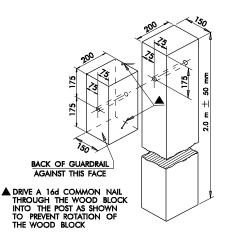


STEEL POST & WOOD BLOCKOUT

FABRICATED STEEL BEAMS OF THE SAME BASIC DIMENSIONS AND BENDING PERFORMANCE WILL BE AN ACCEPTABLE ALTERNATE. ALL HOLES IN STEEL TO BE 19 mm DIAMETER AND SHALL BE PUNCHED OR DRILLED BEFORE GALVANIZING. USE BOLT NO. 5 TO MOUNT RAIL AND BLOCKOUT TO POST. SEE TABLE OF BOLTS ON THIS SHEET FOR DETAILS. POST UNIT TO BE GALVANIZED AFTER FABRICATION. ON INITIAL INSTALLATION, THE BLOCKOUT AND RAIL ELEMENT SHALL BE ATTACHED TO THE POST USING THE SINGLE HOLE IN THE POST AND BLOCKOUT (ONE BOLT IS REQUIRED), OTHER HOLES IN POST ARE FOR FUTURE VERTICAL ADJUSTMENT. BEAM WASHERS ARE NO LONGER USED.



WOOD POSTS & BLOCKOUT

ALL HOLES IN WOOD TO BE 19 mm IN DIAMETER AND DRILLED, AS SHOWN ON THE LONGITUDINAL CENTER OF THE 150 mm FACE AND TREATED WITH AN APPROVED PRESERVATIVE. ON INITIAL INSTALLATIONS, THE RAIL AND BLOCKOUT SHALL BE ATTACHED TO THE POST USING ONE BOLT NO. 2 THROUGH THE RAIL, THE CENTER HOLE IN THE BLOCKOUT AND THE HOLE IN THE POST.

150

75 75

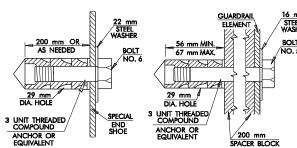
SLOT 19 mm x 64 mm

BACKUP

CONNECTION

OPTIONAL TYPE POSTS OR BLOCKOUTS FOR STANDARD LINE GUARDRAIL

THE CONTRACTOR MAY, AT HIS OPTION, SELECT AND USE ONE OF THE TYPE POSTS SHOWN ABOVE. THIS POST & BLOCKOUT CHOICE MUST BE USED ON THE ENTIRE PROJECT. THE ONLY OBLIGATORY USE OF WOODPOST IS FOR POST NO. 1, AS SHOWN ON ANCHOR UNIT TYPE A. ALTERNATIVE POST & BLOCKOUT COMBINATIONS, INCLUDING RECYCLED MATERIAL, RUBBER, PLASTIC AND COMPOSITE PRODUCTS, MUST BE OF TYPE WHICH PASSES NCHRP 350, TESTING LEVEL 3, BE SUBMITTED WITH FHWA CERTIFICATION AND BE APPROVED FOR USE BEFORE INSTALLATION



ANCHOR DEVICE (M22 BOLT)

USE TO ANCHOR SPECIAL END SHOE TO BRIDGE PIER, BRIDGE CURB, OR TO CONCRETE PARAPET IN LIEU OF BOLTS THROUGH THE PARAPET.

ANCHOR DEVICE (M16 BOLT)

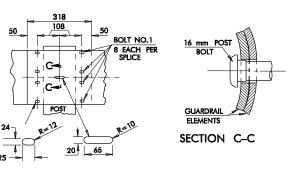
USE WHERE CONNECTION IS MADE TO ROUND PIERS, AS IN TYPE C. G. OR GE UNIT.

| | EQUIVALENT ANCHOR SYSTEM SPECIFICATIONS & DATA | | | | | |
|----------------|--|--------------------|-----------------------|-------------------------|--|--|
| ANCHOR BOLT | BAR | BAR DIA, (d) | BOND STRESS (u) | BOND CAPACITY (U) | | |
| SIZE | SIZE | mm | MPa | N/mm | | |
| M14 | #13M | 12.7 | 4.59 | 183 | | |
| M16 | #16M | 15.9 | 4.59 | 229 | | |
| M20 | #19M | 19.1 | 4.00 | 240 | | |
| M22 | #22M | 22.2 | 3.43 | 240 | | |
| M24 | #25M | 25.4 | 3.00 | 240 | | |
| M27 | #29M | 28.7 | 2.66 | 240 | | |
| W30 | #32M | 32.3 | 2.36 | 240 | | |

ALTERNATIVE ANCHOR BOLT SYSTEMS MEETING THE MINIMUM STRENGTH REQUIREMENTS, AS SHOWN IN THE SPEC. & DATA TABLE ABOVE, MAY BE USED IN ATTACHMENT APPLICATIONS IN LIEU OF COMPOUND OR THROUGH BOLT ANCHORS IF APPROVED BY THE ENGINEER. WHERE, T = U x L = PULL-OUT STRENGTH BOND CAPACITY PER (mm) L = EMBEDMENT DEPTH IN (mm)

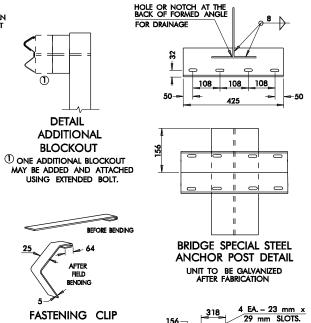
| | | TABLE OF BOLTS, NUTS, & WASHERS | | | | |
|------------|-------------------|-----------------------------------|---|--|--|--|
| | ITEM | ASSEMBLY | NOMENCLATURE & DIMENSIONS | | | |
| 2 | BOLT 1 | RECESS NUT & SPECIFIED WASHER | M16 x 32 mm LONG BUTTON HEAD W/OVAL SHOULDER. | | | |
| 2 | BOLT 2 | RECESS NUT & STEEL WASHER | M16 x 450 mm LONG BUTTON W/OVAL SHOULDER. | | | |
| 2 | BOLT 3 | HEX NUT & LOCK WASHER | M16 x 38 mm LONG HEX-HEAD BOLT, | | | |
| 2 | BOLT 4 | RECESS NUT & 16 mm STEEL WASHER | M16 x mm LONG BUTTON HEAD W/OVAL SHOULDER. | | | |
| 2 | BOLT 5 | 16 mm STEEL WSHR. & ANCH. DEVICE | M16 x 265 mm LONG HEX-HEAD BOLT. | | | |
| ①② | BOLT 6 | 22 mm STEEL WSHR, & ANCH, DEVICE | M22 x 200 mm LONG HEX-HEAD BOLT. | | | |
| ①③ | BOLT 7 | 22 mm STEEL WSHR. & 22 mm HEX NUT | M22 x mm LONG HIGH STRENGTH STEEL HEX-HEAD BOLT | | | |
| 6 | RECESS NUT | | 16 mm SEMI-FINISHED. | | | |
| 6 | 16 mm HEX NUT | | 16 mm SEMI-FINISHED. | | | |
| ① ④ | 22 mm HEX NUT | | 22 mm SEMI-FINISHED. | | | |
| ⑤ | 16 mm STEEL WSHR. | | 18 mm x 44 mm x 3.58 mm TYPE A PLAIN WASHER. | | | |
| (5) | 22 mm STEEL WSHR. | | 24 mm x 57 mm x 4 mm TYPE A PLAIN WASHER. | | | |
| 1 | LOCK WASHER | | 18 mm I.D. GALVANIZED STANDARD HARDWARE ITEM. | | | |

- (1) NOT A STANDARD ITEM IN "A GUIDE TO STANDARIZED HIGHWAY BARRIER RAIL HARDWARE" TECHNICAL BULLETIN #268-B.
- 2 SHALL MEET REQUIREMENTS OF A.S.T.M. A307 & A153.
- 3 SHALL MEET REQUIREMENTS OF A.S.T.M. A325M OR A449 & A153.
- (4) SHALL MEET REQUIREMENTS OF A.S.T.M. A153 & A563M GRADE B OR BETTER.
- 5 SHALL MEET REQUIREMENTS OF A.S.T.M. A153 & A.N.S.I. B27.2.
- (6) SHALL MEET REQUIREMENTS OF A.S.T.M. A153 & A563M. GRADE A OR BETTER.
- TSHALL MEET REQUIREMENTS OF A.A.S.H.T.O. M180.



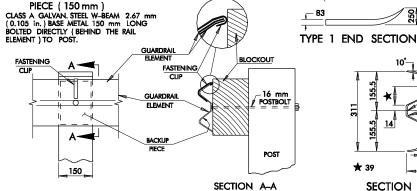
GUARDRAIL SHALL BE LAPPED IN THE DIRECTION OF NEAREST TRAFFIC AT BRIDGE APPROACHES, WHERE SPLICES OCCUR (EXCEPT AT NARROW OR ONE LANE BRIDGE APPROACHES, WHERE LAPS SHALL BE TOWARD THE BRIDGE ON BOTH SIDES OF THE APPROACH ROADWAY).

RAIL SPLICE



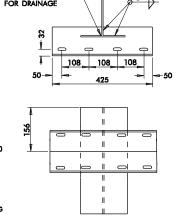
FASTENING CLIP

5 mm x 300 mm A36 (MILD) GAL-VANIZED STEEL PLATE TO BE FIELD SHAPED WITH HAMMER FOR TIGHT FIT. HOOK FITS OVER BACKUP CONNECTION PIECE & GUARDRAIL ELEMENT TO FORM FORM WEAKENED CONNECTION, COAT WITH A ZINC-RICH GALVANIZING PAINT AFTER BENDING.



DETAIL OF WEAKENED CONNECTION

NOTE: WEAKENED CONNECTION TO BE USED WITH GUARDRAIL ANCHOR UNIT TYPE A. SEE ROADWAY STD. GRAU1-1, SHEET NO. R-132M.



19 mm x 63 mm

10 -

83

SECTION THRU RAIL ELEMENT

STEEL (CLASS A - TYPE III)

MAY VARY DUE TO TOLERANCES. NOMINAL THICKNESS OF 2.67 mm, EXCLUSIVE OF PROTECTIVE COATING.

NEUTRAL AXIS

19 mm x 29 mm \$LOT

HOLES W/CENTERS

ON NEUTRAL AXIS

SLOT

50 _

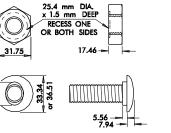
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MATERIALS SHALL MEET THE REQUIREMENTS OF THE FOLLOWING SUBSECTIONS OF THE 1999 STD. SPEC'S.

PORTLAND CEMENT CONCRETE PORTIAND CEMENT | 743 REINFORCING STEEL | 743 ■ G. RAIL POSTS & SPACER BLOCKS | 727 & 732 METAL PLATE STEEL BEAM | 732 732 GALVANIZATION

ALL DIMENSIONS ARE SUBJECT TO MANUFACTURER'S TOLERANCE. ■ WOOD POSTS SHALL MEET THE REQUIREMENTS

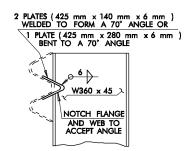
REVISIONS RE-ISSUE W/METRIC 1999 SPECS, Replace Metal Blockout W/Wood, Delete Bearn Washer & Add NCHRP 350 Note Igc 7/99



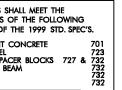
16 mm Ø BUTTON HEAD BOLT & RECESS NUT



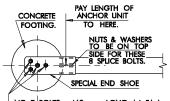
ALTERNATE BUTTON HEAD BOLT



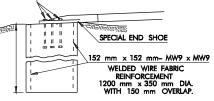
NOTE: GUARDRAIL COMPONENTS SHALL MEET THE APPLICABLE STD'S OF "A GUIDE TO STANDARDIZED HIGHWAY BARRIER RAIL HARDWARE" PREPARED AND APPROVED BY THE AASHTO-ARTBA-AGC JOINT COOPER-ATIVE COMMITTEE, TECHNICAL BULLETIN NO. 268 B.



OF STRESS GRADE 1200F OF SECTION 727.



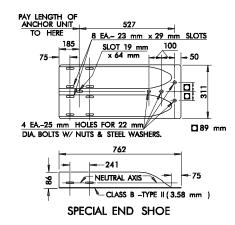
NO. 7 BOLTS - 460 mm LONG (4 EA.) BOLTS SHALL PROTRUDE 38 mm FROM TOP SURFACE OF FOOTING. USE BACKUP NUTS AND WASHERS UNDER SPECIAL END SHOE. TIGHTEN NUTS USING TURN OF THE NUT METHOD WITH MINIMUM OF 1/12 TURN AND MAXIMUM OF 1/4 TURN OVER SNUG TIGHT.



CLASS A CONCRETE TO BE PLACED INTO 460 mm DIA. HOLE TO A DEPTH OF APPROX. 1400 mm. SHAPE CONCRETE TO DRAIN OR FIT SLOPES. END SHOE MUST REMAIN LEVEL. CLASS A CONCRETE = 0.23 CUBIC METERS

DETAIL OF CONCRETE & BOLTS USED IN ANCHOR

NOTE: PRECAST FOOTING (EQUIV. SIZE & DESIGN) MAY BE SUBSTITUTED FOR CAST-IN-PLACE FOOTING, IF APPROVED BY THE ENGINEER.



| BASIS OF PAYMENT | | | | | |
|------------------|---------------------------------|-------|--|--|--|
| ITEM NO. | ITEM | UNIT | | | |
| 623.06 (A) | BEAM GUARDRAIL (W-BEAM) SINGLE | METER | | | |
| | | | | | |

APPROVED BY ROADWAY ENGINEER

OKLAHOMA DEPT. OF TRANSPORTATION ROADWAY STANDARD (METRIC)

GUARDRAIL HARDWARE

01M 1999 SPECIFICATIONS GRH_3 ALL DIMENSIONS ON THIS SHEET IN MILLIMETERS UNLESS OTHERWISE NOTED. R-134M