Andy Beshear
GOVERNOR

TRANSPORTATION CABINET
200 Mero Street
Frankfort, Kentucky 406 01

Jim Gray
SECRETARY

DESIGN MEMORANDUM NO. 02-25; CONSTRUCTION MEMORANDUM CM 25-04

TO: Chief District Engineers
Project Development Branch Managers
Design Engineers
Active Consultants

FROM: Tim Layson, P.E., Director
Division of Highway Design

Matthew P Simpson, P.E., Director
Division of Construction

Josh Rogers, P.E., Director
Division of Maintenance

DATE: July 16, 2025

SUBJECT: Implementation of Guardrail End Treatment Type 2M

The Division of Highway Design is publishing a revised **Standard Drawing RBR-025, Guardrail End Treatment Type 2M**. This updated drawing introduces a MASH-compliant, non-proprietary trailing-end terminal and anchor designed for use with the 31-inch Midwest Guardrail System (MGS) W-beam, Kentucky's standard guardrail system.

The Type 2M terminal anchors MGS guardrail on the downstream end of a barrier system. It is crashworthy only in the direction of adjacent traffic and is not designed to withstand head-on impacts from opposing traffic. Appropriate locations for its installation include downstream ends of one-way roadways or areas beyond the clear zone for opposing traffic. The Type 2M terminal passed MASH Test Level 3 crash testing for impacts in the direction of adjacent traffic.

Key features of the Guardrail End Treatment Type 2M are summarized below:

- A non-redirective, gating terminal (gates at posts 1–5)
- Intended for the downstream end of a barrier system on a one-way roadway or beyond the opposing traffic clear zone
- Not suitable for shielding fixed objects within the gating zone
- Provides structural anchorage for the MGS guardrail system

- Requires proper grading to maintain crashworthy performance

The Standard Drawing provides component details, while the accompanying **Standard Drawing Reference Report** includes design guidance.

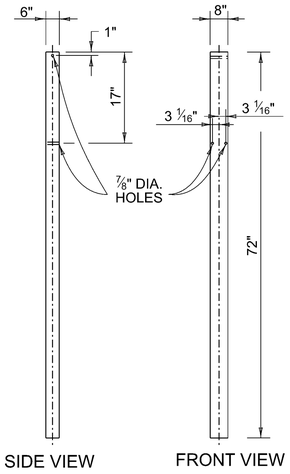
This drawing replaces the previous version of RBR-025, which featured the Type 2A terminal — a pre-MASH design that is no longer acceptable for new installations.

Effective immediately, designers shall use the Guardrail End Treatment Type 2M in place of the discontinued Type 2A at all applicable project locations. For projects currently under construction, all proposed Type 2A end treatments shall be revised to a Type 2M end treatment. If a 2A end treatment has already been installed, the project engineers may elect to leave it in place if deemed appropriate for the specific project conditions. In cases where a Type 2A end treatment was previously specified on the leading end of a guardrail run, it must be replaced with a Guardrail End Treatment Type 1 or Type 4A. The guardrail should be extended as needed to satisfy length-of-need requirements.

Because the Guardrail End Treatment Type 2M is a downstream trailing-end terminal, Standard Drawing RBI-003 – Typical Installation for Guardrail End Treatment Type 2A is no longer valid for new construction and will be archived. Design teams shall no longer reference Standard Drawing RBI-003 in contract plans.

If you have questions regarding this memorandum, please contact the Division of Highway Design at (502) 564-3280.

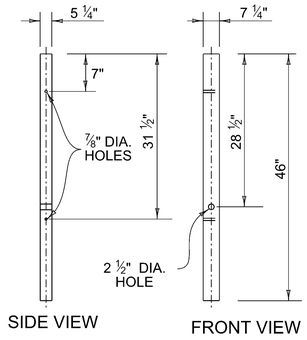
Attachments
RBR-025 GUARDRAIL END TREATMENT TYPE 2M (TRAILING END TERMINAL)



STEEL FOUNDATION TUBE

6"x 8"x ⅛" x 72" STEEL TUBE

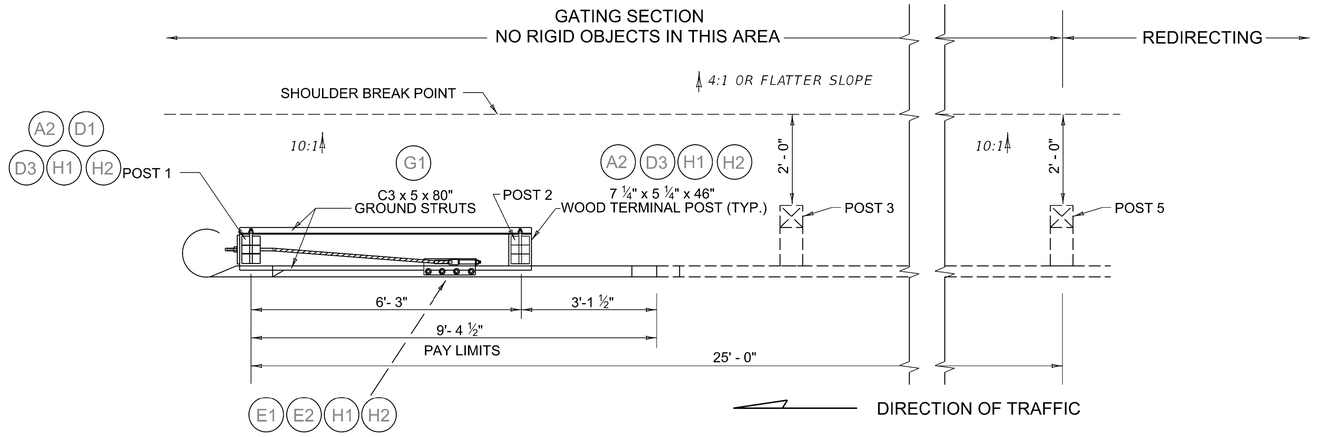
A1 6



TERMINAL POST

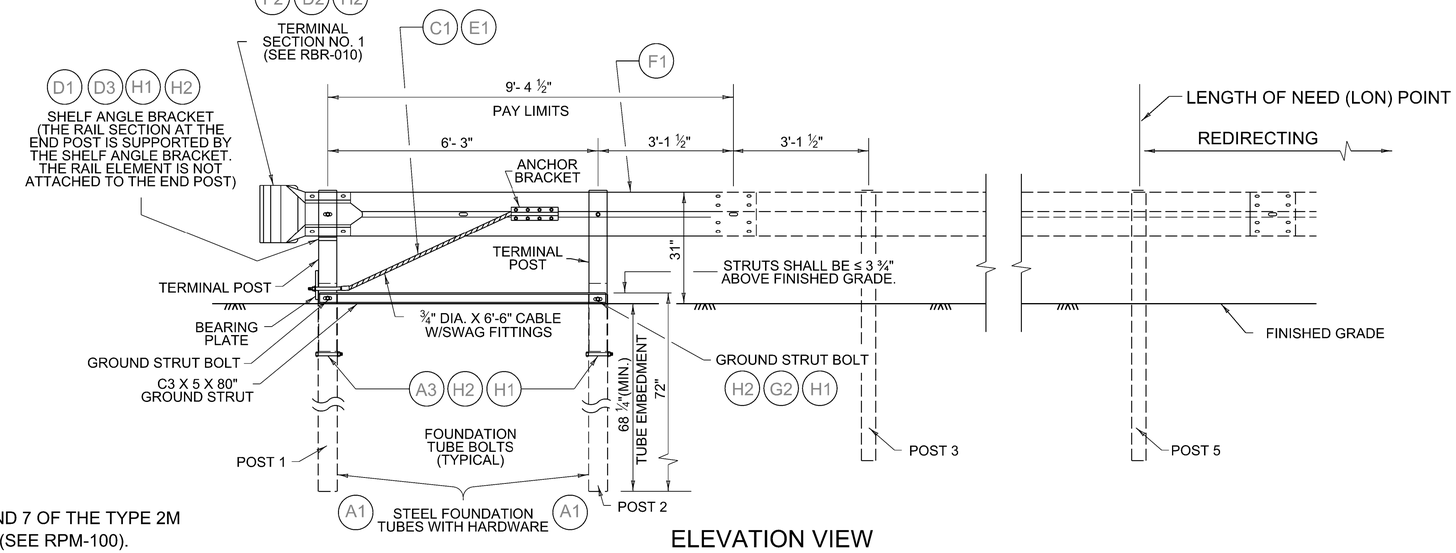
7 ¼"x 5 ¼"x 46" WOOD POST

A2



PLAN VIEW

THIS GUARDRAIL ANCHOR SHALL ONLY BE INSTALLED AT TRAILING ENDS WHEN LOCATED OUTSIDE THE CLEAR ZONE AREA OF OPPOSING TRAFFIC.



ELEVATION VIEW

~ NOTES ~

1. TYPE 2M GUARDRAIL ANCHOR SHALL ONLY BE INSTALLED AT TRAILING ENDS WHEN LOCATED OUTSIDE THE CLEAR ZONE AREA OF OPPOSING TRAFFIC. THE LENGTH OF NEED (LON) OF THE GUARDRAIL IS ONLY OBTAINED AT THE FIFTH GUARDRAIL POST.
2. ALL HOLES IN WOOD POSTS ARE TO BE DRILLED BEFORE PRESERVATIVE TREATMENT IS APPLIED.
3. ALL CUTTING, DRILLING, AND WELDING OF STEEL COMPONENTS SHALL BE DONE BEFORE GALVANIZING.
4. THE FINISHED CABLE ASSEMBLY WILL NOT BE ACCEPTABLE UNLESS IT IS IN TENSION WITH NO SAG.
5. ALL HARDWARE SHALL CONFORM TO ASTM A307 UNLESS OTHERWISE SHOWN.
6. FOR END TERMINAL POSTS 1 AND 2 INSTALLED WITH FOUNDATION TUBES:
   *FOR TYPICAL SOILS, MINIMUM EMBEDMENT REQUIRED IS 68 1/4".
   *IF SOLID ROCK IS ENCOUNTERED AT 20" OR LESS DEPTH, DRILL A 12"-16" DIAMETER HOLE 2 INCHES DEEPER THAN REQUIRED AND INSTALL THE TUBE AT THE STANDARD HEIGHT.
   *IF SOLID ROCK DEPTH EXCEEDS 20 INCHES, DRILL A 12"-16" DIAMETER HOLE AT LEAST 36" DEEP. ADJUST THE TUBE LENGTH TO ENSURE THAT IT IS FULLY EMBEDDED IN THE 36-INCH DRILLED HOLE AND A MAXIMUM 4-INCH PROJECTION ABOVE GRADE, TRIMMING AS NEEDED.
   BACKFILL WITH CUTTING SPOILS, PLACING GRANULAR MATERIAL OR SMALL ROCK (#9 OR #57 STONE) IN THE BOTTOM 2 INCHES FOR DRAINAGE.
7. WHEN CURB AND GUTTER ARE PRESENT WITH GUARDRAIL, BETWEEN POSTS 6 AND 7 OF THE TYPE 2M TERMINAL TRANSITION TO LIP CURB AND GUTTER OR ISLAND CURB AND GUTTER (SEE RPM-100). CONTINUE THE LIP OR ISLAND CURB AND GUTTER FOR 50 FEET BEYOND POST 1 OF THE TERMINAL.
8. COMPONENT DETAILS LABELED BY LETTER AND NUMBER (e.g., A1, H2) ARE DEFINED IN THE MATERIALS LIST ON SHEET 2.

BID ITEM AND UNIT TO BID

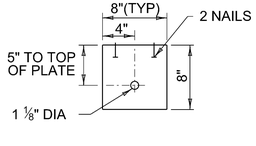
GUARDRAIL END TREATMENT TYPE 2M EACH

REVISION DATE: 07/17/2025
REVISION NUMBER: 0

SUBMITTED — DIVISION DIRECTOR — 07-17-2025 — DATE

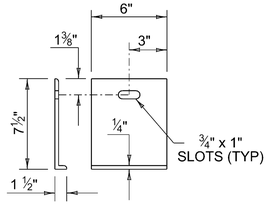
APPROVED — STATE HIGHWAY ENGINEER — DATE

BARRIERS



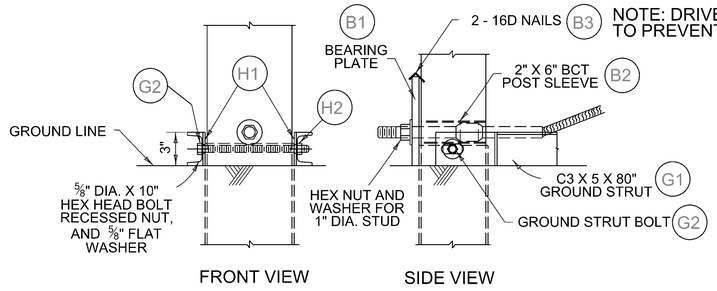
BEARING PLATE
8"x 8"x ⅝" PL

B1

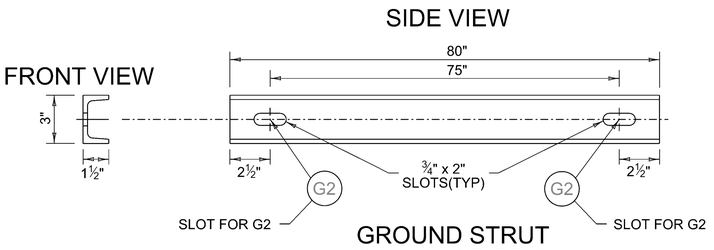


SHELF ANGLE BRACKET

D1



BEARING PLATE ASSEMBLY DETAIL



GROUND STRUT
C3 x 5 x 80", GRADE A36

G1

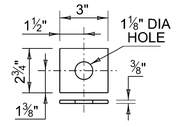
TYPE 2M MATERIALS LIST

PART NUMBER	QUANTITY	DESCRIPTION	HARDWARE GUIDE [1]	MATERIAL DESCRIPTIONS [2, 3]
A1	2	6" x 8" x 72" STEEL FOUNDATION TUBE	NA	AASHTO M111/ASTM A123 ASTM A500 GRADE B OR ASTM A-501
A2	2	7 ¼" X 5 ¼" X 46" WOOD TERMINAL POST	NA	S4S FINISH ON 4 SIDES
A3	4	BOLT, ⅝" DIA. X 8" HEX FOR SOIL FOUNDATION TUBE	FBX16a	ASTM A307
B1	1	BEARING PLATE	FPB01	SEE SPEC. SECTION 812.01.01 FOR ALTERNATIVE STEEL GRADES.
B2	1	BCT POST SLEEVE	FMM02	SEE SPEC. SECTION 812.01.01 FOR ALTERNATIVE STEEL GRADES.
B3	2	16D DOUBLE HEAD NAIL (FOR BEARING PLATE)	NA	AASHTO M232 CLASS D
C1	1	¾" DIA. X 6'-6" CABLE W/ SWAGE FITTINGS (BCT CABLE)	FCA01	
C2	2	1" DIA. ANCHOR CABLE ASSEMBLY WASHER	FWC24a	
C3	2	1" DIA. ANCHOR ASSEMBLY NUT	FNX24a	ASTM A563, GRADE A OR BETTER
D1	1	SHELF ANGLE BRACKET	FPP02	AASHTO M111/ASTM 123/ASTM A36 MIN. STRENGTH 36 KSI, SEE SPEC. SECTION 812.01.01 FOR ALTERNATIVE STEEL GRADES
D2	4	BOLT, BUTTON-HEAD 1 ¼" (FOR CONNECTING TERMINAL SECTION NO. 1)	FBB01	
D3	2	BOLT, BUTTON-HEAD 10" (⅝" DIA. POST BOLT)	FBB03	
E1	1	ANCHOR BRACKET	FPA01	SEE SPEC. SECTION 812.01.01 FOR ALTERNATIVE STEEL GRADES.
E2	8	BOLT, ⅝" DIA. X 2" HEX FOR ANCHOR BRACKET ASSEMBLY	FBX16a	ASTM A307
F1	1	10" 4 ¾" TERMINAL RAIL ELEMENT (12 GA. W-BEAM)	RWM02a	
F2	1	W-BEAM TERMINAL SECTION NO. 1 (12 GA.)	RWE03a	RBR-010
G1	2	C3 X 5 X 80" GROUND STRUT	NA	AASHTO M111/ASTM 123/ASTM A36 MIN. STRENGTH 36 KSI, SEE SPEC. SECTION 812.01.01 FOR ALTERNATIVE STEEL GRADES
G2	2	BOLT, ⅝" DIA. X 10" HEX FOR GROUND STRUT ATTACHMENT TO TERMINAL POSTS	FBX16a	ASTM A307
H1	18	WASHER, ⅝" FLAT	FWC16a	
H2	20	NUT, RECESSED GUARDRAIL	FBB	ASTM A563, GRADE A OR BETTER

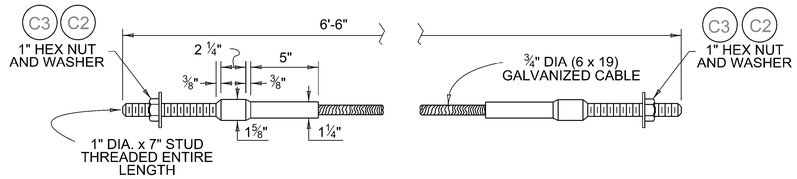
[1] THE HARDWARE GUIDE NUMBER IS REFERENCED IN THE TASK FORCE 13 GUIDE TO STANDARDIZED ROADSIDE HARDWARE, AVAILABLE AT https://tf13.org/guides/. WHEN AASHTO AND ASTM MATERIAL SPECIFICATIONS ARE AVAILABLE FOR COMPONENT, THEY ARE LISTED IN THE GUIDE.

[2] IF THE TASK FORCE 13 GUIDE TO STANDARDIZED ROADSIDE HARDWARE DOES NOT REFERENCE THE AASHTO AND ASTM SPECIFICATIONS, THEY ARE PROVIDED IN THE MATERIAL DESCRIPTIONS COLUMN. ADDITIONAL MATERIAL SPECIFICATIONS CAN BE FOUND IN KENTUCKY STANDARD SPECIFICATIONS, SECTION 814-GUARDRAIL SYSTEMS.

[3] IF THERE ARE DISCREPANCIES IN MATERIAL OR DIMENSIONS BETWEEN THE TASK FORCE 13 GUIDE TO STANDARDIZED ROADSIDE HARDWARE AND THIS STANDARD DRAWING SET, THE DETAILS IN THE STANDARD DRAWING SET SHALL TAKE PRECEDENCE.

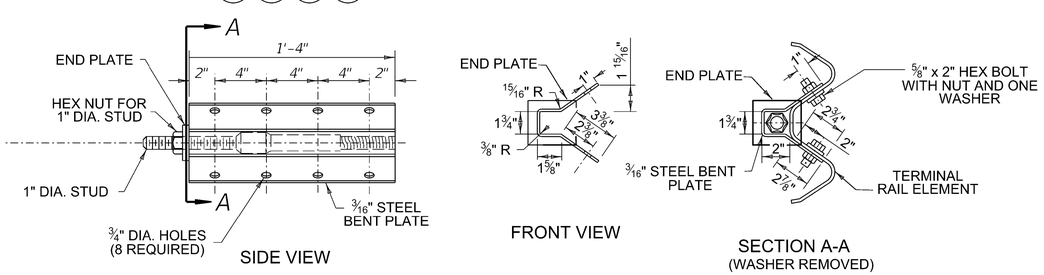


END PLATE

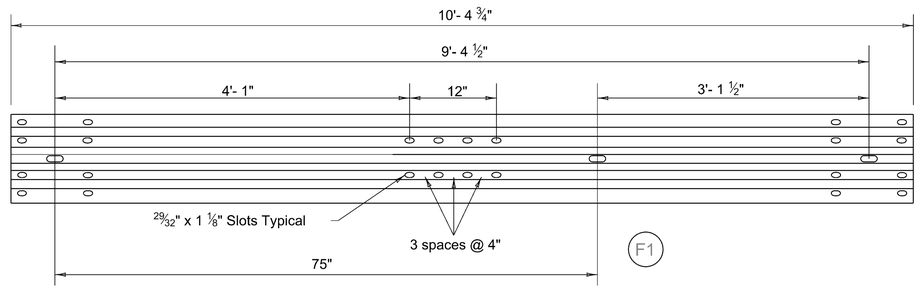


STANDARD SWAGE FITTING AND STUD
NOTE: CABLE TO BE SWAGE-CONNECTED

C1



ANCHOR BRACKET ASSEMBLY DETAILS
(ANCHOR PLATE, (8) ⅝" X 2" HEX HEAD BOLTS, NUTS, AND WASHERS)



TERMINAL RAIL ELEMENT

REVISION DATE: 07/17/2025
REVISION NUMBER: 0

07-17-2025
DATE
SUBMITTED
DIVISION DIRECTOR
DATE
APPROVED
STATE HIGHWAY ENGINEER

BARRIERS

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

GUARDRAIL END TREATMENT

SHEET 002: GUARDRAIL END TREATMENT TYPE 2M (TRAILING END TERMINAL)

SEPIA NUMBER
RBR-025-06-S

Standard Drawing Reference Report

RBR-025-06-S
GUARDRAIL END TREATMENT TYPE 2M (TRAILING END TERMINAL)
Effective with the August 21, 2025 Letting

Design Notes

The Type 2M terminal is a non-proprietary terminal used to anchor 31" Midwest Guardrail System (MGS) W-beam guardrail. As a downstream trailing end terminal, it is crashworthy only in the direction of adjacent traffic. It is not designed to withstand impacts from the opposite direction. These terminals are typically installed beyond the clear zone of opposing traffic or at the downstream end of guardrail systems on one-way roadways. The Type 2M terminal has passed MASH Test Level 3 crash testing for impacts from the direction of adjacent traffic.

The Type 2M terminal provides structural support for the entire guardrail system. Inadequate grading at the terminal location may compromise the barrier's performance. Refer to drawing for grading details.

Type 2M terminals are fully gating from post 1 to post 5. This means that, during a crash, the terminal allows a vehicle to pass through the end of the barrier rather than redirect or contain it. Therefore, the terminal is not intended to shield fixed objects located within the gating zone, which extends perpendicular to posts 1 through 5. The terminal must be placed so that this area remains clear of obstacles. If fixed objects are present within the proposed gating zone, consider extending the guardrail to shift the gating zone beyond the fixed object.

For impacts occurring upstream of post 5, the guardrail system anchored by the Type 2M terminal is designed to redirect impacting vehicles. The Length of Need for the Type 2M begins at post 5. To ensure proper performance, no rigid objects should be placed adjacent to the barrier within the system's working width—60 inches for MGS—as these could compromise the guardrail's ability to redirect vehicles.

When curb and gutter are present with guardrail, between posts 6 and 7 of the Type 2M terminal transition to lip curb and gutter or island curb and gutter (see RPM-100). Continue the lip or island curb and gutter for 50 feet beyond post 1 of the terminal.

References

KYTC Standard Specifications for Road and Bridge Construction

- Section 719 – Guardrail
- Section 814 – Guardrail Systems

Highway Design Guidance Manual

- HD-800 ROADSIDE DESIGN
- HD-801.6 END TREATMENTS & CRASH CUSHIONS

TTI REPORT 9-1002-6
MwRSF TRP-03-279-13
MwRSF TRP-03-469-24

Related Standard Drawings

RBB-002	GUARDRAIL AND BRIDGE END DRAINAGE FOR TWIN STRUCTURE
RBI-001	TYPICAL GUARDRAIL INSTALLATIONS
RBI-002	TYPICAL GUARDRAIL INSTALLATIONS
RBI-005	GUARDRAIL INSTALLATIONS AT BRIDGE COLUMNS
RBI-006	GUARDRAIL INSTALLATIONS AT SIGN SUPPORTS
RBR-001	STEEL BEAM GUARDRAIL (“W” BEAM)
RBR-010	GUARDRAIL TERMINAL SECTIONS
RBR-018	GUARDRAIL SYSTEM TRANSITION

Revision History

Revision	Description of Changes
RBR-025-06-S DATE: 2025-07-17	➢ Renamed Guardrail End Treatment Type 2A to Type 2M (Trailing End Terminal) ➢ Updated the design to a MASH-compliant terminal for use on the downstream trailing end of guardrail systems