



Road & Bridge Design Publications

Monthly Update – August 2016

Revisions for the month of **August** are listed and displayed below. New special details will be included in projects submitted for the **November** letting as is stated on the special detail index sheets. E-mail Road related questions on these changes to MDOT-Road-Design-Standards@michigan.gov. E-mail Bridge related questions to MDOT-Bridge-Design-Standards@michigan.gov.

Special Details

R-61-H: Guardrail Approach Terminal Types 1B & 1T: Added two notes on sheet six in regards to the proper location of slot guards and guardrail panels on the SRT ending.

Road Design Manual

3.08.01E: Design Exceptions: Added a clarification for “Bridges to Remain in Place” criteria.

6.04.12 E 1: Pavt Repr, Rem: Revised the maximum length of this pay item from 50’ to 100’ to match the spec book.

6.04.12 E 3: Pavt Repr, Reinf Conc & Pavt Repr, Nonreinf Conc: Incorporated the 100’ maximum length of the “repair” pay item and described when to use concrete “repair” versus “miscellaneous” concrete pay items.

6.05.04A: Freeway Shoulder Width: Revised the link (reference) for freeway shoulder widths from section 6.05.04C to Appendix 3A.

8.03.07: Work Zone Pedestrian Accommodation: Added a new section dealing with pedestrians, the American’s with Disabilities Act (ADA), and their accommodation in work zones.

12.12.09: Design Features of Shared Use Paths: Added a paragraph noting National Association of City Transportation Officials (NACTO) guides as resources in the development of context sensitive, multi-modal facilities, while still retaining AASHTO guides as the standards.

14.36.02: Procedure for “The Plan Review”: Updated the procedure by replacing Form 0200 (Plan Review Meeting) with Form 0303 (Design Plan Submittal), renaming the ProjectWise subfolder “Meeting Requests & Minutes” as “Design Submittal Form and Minutes”, and updating the required format of ProjectWise (folder 3).



Road & Bridge Design Publications

Monthly Update – August 2016

Bridge Design Guides

8.21.02: Updated designation (symbols) for weld sizes and groove (bevel) dimension.

Bridge Design Manual

2.01.07 & 12.00: Added a clarification for “Bridges to Remain in Place” criteria.

3.00 & 12.01: Updated standards and design criteria governing 3R and 4R projects when there is a combination of work types (3R, 4R or other work type) within the same project.

Updates to MDOT Cell Library, Bridge Auto Draw Program, etc., may be required in tandem with some of this month's updates. Until such updates to automated tools can be made, it is the designer's/detailer's responsibility to manually incorporate any necessary revisions to notes and plan details to reflect these revisions.

Index to Special Details

8-22-2016

⑥

SPECIAL DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE
21	2	GUARDRAIL AT INTERSECTIONS	3-14-16
24	8	GUARDRAIL ANCHORED IN BACKSLOPE TYPES 4B, 4T, & 4MGS-8	4-25-16
99	2	CHAIN LINK FENCE WITH WIRE ROPE	9-22-14
R-1-G	9	DRAINAGE STRUCTURES	6-15-16
R-28-J	7	SIDEWALK RAMP AND DETECTABLE WARNING DETAILS	3-15-16
R-39-J	5	TRANSVERSE PAVEMENT JOINTS	7-13-16
R-53-A	22	TEMPORARY CONCRETE BARRIER LIMITED DEFLECTION	8-14-15
R-60-J	16	GUARDRAIL TYPES A, B, BD, T, TD, MGS-8, & MGS-8D	4-22-16
* R-61-H	19	GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SKT, FLEAT, & X-Lite)	8-1-16
R-62-H	10	GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T (SKT & X-Lite)	3-15-16
R-63-C	16	GUARDRAIL APPROACH TERMINAL TYPES 3B & 3T	3-15-16
R-66-E	4	GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS	4-27-16
R-67-G	7	GUARDRAIL ANCHORAGE, BRIDGE, DETAILS	3-15-16
R-72-D	11	W-BEAM BACKED GUARDRAIL & GUARDRAIL LONG SPAN INSTALLATIONS	5-11-16
R-73-F	6	GUARDRAIL OVER BOX OR SLAB CULVERTS	3-15-16
R-83-C	5	UTILITY TRENCHES	2-8-16
R-126-I	5	PLACEMENT OF TEMPORARY CONCRETE & STEEL BARRIER	8-25-15

*** Denotes New or Revised Special Detail to be included in projects for (beginning with) the November letting.**

Note:

Former Standard Plans IV-87, IV-89, IV-90, and IV-91 Series, used for building cast-in-place concrete head walls for elliptical and circular pipe culverts, are now being replaced with plans that detail each specific size. The Municipal Utilities Unit will provide these full sized special details for inclusion in construction plans for MDOT jobs. To assure prompt delivery, requests **must** be made in advance.

Former Standard Plans IV-93 and IV-94 series have been replaced with precast concrete box & three-sided culverts as per the 2012 Standard Specifications for Construction.

Index to Bridge Detail Sheets

8-22-2016

⑦

DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE
B-22-E	4	BRIDGE RAILING, THRIE BEAM RETROFIT (R4 TYPE RAILING)	3-15-16
B-23-F	4	BRIDGE RAILING, THRIE BEAM RETROFIT (OPEN PARAPET RAILING)	3-15-16
B-101-G	2	DRAIN CASTING ASSEMBLY DETAILS	2-8-16
EJ3AB	1 or 2	EXPANSION JOINT DETAILS	2-10-16
EJ4O	1 or 2	EXPANSION JOINT DETAILS	2-10-16
PC-2G	1	70" PRESTRESSED CONCRETE I-BEAM DETAILS	3-31-06
PC-4E	1	PRESTRESSED CONCRETE 1800 BEAM DETAILS	3-31-06
PC-1L	1	PRESTRESSED CONCRETE I-BEAM DETAILS	7-12-06

*** Denotes New or Revised Special Detail to be included in projects for (beginning with) the November letting.**

Note:

Details EJ3AA & EJ4N are interactive, i.e. designers and detailers choose details based upon railing type and angle of crossing. Place all details appropriate for the project, structure specific information, and the Expansion Joint Device quantity on the sheet. The sheet shall then be added to the plans as a normal plan sheet.

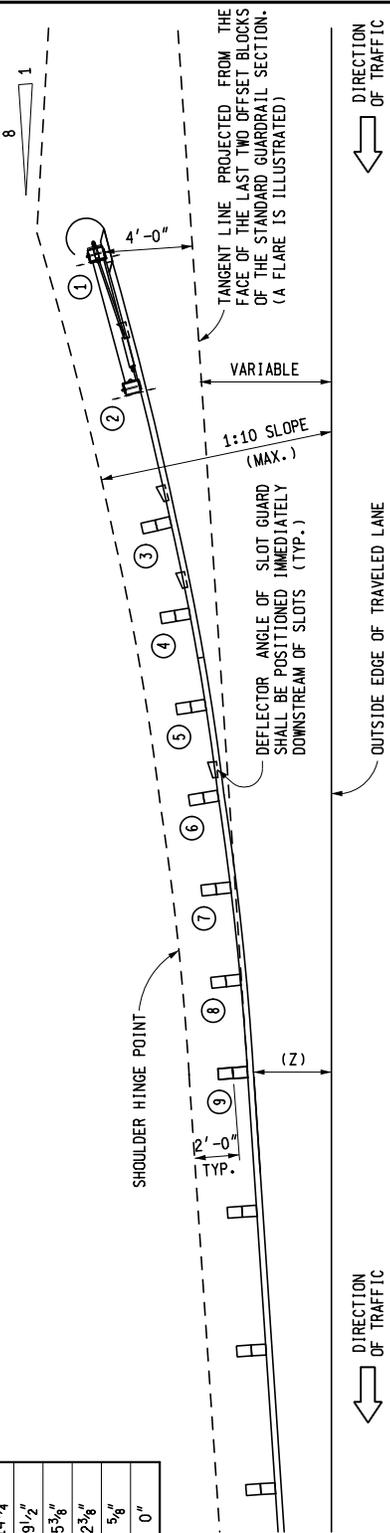
Detail PC-1L, PC-2G and PC-4E shall have structure specific information and quantities added to the sheet. The sheet shall then be added to the plans as a normal plan sheet.

THE POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE WOOD OFFSET BLOCKS, EXCEPT FOR THE FIRST AND SECOND POSTS WHICH ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS ARE TO BE LOCATED BY CHORD MEASUREMENTS AT THE BACK OF THE RAIL EQUAL TO THE NOMINAL POST SPACINGS SPECIFIED. POSTS ARE TO BE SET APPROXIMATELY TANGENT TO THE BEAM ELEMENT AT EACH POST LOCATION.

** FOR LAYOUT ON CURVES SEE DETAIL ON SHEET 18.

SEE END ANCHORAGE ASSEMBLY, SHEET 3

POST	** POST OFFSET DISTANCE
1	4'-0"
2	2'-8"
3	1'-8"
4	1'-2"
5	0'-8"
6	0'-45"
7	0'-2"
8	0'-05"
9	0' 0"

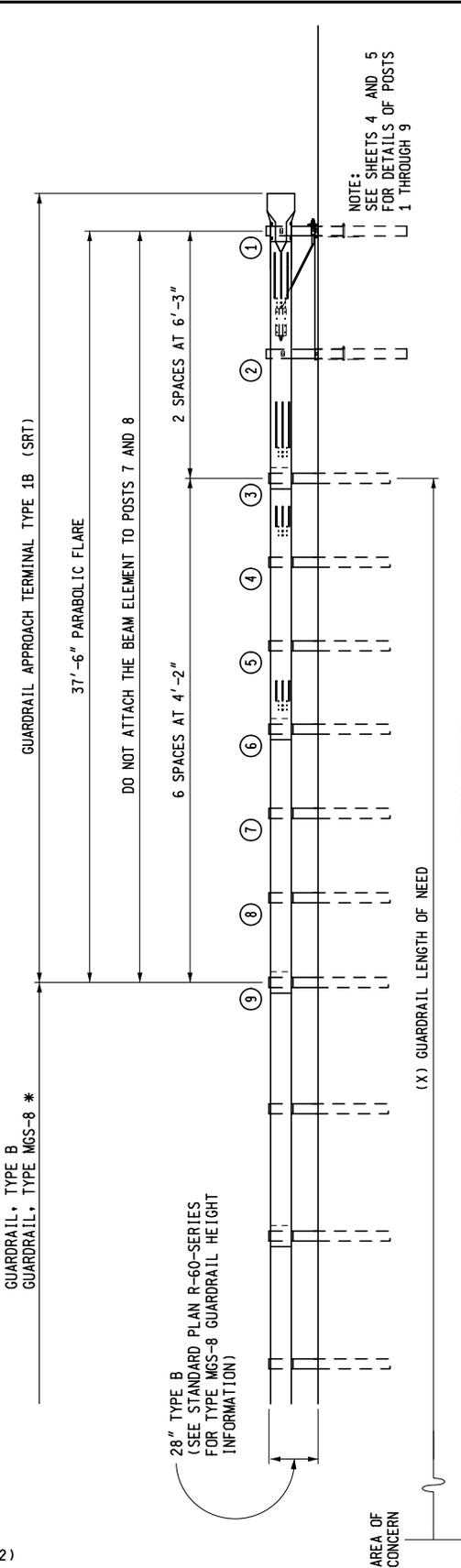


PLAN VIEW

* SEE STANDARD PLAN R-60-SERIES FOR POST SPACING AND GUARDRAIL LAYOUT TO TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL APPROACH TERMINAL TYPE 1B

OPTION 1

(DETAILED ON SHEETS 1 THROUGH 6, 11 AND 12)



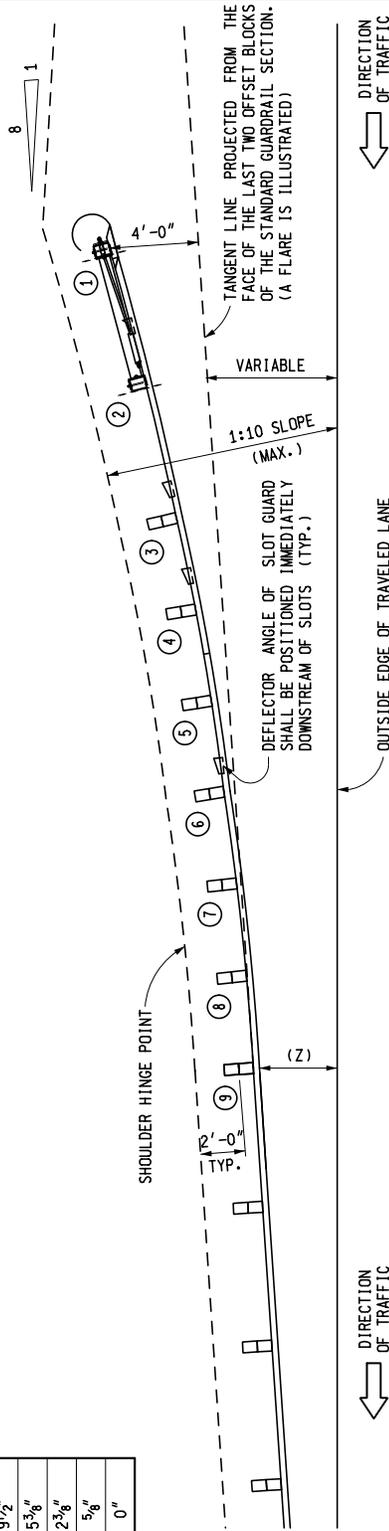
ELEVATION
GUARDRAIL APPROACH TERMINAL TYPE 1B
"SRT"

	DEPARTMENT DIRECTOR Kirk T. Stedule	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR	
	PREPARED BY DESIGN DIVISION	APPROVED BY: _____ ENGINEER OF DELIVERY	GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)
DRAWN BY: <u>B.L.T.</u>	APPROVED BY: _____ ENGINEER OF DEVELOPMENT	8-1-2016 PLAN DATE	R-61-H
CHECKED BY: <u>W.K.P.</u>		F.H.W.A. APPROVAL	SHEET 1 OF 19

THE POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE WOOD OFFSET BLOCKS, EXCEPT FOR THE FIRST AND SECOND POSTS WHICH ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS ARE TO BE LOCATED BY CHORD MEASUREMENTS AT THE BACK OF THE RAIL EQUAL TO THE NOMINAL POST SPACINGS, SPECIFIED. POSTS ARE TO BE SET APPROXIMATELY TANGENT TO THE BEAM ELEMENT AT EACH POST LOCATION.

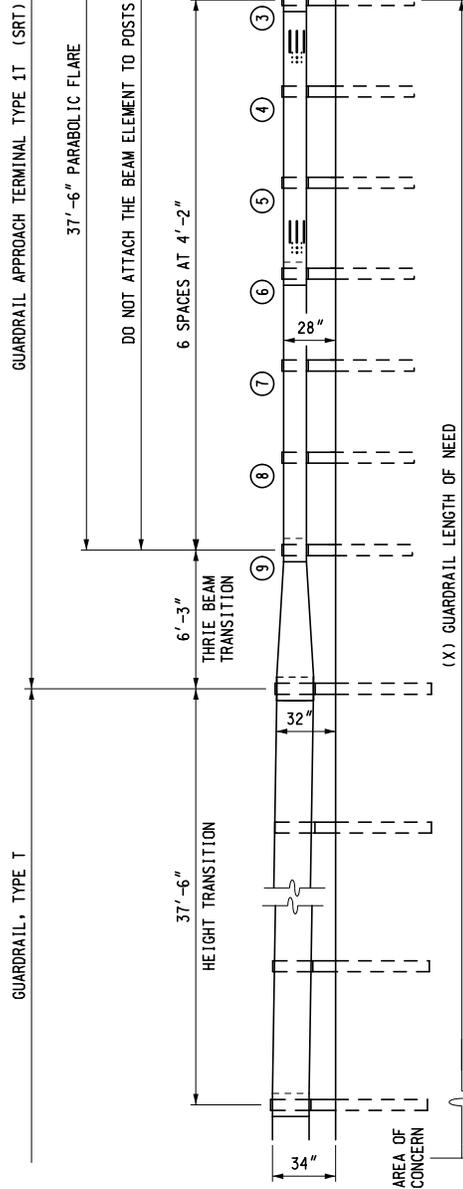
** FOR LAYOUT ON CURVES SEE DETAIL ON SHEET 18.

SEE END ANCHORAGE ASSEMBLY,
SHEET 3



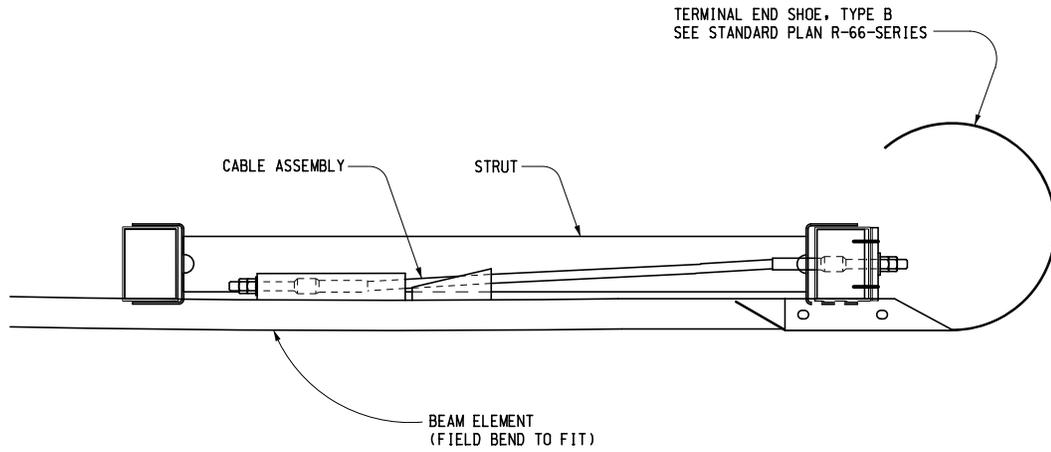
PLAN VIEW

POST	** POST OFFSET DISTANCE
1	4'-0" 48"
2	2'-8" 33 1/2"
3	1'-8" 21 1/4"
4	1'-2" 14 3/4"
5	0'-8" 9 1/2"
6	0'-45" 5 3/8"
7	0'-2" 2 3/8"
8	0'-05" 5/8"
9	0' 0"

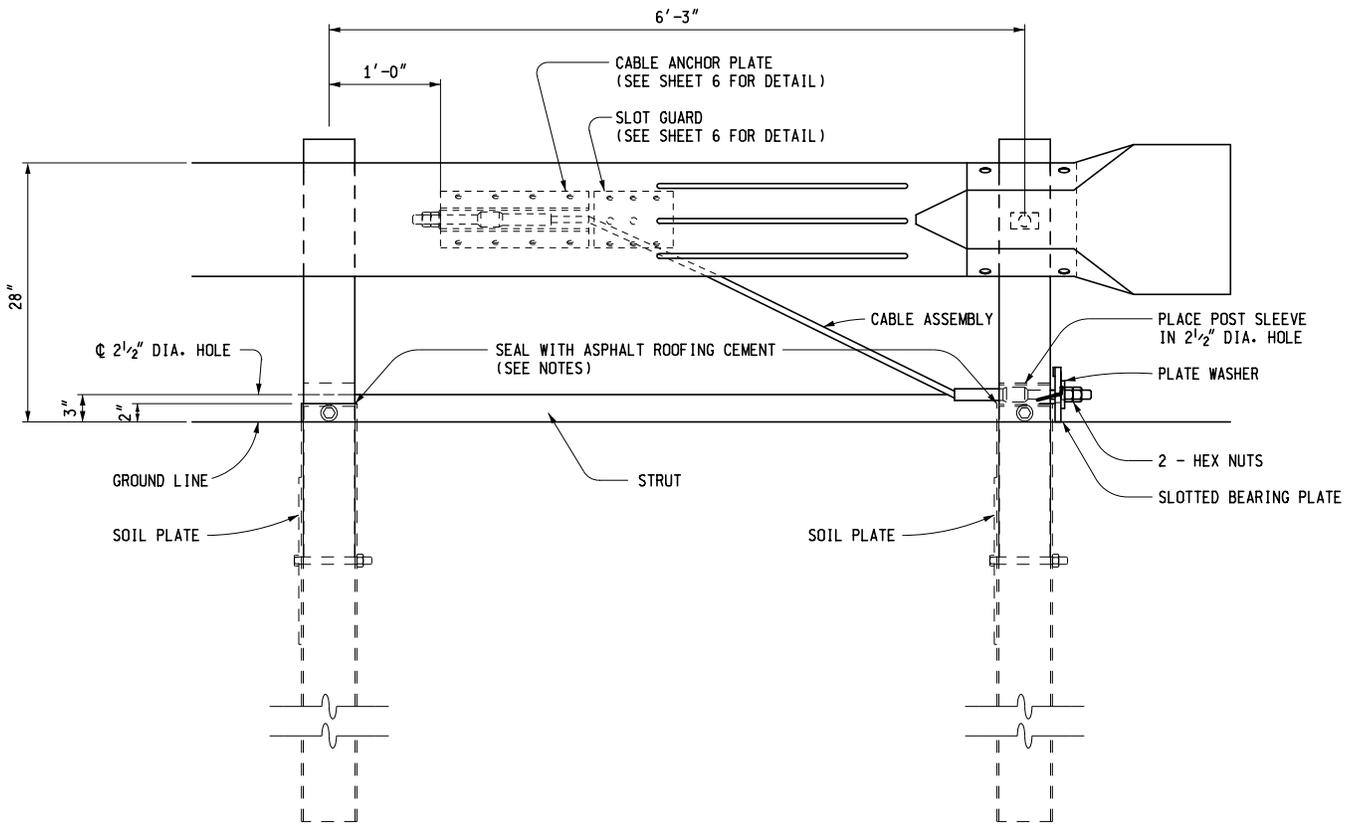


ELEVATION
GUARDRAIL APPROACH TERMINAL TYPE 1T
"SRT"

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
**GUARDRAIL APPROACH
TERMINAL TYPES 1B & 1T
(SRT, FLEAT & X-LITE-FLARED)**



PLAN VIEW



ELEVATION

END ANCHORAGE ASSEMBLY
(SRT)

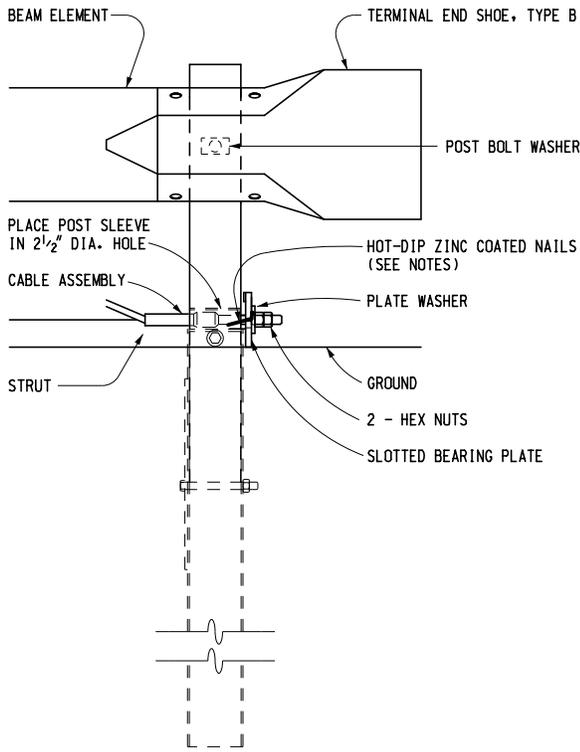
NOTES:

DETAILS ON THIS SHEET ONLY APPLY TO "SRT".

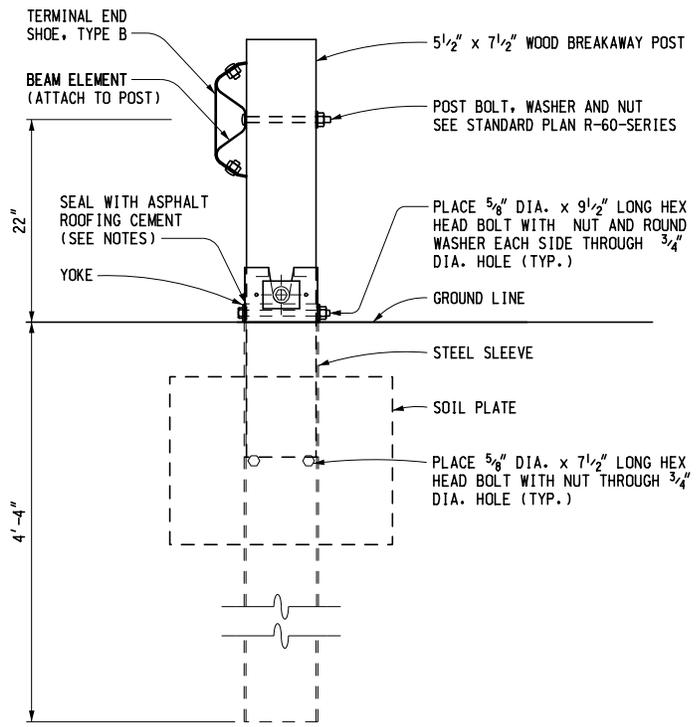
AFTER THE CABLE ASSEMBLY HAS BEEN TIGHTENED, A SECOND NUT SHALL BE INSTALLED ON EACH END OF THE CABLE SO THAT THE CABLE WILL NOT LOOSEN.

ASPHALT ROOFING CEMENT SHALL BE USED TO SEAL THE PERIMETER AREA BETWEEN THE STEEL SLEEVE (SOIL TUBE) AND THE WOOD BREAKAWAY POST.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)		
F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H
		SHEET 3 OF 19

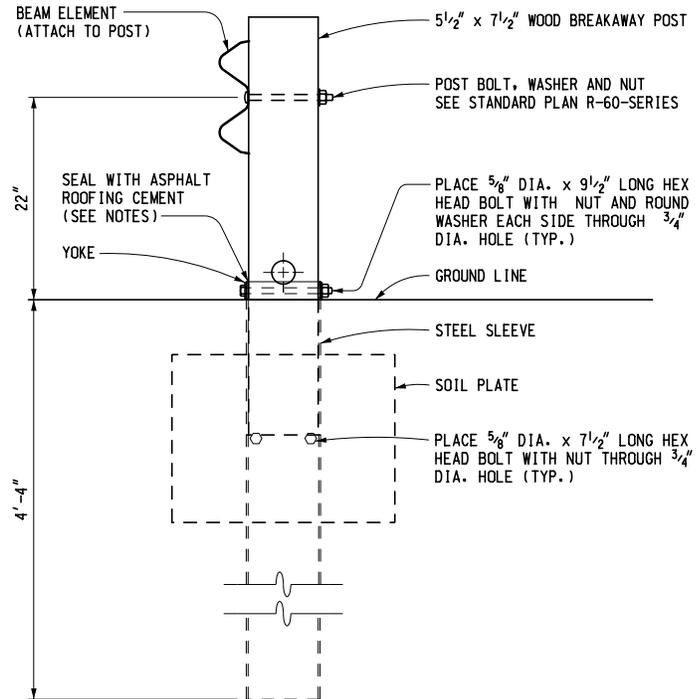


ELEVATION



SIDE

POST 1 DETAIL (SRT)



POST 2 DETAIL (SRT)

NOTES:

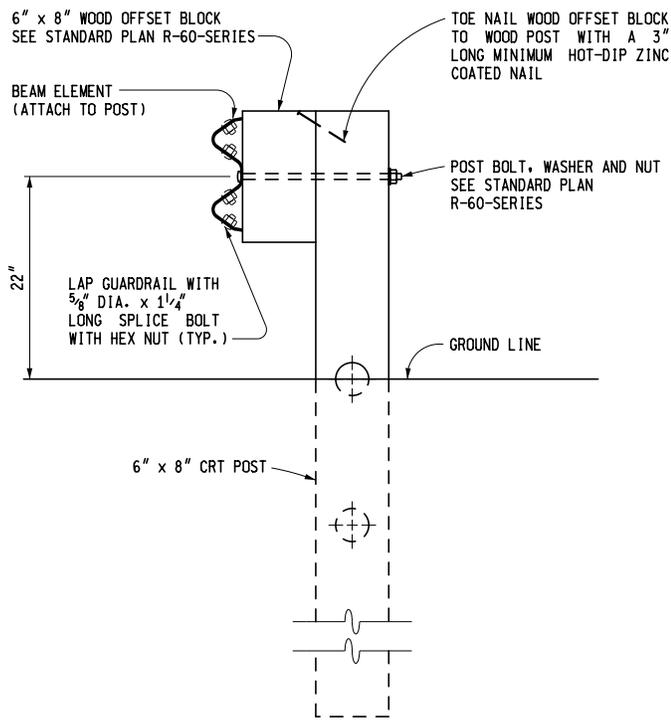
DETAILS ON THIS SHEET ONLY APPLY TO "SRT".

TWO HOT-DIP ZINC COATED NAILS SHALL BE DRIVEN INTO THE WOOD POST THROUGH THE HOLES IN THE SLOTTED BEARING PLATE ON POST 1 OF THE "SRT" TO KEEP THE PLATE FROM ROTATING.

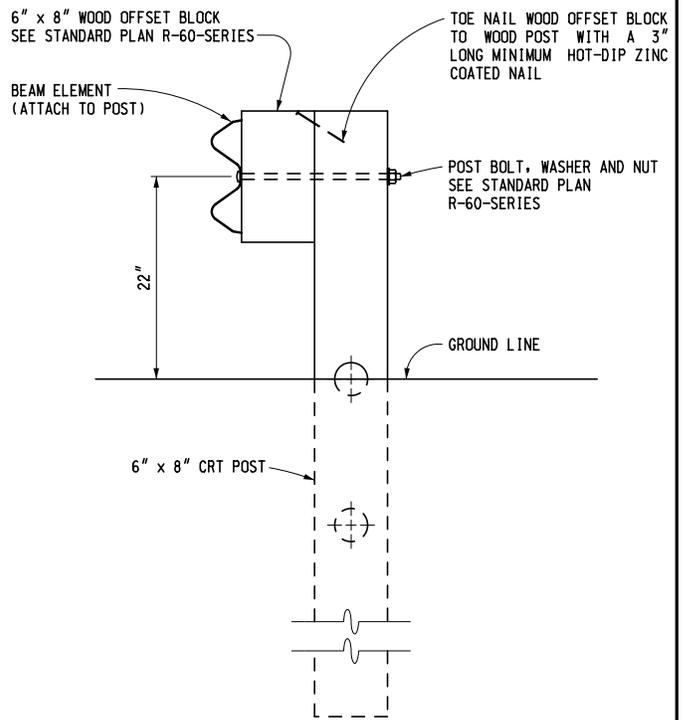
AFTER THE CABLE ASSEMBLY HAS BEEN TIGHTENED, A SECOND NUT SHALL BE INSTALLED ON EACH END OF THE CABLE SO THAT THE CABLE WILL NOT LOOSEN.

ASPHALT ROOFING CEMENT SHALL BE USED TO SEAL THE PERIMETER AREA BETWEEN THE STEEL SLEEVE (SOIL TUBE) AND THE WOOD BREAKAWAY POST.

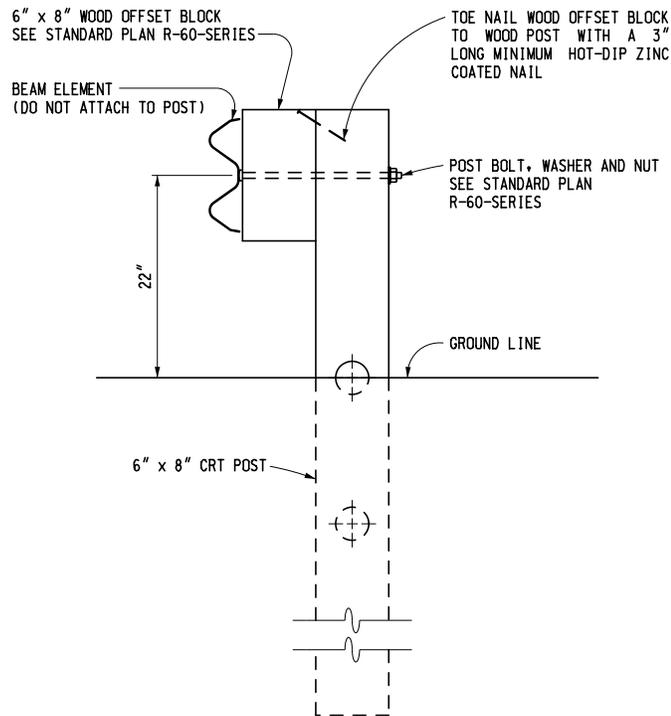
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR			
GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)			
F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H	SHEET 4 OF 19



POST 3 AND 6 DETAIL
(SRT)



POST 4 AND 5 DETAIL
(SRT)



POST 7 AND 8 DETAIL
(SRT)

NOTE: POST 9 IS A STANDARD LINE POST

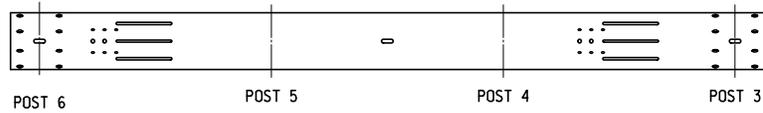
NOTE:

DETAILS ON THIS SHEET ONLY APPLY TO "SRT".

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR		
GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)		
F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H
		SHEET 5 OF 19



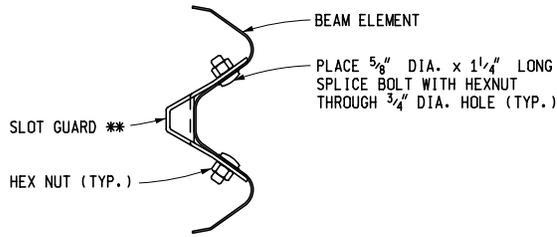
SLOTTED RAIL BEAM ELEMENT *
(POST 1 THROUGH 3)



SLOTTED RAIL BEAM ELEMENT *
(POST 3 THROUGH 6)

* INSTALL THE SLOTTED RAIL BEAM ELEMENTS IN THE ORDER AND ORIENTATION DETAILED ABOVE SO THAT THE SLOT GUARD ATTACHMENT HOLES ARE ON THE DOWNSTREAM END (AWAY FROM POST 1) OF THE ELONGATED SLOTS.

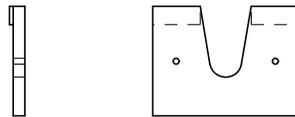
** PLACE THE SLOT GUARD SO THAT THE DEFLECTOR ANGLE GAP OPENS IN THE DIRECTION FACING THE ADJACENT SLOTS AND POST 1.



ASSEMBLY DETAIL **



SLOT GUARD DETAILS

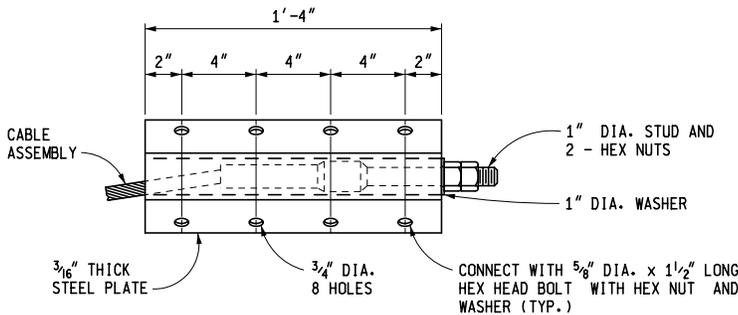


SLOTTED BEARING PLATE

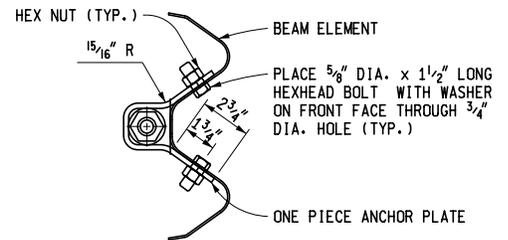


PLATE WASHER

NOTE: ALL "SRT" ITEMS ILLUSTRATED WITHOUT DIMENSIONS SHALL BE ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.



CABLE ANCHOR PLATE DETAILS
(SRT)



NOTES:

DETAILS ON THIS SHEET ONLY APPLY TO "SRT".

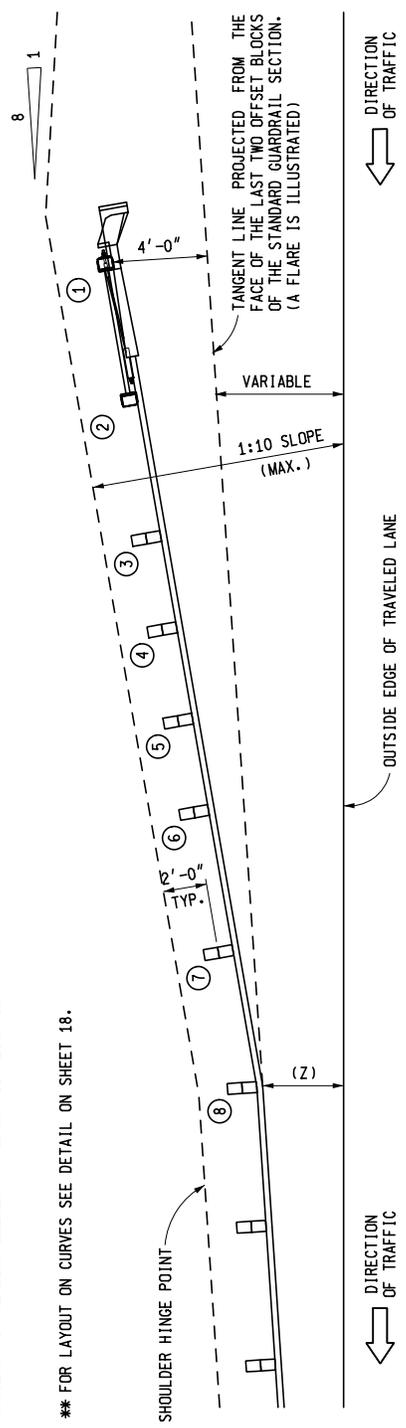
AFTER THE CABLE ASSEMBLY HAS BEEN TIGHTENED, A SECOND NUT SHALL BE INSTALLED ON EACH END OF THE CABLE SO THAT THE CABLE WILL NOT LOOSEN.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
**GUARDRAIL APPROACH
TERMINAL TYPES 1B & 1T
(SRT, FLEAT & X-LITE-FLARED)**

F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H	SHEET 6 OF 19
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THE POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE WOOD OFFSET BLOCKS, EXCEPT FOR THE FIRST AND SECOND POSTS WHICH ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS ARE TO BE LOCATED BY CHORD MEASUREMENTS AT THE BACK OF THE RAIL EQUAL TO THE NOMINAL POST SPACINGS SPECIFIED. POSTS ARE TO BE SET APPROXIMATELY TANGENT TO THE BEAM ELEMENT AT EACH POST LOCATION.

** FOR LAYOUT ON CURVES SEE DETAIL ON SHEET 18.



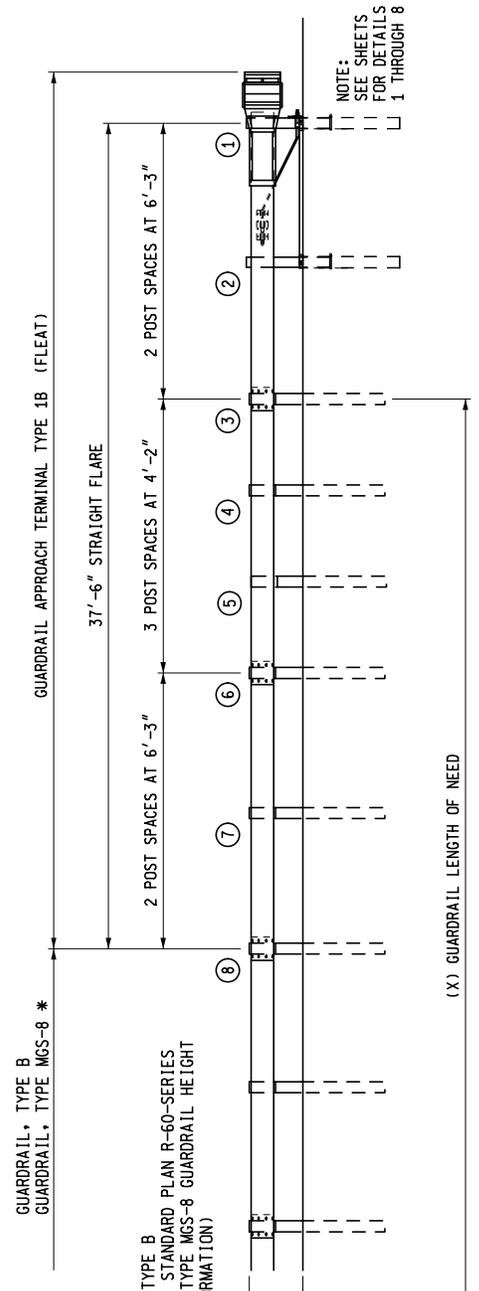
PLAN VIEW

* SEE STANDARD PLAN R-60-SERIES FOR POST SPACING AND GUARDRAIL LAYOUT TO TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL APPROACH TERMINAL TYPE 1B

POST	** POST OFFSET DISTANCE
1	4'-0" 48"
2	3'-33' 40"
3	2'-67' 32"
4	2'-22' 26 ¹¹ / ₁₆ "
5	1'-77' 21 ⁵ / ₁₆ "
6	1'-33' 16"
7	0'-67' 8"
8	0' 0"

OPTION 2

(DETAILED ON SHEETS 7 THROUGH 12)



ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 1B "FLEAT"

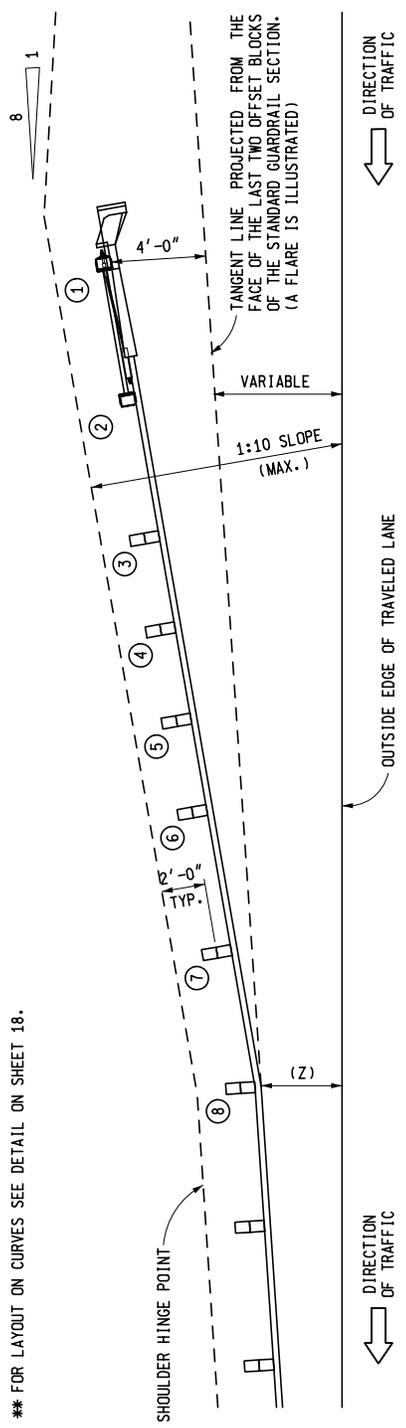
MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF DEVELOPMENT STANDARD PLAN FOR
GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)

F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H	SHEET 7 OF 19
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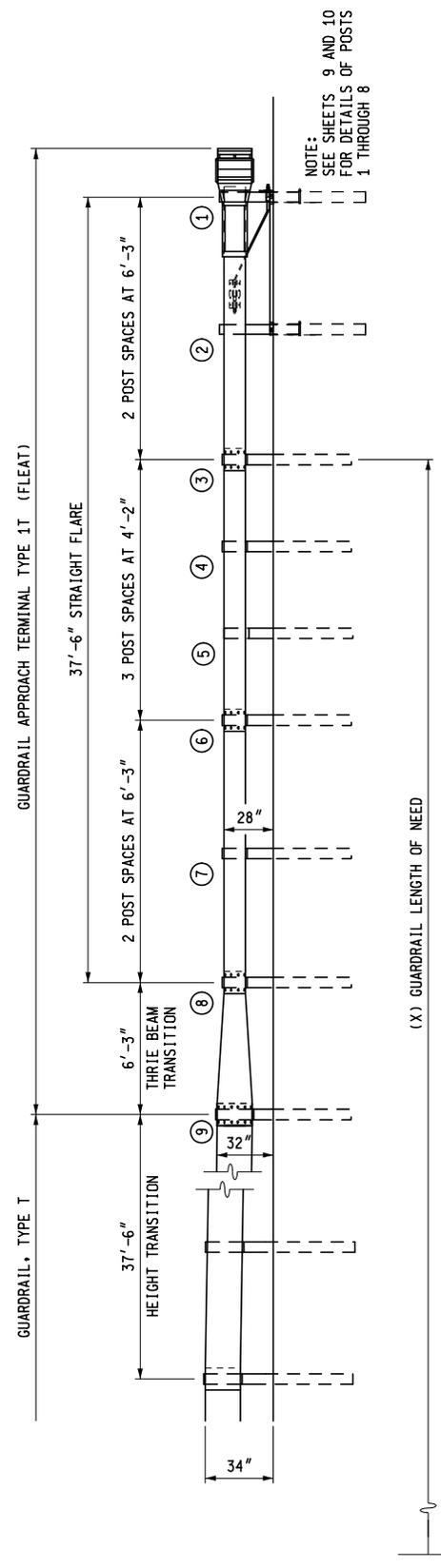
THE POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE WOOD OFFSET BLOCKS, EXCEPT FOR THE FIRST AND SECOND POSTS WHICH ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS ARE TO BE LOCATED BY CHORD MEASUREMENTS AT THE BACK OF THE RAIL EQUAL TO THE NOMINAL POST SPACINGS SPECIFIED. POSTS ARE TO BE SET APPROXIMATELY TANGENT TO THE BEAM ELEMENT AT EACH POST LOCATION.

** FOR LAYOUT ON CURVES SEE DETAIL ON SHEET 18.

POST	** POST OFFSET DISTANCE
1	4'-0" 48"
2	3'-33' 40"
3	2'-67' 32"
4	2'-22' 26 ¹¹ / ₁₆ "
5	1'-77' 21 ⁵ / ₁₆ "
6	1'-33' 16"
7	0'-67' 8"
8	0' 0"



PLAN VIEW



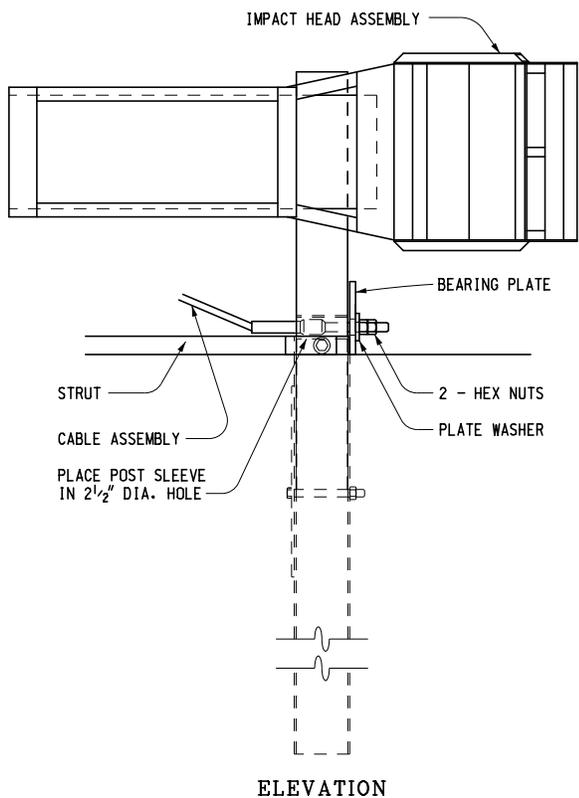
ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 1T
"FLEAT"

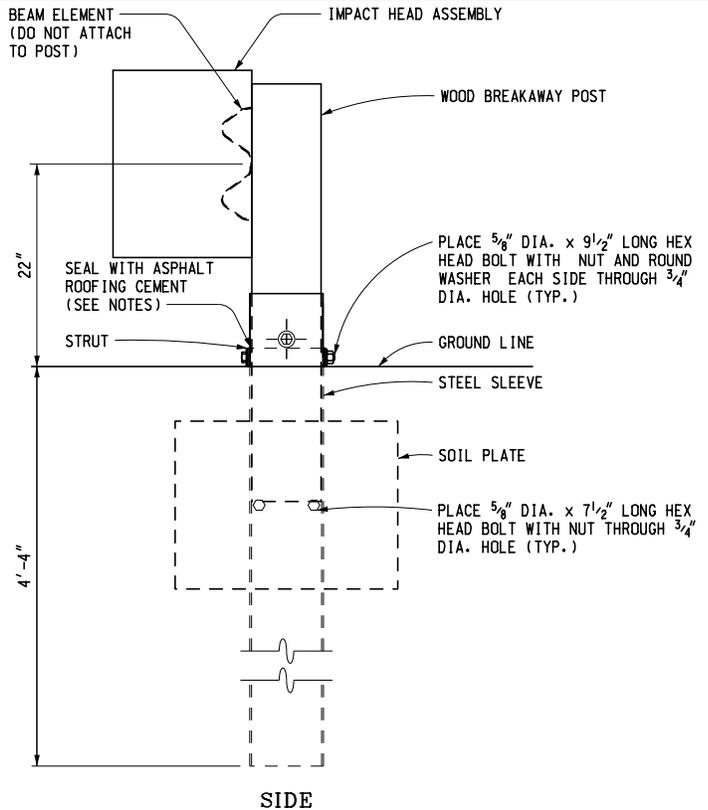
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

**GUARDRAIL APPROACH
TERMINAL TYPES 1B & 1T
(SRT, FLEAT & X-LITE-FLARED)**

F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H	SHEET 8 OF 19
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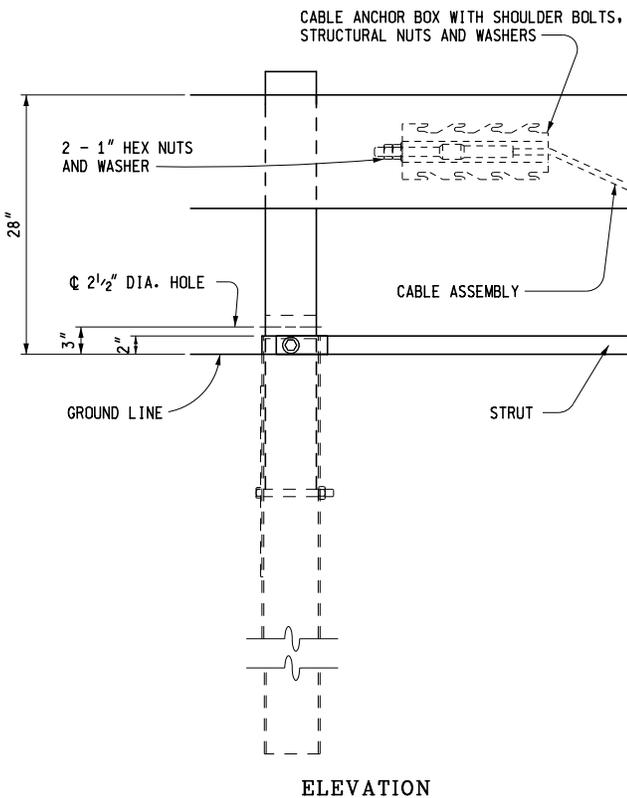


ELEVATION

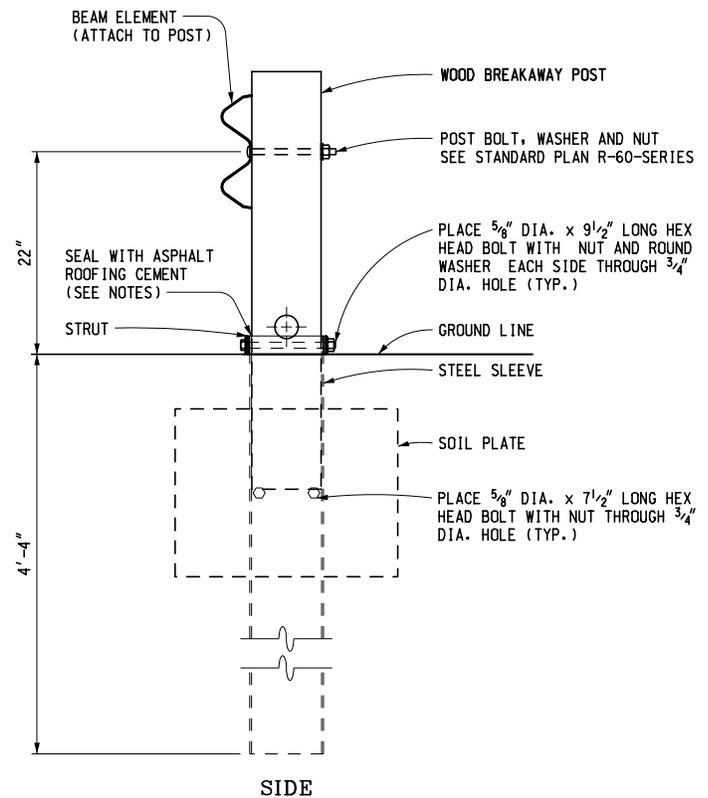


SIDE

POST 1 DETAIL (FLEAT)



ELEVATION



SIDE

POST 2 DETAIL (FLEAT)

NOTES:

DETAILS ON THIS SHEET ONLY APPLY TO "FLEAT".

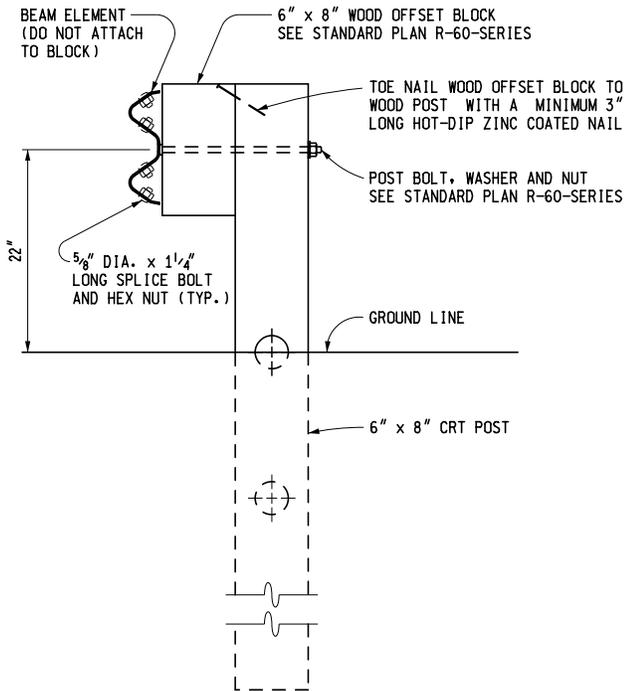
AFTER THE CABLE ASSEMBLY HAS BEEN TIGHTENED, A SECOND NUT SHALL BE INSTALLED ON EACH END OF THE CABLE SO THAT THE CABLE WILL NOT LOOSEN.

ASPHALT ROOFING CEMENT SHALL BE USED TO SEAL THE PERIMETER AREA BETWEEN THE STEEL SLEEVE (SOIL TUBE) AND THE WOOD BREAKAWAY POST.

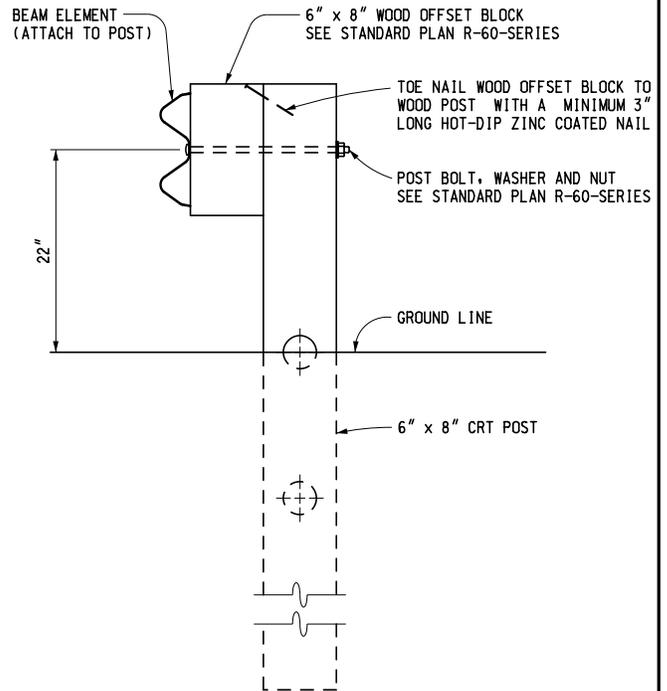
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

**GUARDRAIL APPROACH
TERMINAL TYPES 1B & 1T
(SRT, FLEAT & X-LITE-FLARED)**

F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H	SHEET 9 OF 19
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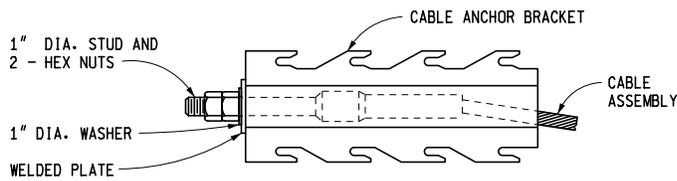


POST 3 DETAIL
(FLEAT)

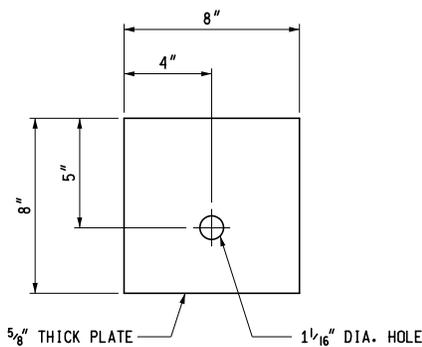
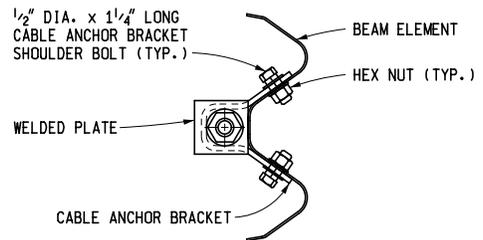


POST 4 THROUGH 7 DETAIL
(FLEAT)

NOTE: POST 8 IS A STANDARD LINE POST



CABLE ANCHOR BRACKET DETAIL
(FLEAT)



BEARING PLATE
(FLEAT)



W-BEAM GUARDRAIL END SECTION
(POST 1 THROUGH 3)

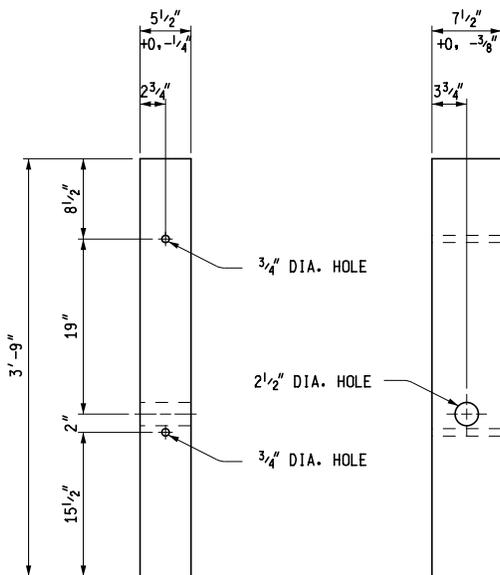
NOTE: ALL "FLEAT" ITEMS ILLUSTRATED WITHOUT DIMENSIONS SHALL BE ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.

NOTES:

DETAILS ON THIS SHEET ONLY APPLY TO "FLEAT".

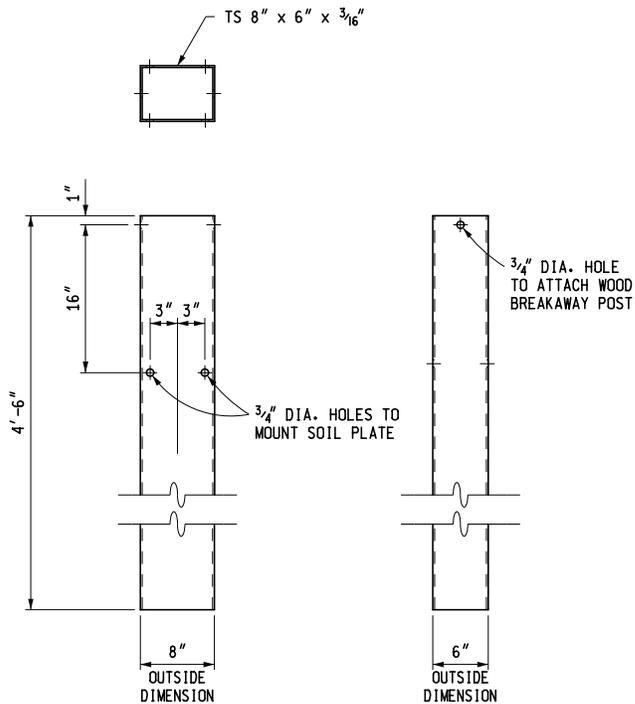
AFTER THE CABLE ASSEMBLY HAS BEEN TIGHTENED, A SECOND NUT SHALL BE INSTALLED ON EACH END OF THE CABLE SO THAT THE CABLE WILL NOT LOOSEN.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR		
GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)		
F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H SHEET 10 OF 19

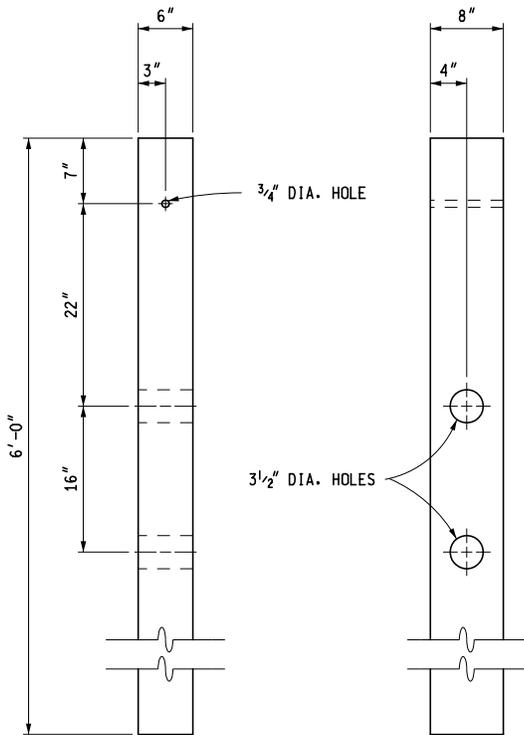


WOOD BREAKAWAY POST

POSTS 1 AND 2 "SRT" AND "FLEAT"

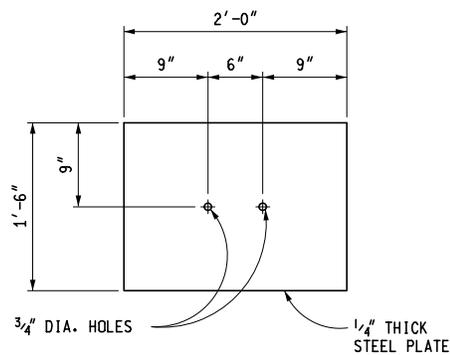


STEEL SLEEVE



CRT POST

POSTS 3 THROUGH 9 "SRT"
POSTS 3 THROUGH 7 "FLEAT"



SOIL PLATE



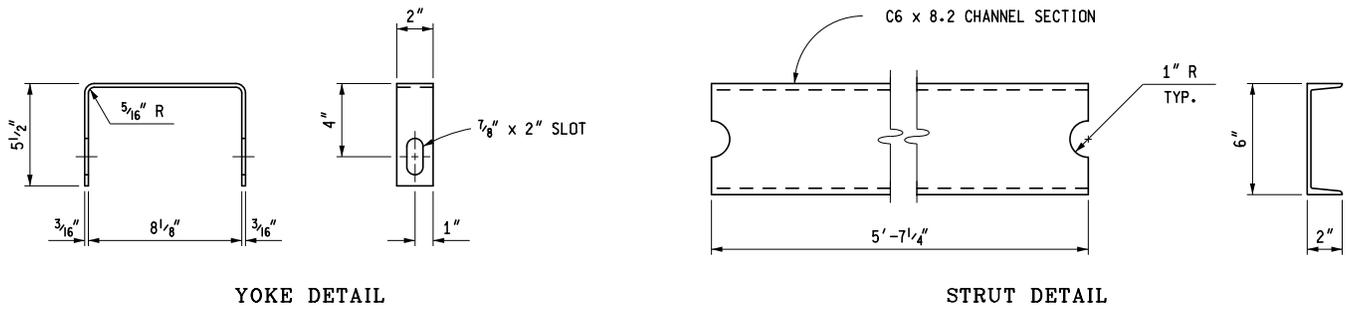
POST SLEEVE

(FOR POST 1)

NOTE:

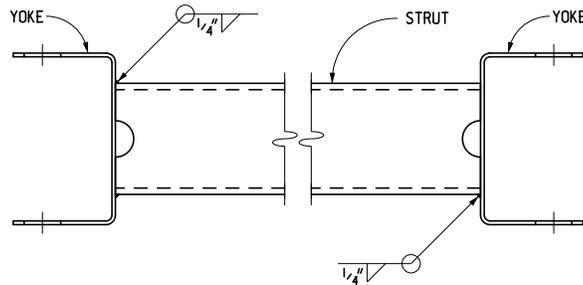
DETAILS ON THIS SHEET ONLY APPLY TO "SRT" AND "FLEAT".

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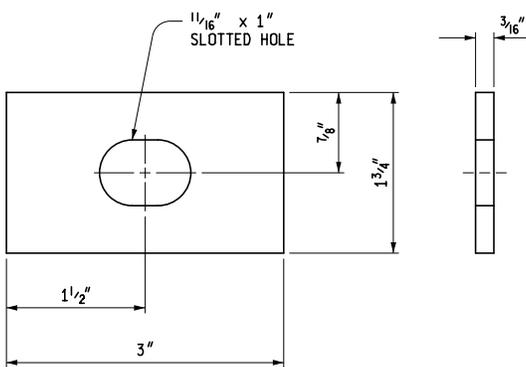


YOKE DETAIL

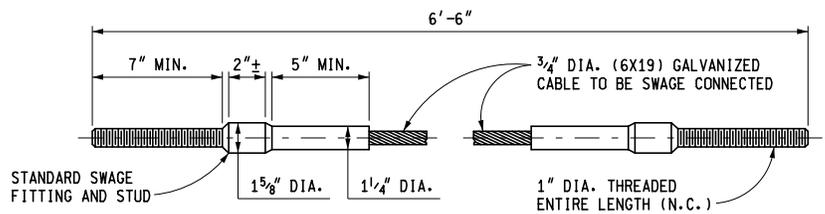
STRUT DETAIL



ASSEMBLY DETAIL
STRUT AND YOKE ASSEMBLY



POST BOLT WASHER
(POST 1 ONLY)



CABLE ASSEMBLY

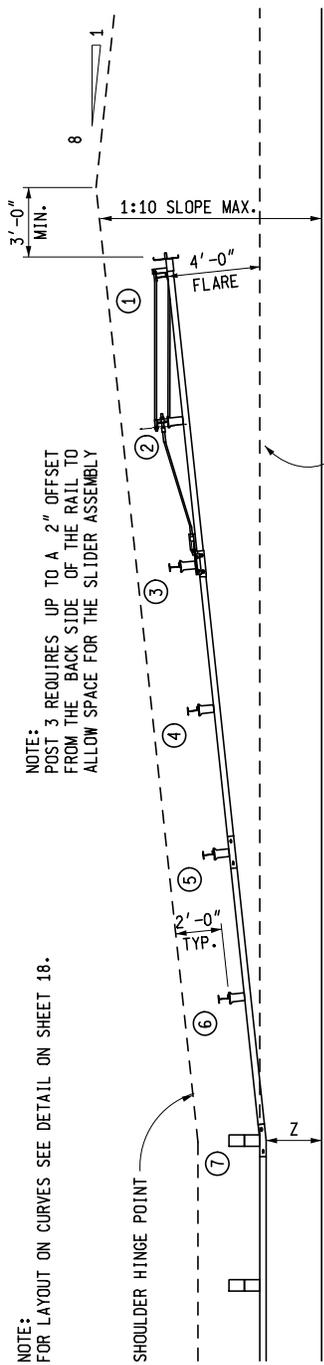
NOTE:
DETAILS ON THIS SHEET ONLY APPLY TO "SRT" AND "FLEAT".

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)		
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TRAILING END

NOTE:
FOR LAYOUT ON CURVES SEE DETAIL ON SHEET 18.

NOTE:
POST 3 REQUIRES UP TO A 2" OFFSET
FROM THE BACK SIDE OF THE RAIL TO
ALLOW SPACE FOR THE SLIDER ASSEMBLY



TANGENT LINE PROJECTED FROM THE FACE
OF THE LAST TWO OFFSET BLOCKS OF THE
STANDARD GUARDRAIL SECTION

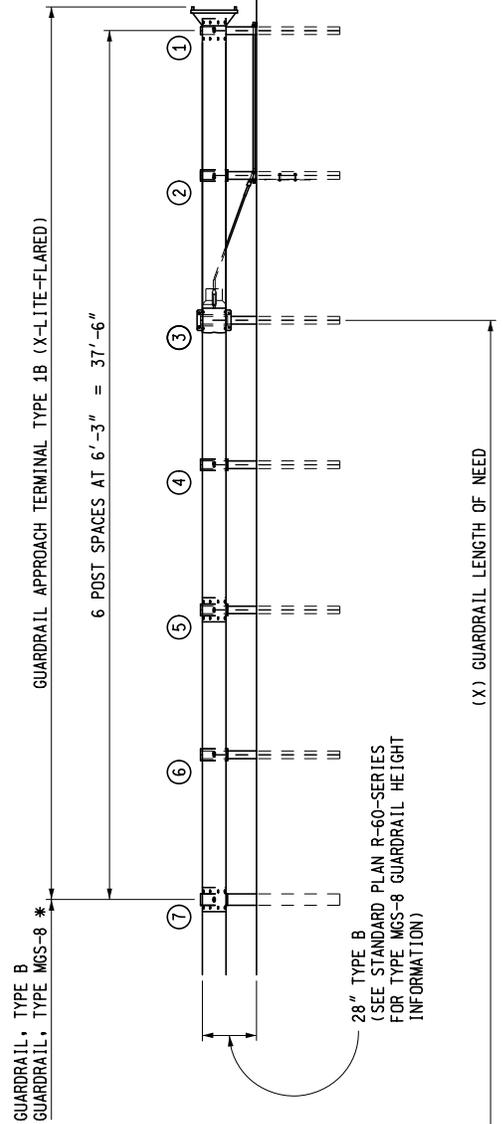
DIRECTION
OF TRAFFIC

PLAN VIEW

* SEE STANDARD PLAN R-60-SERIES FOR POST SPACING AND GUARDRAIL
LAYOUT TO TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL
APPROACH TERMINAL TYPE 1B

OPTION 3

(DETAILED ON SHEETS 13 THROUGH 17)



ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 1B "X-LITE-FLARED"

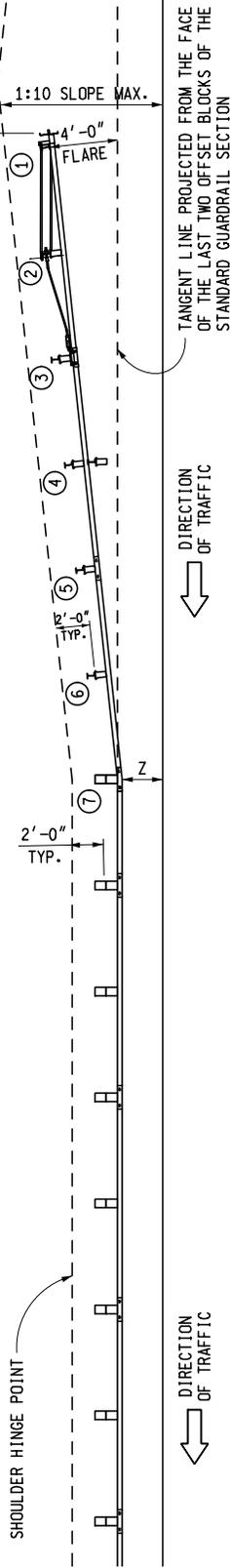
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR		
GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)		
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TRAILING END

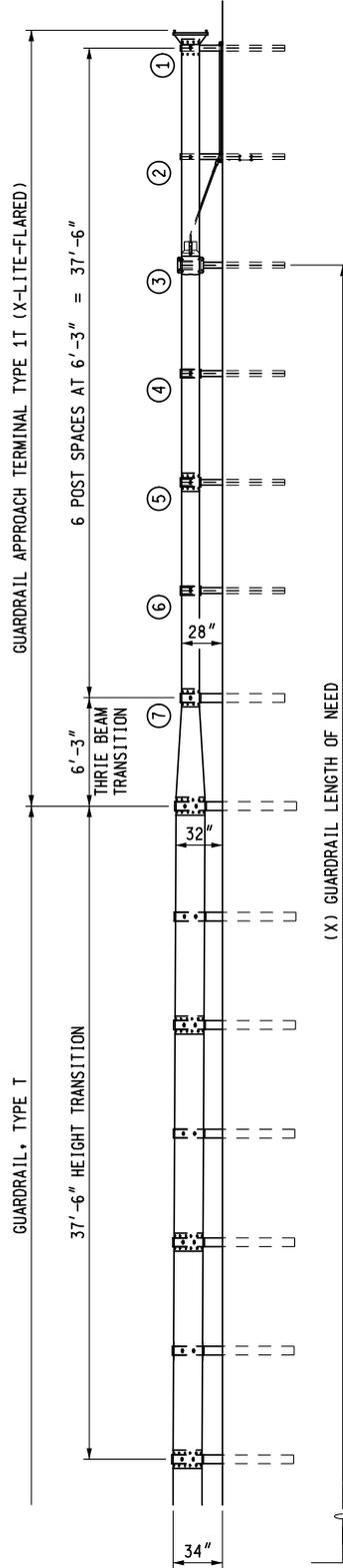
APPROACH END

NOTE:
FOR LAYOUT ON CURVES SEE DETAIL ON SHEET 18.

NOTE:
POST 3 REQUIRES UP TO A 2" OFFSET
FROM THE BACK SIDE OF THE RAIL TO
ALLOW SPACE FOR THE SLIDER ASSEMBLY



PLAN VIEW



ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 1T
"X-LITE-FLARED"

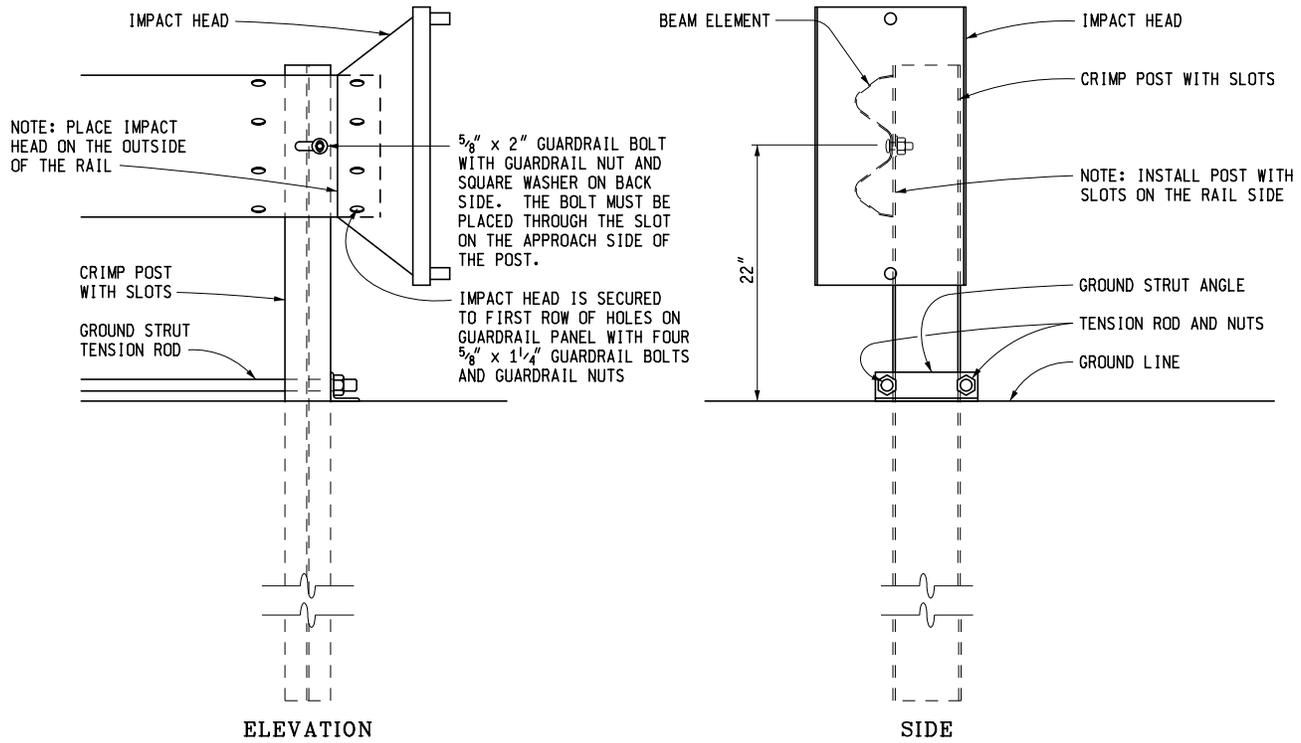
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
**GUARDRAIL APPROACH
TERMINAL TYPES 1B & 1T
(SRT, FLEAT & X-LITE-FLARED)**

F.H.W.A. APPROVAL

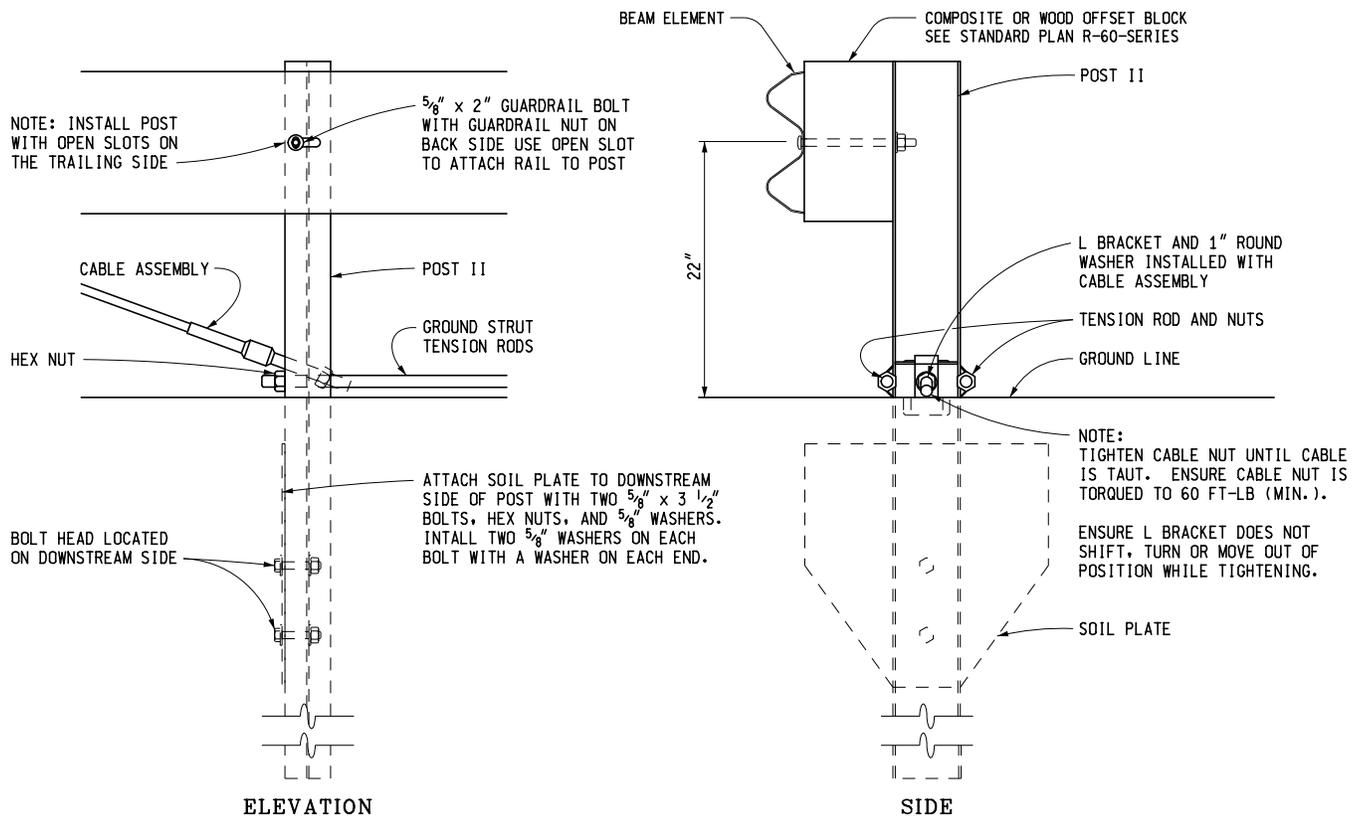
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14 OF 19



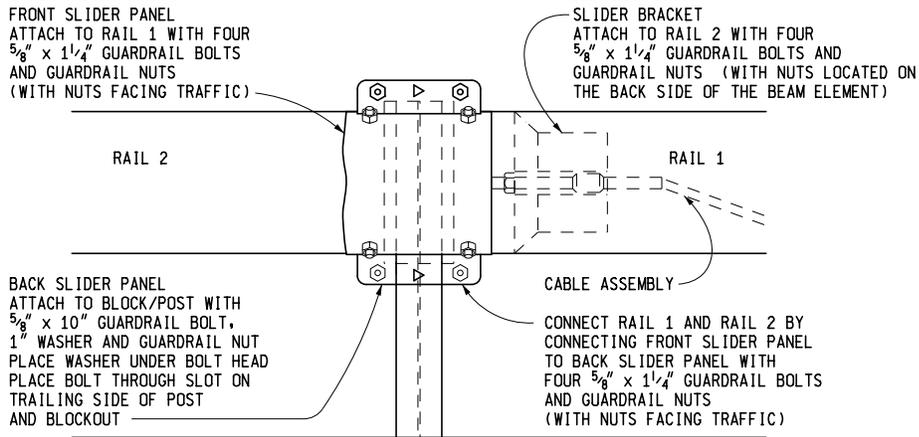
POST 1 DETAIL



POST 2 DETAIL

NOTE:
 DETAILS ON THIS SHEET ONLY APPLY TO "X-LITE-FLARED".

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR			
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NOTES:

POST 3 REQUIRES UP TO AN ADDITIONAL 2" OFFSET BETWEEN THE RAIL AND THE OFFSET BLOCK TO ALLOW SPACE FOR THE SLIDER ASSEMBLY.

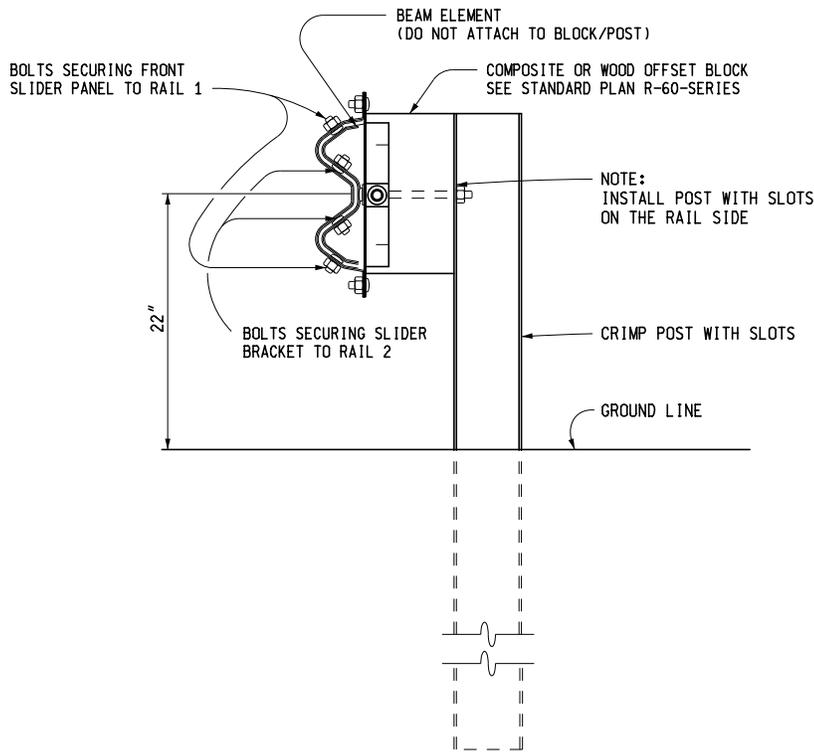
POST 3 REQUIRES GUARDRAIL BOLT TO BE ATTACHED TO SLOT ON TRAILING SIDE OF THE POST.

ENSURE OPEN END OF THE SLOT ON THE BACK SLIDER PANEL IS POINTING TOWARD THE APPROACH END.

ENSURE ANGLED PORTION OF THE FRONT SLIDER PANEL EXTENDS BEYOND THE END OF THE RAIL 1, AND IS FACING THE TRAILING END OF THE TERMINAL.

ARROWS ON FRONT AND BACK SLIDER PANELS NEED TO POINT TOWARD THE APPROACH END OF THE TERMINAL.

ELEVATION



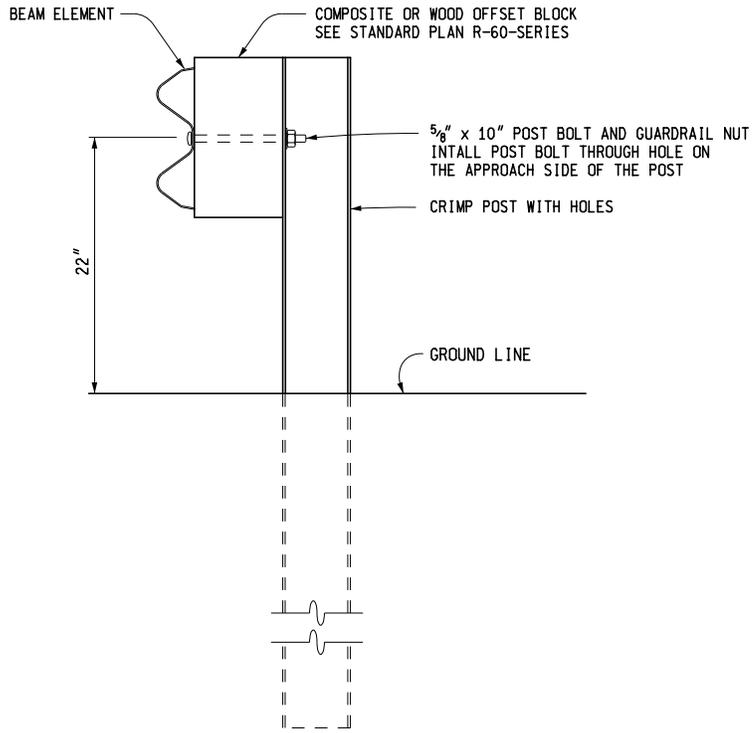
SIDE

POST 3 DETAIL

NOTE:

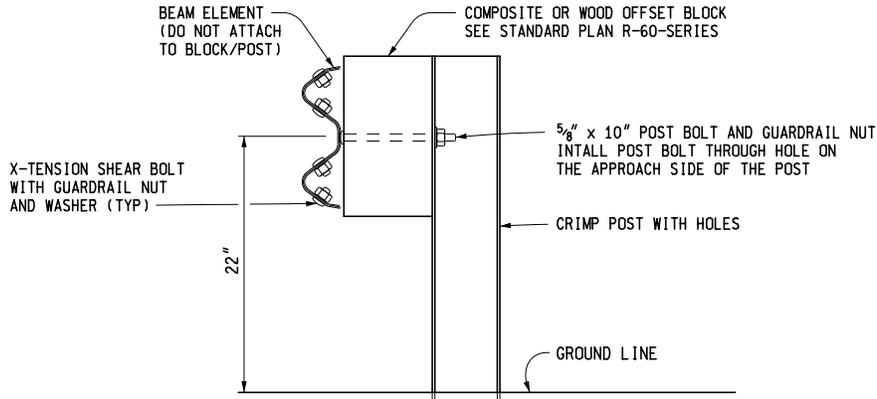
DETAILS ON THIS SHEET ONLY APPLY TO "X-LITE-FLARED".

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR GUARDRAIL APPROACH TERMINAL TYPES 1B & 1T (SRT, FLEAT & X-LITE-FLARED)			
F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H	SHEET 16 OF 19



POST 4 AND 6 DETAIL

NOTE:
OVERLAP BEAM ELEMENTS WITH ELEMENTS
ON THE APPROACH END OVER ELEMENTS
ON THE TRAILING END.



NOTE:
AVOID OVERTIGHTENING X-TENSION SHEAR
BOLTS. DO NOT USE AN IMPACT WRENCH
TO TIGHTEN X-TENSION SHEAR BOLTS.

POST 5

NOTE:
POST 7 IS A STANDARD LINE POST.

NOTE:

DETAILS ON THIS SHEET ONLY APPLY TO "X-LITE-FLARED".

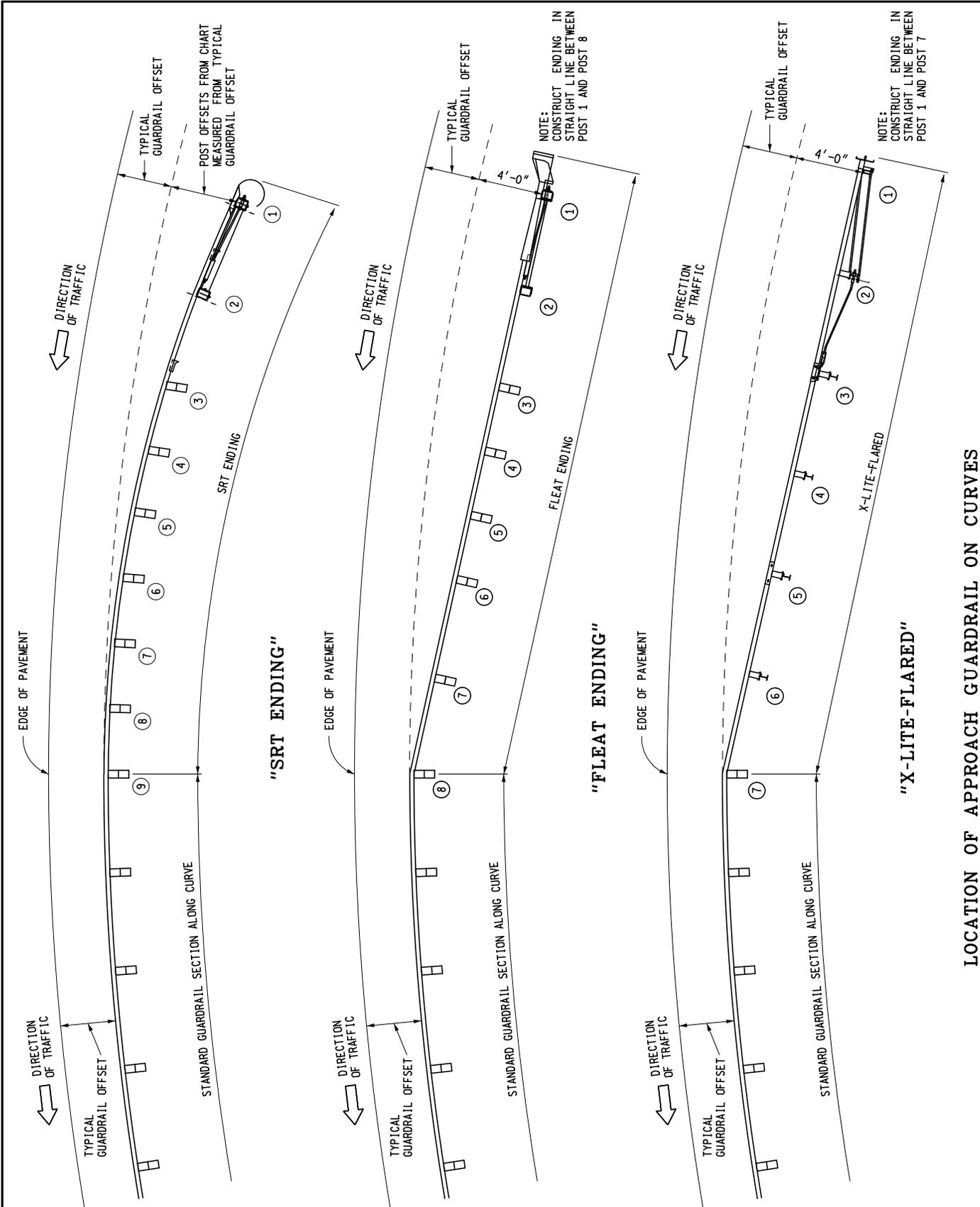
MICHIGAN DEPARTMENT OF TRANSPORTATION
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LOCATION OF APPROACH GUARDRAIL ON CURVES

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF DEVELOPMENT STANDARD PLAN FOR

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 (SRT, FLEAT & X-LITE-FLARED)**

F.H.W.A. APPROVAL	8-1-2016 PLAN DATE	R-61-H	SHEET 18 OF 19
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NOTES:

ALL POSTS, OFFSET BLOCKS, BEAM ELEMENTS, AND HARDWARE (INCLUDING BOLTS, NUTS, AND WASHERS) SHALL CONFORM TO THE CURRENT STANDARD SPECIFICATIONS AND TO THE CURRENT STANDARD PLAN R-60-SERIES, WHERE APPLICABLE, EXCEPT AS SPECIFIED ON THIS STANDARD.

ALL 1:10 SLOPES SHALL BE GRADED TO CLASS A SLOPE TOLERANCES.

GUARDRAIL REFLECTORS ARE NOT TO BE USED ON THE GUARDRAIL APPROACH TERMINAL. PLACE REFLECTORS BEGINNING ON STANDARD RUN OF GUARDRAIL.

USE REFLECTIVE SHEETING ACCORDING TO THE FOLLOWING TRAFFIC CONDITIONS:
(NOTE: ALTERNATE 3" BLACK AND 3" YELLOW STRIPES ON A 45° ANGLE)



TRAFFIC PASSING ON
THE LEFT SIDE



TRAFFIC PASSING ON
BOTH SIDES



TRAFFIC PASSING ON
THE RIGHT SIDE

ON THE "SRT", THE CURVED PORTION OF THE TERMINAL END SHOE FACING TRAFFIC (HALF CIRCLE) SHALL BE COMPLETELY COVERED WITH HIGH INTENSITY ADHESIVE REFLECTIVE SHEETING.

ON THE "FLEAT" AND "X-LITE-FLARED", THE PORTION OF THE IMPACT HEAD ASSEMBLY FACING TRAFFIC SHALL BE COMPLETELY COVERED WITH HIGH INTENSITY ADHESIVE REFLECTIVE SHEETING.

MICHIGAN DEPARTMENT OF TRANSPORTATION
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(SRT, FLEAT & X-LITE-FLARED)**

F.H.W.A. APPROVAL

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MICHIGAN DESIGN MANUAL ROAD DESIGN

3.08

3R, 4R AND OTHER PROJECTS

3.08.01 (revised 8-22-2016)

General

A. (3R) Resurfacing Restoration and Rehabilitation

This work is defined in 23 CFR (Code of Federal Regulations) as "*work undertaken to extend the service life of an existing highway and enhance highway safety. This includes placement of additional surface material and/or other work necessary to return an existing roadway, including shoulders, bridges, the roadside and appurtenances to a condition of structural or functional adequacy. This work may include upgrading of geometric features, such as widening, flattening curves or improving sight distances.*" Examples of this type of work include:

1. Resurfacing, milling or profiling, concrete overlays and inlays (without removing subbase).
2. Lane and/or shoulder widening (no increase in number of through lanes).
3. Roadway base correction.
4. Minor alignment improvements.
5. Roadside safety improvements.
6. Signing, pavement marking and traffic signals.
7. Intersection and railroad crossing upgrades.
8. Pavement joint repair.
9. Crush and shape and resurfacing.
10. Rubblize and resurface.

3.08.01A (continued)

11. Intermittent grade modifications (used to correct deficiencies in the vertical alignment by changing the paving profile for short distances) that leave the existing pavement in service for more than 50% of the total project length.
12. Passing relief lanes.

See [Chapter 12](#) of the Bridge Design Manual for examples of "bridge" 3R work.

B. (4R) New Construction/ Reconstruction

Projects that are mainly comprised of the following types of work are not considered 3R.

1. Complete removal and replacement of pavement (including subbase).
2. Major alignment improvements.
3. Adding lanes for through traffic.
4. New roadways and /or bridges.
5. Complete bridge deck or superstructure replacement.
6. Intermittent grade modifications (used to correct deficiencies in the vertical alignment by changing the paving profile for short distances) that leave the existing pavement in service for less than 50% of the total project length.

The above lists are not all inclusive, but are intended to give typical examples of 3R and 4R work.

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3.08.01E (continued)

General

When a bridge carrying road project traffic falls within a road project and no work is planned for the bridge, AASHTO “bridges to remain in place” criteria apply to the bridges. See AASHTO publication, *A Policy on Design Standards-Interstate System*, 2005 or *A Policy on Geometric Design of Highways and Streets*, 2011 6th Edition. If the bridge does not meet the criteria to “remain in place” the Road Designer shall be responsible for submitting any necessary design exceptions for the bridge.

F. Safety Review / Crash Analysis

A safety review is required for all 3R and 4R projects. The Project Manager should contact the TSC Traffic Engineer during scoping, so that a safety review can be performed throughout the project limits. On corridor projects only one analysis that includes roadways and bridges is required. This review should consist of an analysis of available crash data to determine where safety enhancements are warranted. Safety reviews more than 3 years old shall be updated to verify the original safety review.

A site specific crash analysis is required as justification for any design exception. It is also required in determining appropriate 3R design criteria according to [Section 3.09.02A](#) and [3.09.02B](#). Site specific crash analyses more than 3 years old shall be updated to verify the original crash analysis.

3.09

NON-FREEWAY RESURFACING, RESTORATION AND REHABILITATION (3R) MINIMUM DESIGN GUIDELINES

3.09.01 (revised 1-6-99)

General

The intent of the 3R guidelines is to extend the useful life of existing roadways and enhance safety while incurring minimal aesthetic and environmental disturbance and economic burden. Often, design guidelines used for new and major reconstruction are not cost effective on 3R projects. Where economically and physically practical, design guidelines should be according to AASHTO requirements to insure the greatest traffic service. The ultimate goal is to improve operating conditions and provide highways that are reasonably safe and fit for travel.

3R guidelines are divided into three categories that are addressed in subsequent sections of this chapter. These are NHS, Non-NHS and 3R Safety Considerations. They apply strictly to non-freeway applications. Guidelines for freeway 3R and 4R type work are addressed separately in [Section 3.11](#).

3.09.02 (revised 3-21-2016)

3R Minimum Guidelines

Minimum guidelines for controlling design elements shall be according to the following:

MICHIGAN DESIGN MANUAL ROAD DESIGN

6.04.11 (continued)

Concrete Pavement Overlays

C. Unbonded Overlay

This method of pavement rehabilitation provides a new pavement while making use of the old as base and basically involves constructing a new pavement atop the old. The Department completed many such projects since 1984.

While the designer can expect to be furnished details of such construction if a project is ever assigned, it should be noted that, on an I-96 project, from M-66 easterly to the Grand River at Portland, the underlying CRC pavement was sawed into 100' long slabs, 7" deep sawcut to cut the lowest steel. An 80 lbs/syd (minimum) HMA separation course was used between existing pavement and the overlay. The overlay pavement was 7" thick, which necessitated a modified transverse joint design and modified load transfer assemblies. The transverse joints were staggered to keep them at least 3' away from joints or open cracks in the underlying pavement.

Some of the obvious disadvantages of a thick concrete pavement overlay are that it raises the level of the pavement sufficiently to render existing guardrail too low, it steepens the foreslope for a few feet beyond the shoulder hinge point, and it usually cannot be used under bridges because of underclearance requirements.

6.04.11 (continued)

D. Whitetopping

In 1999, the Department constructed its first whitetopping project on M-46 from just east of Carsonville to M-25 in Port Sanilac. It contained two 6" sections, one with fiber reinforcement and one without, a small 5" transition section, and a 3" ultra-thin section in Port Sanilac. The intersection of M-54 and M-83 near Birch Run was also whitetopped in 2000. Because these projects are relatively young, the performance of whitetopping is still being evaluated.

6.04.12 (revised 8-22-2016)

Concrete Pavement Patching

A. References

See Standard Plan R-44-Series, "Concrete Pavement Repair". Also see [Section 6.03.04B](#), Concrete or Composite (HMA on Concrete) Pavement.

B. General

It is preferable to delay a first-time resurfacing of a concrete pavement as long as possible by patching and joint repair. As the emphasis has shifted from large scale new construction or relocation to improving and expanding the existing trunkline system, and maintaining it, patching and joint repair projects have taken an increasingly larger share of construction dollars.

It is difficult to separate patching from joint repair. Except for construction-induced pavement and base deficiencies, most deterioration of a pavement occurs at the joints, primarily in the transverse joints and, to a lesser extent, in the longitudinal joints and deteriorated transverse cracks.

MICHIGAN DESIGN MANUAL ROAD DESIGN

6.04.12E (continued)

Concrete Pavement Patching

The following notes clarify the use of these items:

1. Pavt Repr, Rem

The pay item of Pavt Repr, Rem applies to pavement removals from 4' (the minimum length of a patch) to 100' long. Removals more than 100' long are paid for as Pavt, Rem. Removal of concrete shoulders, curb, curb and gutter, and valley gutter are paid for using the same pay item as used for the adjacent pavement.

It should be noted that Pavt, Rem carries no restriction regarding disturbance of the underlying base, whereas Pavt Repr, Rem does carry a prohibition against disturbing the base, so as to require sawing and lifting methods. Pavement removal for utility cuts, even though unavoidably disturbing the base, should be paid for as "Pavt Repr, Rem.

If the thickness of the old pavement being removed results in the base being more than 2" low, the contractor will be required to bring it up to proper elevation with aggregate. (Concrete would be permitted but payment will be limited to that for aggregate) If the base is 2" low or less, or is low as a result of the contractor's removal operation, the contractor must fill the deficiency with concrete at his/her expense. Any disturbed base must be recompacted before casting the patch, otherwise settlement will occur.

6.04.12E (continued)

2. Saw Cut, Intermediate

Because the pay item Pavt Repr, Rem prohibits disturbing the base, the contractor must lift out the old pavement that is to be replaced. This in turn requires that it be cut up into 6' long slabs of a lane width, (a convenient size that will fit a dump truck.) Most repairs occur at a joint or crack where the pavement segment will break into two pieces anyway, but for longer repairs we compensate the contractor for the cost of sawing the old pavement up into 6' lengths. For estimating purposes, designers should assume that approximately 75% of the repairs in the over 6' to 12' range will require one intermediate saw cut. Ten percent of the 6' patches should also be set up for an intermediate saw cut. Patches longer than 12' (but not exceeding 50') should be set up for one saw cut every 6'.

MICHIGAN DESIGN MANUAL ROAD DESIGN

6.04.12E (continued)

Concrete Pavement Patching

3. Pavt Repr, Reinf Conc and Pavt Repr, Nonreinf Conc

The pay item depth for repairs is based on the plan thickness originally specified for the existing concrete pavement plus 1”.

If the length of the repair is 100' or less, the replaced pavement is paid for as Pavt Repr, Reinf Conc, ___ inch or Pavt Repr, Nonreinf Conc, ___ inch. If the repair is greater than 100' in length, the replaced pavement is paid for as Conc Pavt, Misc, Reinf, ___ inch or Conc Pavt, Misc, Nonreinf, ___ inch.

The texture of the repair should approximate that of the adjacent pavement, e.g., a heavily tined patch in a comparatively smooth textured pavement would not only accentuate the perception of a patched pavement but would provide an audible and tactile discontinuity as well.

6.04.12E (continued)

4. Lane Tie, Epoxy Anchored

Epoxy anchored lane ties shall be used between the adjoining lanes of full width pavement repairs where the distance between joints exceeds 15' and shall be spaced according to Standard Plan R-41-Series. Single-lane pavement repairs, one slab length or longer shall use "Lane Tie, Epoxy Anchored" for that portion of the repair between the joints of the existing pavement. Single-lane repairs greater than 15' that are located on curves with radii 3800' or less shall also be tied to the adjacent slab. Do not install epoxy anchored lane ties in the offset portion of a tangent repair unless the end aligns with an existing joint or working crack. See Standard plan R-44-Series and [Section 6.04.12F](#) for more detailed information.

5. Joint Types

Repairs made in jointed concrete pavements shall be doweled and grouted unless otherwise directed by the Engineer. The transverse joint types used (Tied Joint, Trg, Contraction Joint, Crg, and Expansion Joint, Erg) are specified on Standard Plan R-44-Series. When the repair includes a curb and gutter and an Expansion Joint, Erg, an undoweled Expansion Joint, Esc shall be placed in the curb and gutter portion of the repair.

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ROAD DESIGN

6.05.03 (revised 11-28-2011)

General

It is the usual practice of the Department to construct hard-surfaced shoulders immediately adjacent to the traveled lanes of state trunklines. There are still many miles of gravel shoulders on the trunkline system, however, so this practice does not mandate that projects be let specifically to pave these shoulders. It is current practice, however, if a resurfacing project is proposed, to include at least a 3 ft. shoulder ribbon when the average daily traffic (ADT) is greater than or equal to 750. (See [Section 3.09.02](#))

While existing prime and sealed shoulders are considered as "paved", the Department no longer builds prime and sealed shoulders, except as may be done by the Maintenance Division or by contract as part of heavy maintenance. This means that a 3 ft. HMA mat is normally the minimum type of paved shoulder that we would now construct. (Sometimes it is prudent to combine a pavement widening with the laying of a shoulder mat, painting the edge line on the shoulder paving in such a way as to provide 3 ft. of paved shoulder.)

Flush shoulders are required on **new** urban freeway construction. This requirement does not necessarily apply to urban freeway **reconstruction**.

6.05.04 (revised 8-22-2016)

Shoulder Width

A. Freeways

Shoulder widths for freeways and ramps are specified in [Appendix 3A](#). Design criteria for freeways do not differ between new construction, reconstruction and 3R type work. The following adjustments in freeway shoulder widths apply:

1. When the roadways are composed of three or more lanes in the same direction, the median shoulder width is increased to the same width as the outside shoulder.
2. When commercial traffic for the design year exceeds 250 vehicles per hour in one direction, 12 ft. paved shoulders should be considered.

On projects where 12 ft. shoulders are being considered, the designer should check with the Geometrics section of the Design Division for any other warrants that might preclude the use of the wider shoulders.

As a general practice, existing shoulder widths should not be reduced. This is of particular importance when upgrading guardrail as part of the project, as the most recent guardrail shoulder designs may have greater lateral width, than the old. Posts that are 8 ft. in length may be used to obtain proper shoulder width in guardrail sections (See [Section 7.01.41D](#)).

B. Paved Ramp Gores

To reduce the need for maintenance in gore areas, additional shoulder paving should be provided to the point in the divergence where the 4 ft. ramp paved shoulder and the 10 ft. mainline paved shoulder are 8 ft. apart. This would typically be a total distance of 22 ft. (10 ft. + 8 ft. + 4 ft.) between the freeway mainline and ramp edges. This would still end the surfacing in front of the "Exit" sign. (This practice applies to new freeway construction and may apply to reconstruction and resurfacing, as determined.)

**MICHIGAN DESIGN MANUAL
ROAD DESIGN**

CHAPTER 8

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MAINTAINING TRAFFIC

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MICHIGAN DESIGN MANUAL

ROAD DESIGN

8.03.05 (revised 12-22-2011)

Lane Closures

Often construction projects require one or more lanes to be closed when it is not feasible or economical to use other maintaining traffic methods. Lane closures may be short term, i.e., for routine maintenance, pavement repairs or some resurfacing projects, or long term, i.e., for bridge reconstruction or repairs.

Typical lane closures are shown in the Maintaining Traffic Typical which are readily available in the design units.

8.03.06 (revised 11-4-97)

Maintaining Traffic on Freeway Shoulders

Most newly constructed and reconstructed freeway shoulders will withstand heavy traffic loads and can be used for maintaining traffic. In cases where the existing shoulders are not adequate to withstand heavy traffic, the shoulders will need to be modified to carry these loads. Such usage, however, should be discussed with the Region/TSC during the preliminary design.

If shoulders are to be used, a special provision may be needed to address existing and/or proposed rumble strips.

8.03.07 (added 8-22-2016)

Work Zone Pedestrian Accommodation

The Americans with Disability Act (ADA) of 1990 requires that pedestrians with disabilities be equally accommodated not only in completed permanent publicly accessible facilities, but also during construction activities. Designers must ensure that all pedestrian travel can be equally maintained or otherwise equally prohibited. Accommodation either within the existing pedestrian route or by alternate route must be investigated during the design phase to determine the best feasible options.

Where appropriate, detailed staging plans should be developed to identify required elements for barrier free accommodation. Previously approved special provisions are available to specify applicable temporary pedestrian devices and incidental construction specifications. The staging plans should detail the pay items for these devices and their intended locations within the pedestrian route.

Detailed staging plans may not be practical where staging is less predictable. When staging plans are not provided, the designer may include miscellaneous quantities for the pedestrian devices and construction specifications for use in conjunction with construction staging. Project specific details may be used for clarifications. Avoid arbitrary use of miscellaneous quantities to cover remote possibilities of pedestrian accommodation. For example, if significant earthwork or right of way makes a temporary path impracticable, then it should not be specified or covered by miscellaneous pay items. Assess the likelihood of pedestrian interruption and make practicable provisions.

MICHIGAN DESIGN MANUAL ROAD DESIGN

8.03.07 (continued)

Work Zone Pedestrian Accommodation

For additional information please contact the Work Zone Safety and Mobility Area.

The previously approved special provisions currently include (illustrations are examples only);

A. Temporary Pedestrian Type II Channelizer

This special provision is to be utilized when pedestrian traffic needs additional guidance through the work zone or around a hazardous area. (Not for vehicle traffic control use.)



B. Temporary Pedestrian Barrier with Fence

(If fence is not used, the pay item for the barrier is used for separation from vehicle traffic.)



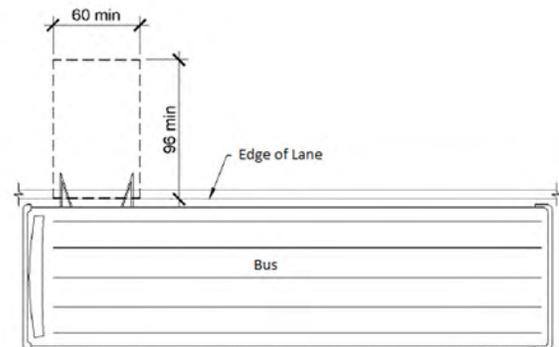
8.03.07 (continued)

C. Temporary Pedestrian Type II Barricade

This special provision is to be utilized when sidewalk or access point needs to be closed off to pedestrian traffic (Not for vehicle traffic control use.)



D. Temporary Bus Stop



E. Temporary Pedestrian Path

Specifies work and materials to construct a temporary path.



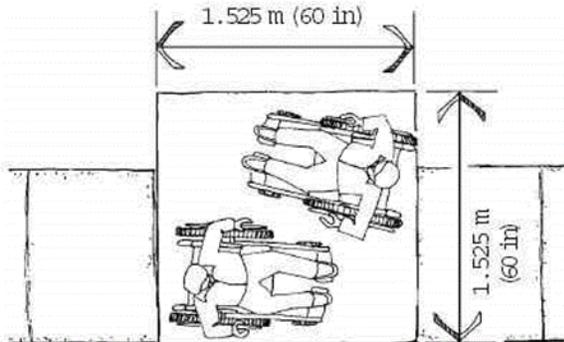
MICHIGAN DESIGN MANUAL ROAD DESIGN

8.03.07 (continued)

Work Zone Pedestrian Accommodation

F. Temporary Pedestrian Passing Space

Specifies required widened passing spaces at 200 ft. intervals per ADA requirements.



G. Temporary Pedestrian Ramp

Specifies use of portable temporary ramps on alternate routes where curb ramp is absent at existing curbed sidewalk to roadway interface.



8.04

TRAFFIC CONTROL DEVICES

8.04.01 (revised 11-4-97)

General

Traffic control devices including, but not limited to, signs, barriers, barricades, plastic drums, lights and pavement markings shall be according to the Michigan Manual of Uniform Traffic Control Devices (MMUTCD). The MUTCD contains information which should be used when preparing the maintaining traffic plan and specifications.

The Maintaining Traffic Typical are also excellent references for use of signs, barricades, etc. and their spacing and location.

The designer should show the limits of the Construction Influence Area (CIA) on the title sheet. This information should be described in the maintaining traffic special provision.

8.04.02 (revised 10-20-2008)

Construction Zone Signing

Construction zone signing must be clear, properly located, taken down or covered when not appropriate, and must convey the proper message to the motorist. The MMUTCD gives information on sign size, mounting height, legend, and location in the signing sequence.

MICHIGAN DESIGN MANUAL ROAD DESIGN

12.12.09 (revised 8-22-2016)

Design Features of Shared-Use Paths

The basis for the design of bicycle facilities is the AASHTO "Guide for the Development of Bicycle Facilities, 4th Edition 2012. Although formal design exceptions are not required for off road facilities, designers should document in the project file when minimum criteria for elements listed in A-F below cannot be met.

The National Association of City Transportation Officials (NACTO) also provides helpful recommendations. The NACTO Urban Street Design Guide, and Urban Bikeway Design Guide are useful tools and resources for consideration in the development of context sensitive multi-modal facilities. However, the American Association of State Highway and Transportation Officials (AASHTO) national guides remain the standard for planning and designing Michigan roadways and multi-modal facilities.

Generally, it is poor practice to attempt to utilize portions of existing sidewalk in front of homes for a shared-use path. If it is proposed to build a shared-use path in front of homes, the Region/TSC, and Design should coordinate the proposal with local officials. If favored locally, the local officials should contact affected property owners to discuss the shared use path and land requirements with them, and include those results in a response to MDOT. This information will be used to determine if an MDOT public hearing is required prior to initiating R.O.W. acquisition by MDOT.

A. Design Speed

The desirable design speed for bicycle paths should be 18 mph. Where descending grades are over 6%, the design speed should be increased to 30 mph. On paths where a high concentration of pedestrian users is anticipated, lower design speeds may be considered.

12.12.09 (continued)

B. Grades

Grades, in general, should follow the lay of the land or grade of the roadway. The grade of the path should not exceed 5%, but if the roadway exceeds 5% the path should be less than or equal to the adjacent roadway grades. Except for short distances, grades greater than 5%, either ascending or descending, are undesirable. Certain conditions such as physical constraints or regulatory constraints may prevent full compliance with 5% maximum grade and must be documented (Technical Infeasibility for ADA, [Form 0370](#)).

For grades greater than 5%, consider level landing, rest areas or increased path width where feasible.

C. Horizontal Alignment

When curvature is required, compound or spiral curves are preferable to simple circular curves. Tight, short-radius curves should be avoided, if possible. For a design speed of 18 mph, a minimum radius on the order of 60' is recommended.

Design Speed (mph)	Minimum Radius (ft)
12	27
14	36
16	47
18	60
20	74
25	115
30	166

MICHIGAN DESIGN MANUAL

ROAD DESIGN

14.36.02 (revised 8-22-2016)

Procedure

1. When the Project Manager or Consultant determines the plans meet the requirements for The Plan Review, a Plan Review Material Submittal (Form 2913) is completed to verify that supporting documents, proposal materials and plans are ready to submit. The materials are entered into ProjectWise using the file naming conventions outlined in Section 1.03.02.
2. The Project Manager fills out a Design Plan Submittal (Form 0303). Include E-mail addresses for invitees outside of MDOT. Include dates that key personnel and conference rooms are available. They should be at least 3 weeks (preferably 4-5 weeks) from the submittal date.
3. The Project Manager will verify that ProjectWise (folder 3) is current with the following format;
 - 3 – Plan Review
 - Design Submittal Form and Minutes
 - Digital Pen Plan Set
 - RID Preliminary

If the format is not correct contact the ProjectWise administrator to apply the proper template.
4. When the project is ready for final review, form 0303 is placed in the ProjectWise subfolder "Design Submittal Form and Minutes" using the file name *Job Number-0303.DPS.pdf* and the state is advanced to "Request for Meeting" to initiate submittal to Quality Assurance for review. The ProjectWise state on the three files containing plans, proposal material and supporting documents in the "Plan Review" folder are also advanced once to "Submitted for Review".

14.36.02 (continued)

5. The plans will be reviewed by Quality Assurance for completeness and a meeting date scheduled 4-5 weeks from the time of submittal. Instances where projects require a compressed schedule or scheduling without plans should be kept to a minimum. The 4-5 week period is needed to assure all participants are given ample time to review the plans prior to the meeting. This is essential to making The Plan Review as useful and productive as possible.
6. Plans and other material are made accessible in ProjectWise by the Project Manager. Quality Assurance distributes the same to non-ProjectWise users in an alternate deliverable and usable format. The reviewers include the following:
 - Operations Field Services Division
 - Region System Manager
 - TSC Manager
 - Region/TSC Resident/Delivery Engineer
 - TSC Development Engineer
 - Region/TSC Operations Engineer
 - Region/TSC Soils/Materials Engineer
 - Region/TSC Traffic and Safety Engineer
 - Region/TSC Maintenance Engineer
 - Region/TSC Utilities/Permits Engineer
 - Region/TSC Real Estate Agent
 - Region Resource Specialist
 - Region Bridge Engineer
(Bridge Jobs Only)
 - Region Bridge Inspection Engineer
(Bridge Jobs Only)
 - Environmental Services Section
 - FHWA Oversight
 - Design Utilities Section
 - Railroad Coordination Unit – Office of Rail
(if applicable)
 - Geometrics Section- Design
 - Utilities/Permits Development Services
 - Division
 - MDOT-RIDSupport
 - City or Village (if applicable)
 - County Drain Commissioner
(if applicable)
 - County Road Commission
 - Department of Management and Budget
(MIR Program)
 - Others identified by the Project Manager

MICHIGAN DESIGN MANUAL

BRIDGE DESIGN

2.01.05

Region/TSC Requests

The Region/TSC Engineer in consultation with the Region Bridge Engineer may request work to be performed on projects in the Region/TSC based on citizens' requests or based on field observations by Region/TSC personnel.

2.01.06

Privately-Owned Facilities

Occasionally MDOT will agree to perform work on privately-owned facilities at the request and expense of private parties. Such work shall not be undertaken without a written agreement between the private parties and MDOT.

2.01.07

Bridges to Remain In Place

Bridges to remain in place criteria occurs when a bridge **carrying road project traffic** falls within a road project and no work is planned for the bridge (see AASHTO publication, ***A Policy on Design Standards - Interstate System or A Policy on Geometric Design of Highways and Streets, 2011, 6th Edition***). If the bridge does not meet the criteria to "remain in place" the Road Designer shall submit any necessary design exceptions for the bridge. (10-22-2012) (3-21-2016) **(8-22-2016)**

MICHIGAN DESIGN MANUAL BRIDGE DESIGN

CHAPTER 3

PLAN COMPOSITION - NEW & RECONSTRUCTION PROJECTS

3.00

GENERAL

New Construction and Reconstruction (4R) is defined as a new bridge, a bridge replacement, a superstructure replacement, a deck replacement or widening of at least one lane width (including a lane used for maintaining traffic or retained for use as a future lane). See also Chapter 3 of Road Design Manual.

If a project includes 3R (Chapter 12) and 4R (Chapter 7) work, the applicable standards are governed by the standards that correspond individually to each work type (3R or 4R). Work type overlap within a structure may cause a default to 4R standards within the overlap (entire structure). Identify each work type on the project information sheet to distinguish where 3R guidelines and 4R standards are separately applied.

When other work types are combined with 3R or 4R projects, they are also governed separately and identified as such on the project information sheet.

Projects categorized as CPM (preventive maintenance) projects are governed by guidelines that differ from 3R and 4R Guidelines. When CPM work types are packaged with a 3R or 4R project, the portion of the project that is outside the 3R or 4R work limits is governed by the guidelines that pertain to CPM work type. When describing the work type in the request for Plan Review Meeting, identify the work type separation so that the appropriate requirements are considered within each structure. Work type overlap within a structure may cause a default to 3R or 4R requirements.

Cross road over bridges shall be treated as individual segments regardless of project work type. (8-20-2009) (2-27-2012) (8-22-2016)

3.01

STUDY

The first plan of a structure is a feasibility study showing the basic design concept and the topography in the immediate structure area. This study is prepared on a reproduction of the General Plan of Site Sheet.

The study is submitted by the Unit Leader to the Design Supervising Engineer for approval. FHWA Oversight projects that are federally financed shall also be reviewed by the FHWA. For definition/clarification of oversight see Chapter 2. These approvals must be obtained before Preliminary Plans can be started. The study, as approved, then becomes a permanent record and is to be kept by the Unit until the construction of the bridge is completed. (8-6-92)

A study must be completed for all new construction and reconstruction projects. For rehabilitation, e.g., railing replacement and/or deck overlay projects see Chapter 4.

Where a project involves earth excavation, the Project Manager sends a project description and requests a list of potentially contaminated sites identified by the Environmental Assessment Unit, Development Services Division, Project Coordination Unit of the Project Planning Division and the Region Resource Specialist. The Project Manager will locate identified potential sites of contamination on the preliminary plans. If earth excavation will impact a potential contaminated site, the Project Manager will request further investigation of the site to be done by the Geotechnical Services Section of the Construction Field Services Division. Geotechnical Services Section will provide information on the type and extent of the contamination, appropriate pay items and quantities for the Plans and Specifications. For more detailed information see Section 14.13 of the Road Design Manual. (5-1-2000)

MICHIGAN DESIGN MANUAL BRIDGE DESIGN

CHAPTER 12

REHABILITATION PROJECTS

12.00

REHABILITATION PROJECTS (9-1-88)

For the purpose of this volume, the following definitions will be used:

Preventive maintenance work is defined as bridge activities that will repair and preserve the bridge. Projects where only this work is done do not have to include geometric enhancements. This is done with the understanding that future rehabilitation or reconstruction projects will contain appropriate safety and geometric enhancements, thus Design Exceptions are not required for preventive maintenance work. These activities include joint replacement, pin and hanger replacement, complete painting, zone painting, thin polymer overlays, deck patching, asphalt overlay, hot mix asphalt (HMA) cap and scour countermeasures. (9-2-2003)

Rehabilitation (3R) is defined as work undertaken to extend the service life of an existing bridge and to enhance highway safety. The intent of this work is to return a bridge to a condition of structural or functional adequacy. This work may include upgrading geometric features such as roadway (bridge) widening (no increase in number of through lanes), flattening curves, or improving sight distance. Examples of this work are shallow and deep concrete overlays, superstructure repairs, railing replacements, extensive substructure repair, and substructure replacement. (8-20-2009)

Reconstruction (4R) involves substantial changes to the existing structure such as bridge deck replacement or greater. See Chapter 7 for reconstruction (including deck replacements) projects requirements. (3-26-2012)

12.00 (continued)

Bridges to remain in place criteria occurs when a bridge **carrying road project traffic** falls within a road project and no work is planned for the bridge (see AASHTO publication, ***A Policy on Design Standards - Interstate System*** or ***A Policy on Geometric Design of Highways and Streets, 2011, 6th Edition***). If the bridge does not meet the criteria to “remain in place” the Road Designer shall submit any necessary design exceptions for the bridge. (3-26-2012) (3-21-2016) **(8-22-2016)**

With structure resurfacing, railing upgrading and joint replacement projects the structural adequacy of the superstructure shall be evaluated.

MICHIGAN DESIGN MANUAL

BRIDGE DESIGN

12.01

SCOPE OF REHABILITATION PROJECTS (8-20-2009)

The scope for rehabilitation projects is created by the Region Bridge Engineer using the Bridge Deck Preservation Matrix (Section 12.09.02). As soon as possible after assignment, the bridge design engineer should schedule a scope verification meeting. At this meeting, the scope of the project will be reviewed.

If a project includes 3R and 4R (Chapter 7) work, the applicable standards are governed by the standards that correspond individually to each work type (3R or 4R). Work type overlap within a structure may cause a default to 4R standards within the overlap (entire structure). Identify each work type on the project information sheet to distinguish where 3R guidelines and 4R standards are separately applied.

When other work types are combined with 3R or 4R projects, they are also governed separately and identified as such on the project information sheet.

Projects categorized as CPM (preventive maintenance) projects are governed by guidelines that differ from 3R and 4R Guidelines. When CPM work types are packaged with a 3R or 4R project, the portion of the project that is outside the 3R or 4R work limits is governed by the guidelines that pertain to CPM work type. When describing the work type in the request for Plan Review Meeting, identify the work type separation so that the appropriate requirements are considered within each structure. Work type overlap within a structure may cause a default to 3R or 4R requirements.

Cross road over bridges shall be treated as individual segments regardless of project work type. (8-22-2016)

12.01 (continued)

In addition to any concerns the designer may have over the project scope, the following design elements must be reviewed to determine conformance with both MDOT's 3R criteria (see Road Design Manual Chapter 3) and AASHTO standards (see also Section 12.02).

1. Design Speed
2. Lane Width
3. Shoulder Width
4. Bridge Width
5. Structural Capacity
6. Horizontal alignment
7. Vertical Alignment
8. Grade
9. Stopping Sight Distance
10. Cross Slope
11. Vertical Clearance
12. Superelevation
13. Horizontal Clearance
(not including clear zone)

If any of the previous design elements do not conform to the standards, the designer should consider including their upgrade as part of the rehabilitation. Where this is not practical, a design exception (see Section 12.03) is required. (8-20-2009)