



Road & Bridge Design Publications

Monthly Update – February 2012

Revisions for the month of **February** are listed and displayed below. New special details are to be included in projects submitted for the **May** letting as is stated on the special detail index sheets. Please contact Wayne Pikka (pikkaw@michigan.gov) for any questions related to the road changes or Vladimir Zokvic (zokvicv@michigan.gov) for questions related to the bridge changes.

Special Details

R-31-F: On sheet one, removed the neoprene joint sealer and associated notes and labeled the reinforcing bars, “epoxy coated #4 bars, see notes.” On sheet two in the note section, changed the pay item “aggregate base, concrete” to the current pay item, “aggregate base” and added the following note: “Omit longitudinal reinforcement when curb & gutter is tied to a non-reinforced concrete base course, shoulder, or pavement.”

R-43-I: The severe skew details on sheet two were eliminated since they are no longer necessary with the new bridge approach pavement reinforcement.

R-126-I: On sheet three, the reference to former standard plan R-125-series was revised to Work Zone Device Special Detail WZD-125-series. In the first note on the note sheet, the reference to R-52-series was eliminated since that standard plan has been eliminated. Also, the temporary concrete barrier end section detail was moved from the deleted R-52-series to this standard plan. The pin and loop connection was removed from these sketches and a note was added which addresses the hardware to connect the end section to the barrier.

B-25-G: Extended the pay limits of railing to include end walls, per 2012 Standard Specifications for Construction.

Road Design Manual

7.01.67: Temporary Concrete Barrier: The second paragraph was revised to reflect current criteria for TCB.

7.01.68: Ending Temporary Concrete Barrier: A reference to R-52-series was eliminated.

Updates made to the Internet but not attached: The “Real Estate Division” was renamed “Development Services Division” in Chapters 5, 6, 7, 9, 10, 12, 13.



Road & Bridge Design Publications

Monthly Update – February 2012

Bridge Design Manual

3.00: Added criteria for 3R/4R project classifications. Cross road over bridges are to be treated as individual segments as they relate to work type and standards.

3.01 N: Added note to request traffic capacity analysis for deck replacement and reconstruction projects

Updates made to the Internet but not attached:

3.02.05: Interim Update date is removed and new/permanent date added.

Updated Appendix 3.02.04 A.

Real Estate Support Area updated to Development Services Division in various parts of chapter.

Bridge Design Guides

6.29.10D – Updated Angle of Crossing notes; grammatical, file conversion errors.

Please note: Corresponding updates to automated tools, including but not limited to the MDOT Bulletin Board, 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

2-27-2012

⑥

SPECIAL DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE
21	2	GUARDRAIL AT INTERSECTIONS	5-24-01
24	5	GUARDRAIL ANCHORED IN BACK SLOPE TYPES 4B & 4T	7-22-02
R-29-H	4	DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK	10-20-11
* R-31-F	2	INTEGRAL CURB AND INTEGRAL CURB & GUTTER	1-30-12
R-42-F	6	TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT	12-6-10
* R-43-I	2	LOCATION OF TRANSVERSE JOINTS IN PLAIN CONCRETE PAVEMENT	2-8-12
R-45-I	2	PAVEMENT REINFORCEMENT FOR BRIDGE APPROACH	12-6-11
R-99-B	2	CHAIN LINK FENCE WITH WIRE ROPE	11-1-00
R-100-G	4	SEEDING AND TREE PLANTING	9-8-11
* R-126-I	5	PLACEMENT OF TEMPORARY CONCRETE BARRIER	1-26-12
<p>* Denotes New or Revised Special Detail to be included in projects for (beginning with) the May letting.</p> <p>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 <i>must</i> be made in advance.</p> <p>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.</p>			

Index to Bridge Detail Sheets

2-27-2012

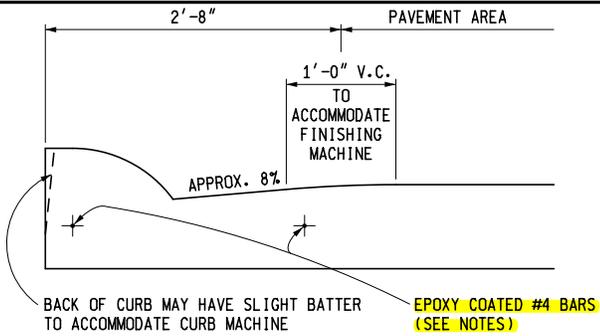
7

DETAIL NUMBER	NUMBER OF SHEETS	TITLE	CURRENT DATE
B-21-I	4	BRIDGE RAILING, 2 TUBE	6-3-11
B-23-E	4	BRIDGE RAILING, THRIE BEAM RETROFIT	10-19-09
* B-25-G	6	BRIDGE RAILING, AESTHETIC PARAPET TUBE	1-30-12
EJ3Z	1 or 2	EXPANSION JOINT DETAILS	6-8-11
EJ4M	1 or 2	EXPANSION JOINT DETAILS	6-8-11
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

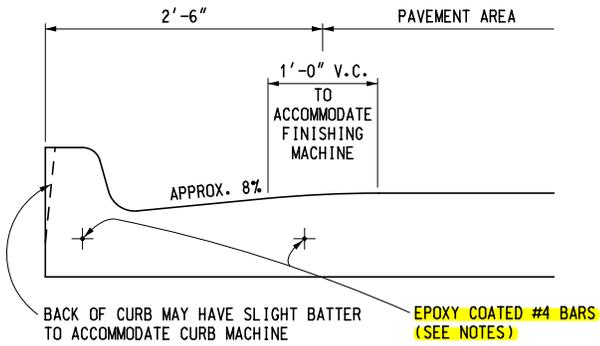
* Denotes New or Revised Special Detail to be included in projects for (beginning with) the May letting.

Note: Details EJ3Z & EJ4M 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.

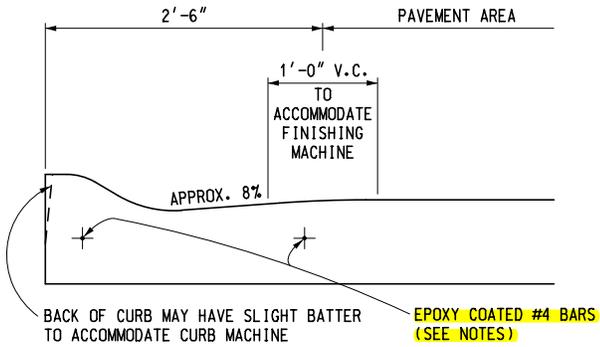
Detail PC-1L, PC-2G and PC-4E shall have structure specific information and quantities added to the sheet. The sheet shall then be added to the plans as a normal plan sheet.



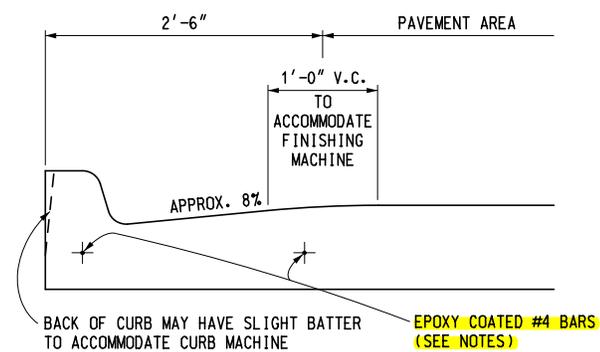
SECTION A - A
INTEGRAL CURB & GUTTER, DETAIL B



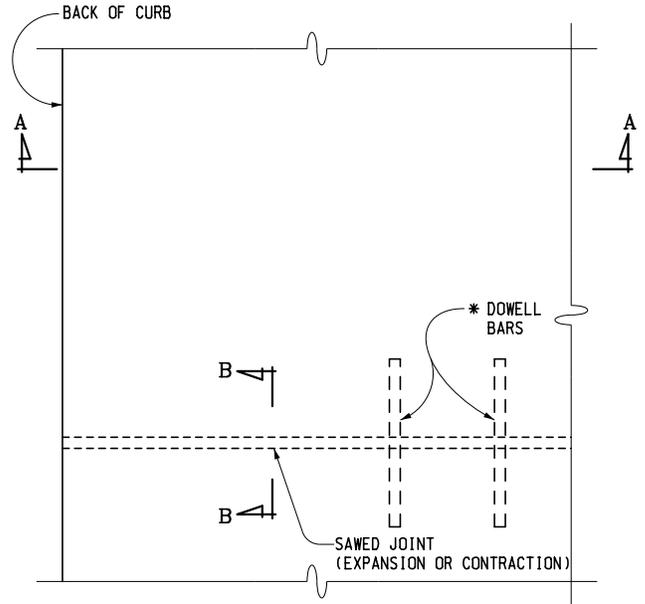
SECTION A - A
INTEGRAL CURB & GUTTER, DETAIL C



SECTION A - A
INTEGRAL CURB & GUTTER, DETAIL D

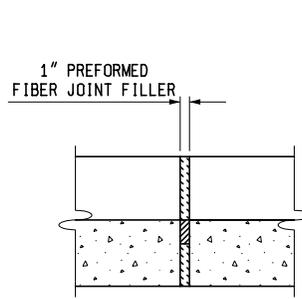


SECTION A - A
INTEGRAL CURB & GUTTER, DETAIL F

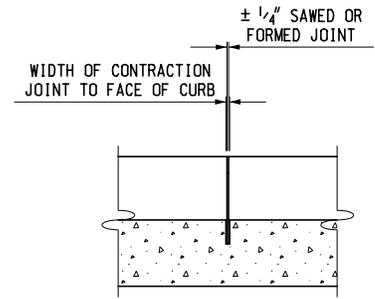


* END DOWELL BARS AT V.C. BEFORE GUTTER PAN.

PLAN AT TRANSVERSE JOINT
SEE NOTES IF PAVEMENT REINFORCEMENT IS REQUIRED



SECTION B - B
EXPANSION JOINT



SECTION B - B
CONTRACTION JOINT



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DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

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DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

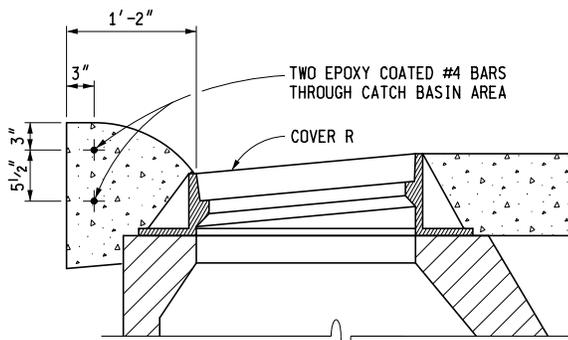
**INTEGRAL CURB AND
INTEGRAL CURB & GUTTER**

F.H.W.A. APPROVAL

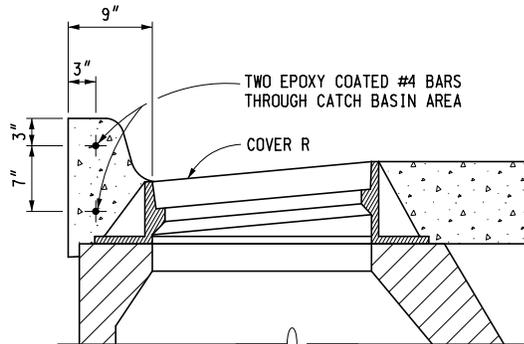
1-30-2012
PLAN DATE

R-31-F

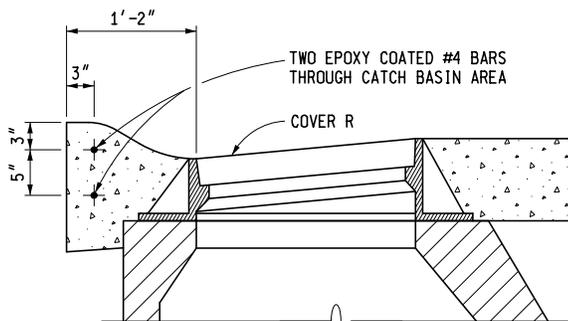
SHEET
1 OF 2



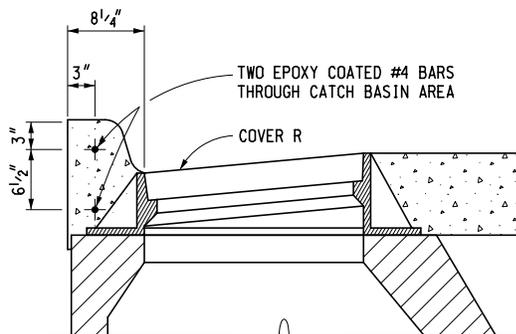
SECTION C - C
INTEGRAL CURB & GUTTER, DETAIL B



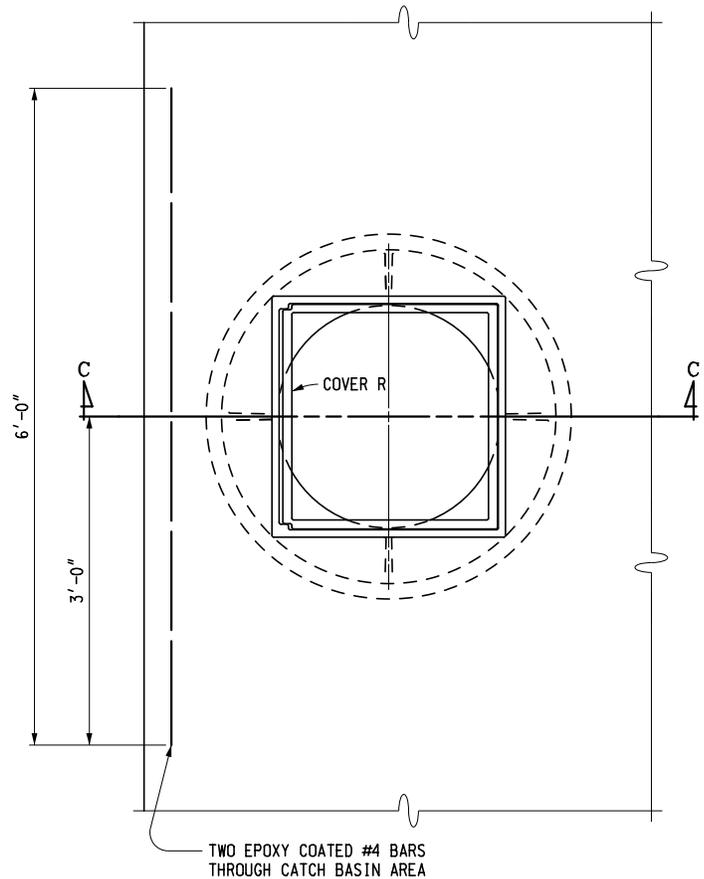
SECTION C - C
INTEGRAL CURB & GUTTER, DETAIL C



SECTION C - C
INTEGRAL CURB & GUTTER, DETAIL D



SECTION C - C
INTEGRAL CURB & GUTTER, DETAIL F



PLAN IN CATCH BASIN AREA
SEE STANDARD PLAN R-37-SERIES FOR REINFORCING DETAILS

NOTES:

DETAILS OF CURB FACES ARE SPECIFIED ON STANDARD PLAN R-30-SERIES.

PAVEMENT REINFORCEMENT, EXTENDED TO WITHIN 3" OF BACK OF INTEGRAL CURB OR INTEGRAL CURB AND GUTTER, MAY BE SUBSTITUTED FOR THE BAR REINFORCEMENT SPECIFIED ON STANDARD PLAN R-30-SERIES. PAVEMENT REINFORCEMENT SHALL EXTEND TO 1'-6" OF A SAWED JOINT.

OMIT LONGITUDINAL REINFORCEMENT WHEN CURB AND GUTTER IS TIED TO A NON-REINFORCED CONCRETE BASE COURSE, SHOULDER, OR PAVEMENT.

WHEN THE CURB PORTION IS POURED SEPARATE FROM THE INTEGRAL PAVEMENT AND GUTTER, AND DELAY EXCEEDS 30 MINUTES, EPOXY COATED #4 VERTICAL BARS SPACED AT 1'-0" CENTER TO CENTER SHALL BE USED TO TIE CURB AND UNDERLYING CONCRETE.

AGGREGATE BASE, WHEN SPECIFIED ON TYPICAL CROSS SECTIONS, SHALL EXTEND 2'-0" BEYOND THE BACK OF INTEGRAL CURB AND GUTTER, EVEN IF THE GRADING SECTION MUST BE WIDENED TO DO SO. NO PAYMENT WILL BE MADE FOR THE ADDITIONAL AGGREGATE BASE THAT IS REQUIRED TO CONSTRUCT THE INTEGRAL CURB AND GUTTER ALTERNATE.

TRANSVERSE JOINTS IN THE INTEGRAL CURB SHALL BE AS SPECIFIED ON THIS STANDARD PLAN.

FIBER FILLER USED FOR PAVEMENT EXPANSION JOINTS SHALL EXTEND TO BACK OF CURB.

CATCH BASIN "COVER R" OR OTHER APPROVED COVERS SHALL BE SUBSTITUTED FOR COVERS SPECIFIED ON THE PLANS ONLY WHEN THE INTEGRAL CURB AND GUTTER ALTERNATE IS USED.

MICHIGAN DEPARTMENT OF TRANSPORTATION
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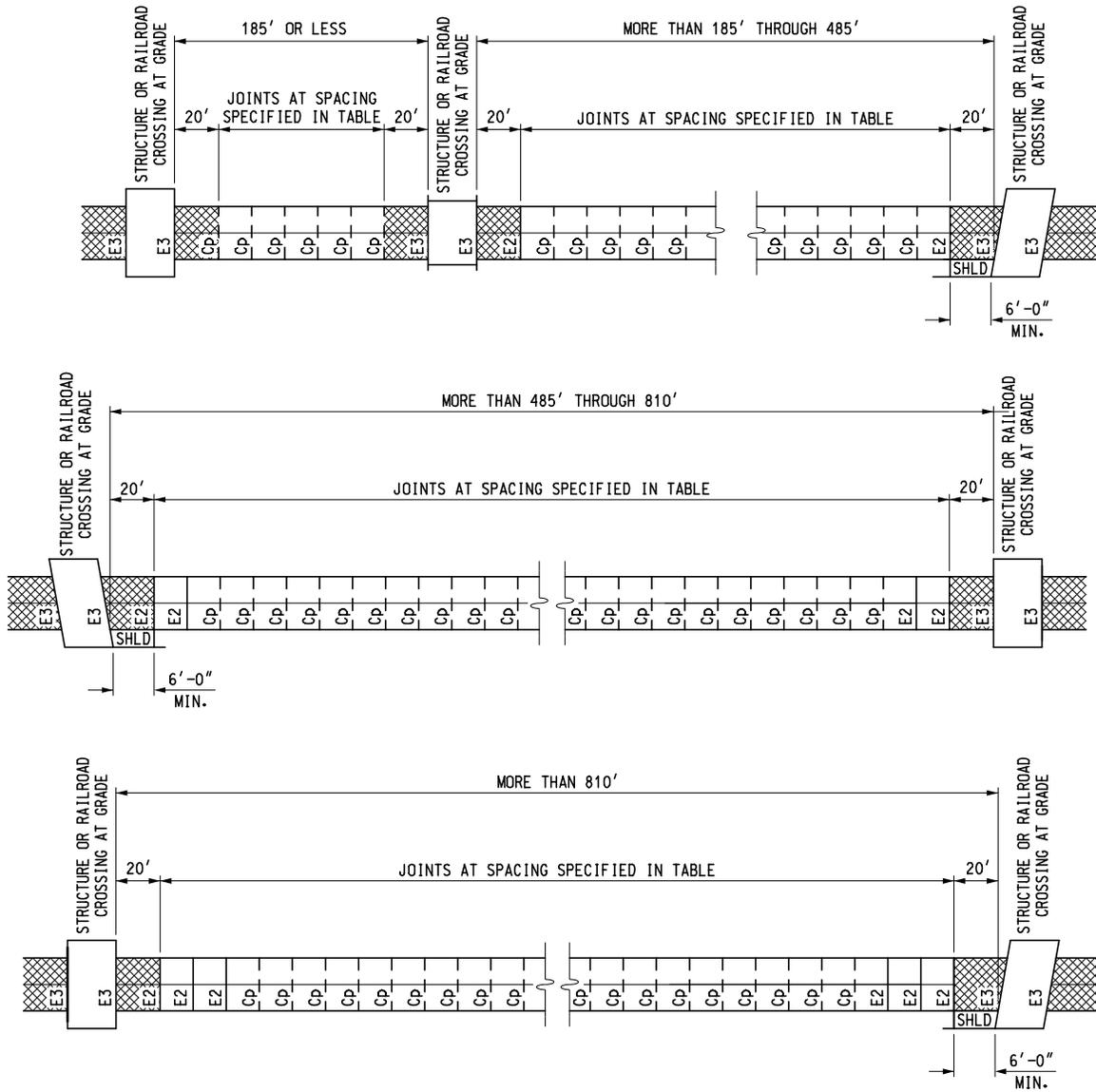
INTEGRAL CURB AND
INTEGRAL CURB & GUTTER

F.H.W.A. APPROVAL

1-30-2012
PLAN DATE

R-31-F

SHEET
2 OF 2



PLAN VIEW SHOWING TRANSVERSE JOINT LOCATIONS

NOTE:
SEE SHEET 2 FOR DETAIL OF JOINT SPACING
WITH INTEGRAL / SEMI-INTEGRAL ABUTMENTS
AND SLEEPER SLAB.

- JOINT LEGEND**
ACCORDING TO STANDARD PLAN R-39-SERIES
- (E2) 1" TRANSVERSE EXPANSION JOINT WITH LOAD TRANSFER ASSEMBLY
 - (E3) 1" TRANSVERSE EXPANSION JOINT WITHOUT LOAD TRANSFER ASSEMBLY
 - (Cp) TRANSVERSE CONTRACTION JOINT
 - REINFORCED CONCRETE PAVEMENT ADJACENT TO BRIDGE REFERENCE LINE OR SLEEPER SLAB

JOINTED PLAIN CONCRETE PAVEMENT	
PAVEMENT THICKNESS	JOINT SPACING
6 1/2" TO 8 3/4"	12'
9" TO 11 3/4"	14'
12" OR MORE	16'



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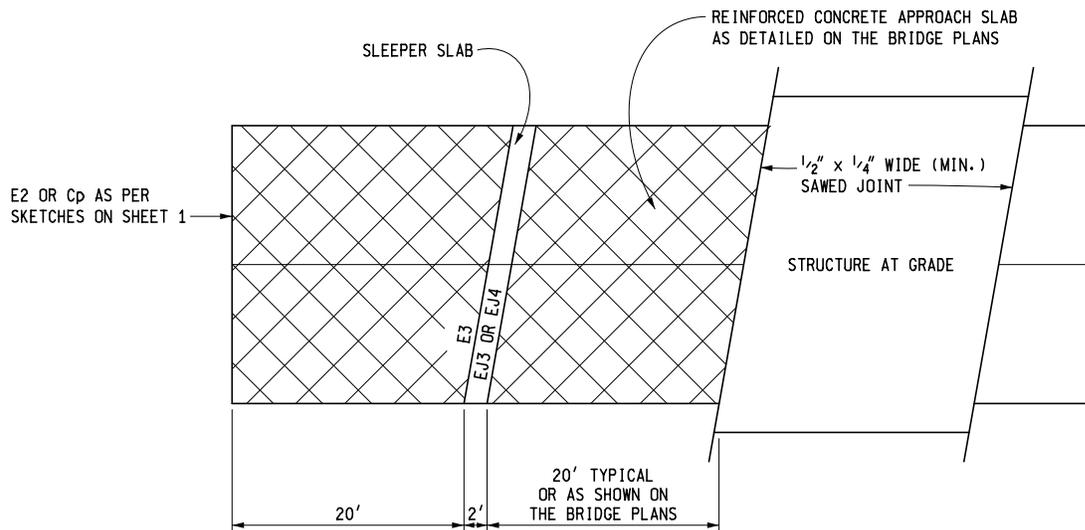
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DIRECTOR, BUREAU OF FIELD SERVICES

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MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**LOCATION OF TRANSVERSE JOINTS
IN PLAIN CONCRETE PAVEMENT**

_____	2-8-2012	R-43-I	SHEET 1 OF 2
F.H.W.A. APPROVAL	PLAN DATE		



**JOINT SPACING WITH
INTEGRAL / SEMI-INTEGRAL ABUTMENTS AND SLEEPER SLABS**

NOTES:

UNLESS OTHERWISE SPECIFIED ON THE PLANS OR DIRECTED BY THE ENGINEER, TRANSVERSE JOINTS SHALL BE PLACED AS SPECIFIED ON THIS STANDARD PLAN AND ON CURRENT STANDARD PLAN R-42-SERIES.

MAXIMUM JOINT SPACING SHALL NOT EXCEED THE DISTANCE SPECIFIED. WHEN A JOINT SPACING ADJUSTMENT IS REQUIRED, IT SHALL BE MADE BETWEEN CONTRACTION JOINTS WITH THE ADJUSTED SPACE BEING NOT LESS THAN 6'-6".

EXPANSION JOINTS SHALL ONLY BE PLACED AT STRUCTURES, INTERSECTIONS AND SPECIFIED LOCATIONS.

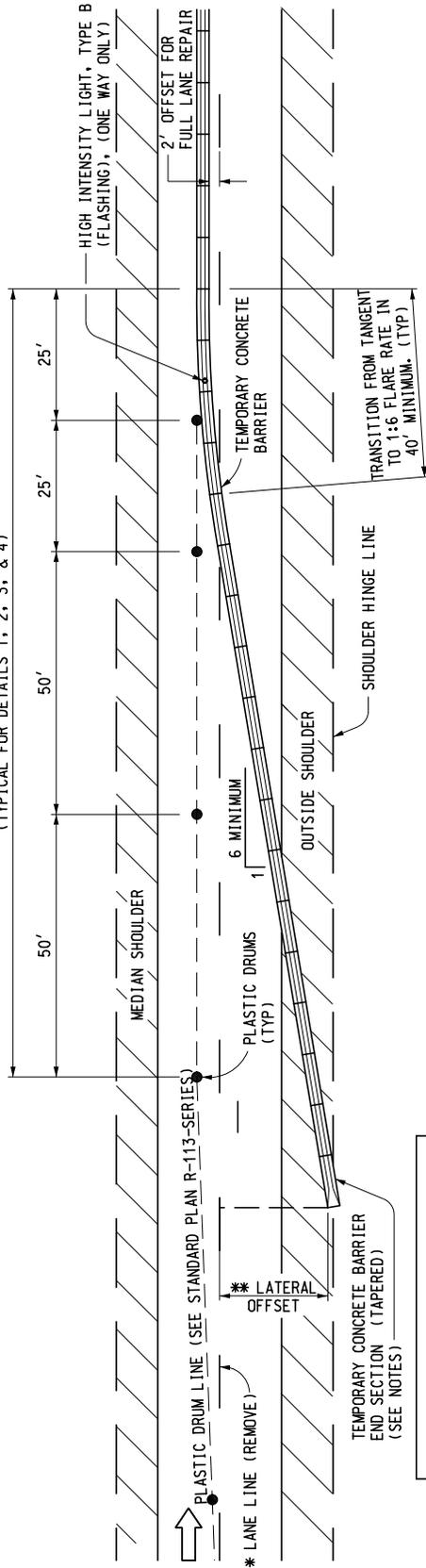
JOINTS ABUTTING RAILROAD TRACKS SHALL BE AS SPECIFIED ON CURRENT STANDARD PLAN R-121-SERIES.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**LOCATION OF TRANSVERSE JOINTS
IN PLAIN CONCRETE PAVEMENT**

F.H.W.A. APPROVAL	2-8-2012 PLAN DATE	R-43-I
		SHEET 2 OF 2

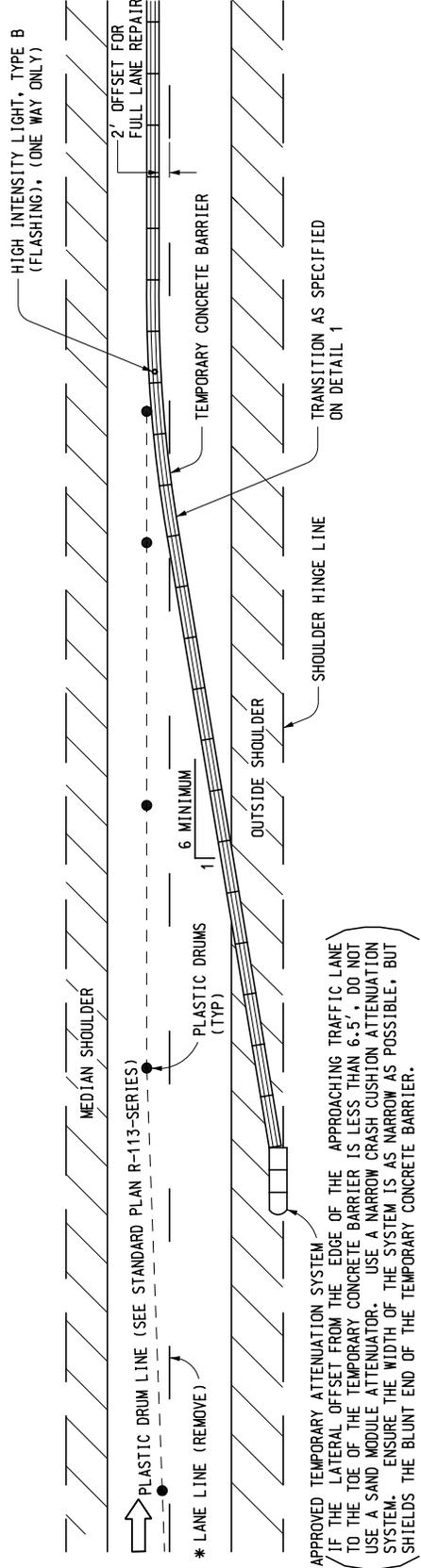
150' ON TANGENT
(TYPICAL FOR DETAILS 1, 2, 3, & 4)



** LATERAL OFFSET (MINIMUM DISTANCE)	
SPEED (MPH)	DISTANCE (FEET)
≤ 35	15
40	18
45	20
50	23
≥ 55	31

- * LANE LINE SHALL BE REMOVED A MINIMUM LENGTH EQUAL TO THE LENGTH OF THE DRUM LINE TAPER; TYPICAL FOR DETAILS 1, 2, 3, 4, AND 5.
- ** THE LATERAL OFFSET REFERS TO THE MINIMUM DISTANCE BETWEEN THE EDGE OF THE NEAREST TRAVELED (OPEN) LANE AND THE TRAFFIC SIDE OF THE ENDING OF THE TEMPORARY BARRIER. THE BARRIER SHALL BE EXTENDED TO THE EDGE OF THE SHOULDER EVEN IF THIS DISTANCE IS GREATER THAN LATERAL OFFSET. IF THE LATERAL OFFSET DISTANCE IS GREATER THAN THE DISTANCE TO THE SHOULDER HINGE LINE, USE DETAIL 2.

DETAIL 1



APPROVED TEMPORARY ATTENUATION SYSTEM
IF THE LATERAL OFFSET FROM THE EDGE OF THE APPROACHING TRAFFIC LANE TO THE TOE OF THE TEMPORARY CONCRETE BARRIER IS LESS THAN 6'-5", DO NOT USE A SAND MODULE ATTENUATOR. USE A NARROW CRASH CUSHION ATTENUATION SYSTEM. ENSURE THE WIDTH OF THE SYSTEM IS AS NARROW AS POSSIBLE, BUT SHIELDS THE BLUNT END OF THE TEMPORARY CONCRETE BARRIER.

DETAIL 2

WHEN DETAIL 1 CANNOT BE USED BECAUSE OF RESTRICTED LATERAL OFFSET



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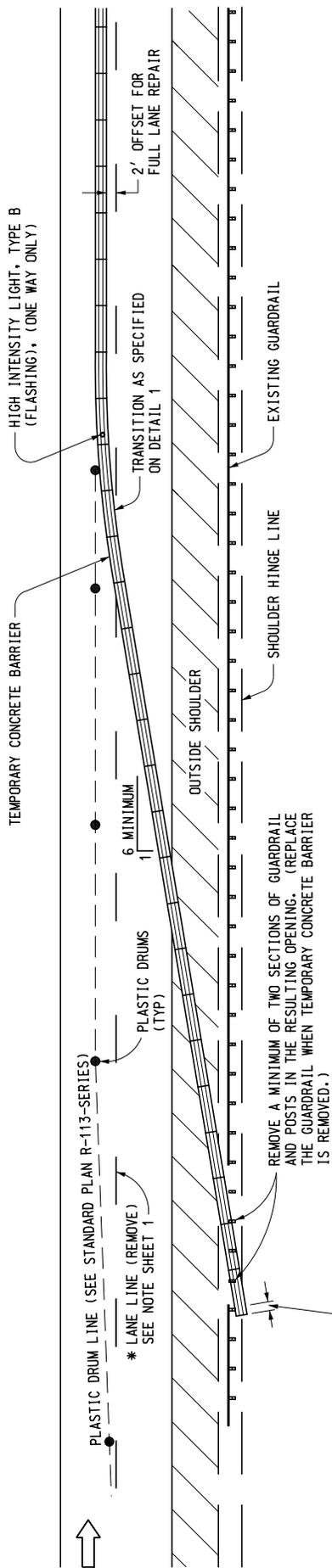
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DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

PLACEMENT OF TEMPORARY CONCRETE BARRIER

F.H.W.A. APPROVAL 1-26-2012 PLAN DATE R-126-I SHEET 1 OF 5

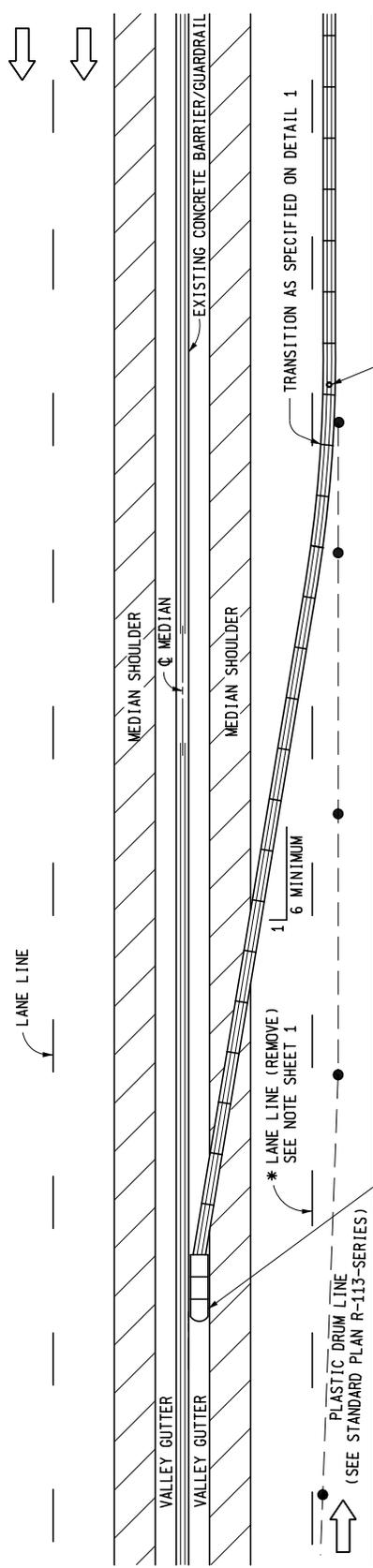


REMOVE A MINIMUM OF TWO SECTIONS OF GUARDRAIL AND POSTS IN THE RESULTING OPENING. (REPLACE THE GUARDRAIL WHEN TEMPORARY CONCRETE BARRIER IS REMOVED.)

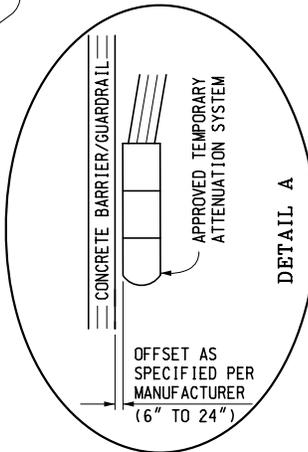
THE TEMPORARY CONCRETE BARRIER SHALL EXTEND A MINIMUM OF 2' BEYOND THE GUARDRAIL POST. PLACE BARRIER AGAINST POST. DO NOT BREAK INTO THE LENGTH OF A GUARDRAIL ENDING TERMINAL. BEGIN BARRIER A MINIMUM OF ONE SECTION OF RAIL BEYOND THE LENGTH OF THE APPROACH TERMINAL (OR REVISE THE TAPER RATE OF THE BARRIER.)

DETAIL 3

(TEMPORARY CONCRETE BARRIER IN GUARDRAIL AREA)



APPROVED TEMPORARY ATTENUATION SYSTEM (SEE DETAIL A) IF THE LATERAL OFFSET FROM THE EDGE OF THE APPROACHING TRAFFIC LANE TO THE TOE OF THE EXISTING CONCRETE BARRIER/GUARDRAIL IS LESS THAN 8'. DO NOT USE A SAND MODULE ATTENUATOR. USE A NARROW CRASH CUSHION ATTENUATION SYSTEM. ENSURE THE WIDTH OF THE SYSTEM IS AS NARROW AS POSSIBLE, BUT SHIELDS THE BLUNT END OF THE TEMPORARY CONCRETE BARRIER.



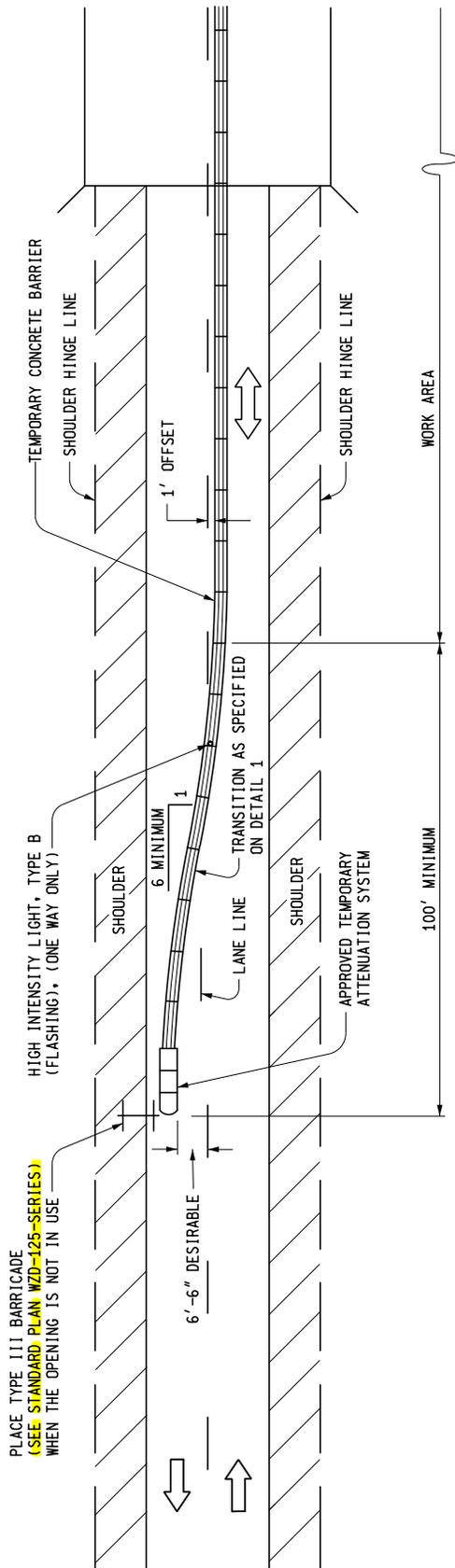
DETAIL 4

(TEMPORARY CONCRETE BARRIER IN CONCRETE MEDIAN BARRIER AREA)

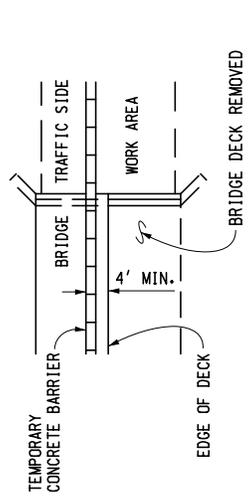
NOTE: SIMILAR TREATMENT MAY BE USED ON SINGLE FACE BARRIER ON OUTSIDE SHOULDER.

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
**PLACEMENT OF
 TEMPORARY CONCRETE BARRIER**

F.H.W.A. APPROVAL	1-26-2012 PLAN DATE	R-126-I	SHEET 2 OF 5
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DETAIL 5
 (TRAILING END OF TEMPORARY CONCRETE BARRIER ON TWO-WAY ROADWAY)



TEMPORARY CONCRETE BARRIER ON BRIDGE
 (BRIDGE DECK REPLACEMENT - PART WIDTH)

- BARRIER ON BRIDGE NOTES:**
- IT IS RECOMMENDED THAT ONE OF THE FOLLOWING METHODS, WHICH ARE LISTED IN ORDER OF PREFERENCE, BE USED WHEN THERE IS LESS THAN 4'-0" Laterally between the toe of the barrier on the traffic side and the drop-off.
 - CONSTRUCT A SLIP-FORMED CONTINUOUSLY STEEL REINFORCED CONCRETE BARRIER.
 - IF THE BARRIER IS TO BE PLACED ON AN EXISTING CONCRETE DECK THAT WILL EVENTUALLY BE REMOVED ANYWAY, DRILL TWO HOLES LARGE ENOUGH FOR #8 STEEL DOWELS OR PEGS TO BE INSERTED INTO THE LOWER SLOPING PORTION OF EACH BARRIER SECTION NEAR EACH END OF THE TRAFFIC SIDE OF THE BARRIER AND CONTINUING INTO THE CONCRETE BELOW. THESE DOWELS SHOULD EXTEND 6" IN THE DECK, AND AT LEAST 6" INTO THE BARRIER, (BUT NOT PROTRUDE ABOVE THE BARRIER SURFACE) AND BE GROUTED, TO PREVENT BOTH SLIDING AND OVERTURNING OF THE BARRIER SECTION.

DETAIL 5 NOTES:

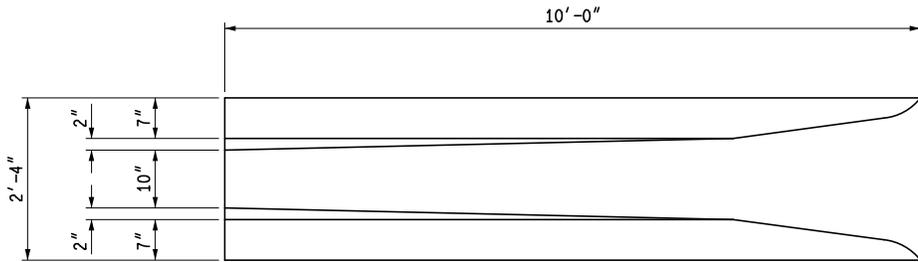
WHERE CONTROLLED BI-DIRECTIONAL TRAFFIC IS MAINTAINED ON A SINGLE LANE, THE PLACING OF TEMPORARY CONCRETE BARRIER ON THE APPROACHING END OF A LANE CLOSURE SHALL BE THE SAME AS SPECIFIED ON DETAIL 1, 2 OR 3. THE TRAILING END OF THE LANE CLOSURE SHALL BE AS SPECIFIED ON DETAIL 5. THE PLASTIC DRUM LINE TAPER WILL BE ACCORDING TO THE CURRENT MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES OR WITH THE MAINTAINING TRAFFIC PROVISIONS IN THE PLANS OR PROPOSAL. THE TEMPORARY CONCRETE BARRIER END SECTION ON THE TRAILING END OF THE TEMPORARY CONCRETE BARRIER SHALL BE PARALLEL WITH THE TRAFFIC.

3. IF BARRIER IS PLACED ON A NEWLY CONSTRUCTED SURFACE, DEVICES FOR ANCHORING THE TEMPORARY CONCRETE BARRIER COULD BE USED, PROVIDED THE ANCHORING DEVICES CAN BE REMOVED FLUSH WITH THE ROADWAY SURFACE WHEN THE BARRIER IS REMOVED.

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

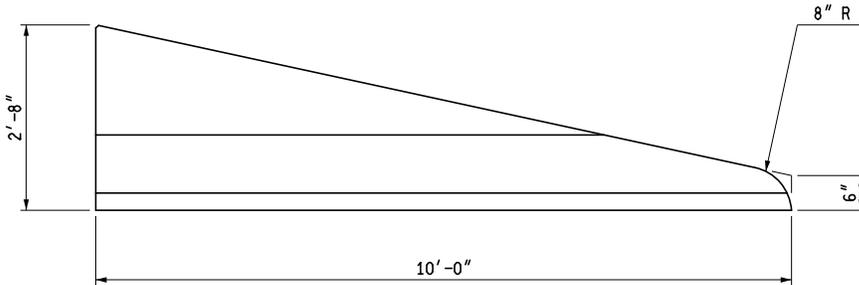
**PLACEMENT OF
 TEMPORARY CONCRETE BARRIER**

F.H.W.A. APPROVAL	1-26-2012 PLAN DATE	R-126-I	SHEET 3 OF 5
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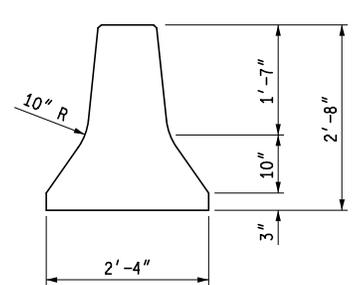


TOP VIEW

NOTE:
HARDWARE USED TO CONNECT THE END SECTION TO TEMPORARY CONCRETE BARRIER MUST MEET THE REQUIREMENTS OF NCHRP 350 OR MASH (TEST LEVEL 3 OR HIGHER).

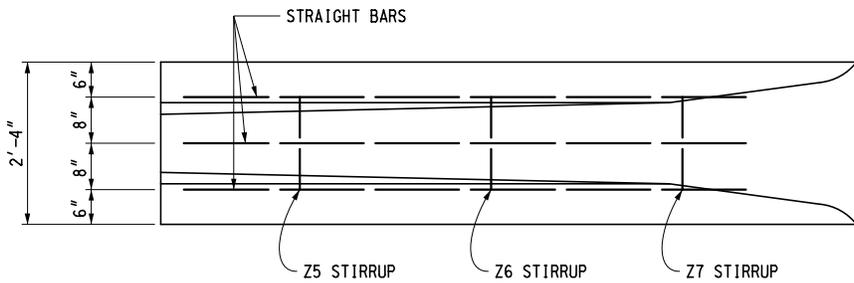


ELEVATION VIEW

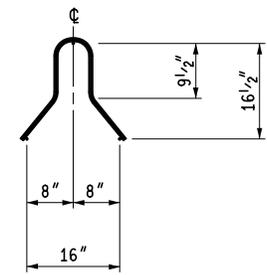


END VIEW

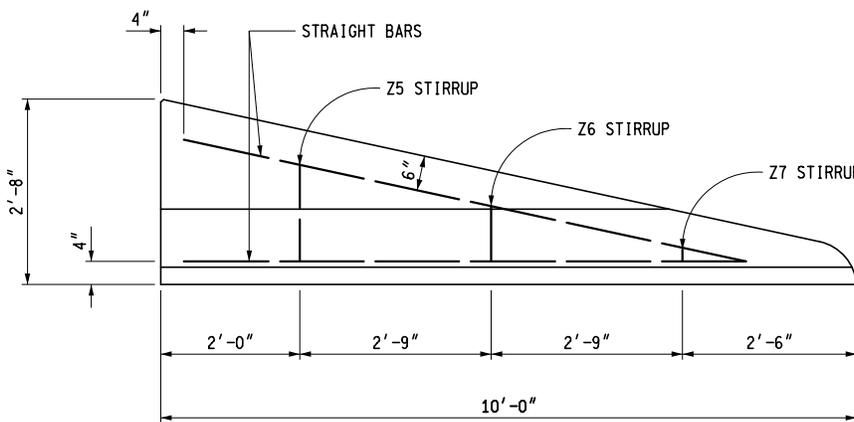
TEMPORARY CONCRETE BARRIER END SECTION



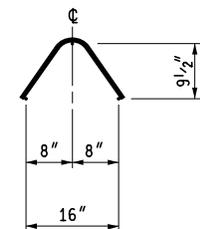
TOP VIEW



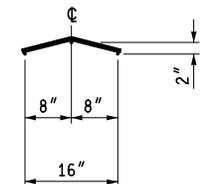
Z5 STIRRUP DETAIL



ELEVATION VIEW



Z6 STIRRUP DETAIL



Z7 STIRRUP DETAIL

STEEL REINFORCEMENT FOR TEMPORARY CONCRETE BARRIER END SECTION

NOTE: #5 BARS SHALL BE USED FOR ALL STRAIGHT BARS AND STIRRUPS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**PLACEMENT OF
TEMPORARY CONCRETE BARRIER**

F.H.W.A. APPROVAL	1-26-2012 PLAN DATE	R-126-I	SHEET 4 OF 5
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NOTES:

THE SEQUENCE OF BARRIER PLACEMENT SHALL BE IN THE DIRECTION OF TRAFFIC FLOW. BARRIER REMOVAL SHALL BE IN THE DIRECTION OPPOSITE TO TRAFFIC FLOW.

TEMPORARY PORTABLE BARRIER END SECTION SHALL BE USED TO TERMINATE BARRIER ENDS SUBJECT TO APPROACH TRAFFIC, EXCEPT WHEN THE BARRIER IS OTHERWISE ATTENUATED OR TERMINATED BEHIND GUARDRAIL.

DETAIL 2 WILL BE USED WHEN THERE IS NO EXISTING GUARDRAIL OR BARRIER AVAILABLE AS SPECIFIED IN DETAILS 3 OR 4.

THE LOCATION OF THE HIGH INTENSITY LIGHT, TYPE B (FLASHING) SPECIFIED IN DETAIL 1, SHALL APPLY TO DETAILS 2, 3, 4, AND 5. ALSO THE HIGH INTENSITY LIGHT, TYPE B SHALL BE FASTENED ON THE TOP OF THE BARRIER.

THE BARRIER FLARE RATE SHALL BE AT LEAST 6' OF RUN FOR EVERY FOOT OF OFFSET.

EXACT LATERAL PLACEMENT OF BARRIER MUST BE SPECIFIED ON THE PLANS OR IN THE PROPOSAL. BARRIER POSITION SPECIFIED IS DESIRABLE WHEN WORK AREA INVOLVES THE FULL WIDTH OF THE CLOSED LANE. WHEN PARTIAL LANE WORK IS INVOLVED, OR SHOULDER WORK ONLY, BARRIER SHOULD BE SET INSIDE CLOSED LANE, AS ALLOWED BY WORK AREA, WITH 2' OR MORE OFFSET DESIRABLE TO LANE LINE.

IN DETAIL 3, EXISTING GUARDRAIL POSTS ARE REMOVED TO FACILITATE PLACING OF TEMPORARY BARRIER BEHIND THE GUARDRAIL. THE DEGREE OF THE BARRIER DEPARTURE ANGLE WILL DETERMINE THE AMOUNT OF BEAM GUARDRAIL AND THE NUMBER OF POSTS TO BE REMOVED.

THE HIGH INTENSITY LIGHT, TYPE B SHALL BE OMITTED WHERE TWO-WAY TRAFFIC IS MAINTAINED ON ONE LANE AND IS CONTROLLED BY TRAFFIC SIGNALS.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

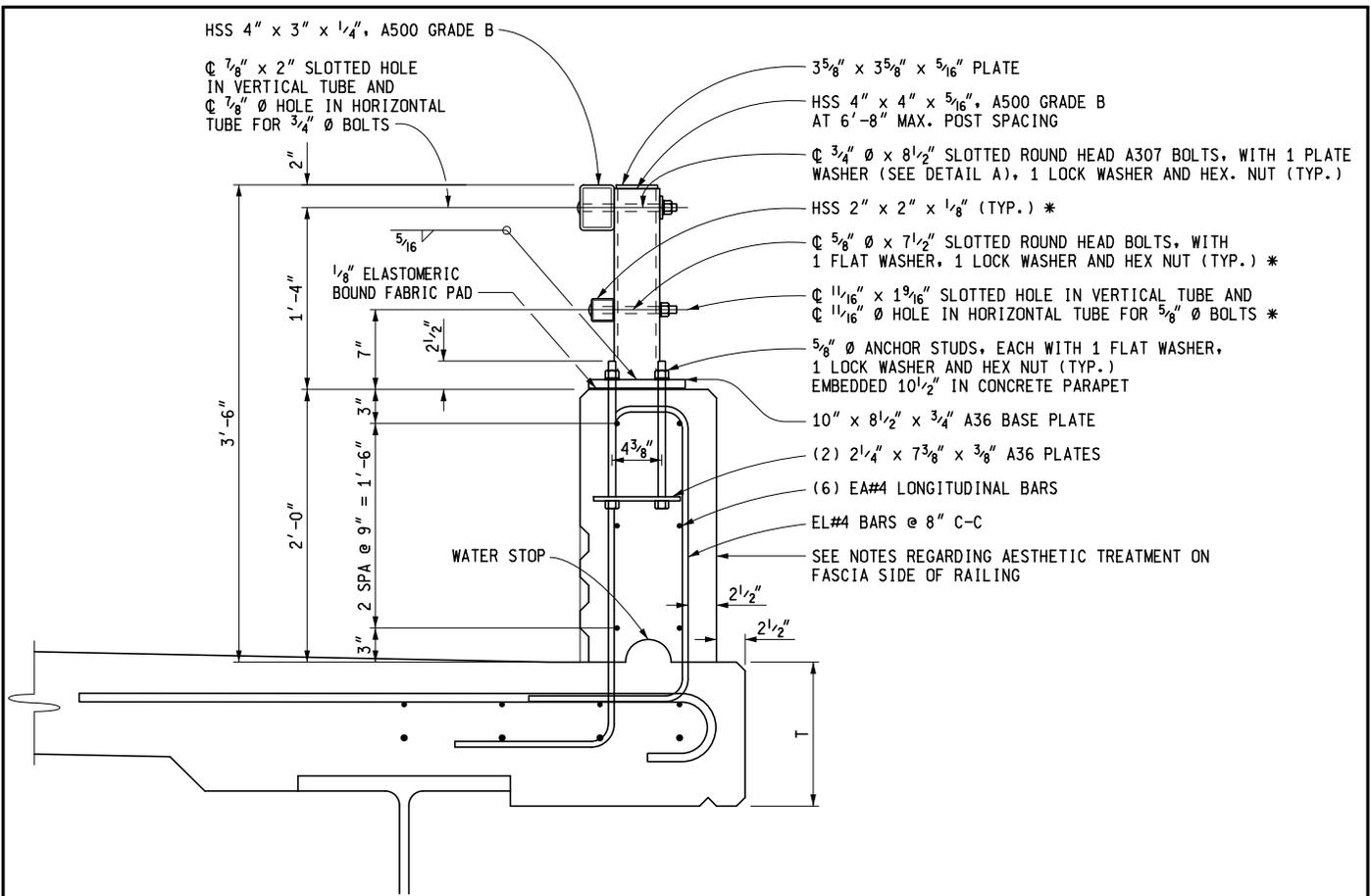
**PLACEMENT OF
TEMPORARY CONCRETE BARRIER**

F.H.W.A. APPROVAL

1-26-2012
PLAN DATE

R-126-I

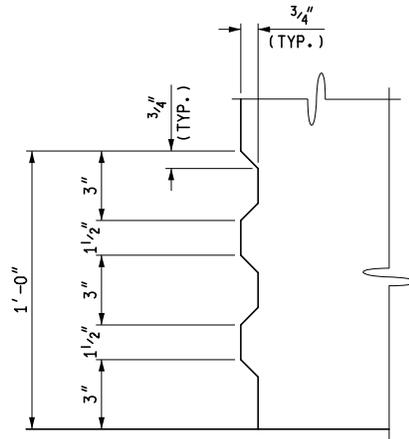
SHEET
5 OF 5



FLUSH MOUNT BRIDGE RAILING

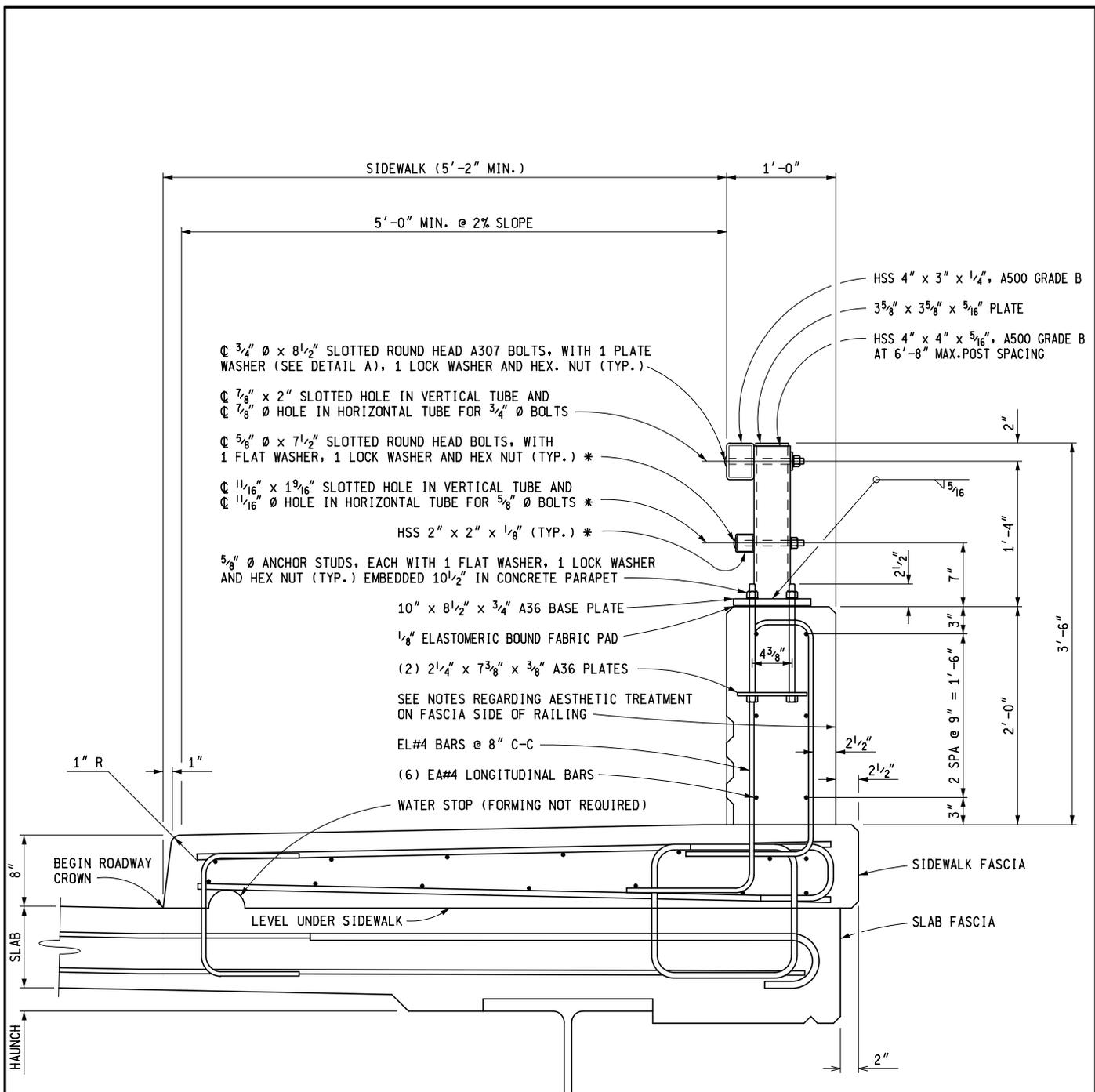
NOTES:

- ALL WORK AND MATERIAL SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
- DETAILS SHOWN ARE IN ACCORDANCE WITH CURRENT AASHTO SPECIFICATIONS.
- BRIDGE RAILING USED WITH SIDEWALK SHALL BE USED ONLY WITH THE SIDEWALK CONFIGURATION (PROFILE) SHOWN ON THIS STANDARD PLAN.
- NO SLIP FORMING OF "BRIDGE RAILING, AESTHETIC PARAPET TUBE" SHALL BE ALLOWED. RAILING SHALL BE CAST IN PLACE.
- THE LIGHT STANDARD ANCHOR BOLT ASSEMBLY IS INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". SEE STANDARD PLAN B-103-SERIES.
- FOR LIGHT STANDARD ANCHOR BOLT ASSEMBLY DETAILS, IF BRIDGE RAILING, AESTHETIC PARAPET TUBE IS PLACED FLUSH ON THE BRIDGE DECK (WITHOUT SIDEWALK), THE LIGHTING CONDUIT SHALL NOT BE PLACED IN THE RAILING.
- A RUBBED FINISH ON THE VERTICAL AND TOP CONCRETE SURFACES OF THE PARAPET RAILING IS REQUIRED.
- AESTHETIC TREATMENT AS DETAILED ON THIS SHEET SHALL BE ADDED TO THE FASCIA SIDE OF RAILING IF NO AESTHETIC TREATMENT IS DETAILED ON THE PLAN SHEETS AND SHALL BE INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". AESTHETIC TREATMENT DETAILED ON THE PLAN SHEETS MAY BE UP TO 1" IN CONCRETE DEPTH WITHOUT MODIFICATION TO THE RAILING WIDTH AND SHALL BE INCLUDED IN THE BID ITEM "BRIDGE RAILING, AESTHETIC PARAPET TUBE". AESTHETIC TREATMENT REQUIRING ADDITIONAL RAILING WIDTH OR THE USE OF ELASTOMERIC FORM LINERS SHALL BE PAID FOR SEPARATELY.
- * THE HSS 2" x 2" x 1/8" RAIL, SLOTTED HOLE, AND 5/8" BOLT ARE NOT REQUIRED WHEN RAILING IS USED IN COMBINATION WITH PEDESTRIAN FENCING (SEE STANDARD PLAN B-41-SERIES).



AESTHETIC TREATMENT DETAIL

 PREPARED BY DESIGN DIVISION DRAWN BY: <u>B.L.T.</u> CHECKED BY: <u>V.Z.</u>	DEPARTMENT DIRECTOR Kirk T. Stuedle APPROVED BY: _____ DIRECTOR, BUREAU OF FIELD SERVICES	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR BRIDGE RAILING, AESTHETIC PARAPET TUBE	
	APPROVED BY: _____ DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT	F.H.W.A. APPROVAL	1-30-2012 PLAN DATE

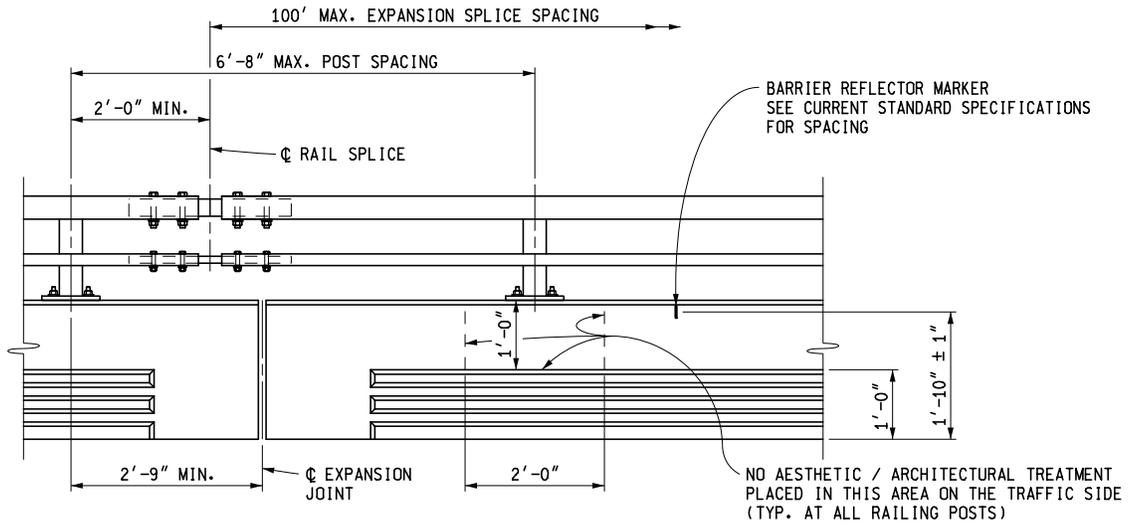


BRIDGE RAILING WITH SIDEWALK

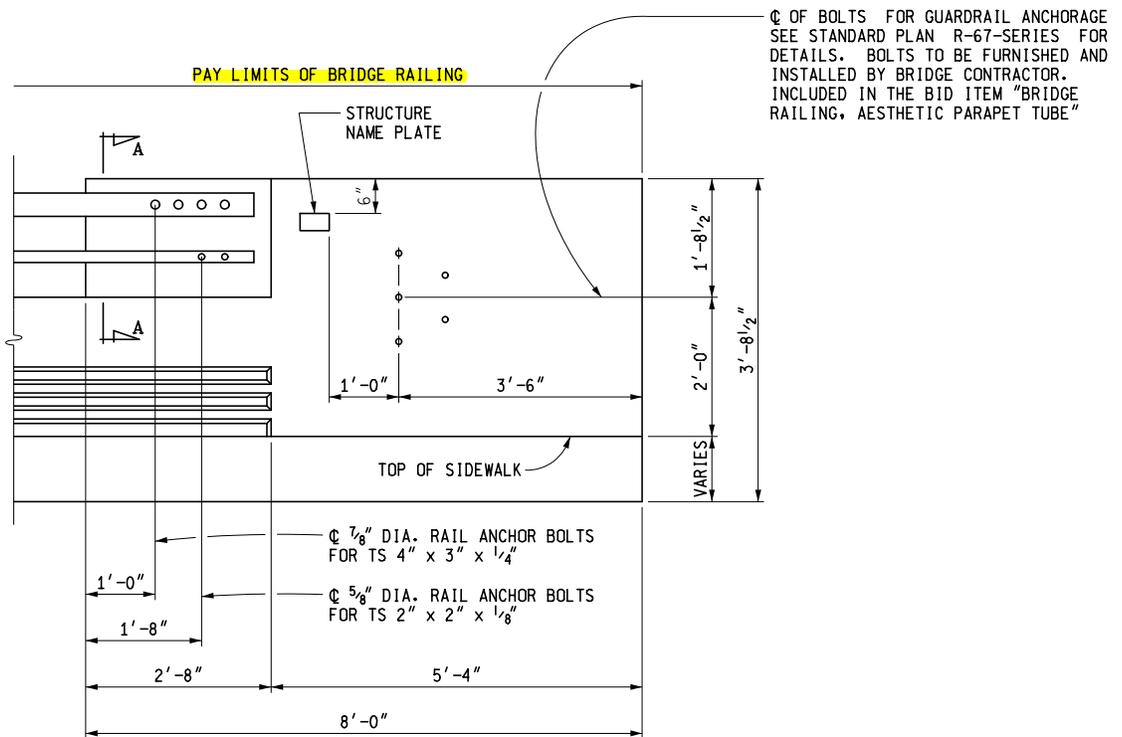
MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**BRIDGE RAILING,
 AESTHETIC PARAPET TUBE**

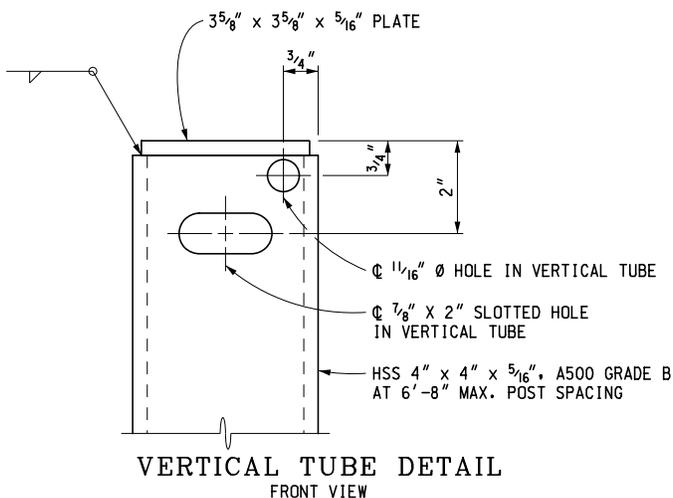
F.H.W.A. APPROVAL	1-30-2012 PLAN DATE	B-25-G	SHEET 2 OF 6
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RAILING ELEVATION



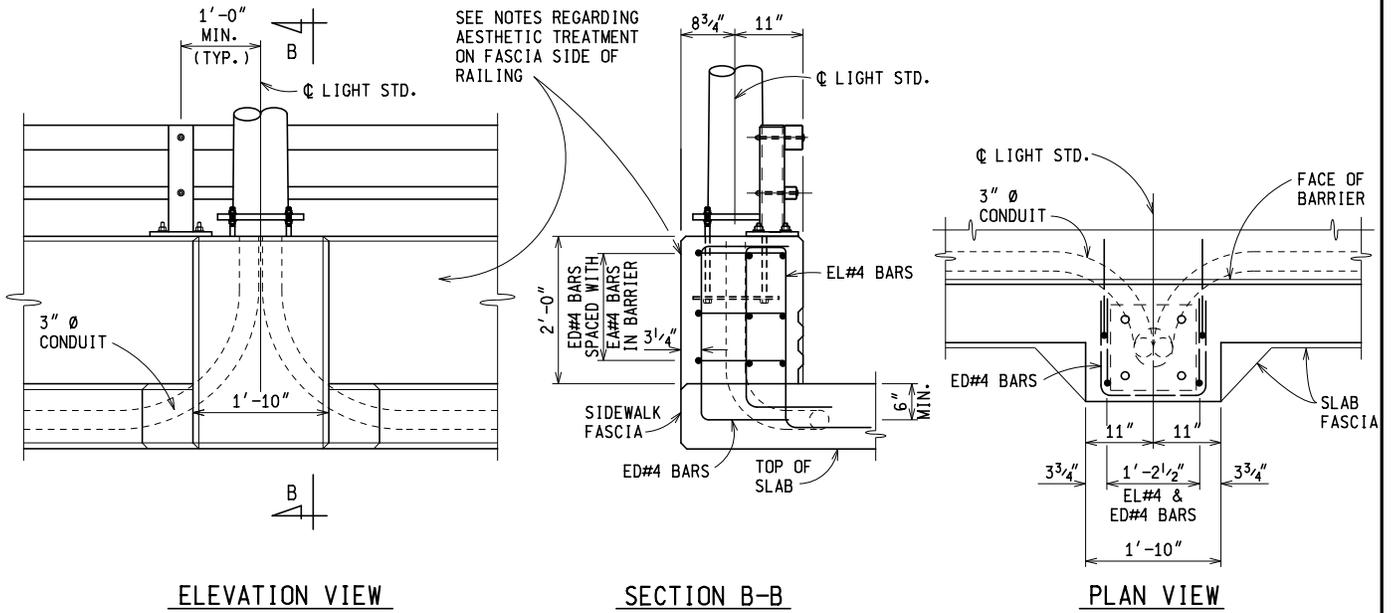
END WALL ELEVATION



MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**BRIDGE RAILING,
AESTHETIC PARAPET TUBE**

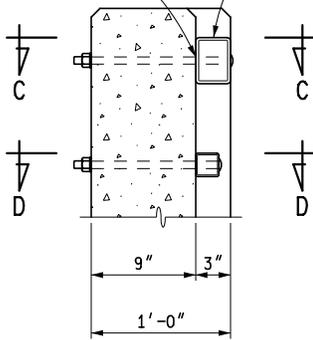
F.H.W.A. APPROVAL	1-30-2012 PLAN DATE	B-25-G	SHEET 3 OF 6
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LIGHT STANDARD DETAILS

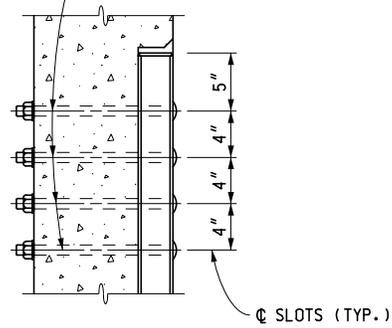
THREADS SHALL BE EXCLUDED FROM SHEAR PLANE (TYP.)

HSS 4" x 3" x 1/4", A500 GRADE B



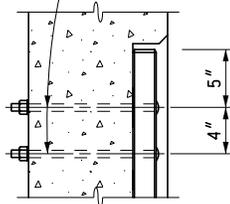
SECTION A-A

1 5/16" x 1 1/8" SLOTTED HOLE IN RAIL, 7/8" Ø x 1'-2" SLOTTED ROUND HEAD BOLTS WITH HEX. NUT, 1 FLAT WASHER, 1 LOCK WASHER (TYP.)



SECTION C-C

1 1/16" x 7/8" SLOTTED HOLE IN RAIL, 5/8" Ø x 1'-1" SLOTTED ROUND HEAD BOLTS WITH HEX. NUT, 1 FLAT WASHER, 1 LOCK WASHER (TYP.)



SECTION D-D

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

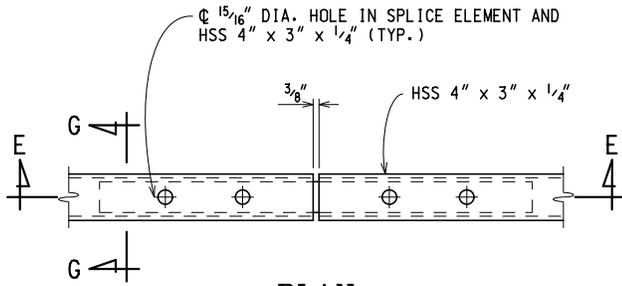
**BRIDGE RAILING,
AESTHETIC PARAPET TUBE**

F.H.W.A. APPROVAL

1-30-2012
PLAN DATE

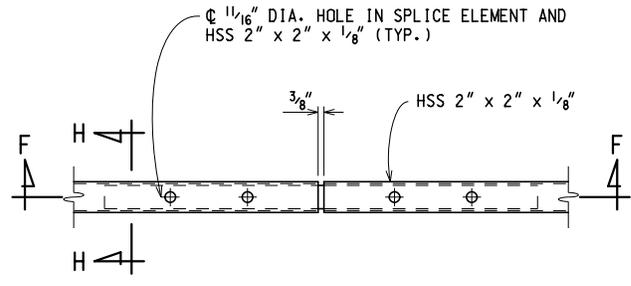
B-25-G

SHEET
4 OF 6



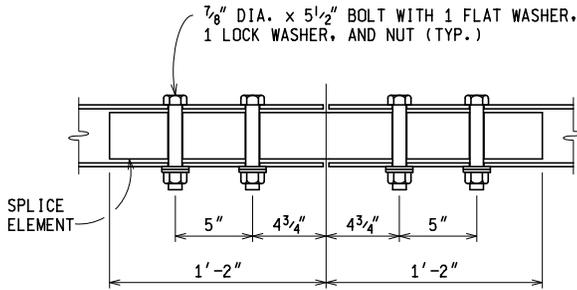
PLAN

HSS 4" x 3" x 1/4"



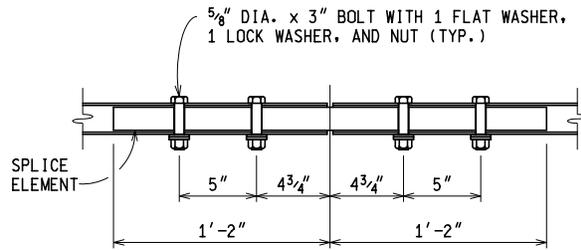
PLAN

HSS 2" x 2" x 1/8"



SECTION E-E

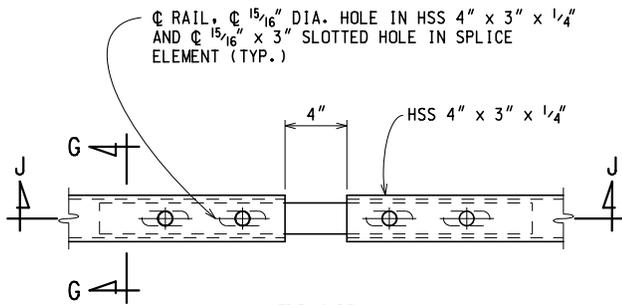
HSS 4" x 3" x 1/4"



SECTION F-F

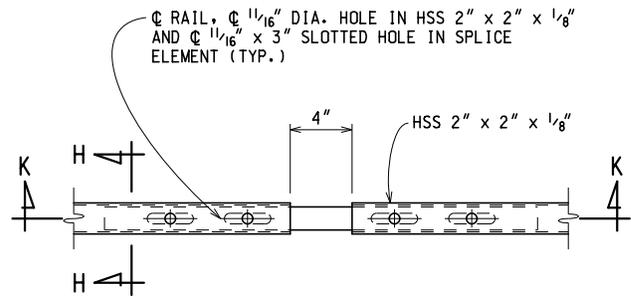
HSS 2" x 2" x 1/8"

FIXED SPLICE DETAILS



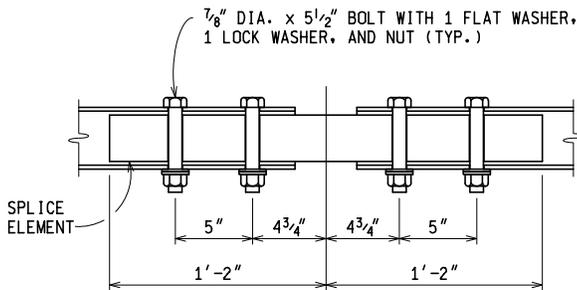
PLAN

HSS 4" x 3" x 1/4"



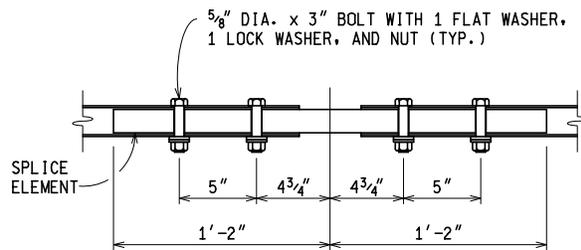
PLAN

HSS 2" x 2" x 1/8"



SECTION J-J

HSS 4" x 3" x 1/4"



SECTION K-K

HSS 2" x 2" x 1/8"

EXPANSION SPLICE DETAILS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

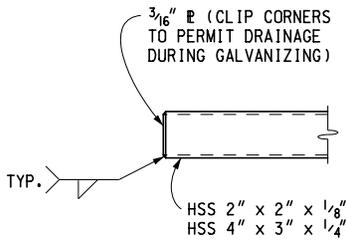
BRIDGE RAILING,
AESTHETIC PARAPET TUBE

F.H.W.A. APPROVAL

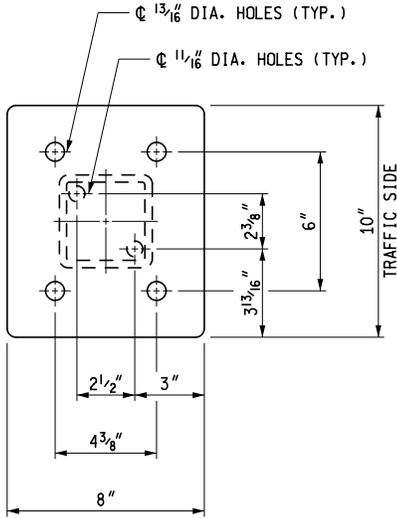
1-30-2012
PLAN DATE

B-25-G

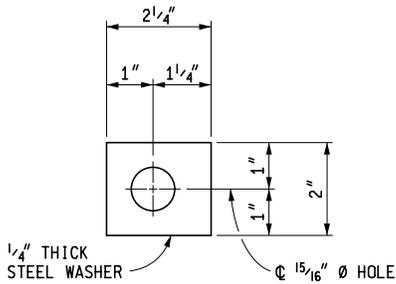
SHEET
5 OF 6



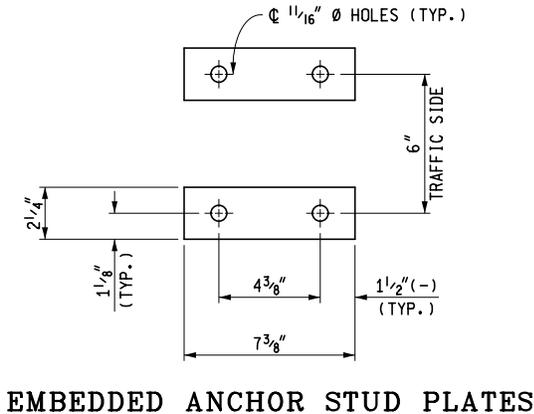
END OF RAIL



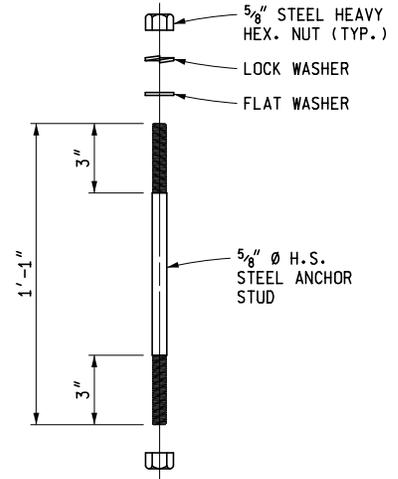
EXTERIOR BASE PLATE



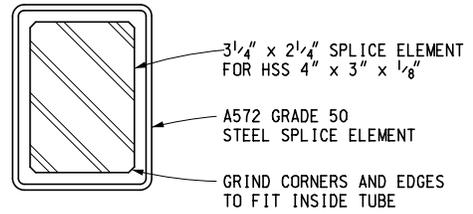
DETAIL A



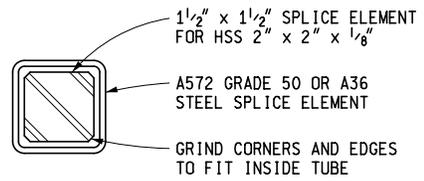
EMBEDDED ANCHOR STUD PLATES



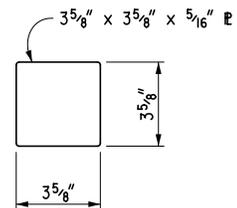
ANCHOR STUD DETAIL



SECTION G-G



SECTION H-H



POST COVER PLATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**BRIDGE RAILING,
AESTHETIC PARAPET TUBE**

F.H.W.A. APPROVAL

1-30-2012
PLAN DATE

B-25-G

SHEET
6 OF 6

ROAD DESIGN MANUAL ROAD DESIGN

7.01.66 (revised 10-22-99)

Concrete Barrier, Single Face

Single face concrete barrier was developed to shield roadside hazards from one side only. One such situation is found on depressed expressways, where the right side approaches to bridge piers need shielding from only one side. The Metro Region favors the use of a concrete barrier over the use of steel beam guardrail in these locations. The major justification for its use is the virtual absence of the need for maintenance. The results are less exposure to risk for maintenance personnel and the elimination of a damaged system being exposed to the motoring public between an impact and the completed repair.

If the normal width shoulder can be maintained and a concrete barrier safety shape is needed, it should be placed in front of the underpass bridge piers. Otherwise the concrete safety shape should be transitioned to the vertical face of the pier column as specified on Standard Plan R-54-Series. Because single face concrete barrier is most commonly used on urban depressed expressways, the approach ending is usually buried in the adjacent cut slope. See Standard Plan R-54-Series. If the approach end cannot be buried in a backslope, it should be shielded with a minimum of a Guardrail Anchorage, Bridge and a guardrail approach terminal.

The use of single face concrete barrier will usually be requested at the plan review meeting and will usually be restricted to the depressed urban freeway situation. Its use in rural areas is generally discouraged because of the cost factor, the "snow fence" effect, and drainage problems created by concentrating runoff at one or few locations on high fills. However, the single face concrete safety shape might be considered between two consecutive bridges having safety shape concrete railings that are approximately 200' apart or less.

7.01.67 (revised 2-27-2012)

Temporary Concrete Barrier

Temporary concrete barrier was introduced in Michigan about 1972. Since that time, its use in construction work zones has steadily increased. Temporary concrete barrier serves a dual purpose: it shields hazards originating from construction practices and protects construction and maintenance personnel from the inherent hazard of closely adjacent moving traffic.

Barrier sections were initially precast. Then, a cast-in-place or slip-formed barrier similar to permanent barrier was allowed. Current designs meeting NCHRP 350 / MASH criteria are now required.

When computing quantities of temporary concrete barrier, the designer should review the staging plans and determine the maximum length of barrier required at any one time on the project. If the staging requires that barrier units be moved, additional pay items and quantities either for adjusting or relocating are necessary. Generally, the pay item "Conc Barrier, Temp, Adj" is used for moving the barrier laterally to a new alignment on the same roadbed and "Conc Barrier, Temp, Relocated" is used for relocating the barrier longitudinally on the same roadbed, or to another roadbed. See current specifications for exact methods of payment.

ROAD DESIGN MANUAL ROAD DESIGN

7.01.68 (revised 2-27-2012)

Ending Temporary Concrete Barrier

The methods for ending temporary barrier are specified on Standard Plan R-126-Series.

7.01.69 (revised 3-23-2010)

Temporary Concrete Barrier at Bridge Deck and Railing Reconstruction

Temporary concrete barrier is frequently used on bridge railing replacement projects. Its use, however, is not feasible if it results in lane widths of less than 10'-0", nor if the duration of need is short. In the latter event, alternatives are plastic drums, traffic signals at each end of the work site, or a detour. It may be noted that use of concrete barrier on a bridge produces three points of constriction at about the same location: a narrower shoulder, introduction of the bridge railing, and the funneling down created by the barrier itself. If possible, it is better if these constrictions and driver decision points can be spread out along the approach roadway.

Bridge deck reconstruction usually requires more work area than bridge railing reconstruction, and will frequently result in bi-directional traffic control on a single lane. Temporary concrete barrier is commonly used in this application and a detail showing placement is specified on Standard Plan R-126-Series. Maintaining traffic provisions should be included in the plans.

7.01.70 (revised 10-22-99)

Temporary Concrete Barrier Adjacent to a Precipitous Drop-off

There are occasions, notably when reconstructing a bridge by part width, when maintaining traffic constraints will force the placement of temporary concrete barrier immediately adjacent to a precipitous drop-off situation. This creates a potential for the line of barrier to be displaced under impact, when there may be no room available for displacement. When this condition occurs, special measures may be needed to ensure that the barrier will not be so displaced. When less than 4'-0" is available between the toe of the barrier on the *traffic* side and the drop-off, one of the following measures, listed in order of preference should be used:

1. Cast a continuous slip-formed barrier, steel reinforced.
2. If the barrier is to be placed on an existing concrete deck that will eventually be removed anyway, drill two holes large enough for 1" diameter steel dowels or pegs to be inserted into the lower sloping portion of each barrier section near each end on the traffic side of the barrier and continuing into the concrete below. These dowels should extend 6" into the deck, and at least 4" into the barrier, (but not protrude above the barrier surface) and be grouted, to prevent both sliding and overturning of the barrier section.
3. In the case of new work, a variation of option 2 above might involve casting some type of anchor that can be cut off flush later.
4. Other treatments may be submitted to the Barrier Advisory Committee for approval.

If the designer has a choice, removal limits should be selected so as to maximize and equalize available width for the traffic lanes and barrier.

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 contains 3R and 4R work, the determination of the work category will be based on the work type that is more than 50% of the total cost of the project. The whole project will be considered as the controlling dollar work type, either 3R or 4R.

The single classification of combined work does not necessarily dictate the standards that apply to the project. When it is determined by cost criteria that a project is classified as 4R, 4R standards will apply to the entire project regardless of individual work types. Projects classified as 3R are governed by the standards that correspond to each work type (3R or 4R). **Cross road over bridges shall be treated as individual segments regardless of project work type.** (8-20-2009) (2-27-2012)

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)

3.01 (continued)

A study must be prepared for all new construction and major 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)

Before starting and during the preparation of the study plans, the following information relevant to the design of the bridge should be considered:

- A. Engineering Report. (Including Environmental Impact Statement if applicable.) (8-20-99)
- B. Topography.
- C. Traffic data - If traffic data is unavailable at this time, it should be requested from Region/TSC Traffic and Safety personnel.

3.01 (continued)

STUDY

- D. Soil Data - Soil borings should be ordered as soon as possible after receiving the project.

In general, one soil boring should be requested for each substructure unit less than 100' long and two borings for footings longer than 100'. For retaining walls, MSE walls and sewers, borings should be taken every 300'. If conditions are found to vary appreciably, additional borings will be required. Refer to the Geotechnical Investigation and Analysis Requirements for Structures, on the MDOT Web site. (8-20-2009)

Soil boring requests should be submitted to the Geotechnical Services Section of the Construction Field Services Division. The request should consist of four copies for Soils and one copy for the Unit File of the General Plan of Site Sheet as described in Section 3.01.01, with the following information shown in red on the copies:

1. Town, range and section number.
2. Scope of work.
3. Location of substructure units and borings.
4. Approximate bottom of footing elevations.
5. Notification when piles will be used regardless of soil character.
6. Indicate whether 400 kip nominal pile resistance (60 ton LFD) piles are appropriate (widening jobs). (8-20-2009)
7. Indicate if continuous superstructure is anticipated, and if integral abutments are being considered. (8-20-99)

If plans of an existing structure are available, prints of the General Plan of Site and Log of Borings should be included. (8-6-92)

- E. Maintenance Reports (reconstruction projects). (8-20-99)

3.01 (continued)

- F. Existing and/or proposed utilities.

- G. Waterway data for stream and river crossings.

1. Stream crossings are to be checked to determine whether they are a part of the county drain system, and the findings are to be recorded in the design folder. Contact Design Engineer - Hydraulics/Hydrology or Region Drainage Coordinator.

2. Scour potential shall be investigated and design provisions may be needed to prevent undermining of the substructure. Contact Design Engineer - Hydraulics/Hydrology or Construction Field Services Division, Geotechnical Services Section.

A scour analysis is required at all stream crossings where reconstruction is proposed. (8-20-2009)

- H. Scoping Document and Region/TSC Scoping estimate. (8-20-99)

- I. Minutes of city, county, or other meetings that have been held relevant to the project.

- J. Correspondence files.

- K. Existing Plans (reconstruction projects) and web based street level viewer.

- L. At all stream crossings, contact Roadside Development Unit to determine if an aesthetic or open railing should be considered.

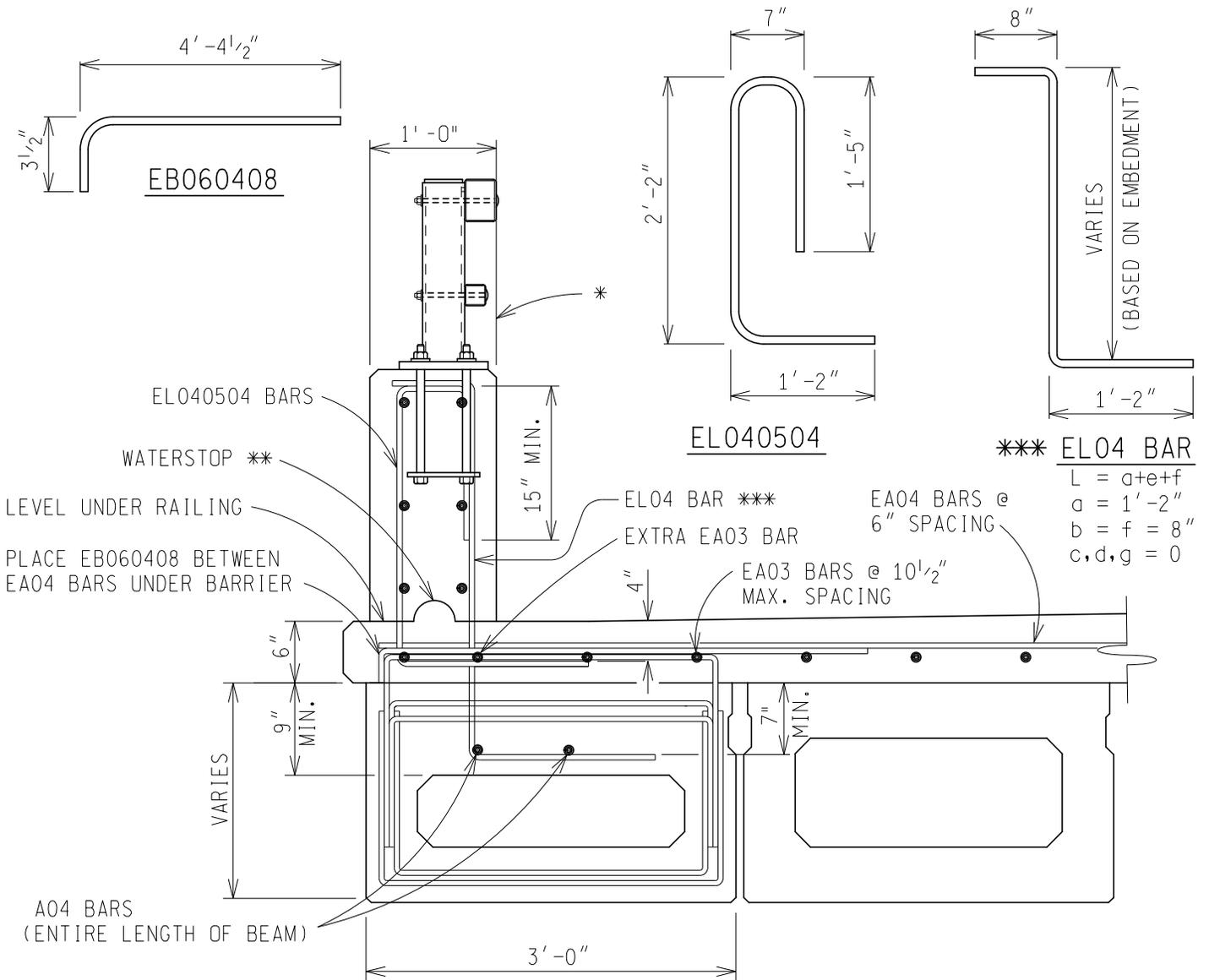
- M. Project Safety Analyses - Requests should be made to Design Division, Safety Programs Section in Lansing. (8-20-99)

- N. Capacity Analysis – Traffic (request for deck replacement and reconstruction projects only) (2-27-2012)

DRAWN BY: BLT
 CHECKED BY: VZ
 APPROVED BY: DAJ

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAY DEVELOPMENT
 AESTHETIC PARAPET TUBE RAILING ON
 PRESTRESSED CONCRETE BOX BEAM

ISSUED: 02/27/12
 SUPERSEDES: 02/14/11



BEAM DESIGN MUST BE CHECKED FOR ADDITIONAL DEAD LOAD AND POSSIBLE PULLOUT OF ELO4 BAR.

FOR ANGLE OF CROSSING 70° TO 90° PLACE TRANSVERSE STEEL PARALLEL TO REF. LINE.

FOR ANGLE OF CROSSING < 70° AND SPAN LENGTH > DECK WIDTH PLACE TRANSVERSE STEEL ⊥ TO BRIDGE C.

FOR ANGLE OF CROSSING < 70° AND SPAN LENGTH < DECK WIDTH PLACE TRANSVERSE STEEL || TO REF. LINE.

PLACE LONGITUDINAL STEEL PARALLEL TO BRIDGE C IN ALL CASES.

* PERPENDICULAR TO PLANE OF SLAB - NORMAL CROWN SECTION AND HIGH SIDE OF SUPERELEVATED SECTIONS.

VERTICAL - LOW SIDE OF SUPERELEVATED SECTIONS.

** 2" HIGH x 4" LONG (±). FORMING NOT REQUIRED.

FOR ADDITIONAL DETAILS OF BRIDGE RAILING, SEE STANDARD PLAN B-25-SERIES.

BARS WITH PREFIX "E" ARE TO BE EPOXY COATED.

PREPARED BY
 DESIGN DIVISION

6.29.10D