

DEER POND/DAYS RIVER GUARD RAIL

DIVISION TWO – SITE WORK

SECTION 02843

GUARD RAIL

PART ONE – GENERAL

1.01 SUMMARY

- A. This work shall include, but is not necessarily limited to, all labor, materials and equipment required for the complete and satisfactory construction of all items on the project site as indicated on the drawings and specified herein.
 - 1. Install MDOT Guardrail Type A per Owner's direction and MDOT Standard Specification section 807 (2003). Steel Posts are required. **Nuts shall be welded to the bolts during installation so as to prevent vandalism.**

1.02 QUALITY ASSURANCE

- A. The contractor shall provide suitable equipment for the construction work. Equipment shall be in good working condition and shall be operated by individuals who are properly trained and skilled for such equipment.
- B. Contractor shall be responsible for obtaining all permits and complying with all pertinent regulations of governmental agencies having jurisdiction.
- C. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern when so directed by the Engineer.

1.03 METHOD OF PAYMENT

- A. All work under this section is included in the contract lump sum price. No separate payments will be made for this work.

PART TWO – PRODUCTS

2.01 MATERIALS

- A. Sound Earth shall meet MDOT Standard Specification (2003) section 205.
- B. Guardrail Beam Elements and Hardware, Reflectors and Steel Posts shall meet MDOT Standard Specifications (2003) section 908.
- C. Steel Posts and Wood Guardrail Blocks shall meet MDOT Standard Specifications (2003) section 912.

DEER POND/DAYS RIVER GUARD RAIL

PART THREE – EXECUTION

3.01 EXAMINATION

- A. The Contractor shall thoroughly inspect the premises prior to commencing work. The Contractor shall also determine the extent of work required and the need for temporary shoring and/or permanent structural changes.
- B. The Contractor shall comply with Act 53, P.A. of 1974, by notifying the public utilities of the proposed demolition at least 48 hours prior to the commencement of such activities by contacting MISS DIG.
- C. It shall be the responsibility of the contractor to determine the exact location of all existing utilities. For those utilities to remain in service, the Contractor shall make temporary and/or permanent relocation, as necessary, to comply with the drawings.

3.02 SALVAGED ITEMS

- A. Prior to construction, the Contractor shall meet with the Owner to determine and list any items that are to be salvaged for the Owner's use. Items not listed as salvage shall be removed from the site as described later in this section.

3.03 PREPARATION

- A. Protect all existing structures and utilities that will remain. Any damage to these items shall be repaired at no additional expense to the owner.
- B. The Contractor is responsible to place illuminate, post warning signs, and place temporary fencing around any dangerous openings and/or areas as necessary to ensure the safety of the workers, park staff and park visitors.

3.04 GRADING

- A. After construction, all areas shall be brought to a uniform level with the adjoining grades.

3.05 REMOVAL OF SURPLUS MATERIAL

- A. Remove all materials, debris and rubbish resulting from the construction work from the site as soon as practicable. Excess accumulation of materials on site will not be permitted.
- B. All material resulting from the construction work shall become the property of the Contractor and removed from the site unless otherwise specified.

DEER POND/DAYS RIVER GUARD RAIL

3.06 RESTORATION

- A. Surface restoration of all items to remain that are damaged by the Contractor shall include, but are not limited to:
1. Lawn Areas: Shall be replaced with three inches of topsoil and seeded with a roadside seed mixture. It shall then be fertilized and mulched as specified in Section 02900 or as directed by the Owner.
 2. Other Areas (Fields, Woods, etc.): Shall be seeded as specified in the above paragraph.

END OF SECTION

DEER POND/DAYS RIVER GUARD RAIL

DIVISION TWO - SITE WORK

LANDSCAPE BOULDERS

SECTION 02905

PART 1 - DESCRIPTION

1.1 Scope

- A. This work shall consist of furnishing and installing landscape boulders as specified herein.

PART 2 - MATERIALS

2.1 Products

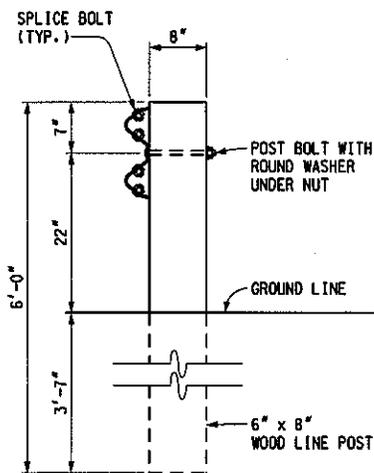
- A. 4' Nominal Boulders – Boulders shall have one dimension 4' or greater and shall not have any dimension less than 30".
- B. 3' Nominal Boulders – Boulders shall have one dimension 3' or greater and shall not have any dimension less than 24".
- C. Boulders shall be natural Michigan quarried limestone; be clean and free from sharp protrusions. Boulders shall not have large holes or ragged edges and be free from large cracks. A sample boulder shall be provided for approval by the Engineer.

PART 3 - EXECUTION

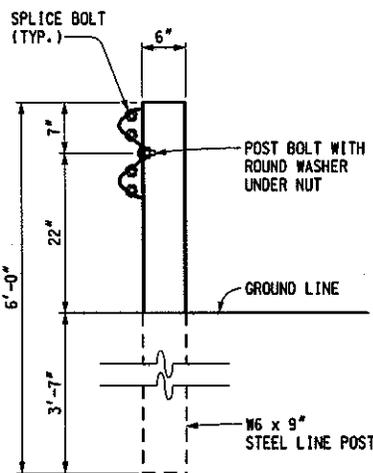
3.1 CONSTRUCTION METHODS

- A. Excavate four inch deep holes for boulders to rest in at six foot as shown on the plans.
- B. Place boulders in holes in a manner which a one thousand pound point force will not topple or roll the boulder in any direction. Maximum dimension of boulder shall be parallel and as close to the ground surface as possible.

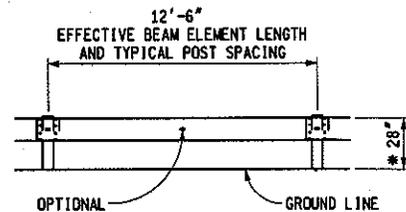
END OF SECTION



WOOD POST

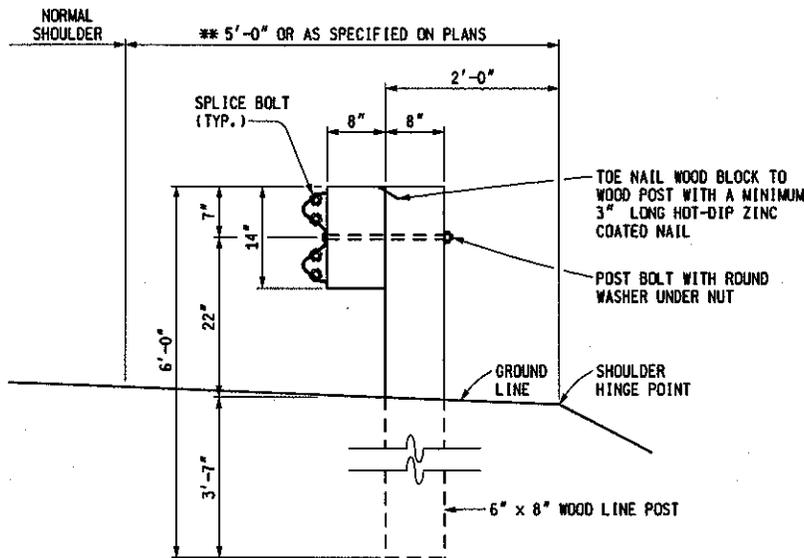


STEEL POST

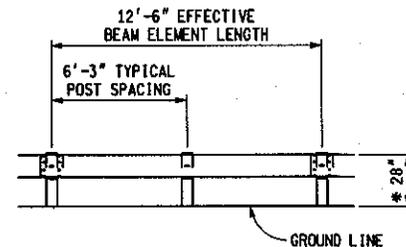


ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE A



** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".



ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE B
(WOOD POST)



PREPARED BY
DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: *John C. Friend*
ENGINEER OF DELIVERY

APPROVED BY: *Maria Van Pelt*
ENGINEER OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL,
TYPES A, B, BD, T, & TD

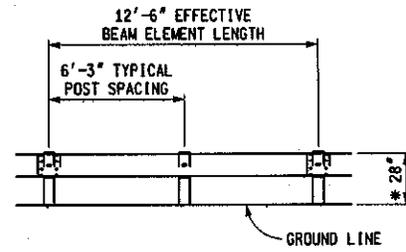
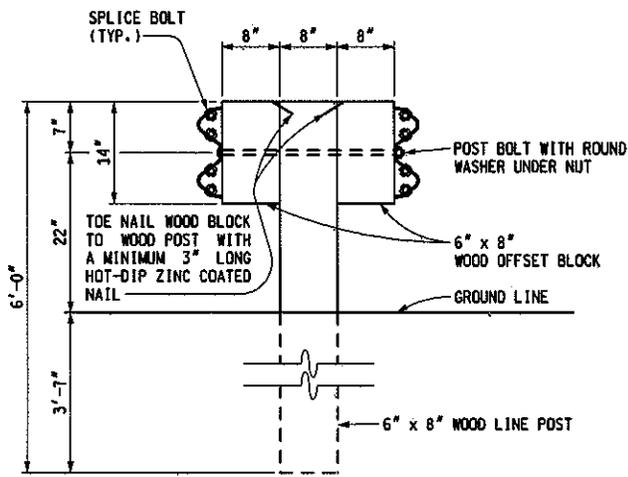
9-16-2009
F.H.W.A. APPROVAL

6-9-2009
PLAN DATE

R-60-H

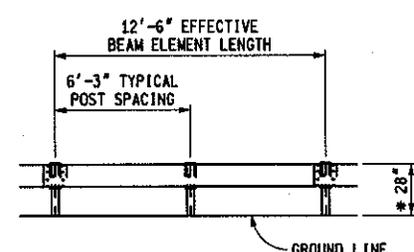
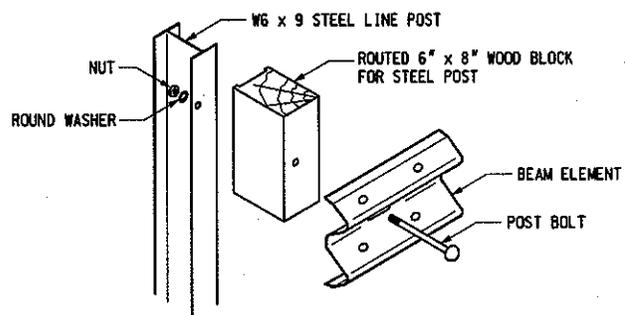
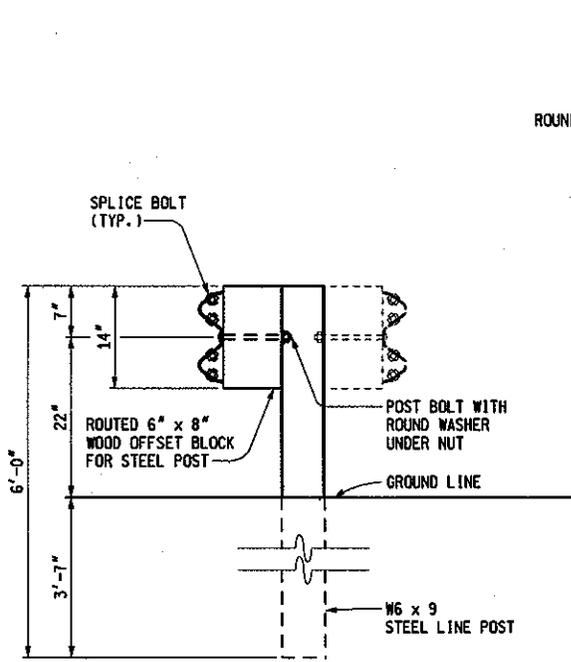
SHEET
1 OF 10

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ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE BD
(WOOD POST)



ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

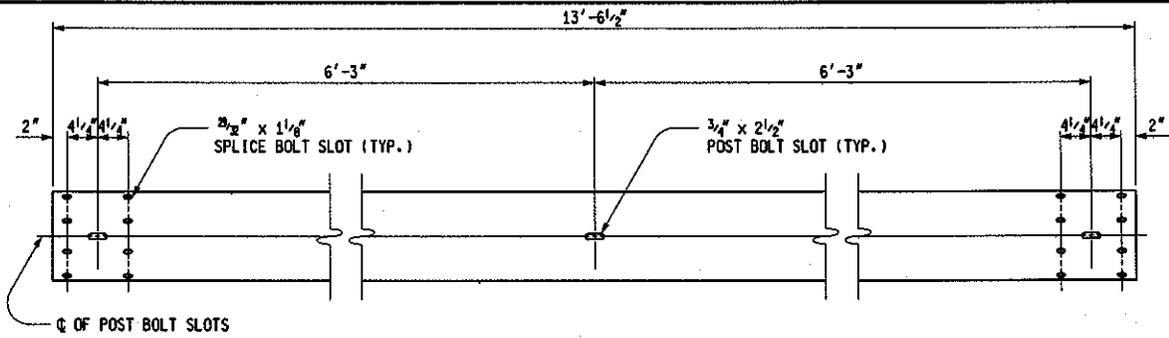
GUARDRAIL, TYPE B (OR BD)
(STEEL POST)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

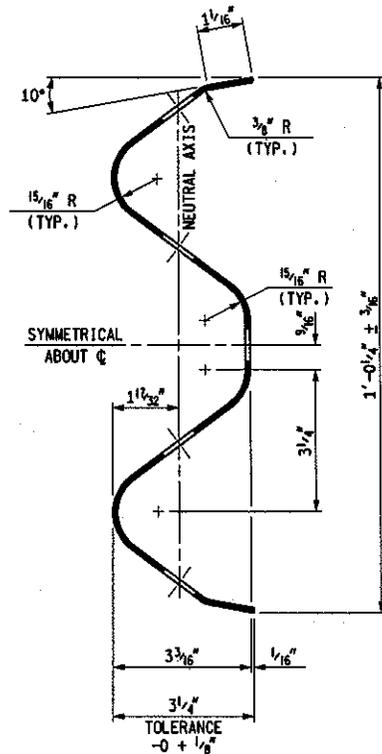
**GUARDRAIL,
TYPES A, B, BD, T, & TD**

9-16-2009 F.H.W.A. APPROVAL	6-9-2009 PLAN DATE	R-60-H	SHEET 2 OF 10
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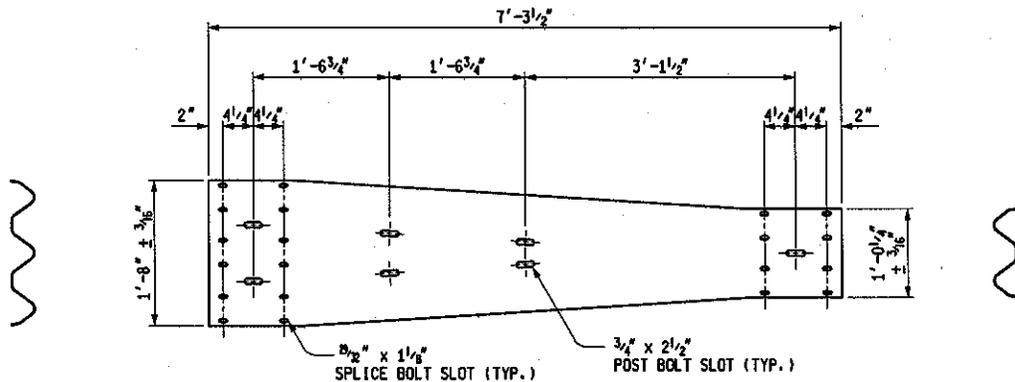
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FRONT ELEVATION OF BEAM ELEMENT



SECTION THROUGH BEAM ELEMENT
(FOR GUARDRAIL, TYPE A, TYPE B, AND TYPE BD)



THRIE BEAM TRANSITION

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

GUARDRAIL,
TYPES A, B, BD, T, & TD

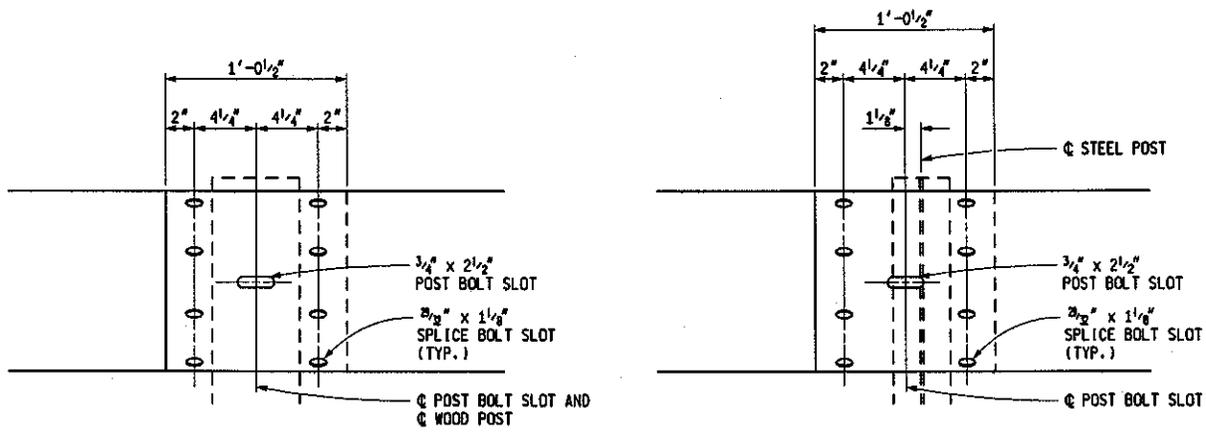
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6-9-2009
PLAN DATE

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SHEET
3 OF 10

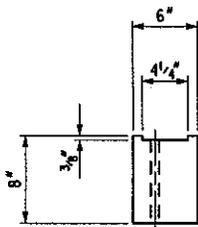
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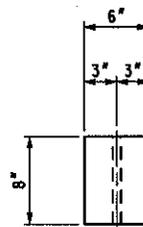
WOOD POST

STEEL POST

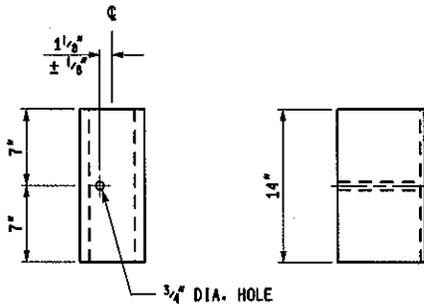
BEAM ELEMENT SPLICE DETAILS



TOP



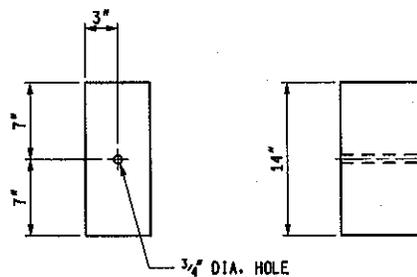
TOP



FRONT

SIDE

FOR USE ON STEEL POSTS



FRONT

SIDE

FOR USE ON WOOD POSTS

(SEE NOTES ON SHEET 10 OF 10)

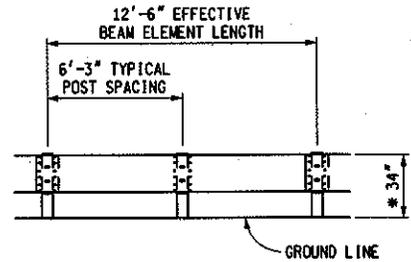
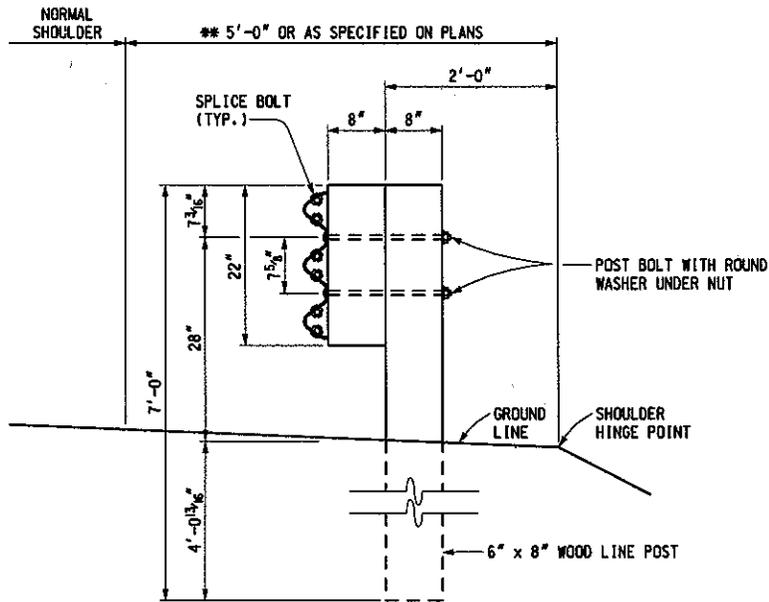
WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE B AND TYPE BD

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

GUARDRAIL,
TYPES A, B, BD, T, & TD

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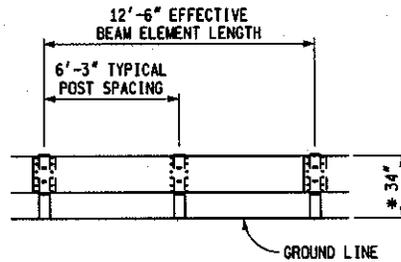
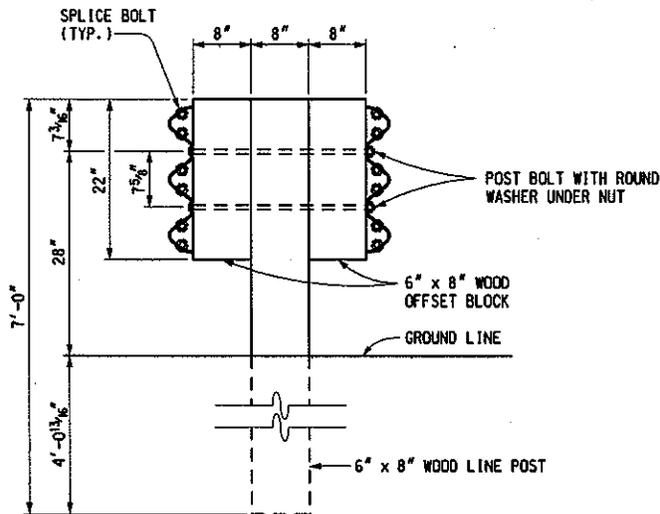
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ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

GUARDRAIL, TYPE T
(WOOD POST)



ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE TD
(WOOD POST)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

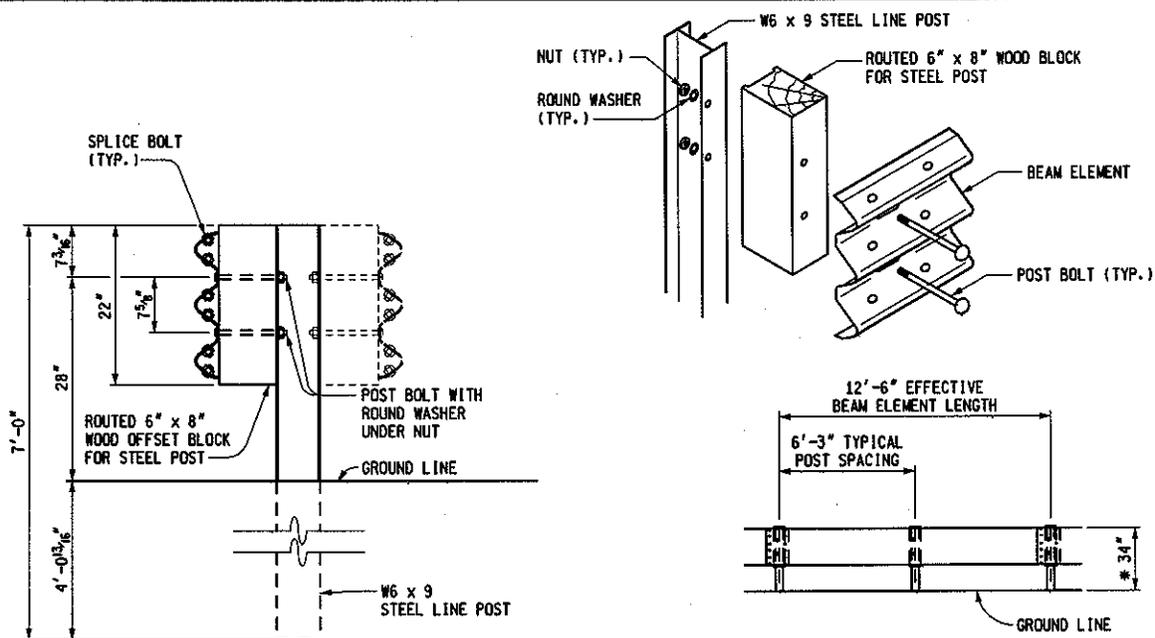
GUARDRAIL,
TYPES A, B, BD, T, & TD

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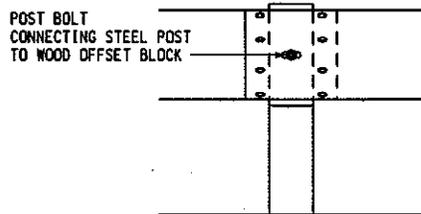
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SHEET
5 OF 10

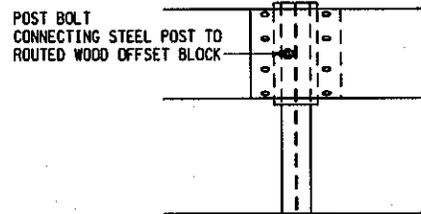


ELEVATION SHOWING POST SPACING
 * SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

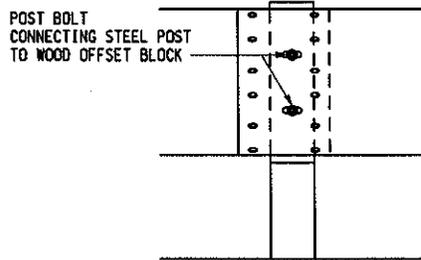
**GUARDRAIL, TYPE T OR TD
 (STEEL POST)**



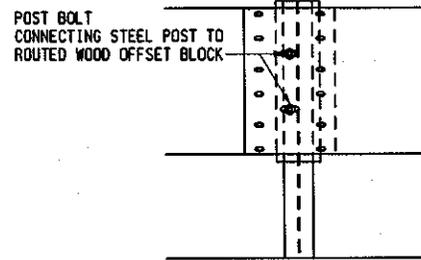
**GUARDRAIL, TYPE B
 WOOD POST**



**GUARDRAIL, TYPE B
 STEEL POST**



**GUARDRAIL, TYPE T
 WOOD POST**



**GUARDRAIL, TYPE T
 STEEL POST**

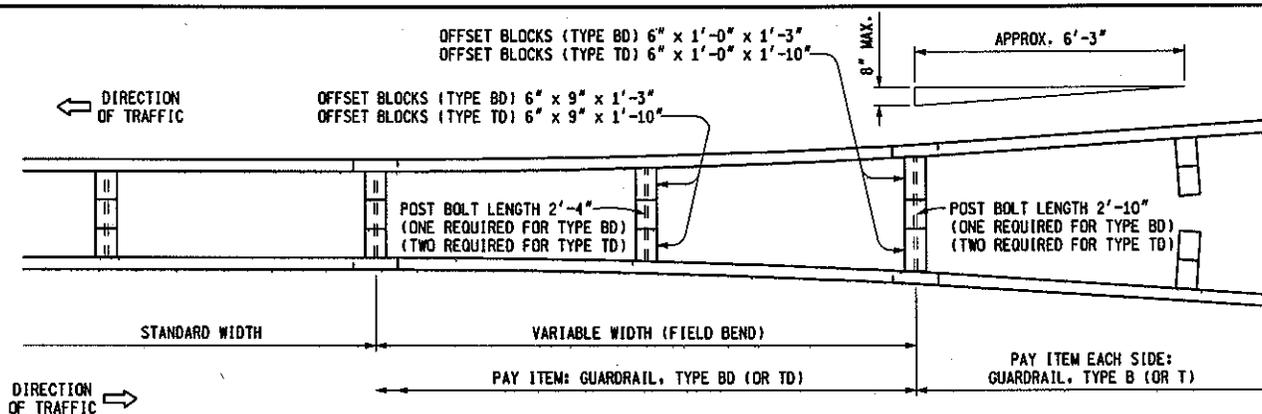
BLOCK AND POST CONNECTION DETAILS

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

**GUARDRAIL,
 TYPES A, B, BD, T, & TD**

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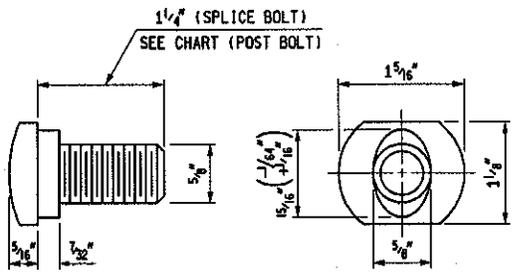
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DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE B (OR TYPE T) TO GUARDRAIL, TYPE BD (OR TYPE TD)

POST BOLTS, SPLICE BOLTS AND WASHERS AT BEAM ELEMENT SPLICE POSTS AND AT INTERMEDIATE POSTS						
GUARDRAIL TYPE	POST	OFFSET BLOCK	POST BOLTS		SPLICE BOLTS (1 1/4" LONG) (NO. REQ'D)	WASHERS (ROUND) (NO. REQ'D)
			NO. REQ'D	LENGTH		
A	WOOD	N/A	1	9 1/2"	8	1
	STEEL	N/A	1	2"		
B	WOOD	WOOD	1	18"	8	1
	STEEL	WOOD	1	9 1/2"		
BD	WOOD	WOOD	1	*26 1/2"	16	2
	STEEL	WOOD	2	9 1/2"		
T	WOOD	WOOD	2	18"	12	2
	STEEL	WOOD	2	9 1/2"		
TD	WOOD	WOOD	2	*26 1/2"	24	4
	STEEL	WOOD	4	9 1/2"		

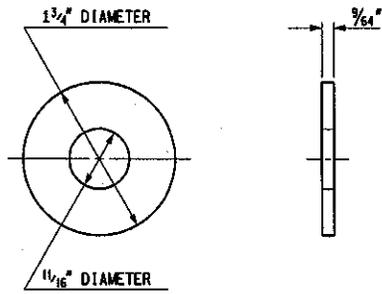
MINIMUM POST BOLT THREAD LENGTH	
BOLT LENGTH	MINIMUM THREAD LENGTH
9 1/2"	1 3/4"
18"	2 1/2"
26 1/2"	3"



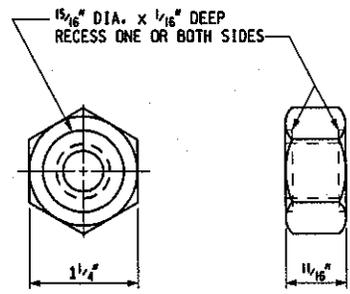
SPLICE BOLT AND POST BOLT

THREE BEAM TRANSITIONS REQUIRE 20 SPLICE BOLTS EACH (12 ON TYPE T END AND 8 ON TYPE B END).

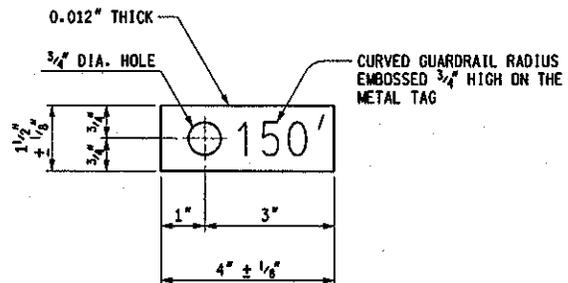
* EXCEPT AS SPECIFIED ON DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE B (OR TYPE T) TO GUARDRAIL, TYPE BD (OR TYPE TD). POST BOLTS SHALL NOT EXTEND MORE THAN 1/2" BEYOND NUT.



ROUND WASHER



NUT



METAL TAG

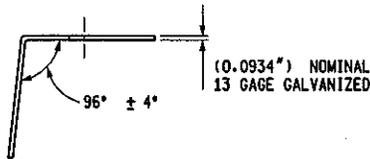
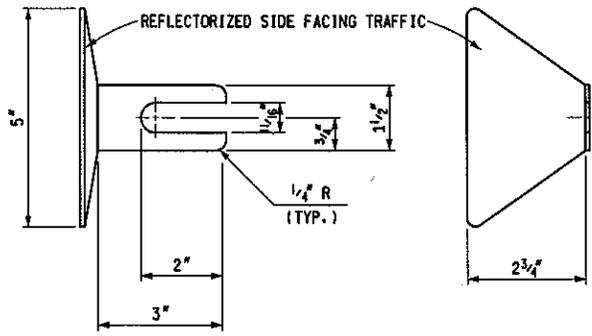
FOR CURVED GUARDRAIL WITH RADIUS OF 150' OR LESS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

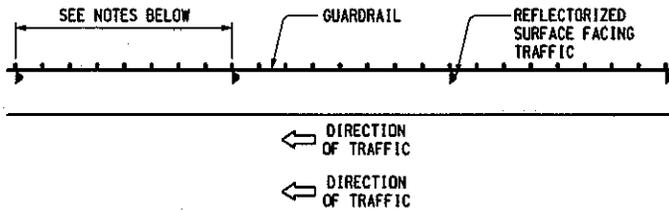
**GUARDRAIL,
TYPES A, B, BD, T, & TD**

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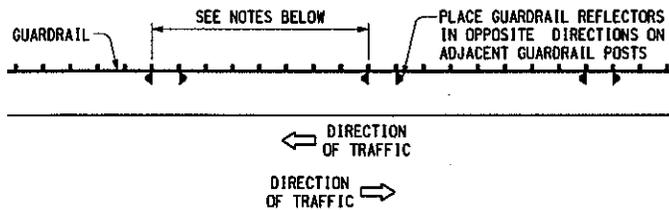
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GUARDRAIL REFLECTOR



ONE-WAY TRAFFIC

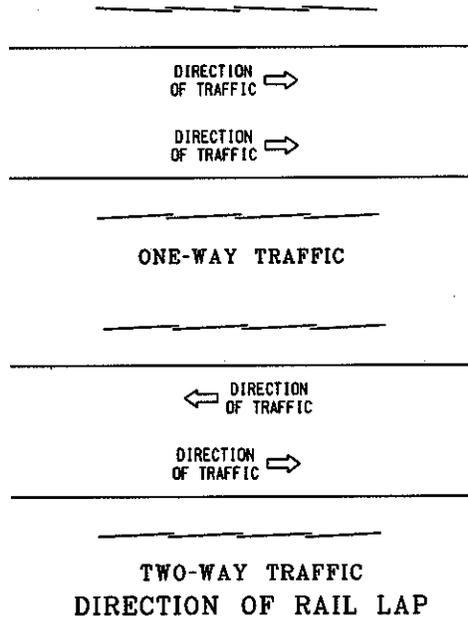


TWO-WAY TRAFFIC

PLACEMENT OF GUARDRAIL REFLECTORS

NOTES GOVERNING THE USE OF GUARDRAIL REFLECTORS

1. GUARDRAIL REFLECTORS SHALL BE USED ON ALL STANDARD GUARDRAIL RUNS, REGARDLESS OF ROADWAY LIGHTING.
2. GUARDRAIL REFLECTORS ARE TO BE SPACED AT THE FOLLOWING INTERVALS:
 - a) 50'-0" ON TANGENT SECTIONS AND CURVES WITH A RADIUS OF 1150' OR MORE.
 - b) 25'-0" ON CURVES WITH A RADIUS LESS THAN 1150'.
3. FOR GUARDRAIL REFLECTOR PLACEMENT ON APPROACH TERMINALS, SEE THE APPROPRIATE GUARDRAIL APPROACH TERMINAL STANDARD PLAN.
4. A GUARDRAIL REFLECTOR IS TO BE PLACED ON THE SECOND POST FROM THE GUARDRAIL DEPARTING TERMINAL.
5. ON GUARDRAIL, TYPE T AND TYPE TD GUARDRAIL REFLECTORS ARE TO BE PLACED ON THE UPPER POST BOLT.
6. GUARDRAIL REFLECTORS SHALL MATCH COLOR OF EDGE LINE.



NOTES:

DETAILS SPECIFIED ON THIS STANDARD ARE ACCORDING TO THE JOINT AASHTO - ARBA TECHNICAL BULLETIN NO. 268, "A GUIDE TO STANDARDIZED HIGHWAY BARRIER RAIL HARDWARE".

BEAM ELEMENTS SHALL BE SHOP BENT TO PLAN RADIUS FOR CURVE RADIUS 150' OR LESS. A TAG IDENTIFYING THE CURVATURE OF THE SHOP BENT SECTION WILL BE REQUIRED FOR EACH CURVED ELEMENT.

POST BOLT SLOTS AT 6'-3" INTERVALS WILL BE ALLOWED IN BEAM ELEMENTS USED TO CONSTRUCT GUARDRAIL, TYPE A.

SEE STANDARD PLAN R-61-SERIES, R-62-SERIES OR R-63-SERIES FOR GUARDRAIL APPROACH TERMINALS; STANDARD PLAN R-66-SERIES FOR GUARDRAIL DEPARTING TERMINALS AND STANDARD PLAN R-67-SERIES FOR GUARDRAIL ANCHORAGE, BRIDGE.

WHEN THE PLANS SPECIFY GUARDRAIL IS TO BE PLACED ON THE SHOULDER HINGE POINT, RATHER THAN AS SPECIFIED ON THIS PLAN, 8'-0" POSTS SHALL BE PROVIDED, WITH THE ADDITIONAL LENGTH EMBEDDED FOR ADDED STABILITY. (NOT NECESSARY WHEN THE SLOPE IS REASONABLY LEVEL BEYOND THE SHOULDER HINGE POINT, AS DETERMINED BY THE ENGINEER.)

WOOD POSTS WITH 1/2" BEVELS AT THE TOP MAY BE USED IN LIEU OF WOOD POSTS WITHOUT BEVELS SPECIFIED. THE LENGTH, WIDTH AND DEPTH OF THE POST SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT.

WOOD OFFSET BLOCKS WITH 1/2" BEVELS AT THE TOP AND BOTTOM OR A 1" BEVELED TOP MAY BE USED IN LIEU OF WOOD BLOCKS WITHOUT BEVELS SPECIFIED. THE LENGTH (FRONT AND BACK FACE), WIDTH AND DEPTH OF THE BLOCK SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT AND COMPATIBILITY WITH POST HOLES.

WHEN THE DISTANCE BETWEEN THE BACK OF CURB AND THE FACE OF THE GUARDRAIL POST IS 10" OR LESS, THE RAIL HEIGHT SHOULD BE MEASURED FROM THE FRONT EDGE OF THE GUTTER PAN, WHICH IS THE POINT ON THE GUTTER PAN THAT IS CLOSEST TO THE EDGE OF THE TRAVELED LANE. AT GREATER DISTANCES (TYPICALLY 5'-0" TO 6'-6") THE RAIL HEIGHT SHOULD BE MEASURED FROM THE GROUND JUST IN FRONT OF THE GUARDRAIL.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

**GUARDRAIL,
TYPES A, B, BD, T, & TD**

9-16-2009 F.H.W.A. APPROVAL	6-9-2009 PLAN DATE	R-60-H	SHEET 10 OF 10
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