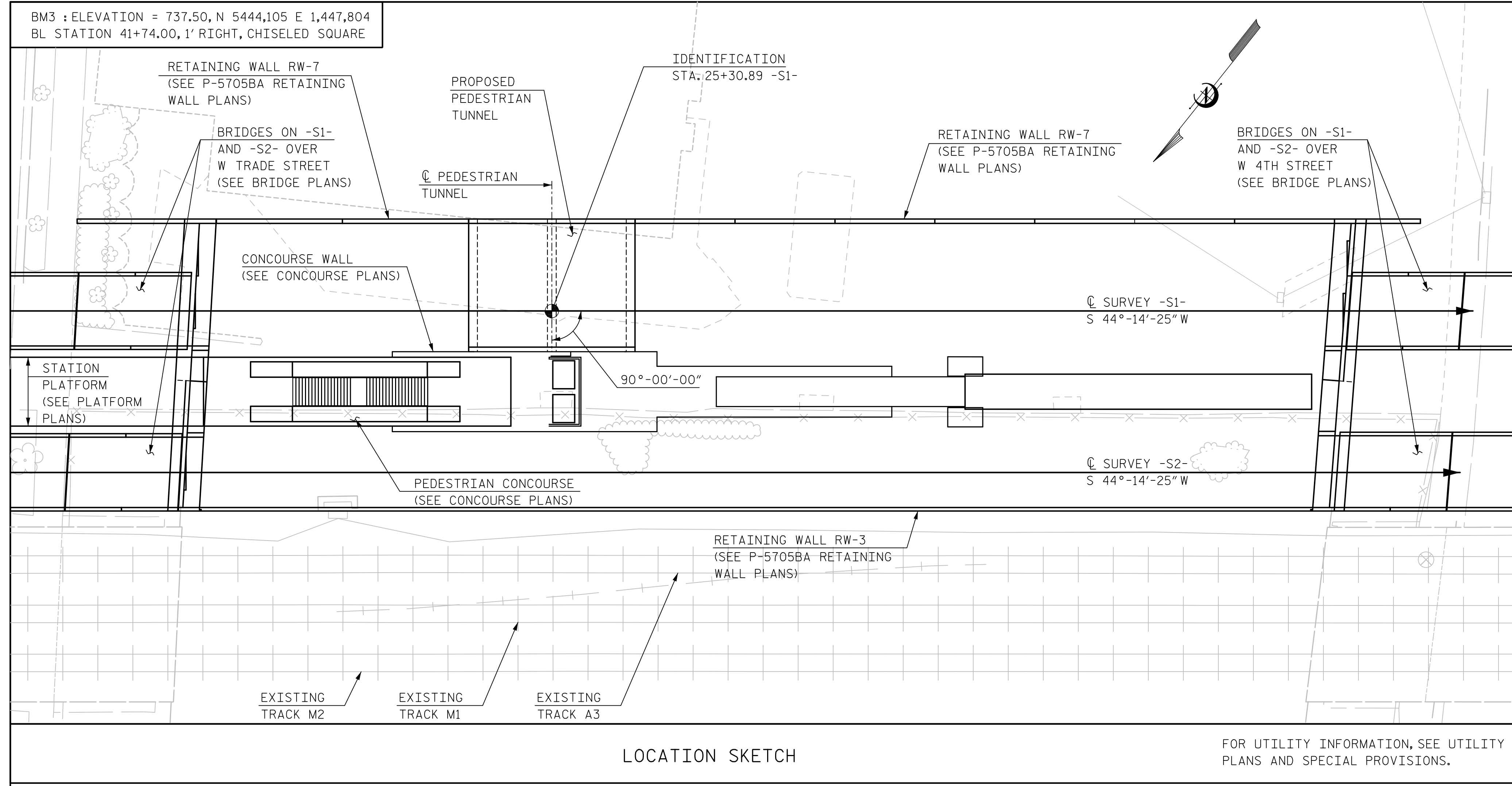


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0012DEL\_P28



| TOTAL BILL OF MATERIAL |   |   |             |                   |                   |
|------------------------|---|---|-------------|-------------------|-------------------|
|                        | CULVERT EXCAVATION AT STATION 25+30.89 -S1- | FOUNDATION CONDITIONING MATERIAL, BOX CULVERT | PDA TESTING | CLASS AA CONCRETE | REINFORCING STEEL |
|                        | LUMP SUM                                    | TON   | EACH        | CU. YDS.          | LBS.              |
| PEDESTRIAN TUNNEL      | LUMP SUM                                    | 126   | 1           | 504.8             | 128,348           |

|                   | WATERPROOFING | METHOD B DAMPPROOFING | METAL RAIL (ALUMINUM) | HP 14x73 STEEL PILES | PILE DRIVING EQUIPMENT SETUP FOR HP 14x73 STEEL PILES |
|-------------------|---------------|-----------------------|-----------------------|----------------------|---|
|                   | SQ. YARDS     | SQ. YARDS             | L.F.                  | NO.                  | L.F.  |
| PEDESTRIAN TUNNEL | 341.8         | 17.6                  | 47.2                  | 29                   | 1,112   |

INDEX OF DRAWINGS

- 1 GENERAL DRAWING: PEDESTRIAN TUNNEL (SHEET 1 OF 5)
- 2 PEDESTRIAN TUNNEL DETAILS (SHEET 2 OF 5)
- 3 PEDESTRIAN TUNNEL DETAILS (SHEET 3 OF 5)
- 4 PEDESTRIAN TUNNEL DETAILS (SHEET 4 OF 5)
- 5 PEDESTRIAN TUNNEL DETAILS (SHEET 5 OF 5)
- 6 METAL HANDRAIL DETAILS (SHEET 1 OF 2)
- 7 METAL HANDRAIL DETAILS (SHEET 2 OF 2)

GRADE DATA

TOP OF RAIL EL. @ STA. 25+30.89 -S1- = 744.11  
 TUNNEL INVERT ELEVATION @ STA. 25+30.89 -S1- = 724.12

**NOTES:**  
 ASSUMED LIVE LOAD = AREMA E-80

THIS TUNNEL HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT EDITION OF AREMA'S MANUAL FOR RAILWAY ENGINEERING, VOL. 2, STRUCTURES.

DESIGN FILL = 4.69' (BASE OF RAIL TO TOP OF STRUCTURE)

FOR OTHER DESIGN DATA AND NOTES SEE STRUCTURE STANDARD NOTE SHEET.

3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

TUNNEL SHALL BE CONSTRUCTED USING CLASS AA CONCRETE WITH f'c = 4,500 psi.

CONCRETE IN TUNNEL TO BE POURED IN THE FOLLOWING ORDER:  
 1. FLOOR SLAB INCLUDING CUTOFF WALLS AND 2" OF ALL VERTICAL WALLS.

2. THE REMAINING PORTIONS OF THE WALLS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

NO BACKFILLING OF EXTERIOR WALLS SHALL BE PERMITTED UNTIL TOP SLAB HAS BEEN PLACED AND CURED. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARILY BRACING WALLS UNTIL TOP SLAB IS COMPLETED.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

REINFORCING STEEL SHALL BE ASTM DESIGNATION A615, GRADE 60. ALL DIMENSIONS RELATING TO BAR SPACING ARE TO BAR CENTERS UNLESS NOTED. FABRICATION TO BE IN ACCORDANCE WITH THE "MANUAL OF STANDARD PRACTICE" A.C.I. 315-80.

WATERPROOFING AND DAMPPROOFING SHALL BE APPLIED IN ACCORDANCE WITH THE PLANS, STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS. AT LOCATIONS WHERE WATERPROOFING AND DAMPPROOFING OVERLAP, WATERPROOFING SHALL ALWAYS BE APPLIED FIRST.

DAMPPROOFING: FILL FACE OF HEADWALL FROM TOP OF SLAB TO TOP OF SUBBALLAST.

WATERPROOFING: TOP SURFACE AREA OF TOP SLAB AND EXTERIOR FACES OF EXTERIOR WALLS. CONTRACTOR SHALL SUBMIT WATERPROOFING SYSTEM AND DETAILS TO THE ENGINEER, INCLUDING WATERPROOFING DETAIL FOR EXPANSION JOINTS, FOR REVIEW AND APPROVAL.

FOR WATERPROOFING, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES", JANUARY 2018, NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (HEREIN CALLED STANDARD SPECIFICATIONS), EXCEPT AS NOTED HEREIN, ELSEWHERE ON PLANS, OR IN THE SPECIAL PROVISIONS.

ALL CONCRETE SHALL BE 4,500 PSI CLASS AA CONCRETE WITH NO. 57 OR 67 COARSE AGGREGATE AND SHALL BE AIR-ENTRAINED. MINIMUM CEMENT CONTENT PER CUBIC YARD OF CONCRETE SHALL BE 6.5 BAGS. NO SUBSTITUTION OF FLYASH, BLAST FURNACE SLAG OR OTHER MATERIAL WILL BE PERMITTED IN MEETING THIS MINIMUM CEMENT REQUIREMENT. CHAMFER ALL EXPOSED EDGES AND CORNERS 3/4" EXCEPT AS NOTED. THE USE OF GROUND GRANULATED BLAST FURNACE SLAG IS NOT PERMITTED IN THIS STRUCTURE.

CONTROL OF WORK: ALL WORK INVOLVED IN THE CONSTRUCTION OF THE RAILWAY STRUCTURE SHALL BE PERFORMED SATISFACTORY TO THE ENGINEER AND/OR NORFOLK SOUTHERN RAILWAY COMPANY. ALL METHODS OF HANDLING THE WORK AFFECTING THE SAFETY OF RAIL OPERATIONS MUST BE APPROVED BY THE RAILWAY COMPANY BEFORE PROCEEDING WITH THAT PORTION OF THE WORK. RAIL TRAFFIC SHALL, AT ALL TIMES, BE MAINTAINED AND PROTECTED. THE CONTRACTOR SHALL NOT AT ANY TIME DELAY OR INTERFERE WITH RAIL OPERATIONS.

FOR METAL RAIL (ALUMINUM), SEE SPECIAL PROVISIONS.

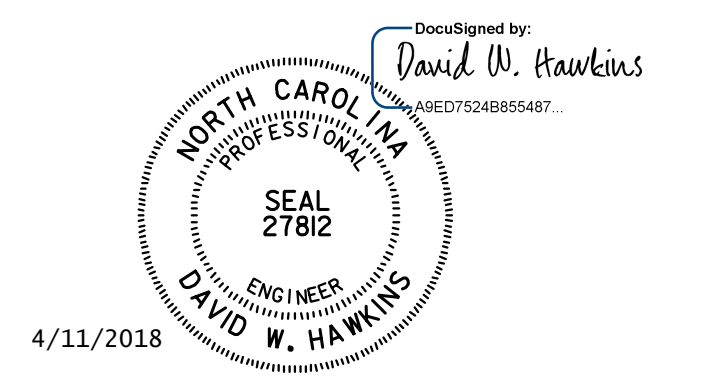
FOR PORTLAND CEMENT, SEE SPECIAL PROVISIONS.

FOR FINE AND COARSE AGGREGATE, SEE SPECIAL PROVISIONS.

FOR BACKFILL AROUND STRUCTURE, SEE SPECIAL PROVISION "BACKFILLING AROUND STRUCTURES".

FOR WATERSTOPS, SEE SPECIAL PROVISIONS.

FOR FOUNDATION LAYOUT AND FOUNDATION NOTES, SEE PEDESTRIAN TUNNEL DETAILS (SHEET 5 OF 5)



PROJECT NO. P-5705BB  
MECKLENBURG COUNTY  
 STATION: STA. 25+30.89 -S1-

SHEET 1 OF 5

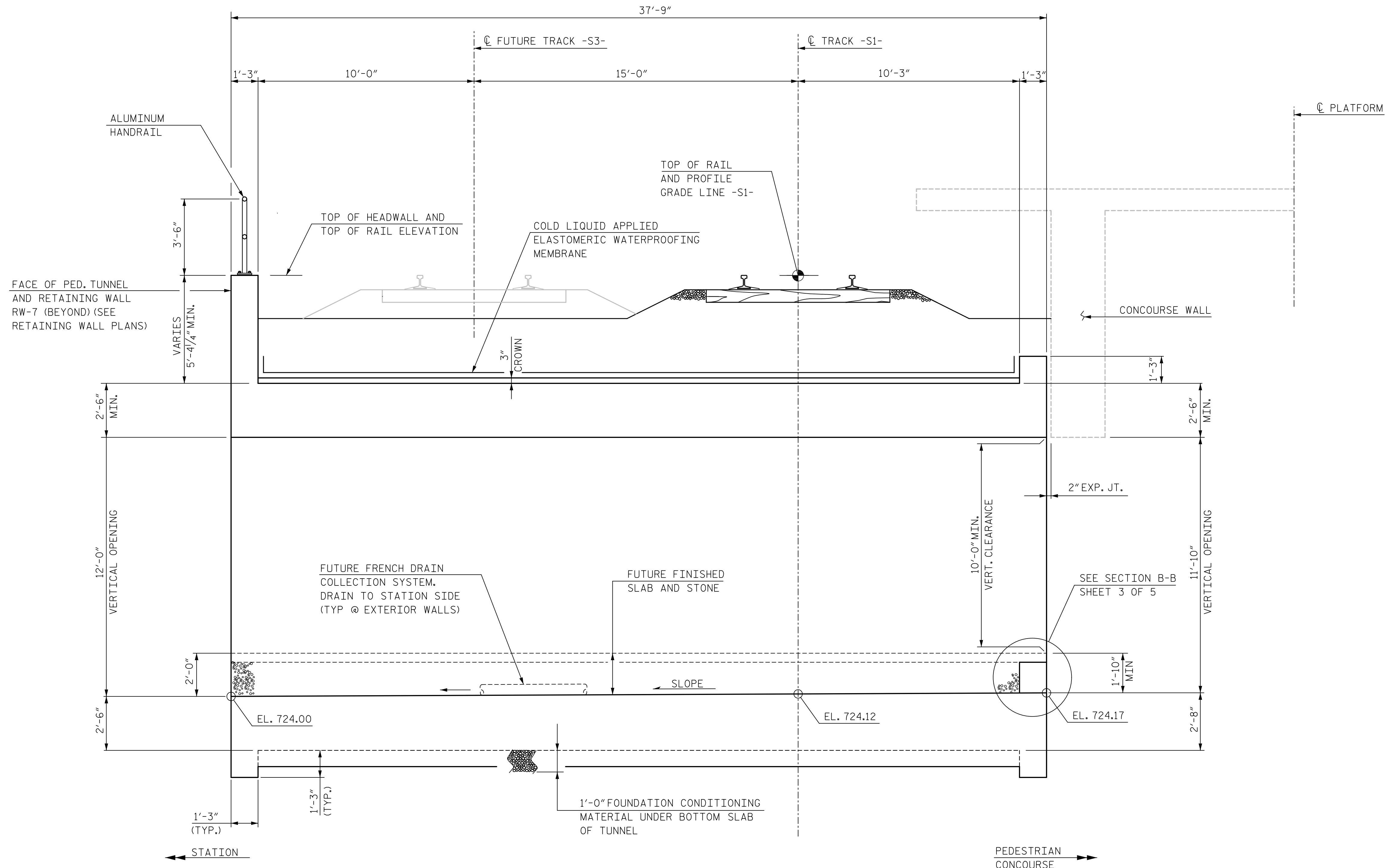
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

GENERAL DRAWING  
 PEDESTRIAN  
 TUNNEL

|                         |  |  |  |                 |  |
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| CHECKED BY: J. WHEATLEY |  | DATE: 11/17  |  |                 |  |

| REVISIONS |    |      |     |    |      |
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| 1         |    |      | 3   |    |      |
| 2         |    |      | 4   |    |      |

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**LONGITUDINAL SECTION THROUGH TUNNEL**  
PILES AND REINFORCING NOT SHOWN FOR CLARITY

**NOTES:**

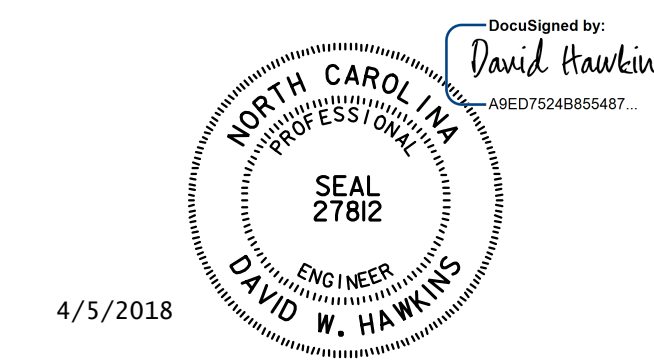
- FOR EXPANSION JOINT DETAILS, SEE SHEET 5 OF 5.
- FOR PEDESTRIAN CONCOURSE, SEE PEDESTRIAN CONCOURSE PLANS.
- FOR HANDRAIL, SEE "METAL HANDRAIL DETAILS" SHEETS.

PROJECT NO. P-5705BB  
MECKLENBURG COUNTY  
 STATION: STA. 25+30.89 -S1-

SHEET 2 OF 5

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
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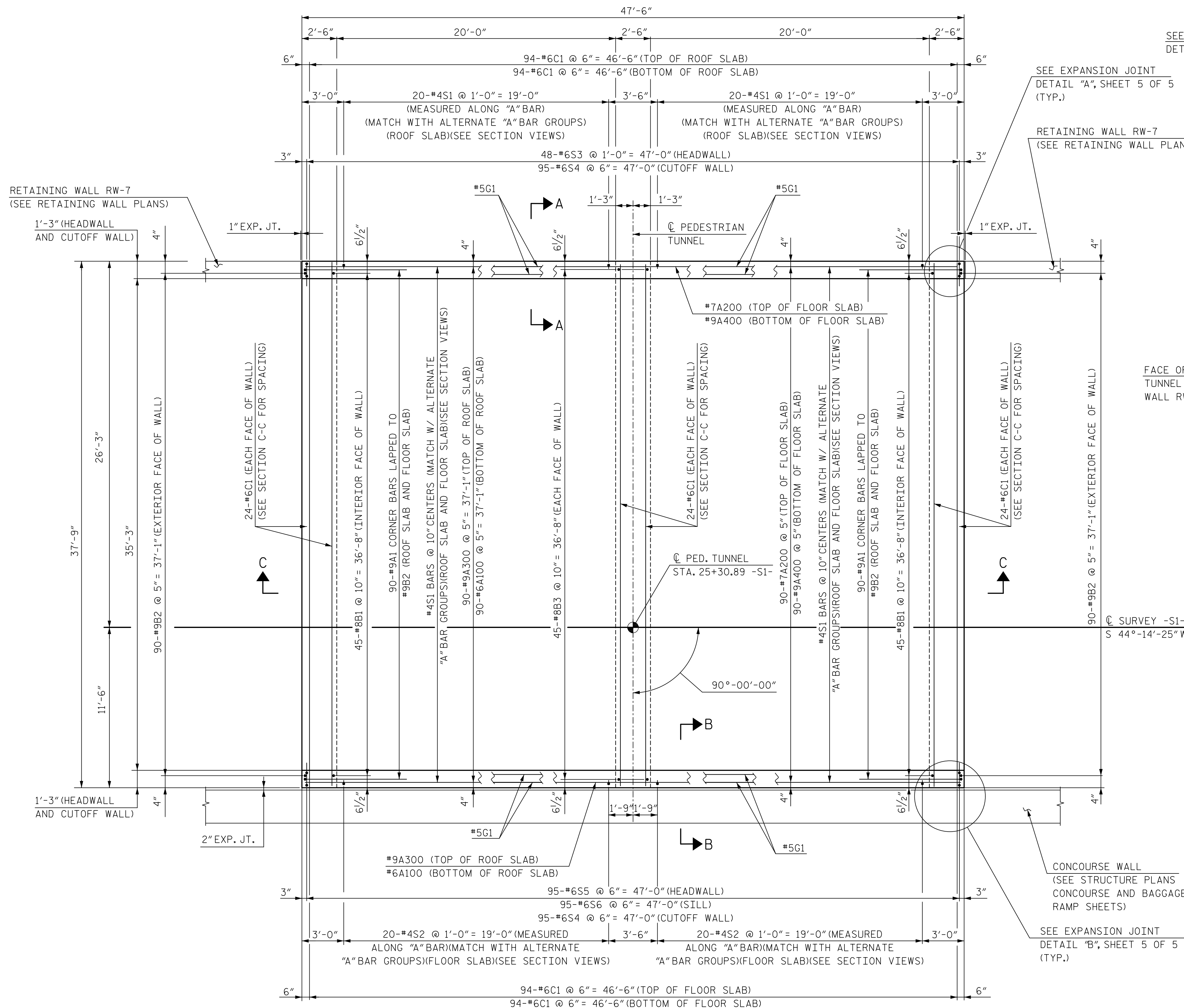
**PEDESTRIAN  
 TUNNEL  
 DETAILS**



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| NO.       | BY | DATE | NO. | BY | DATE | S11-2             |
| 1         |    |      | 3   |    |      | TOTAL SHEETS<br>7 |
| 2         |    |      | 4   |    |      |                   |

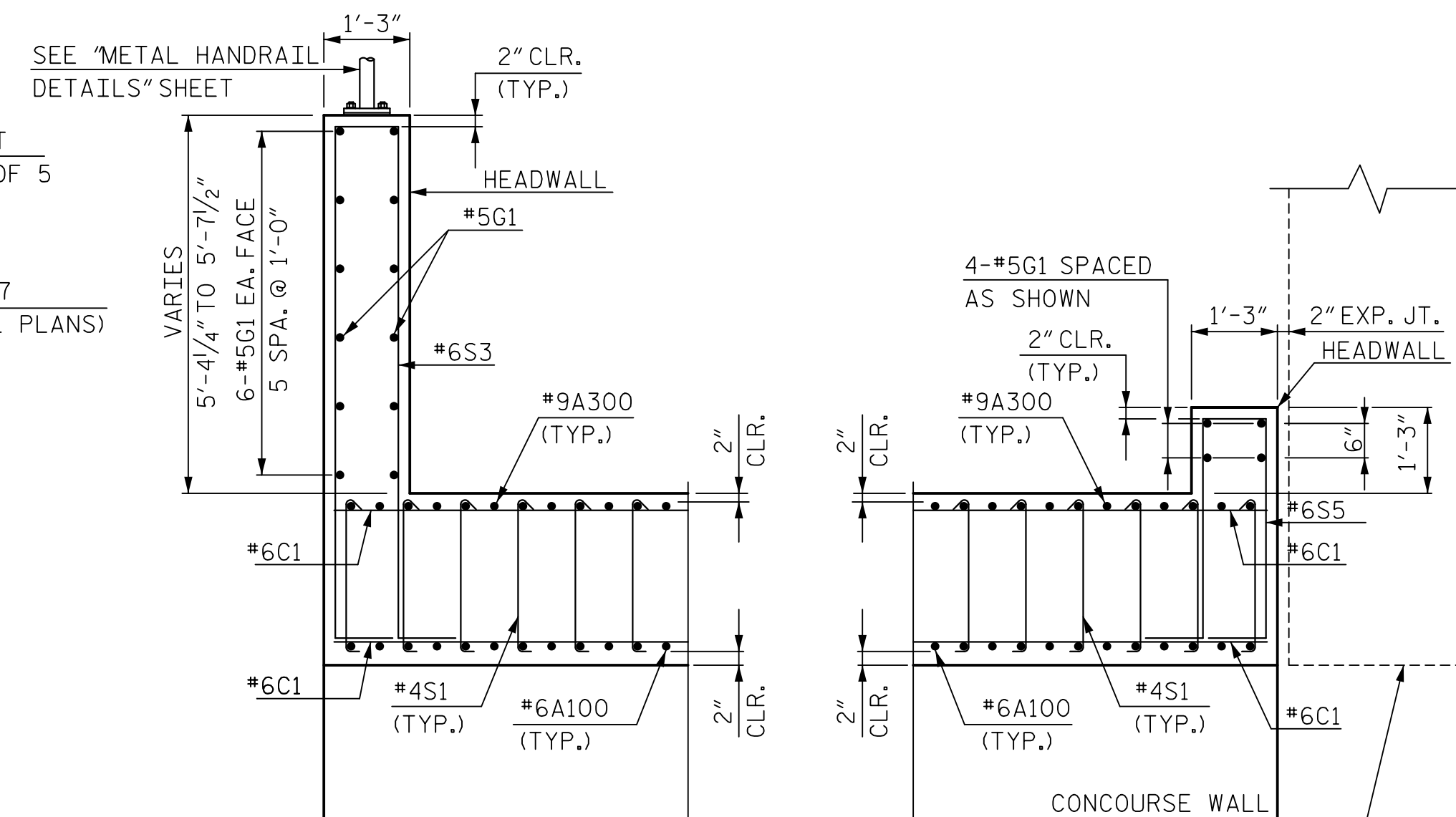


PLAN

NOTES:

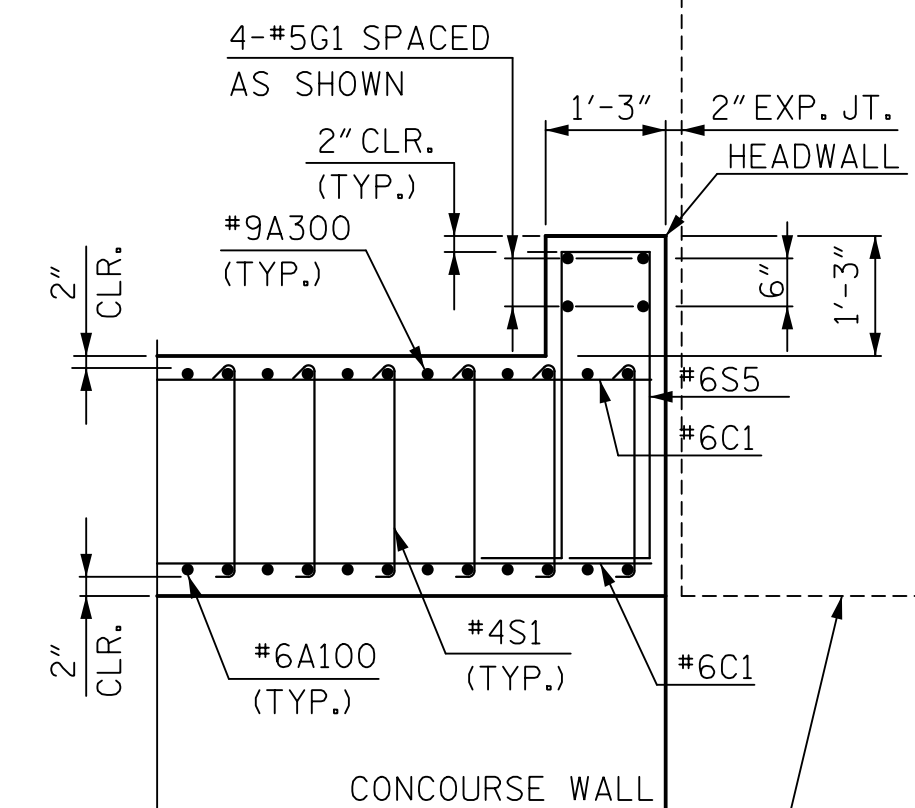
FOR SECTION C-C, SEE SHEET 4 OF 5.

FOR EXPANSION JOINT DETAILS, SEE SHEET 5 OF 5.

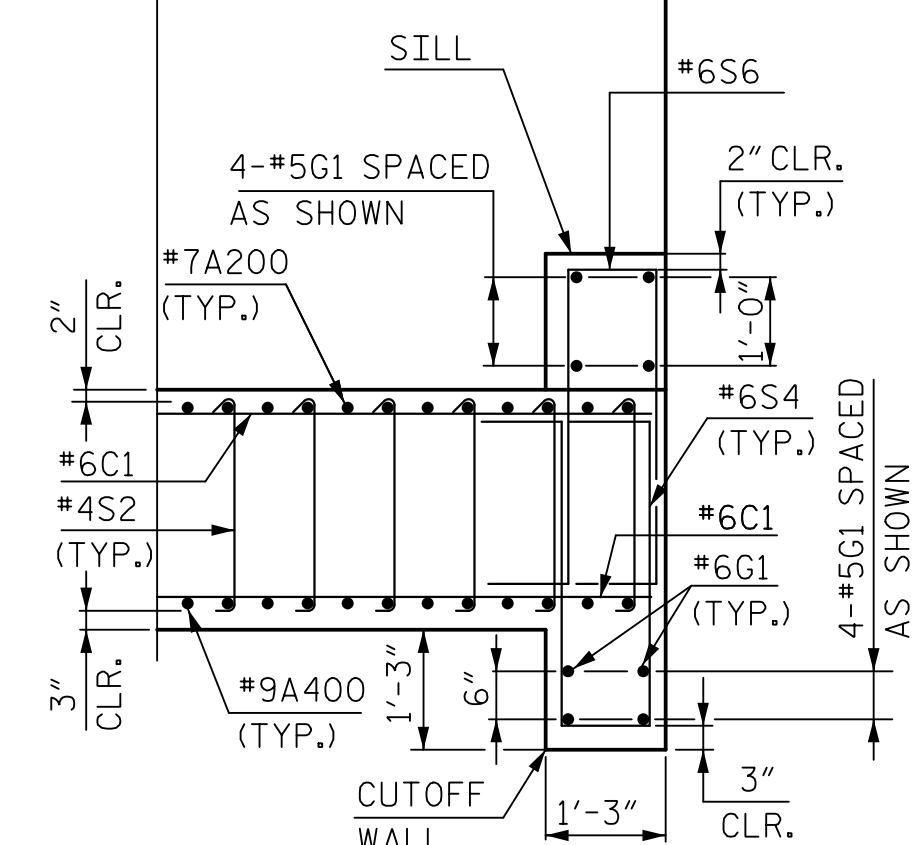
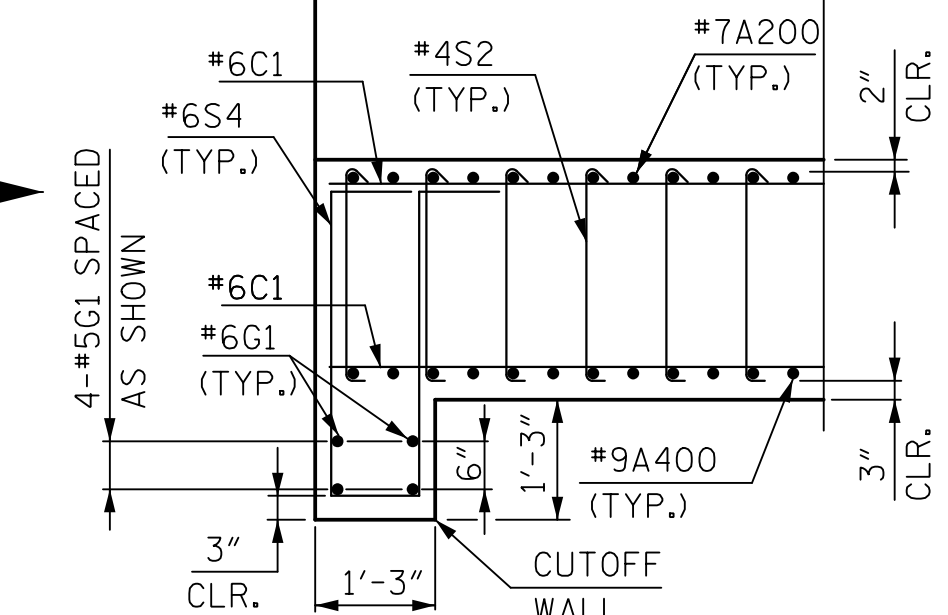


SECTION A-A

FACE OF PEDESTRIAN TUNNEL AND RETAINING WALL RW-7 (BEYOND)



SECTION B-B

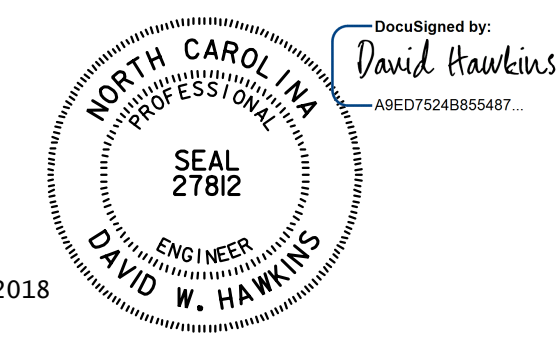


PROJECT NO. P-5705BB  
 MECKLENBURG COUNTY  
 STATION: STA. 25+30.89 -S1-

SHEET 3 OF 5

STATE OF NORTH CAROLINA  
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PEDESTRIAN TUNNEL DETAILS

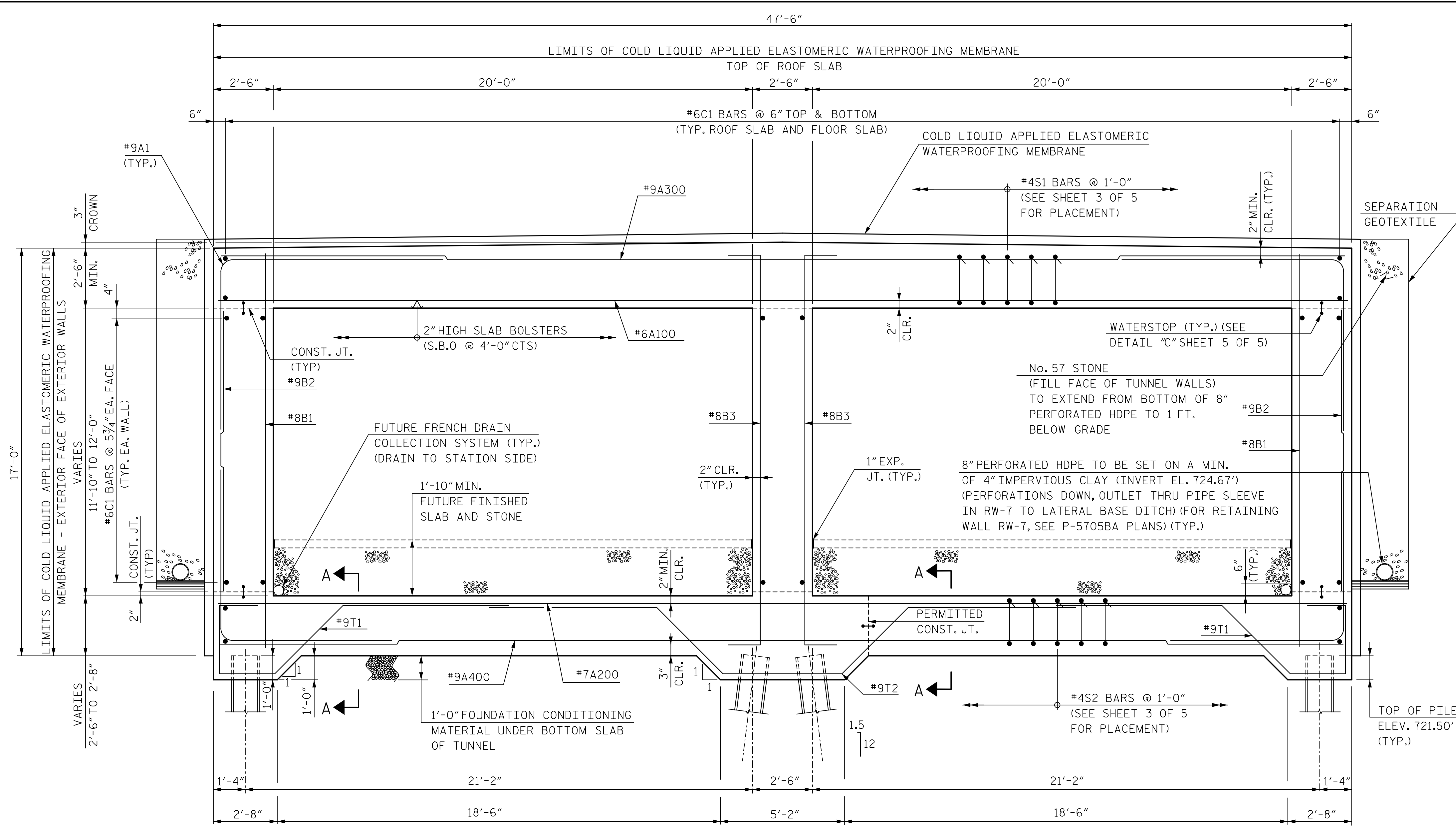


3/30/2018

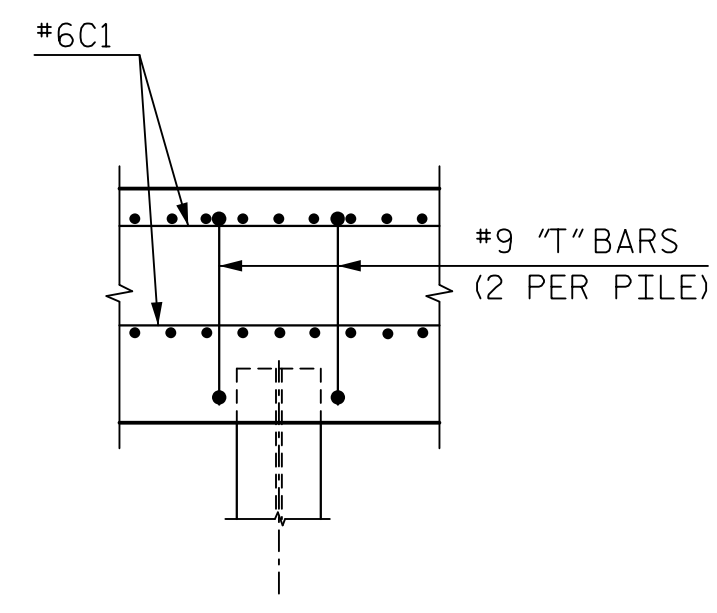
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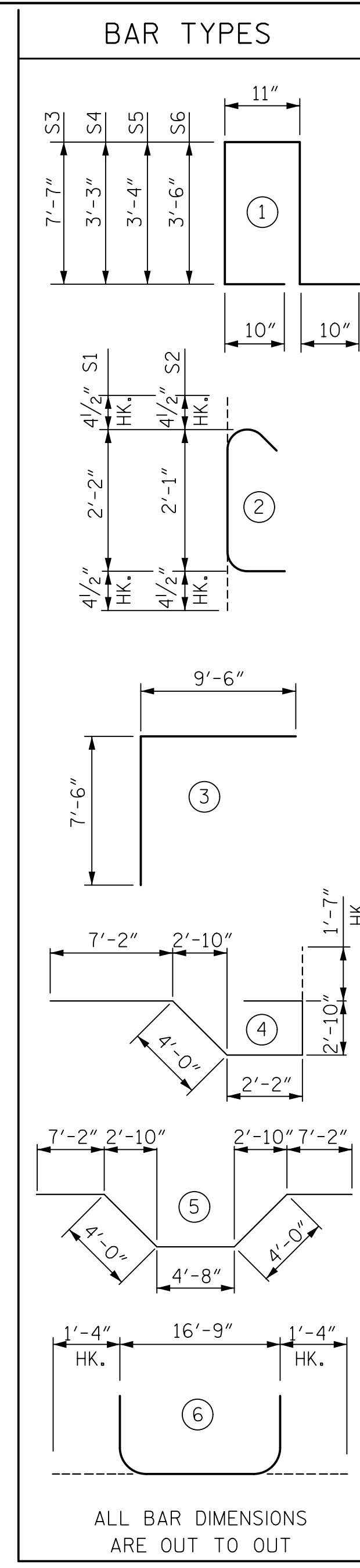
SECTION C-C



SECTION A-A

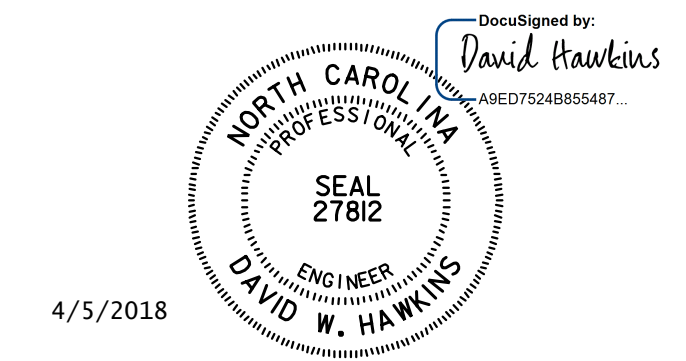
| SPLICE LENGTH CHART |               |
|---------------------|---------------|
| BAR SIZE            | SPLICE LENGTH |
| #5                  | 2'-2"         |
| #6                  | 2'-8"         |
| #7                  | 4'-4"         |
| #8                  | 4'-2"         |
| #9 TOP BAR          | 7'-2"         |
| #9                  | 5'-2"         |

NOTE: PAYMENT FOR DRAIN AND ALL INCIDENTAL ITEMS SHALL BE INCLUDED IN THE LUMP SUM PAY ITEM FOR CULVERT EXCAVATION AT STATION 25+30.89 -S1-. SEPARATION GEOTEXTILE SHALL BE TYPE I GEOTEXTILE IN ACCORDANCE WITH SECTION 1056 OF THE STANDARD SPECIFICATIONS.



| BILL OF MATERIAL  |       |      |      |        |        |
|-------------------|-------|------|------|--------|--------|
| BAR               | NO.   | SIZE | TYPE | LENGTH | WEIGHT |
| PEDESTRIAN TUNNEL |       |      |      |        |        |
| A1                | 360   | 9    | 3    | 17'-0" | 20,808 |
| A100              | 90    | 6    | STR  | 47'-2" | 6,376  |
| A200              | 90    | 7    | STR  | 47'-2" | 8,677  |
| A300              | 90    | 9    | STR  | 47'-2" | 14,433 |
| A400              | 90    | 9    | STR  | 47'-2" | 14,433 |
| B1                | 90    | 8    | STR  | 16'-7" | 3,985  |
| B2                | 180   | 9    | STR  | 11'-8" | 7,140  |
| B3                | 90    | 8    | 6    | 19'-5" | 4,666  |
| C1                | 520   | 6    | STR  | 37'-5" | 29,224 |
| G1                | 28    | 5    | STR  | 47'-2" | 1,377  |
| S1                | 1,800 | 4    | 2    | 2'-11" | 3,507  |
| S2                | 1,800 | 4    | 2    | 2'-10" | 3,407  |
| S3                | 48    | 6    | 1    | 17'-9" | 1,280  |
| S4                | 190   | 6    | 1    | 9'-1"  | 2,592  |
| S5                | 95    | 6    | 1    | 9'-3"  | 1,320  |
| S6                | 95    | 6    | 1    | 9'-7"  | 1,367  |
| T1                | 28    | 9    | 4    | 17'-9" | 1,690  |
| T2                | 30    | 9    | 5    | 27'-0" | 2,754  |

| QUANTITIES                   |          |         |
|------------------------------|----------|---------|
| REINFORCING STEEL            | LBS.     | 129,036 |
| CLASS AA CONCRETE BREAKDOWN  |          |         |
| BOTTOM SLAB AND CUTOFF WALLS | CU. YDS. | 190.4   |
| WALLS                        | CU. YDS. | 123.2   |
| TOP SLAB AND HEADWALLS       | CU. YDS. | 188.6   |
| CONCRETE SILL                | CU. YDS. | 2.6     |
| TOTAL                        |          | 504.8   |
| HP 14x73 STEEL PILES         | NO.      | 29      |
|                              | L.F.     | 1,112   |



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DWG. NO. 4

PROJECT NO. P-5705BB  
 MECKLENBURG COUNTY  
 STATION: STA. 25+30.89 -S1-

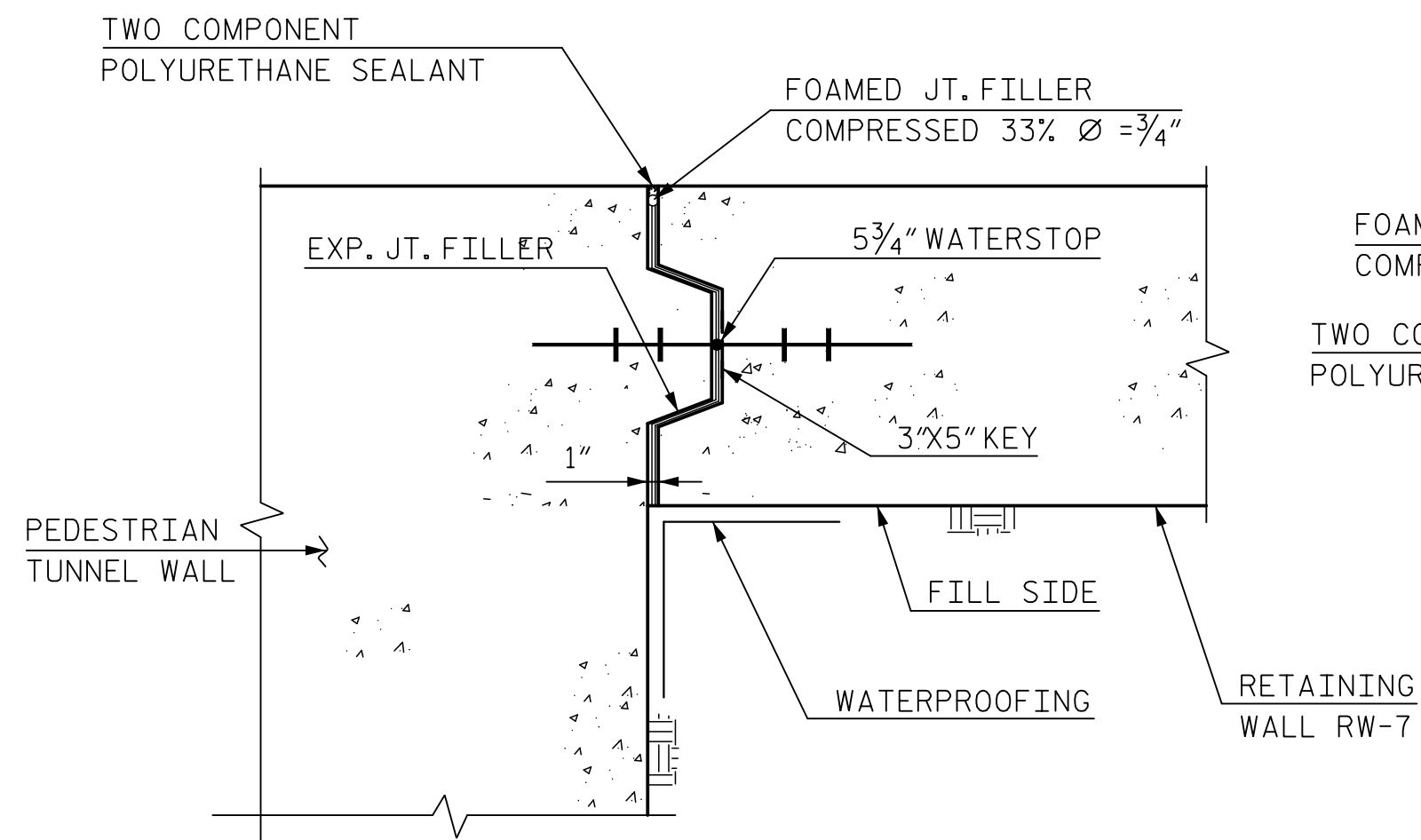
SHEET 4 OF 5

STATE OF NORTH CAROLINA  
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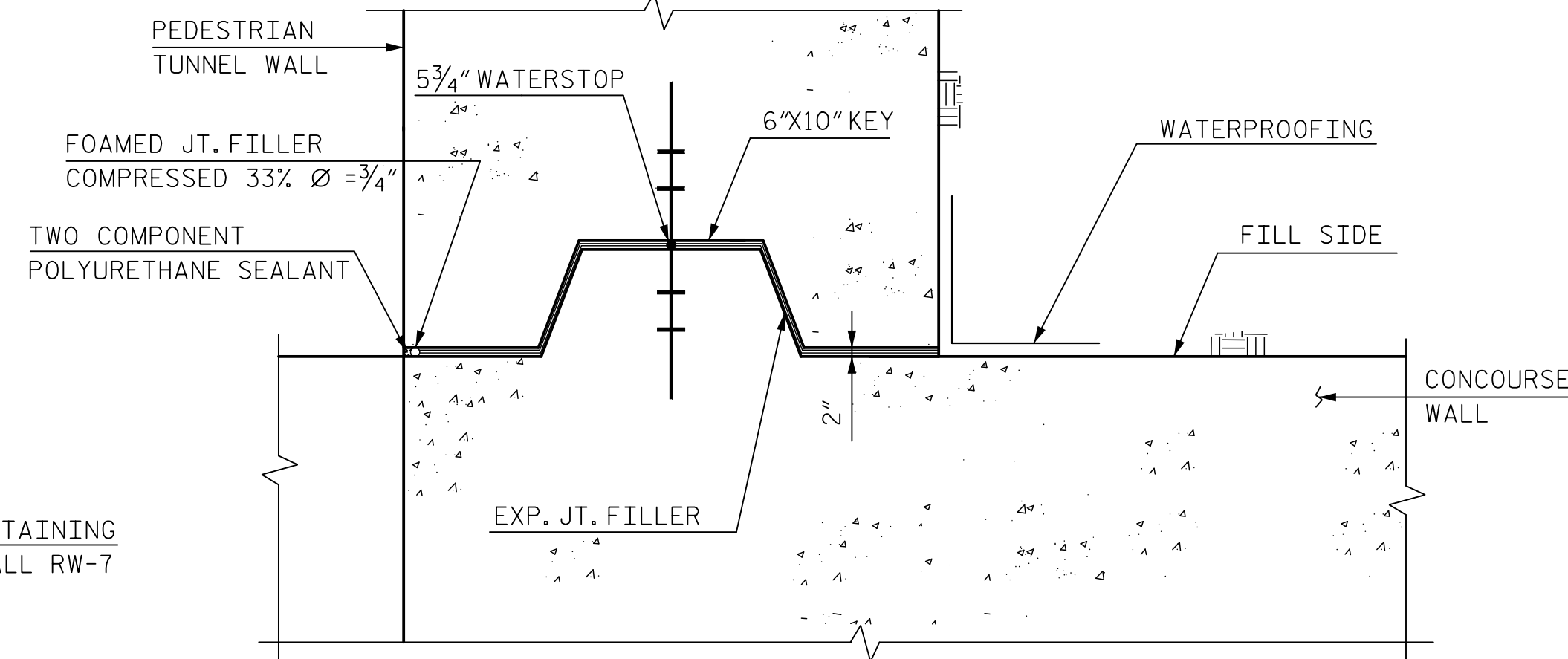
PEDESTRIAN TUNNEL DETAILS

| REVISIONS |    |      |     |    |      |
|-----------|----|------|-----|----|------|
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| 1         |    |      | 3   |    |      |
| 2         |    |      | 4   |    |      |

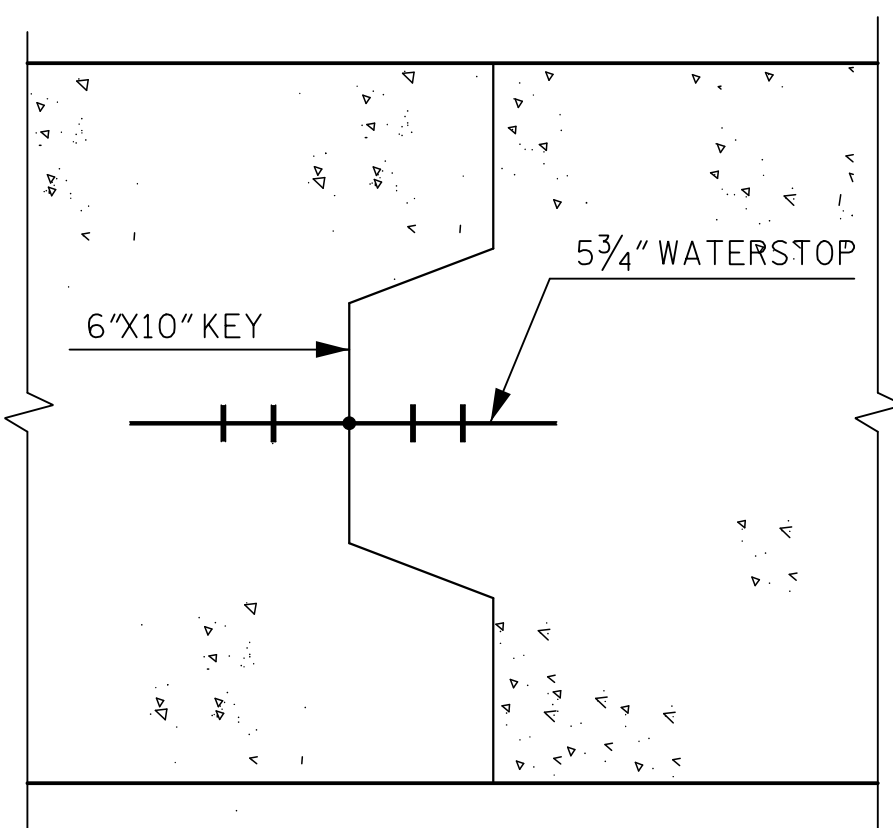
SHEET NO. S11-4  
 TOTAL SHEETS 7



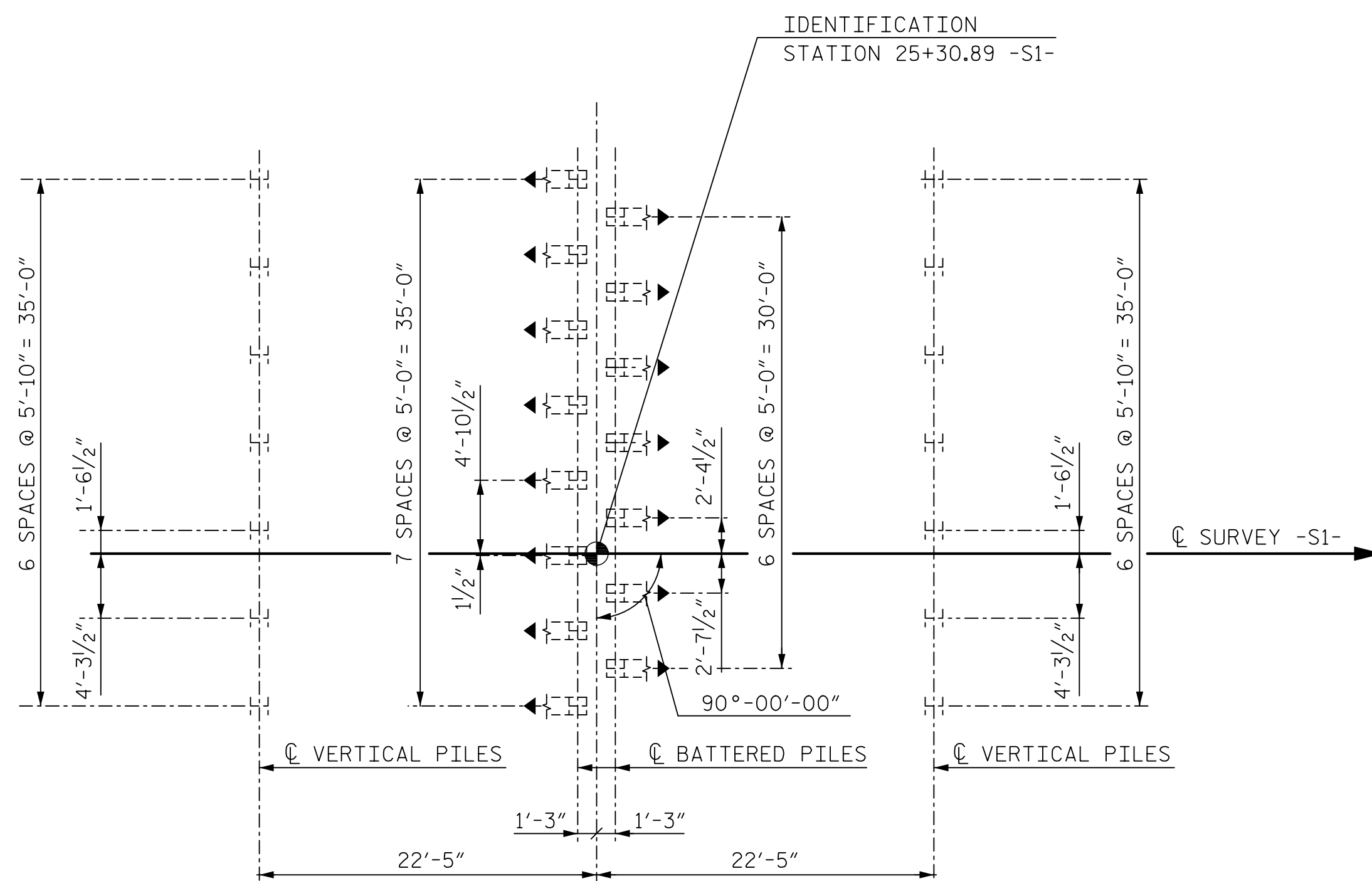
**EXPANSION JOINT - DETAIL "A"**  
RETAINING WALL RW-7  
TO PEDESTRIAN TUNNEL WALL



**EXPANSION JOINT - DETAIL "B"**  
CONCOURSE WALL  
TO PEDESTRIAN TUNNEL WALL



**TYPICAL CONSTRUCTION JOINT - DETAIL "C"**



**FOUNDATION LAYOUT**

**NOTES:**

◀ INDICATES STEEL PILE TO BE BATTERED AT 1/2:12 IN DIRECTION SHOWN.

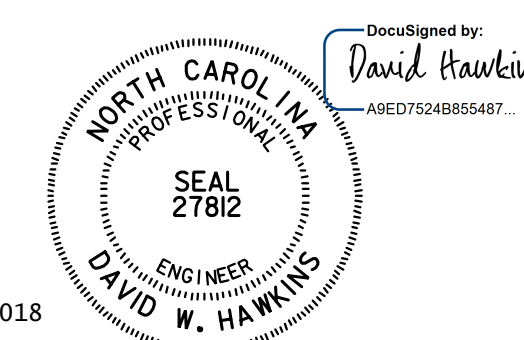
**FOUNDATION NOTES**

FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS.

PILES AT PEDESTRIAN TUNNEL ARE DESIGNED FOR AN ALLOWABLE BEARING CAPACITY OF 100 TONS PER PILE.

DRIVE PILES AT PEDESTRIAN TUNNEL TO A REQUIRED BEARING CAPACITY OF 250 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAG.

TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED AT PEDESTRIAN TUNNEL. FOR PDA TESTING, SEE GEOTECHNICAL SPECIAL PROVISIONS.



3/30/2018

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PROJECT NO. P-5705BB  
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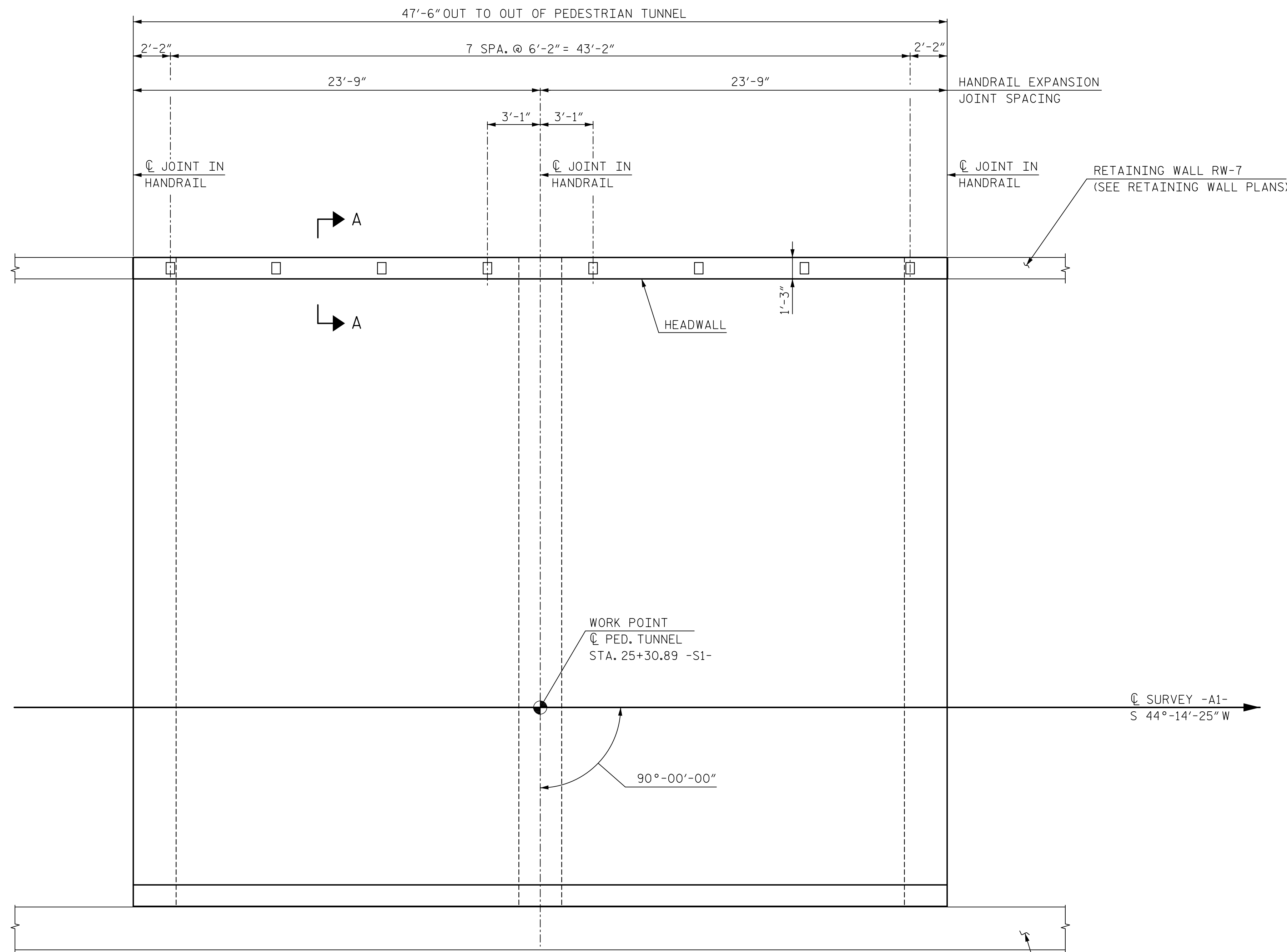
SHEET 5 OF 5

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

PEDESTRIAN  
TUNNEL  
DETAILS

|  |  |
|--|--|
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| DWG. NO. 5                                 |  |

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|-----------|----|------|-----|----|------|--------------|
| NO.       | BY | DATE | NO. | BY | DATE | S11-5        |
| 1         |    |      | 3   |    |      | TOTAL SHEETS |
| 2         |    |      | 4   |    |      | 7            |



**NOTES:**  
 FOR HANDRAIL DETAILS AND POST SPACING ON  
 RETAINING WALL RW-7, SEE RETAINING WALL PLANS.  
 FOR HANDRAIL DETAILS, SEE SHEET 2 OF 2.

**METAL HANDRAIL POST SPACING - PEDESTRIAN TUNNEL**

□ - INTERIOR POST

NOTE: FOR SECTION A-A, SEE SHEET 2 OF 2.

PAY LENGTH = 47.2'

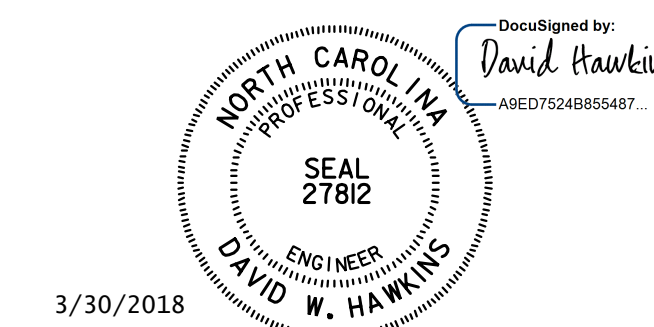
CONCOURSE WALL  
 (SEE STRUCTURE PLANS  
 CONCOURSE AND BAGGAGE  
 RAMP SHEETS)

PROJECT NO. P-5705BB  
MECKLENBURG COUNTY  
 STATION: STA. 25+30.89 -S1-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

METAL HANDRAIL  
 DETAILS

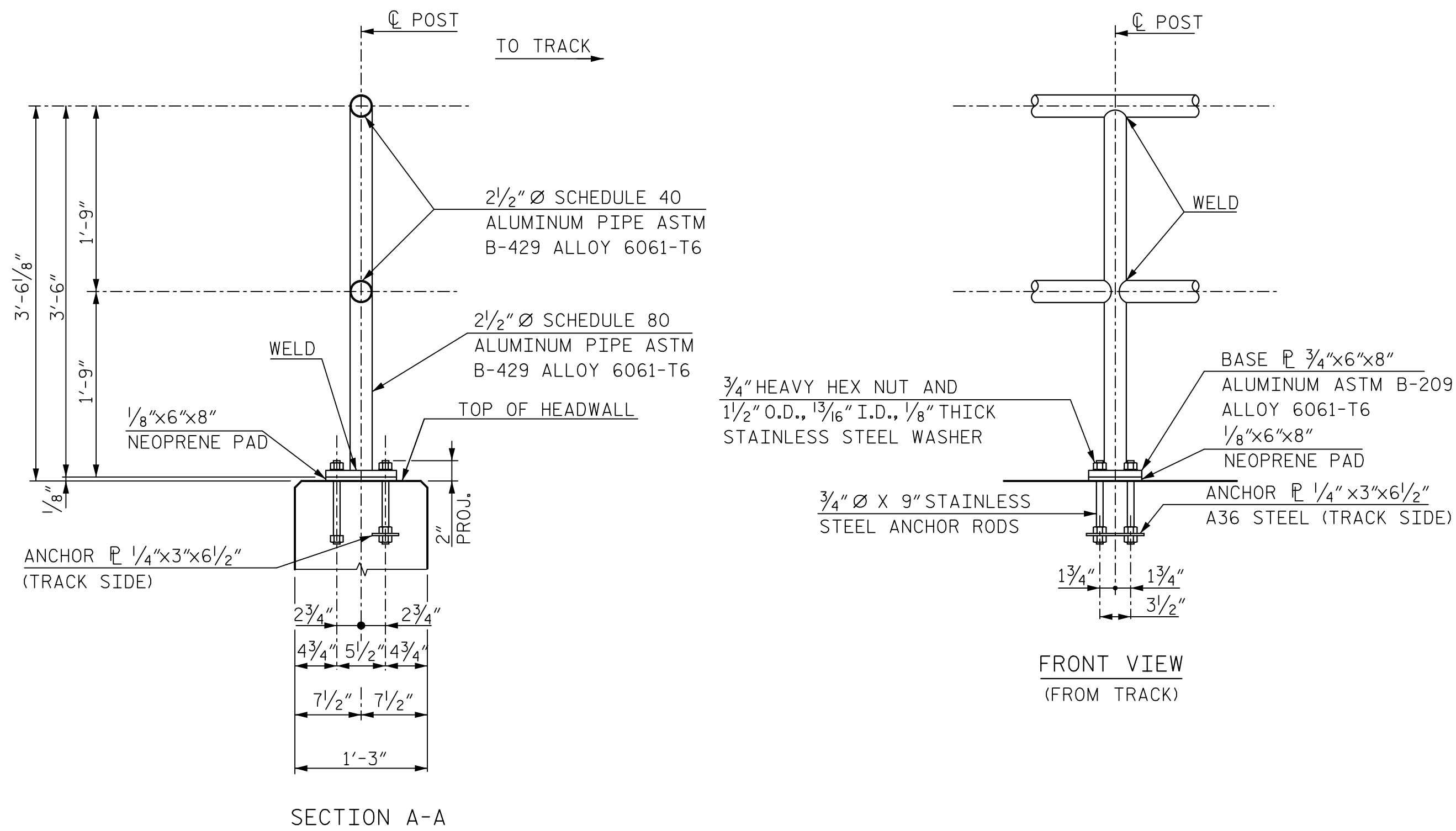


3/30/2018

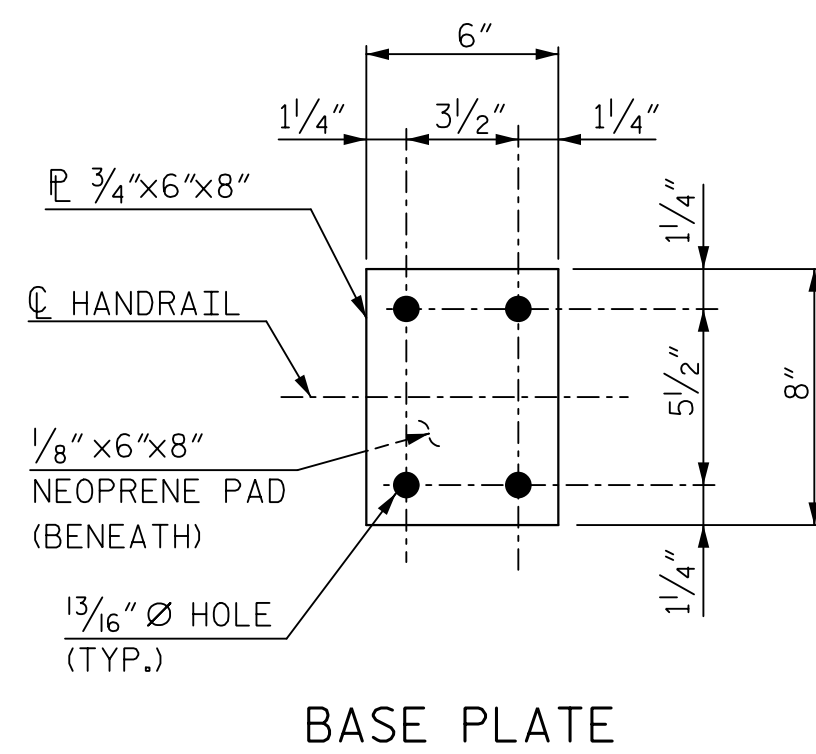
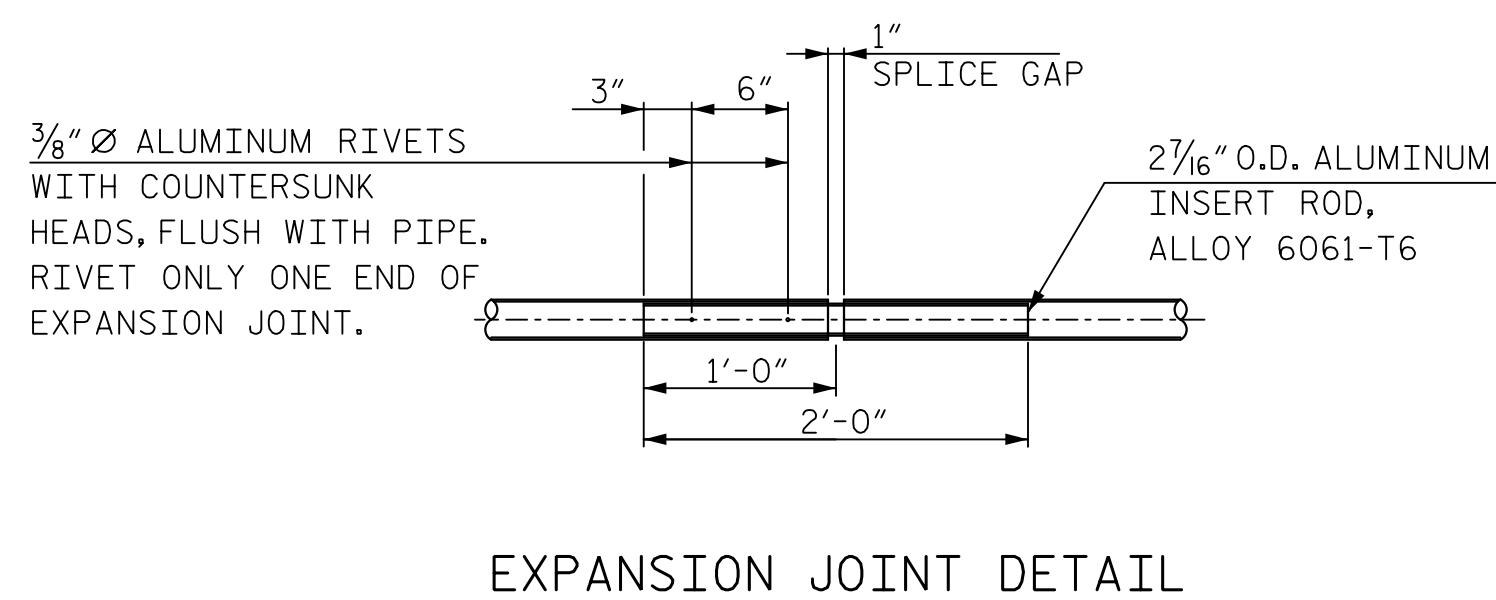
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| CHECKED BY <u>J. WHEATLEY</u> | DATE <u>11/17</u> |  |  |

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|-----------|----|------|-----|----|------|--------------|
| NO.       | BY | DATE | NO. | BY | DATE | S11-6        |
| 1         |    |      | 3   |    |      | TOTAL SHEETS |
| 2         |    |      | 4   |    |      | 7            |



ALUMINUM HANDRAIL AND POST



NOTES:

JOINTS IN RAILING (SPlice GAP) SHALL BE LOCATED AS SHOWN IN POST SPACING PLAN.

ALUMINUM PIPE TO BE ASTM B-429, ALLOY 6061-T6 AND BASE PLATE TO BE ASTM B-209, ALLOY 6061-T6.

STAINLESS STEEL BOLTS, CAP SCREWS, AND NUTS TO BE ASTM A-276 TYPE 304. STAINLESS STEEL WASHERS TO BE ASTM A-276 TYPE 302.

POSTS TO BE SET PERPENDICULAR TO TOP OF HEADWALL AND RAILS SHALL BE PLACED PARALLEL TO THE GRADE OF THE BRIDGE.

CERTIFIED MILL REPORTS ARE REQUIRED FOR RAIL AND POSTS. SHOP INSPECTIONS ARE NOT REQUIRED BY THE RAILROAD BUT MAY BE REQUIRED BY NCDOT.

AFTER ANCHOR ROD NUTS HAVE BEEN TIGHTENED, THREADS SHALL BE SCORED TO LOCK NUTS.

CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON STRUCTURES ON HORIZONTAL AND/OR VERTICAL CURVATURES THE CONTRACTOR MAY AT HIS OPTION HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. IN EITHER EVENT THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.

ANCHOR PLATES SHALL BE STEEL CONFORMING TO ASTM SPECIFICATION A36.

ANCHOR RODS SHALL CONFORM TO ASTM SPECIFICATION A276 TYPE 302 OR 304, STAINLESS STEEL AND THREADS SHALL BE ROLLED, NOT CUT.

UPPER ANCHOR ROD NUTS SHALL BE HEAVY HEX NUTS, PER ASTM A276 TYPE 302 OR 304 STAINLESS STEEL.

LOWER ANCHOR ROD NUTS SHALL BE HEAVY STEEL HEX NUTS, PER ASTM A563.

THE CENTERLINE OF ANY SPLICE AND/OR EXPANSION JOINT IS TO BE LOCATED AT LEAST 2'-0" AWAY FROM CENTERLINE OF POST. EXPANSION AND/OR SPLICE JOINTS FOR EACH RAIL OF TWO RAILINGS ARE TO BE PLACED IN THE SAME LOCATION AND IN THE SAME PANEL.

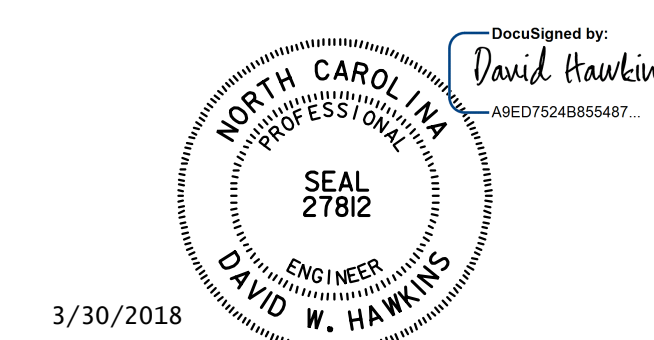
WELDING SHALL BE IN ACCORDANCE WITH THE CURRENT AWS STRUCTURAL WELDING CODE - ALUMINUM.

THE LENGTH OF METAL RAIL TO BE PAID FOR SHALL BE THE CONTINUOUS LENGTH MEASURED FROM END TO END OF RAIL, ALONG THE TOP RAIL.

SHOP DRAWINGS FOR RAILINGS ARE REQUIRED AND SHALL BE SUBMITTED FOR APPROVAL.

FOR METAL RAIL (ALUMINUM), SEE SPECIAL PROVISIONS.

PROJECT NO. P-5705BB  
MECKLENBURG COUNTY  
 STATION: STA. 25+30.89 -S1-



3/30/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

METAL HANDRAIL  
 DETAILS

|   |           |   |       |            |                    |    |      |
|---|-----------|---|-------|------------|--------------------|----|------|
| <b>HNTB</b><br>HNTB NORTH CAROLINA, P.C.<br>NC License No. C-1554<br>343 E. Six Forks Rd., Suite 200, Raleigh, N.C. 27609 | REVISIONS |   |       |            | SHEET NO.<br>S11-7 |    |      |
|   | NO.       | BY  | DATE  | NO.        |                    | BY | DATE |
|   | 1         |   | 10/17 | 3          |                    |    |      |
| 2   |           | 11/17   | 4     |            |                    |    |      |
| DRAWN BY <u>J. BAYNE</u> DATE <u>10/17</u>  |           | CHECKED BY <u>J. WHEATLEY</u> DATE <u>11/17</u> |       | DWG. NO. 7 | TOTAL SHEETS<br>7  |    |      |