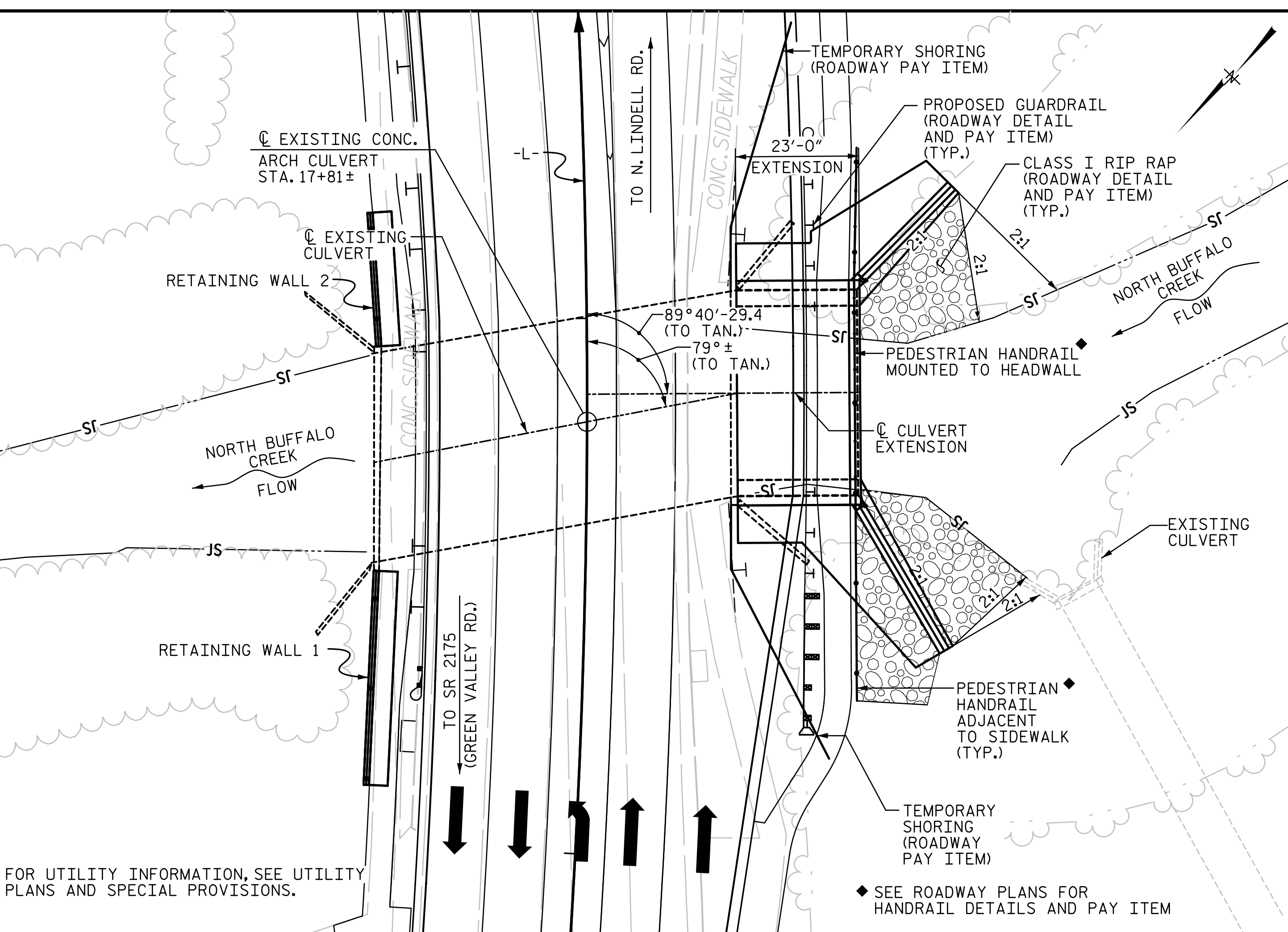


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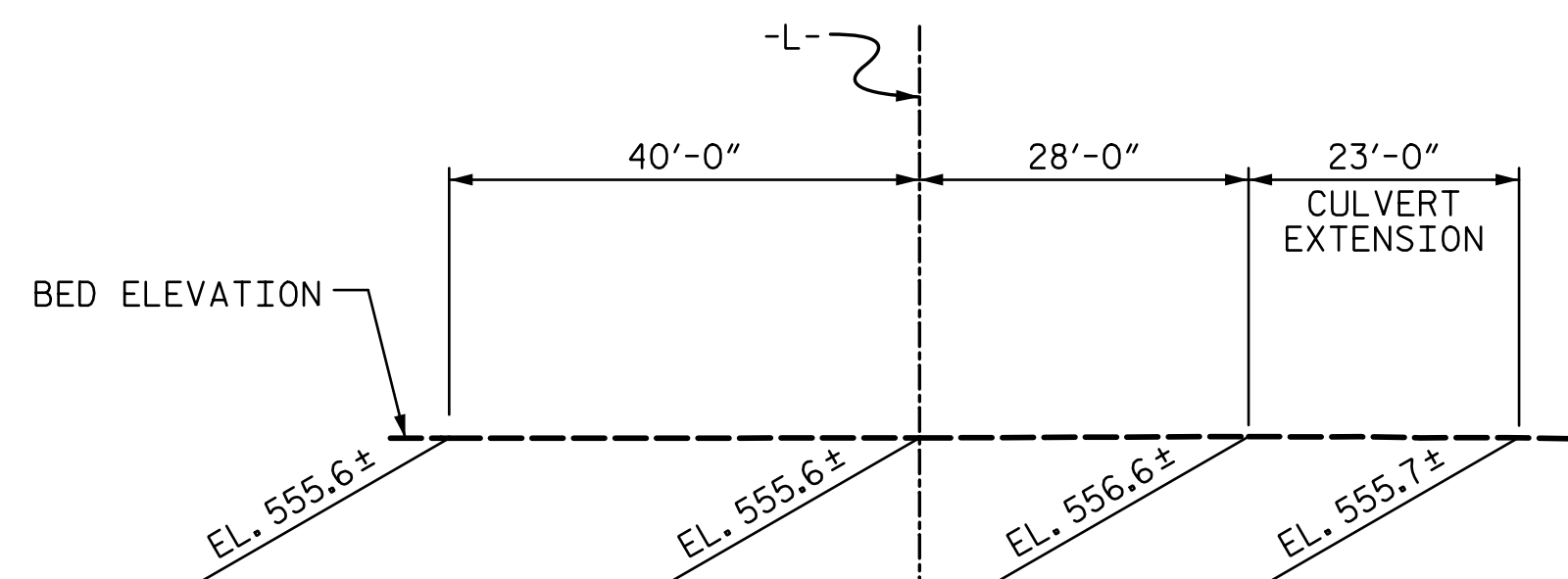
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LOCATION SKETCH

▲ THE CULVERT EXTENSION DIMENSIONS ARE BASED ON THE BEST AVAILABLE INFORMATION FOR THE EXISTING STRUCTURE. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATION AND ALIGNMENT OF THE END OF THE EXISTING ARCH. IF THE LOCATION AND ALIGNMENT OF THE EXISTING ARCH IS DIFFERENT THAN WHAT IS SHOWN ON THE PLANS, THE CONTRACTOR SHALL ADJUST THE CONCRETE AND REINFORCING STEEL QUANTITIES FOR THE CULVERT EXTENSION AS NECESSARY.



PROFILE ALONG C CULVERT

ROADWAY DATA

GRADE POINT ELEV. @ STA. 17+81± -L- = 776.93  
 BED ELEV. @ STA. 17+81± -L- = 555.6±  
 ROADWAY SLOPES @ STA. 17+81± -L- = 2:1

HYDRAULIC DATA

DESIGN DISCHARGE = 2,380 CFS  
 FREQUENCY OF DESIGN FLOOD = 25 YRS.  
 DESIGN HIGH WATER ELEVATION = 766.2 FT.  
 DRAINAGE AREA = 4.8 SQ. MI.  
 BASE DISCHARGE (Q100) = 2,850 CFS  
 BASE HIGH WATER ELEVATION = 767.2 FT.  
 W.S. EL. TAKEN @ RIVER STATION 76628

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 5,800 CFS  
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YRS.  
 OVERTOPPING FLOOD ELEVATION = 776.3 FT.  
 OVERTOPPING OCCURS AT -L- STA. 16+89 AT ELEV. 776.3

TOTAL STRUCTURE QUANTITIES

FOUNDATION EXCAVATION	135.0 C.Y.
UNCLASSIFIED STRUCTURE EXCAVATION	LUMP SUM
CIP GRAVITY RETAINING WALLS	211.3 S.F.
CLASS A CONCRETE ▲	
ARCH @ 3.955 CY/FT	83.1 C.Y.
WINGS ETC.	194.3 C.Y.
TOTAL	277.4 C.Y.
REINFORCING STEEL ▲	
ARCH	24,209 LBS.
WINGS ETC.	9,428 LBS.
TOTAL	33,637 LBS.

FOUNDATIONS RECOMMENDATIONS

THE SPREAD FOOTINGS FOR THE BOTTOMLESS CONCRETE ARCH CULVERT AT STATION 17+81 ARE DESIGNED FOR A FACTORED RESISTANCE OF 5 TSF. CHECK FIELD CONDITIONS FOR THE REQUIRED RESISTANCE OF 12 TSF JUST BEFORE PLACING CONCRETE.  
 KEY IN FOOTINGS FOR THE BOTTOMLESS CONCRETE ARCH CULVERT AT STATION 17+81 AT LEAST 12" INTO WEATHERED ROCK OR ROCK WITH A MINIMUM THICKNESS AS SHOWN IN THE PLANS.  
 THE SCOUR CRITICAL ELEVATION FOR THE BOTTOMLESS CONCRETE ARCH CULVERT AT STATION 17+81 IS THE BOTTOM OF FOOTING ELEVATION. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

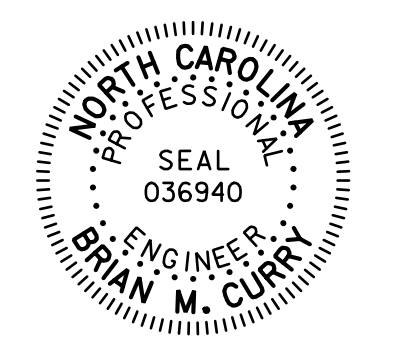
NOTES:

- ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.
- DESIGN FILL----- 2'-6" MIN., 3'-6" MAX.
- FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
  1. WING FOOTINGS, 4" OF THE WINGS, AND ARCH FOOTINGS INCLUDING 4" OF THE ARCH WALLS.
  2. THE REMAINING PORTIONS OF THE ARCH, WINGS, AND HEADWALLS.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT EXTENSION BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN THE ARCH ARE SHOWN ON WING SHEET.
- TEMPORARY SHORING MAY BE REQUIRED TO SUPPORT THE EXISTING CULVERT AND/OR THE ROADWAY EMBANKMENT DURING UNDERCUTTING AND BACKFILLING OPERATIONS. IF TEMPORARY SHORING IS REQUIRED, THE CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS, CONSTRUCTION METHODS, AND DETAILED DRAWINGS, ALL OF WHICH SHALL BE SEALED BY A NORTH CAROLINA PROFESSIONAL ENGINEER, TO THE ENGINEER FOR APPROVAL 21 DAYS BEFORE CONSTRUCTION OF THE SHORING WALL. PAYMENT FOR THE DESIGN AND INSTALLATION OF TEMPORARY SHORING IS CONSIDERED INCIDENTAL TO UNCLASSIFIED STRUCTURE EXCAVATION AND SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR "UNCLASSIFIED STRUCTURE EXCAVATION".
- DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE STANDARD NOTES SHEET.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- DETAILED DRAWINGS FOR FALSEWORK AND FORMS FOR THIS ARCH CULVERT SHALL BE SUBMITTED. SEE STANDARD NOTES SHEET.
- THE CONTRACTOR SHALL INSPECT THE EXISTING ARCH CULVERT PRIOR TO CONSTRUCTION. DAMAGE PRIOR TO OR DURING CONSTRUCTION SHALL BE REPAIRED BY THE CONTRACTOR.
- EXISTING WING WALLS AND FOOTINGS AT CULVERT EXTENSION SHALL BE REMOVED TO AVOID CONFLICT WITH PROPOSED FOOTINGS.
- FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

PROJECT NO. U-5841  
 GUILFORD COUNTY  
 STATION: 17+81.00 -L-  
 SHEET 1 OF 7 BRIDGE NO. 117

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

CONCRETE ARCH CULVERT EXTENSION



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

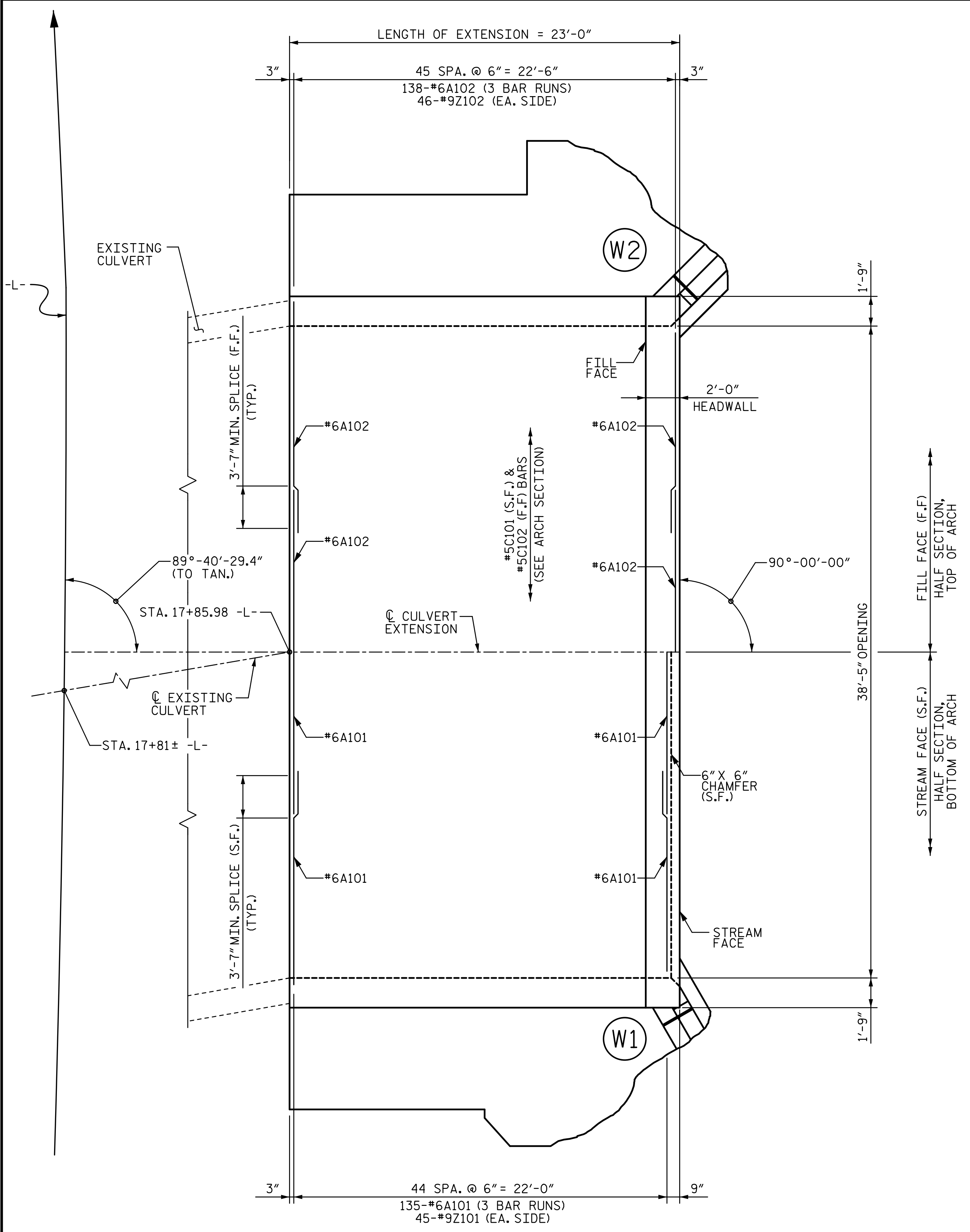
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 TOTAL SHEETS  
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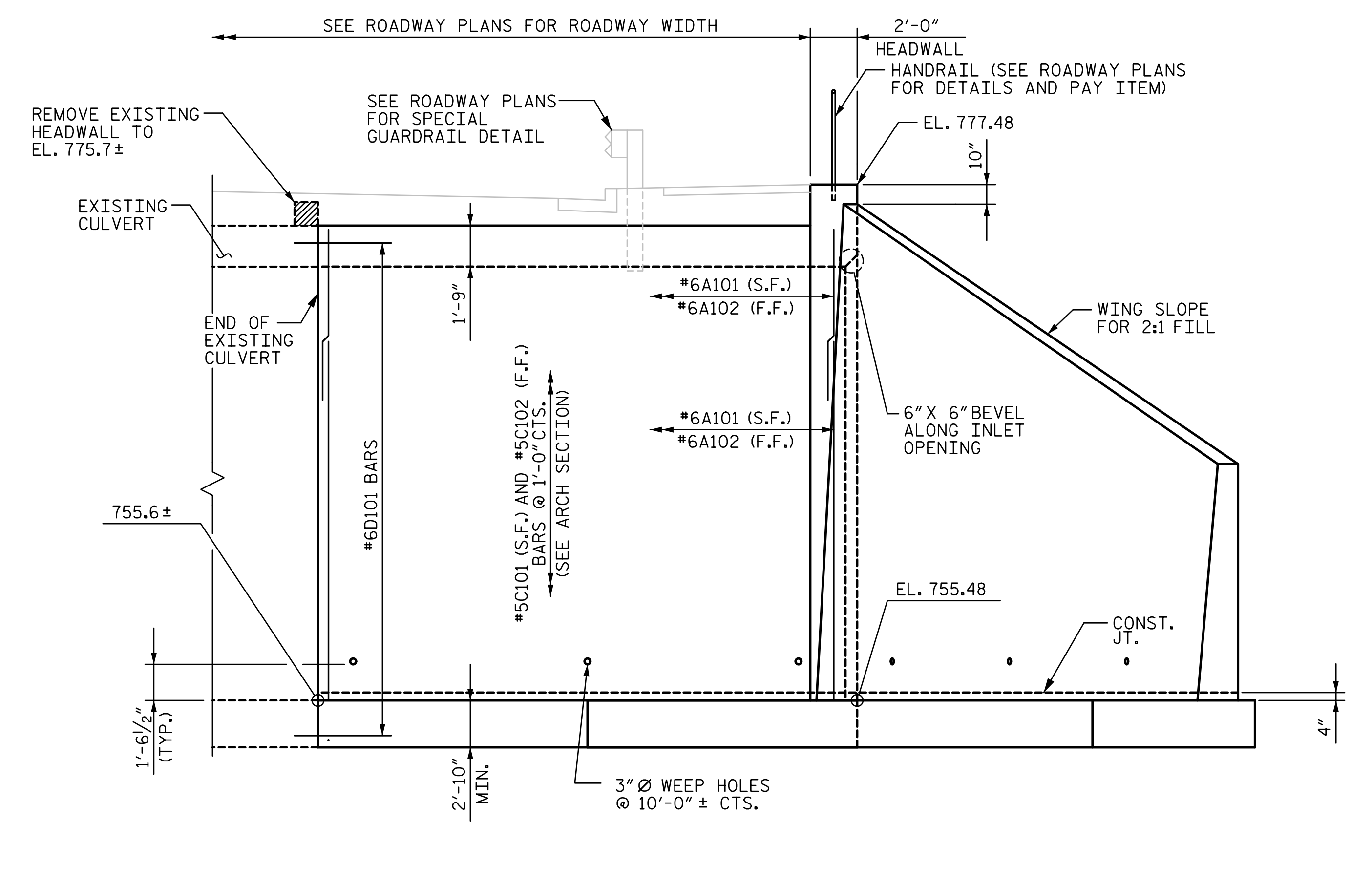
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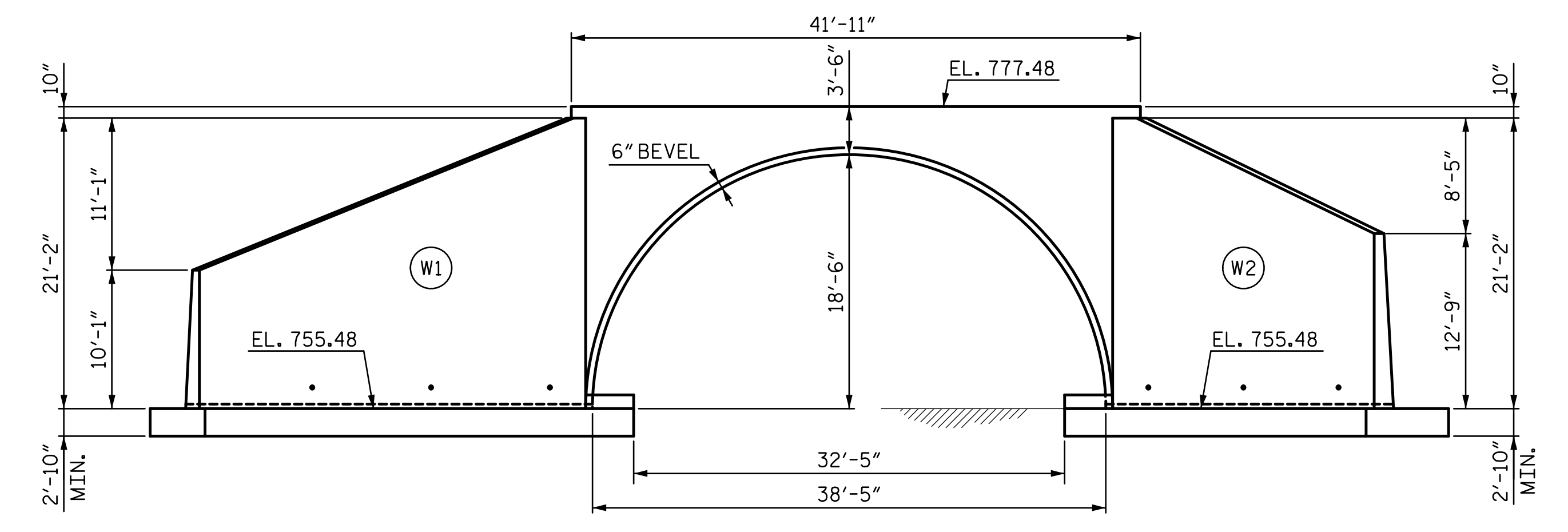


**PLAN-ARCH SLAB**  
(Z101 & Z102 NOT SHOWN, SEE "FOOTING SECTION" FOR DETAILS)

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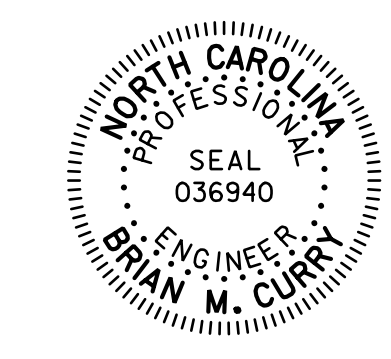


**CULVERT EXTENSION SECTION NORMAL TO ROADWAY**



**INLET EXTENSION END ELEVATION**

PROJECT NO. U-5841  
GUILFORD COUNTY  
 STATION: 17+81.00 -L-  
 SHEET 2 OF 7



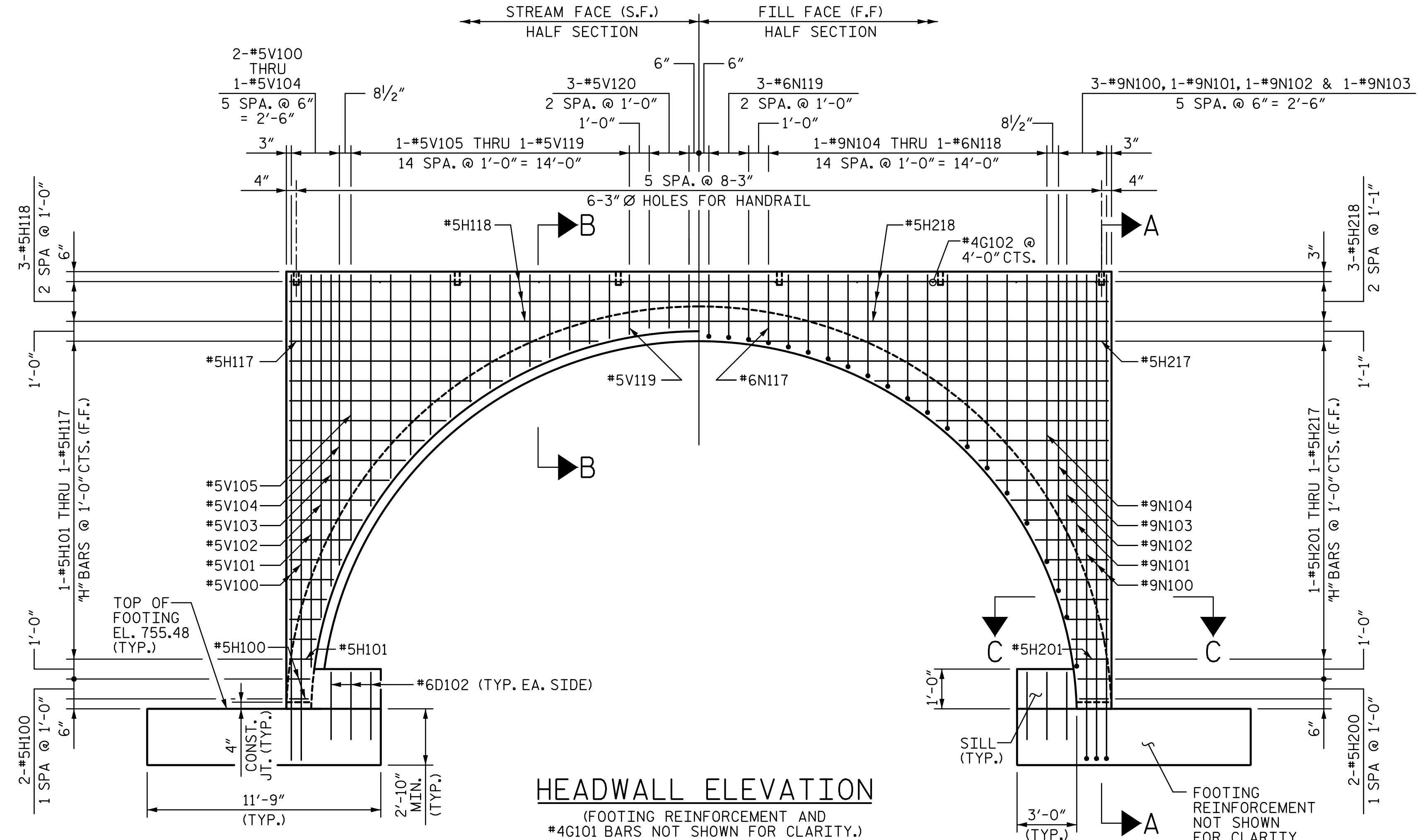
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 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**CONCRETE ARCH  
 CULVERT EXTENSION  
 SECTIONS & DETAILS**

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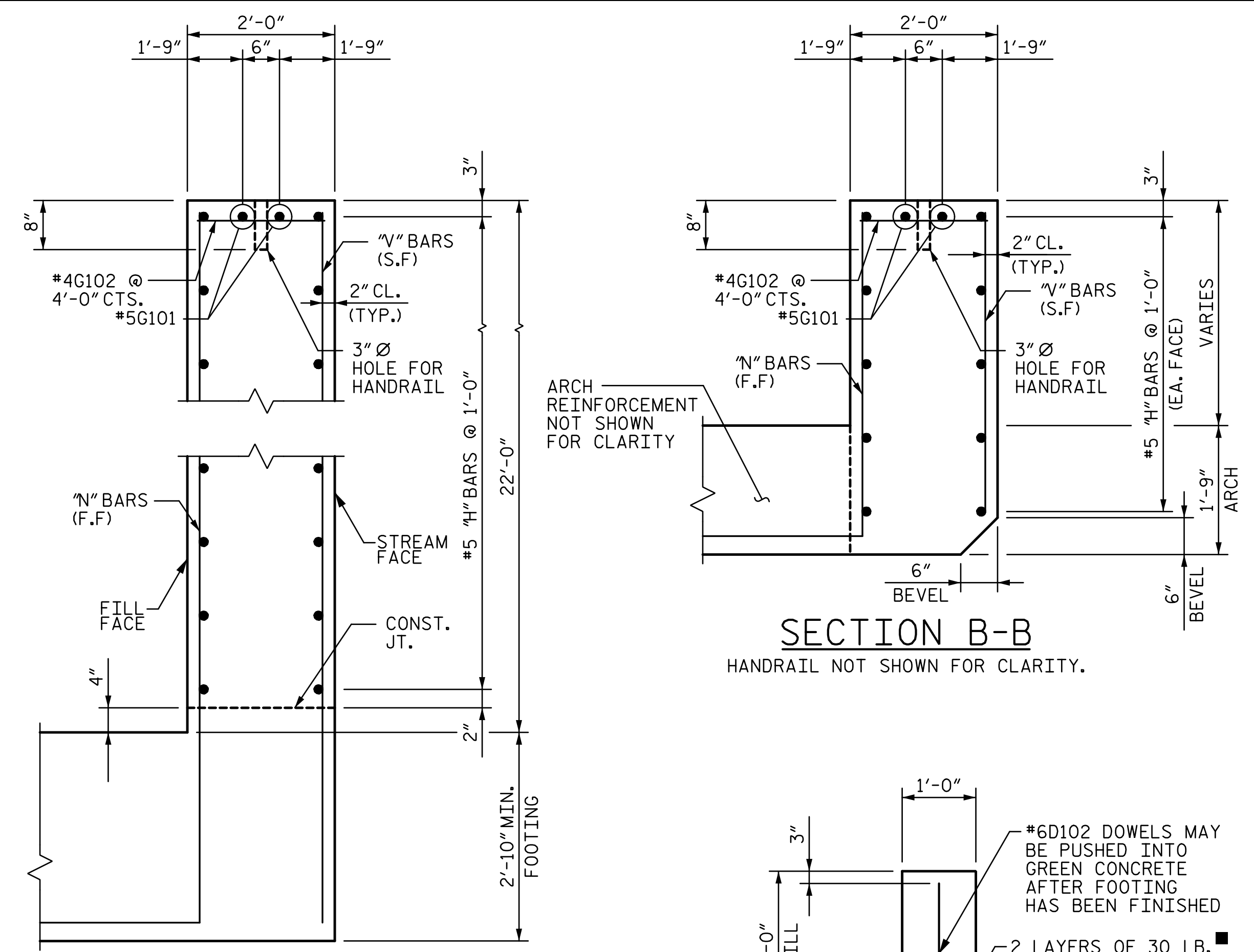
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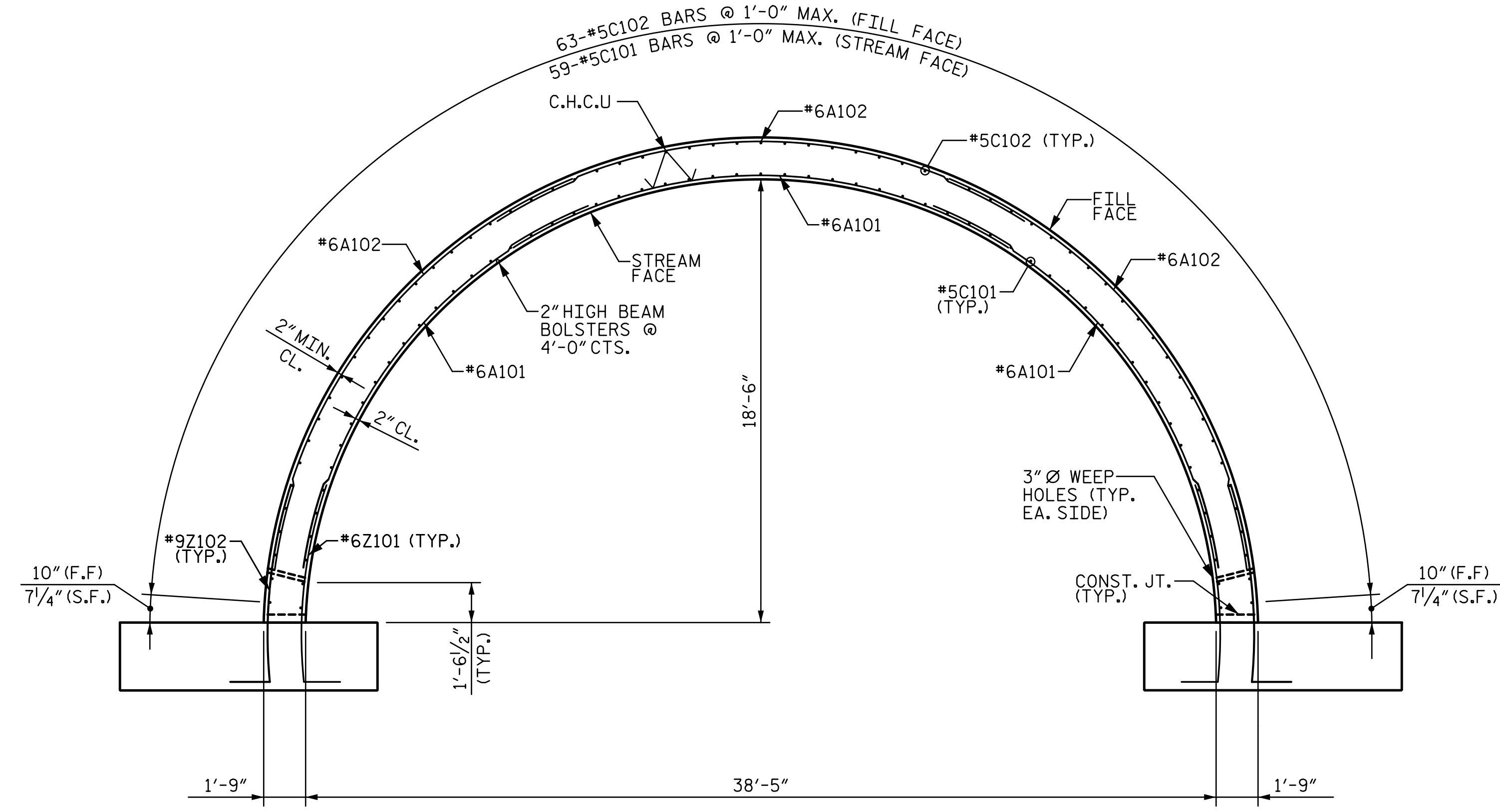


**HEADWALL ELEVATION**  
 (FOOTING REINFORCEMENT AND #4G101 BARS NOT SHOWN FOR CLARITY.)



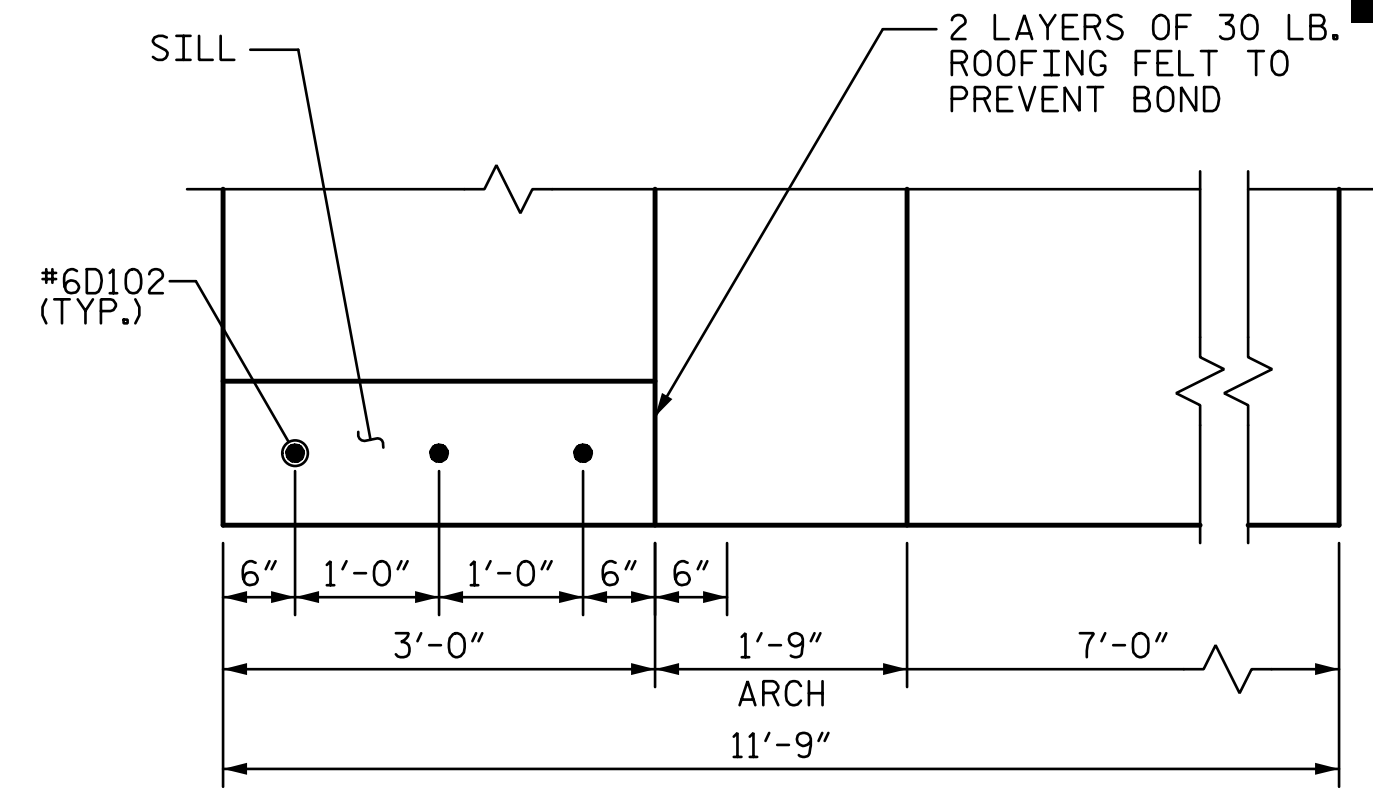
**SECTION A-A**  
 HANDRAIL NOT SHOWN FOR CLARITY.

**SECTION B-B**  
 HANDRAIL NOT SHOWN FOR CLARITY.



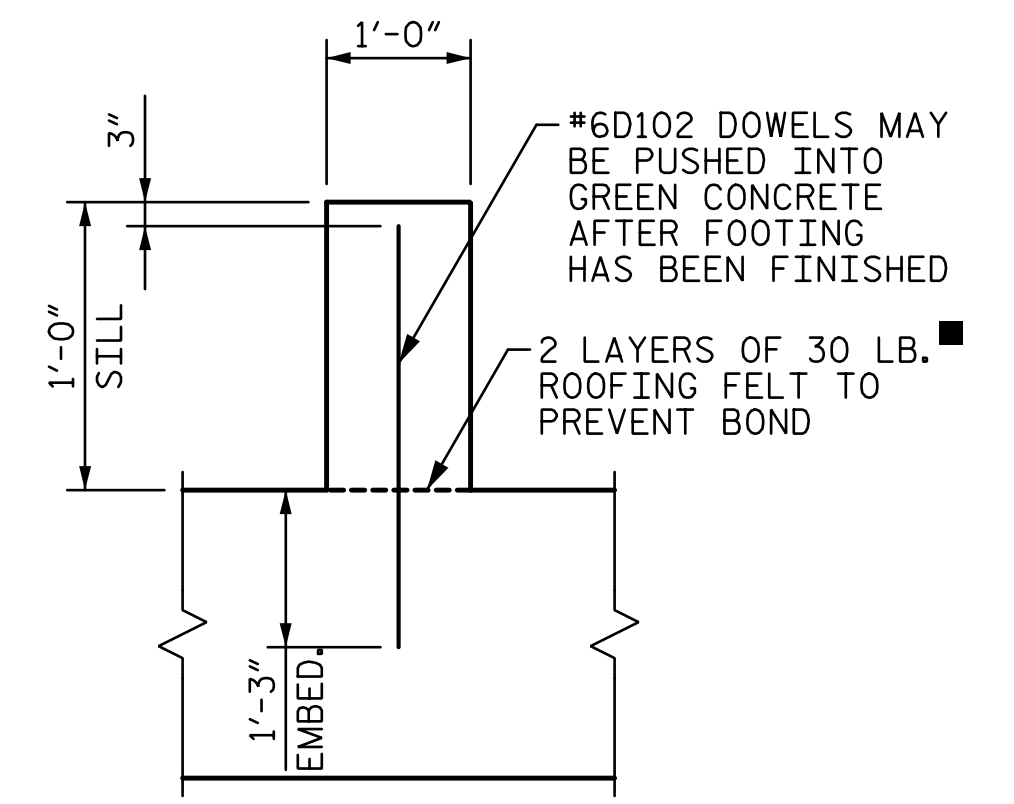
**ARCH SECTION**

FOR FOOTING REINFORCEMENT, SEE SHEET 4 OF 7.



**VIEW C-C**

RIGHT SIDE SILL SHOWN, LEFT SIDE SIMILAR



**SECTION THROUGH SILL**

THE COST OF ROOFING FELT IS INCIDENTAL AND SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS

PROJECT NO. U-5841  
 GUILFORD COUNTY  
 STATION: 17+81.00 -L-  
 SHEET 3 OF 7



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**CONCRETE ARCH  
 CULVERT EXTENSION  
 SECTIONS & DETAILS**

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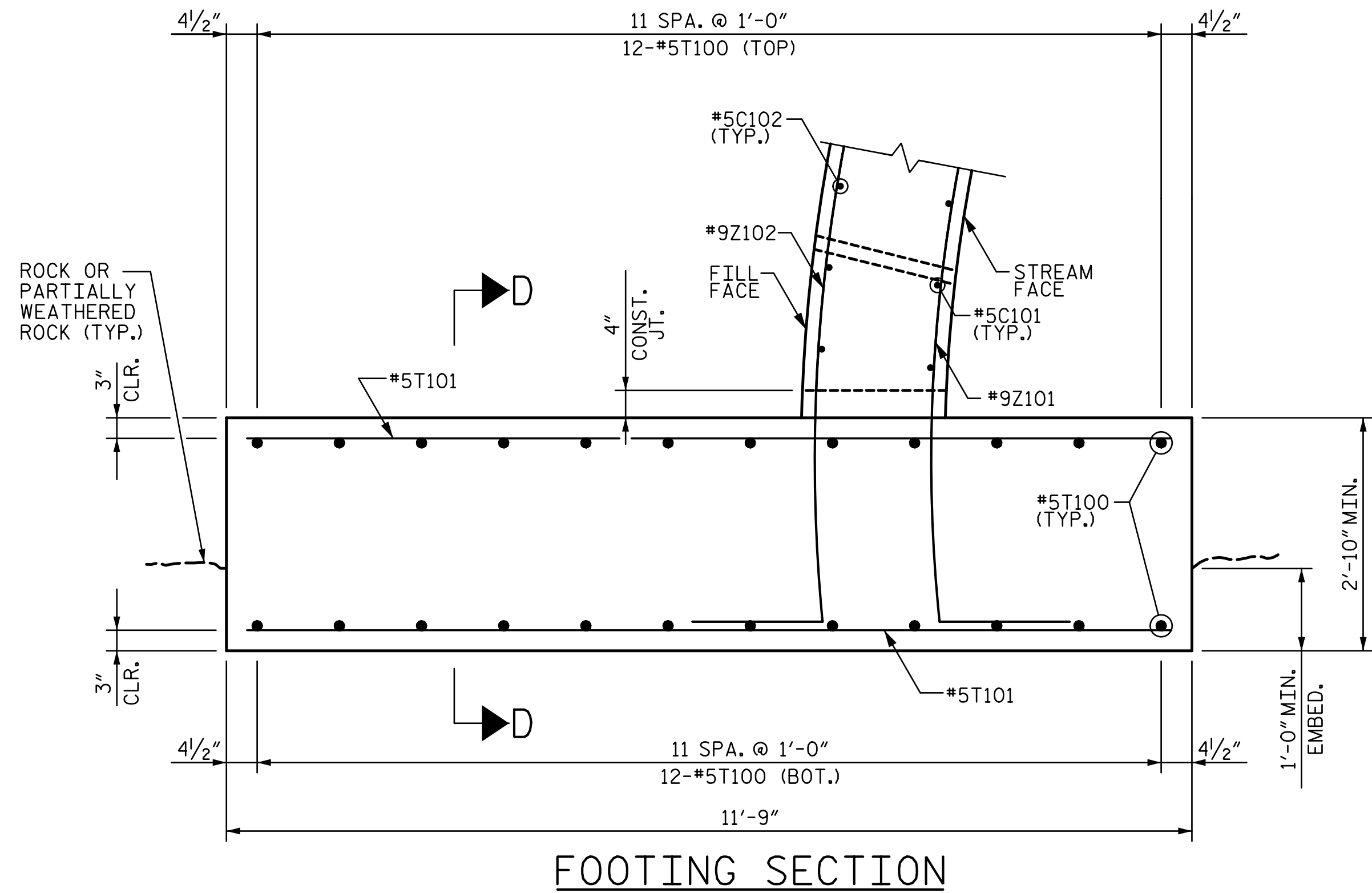


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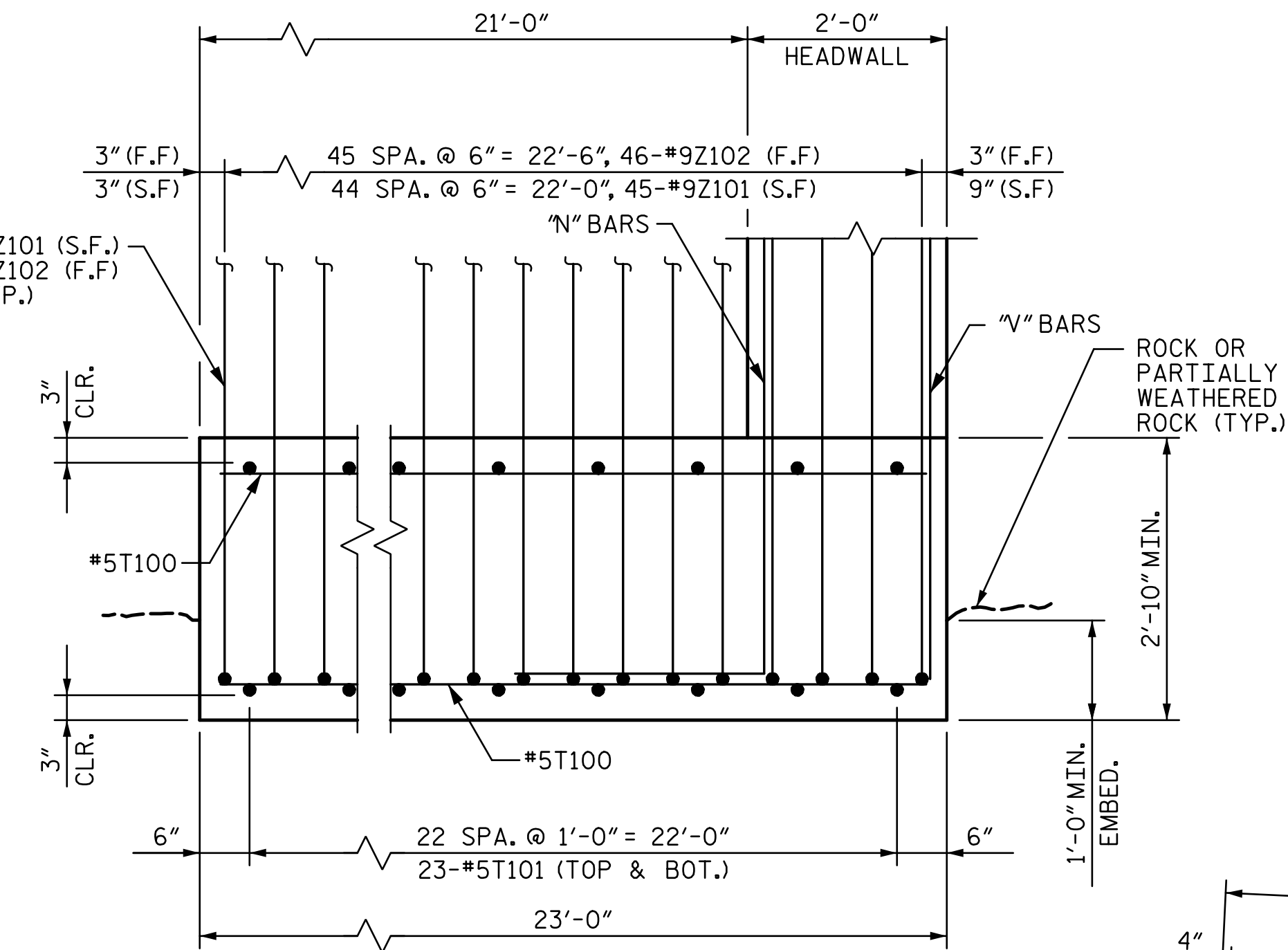
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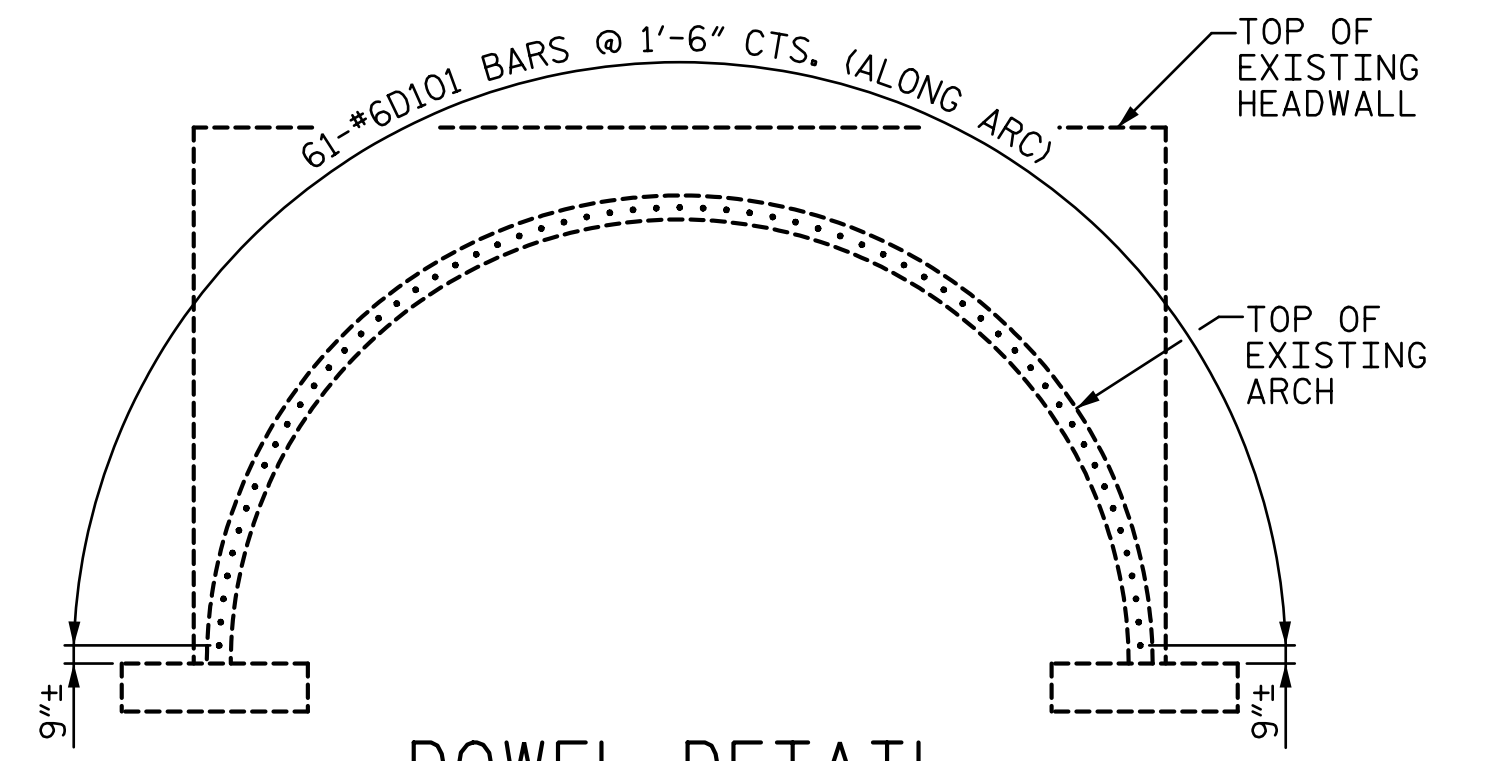
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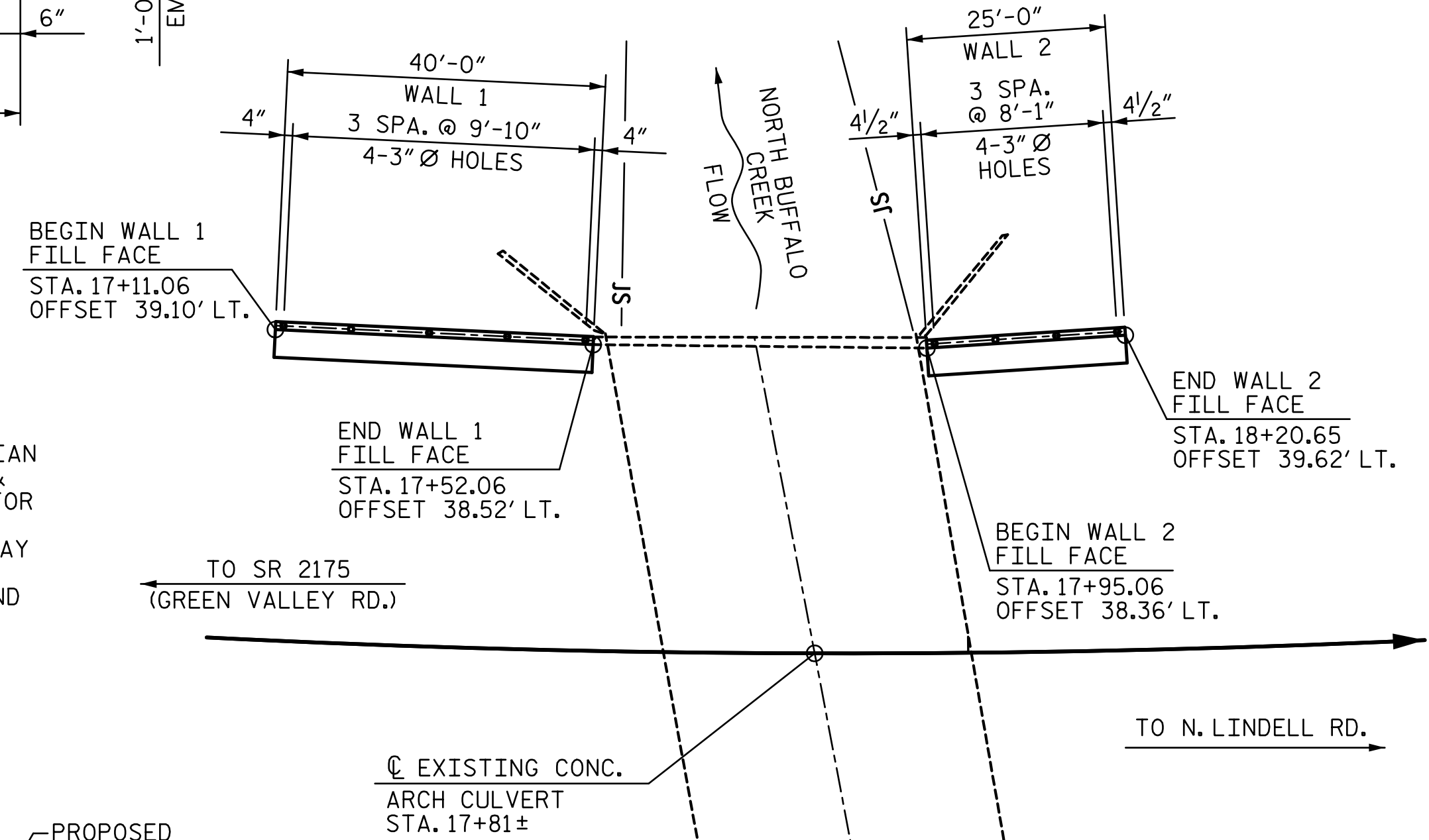
**FOOTING SECTION**



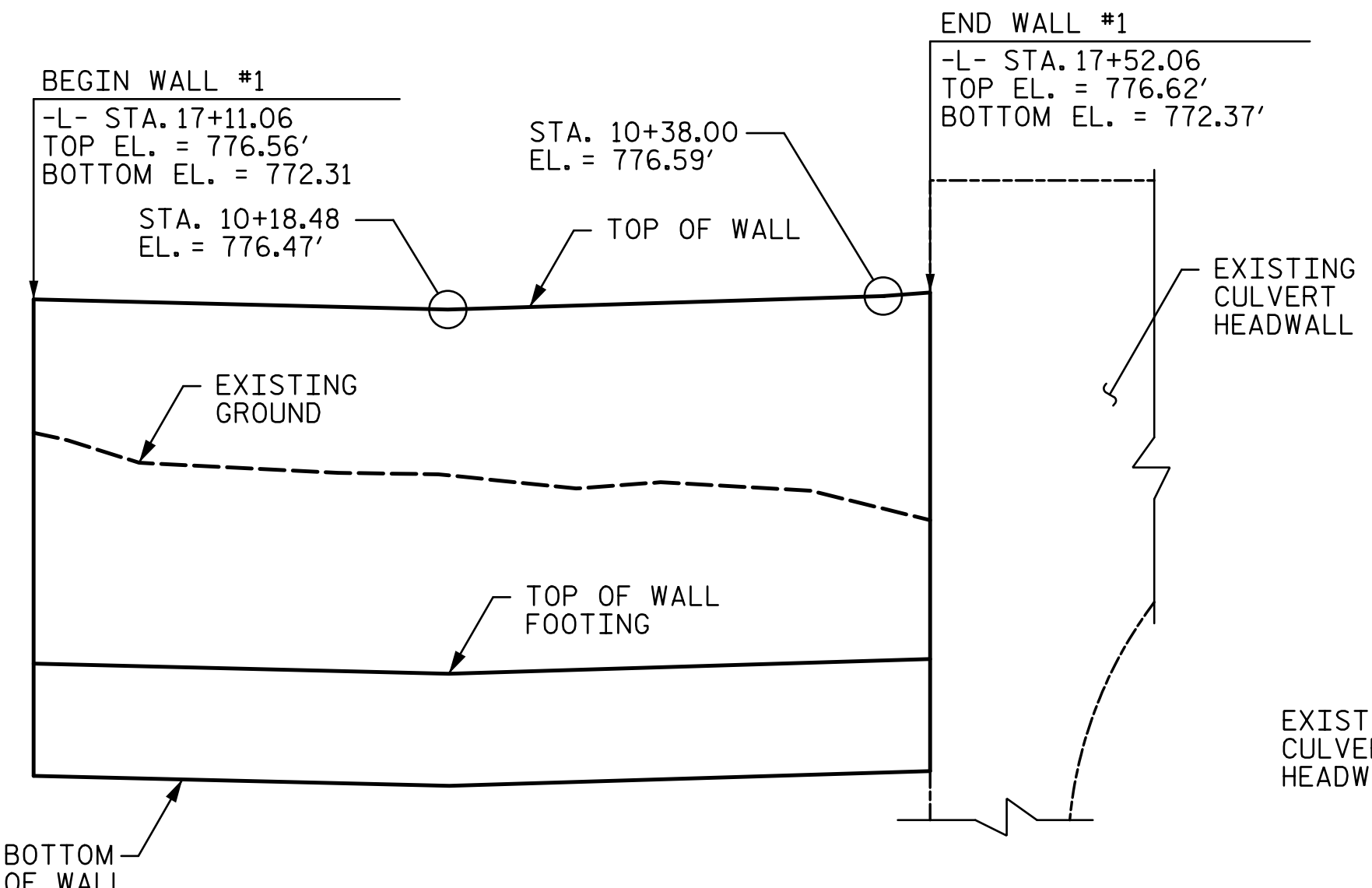
**SECTION D-D**



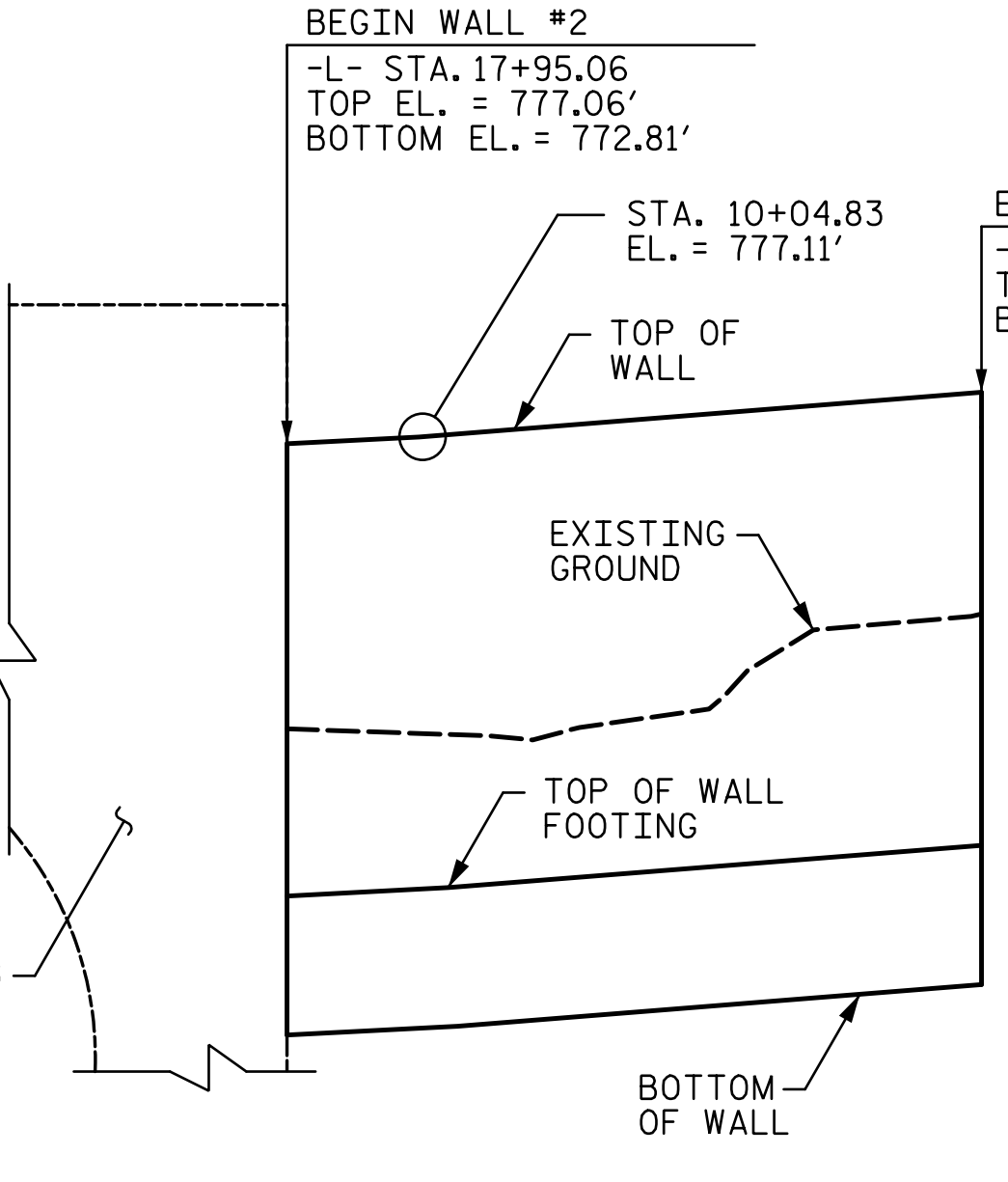
**DOWEL DETAIL**  
 (EXISTING CULVERT INLET END SHOWN.)  
 D1 BARS SHALL BE EMBEDDED 1'-0" INTO EXISTING CULVERT.  
 DOWELS SHALL BE CENTERED HORIZONTALLY IN THE EXISTING ARCH.



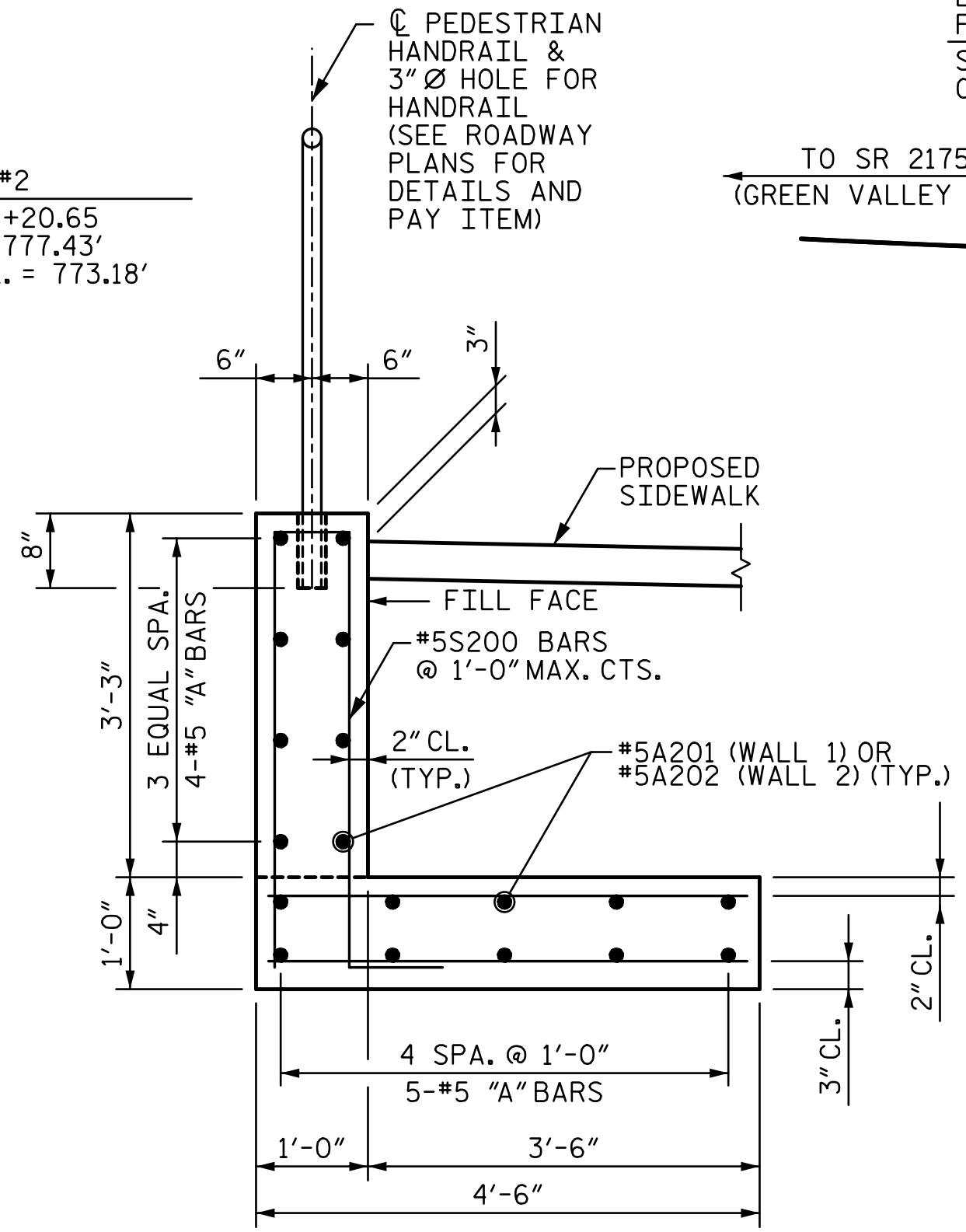
**RETAINING WALL LAYOUT**



**WALL 1 ELEVATION**  
 (HANDRAIL NOT SHOWN FOR CLARITY)



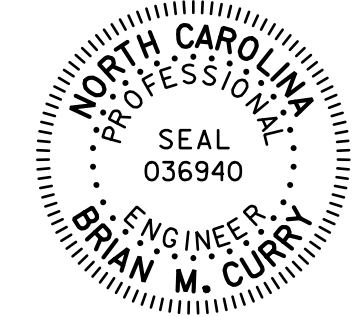
**WALL 2 ELEVATION**  
 (HANDRAIL NOT SHOWN FOR CLARITY)



**RETAINING WALL DETAIL FOR OUTLET END**  
 (SEE ROADWAY PLANS FOR HANDRAIL DETAILS AND PAY ITEM)

PROJECT NO. U-5841  
 GUILFORD COUNTY  
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 SHEET 4 OF 7

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
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**CONCRETE ARCH CULVERT EXTENSION SECTIONS & DETAILS**



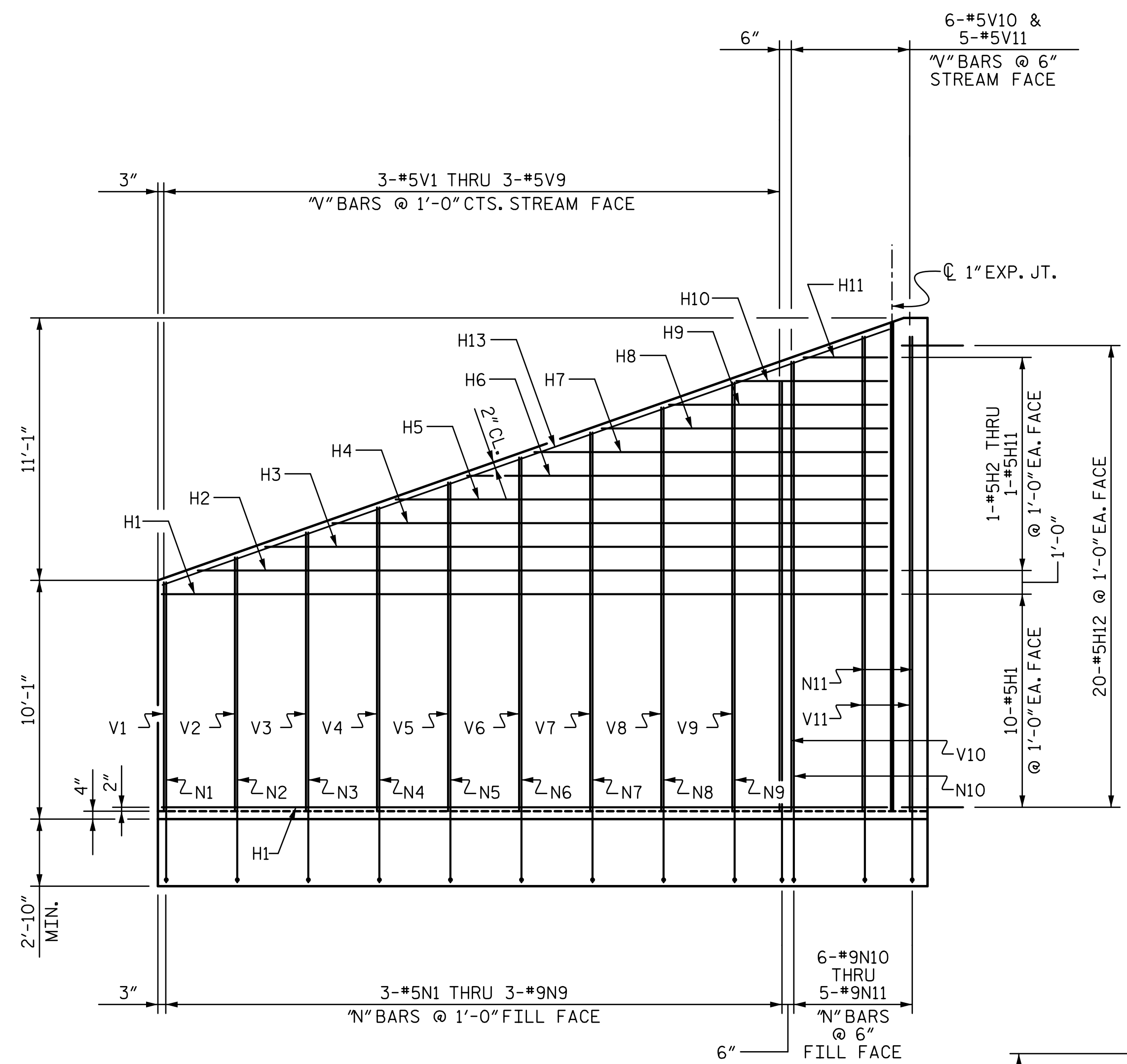
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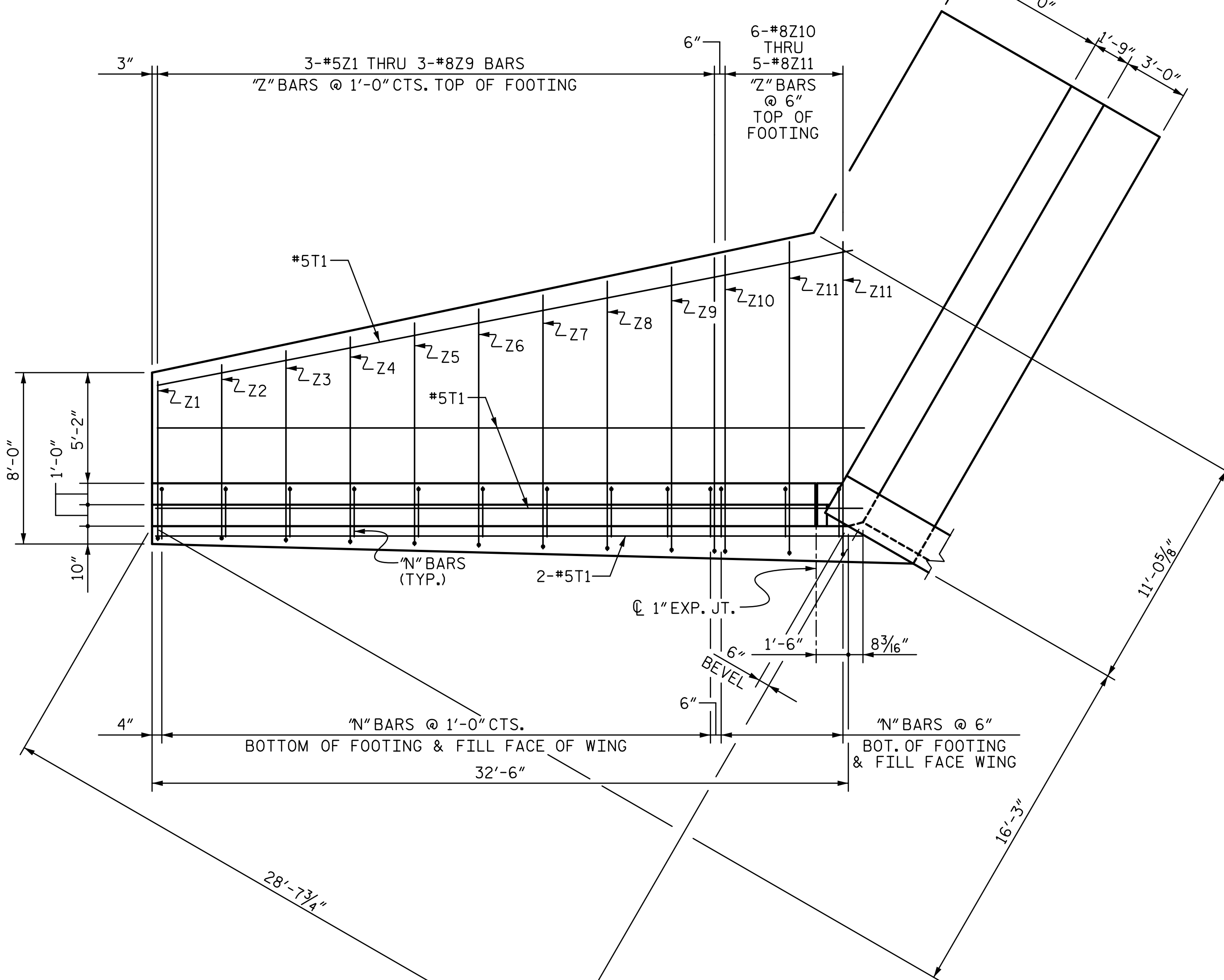
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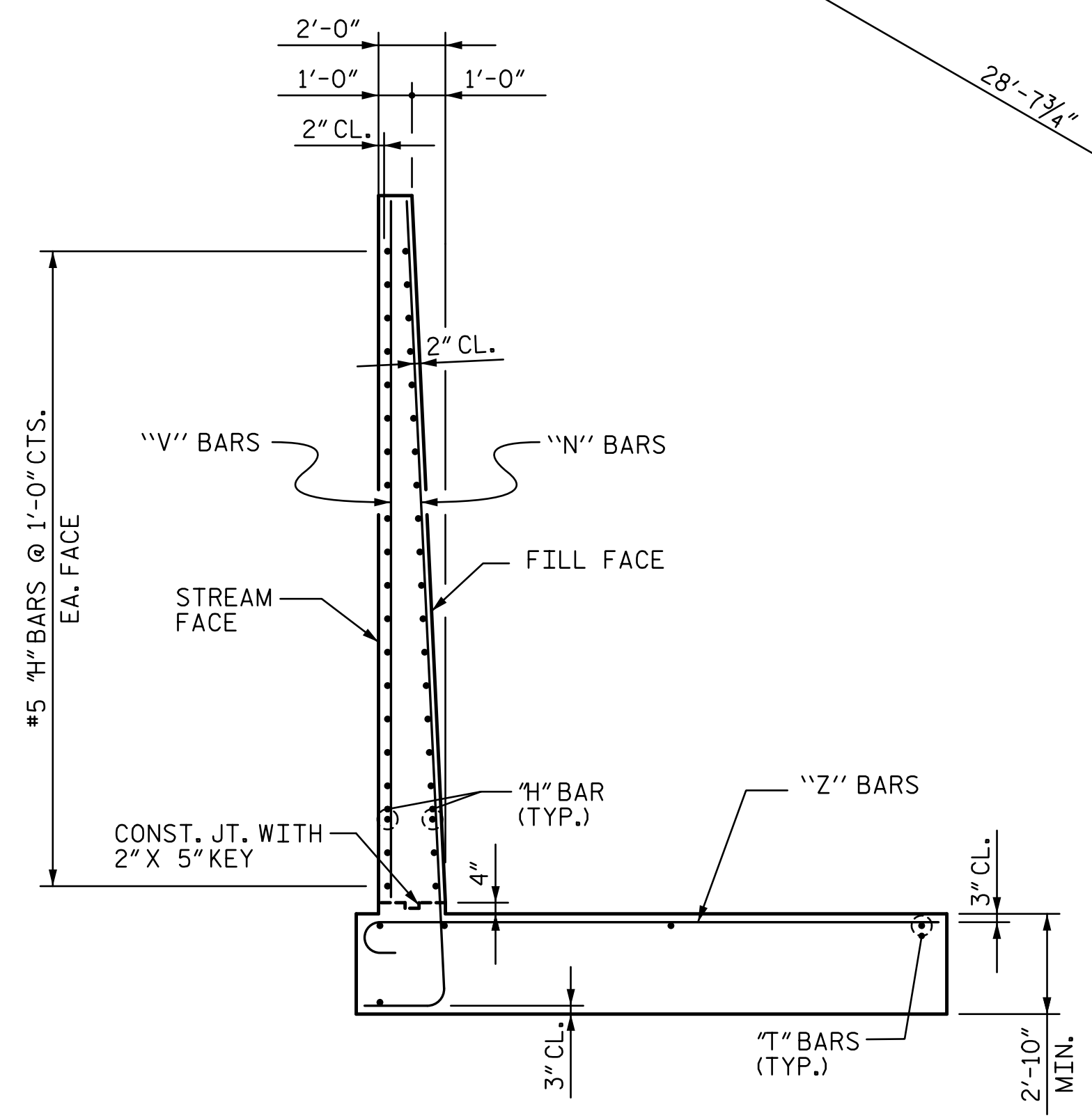
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ELEVATION W1

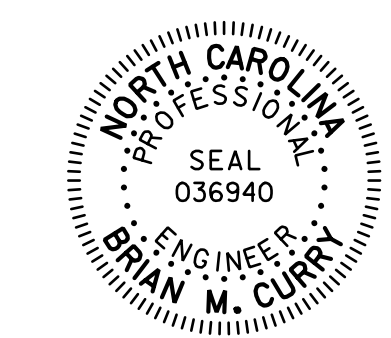


PLAN W1



TYPICAL WING SECTION

PROJECT NO. U-5841  
GUILFORD COUNTY  
 STATION: 17+81.00 -L-  
 SHEET 5 OF 7



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

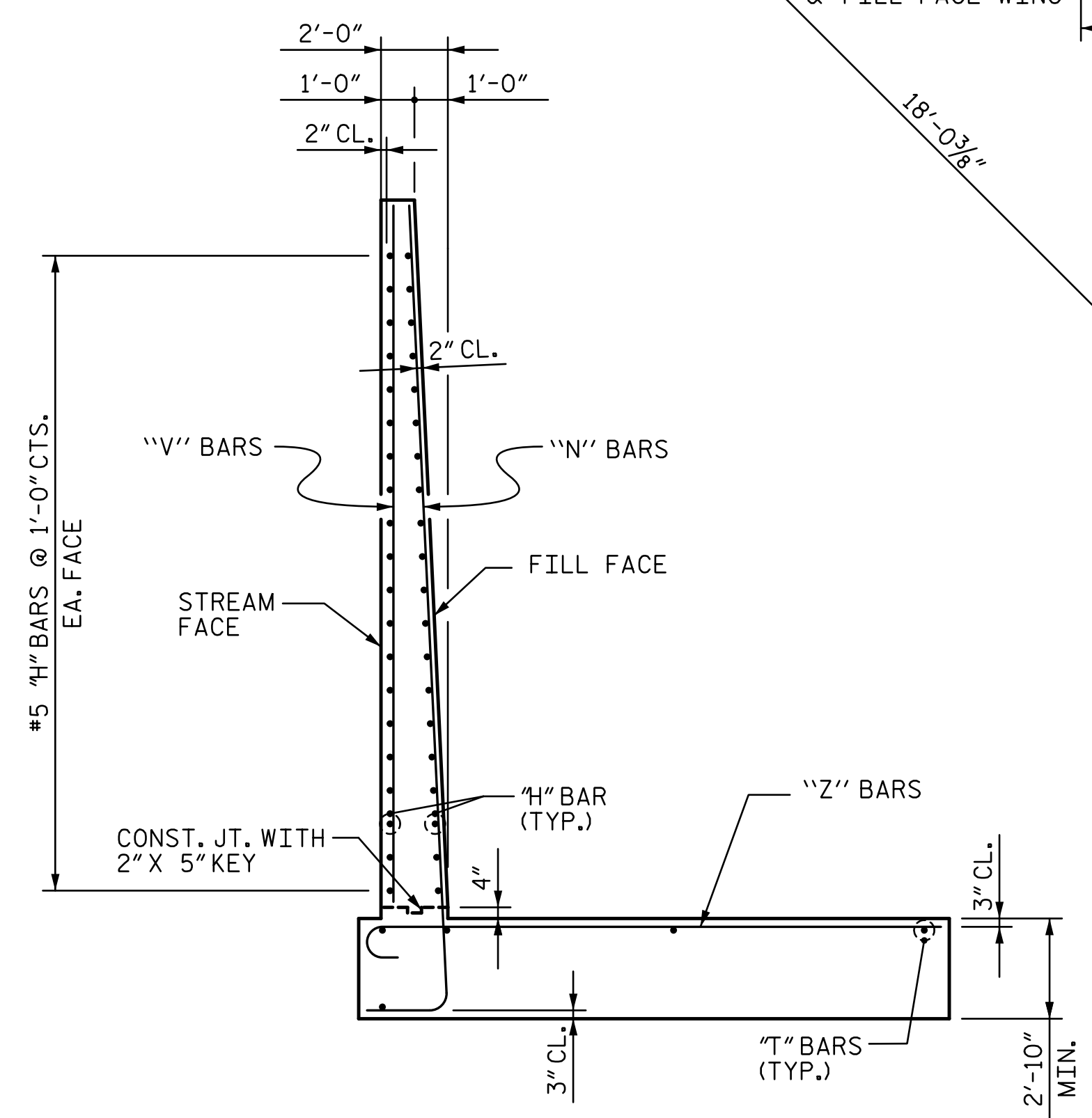
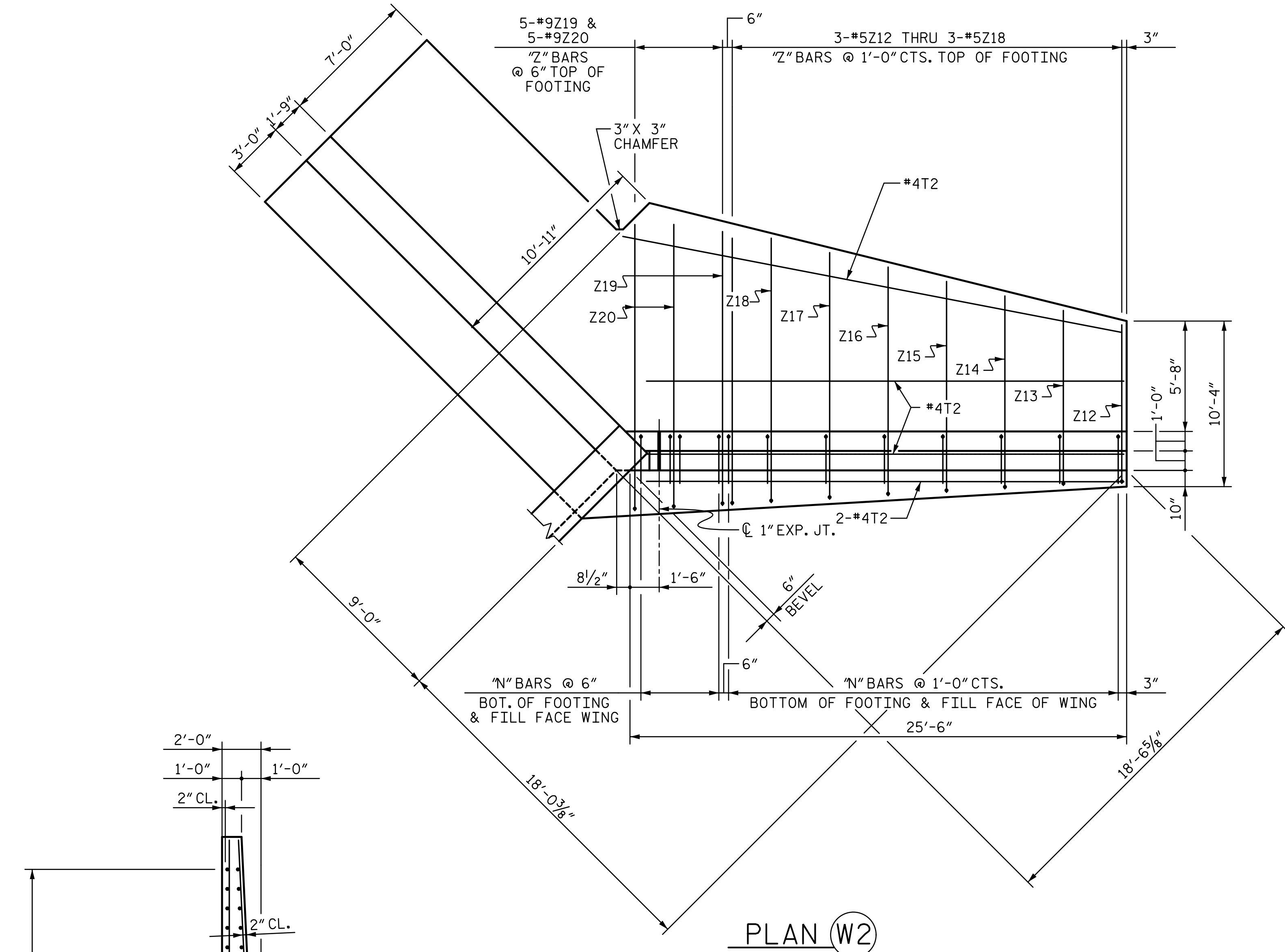
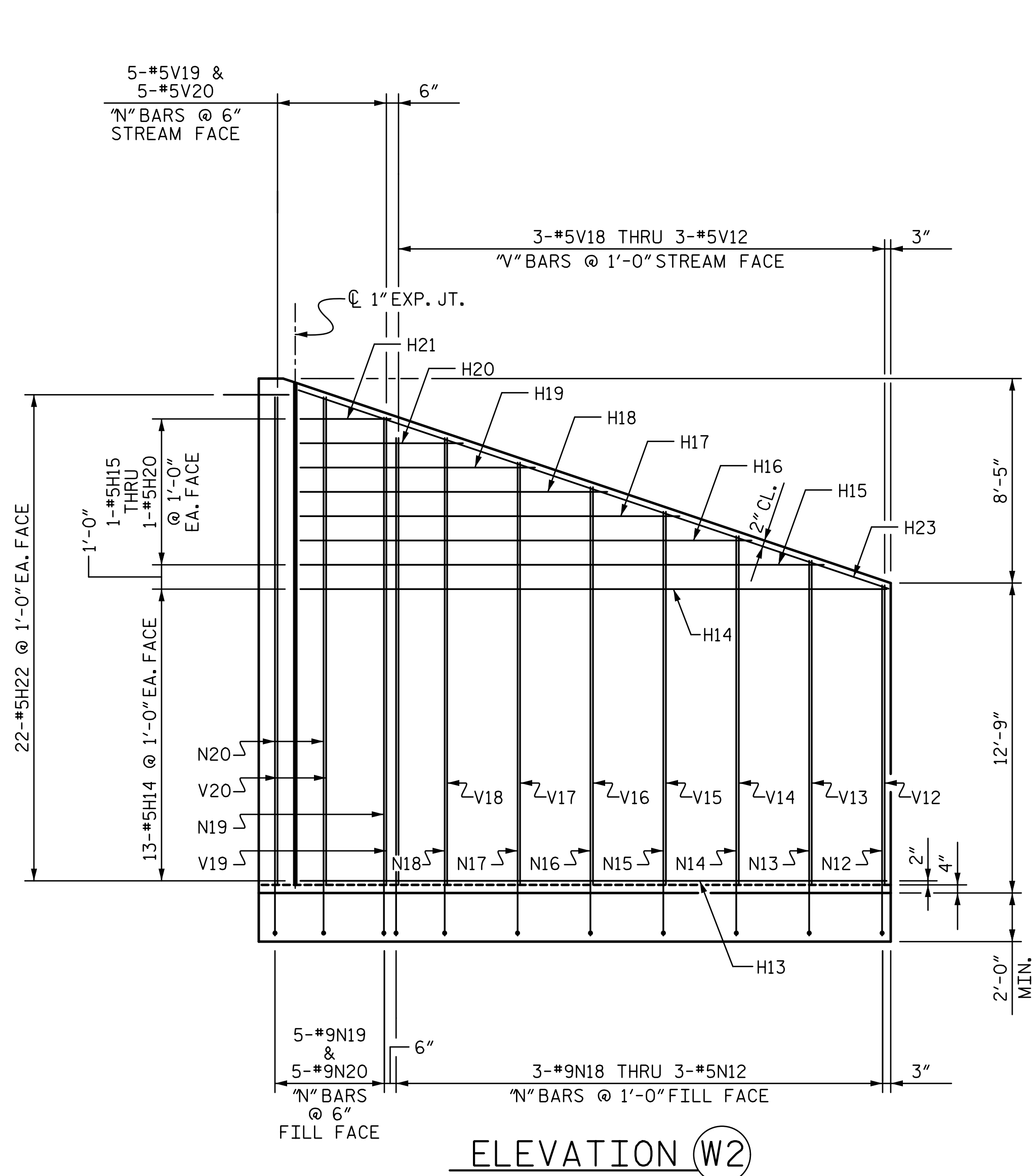
## CONCRETE ARCH CULVERT EXTENSION WING WALL 1

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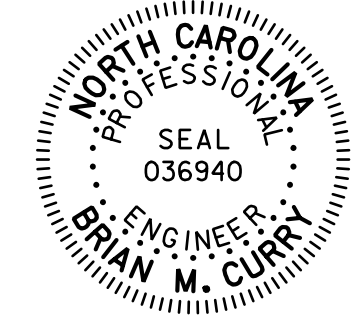
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PROJECT NO. U-5841  
GUILFORD COUNTY  
 STATION: 17+81.00 -L-  
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STATE OF NORTH CAROLINA  
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 RALEIGH  
**CONCRETE ARCH  
 CULVERT EXTENSION  
 WING WALL 2**



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## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	-----	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	--	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	--	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	--	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60	----	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	-----	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	-----	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS	----	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	-----	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	-----	30 LBS. PER CU. FT. (MINIMUM)

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

### CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

### CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED  $\frac{3}{4}$ " WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO  $\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A  $\frac{1}{4}$ " FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A  $\frac{1}{4}$ " RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

### DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

### ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

### REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

### STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE  $\frac{7}{8}$ " Ø SHEAR STUDS FOR THE  $\frac{3}{4}$ " Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{7}{8}$ " Ø STUDS FOR 4 -  $\frac{3}{4}$ " Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{7}{8}$ " Ø STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ " Ø STUDS BASED ON THE RATIO OF 3 -  $\frac{7}{8}$ " Ø STUDS FOR 4 -  $\frac{3}{4}$ " Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST  $\frac{3}{16}$ " IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY  $\frac{1}{16}$ " INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

### SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

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