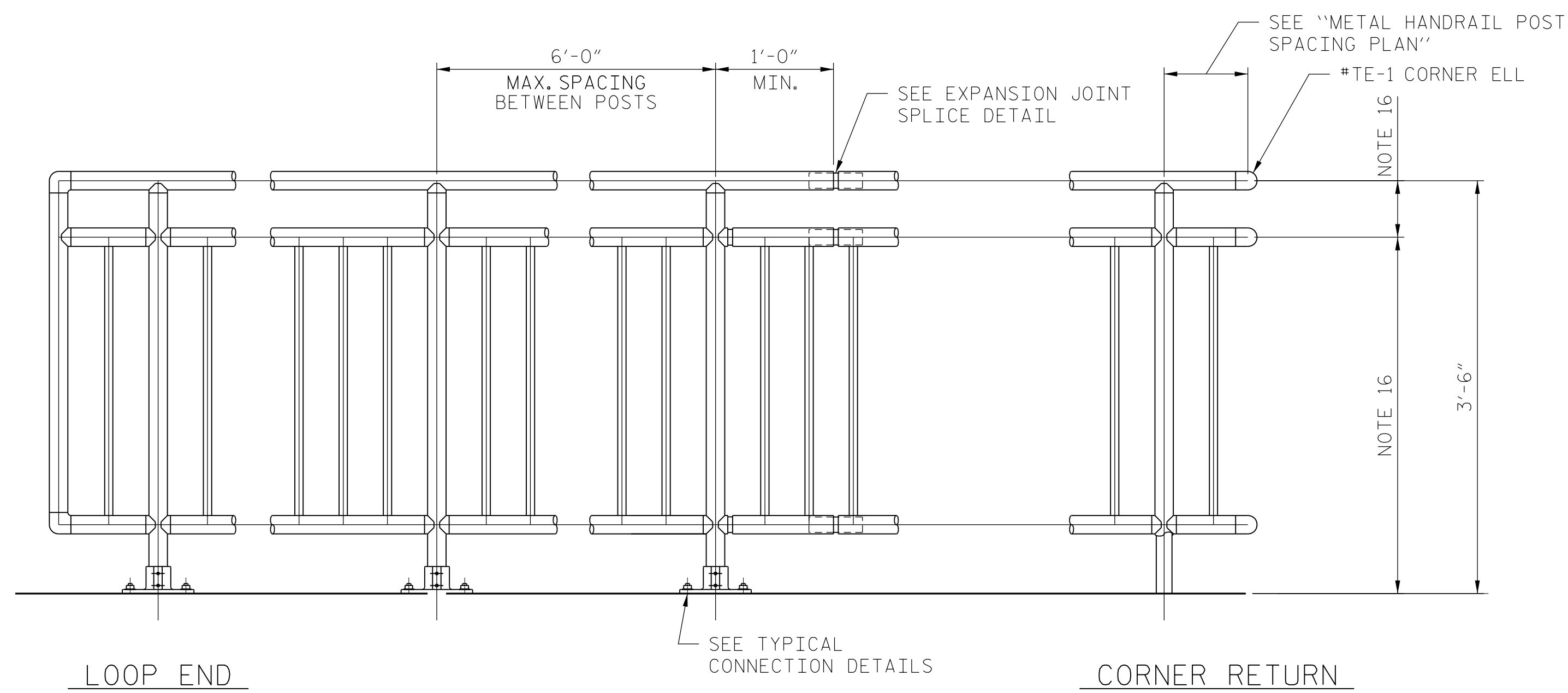


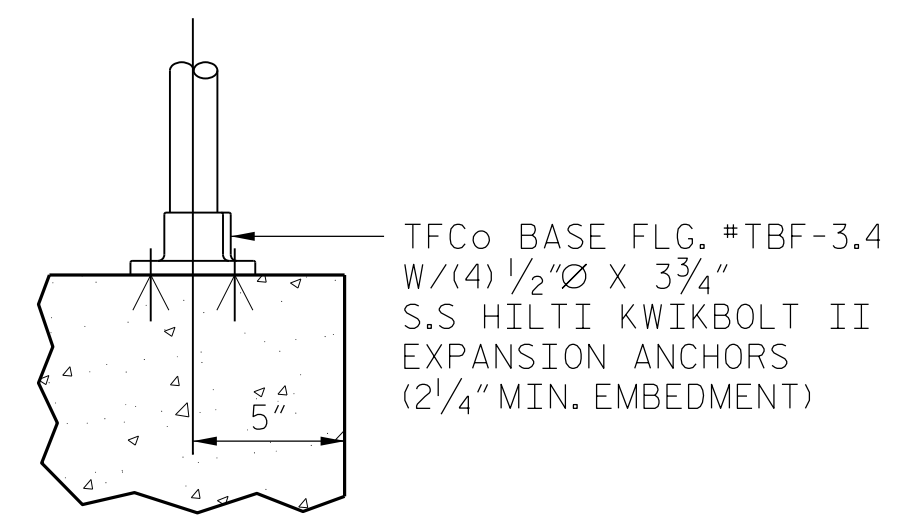
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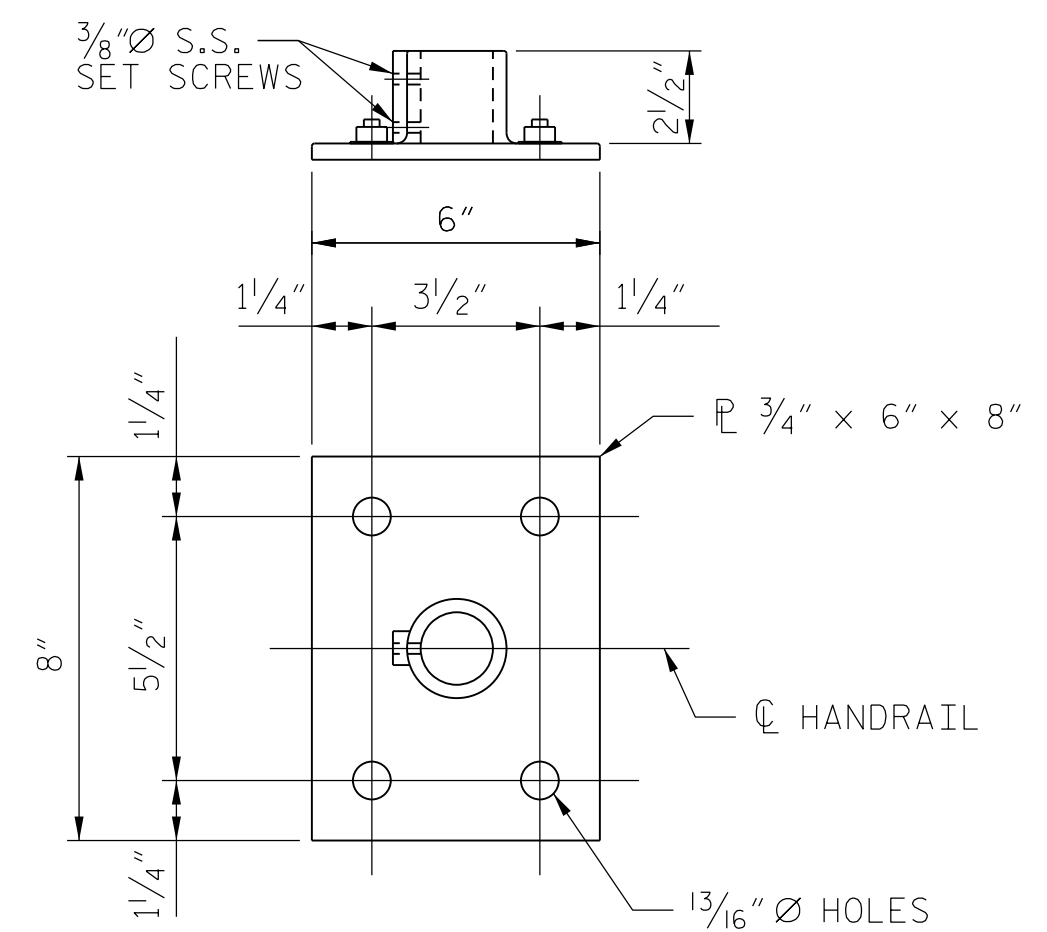
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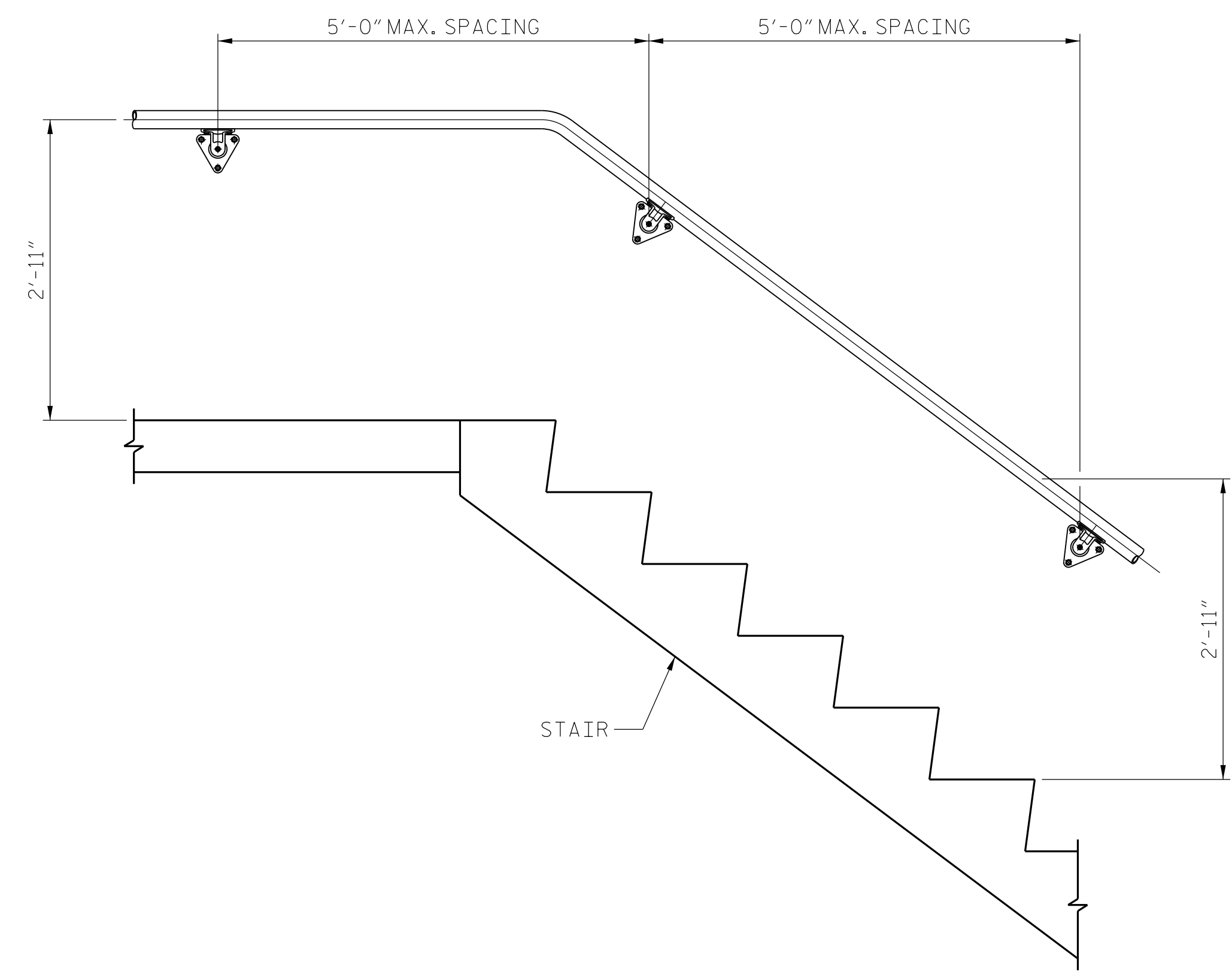
TYPICAL TOP-MOUNTED HANDRAIL
(GUARDRAILS SHALL BE TOP OR SIDE MOUNTED AS SHOWN ON PLANS)



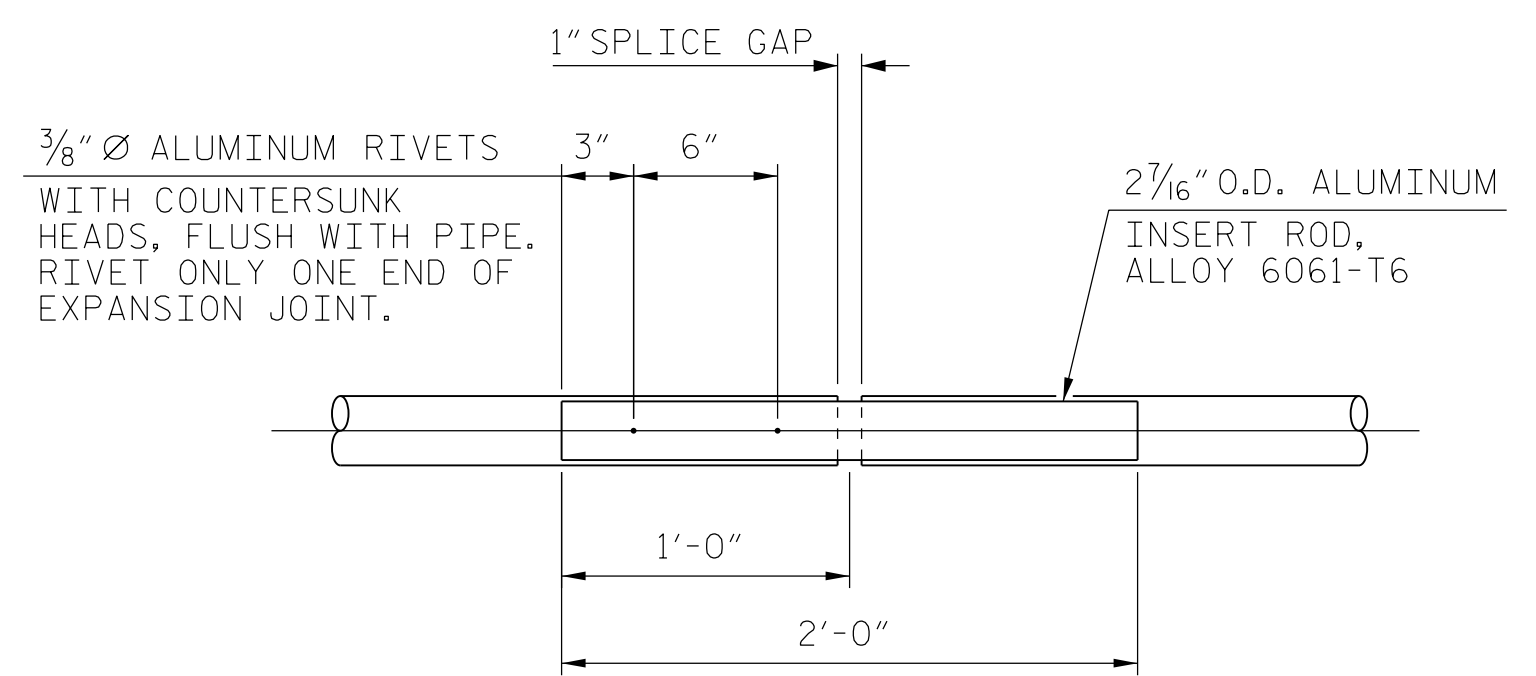
TYPICAL TOP MOUNT CONNECTION TO CONCRETE WALL



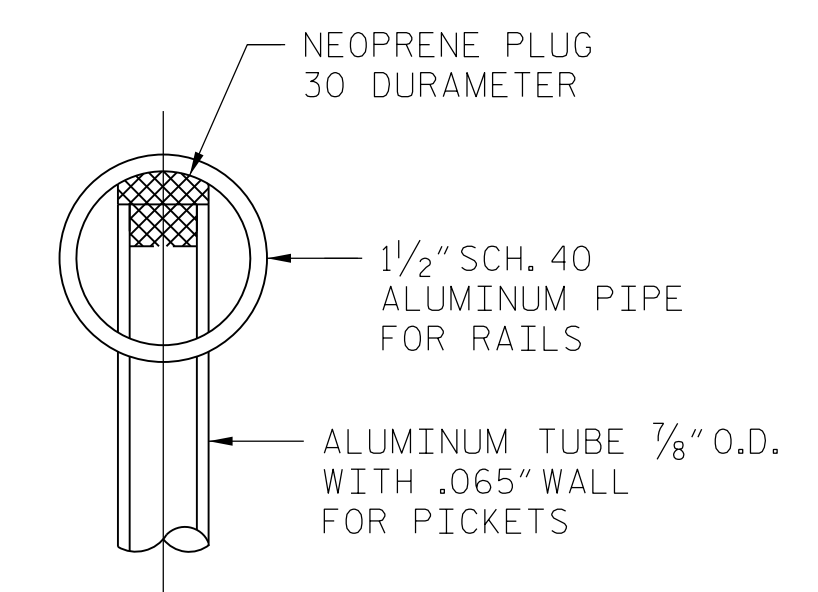
BASE CONNECTION



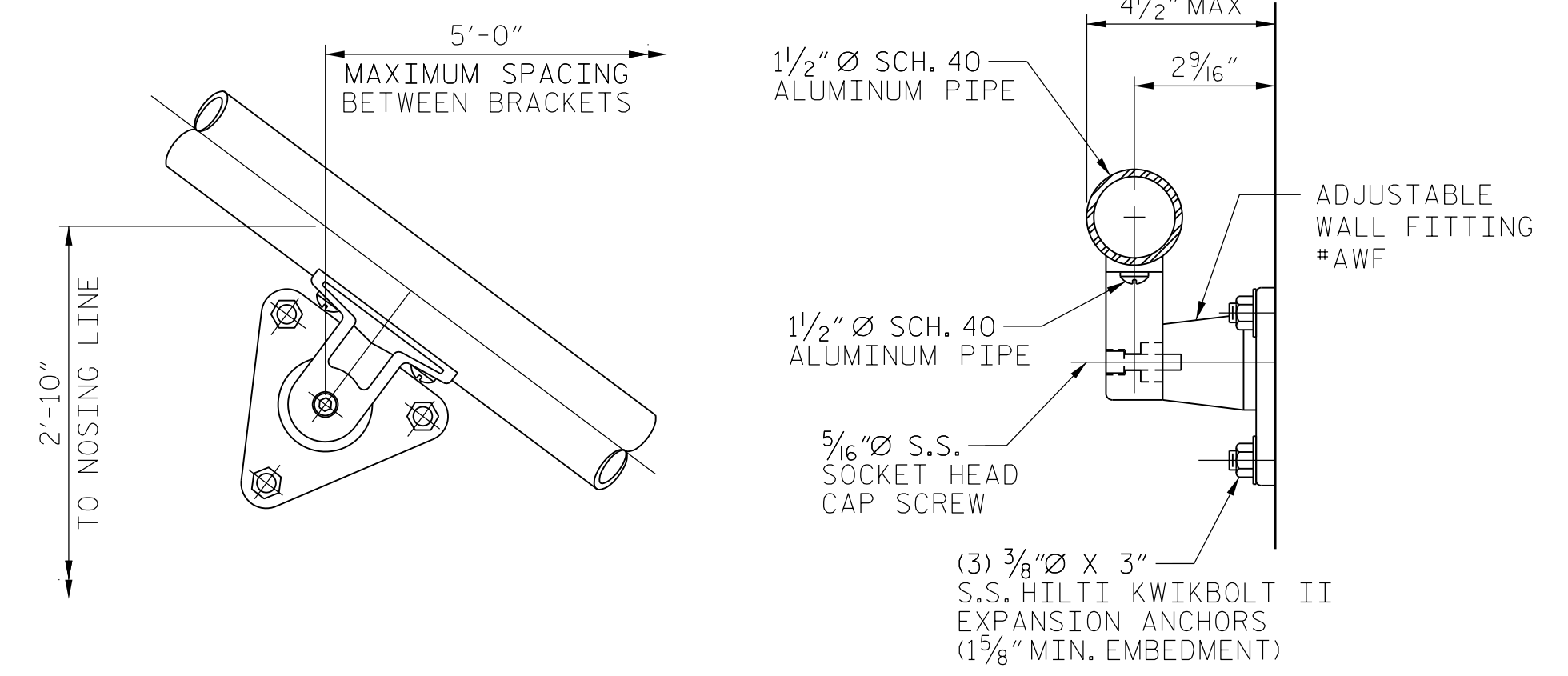
TYPICAL SIDE-MOUNTED HANDRAIL AT RAMPS, WALKWAYS & STAIRS



EXPANSION JOINT DETAIL



PICKET TO RAIL CONNECTION



WALL RAIL ELEVATION

NOTES:

- JOINTS IN RAILING (SPLICE GAP) SHALL BE LOCATED AS SHOWN IN POST SPACING PLAN.
- ALUMINUM PIPE TO BE ASTM B429, ALLOY 6061-T6 AND BASE PLATE TO BE ASTM B209, ALLOY 6061-T6.
- STAINLESS STEEL BOLTS, CAP SCREWS, AND NUTS TO BE ASTM A276 TYPE 304, STAINLESS STEEL WASHERS TO BE ASTM, A276 TYPE 302.
- POSTS TO BE SET PERPENDICULAR TO TOP OF CURB 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.
- AFTER ANCHOR ROD NUTS HAVE BEEN TIGHTENED, THREADS SHALL BE NICKED TO LOCK NUTS.
- CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON BRIDGES ON HORIZONTAL AND/OR VERTICAL CURVATURE, 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 TREADS 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 BOTTOM OF THE BASE PLATES SHALL BE THOROUGHLY COATED WITH ALUMINUM IMPREGNATED CAULKING COMPOUND OF APPROVED QUALITY.
- THE LENGTH OF THE METAL RAIL TO BE PAID FOR SHALL BE THE CONTINUOUS LENGTH MEASURED FROM END TO END OF RAIL, ALONG THE TOP OF RAIL.
- PICKETS AND INTERMEDIATE RAILINGS SHALL BE PROVIDED SUCH THAT A 4-INCH DIAMETER SPHERE CANNOT PASS THROUGH ANY OPENING UP TO A HEIGHT OF 34 INCHES. FROM A HEIGHT OF 34 INCHES TO 42 INCHES ABOVE THE ADJACENT WALKING SURFACE, A SPHERE 8 INCHES IN DIAMETER SHALL NOT PASS. THE TRIANGULAR OPENINGS FORMED BY THE RISER, TREAD AND BOTTOM RAIL AT THE OPEN SIDE OF A STAIRWAY SHALL BE A SIZE SUCH THAT A SPHERE OF 6 INCHES IN DIAMETER CANNOT PASS THROUGH THE OPENING.
- THE MID-RAIL AT A CORNER RETURN SHALL BE ABLE TO WITHSTAND A 200LB LOAD WITHOUT LOOSENING. THE MANUFACTURER IS TO DETERMINE THIS DIMENSION FOR THEIR SYSTEM AND PROVIDE PHYSICAL LABORATORY TESTS TO CONFIRM COMPLIANCE.

PROJECT NO. W-5522
WAKE COUNTY
STATION: 15+58.58 -L-
11+28.22 -Y1-
SHEET 3 OF 3

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AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
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12/4/2017
NORTH CAROLINA PROFESSIONAL SEAL
030474
ENGINEER
JOHN C. MORRISON

DocuSigned by:
John C. Morrison
A2FDE142C82F44B

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| STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH | | | | | |
| METAL HANDRAIL DETAILS | | | | | |
| REVISIONS | | | | | |
| NO. | BY: | DATE: | NO. | BY: | DATE: |
| 1 | | | 3 | | |
| 2 | | | 4 | | |
| SHEET NO. S-31 | | | | | TOTAL SHEETS 31 |

DRAWN BY : M. TOM DATE : 09/2017
CHECKED BY : C. MORRISON DATE : 09/2017
DESIGNED BY : M. TOM DATE : 09/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 12/4/2017 TIME: 9:20:25 AM
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