Engineering Policy Ballot

Effective: January 1, 2025

Level 2

Level three revisions require the approval of the **Assistant Chief Engineer** and the **Federal Highway Administration** only. The Senior Management Team is encouraged to review the content and provide comment to the appropriate director. For all other parties, these revisions are posted for information only.

ENGINEERING POLICY BALLOT

Effective: January 1, 2025

Issue 1: Reinforcing Concrete Curb.

Approval: **Level 2 – Assistant Chief Engineer**

Sponsor: Rick Schneider – MT

Summary: Add longitudinal bar to tie bars when integral curb is poured with permissible construction joint to help reduce curb breaking.

Publication: Missouri Standard Specification: Sec 609.20
Missouri Standard Plan: 609.00, 731.10

Issue 2: Updating AASHTO requirements for M-180 in Sec. 1040

Approval: **Level 2 – Assistant Chief Engineer**

Sponsor: Sarah Kleinschmit – CM, Todd Bennett – CM, Brett Trautman – CM

Summary: AASHTO recently updated the requirements for galvanizing and stamp requirements in M-180. This brings our standard specification up to date.

Publication: Missouri Standard Specification: Sec 1040

SECTION 609.20 INTEGRAL CURB.

609.20.1 Description. This work shall consist of curb constructed on the edge of concrete pavement as shown on the plans or as directed by the engineer.

609.20.2 Material. All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Section
Concrete Curing Material	1055
Material for Joints	1057

609.20.2.1 Integral curb shall be constructed of concrete conforming to that required for concrete pavement, except coarse aggregate in accordance with the gradation requirements of Sec 1005 may be used.

609.20.2.2 The quantity of coarse aggregate in the mix may be reduced to obtain better workability.

609.20.3 Construction Requirements.

609.20.3.1 The curb shall be an integral part of the supporting concrete pavement. The curb may be placed immediately after all pavement finishing operations have taken place and before the pavement has taken initial set, or tie bars may be set in the freshly finished pavement to serve ultimately as a tie between the pavement and the curb, which may be constructed later. If the curb is to be constructed later, an epoxy coated longitudinal bar shall be tied to the tie bars. Neither of these methods will be required for the distance needed for paving equipment to be backed up near a construction joint. The pavement surface within this relatively short distance shall be roughened throughout the area to be covered by the curb.

609.20.3.2 Forms joined neatly and tightly, set accurately to alignment and grade, and securely held in place by connections and bracing shall be used for this work. Forms for curved form lines shall be provided in a manner similar to that required for setting forms for concrete pavement in Sec 502. Slip-form methods may be used for placement of integral curb provided all other requirements of Sec 609.20 are met. Form placement and slip form use shall ensure one inch minimum concrete cover for longitudinal bar and tie bars, when used.

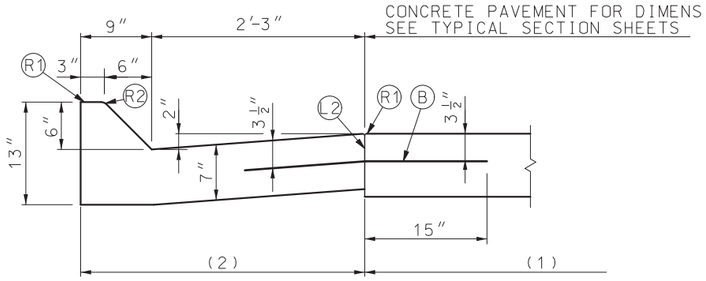
609.20.3.3 The finished curb shall be true to line, grade and cross section, with the top and face finished smooth. The top edges of the curb shall be rounded with approved edging tools. Curing shall be accomplished in the same manner as required for concrete pavement, except transparent membrane shall be used. Joints of preformed material shall be placed through the curb and into each underlying transverse pavement joint to the full depth of the joint in the pavement. The preformed material shall extend entirely through the curb to within 1/4 inch of the top and face of the curb.

609.20.3.4 Where tie bars are set in freshly finished pavement surface and membrane curing is used on the pavement, care shall be taken to avoid spraying the membrane on the protruding tie bars, longitudinal bar or the area on which the integral curb is to be placed. One of the other curing methods allowed in accordance with Sec 502 shall be used for curing this area of the pavement.

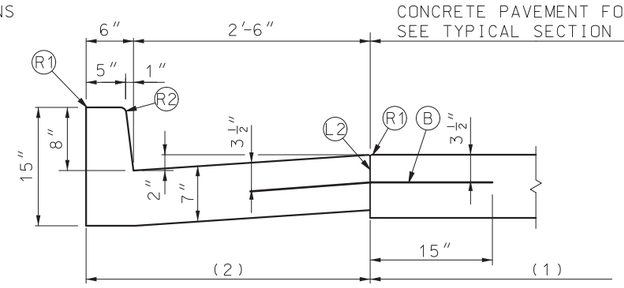
609.20.3.5 Integral curb straightedged parallel to the centerline shall not show a variance greater than 1/4 inch from a 10-foot straightedge.

609.20.4 Method of Measurement. Final measurement of the completed integral curb will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. Where required, integral curb will be measured to the nearest linear foot along the curb face, exclusive of paved approaches. The revision or correction will be computed and added to or deducted from the contract quantity.

609.20.5 Basis of Payment. The accepted quantity of integral curb, complete in place, will be paid for at the contract unit price for each of the pay items included in the contract. Payment for curb constructed on paved approaches will be included in the contract unit price for paved approaches.

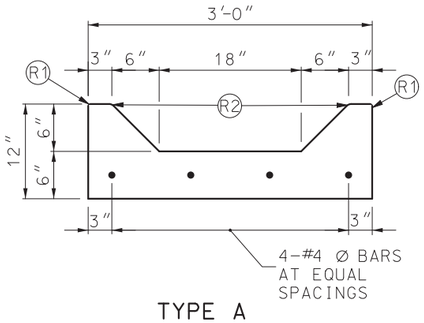


TYPE A
(MOUNTABLE)



TYPE B
(BARRIER)

CURB & GUTTER



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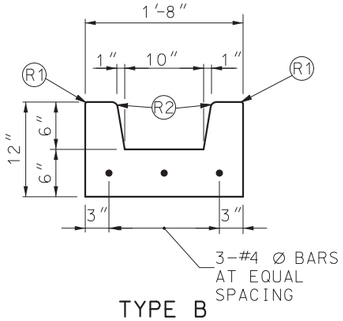
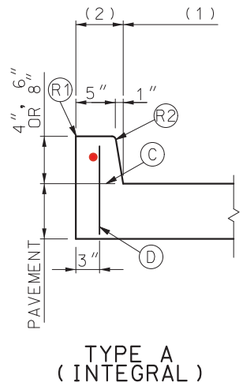


TYPE B

GUTTERS

SEE STANDARD PLAN 607.11 FOR MODIFIED TYPE A AND B GUTTERS



TYPE A
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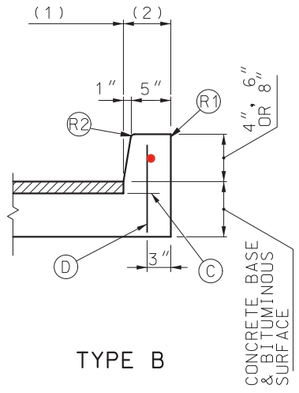
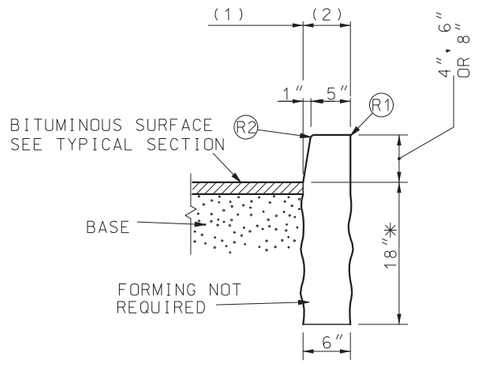


TYPE B



TYPE S
(SEPARATED)

✳ DEPTH MAY BE REDUCED IF KEYED 6″ IN ROCK

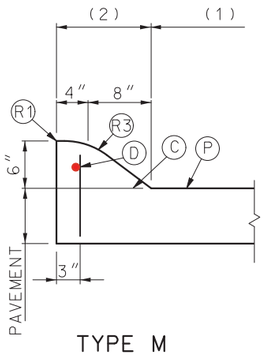
BARRIER CURBS

#3 OR #4 DIA. EPOXY COATED LONGITUDINAL AND TIE BARS. LONGITUDINAL BAR GAPPED 4" AT JOINTS WITH ANY SPLICES LAPPED 8". TIE BARS... MINIMUM 1" COVER OVER BARS.

LONGITUDINAL AND TIE BARS

LEGEND

- (B) TIE BARS – 30″ X #5 Ø AT 30″ CTRS.
- (C) PERMISSIBLE CONSTRUCTION JOINT. IF CONSTRUCTED IN THIS MANNER TIE BARS MUST BE USED.
- (D) #4 Ø TIE BAR AT 24″ CENTERS LENGTH OF THE TIE BARS EQUALS THICKNESS OF PAVEMENT PLUS HEIGHT OF CURB, LESS 3 INCHES.
- (L2) LONGITUDINAL JOINT WITH TIE BARS.
- (P) TOP OF PAVEMENT OR CONCRETE BASE.
- (R1) ROUND TO $\frac{1}{4}$″ RADIUS (EXCEPT FOR SAWED JOINTS).
- (R2) ROUND TO $\frac{3}{4}$″ RADIUS.
- (R3) CONSTRUCT TO 9″ RADIUS.
- (1) PAY LIMIT FOR PAVEMENT
- (2) PAY LIMIT FOR CURB, OR CURB & GUTTER.



TYPE M
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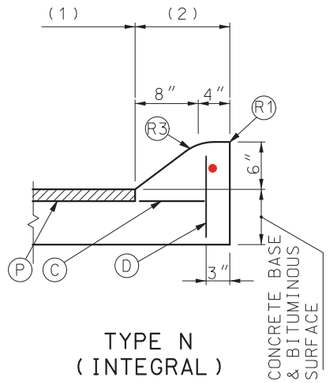

TYPE N
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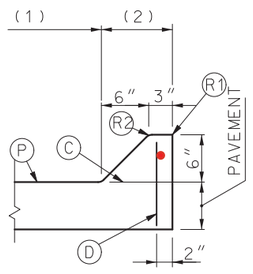
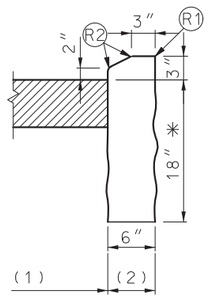
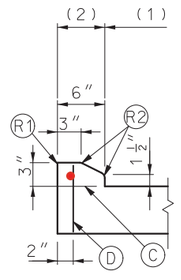


TYPE O
(INTEGRAL)

MOUNTABLE CURBS



TYPE F
(SEPARATED)



TYPE E
(INTEGRAL)

BEGINNING AND ENDING OF INTRODUCED LOW PROFILE CURB SHALL UTILIZE CURB HEIGHT RUNOUT FORM 0 INCHES TO 3 INCHES IN 5 FEET. PAYMENT LENGTH SHALL INCLUDE TAPERS.

✳ DEPTH MAY BE REDUCED IF KEYED 6″ IN ROCK.

LOW PROFILE CURB

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

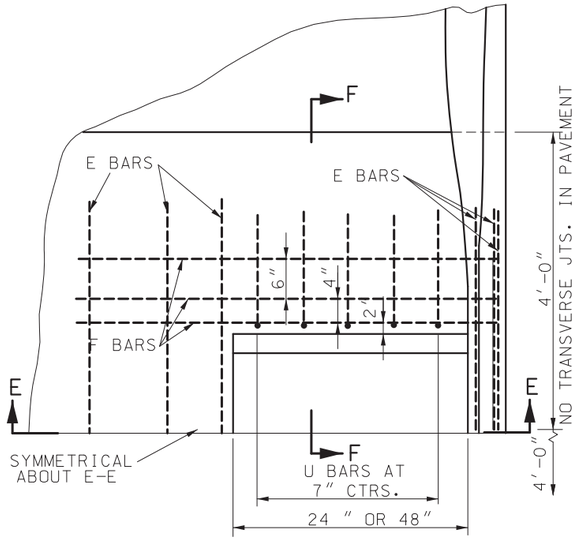
STATE OF MISSOURI
TRAVIS D. KOESTNER
NUMBER PE-30042
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

CONCRETE CURB, CURB AND GUTTER AND GUTTER

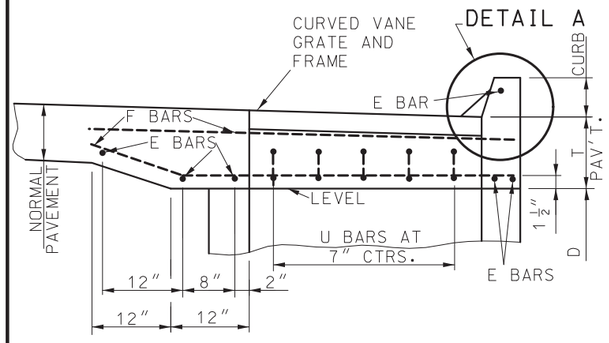
DATE EFFECTIVE: 10/01/2022
DATE PREPARED: 7/19/2022

609.00Q

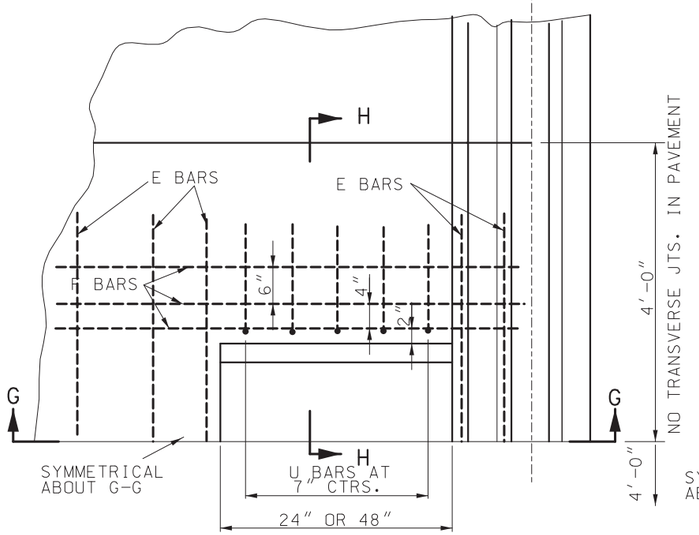
SHEET NO. 2 OF 2



HALF-PLAN



SECTION E-E



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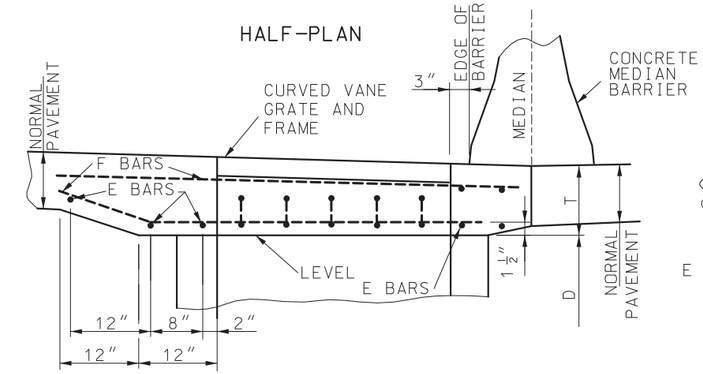
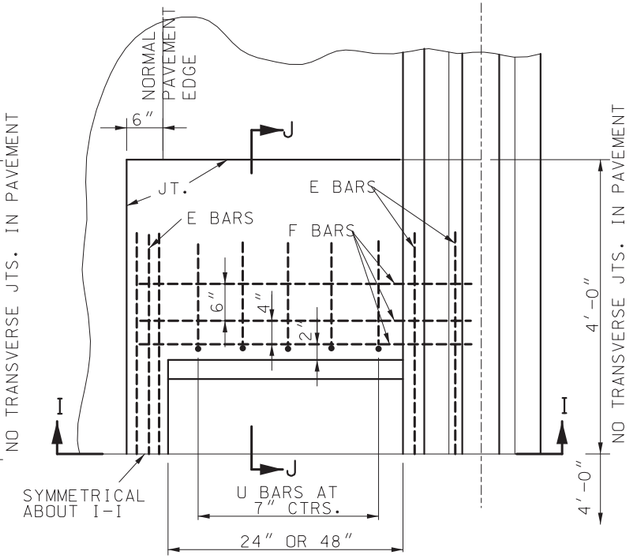


SECTION G-G



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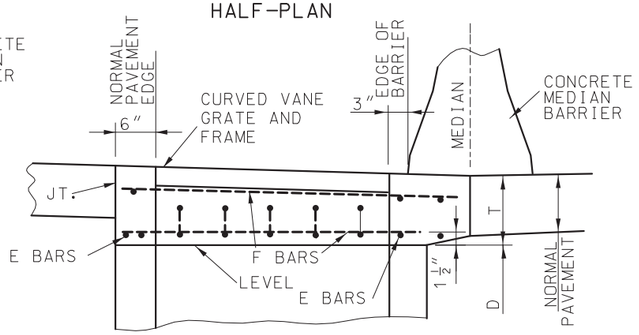
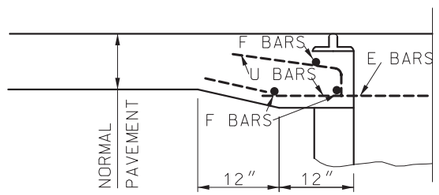
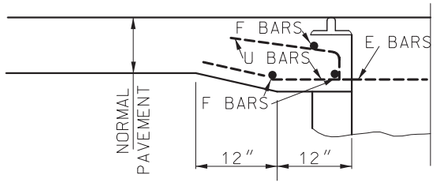


SECTION I-I



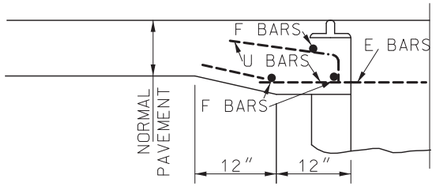
HALF SECTION F-F

TYPE A
INLET ADJACENT TO CURB



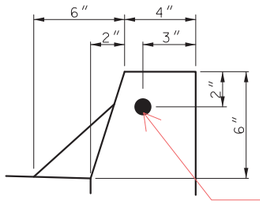
HALF SECTION H-H

TYPE B
DISTANCE BETWEEN BARRIER AND PAVEMENT EDGE GREATER THAN INLET WIDTH



HALF SECTIONJ-J

TYPE C
DISTANCE BETWEEN BARRIER AND PAVEMENT EDGE EQUALTO INLET WIDTH

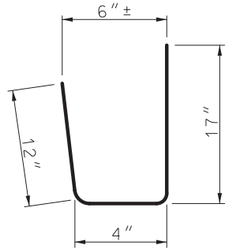


DETAIL A

PAVEMENT BAR BILL

TYPE	WIDTH	LENGTH	MARK	NO.	LENGTH
A	4′	2′	E	6	6′-0″
			F	6	6′-6″
			U	14	2′-9″
	2′	2′	E	6	6′-0″
			F	6	4′-6″
			U	8	2′-9″
B	4′	2′	E	7	6′-0″
			F	6	7′-0″
			U	14	2′-9″
	2′	2′	E	7	6′-0″
			F	6	5′-0″
			U	8	2′-9″
C	4′	2′	E	7	6′-0″
			F	6	5′-3″
			U	14	2′-9″
	2′	2′	E	7	6′-0″
			F	6	3′-3″
			U	8	2′-9″
D	2′	2′	E	6	7′-0″
			F	6	2′-9″
			U	8	2′-9″

BARS E, F, & U.....#4



U-BARS
BENDING DIAGRAM

GENERAL NOTE:

SEE STANDARD PLAN 614.11 FOR CURVED VANE GRATE.

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI
TRAVIS D. KOESTNER
NUMBER PE-30042
PROFESSIONAL ENGINEER
THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

PRECAST DROP INLET
COVERS

DATE EFFECTIVE: 01/01/2022
DATE PREPARED: 10/21/2021

731.10S

SHEET NO.
3 OF 8

SECTION 1040

GUARDRAIL, END TERMINALS, ONE-STRAND ACCESS RESTRAINT CABLE AND GUARD CABLE MATERIAL

1040.1 Scope. This specification covers guardrail, end terminals, one-strand access restraint cable, guard cable and all appurtenances required for installation.

1040.2 Basis of Acceptance. The basis of acceptance will be in accordance with specification compliance and from an approved qualified plant and accepted based on certification, quality control documentation, and tests on samples required by the engineer.

1040.2.1 Sampling, Testing and Acceptance Procedures. All suppliers furnishing components for MoDOT projects shall be qualified as herein described. All components will be subject to inspection by the engineer at the source, intermediate shipping terminal, or at destination. The engineer shall be allowed unlimited access to all facilities and records as required to conduct inspection and sampling in accordance with Sec 106 unless specified below.

1040.2.2 Application for Placement on Qualified List. To become qualified, a written request shall be sent by the supplier to Construction and Materials. The request shall include a "Pre-Qualified Section 1040, 1043, and 1044 Supplier Inclusion Certificate and Guarantee Statement" and a guarantee that all material to be used in fabrication will be in accordance with MoDOT specifications and pre-approval for any source of material will be received prior to use.

1040.2.3 Maintaining Qualification. To maintain qualification, the supplier shall maintain quality control documentation. The required documentation for each shipment of material used in production shall be kept on file for three years. The supplier shall notify Construction and Materials at least 24 hours prior to each shipment.

1040.2.4 Disqualification of a Supplier. A supplier may be disqualified to provide components for use on MoDOT projects based on the discretion of Construction and Materials, for reasons including, but not limited to, not maintaining required documentation, failure of material to consistently meet specifications, falsification of any documentation, misbranding of components, unsatisfactory performance in the field, or for other reasons indicating lack of consistent material quality.

1040.2.4.1 A supplier will not be considered for reinstatement until after one year from the date of removal for falsification of documents.

1040.2.4.2 Three notices of failure to meet specification requirements within a 12-month period will be cause for disqualification of the supplier for one year, effective from the date of the third notice.

1040.2.4.3 A supplier disqualified within one year of the end of a disqualification may be subject to permanent removal, with no application for reinstatement accepted for a period of three years.

1040.2.5 Reinstatement of a Supplier. Consideration of reinstatement of a supplier once disqualified will be no sooner than specified in Sec 1040.2.4, will require a written document from the supplier stating the reasons for disqualification and the action taken to correct those deficiencies, written concurrence from Construction and Materials that the problem has been suitably addressed, and followed by an application in accordance with Sec 1040.2.2.

1040.2.6 Sampling of Material. Random sampling of the material used in production will be conducted by the engineer to verify the material is in compliance with applicable specifications. Sampling size and frequency will be at the discretion of the engineer.

1040.2.7 MoDOT Identification Number. When the supplier contacts the engineer in accordance with Sec 1040.2.3, the engineer will assign a specific MoDOT identification number for each component. A Shippers form must accompany the products to the job site.

1040.3 Posts and Blocks. The same type of posts and blocks shall be used in a given run, except as shown on the plans or as approved by the engineer.

1040.3.1 Wood Posts and Blocks. Wood posts and blocks for guardrail and one-strand access restraint cable shall be in accordance with Sec 1050.

1040.3.2 Steel Posts, Plates and Rails. Steel posts, anchor plates, bearing plates, soil plates, plate washers and channel rail shall be structural steel in accordance with AASHTO M 270, Grade 36, shall be of the dimensions and weights shown on the plans and shall be galvanized in accordance with AASHTO M 111. Bolts, nuts and washers shall be in accordance with the dimensions shown on the plans and shall be galvanized in accordance with AASHTO M 232 (ASTM A153), Class C, or may be mechanically galvanized. If mechanically galvanized, the coating thickness, adherence and quality requirements shall be in accordance with ASTM B695, Class 55. Any dimensional defects and structural discontinuities will be cause for rejection. The material to be welded shall be preheated in accordance with good welding practice, and welds shall be full-section and sound throughout. All welds shall be mechanically cleaned before galvanizing. No punching, drilling, cutting or welding will be permitted after galvanizing.

1040.3.3 Plastic Blocks. Plastic guardrail blocks shall meet the dimensional requirements shown on the plans. The blocks shall be a homogeneous product with a uniform texture, and shall have no cracking, chipping, flaking, peeling or splintering after fabrication. The blocks shall be prepared and tested in accordance with ASTM D4329-13 Cycle C. The blocks shall be of new stock, shall meet all applicable requirements of NCHRP 350 for NCHRP 350 compliant installations or MASH 2016 for MASH 2016 complaint installations, and shall meet the approval of Construction and Materials.

1040.3.3.1 Approval. Prior to approval and use of the plastic guardrail blocks, the manufacturer shall submit to Construction and Materials, the manufacturer's name, the product brand name or model number, a copy of the NCHRP 350 or MASH 2016 test results, a copy of the FHWA eligibility letter, an MSDS and a sample block.

1040.3.3.2 Acceptance. Acceptance of the material will be based on the manufacturer's certification and upon the results of such tests as may be performed by the engineer.

1040.4 Steel Beam Guardrail. Guardrail beams shall be of the class and type shown on the plans. Guardrail beams manufactured after January 1, 2025, shall be in accordance with AASHTO M 180-23, Type 1 or Type 2.

1040.4.1 Test Specimens. Test specimens for mechanical properties, irrespective of the galvanization method, shall be prepared and tested in accordance with ASTM A653.

1040.4.2 End Sections. End sections and terminal connectors shall be of a class and type the same as or superior to that used for the beam to which the end sections and terminal connectors are attached. All end sections and terminal connectors manufactured after January 1, 2025, ~~The physical properties~~ shall be in accordance with AASHTO M 180-23.

1040.4.3 Fabrication. The beams, end sections and terminal connectors shall be shaped and punched as shown on the plans and ready for assembly when delivered. Only drilling or cutting necessary for special connections and for sampling will be permitted in the field. Warped or deformed beams will be rejected. Beams to be erected on a radius of 150 feet or less shall be shop curved to the approximate curvature of the installation.

1040.4.4 Markings.

1040.4.4.1 Beams. All beams manufactured after January 1, 2025, shall have ~~Beam~~ markings ~~shall be~~ in accordance with AASHTO M 180-23, except the AASHTO specification number may be omitted if another designation for Class and Type is used.

1040.4.4.2 Transition Sections and Terminal Connectors. Transition sections and terminal connectors shall be marked in accordance with Sec 1040.4.4.1, except as follows. Durable tags securely attached to each section or connector may be used. If the transition section or terminal connector is Class B, the Class indicator will not be required. If the transition section or terminal connector is Type 2, the Type indicator will not be required. Heat numbers and coating designations will not be required.

1040.4.4.3 End Sections. No markings or tags will be required for end sections.

1040.4.4.4 Posts. Posts shall be marked such that the marking is exposed after installation, in such a manner as to indicate the manufacturer.

1040.4.5 Brand Registration and Guarantee. The manufacturer shall submit a brand registration and guarantee, and current test results indicating compliance with this specification prior to delivery of any material. Once the brand registration and guarantee is approved, the manufacturer's name will be added to the qualified list of guardrail fabricators. For Type I coated material, the brand registration and guarantee shall certify the material as being produced by the continuous galvanizing method.

1040.4.6 Acceptance. Acceptance will be by brand registration and guarantee, and any sampling deemed necessary by the engineer. The contractor or supplier shall provide equipment and personnel required to obtain samples as directed by the engineer.

1040.5 Crashworthy End Terminals.

1040.5.1 Material. Only new material shall be used in the fabrication of end terminals. The major items of the installations shall be the best standard products of a manufacturer regularly engaged in the production of that type of end terminal and shall be of the manufacturer's latest approved design. After installation, the end terminal shall redirect traffic face side vehicle impacts within the prescribed performance crash test criteria ranges.

1040.5.2 Manufacturer's Approval. Prior to approval and use of an end terminal, the contractor shall submit to MoDOT the manufacturer's name, the product brand name or model number, a copy of the MASH 2016 test results, a copy of the FHWA eligibility letter, and shop drawings.

1040.5.3 Acceptance. Acceptance of the material will be based on the manufacturer's certification and upon satisfactory field performance.

1040.5.4 Contractor's Certification. Prior to installation, the contractor shall furnish to the engineer a manufacturer's certification that the units furnished are identical in material and design to successfully tested units.

1040.6 End Anchors, Bridge Anchors, and Approach Transitions.

1040.6.1 Steel Tube and Tube Block. Steel tubes for end anchors shall consist of structural steel tubing in accordance with ASTM A500, Grade B, or ASTM A501 and shall be galvanized in accordance with AASHTO M 111. Structural steel tubing blocks for guardrail shall consist of steel tubing in accordance with ASTM A500, Grade B, and shall be galvanized in accordance with AASHTO M 111.

1040.6.2 Cable. Cable shall be 3/4 inch in diameter, Type II, Class A in accordance with AASHTO M 30.

1040.6.3 Transition Cap Rail. The transition cap rail shall be in accordance with AASHTO M 270, Grade 36.

1040.6.4 Thrie Beam Rail and Transition Section. ~~The~~ All thrie beam rail and transition sections manufactured after January 1, 2025, shall be galvanized in accordance with AASHTO M 180-23, Type 2.

1040.6.5 Approval. The cable assembly and anchor plate will be subject to approval by the engineer and shall have a minimum breaking strength of 20 tons.

1040.6.6 Markings. Thrie beam rail and transition sections shall be marked in accordance with Sec 1040.4.4.

1040.7 Cable and Fittings.

1040.7.1 One-Strand Access Restraint Cable.

1040.7.1.1 Cable. Cable shall be zinc-coated steel wire strand; 1/2-inch diameter; seven wire strand; Common, Siemens-Martin or High Strength grade; Class A coating; and shall be in accordance with ASTM A475.

1040.7.1.2 Hardware. Eyebolts, turnbuckles and clips for cable connections and end anchors shall be steel forgings in accordance with AASHTO M 102 or pearlitic malleable iron in accordance with ASTM A220. All miscellaneous parts, comprising of cable connections, fasteners and end anchors, shall be galvanized in accordance with AASHTO M 232.

1040.7.2 Guard Cable.

1040.7.2.1 Cable and Connecting Hardware. The cable and connecting hardware shall be in accordance with AASHTO M 30 and AASHTO M 269. The wire rope shall be Type 1,
3/4-inch diameter, 3 by 7 construction with a Class A coating. The rope, with connecting hardware, shall develop the breaking strength at a minimum of 25,000-pound single cable. Connecting hardware shall be galvanized in accordance with AASHTO M 232 or may be mechanically galvanized. If mechanically galvanized, the coating, thickness, adherence and quality requirements shall be in accordance with AASHTO M 232, Class C. Cast Steel components shall be in accordance with AASHTO M 103, Grade 70-40, Class 1. Malleable iron castings shall be in accordance with ASTM A47. Compensating devices shall have a spring constant of 0.46 psi, plus or minus 0.06 pound per inch, and permit 6 inches of travel, plus or minus one inch. All threaded parts on compensating cable end assemblies shall be in accordance with ASTM F568, Class 4.6, 3/4-10 threads. Socket baskets shall be designed for use with the cable anchor wedge as shown on the plans. Guard cable anchor brackets shall be manufactured from an AASHTO M 270, Grade 250 steel plate, and zinc-coated in accordance with AASHTO M 111. Dimensional tolerances not shown on the plans shall be consistent with the proper functioning of the part, including the part's appearance and accepted manufacturing process.

1040.7.2.2 Cable Brackets. Steel used in the fabrication of the bracket shall be in accordance with ASTM A36. The bracket shall be galvanized after fabrication in accordance with AASHTO M 111. All fittings, including splices, shall be designed to use the wedge detail, and shall be of such section as to develop the full strength of the 3/4-inch, at a minimum of 25,000-pound round cable. Designs for a combination or single-unit compensating device and turnbuckle assembly shall be submitted for approval. Compensating devices shall have a spring rate of 0.46 ± 0.03 pound per inch, and shall permit 6 inches ± one inch of travel. All parts, except cable wedge, shall be hot-dip zinc coated in accordance with AASHTO M 232 or AASHTO M 298.

1040.7.2.3 Hook Bolts, Hex Bolts, Nuts and Washers. Hook bolts, hex bolts and washers shall be in accordance with ASTM A307. Cable hook nuts shall be 5/16-18 threads and in accordance with ASTM A563. Hook bolts, as installed, shall develop an ultimate pull open strength of 450 to 1,000 pounds applied in a direction normal to the axis of the post. Hooked anchor studs shall be in accordance with AASHTO M 314, except the threads and nominal diameter shall be 3/4-10 and in accordance with ASTM F568, Class 4.6. All

items shall be galvanized in accordance with AASHTO M 232 or may be mechanically galvanized in accordance with AASHTO M 232, Class C.

1040.8 Certification. The contractor shall furnish the manufacturer's certification for all material governed by this specification. Specifically, each certification shall indicate compliance with the requirements of each applicable section and as set forth in Table I.

1040.8.1 Manufacturer's Approval. Prior to a new installation of an approved high-tension guard cable system, the contractor shall submit to MoDOT the manufacturer's name, the product brand name or model number, a copy of the MASH 2016 test results, a copy of the FHWA eligibility letter and shop drawings.

1040.9 Repair of Galvanizing. Galvanized material shall be handled in a manner to avoid damage to the surface. No field punching, drilling, cutting or welding will be permitted after galvanizing. Any galvanized material on which the spelter coating has been damaged will be rejected or may be repaired in accordance with Sec 1081, with approval from the engineer.

TABLE I - Certification Requirements

Item	Galvanizing Standard	Steel Grade	Other
Wood Post and Blocks	-	-	a
Steel Posts, Plates and Brackets	AASHTO M 111	AASHTO M 270, Grade 36	b
Plastic Blocks	-	-	g
Guardrail Beam	Sec 1040.4	Sec 1040.4	b, c
Bolts, Nuts and Washers	AASHTO M 232	ASTM A307	
End Terminals Systems	-	-	f
End Anchors - Tubes - Transition Cap Rail	 AASHTO M 111 AASHTO M 111	 ASTM A500/ASTM A501 AASHTO M 270, Grade 36	 b b
One-Strand Access Restraint Cable - Cable - Hardware	 AASHTO M 30 AASHTO M 232	 AASHTO M 30 AASHTO M 102/ ASTM A220	 b b
Guard Cable - Cable - Hardware - Cast Steel Components - Malleable Iron Castings - Anchor Brackets - Cable Brackets - Hook and Hex Bolts - Hook Nuts - Hooked Anchor Studs	 AASHTO M30 AASHTO M 232 AASHTO M 232 AASHTO M 232 AASHTO M 111 AASHTO M 111 AASHTO M 232 AASHTO M 232 AASHTO M 232	 AASHTO M 30 & AASHTO M 269 AASHTO M 102/ ASTM A220 AASHTO M 103 ASTM A47 AASHTO M 270 AASHTO M 270, Grade 36 ASTM A307 ASTM A563 AASHTO M 314	 b d d d e d

(a) Certification shall state that the material is in accordance with Sec 1050 and shall include a listing of the material supplied and a certified test report as detailed in Section 7.2 of AWPA, Standard M2, attesting to complete compliance with this specification.

(b) Certification shall include, or have attached, specific results of laboratory tests for physical and chemical properties from samples representative of the material.

(c) Shall have Brand Registration and Guarantee on file, including certification indicating the coating is either Type 1 by Continuous Galvanizing Method or Type 2.

(d) All threaded parts of compensating cable end assemblies and hooked anchor studs shall be in accordance with ASTM F568.

(e) All fittings for cable bracket, except the cable wedge, shall be in accordance with AASHTO M 232 or AASHTO M 298.

(f) Certification shall state the name of the manufacturer and that the units furnished are identical in material and design as those tested for performance in accordance with Sec 606.30.

(g) Certification shall state that the materials furnished are identical in chemistry, mechanical properties and geometry as those that passed the NCHRP 350 or MASH 2016 crash test, and as those that were approved by the Missouri Department of Transportation.