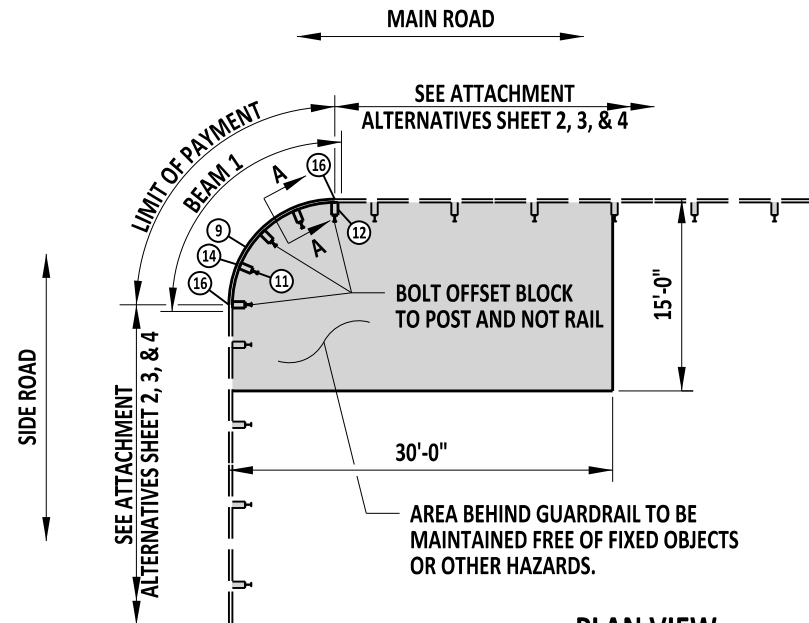
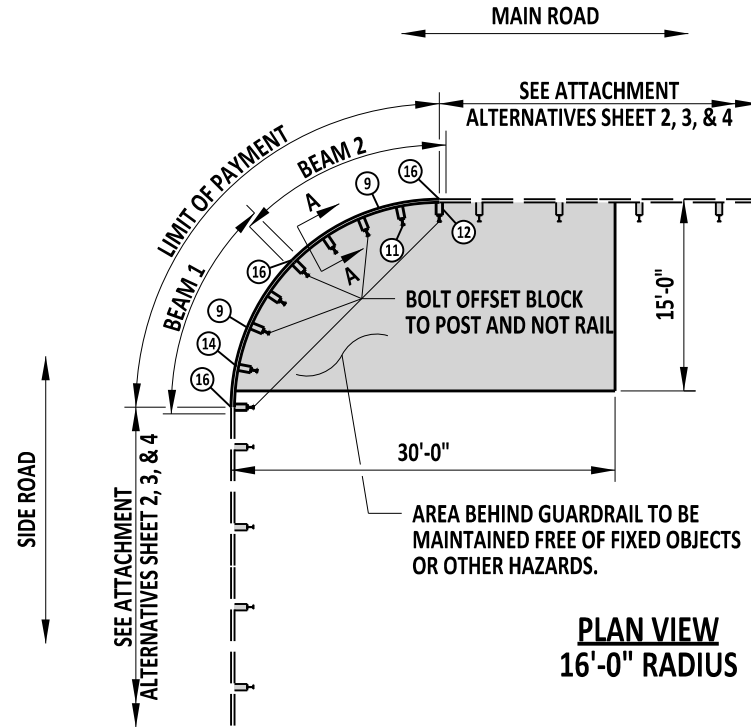
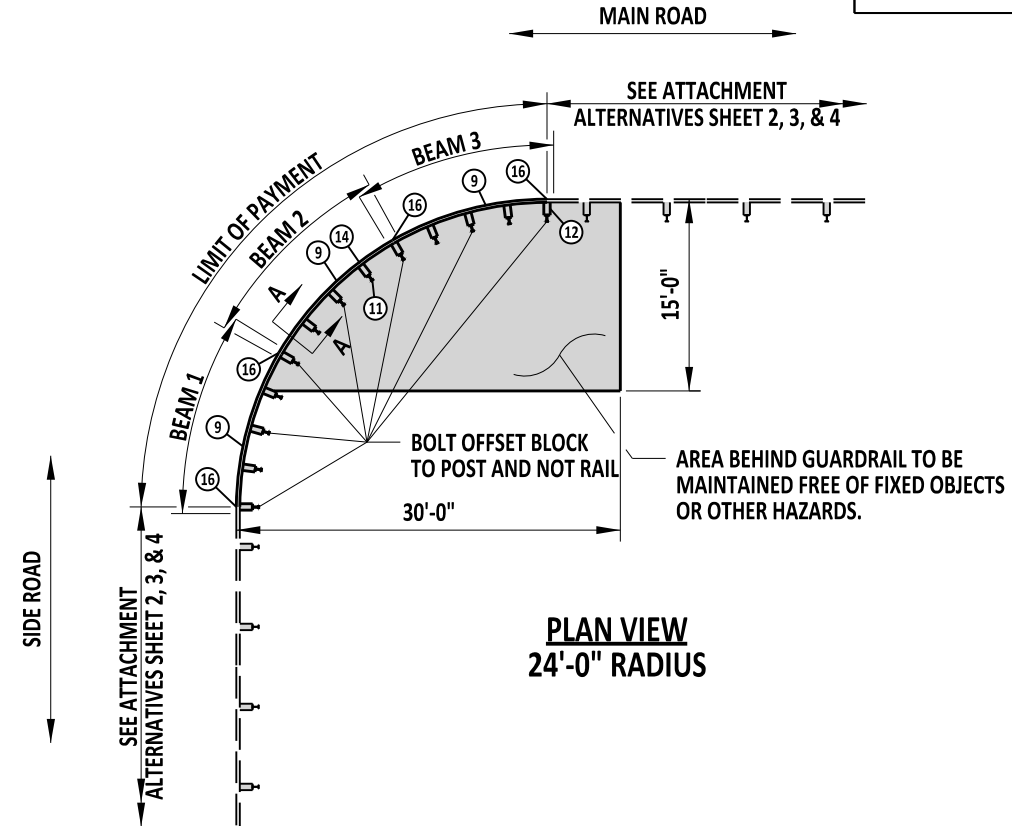




**PLAN VIEW**  
**8'-0" RADIUS**

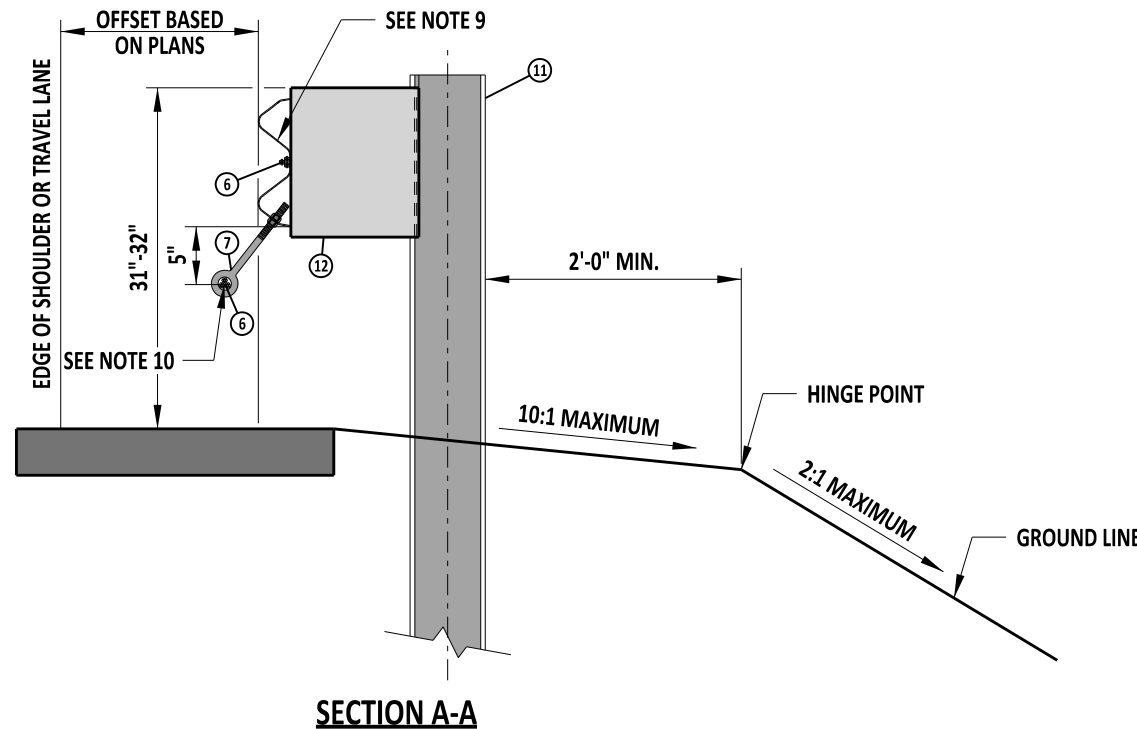


**PLAN VIEW**  
**16'-0" RADIUS**



**PLAN VIEW**  
**24'-0" RADIUS**

| ITEM NO. | DESCRIPTION                                                                    |
|----------|--------------------------------------------------------------------------------|
| ①        | 10 GAUGE THRIE BEAM TERMINAL CONNECTOR (SEE B-13 SHEET 12)                     |
| ②        | 10 GAUGE W-BEAM SPACER GUARDRAIL W/HOLES, 6'-3" LONG (SEE SHEET 5)             |
| ③        | 10 GAUGE SPACER W-BEAM (SEE SHEET 5)                                           |
| ④        | 10 GAUGE ASYMMETRIC W-BEAM TO THRIE BEAM TRANSITION (SEE B-13 SHEET 6)         |
| ⑤        | SWAGED CABLE ASSEMBLAGE AND RELATED HARDWARE (SEE B-5 SHEET 5)                 |
| ⑥        | GUARDRAIL CABLE (SEE SHEET 5)                                                  |
| ⑦        | EYEBOLT (SEE SHEET 5)                                                          |
| ⑧        | CABLE-TO-RAIL ATTACHMENT TO GUARDRAIL BEAM                                     |
| ⑨        | 10 GAUGE 4-SPACE W-BEAM GUARDRAIL W/HOLES (SEE SHEET 6)                        |
| ⑩        | 10 GAUGE 4-SPACE W-BEAM GUARDRAIL, STRAIGHT W/HOLES (SEE SHEET 6)              |
| ⑪        | W6 X 9 STEEL POST (SEE B-13 SHEET 2)                                           |
| ⑫        | 6" x 12" x 14" OFFSET BLOCK (SEE B-13 SHEET 2)                                 |
| ⑬        | 6" x 8" x 14" OFFSET BLOCK (SEE B-13 SHEET 2)                                  |
| ⑭        | 5/8" GUARDRAIL BOLT (L=14") AND RECESSED NUT                                   |
| ⑮        | 5/8" GUARDRAIL BOLT (L=10") AND RECESSED NUT                                   |
| ⑯        | SPLICE - 5/8" GUARDRAIL BOLTS (L=1 1/4") WITH RECESSED NUTS (SEE NOTE 5)       |
| ⑰        | 7/8" HIGH STRENGTH STRUCTURAL HEX BOLT (L=VARIES) AND HEX NUT                  |
| ⑱        | 10 GAUGE 8-SPACE W-BEAM (SEE SHEET 7)                                          |
| ⑲        | 10 GAUGE 4-SPACE W-BEAM GUARDRAIL, STRAIGHT W/HOLES AND SLOT (SEE SHEET 7)     |
| ⑳        | 12 GAUGE 4-SPACE W-BEAM ANCHOR GUARDRAIL, W/HOLES FOR END ANCHOR (SEE SHEET 8) |
| ㉑        | 12 GAUGE 4-SPACE W-BEAM ANCHOR GUARDRAIL, W/HOLES TO GUARDRAIL (SEE SHEET 8)   |
| ㉒        | 10 GAUGE 8-SPACE THRIE BEAM (SEE SHEET 9)                                      |
| ㉓        | 12 GAUGE W-BEAM END SECTION (SEE SHEET 9)                                      |
| ㉔        | 5/8" GUARDRAIL BOLTS (L=1 1/4") WITH RECESSED NUT                              |
| ㉕        | MODIFIED BEARING PLATE (SEE SHEET 10)                                          |



**NOTES:**

- 1). THE APPLICATION IS CONSIDERED A MASH TL-3 SYSTEM WHEN GRADING BELOW THE HINGE IS 6:1 OR FLATTER. WHEN GRADING BELOW THE HINGE IS STEEPER THAN 6:1 BUT 2:1 OR LESS, THE APPLICATION IS CONSIDERED A MASH TL-2 SYSTEM. SLOPES STEEPER THAN 2:1 SHOULD NOT BE USED.
- 2). THE LIMIT OF PAYMENT SHOWN ON THIS SHEET IS FOR THE CURVED SECTION. SEE SHEETS 2, 3, AND 4 FOR CURVED SECTION ATTACHMENT ALTERNATIVES.
- 3). SEE SHEETS 5 THROUGH 11 FOR ADDITIONAL DETAILS ON SYSTEM COMPONENTS.
- 4). THE CURVED SECTION W-BEAM SHALL BE SHOP BENT.
- 5). THE AMOUNT OF BOLTS AND NUTS FOR SPLICES VARIES. SEE B-1 SHEET 2 FOR DETAILS ON W-BEAM GUARDRAIL SPLICE.
- 6). ALL HOLES ARE TO BE PREFABRICATED UNLESS OTHERWISE NOTED. GALVANIZE ALL FIELD DRILLED HOLES.
- 7). TENSION THE FINISHED CABLE ASSEMBLIES UNTIL SLACK IS REMOVED.
- 8). INSTALLATION OF CURB IS NOT PERMITTED WITHIN THE CURVED SECTION OF THE APPLICATION.
- 9). SEE PLAN VIEW FOR W-BEAM DESCRIPTION.
- 10). 5" SPACING IS A NOMINAL DIMENSION AND IS PROVIDED FOR LAYOUT AND INFORMATIONAL PURPOSES ONLY.
- 11). THIS DETAIL IS BASED ON TESTING PERFORMED UNDER NCHRP REPORT 1013.

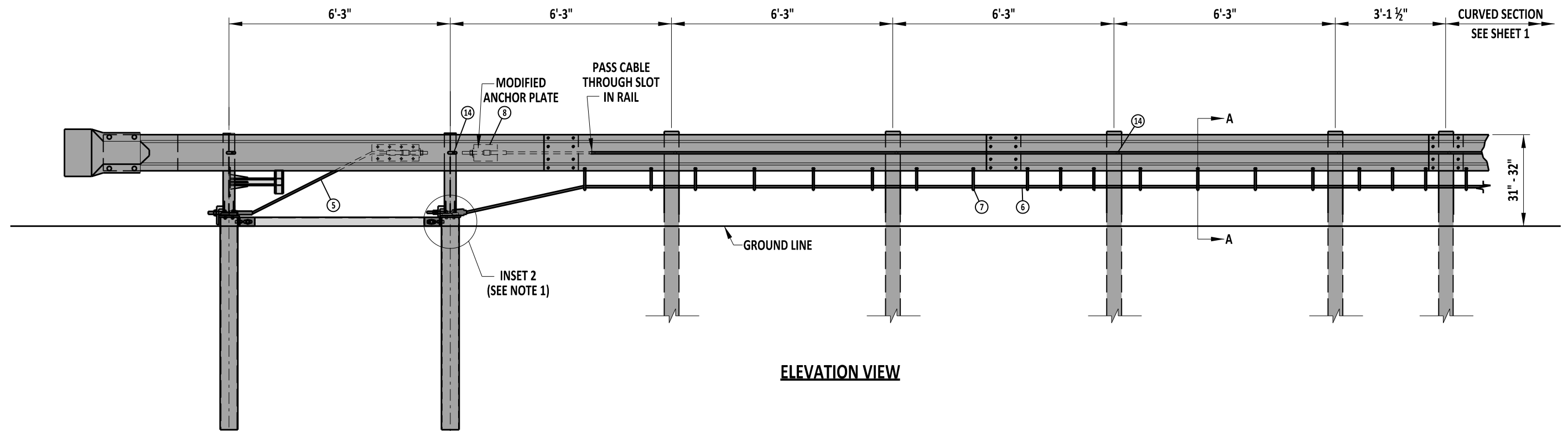
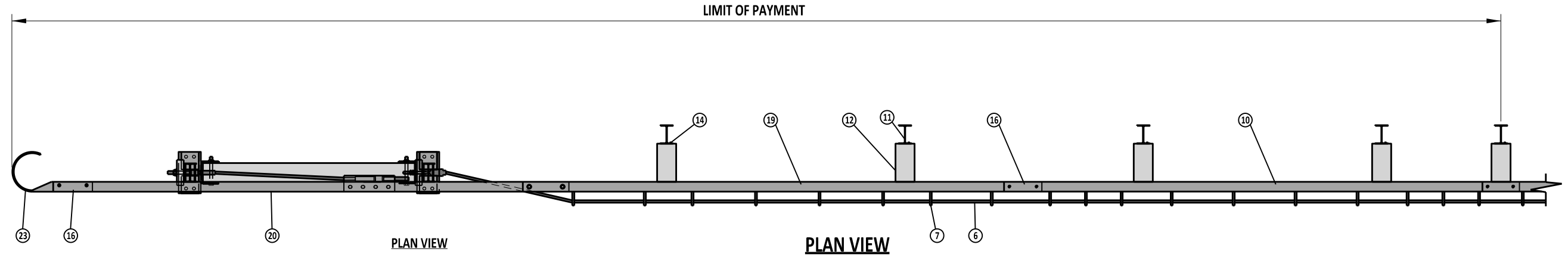


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| 31" CURVED GUARDRAIL |        |       |  |
| DGM 1-31             | SHT. 1 | OF 11 |  |

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| REVIEWED | DEPUTY DIRECTOR - DESIGN | DATE |
| APPROVED | CHIEF ENGINEER           | DATE |

SCALE : NTS



**NOTES:**

- 1). CONSTRUCT THE NON-CRASHWORTHY END ANCHOR IN ACCORDANCE WITH B-5 WITH MODIFIED ANCHOR BEARING PLATE. SEE INSET 2 ON SHEET 11 FOR MORE INFORMATION.
- 2). THE LIMIT OF PAYMENT SHOWN ON THIS SHEET IS FOR A NON-CRASHWORTHY ANCHORAGE. SEE SHEET 1 FOR CURVED SECTION ATTACHMENT.
- 3). SEE SHEET 1 FOR SECTION A-A.
- 4). CURB IS PERMITTED WITHIN THIS TANGENT PORTION OF THE APPLICATION. THE CURB USED MUST BE LIMITED TO A LAYDOWN CURB IN ACCORDANCE WITH C-1 SHEET 4.
- 5). THIS DETAIL IS BASED ON TESTING PERFORMED UNDER NCHRP REPORT 1013.



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31" CURVED GUARDRAIL, NON-CRASHWORTHY ANCHOR

DGM 1-31

SHT. 2 OF 11

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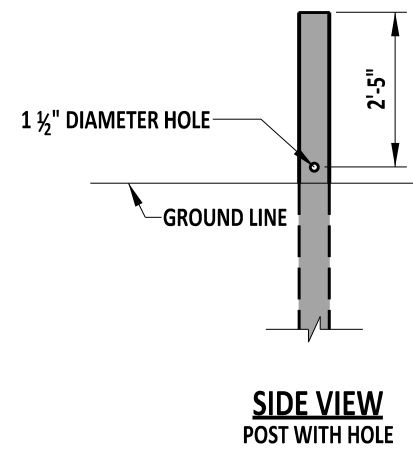
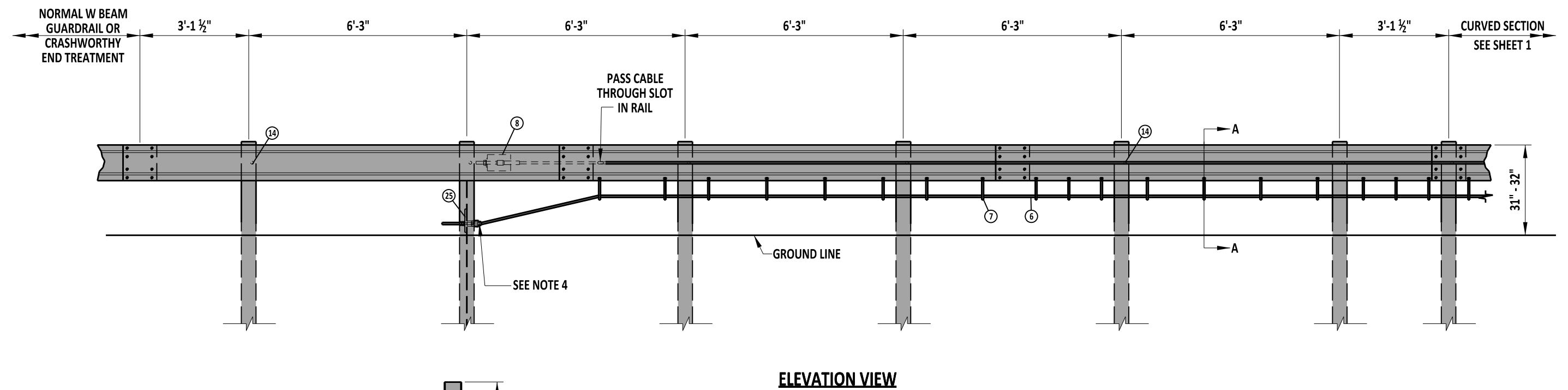
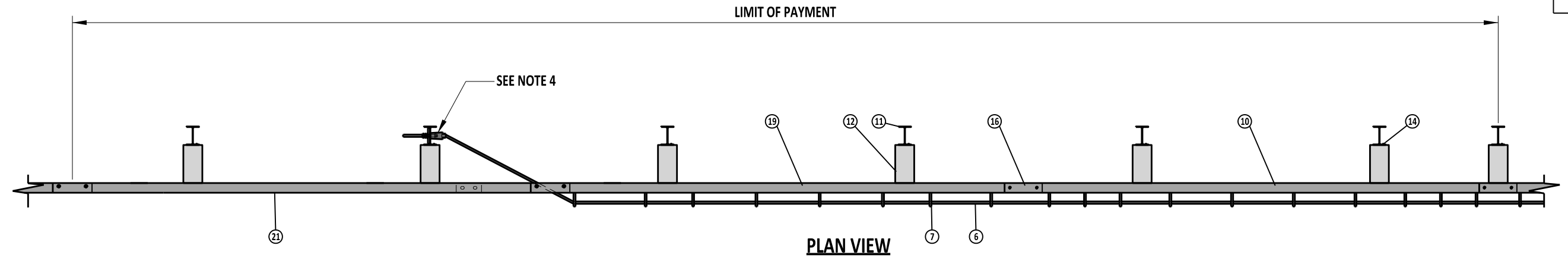
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APPROVED

CHIEF ENGINEER

DATE

SCALE : NTS



**NOTES:**

- 1). THE LIMIT OF PAYMENT SHOWN ON THIS SHEET IS FOR A TRANSITION TO A NORMAL W-BEAM GUARDRAIL. SEE SHEET 1 FOR CURVED SECTION ATTACHMENT.
- 2). SEE SHEET 1 FOR SECTION A-A.
- 3). CURB IS PERMITTED WITHIN THIS TANGENT PORTION OF THE APPLICATION. THE CURB USED MUST BE LIMITED TO A LAYDOWN CURB IN ACCORDANCE WITH C-1 SHEET 4.
- 4). INSERT CABLE END FITTING THROUGH FIELD DRILLED HOLE. SEE CONNECTION DETAIL ON SHEET 10.
- 5). THIS DETAIL IS BASED ON TESTING PERFORMED UNDER NCHRP REPORT 1013.



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31" CURVED GUARDRAIL, ATTACHMENT TO NORMAL W-BEAM GUARDRAIL

DGM 1-31

SHT. 3 OF 11

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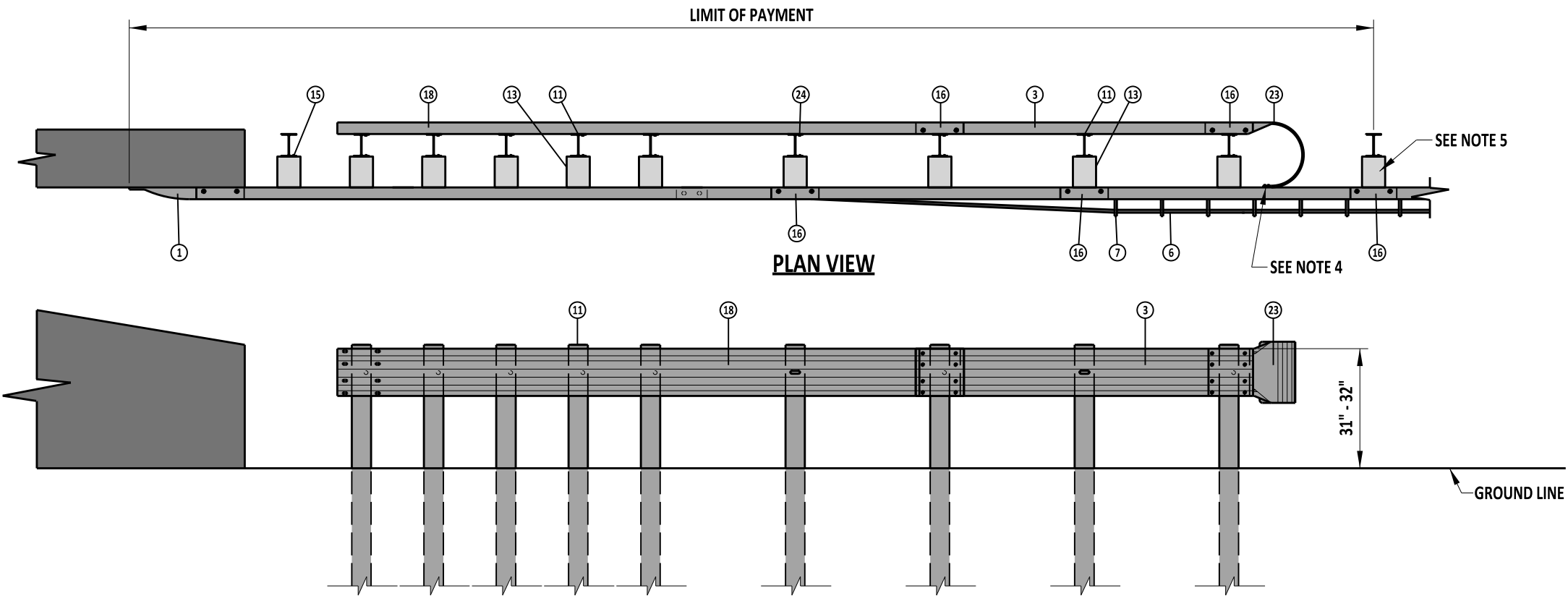
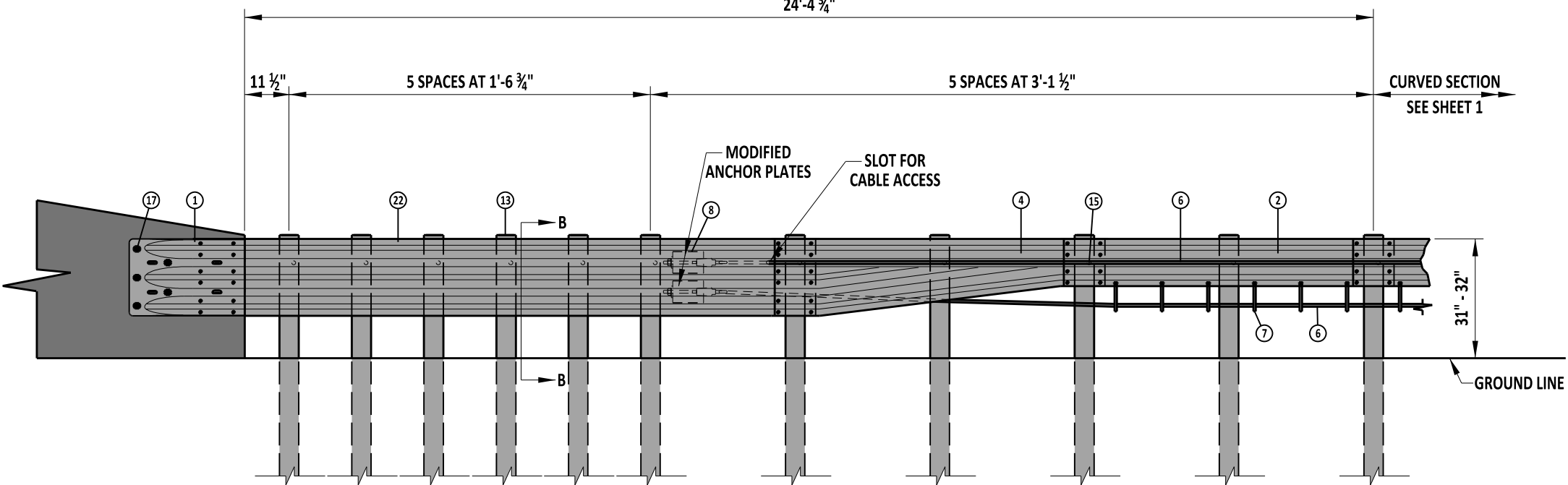
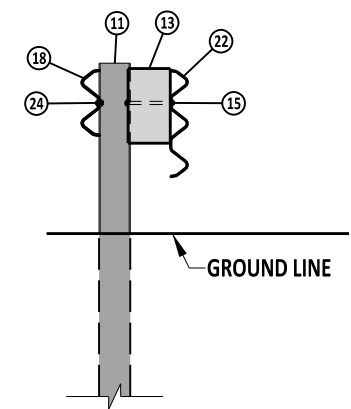
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DATE

**PLAN VIEW****ELEVATION VIEW  
NON-TRAFFIC SIDE  
24'-4 3/4"****ELEVATION VIEW  
TRAFFIC SIDE****SECTION B-B****NOTES:**

- 1). THE LIMIT OF PAYMENT SHOWN ON THIS SHEET IS FOR A TRANSITION TO A RIGID BARRIER. SEE SHEET 1 FOR CURVED SECTION ATTACHMENT.
- 2). INSTALLATION OF CURB IS NOT PERMITTED WITHIN THE TANGENT STIFFNESS TRANSITION TO A RIGID BARRIER.
- 3). THIS DETAIL IS BASED ON TESTING PERFORMED UNDER NCHRP REPORT 1013.
- 4). FIELD DRILL HOLES AND CONNECT W-BEAM END SECTION TO TRAFFIC SIDE W-BEAM WITH TWO (2) 5/8" DIAMETER GUARDRAIL BOLTS AND RECESSED NUTS. BOLTS ARE TO BE 2" IN LENGTH. PLACE PLAIN 5/8" DIAMETER GUARDRAIL WASHERS ON EITHER SIDE OF THE W-BEAM, UNDER THE BOLT HEAD AND NUT. ORIENT SO THE NUT IS ON THE NON-TRAFFIC SIDE AND THE BOLT HEAD IS ON THE TRAFFIC SIDE.
- 5). OFFSET BLOCK MAY BE EITHER 12" OR 8" IN DEPTH OUTSIDE OF THE NON-TRAFFIC SIDE RAIL.



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31" CURVED GUARDRAIL, TRANSITION TO RIGID BARRIER

DGM 1-31

SHT. 4 OF 11

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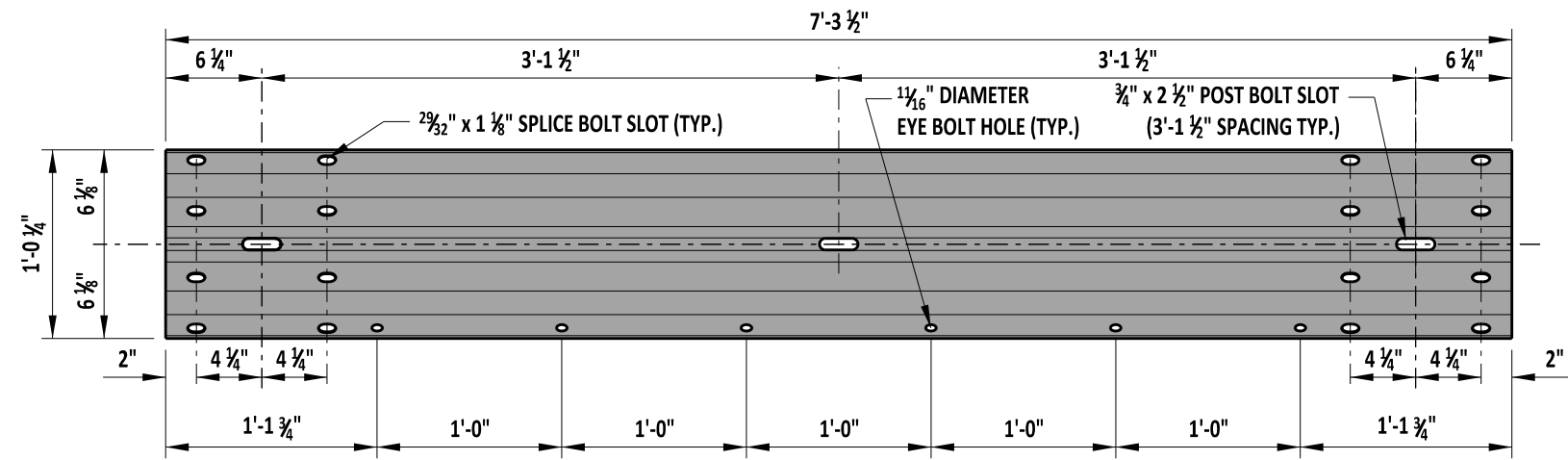
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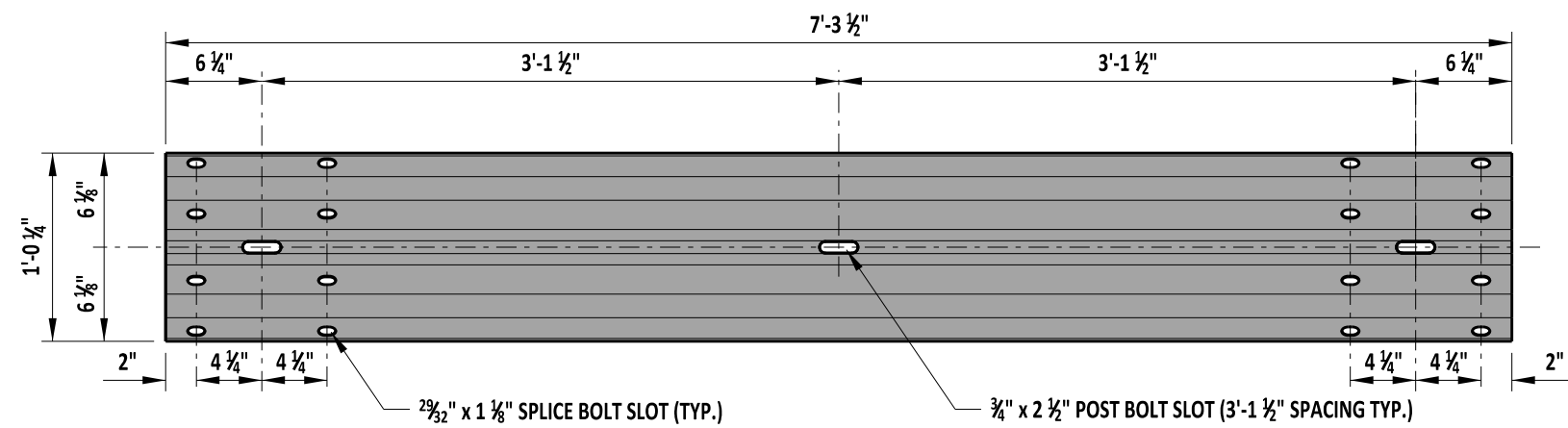
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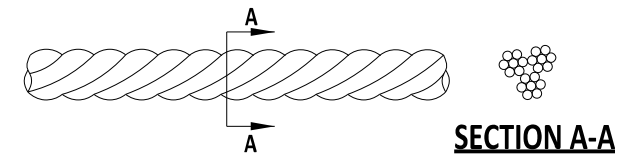
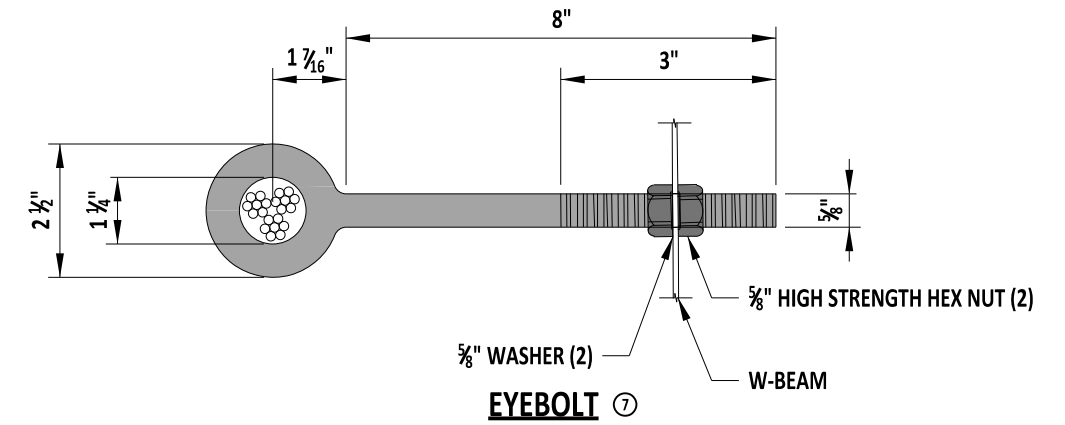
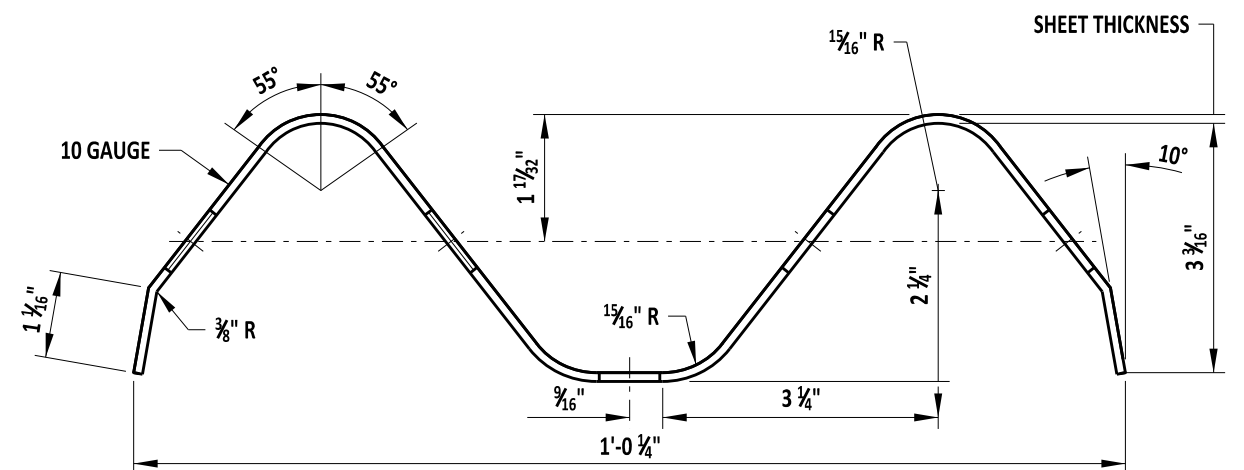
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10 GAUGE W-BEAM SPACER GUARDRAIL W/HOLES, 6'-3" LONG ②



10 GAUGE SPACER W-BEAM ③

GUARDRAIL CABLE ⑥  
3/4" DIAMETER, 3X7 WIRE ROPE

10 GAUGE W-BEAM SECTION

## NOTES:

- GUARDRAIL CABLE AND CONNECTING HARDWARE SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M30 TYPE I CLASS A COATING 3/4" WIRE ROPE. THE ROPE, WITH CONNECTING HARDWARE ATTACHED, SHALL BE CAPABLE OF DEVELOPING 24.7 KIPS STRENGTH OF A SINGLE CABLE.
- THE EYEBOLT SHALL BE MANUFACTURED FROM FORGED STEEL, QUENCHED AND TEMPERED, GALVANIZED, AND ABLE TO WITHSTAND A WORKING LOAD OF 5,200 LBS.



## 31" CURVED GUARDRAIL, COMPONENTS

DGM 1-31

SHT. 5 OF 11

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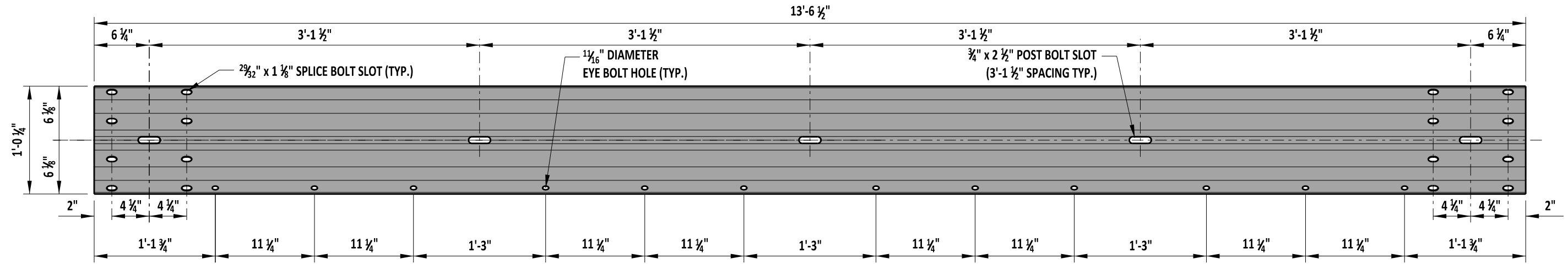
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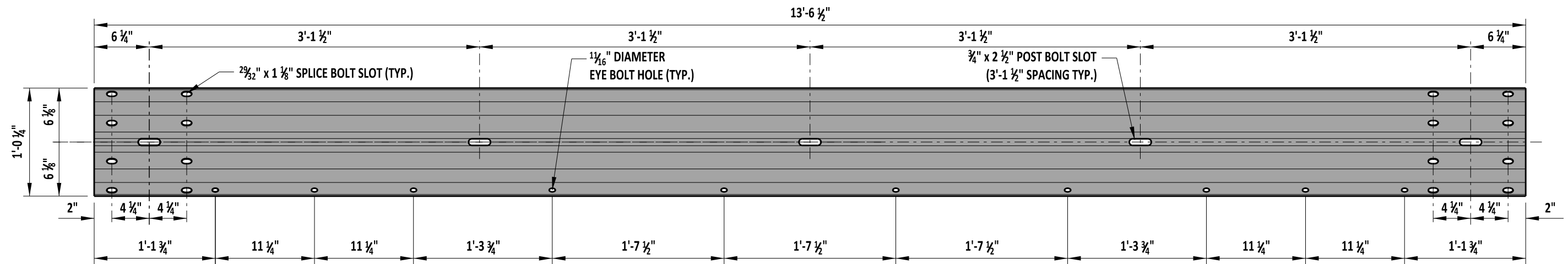
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**10 GAUGE 4-SPACE W-BEAM GUARDRAIL W/HOLES ⑨**



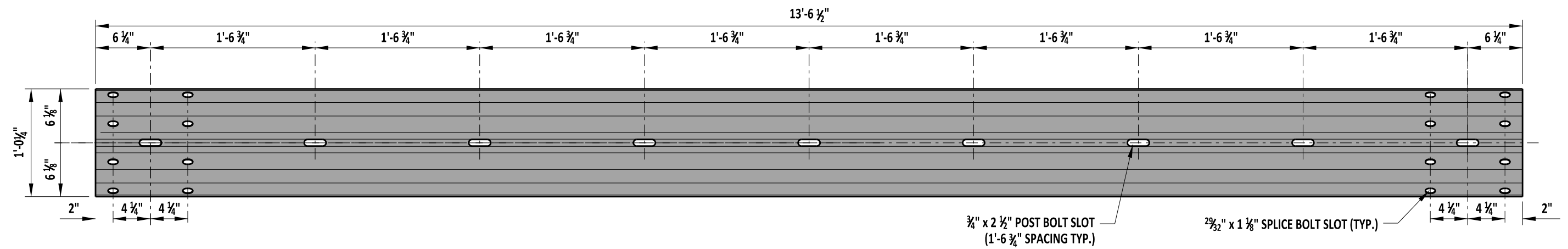
**10 GAUGE 4-SPACE W-BEAM GUARDRAIL, STRAIGHT W/HOLES ⑩**



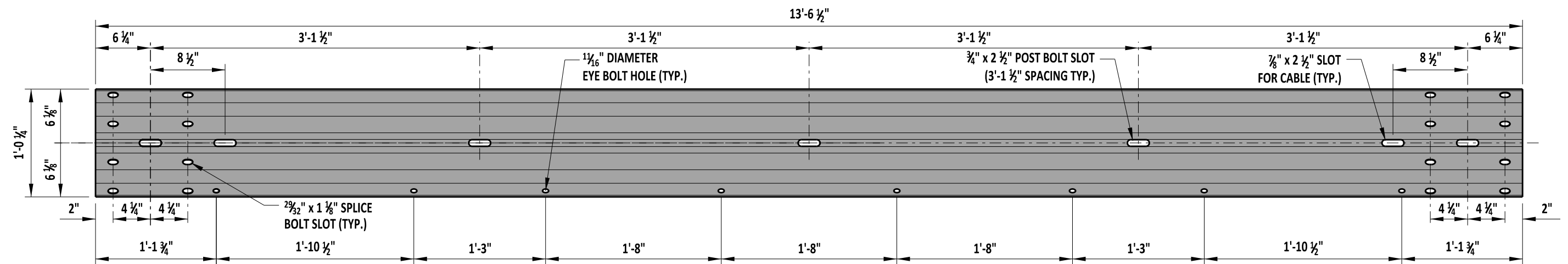
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| 31" CURVED GUARDRAIL, COMPONENTS |        |       |  |
| DGM 1-31                         | SHT. 6 | OF 11 |  |

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**10 GAUGE 8-SPACE W-BEAM** (18)



**10 GUAGE 4-SPACE W-BEAM GUARDRAIL, STRAIGHT W/HOLES AND SLOT** (19)



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### 31" CURVED GUARDRAIL, COMPONENTS

DGM 1-31

SHT. 7 OF 11

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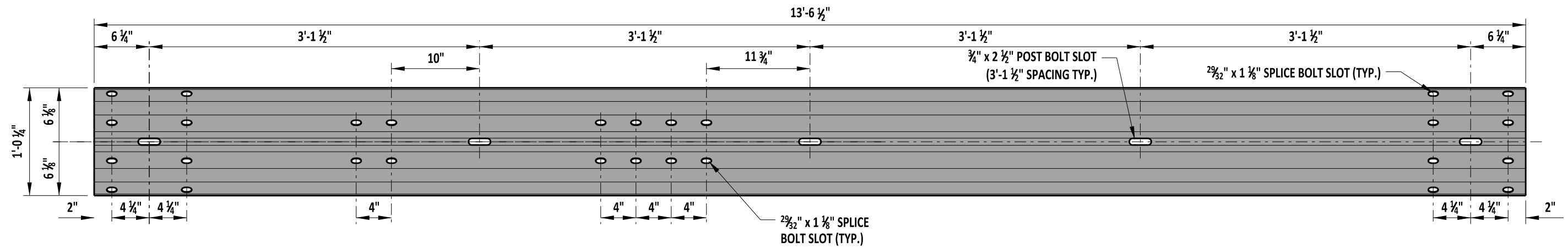
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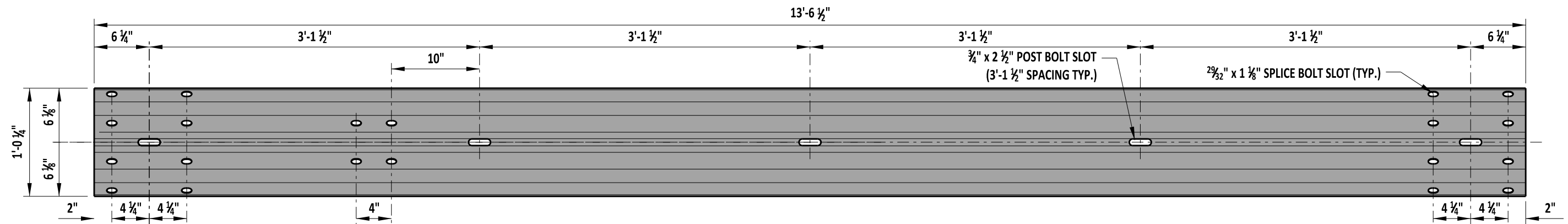
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**12 GAUGE 4-SPACE W-BEAM ANCHOR GUARDRAIL, W/HOLES FOR END ANCHOR ②①**



**12 GAUGE 4-SPACE W-BEAM ANCHOR GUARDRAIL, W/HOLES TO GUARDRAIL ②①**

SEE B-13 SHEET 1 FOR 12 GAUGE W-BEAM SECTION VIEW.



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**31" CURVED GUARDRAIL, COMPONENTS**

DGM 1-31

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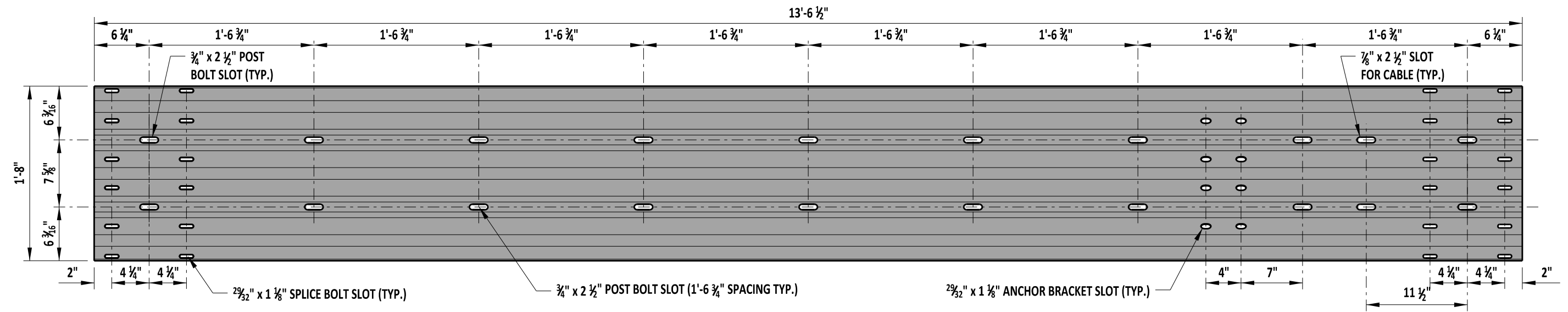
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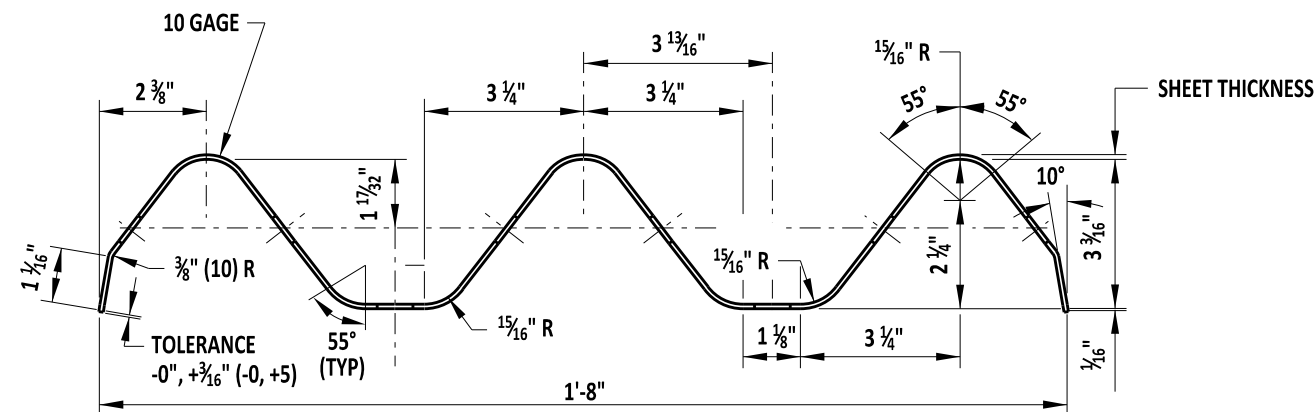
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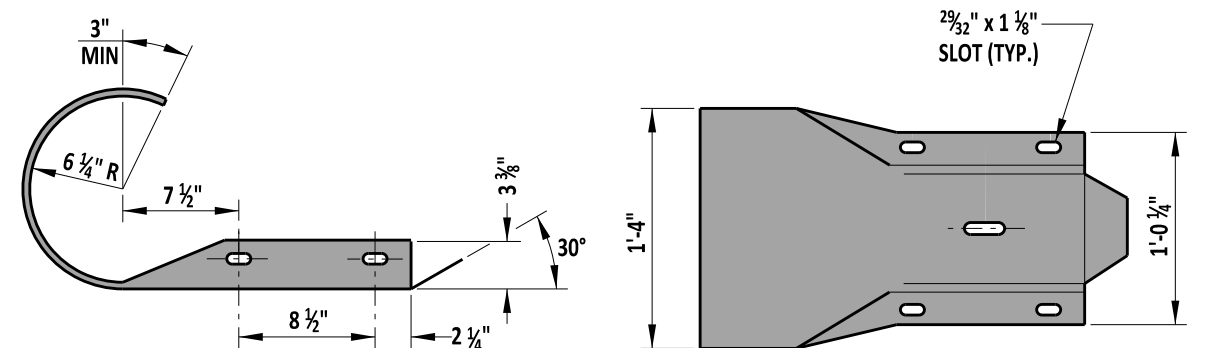
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**10 GAUGE 8-SPACE THRIE BEAM** ②②



**10 GAUGE THRIE BEAM SECTION**



**END SECTION PLAN**

**END SECTION ELEVATION**

**12 GAUGE W-BEAM END SECTION** ②③



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31" CURVED GUARDRAIL, COMPONENTS

DGM 1-31

SHT. 9 OF 11

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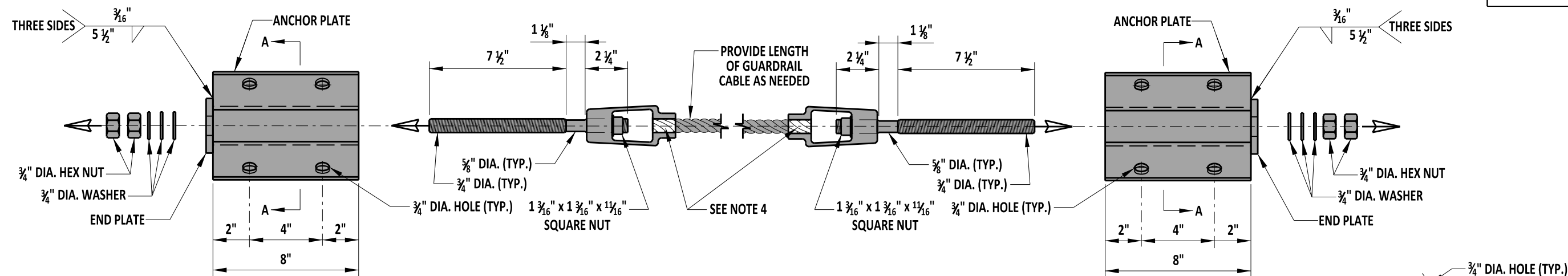
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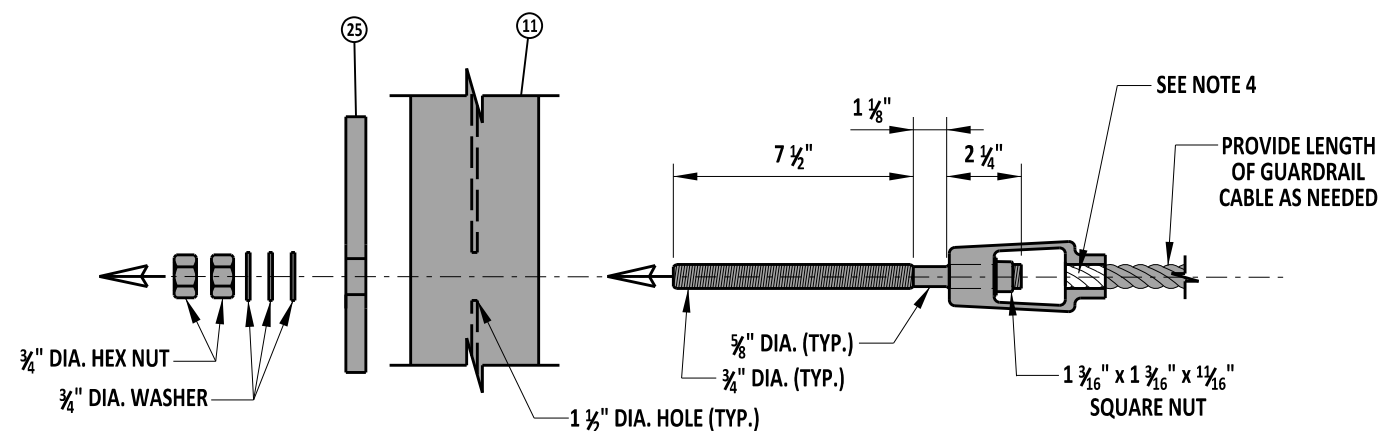
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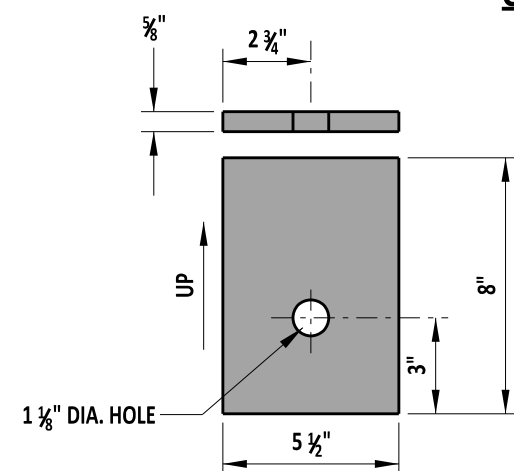


### **CABLE-TO-RAIL ATTACHMENT TO GUARDRAIL BEAM** ⑧

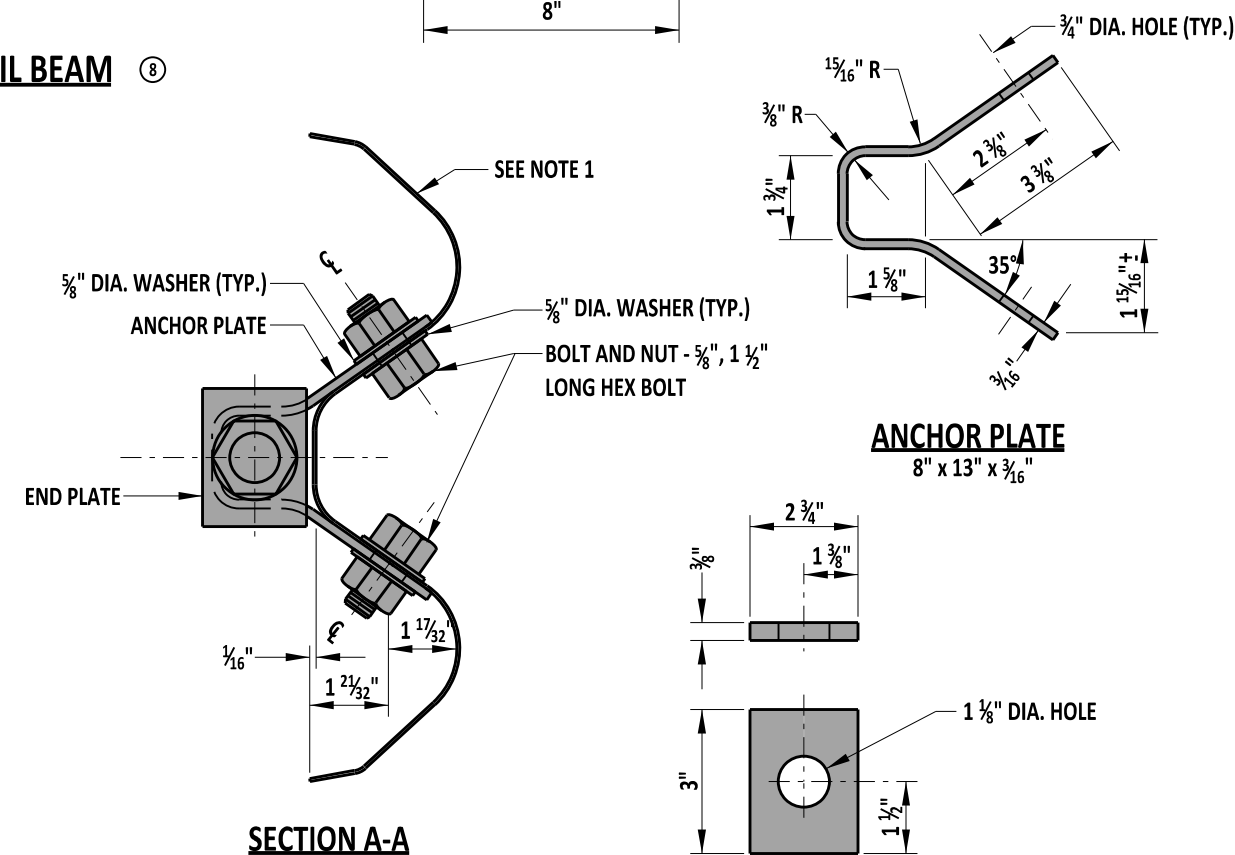


### CABLE-TO-RAIL ATTACHMENT TO NORMAL W-BEAM

### ATTACHMENT TO NORMAL W-BEAM



### MODIFIED BEARING PLATE (25)



**END PLATE**

**NOTES:**

- 1). W-BEAM SHOWN IN SECTION A-A. PROVIDE SAME CONNECTION WHEN CONNECTED TO THRIE BEAM.
- 2). MODIFIED BEARING PLATE SHALL BE AASHTO M270M GRADE 250 STEEL AND ZINC-COATED ACCORDING TO AASHTO M111.
- 3). ANCHOR PLATES AND END PLATES SHALL BE ASTM A36 STEEL.
- 4). FASTEN WITH CABLE WEDGE. CRIMP ONE WIRE OF THE GUARDRAIL CABLE OVER THE BASE OF THE WEDGE TO HOLD IT FIRMLY IN PLACE.
- 5). WIRE ROPE CONNECTING HARDWARE SHALL CONFORM TO AASHTO M269. STEEL COMPONENTS OF THE CONNECTION SHALL CONFORM TO AASHTO M103 GRADE 70-40 CLASS I.



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RECOMMENDED

### 31" CURVED GUARDRAIL, COMPONENTS

DGM 1-31

SHT. 10 OF 11

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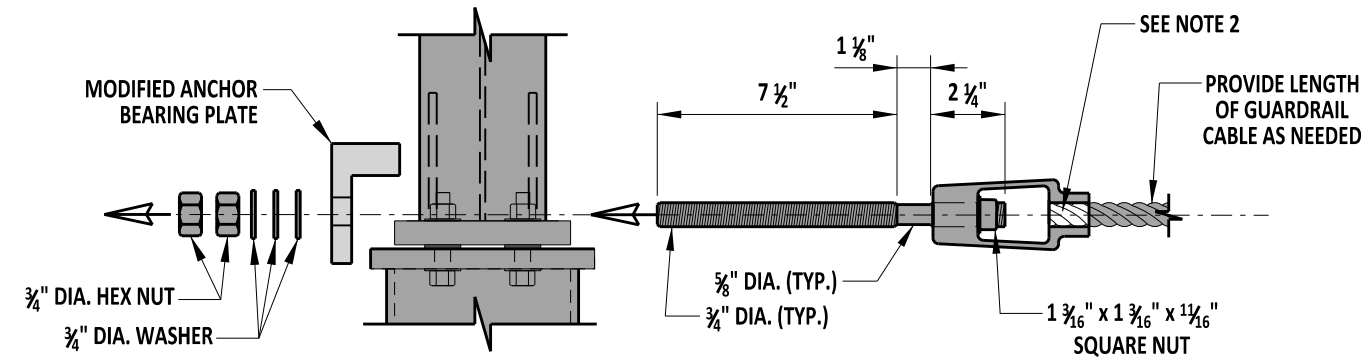
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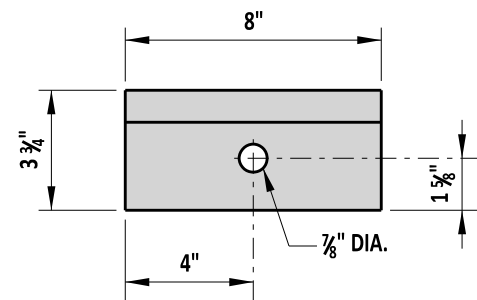
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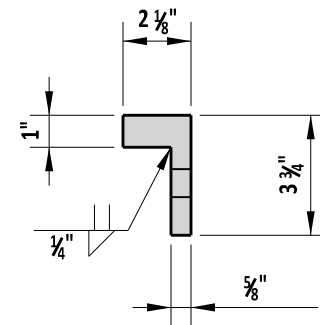
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**MODIFIED CABLE-TO-RAIL ANCHOR WITH CABLE END FITTING**  
ATTACHMENT TO NON-CRASHWORTHY STEEL END ANCHOR

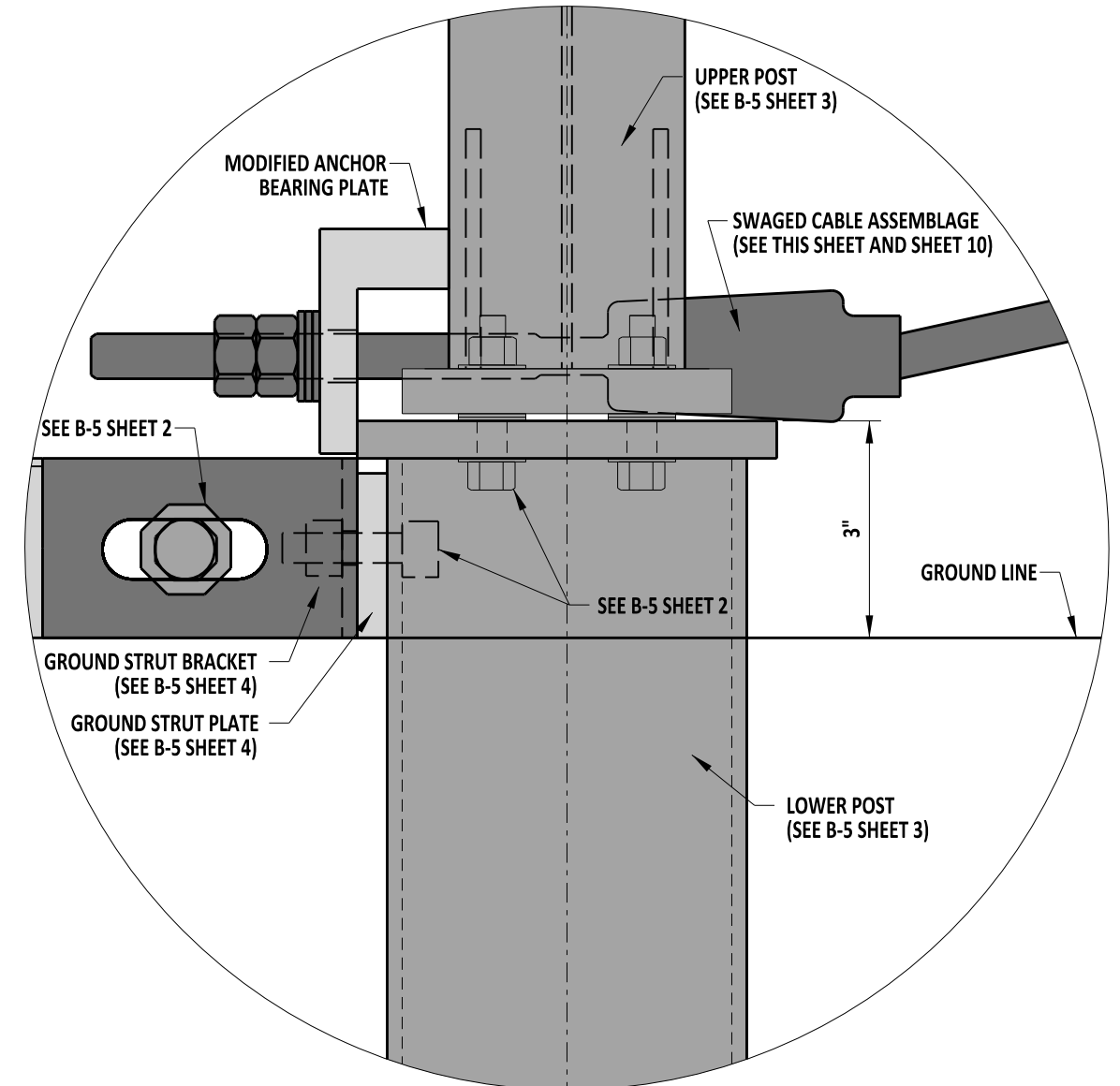


**ELEVATION VIEW**



**SECTION VIEW**

**MODIFIED ANCHOR BEARING PLATE**



**INSET 2**

**NOTES:**

- 1). MODIFIED ANCHOR BEARING PLATE SHALL BE ASTM A36 STEEL.
- 2). FASTEN WITH CABLE WEDGE. CRIMP ONE WIRE OF THE GUARDRAIL CABLE OVER THE BASE OF THE WEDGE TO HOLD IT FIRMLY IN PLACE.



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**31" CURVED GUARDRAIL, COMPONENTS**

DGM 1-31

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