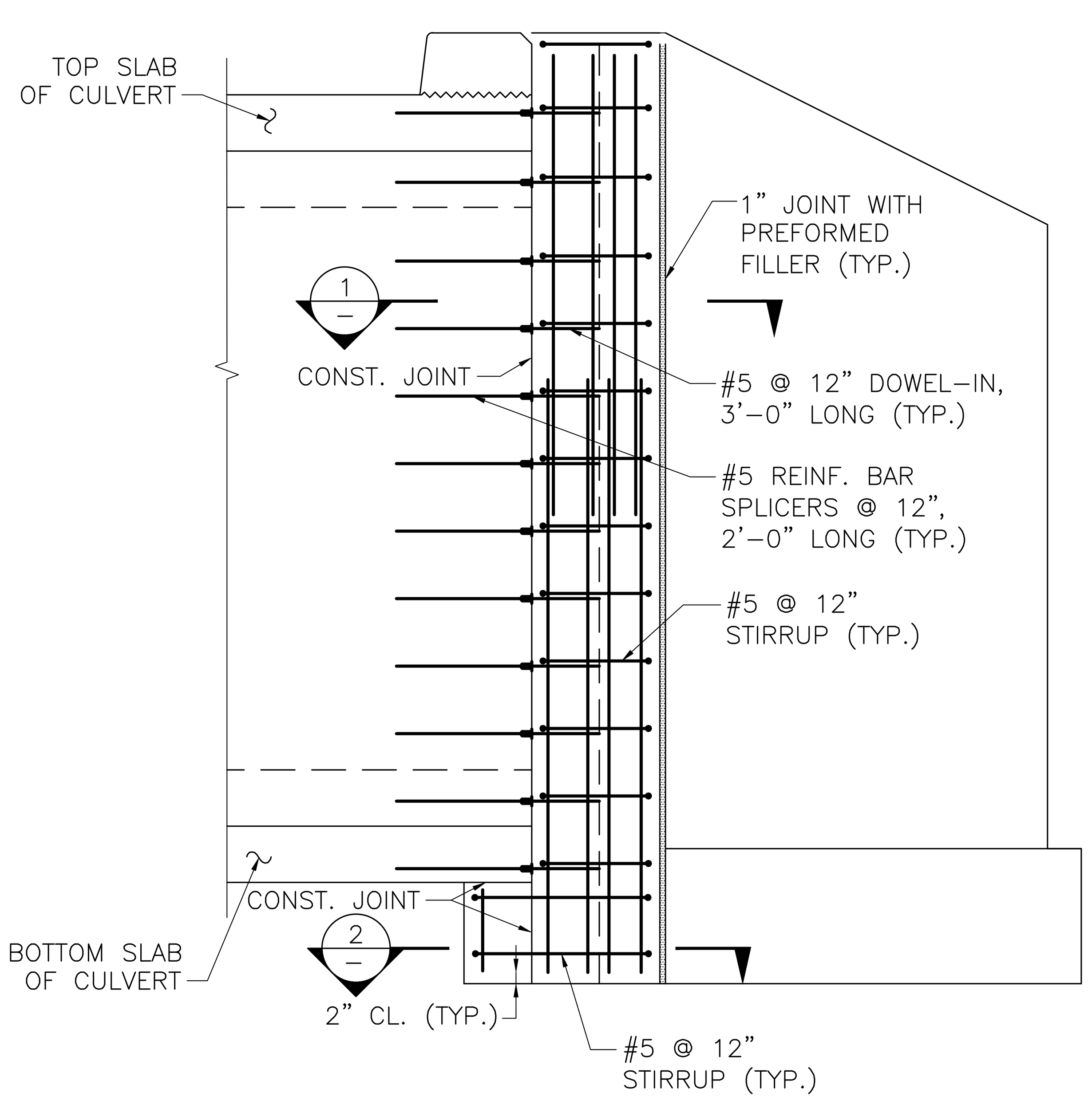


NOTES:

1. APPROACH SLAB TO BE 4000 PSI, 1½ IN, 565 CEMENT CONCRETE.
2. PLACE LONGITUDINAL REINFORCEMENT PARALLEL TO CENTERLINE OF CONSTRUCTION. PLACE TRANSVERSE REINFORCEMENT PARALLEL TO ABUTMENT.

APPROACH SLAB DETAILS

SCALE: ½" = 1'–0"

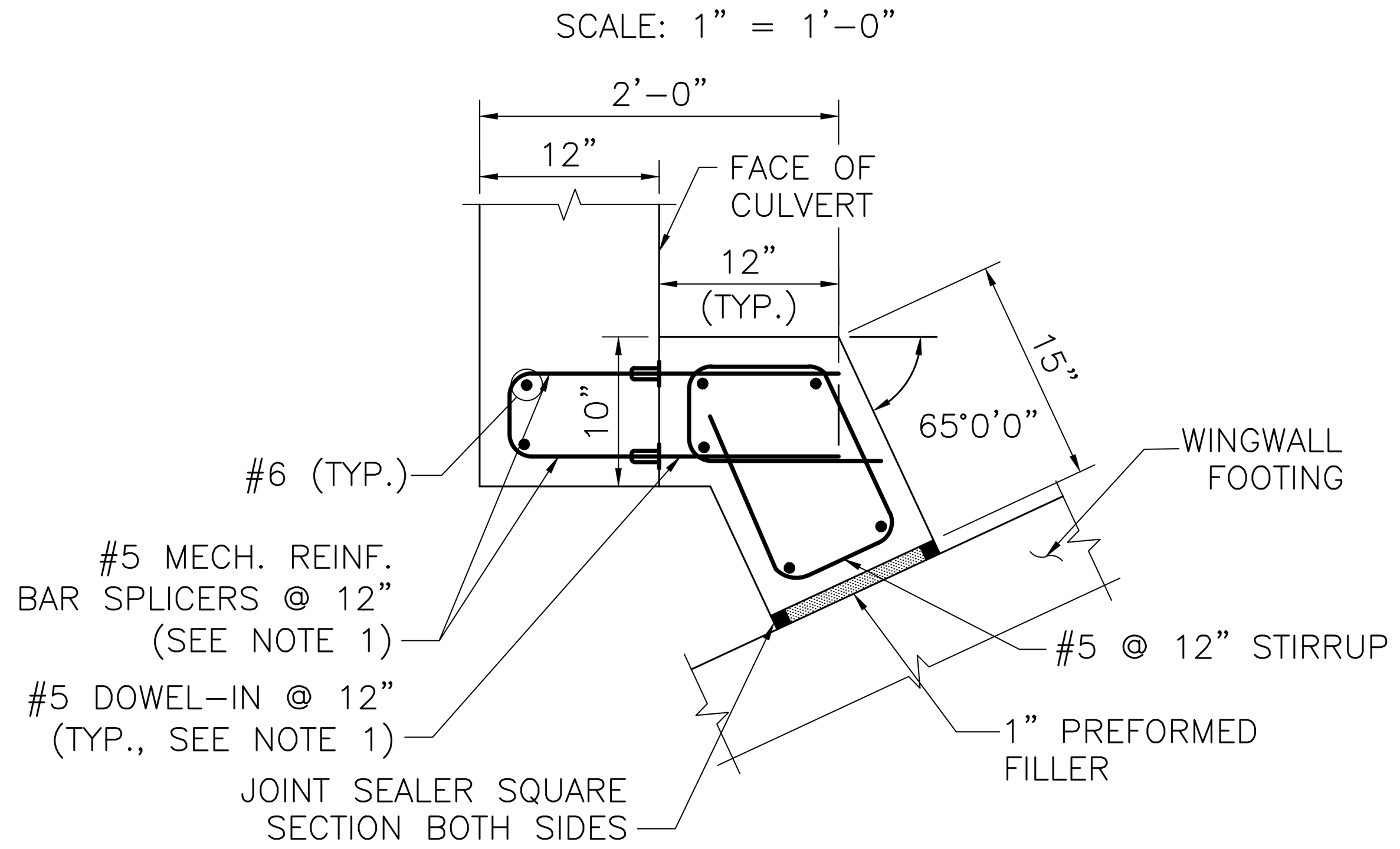


NOTES:

1. THE CONTRACTOR MAY SUBSTITUTE #5 DOWELS, 3'–0" LONG FOR MECHANICAL REINFORCING BAR SPLICERS AND THREADED REBARS.
2. CULVERT REINFORCEMENT IS NOT SHOWN FOR CLARITY.

SECTION AT SOUTH WINGWALL

SCALE: ½" = 1'–0"



NOTES:

1. THE CONTRACTOR MAY SUBSTITUTE #5 DOWELS, 3'–0" LONG, FOR MECHANICAL REINFORCING BAR SPLICERS AND THREADED REBARS.
2. CULVERT REINFORCEMENT IS NOT SHOWN FOR CLARITY.

SECTION 2

SCALE: 1" = 1'–0"

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
DISTRICT 3 BRIDGE ENGINEER | DATE

Project:

TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER DOROTHY POND

CULVERT REPLACEMENT

Weston & Sampson

Weston & Sampson Engineers, Inc.
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
978.532.1900 800.SAMPSON
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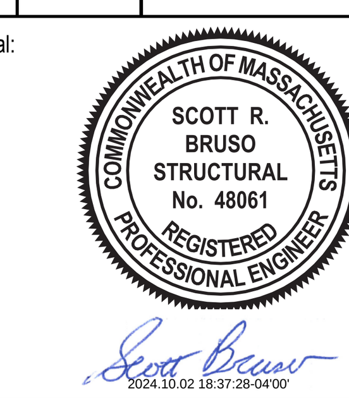
Consultants:

Revisions:

No.	Date	Description

Seal:



COA:

Issued For:

BIDDING

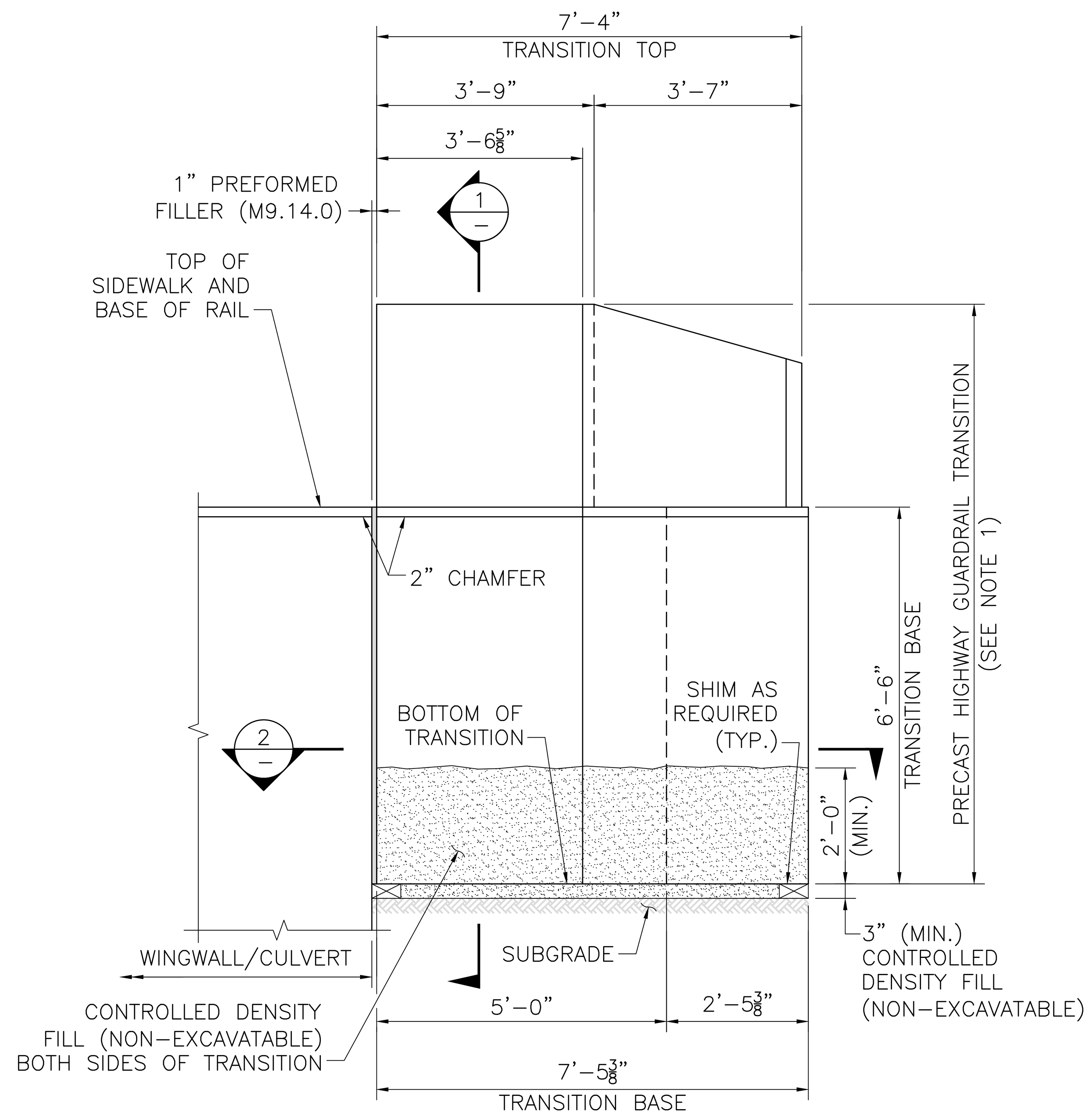
Scale: AS NOTED	
Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title:

CULVERT & WINGWALL DETAILS

Sheet Number:

S-10

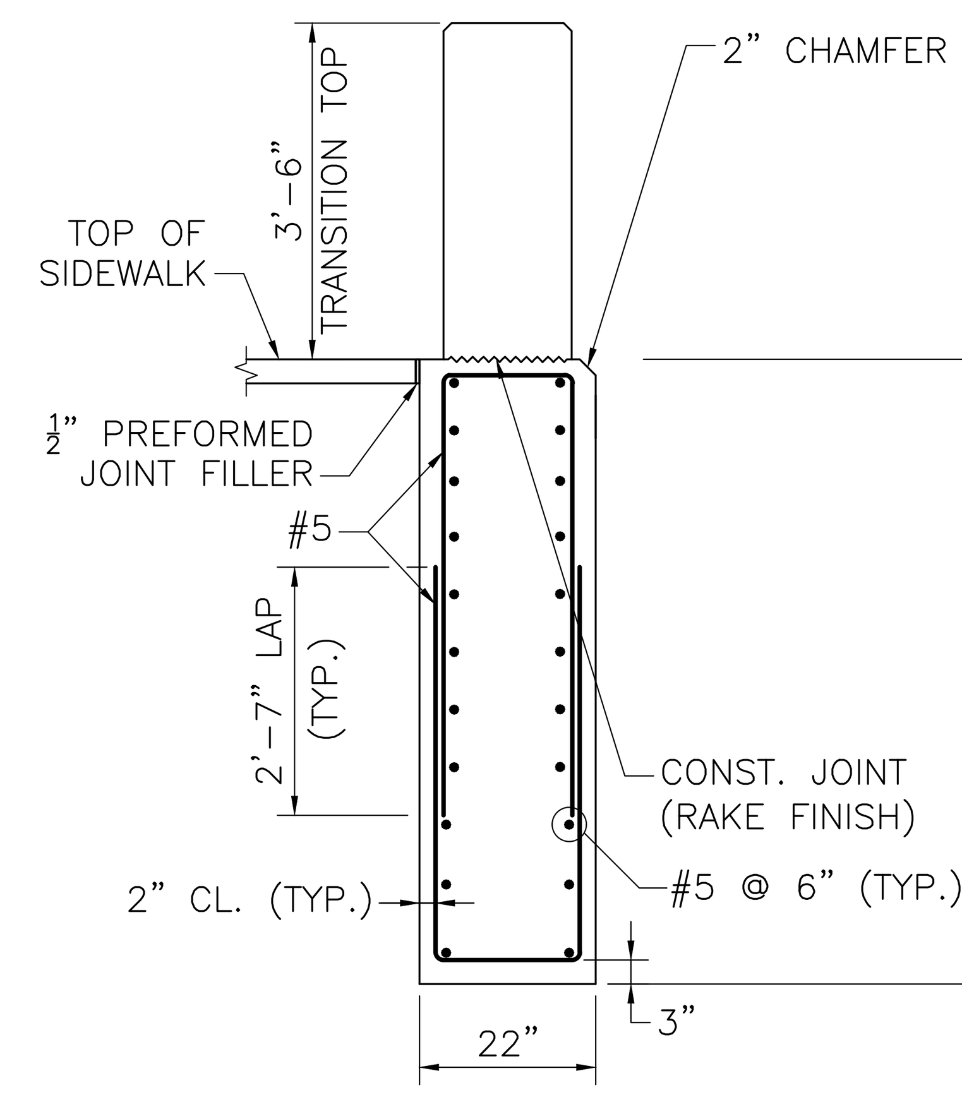


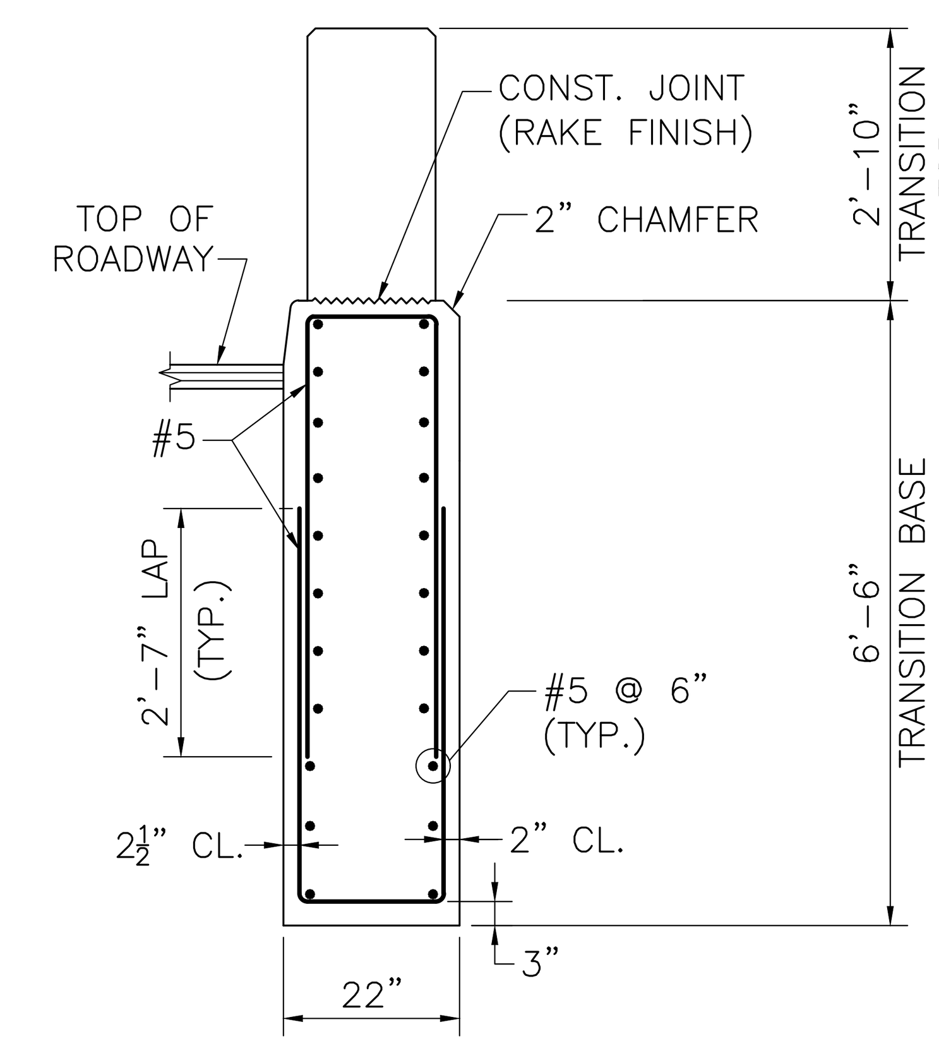
NOTES:

1. PRECAST GUARDRAIL TRANSITION SHALL BE 5000 PSI, ¾ IN, 685 HP CEMENT CONCRETE.
2. GRAVEL BORROW SHALL BE PLACED AND THOROUGHLY COMPACTED TO THE GRADE OF 3" (MIN.) BELOW THE INTENDED BOTTOM OF THE PRECAST GUARDRAIL TRANSITION BASE AND TO A HEIGHT OF 2'-0" (MIN.) ON ALL SIDES OF THE TRANSITION BASE TO FORM A TRENCH IN WHICH TO SET THE TRANSITION. WHERE NO GRAVEL BORROW IS REQUIRED BELOW THE BASE, IT SHALL BE PLACED ON UNDISTURBED SOIL.
3. CONTRACTOR SHALL SET THE PRECAST GUARDRAIL TRANSITION TO THE REQUIRED ELEVATION AND ALIGNMENT, AND BACKILL PRECAST GUARDRAIL TRANSITION WITH CONTROLLED DENSITY FILL (NON-EXCAVATABLE) TO THE ELEVATION SHOWN.
4. THE REST OF REINFORCEMENT IS NOT SHOWN FOR CLARITY.

PRECAST GUARDRAIL TRANSITION
ELEVATION

SCALE: ½" = 1'-0"





NOTES:

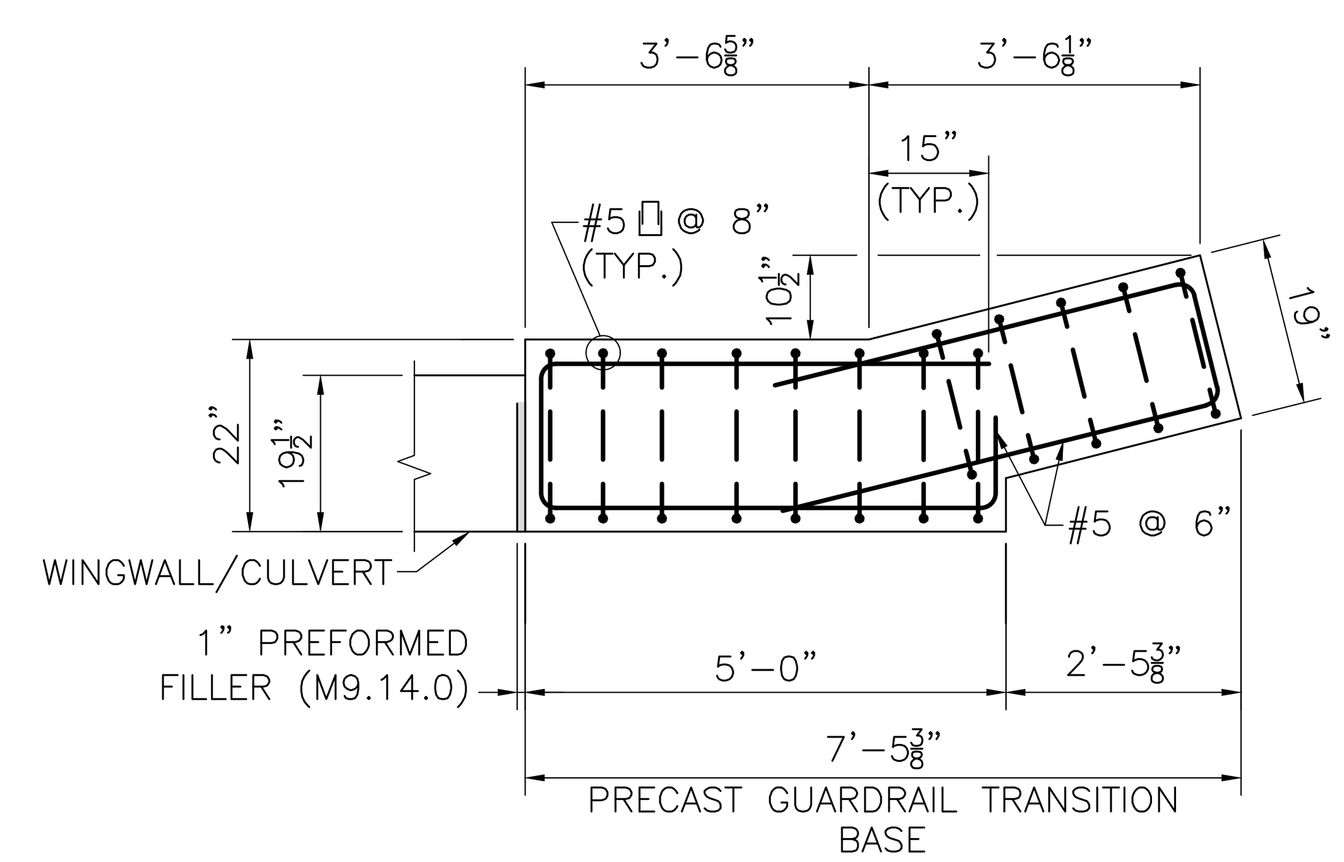
1. REINFORCEMENT OF THE TRANSITION TOP IS NOT SHOWN FOR CLARITY.

SECTION 1 AT SIDEWALK

SCALE: ½" = 1'-0"

SECTION 1 AT SAFETY CURB

SCALE: ½" = 1'-0"



NOTE:

WINGWALL REINFORCEMENT AND STRIATIONS NOT SHOWN FOR CLARITY.

SECTION 2

SCALE: ½" = 1'-0"

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
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Mohammed Nabulsi
DISTRICT 3 BRIDGE ENGINEER | DATE

Project:
TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER
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CULVERT REPLACEMENT

Weston & Sampson
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Seal: SCOTT R. BRUSO STRUCTURAL No. 48061 REGISTERED PROFESSIONAL ENGINEER

Issued For:

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Reviewed By:	CJW
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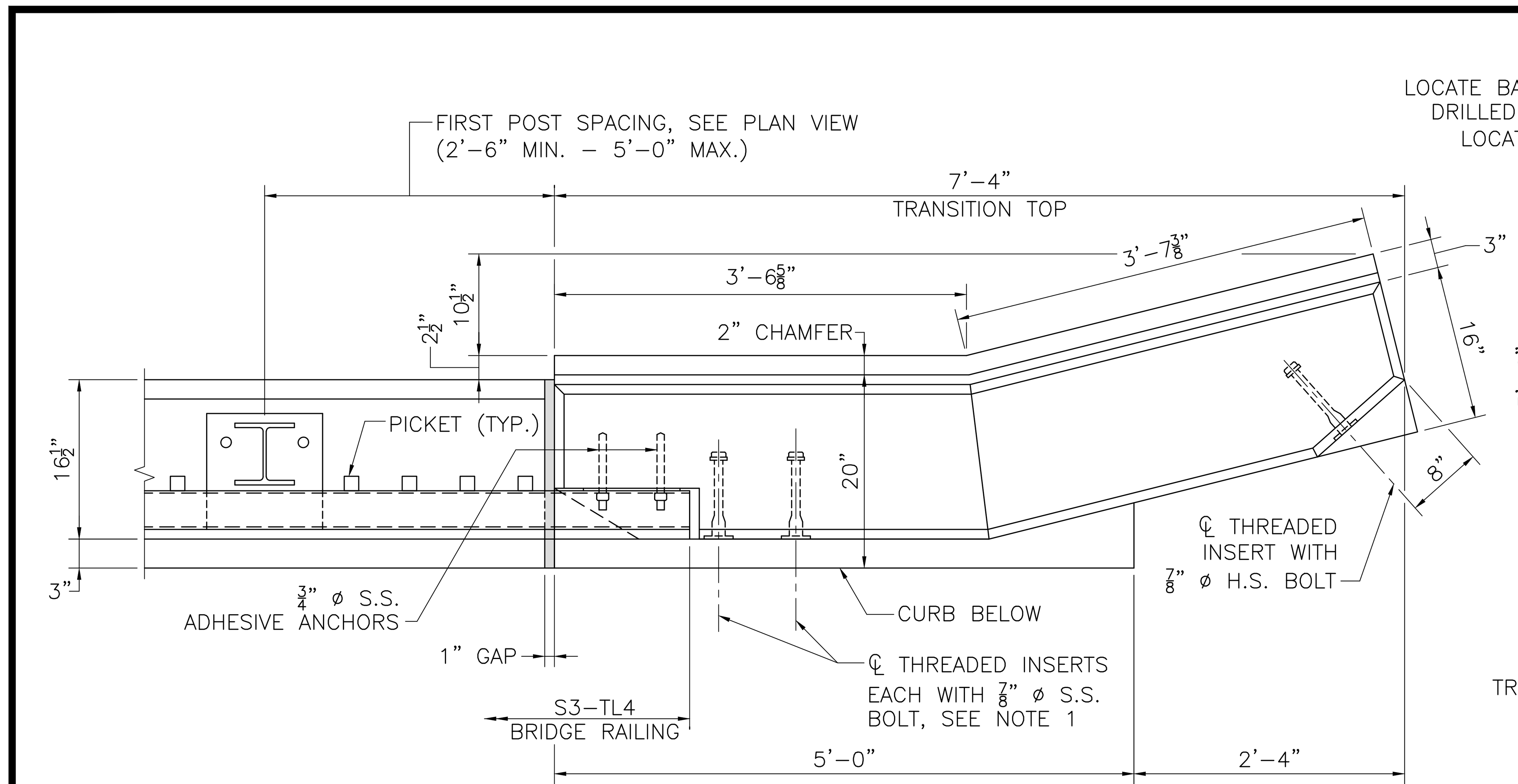
Drawing Title:

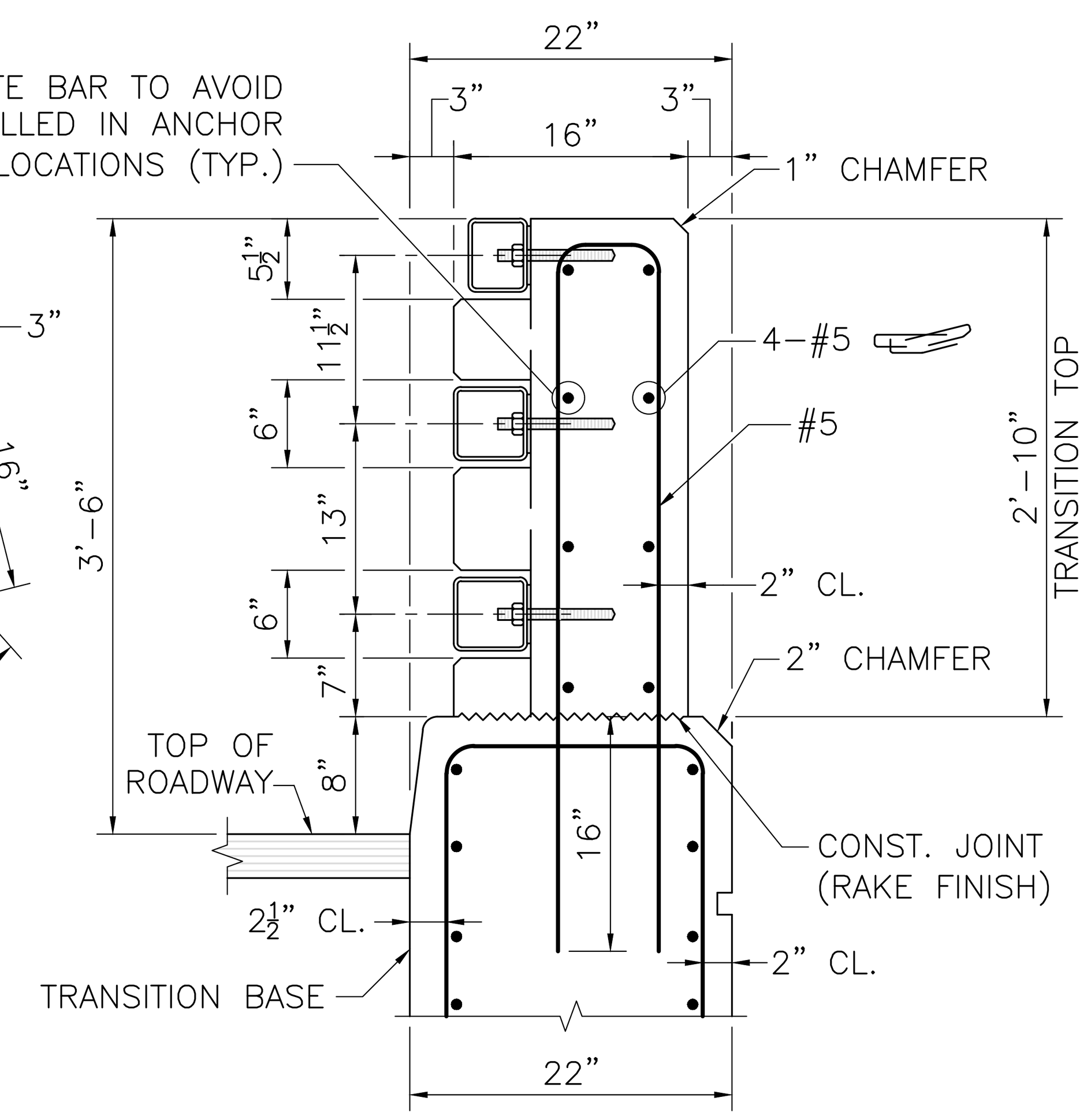
PRECAST GUARDRAIL TRANSITION DETAILS

Sheet Number:

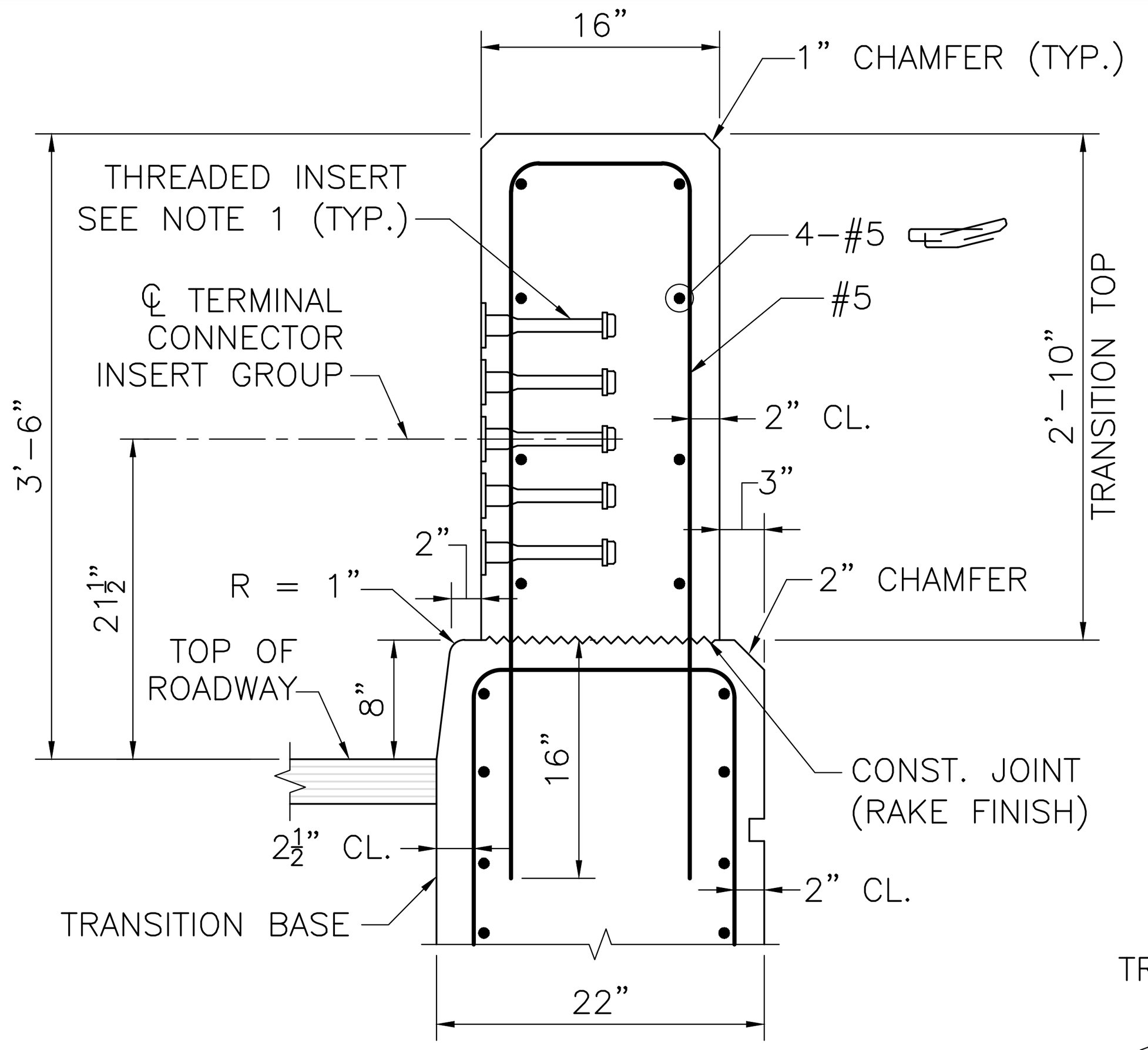
S-11



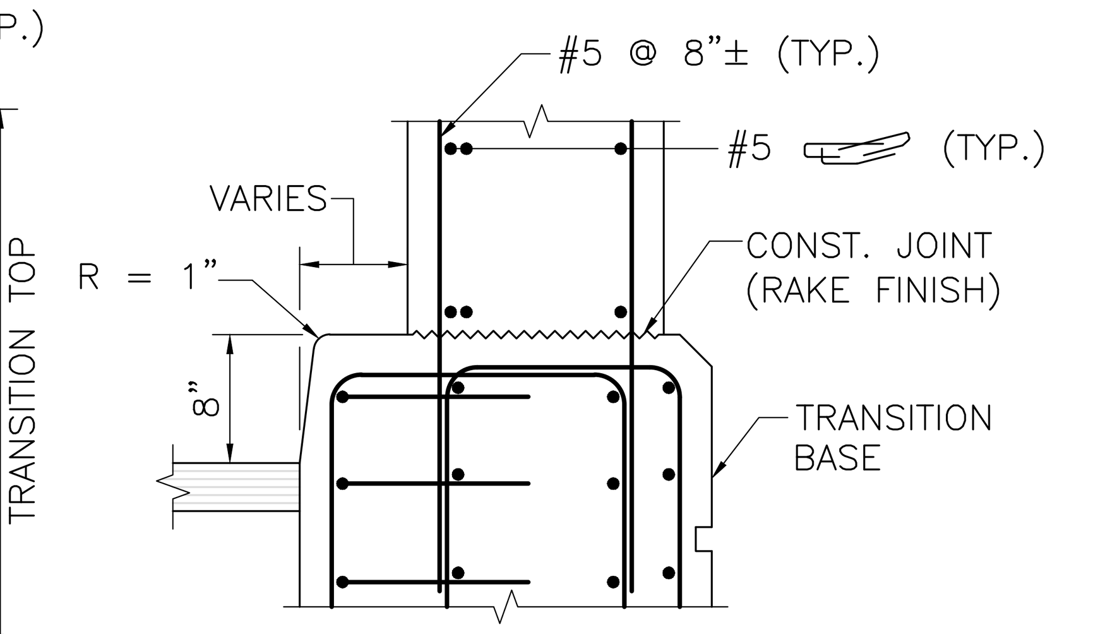
PLAN AT SAFETY CURB
SCALE: 1" = 1'-0"



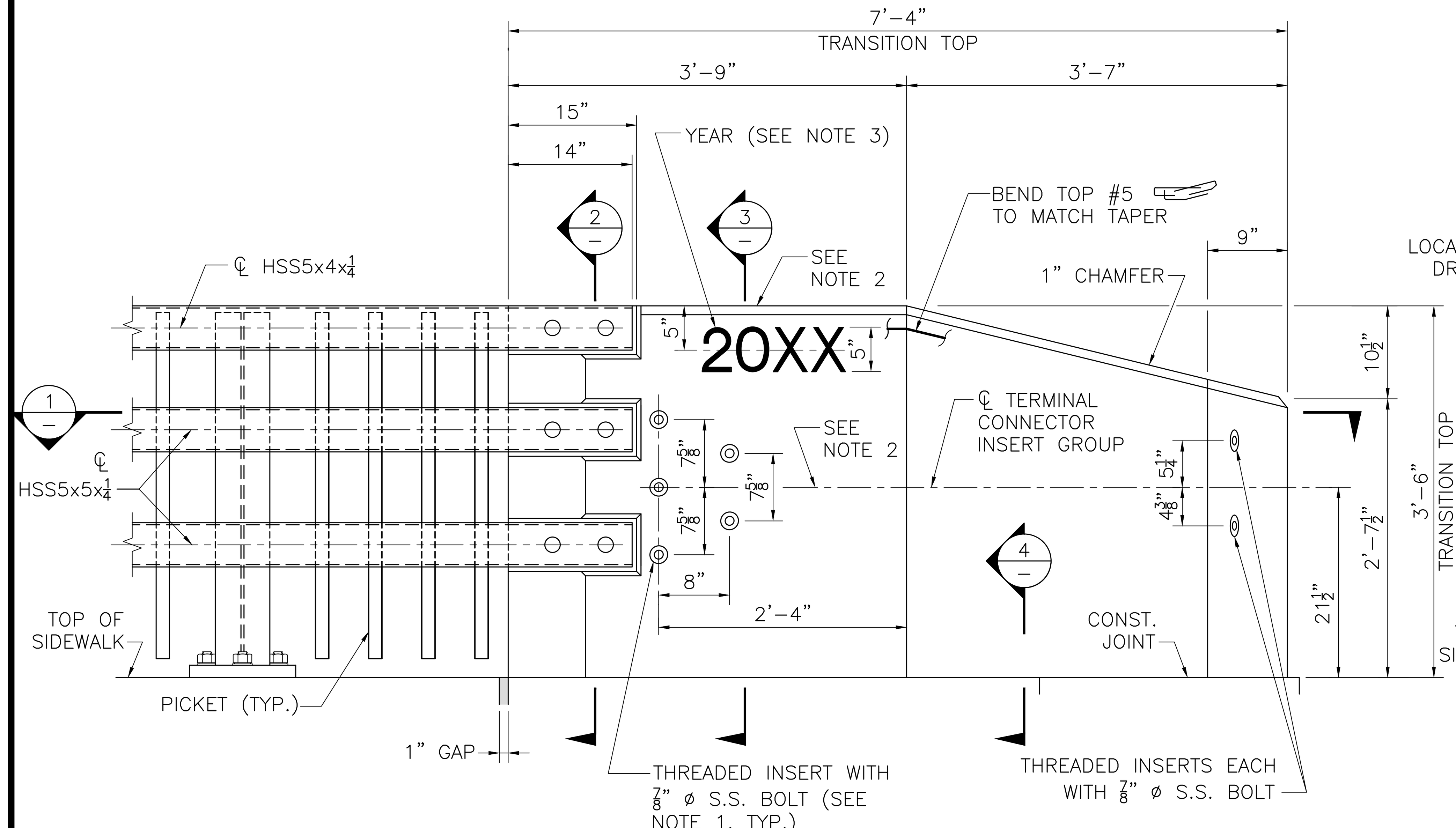
SECTION 2 AT SAFETY CURB
SCALE: 1" = 1'-0"



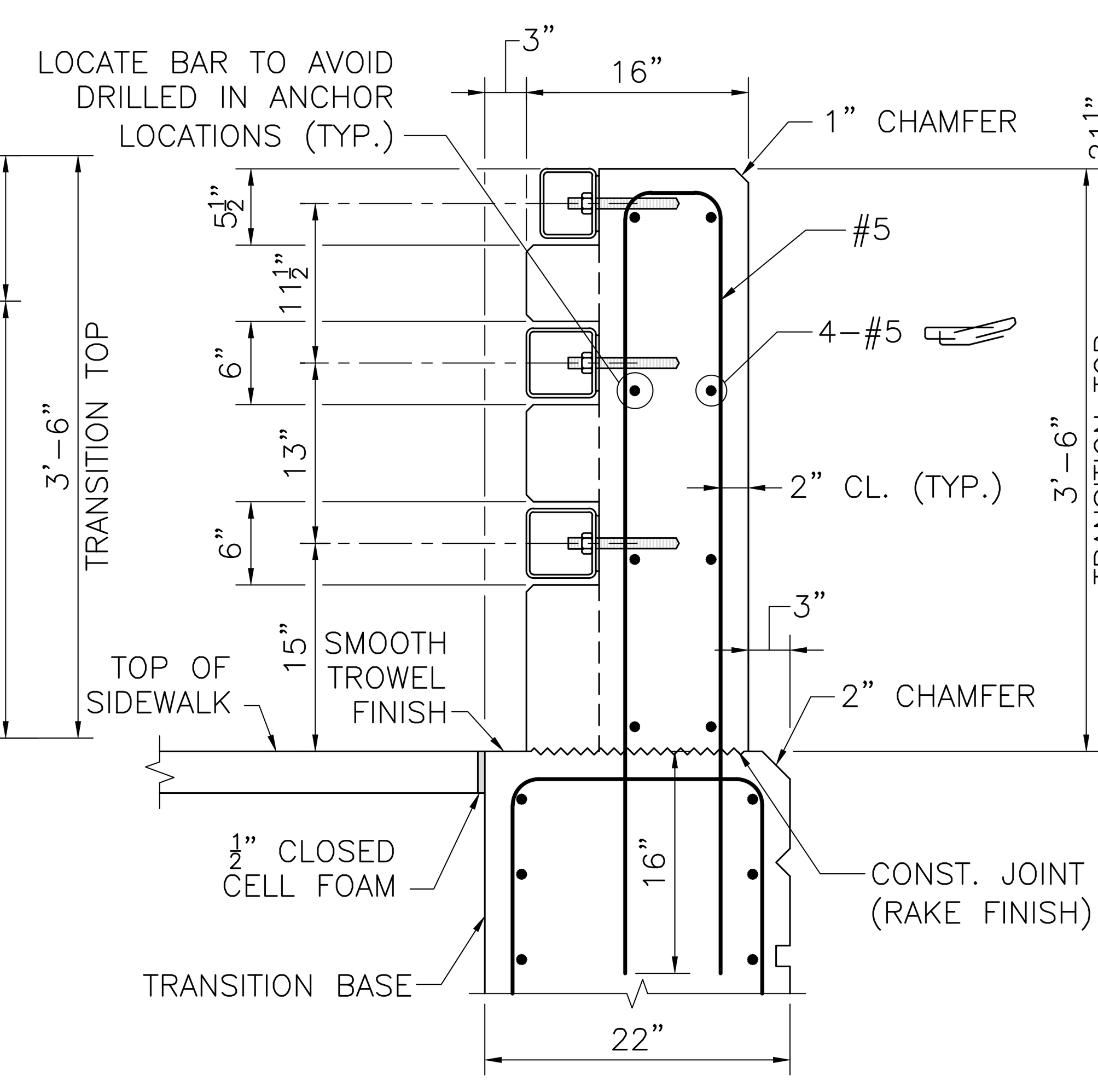
SECTION 3 AT SAFETY CURB
SCALE: 1" = 1'-0"



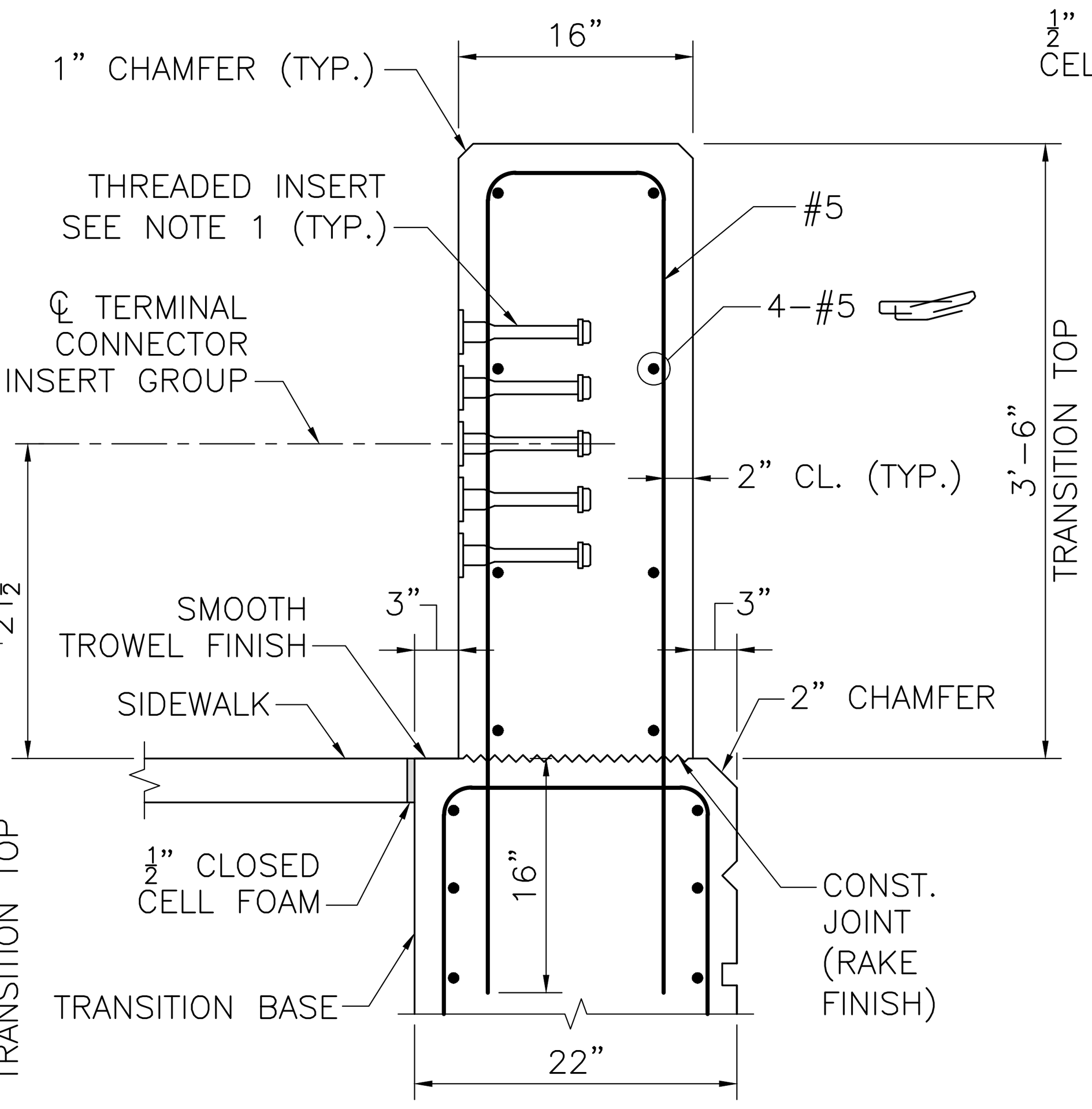
SECTION 4 AT SAFETY CURB
SCALE: 1" = 1'-0"



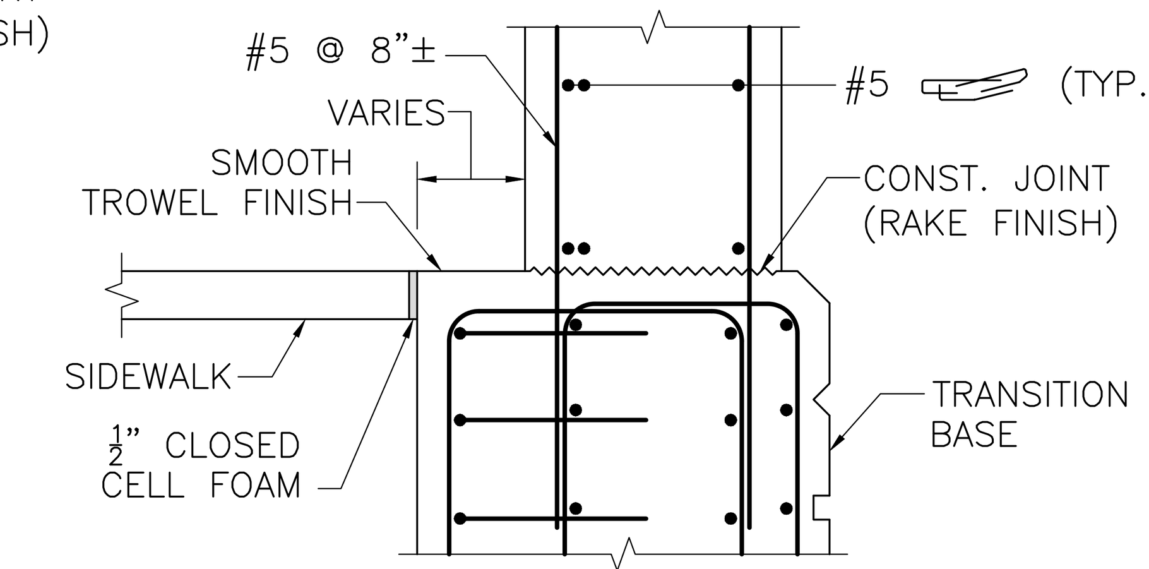
ELEVATION AT SIDEWALK
SCALE: 1" = 1'-0"



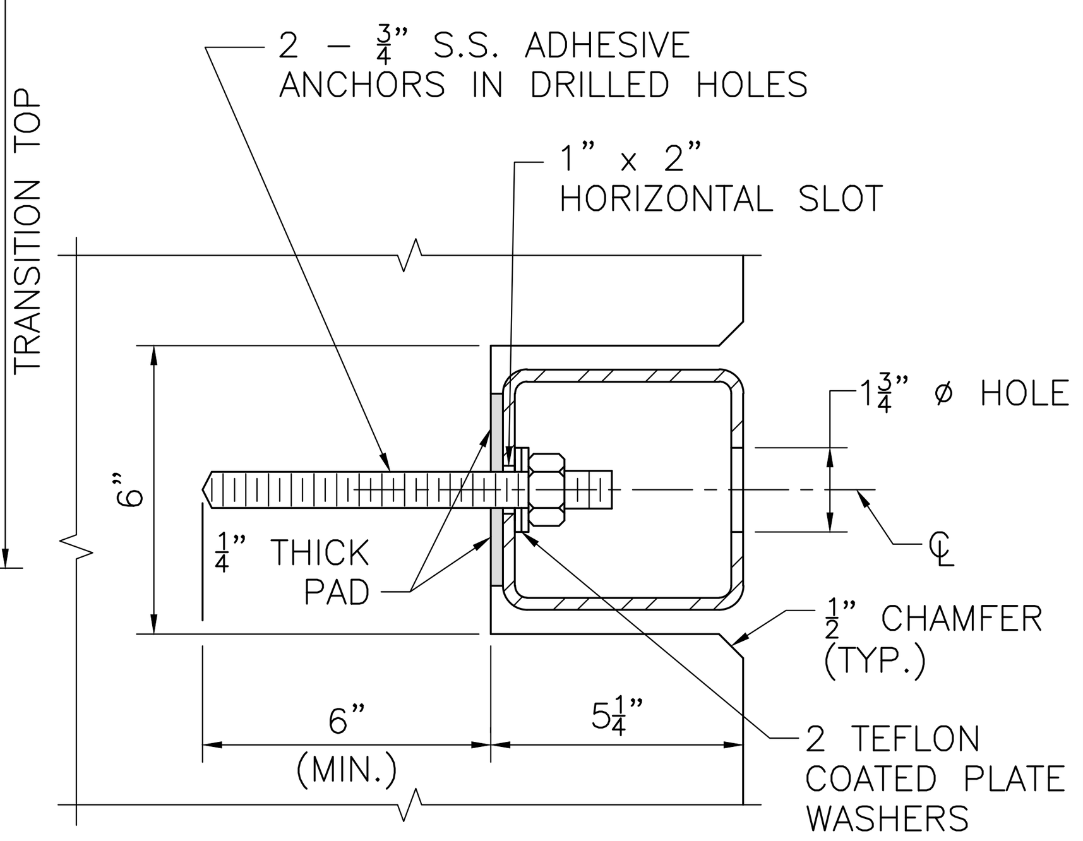
SECTION 2 AT SIDEWALK
SCALE: 1" = 1'-0"



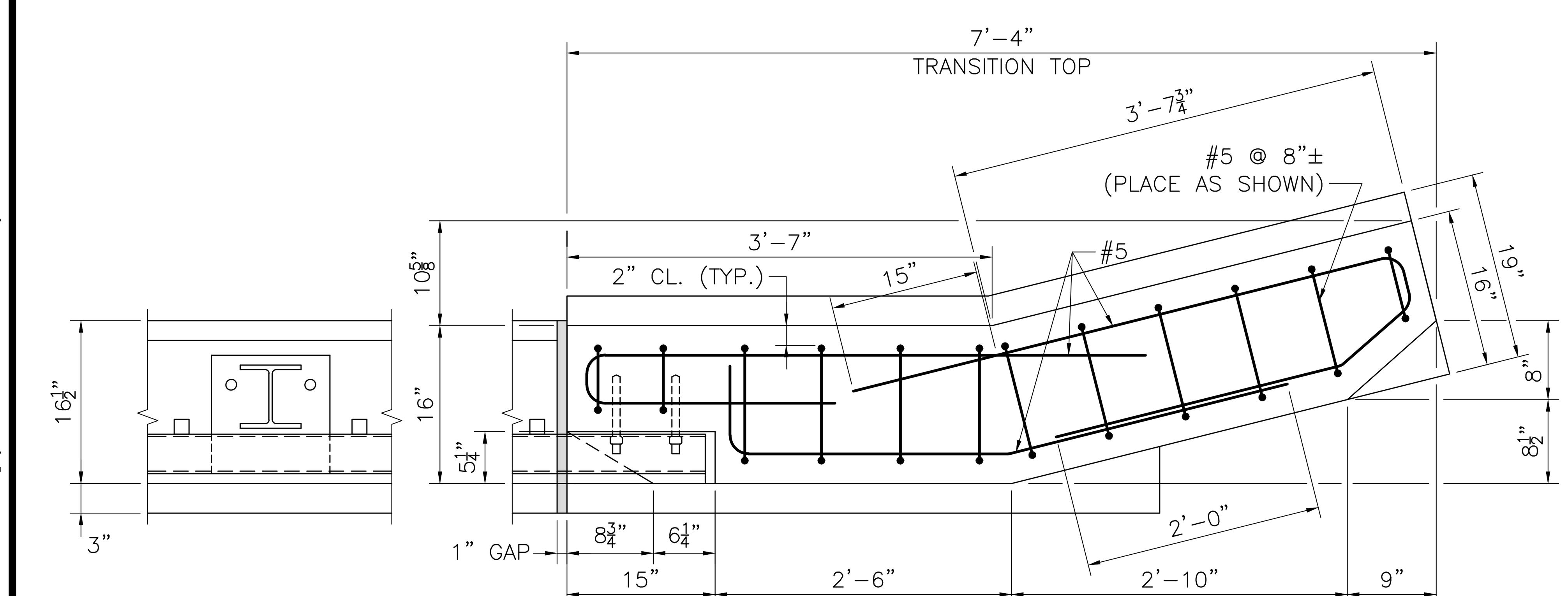
SECTION 3 AT SIDEWALK
SCALE: 1" = 1'-0"



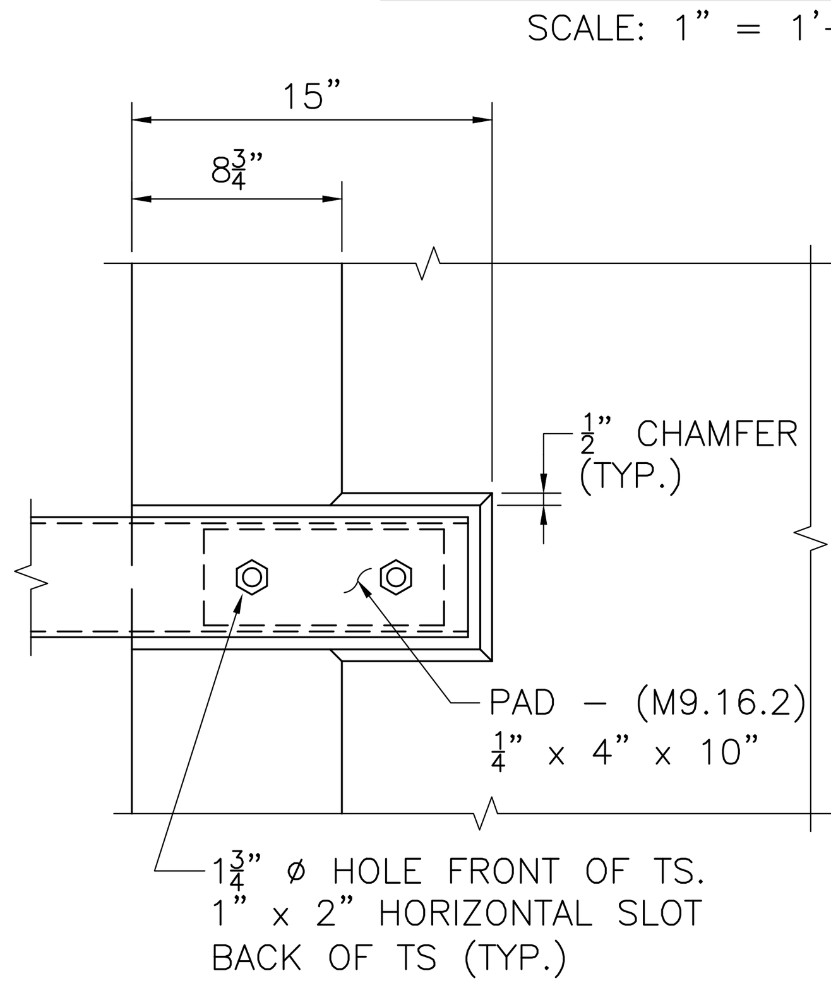
SECTION 4 AT SIDEWALK
SCALE: 1" = 1'-0"



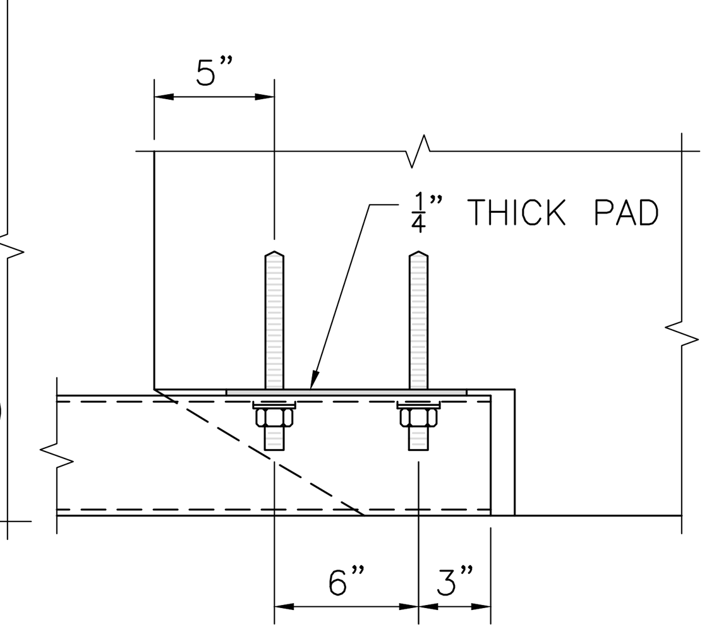
TYPICAL RAIL TO TRANSITION DETAIL
SCALE: 3" = 1'-0"



SECTION 1
SCALE: 1" = 1'-0"



ELEVATION



PLAN

RAIL ATTACHMENT
SCALE: 1½" = 1'-0"

NOTES:

1. THREADED INSERTS SHALL BE PREQUALIFIED BY THE MANUFACTURER AS BEING CAPABLE OF DEVELOPING A NOMINAL SHEAR RESISTANCE OF 20 KIPS PER ⅞" ø S.S. BOLT. S.S. BOLTS SHALL BE ⅞" ø x 1½" LONG FULLY THREADED AISI TYPE 304N STAINLESS STEEL. INSERTS FOR ⅞" S.S. BOLTS SHALL BE GALVANIZED AND CAST INTO THE TRANSITION.

2. FOR AN APPROACH GRADE UP TO 3%, THE TRANSITION MAY BE CAST SQUARE AND SET PLUMB WITH THE MINIMUM EMBEDMENT DEPTH SHOWN. THE TERMINAL CONNECTOR INSERT GROUP SHALL BE SQUARE TO THE POST.

   FOR AN APPROACH GRADE IN EXCESS OF 3%, THE TRANSITION TOP AND THE TOP OF CURB SHALL FOLLOW THE APPROACH GRADE. THE HEIGHT OF THE TRANSITION TOP SHALL VARY PROVIDED THAT THE MINIMUM DIMENSIONS SHOWN ON THE CONSTRUCTION DRAWINGS ARE MET. THE BOTTOM OF THE TRANSITION BASE SHALL BE SET LEVEL WITH THE MINIMUM EMBEDMENT DEPTH SHOWN. THE TERMINAL CONNECTOR INSERT GROUP SHALL BE SLOPED TO FOLLOW THE APPROACH GRADE.

3. USE LATEST CONTRACT COMPLETION YEAR IN EFFECT WHEN THE FIRST GUARDRAIL TRANSITION IS CAST. USE THIS YEAR FOR ALL GUARDRAIL TRANSITIONS.

4. ALL CONCRETE FOR THE PRECAST HIGHWAY GUARDRAIL TRANSITION SHALL BE 5000 PSI, ¾", 685 HP CEMENT CONCRETE.

5. LIFTING DEVICES (NOT SHOWN), INCLUDING THEIR NUMBER AND LOCATION, SHALL BE DESIGNED AND DETAILED BY THE PRECASTER. THEY SHALL BE GALVANIZED AND SHALL BE PLACED AND RECESSED IN POCKETS TO PROVIDE 1½" CLEAR COVER TO THE FACE OF THE TRANSITION CONCRETE. THESE DEVICES SHALL BE CLEARLY SHOWN ON THE SHOP DRAWINGS ALONG WITH ALL SUPPORTING CALCULATIONS AND/OR CATALOG CUTS. ONCE THE PRECAST TRANSITION IS SET IN PLACE, THE LIFTING DEVICE POCKETS SHALL BE FILLED WITH A NON-SHRINK GROUT THAT MATCHES THE COLOR OF THE TRANSITION CONCRETE WHEN CURED AND THE FILLED POCKETS SHALL BE RUBBED WITH A CORUNDUM STONE TO BLEND OUT THE JOINTS.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
DISTRICT 3 BRIDGE ENGINEER | DATE

TOP OF PRECAST HIGHWAY GUARDRAIL TRANSITION FOR S3–TL4 RAILING

Project:
TOWN OF MILLBURY
MILLBURY, MA

WHEELOCK AVENUE OVER
DOROTHY POND

CULVERT REPLACEMENT

Weston & Sampson
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COA:

Issued For:
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Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
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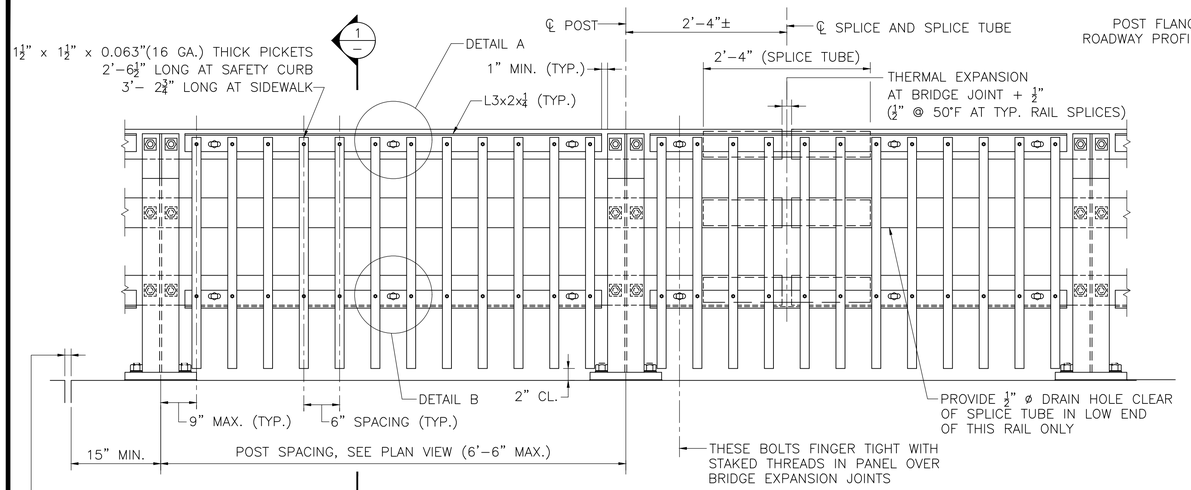
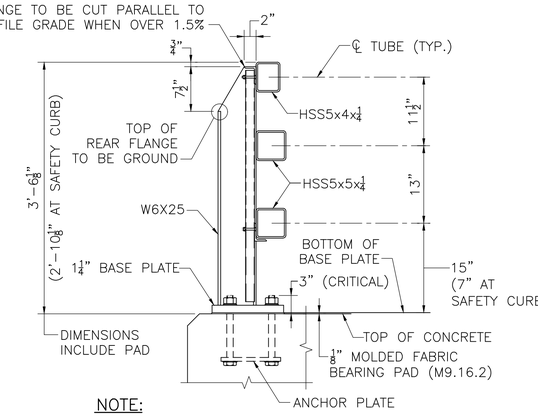
PRECAST GUARDRAIL TRANSITION DETAILS

Sheet Number:
S-12



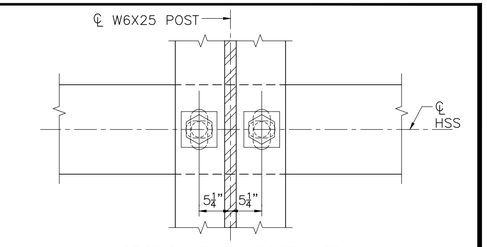
NOTE:
ELEVATION AT SIDEWALK SHOWN. ELEVATION AT SAFETY CURB SIMILAR EXCEPT AS NOTED.

BRIDGE RAILING ELEVATION
SCALE: 1" = 1'–0"

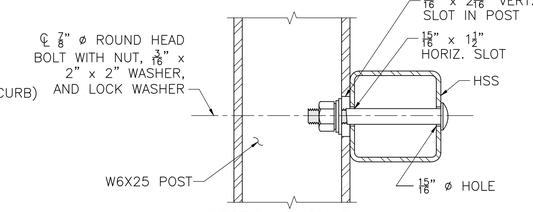


NOTE:
SECTION AT SIDEWALK SHOWN. SECTION AT SAFETY CURB SIMILAR, EXCEPT AS NOTED.

SECTION 1
SCALE: 1" = 1'–0"



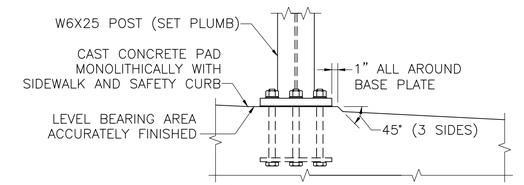
SECTION THRU POST WEB



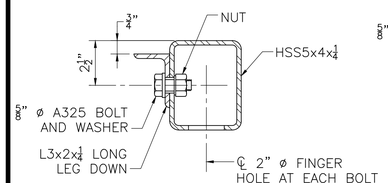
SECTION THRU RAIL

NOTE:
CONNECTIONS AT LOWER RAILS SHOWN.
CONNECTIONS AT TOP RAIL SIMILAR.

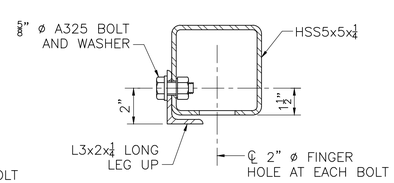
TYPICAL RAIL TO POST CONNECTIONS
SCALE: 1" = 1'–0"



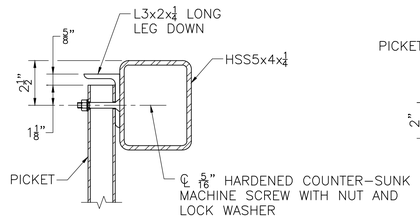
SETTING OF POSTS (PROFILE GRADE OVER 1.5%)
SCALE: 1" = 1'–0"



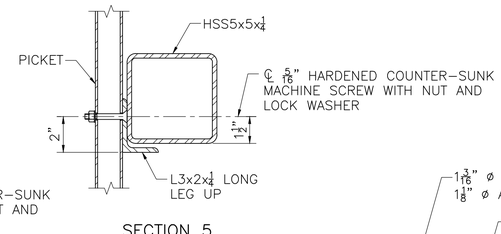
SECTION 2



SECTION 4



SECTION 3



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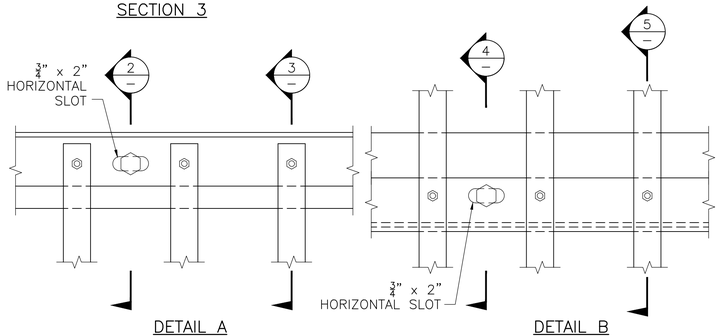
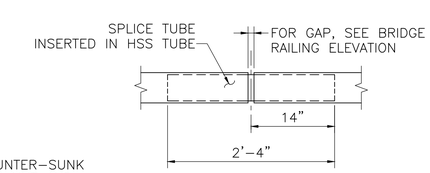
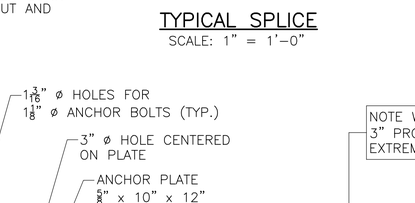


TYPICAL PICKET TO RAIL DETAILS
SCALE: 3" = 1'–0"



SPLICE DETAIL
FULL SIZE



TYPICAL SPLICE
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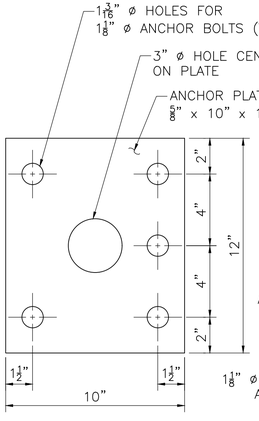
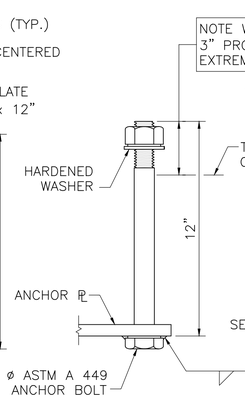
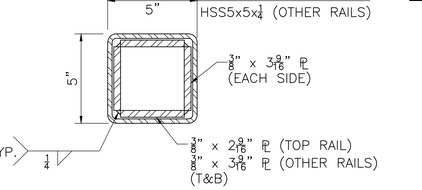


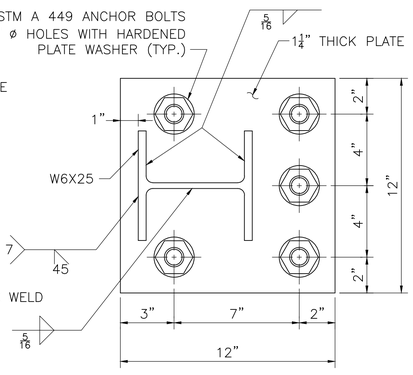
ANCHOR PLATE
SCALE: 3" = 1'–0"



ANCHOR BOLT
SCALE: 3" = 1'–0"



SPLICE TUBE DETIALS
SCALE: 3" = 1'–0"



BASE PLATE
SCALE: 3" = 1'–0"

RAILING NOTES:

1. RAIL POST AND BASE PLATES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 270 GRADE 50. HOLLOW RAILING STRUCTURAL TUBING (HSS) SHALL CONFORM TO THE REQUIREMENTS OF ASTM A 500 WITH A CERTIFIED Fy = 50 KSI MINIMUM. THE MINIMUM HORIZONTAL BENDING RADII OF THE HSS TUBING SHALL BE 8 FEET. PICKET CARRIER ANGLES, ANCHOR PLATES, AND SPLICE TUBE PLATES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 270 GRADE 36. PICKET TUBING SHALL CONFORM TO ASTM A 513 WITH Fy = 36 KSI MIN. OR A 500 GRADE B.
2. ALL STEEL (EXCEPT THE ⅝" ANCHOR PLATE AND FASTENERS) SHALL BE GALVANIZED AND PAINTED DARK BRONZE (FEDERAL STD. 595B COLOR NO. 10045). ANCHOR PLATE SHALL BE GALVANIZED ONLY. HEADS OF ⅞" ø ROUND HEAD BOLTS SHALL BE PAINTED TO MATCH RAIL.
3. ANCHOR BOLTS SHALL BE SET WITH TEMPLATES. THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/8 TURN AFTER STEEL IS IN PLACE.
4. RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF FOUR (4) POSTS WITHOUT SPLICES WHERE POSSIBLE. RAILS SHALL BE SPLICED IN THE PANELS OVER EXPANSION JOINT.
5. ENDS OF TUBE SECTIONS SHALL BE SAWED. GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE TRUE AND SMOOTH.
6. ALL POSTS TO BE PLUMB WHEN PROFILE GRADE EXCEEDS 1.5%. FOR PROFILE GRADES LESS THAN 1.5%, POSTS SHALL BE SET PERPENDICULAR TO GRADE.
7. POST FLANGE WELD DOES NOT REQUIRE MAGNETIC PARTICLE TESTING. WELD SHALL BE BACK–GOUGED ON BACK SIDE EXCEPT AT WEB. WELD IS THE SAME ON BOTH FLANGES.
8. ⅞" ø ROUND HEAD BOLTS SHALL CONFORM TO THE CHEMICAL AND PHYSICAL REQUIREMENTS OF AASHTO M 164.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE TO MASSDOT FOR CONTRACTING
Mohammed Nabulsi
Mohammed Nabulsi (Oct 7, 2024 13:50 EDT)
DISTRICT 3 BRIDGE ENGINEER — DATE

S3–TL4 BRIDGE RAILING

BRIDGE SHEET 13 OF 13 BRIDGE NO. M-22-022 (CPC)

Project:
TOWN OF MILLBURY
MILLBURY, MA
WHEELOCK AVENUE OVER
DOROTHY POND
CULVERT REPLACEMENT

Weston & Sampson
Weston & Sampson Engineers, Inc.
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal:
COMMONWEALTH OF MASSACHUSETTS
SCOTT R. BRUSO
STRUCTURAL
No. 48061
REGISTERED
PROFESSIONAL ENGINEER
2024.10.02 18:36:03-04'00'

Issued For:
BIDDING

Scale: AS NOTED

Date	OCTOBER 9, 2024
Drawn By:	YS
Reviewed By:	CJW
Approved By:	SRB
W&S Project No.:	2180493

Drawing Title:
RAILING DETAILS

Sheet Number:
S-13