MASS HIGHWAY

Number: **E-05-002**

Date: **03/02/2005**

ENGINEERING DIRECTIVE

CHIEF ENGINEER

NEW CONSTRUCTION DRAWINGS FOR GUARDRAIL BURIED IN BACK-SLOPE

Effective immediately, the *1996 Metric Edition Construction and Traffic Standard Details* and the *1977 [English Edition] Construction Standards* are amended with the following new drawings (attached):

M/E 401.2.1a Guardrail Buried in Back-Slope Plan View
M/E 401.2.1b Guardrail Buried in Back-Slope Post Location
M/E 401.2.1c Guardrail Buried in Back-Slope Post Location
M/E 401.2.1d Guardrail Buried in Back-Slope Anchorage Details
M/E 401.2.1e Guardrail Buried in Back-Slope End Anchorage Details Posts 1, 2 and 3

These drawings are available for immediate use on all projects currently under design or in construction as approved guardrail terminals wherever appropriate fore-slope and back-slope conditions exist. The Buried in Back-Slope guardrail end treatment is an alternative to proprietary guardrail end treatments and consists of non-proprietary off-the-shelf parts. The designer shall select the locations where the Buried in Back-Slope guardrail end treatment shall be used, and shall specify those locations in the contract documents. Field changes regarding guardrail end treatments must be approved by the Engineer.

The Buried in Back-Slope guardrail end treatment may be used in locations that have a recoverable fore-slope of 1v:4h or flatter, as defined by the *AASHTO Roadside Design Guide*, and a back-slope resulting from a construction cut. The Buried in Back-Slope guardrail end treatment shall not be used in locations that have a back-slope resulting from a manufactured earth berm.

In locations where appropriate fore-slope and back-slope conditions do not exist, proprietary end treatments conforming to NCHRP 350 must be used. However, in locations where suitable fore-slope and back-slope conditions can be achieved with minor extensions of the guardrail runs, such extensions should be considered so that the Buried in Back-Slope guardrail end treatment can be used. This technique may be cost effective, avoids the need for proprietary end treatments and simplifies future guardrail maintenance operations.

Distribution:_____ **Please Post:_____** **Do Not Post:__X__**

The use of the Buried in Back-Slope guardrail end treatment in a construction contract requires a special provision that includes the following information:

Payment units shall consist of:

620.5 Buried in Back-Slope End Anchorage Unit: Each

The end anchorage unit, measured and paid for each end anchorage installed, consists of the last 3 posts buried in the back-slope. It shall include all rails, plates, posts and bolts along with any earthwork required to properly install the anchorage system.

620.6 Buried in Back-Slope Double Stacked Guardrail Unit: Linear Foot (Meter)

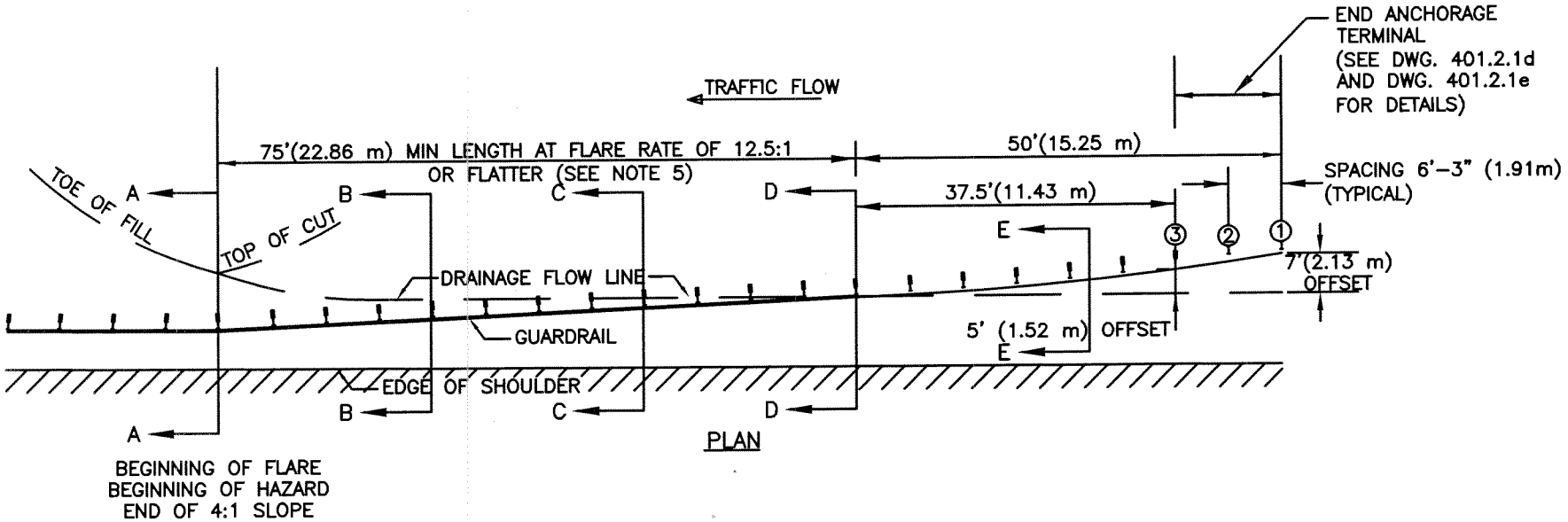
The double stacked rail system, measured and paid for by the linear foot, (or meter) includes the in-place installation of top rails with offset blocks, bottom rail without offset blocks, standard and extra length posts and all attachment hardware. Measurement for payment shall be made from end to end of the double stacked rails.

Attachments:

Distribution:_____ **Please Post:_____** **Do Not Post:__X__**

MASS HIGHWAY
CONSTRUCTION STANDARDS

GUARD RAIL BURIED IN BACK-SLOPE PLAN VIEW



PLAN

NOTES:

1. THE BOTTOM RAIL SHALL BE TUCKED BEHIND AND BOLTED TO POST A-A USING TWO (2) 5/8" DIA. X 1 1/2" (M16 DIA X 38 mm) LONG HEX. HEAD BOLT THROUGH THE UPPER AND LOWER PORTION OF THE RAIL.
2. THE BOTTOM RAIL SHALL BE BOLTED TO THE REMAINING POSTS (OTHER THAN POST 1, 2, & 3) WITH A SINGLE 5/8" DIA. X 1 1/2" (M16 DIA X 38 mm) LONG HEX. HEAD BOLT THROUGH THE MIDDLE OF THE RAIL ELEMENT. (FOR ATTACHMENT TO POST 3 DETAILS SEE DWG. 401.2.1e)
3. OFFSET BLOCKS ARE NOT REQUIRED FOR THE BOTTOM RAIL.
4. MAINTAIN HEIGHT OF TOP RAIL RELATIVE TO EDGE OF SHOULDER UNTIL A MAXIMUM HEIGHT OF 45"(1.15 m) ABOVE GROUND IS REACHED, THEN TOP OF GUARD RAIL BECOMES PARALLEL TO GROUND.
5. LOW SPEED (45 MPH(70 KPH) OR LESS) INSTALLATIONS REQUIRE 50'(15.2m) OF GUARDRAIL USING A 9:1 FLARE RATE.
6. THIS END TREATMENT IS ONLY APPLICABLE WHERE THERE IS A 1:4 OR FLATTER FORE-SLOPE BETWEEN THE ROADWAY AND THE CUT-SLOPE.

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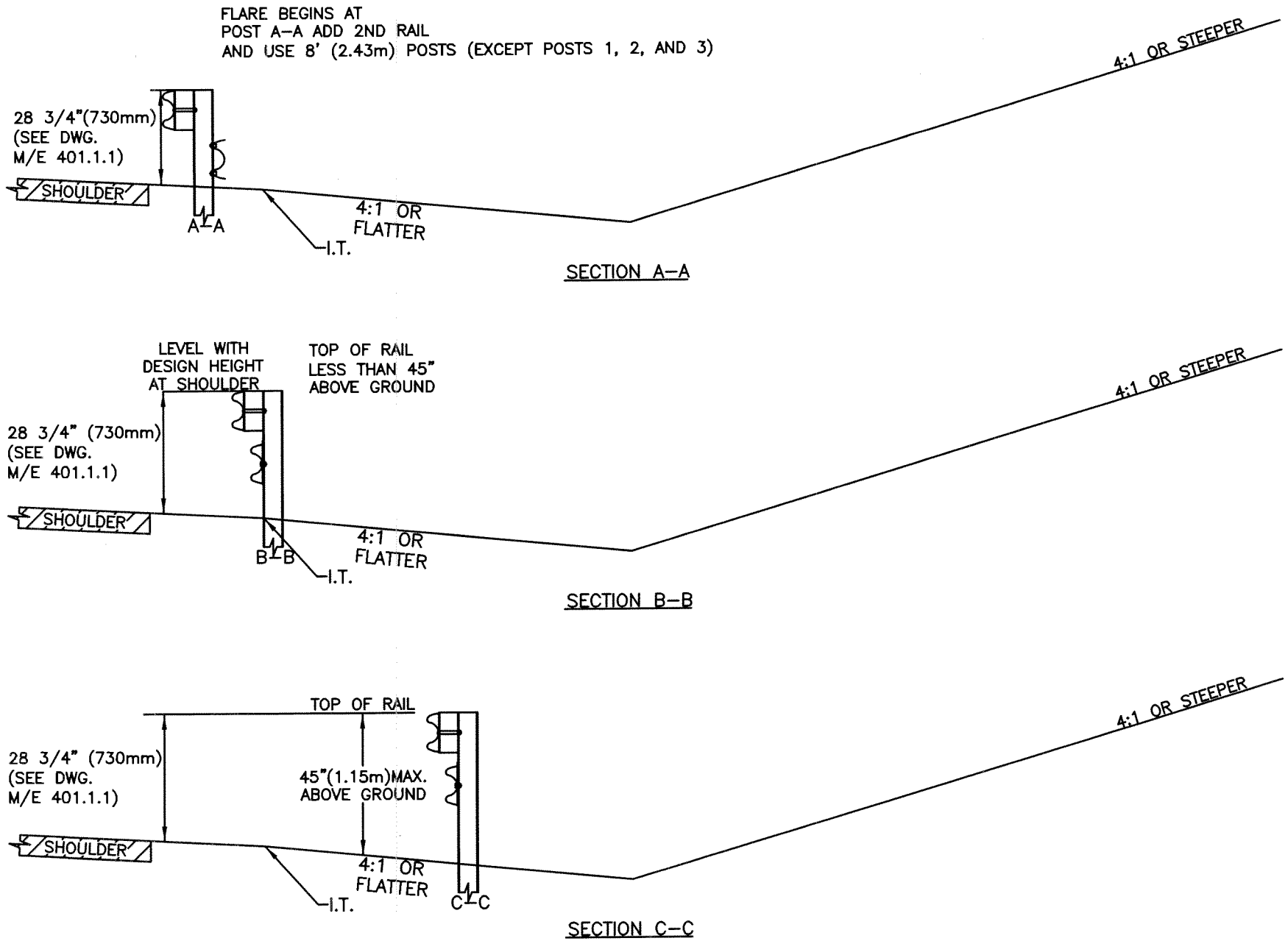
M/E 401.2.1a

MASS HIGHWAY
CONSTRUCTION STANDARDS

GUARD RAIL BURIED IN BACK-SLOPE POST LOCATION



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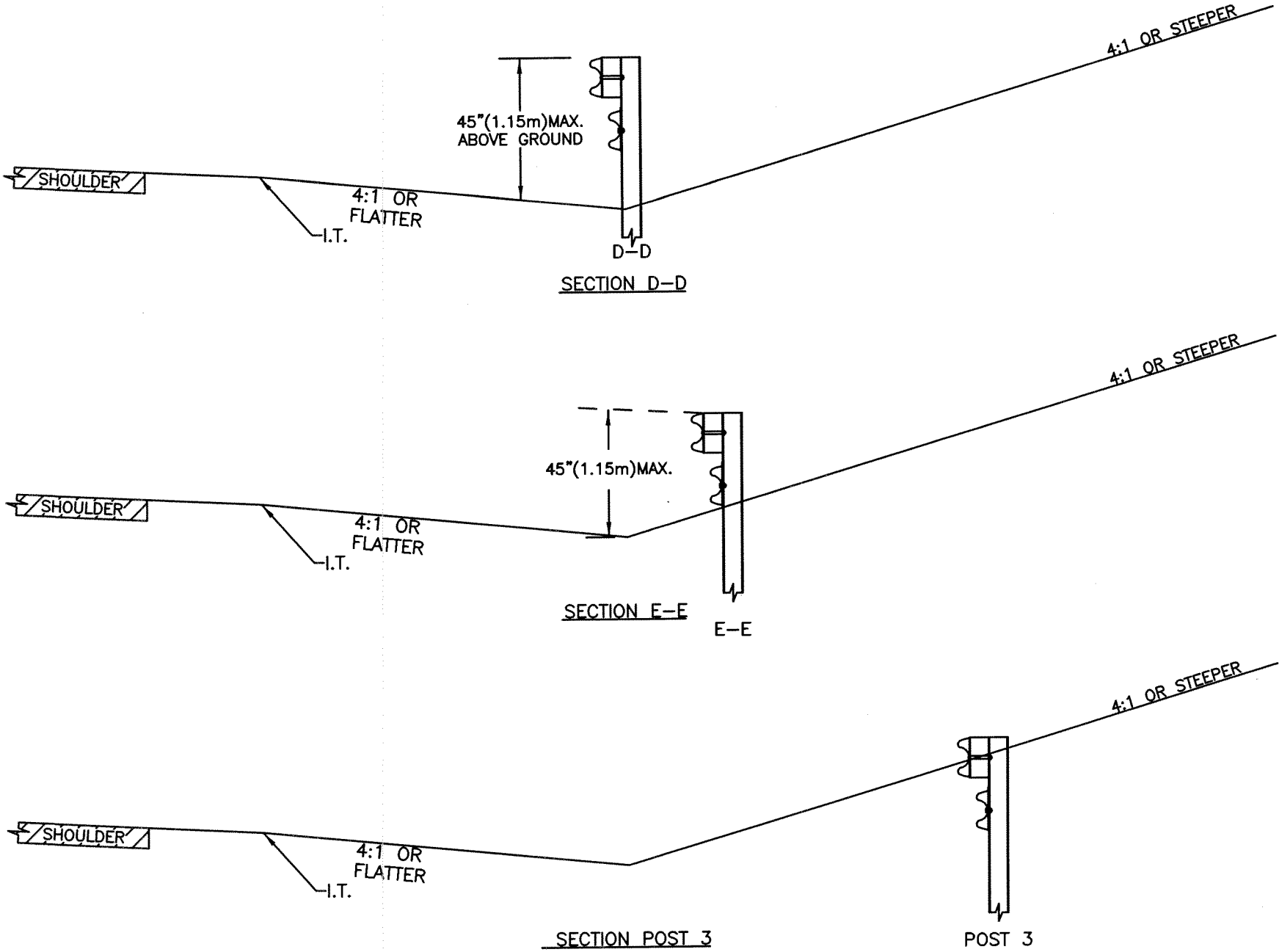
M/E 401.2.1b

MASSHIGHWAY
CONSTRUCTION STANDARDS

GUARD RAIL BURIED IN BACK-SLOPE POST LOCATION



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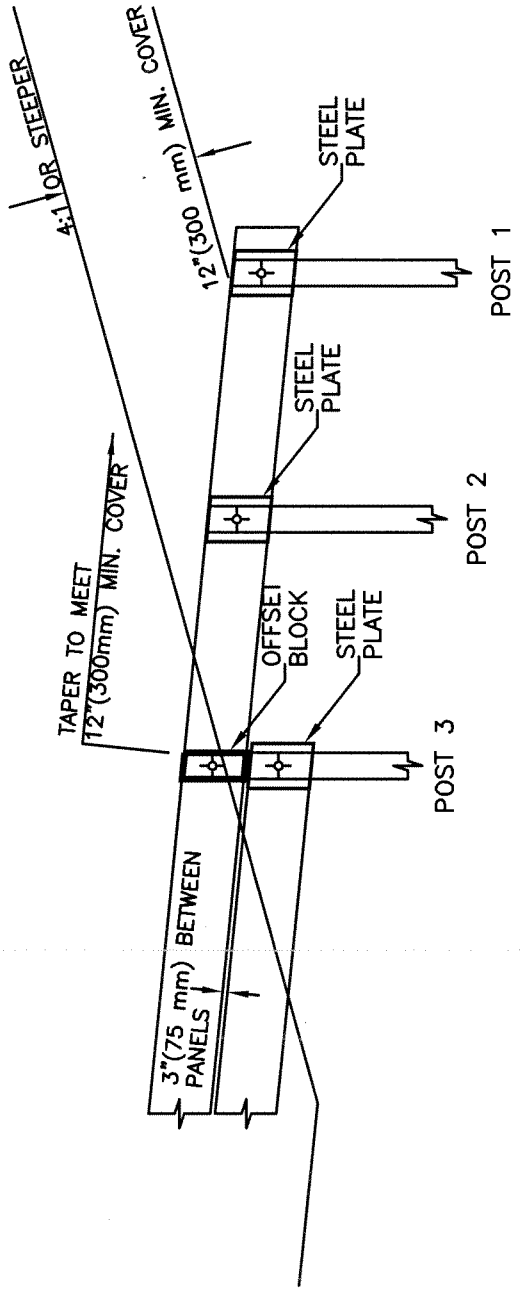
DRAWING NUMBER
M/E 401.2.1c



NOTE: FOR BOLTING AND PLATE DETAILS SEE DWG. 401.2.1e

MASS HIGHWAY
CONSTRUCTION STANDARDS

GUARD RAIL BURIED IN BACK-SLOPE ANCHORAGE DETAILS

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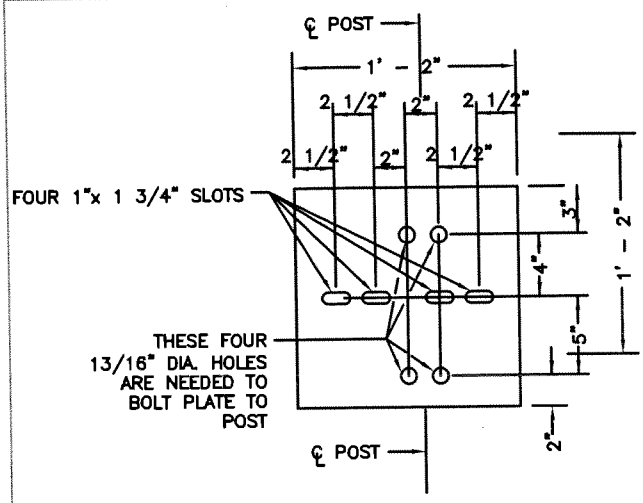
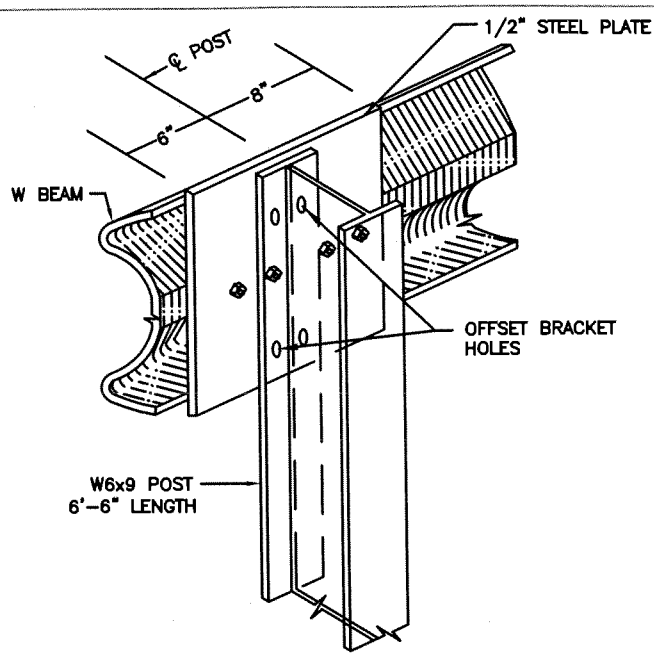
M/E 401.2.1d

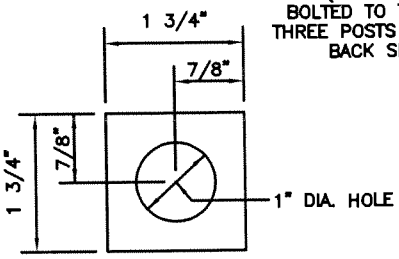


1/2" STEEL PLATE VIEW

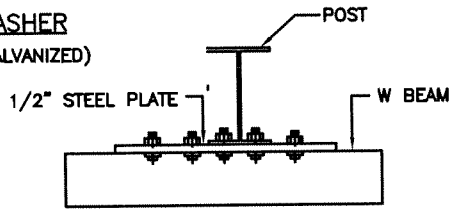
(GALVANIZED)
BOLTED TO THE LAST THREE POSTS BURIED IN BACK SLOPE



1/2" STEEL PLATE ATTACHED TO POST

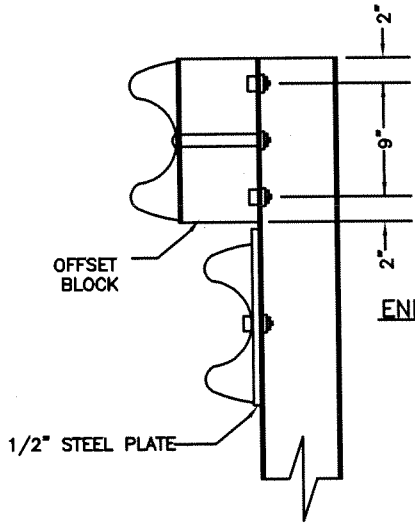


SQUARE WASHER
(3/16" THICK GALVANIZED)

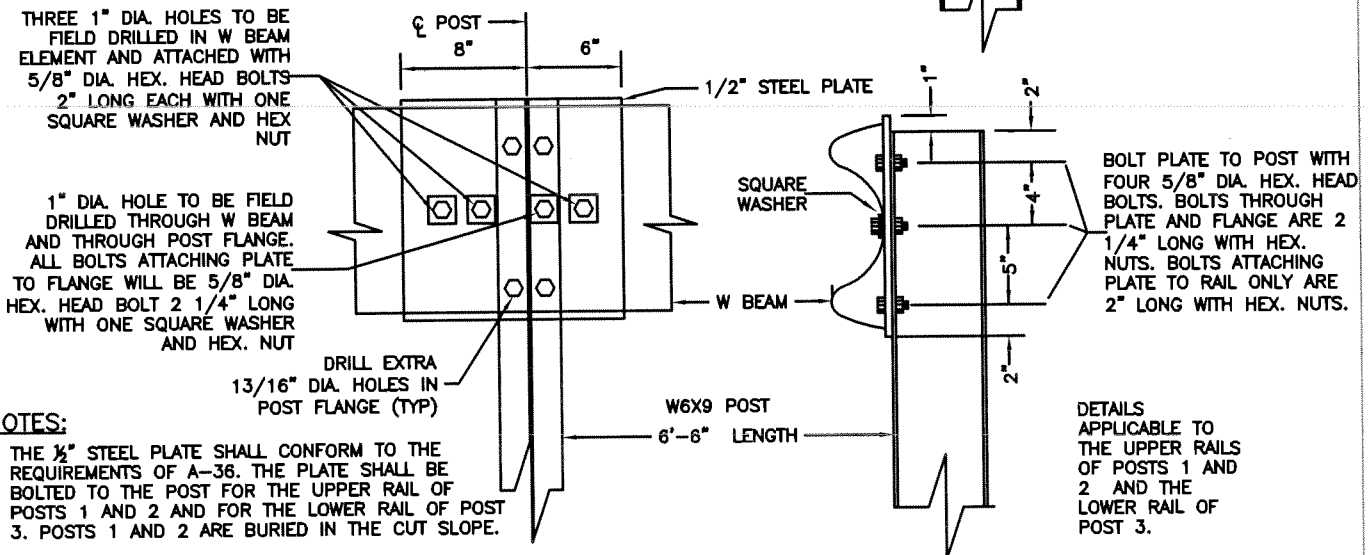


PLAN VIEW
(BOLTED)

ALL BOLTS, NUTS AND WASHERS ARE TO BE GALVANIZED



END VIEW OF POST 3



FRONT VIEW

END VIEW

1/2" STEEL PLATE BOLTED TO POST

NOTES:

1. THE ½" STEEL PLATE SHALL CONFORM TO THE REQUIREMENTS OF A-36. THE PLATE SHALL BE BOLTED TO THE POST FOR THE UPPER RAIL OF POSTS 1 AND 2 AND FOR THE LOWER RAIL OF POST 3. POSTS 1 AND 2 ARE BURIED IN THE CUT SLOPE.
2. FIELD DRILLED HOLES SHALL BE COATED WITH ZINC RICH PAINT.

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GUARD RAIL BURIED IN BACK-SLOPE END ANCHORAGE DETAILS FOR POSTS 1, 2 AND 3

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