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New Single-Slope and Retrofit Traffic Railings

Steven Nolan and Charles Boyd

Outline

- **Part 1** - Introducing the New Single-Slope Traffic Railing
  - MASH implementation
  - Crash testing overview
  - FDOT Standards Development (Index 426, 427 & 428)

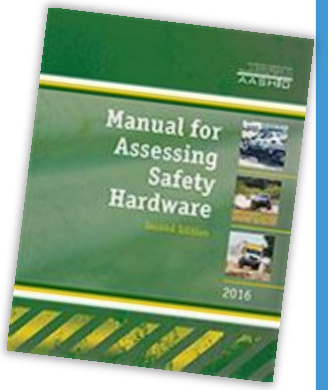
- **Part 2** - New Policy for Retrofitting Existing Bridge Traffic Railings
  - Policy Overview
  - Example applications
  - New Retrofit Standard (Index 490)

Part 1

Introducing the New Single-Slope Traffic Railing

- MASH implementation
- Crash testing overview
- FDOT Standards development (Index 426, 427 & 428)

New Single Slope Traffic Railing



Why the change?

- Updates to traffic railing acceptance criteria with release of ***AASHTO's Manual for Assessment of Safety Hardware* (MASH-09 & 16)** including:
  - increases in the size of several test vehicles to better match the current vehicle fleet, changes to the number and impact conditions of the crash test matrices, and more objective, quantitative evaluation criteria…

- ***Joint Implementation Agreement*** for MASH Implementation between AASHTO and FHWA in December 2015.
  - Uses a phased approach for various Roadside Safety Hardware.

AASHTO/FHWA Policy

- ***AASHTO/FHWA*** Joint Implementation Agreement for Manual for Assessing Safety Hardware (MASH)

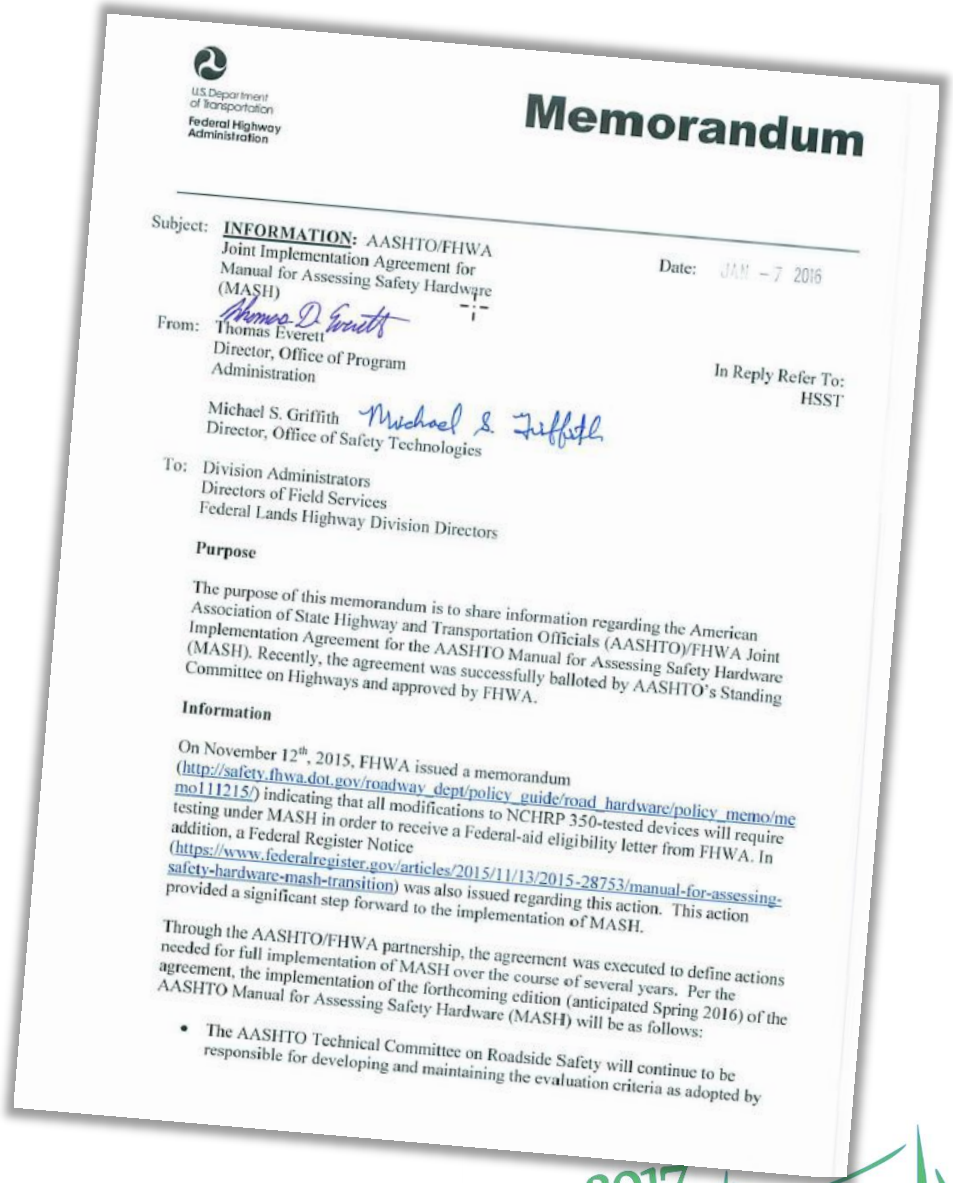
AASHTO Approved Dec 21, 2015

(under recommendations from AASHTO Technical Committee on Roadside Safety):

https://bookstore.transportation.org/item_details.aspx?ID=2707

FHWA Memorandum (Jan 7, 2016):

https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/policy_memo_guidance.cfm



U.S. Department of Transportation
Federal Highway Administration

Memorandum

Subject: **INFORMATION:** AASHTO/FHWA Joint Implementation Agreement for Manual for Assessing Safety Hardware (MASH)

Date: JAN – 7 2016

From: Thomas Everett
Director, Office of Program Administration

In Reply Refer To: HSST

Michael S. Griffith
Director, Office of Safety Technologies

To: Division Administrators
Directors of Field Services
Federal Lands Highway Division Directors

Purpose

The purpose of this memorandum is to share information regarding the American Association of State Highway and Transportation Officials (AASHTO)/FHWA Joint Implementation Agreement for the AASHTO Manual for Assessing Safety Hardware (MASH). Recently, the agreement was successfully balloted by AASHTO's Standing Committee on Highways and approved by FHWA.

Information

On November 12th, 2015, FHWA issued a memorandum (http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/policy_memo/memo111215/) indicating that all modifications to NCHRP 350-tested devices will require testing under MASH in order to receive a Federal-aid eligibility letter from FHWA. In addition, a Federal Register Notice (https://www.federalregister.gov/articles/2015/11/13/2015-28753/manual-for-assessing-safety-hardware-mash-transition) was also issued regarding this action. This action provided a significant step forward to the implementation of MASH.

Through the AASHTO/FHWA partnership, the agreement was executed to define actions needed for full implementation of MASH over the course of several years. Per the agreement, the implementation of the forthcoming edition (anticipated Spring 2016) of the AASHTO Manual for Assessing Safety Hardware (MASH) will be as follows:

- The AASHTO Technical Committee on Roadside Safety will continue to be responsible for developing and maintaining the evaluation criteria as adopted by

AASHTO/FHWA Policy

- ***AASHTO/FHWA*** Joint Implementation Agreement for Manual for Assessing Safety Hardware (MASH)

  Some key dates of interest for phased implementation:

  - December 31, 2017: w-beam barriers and cast-in-place concrete barriers;
  - June 30, 2018: w-beam terminals;
  - December 31, 2018: cable barriers, cable barrier terminals, and crash cushions;
  - December 31, 2019: bridge rails, transitions, all other longitudinal barriers (including portable barriers installed permanently), all other terminals, sign supports, and all other breakaway hardware;

  …but FDOT has a local agreement with FHWA Regional Office to implement roadway and bridge traffic railings at the same time (July 2018 lettings)

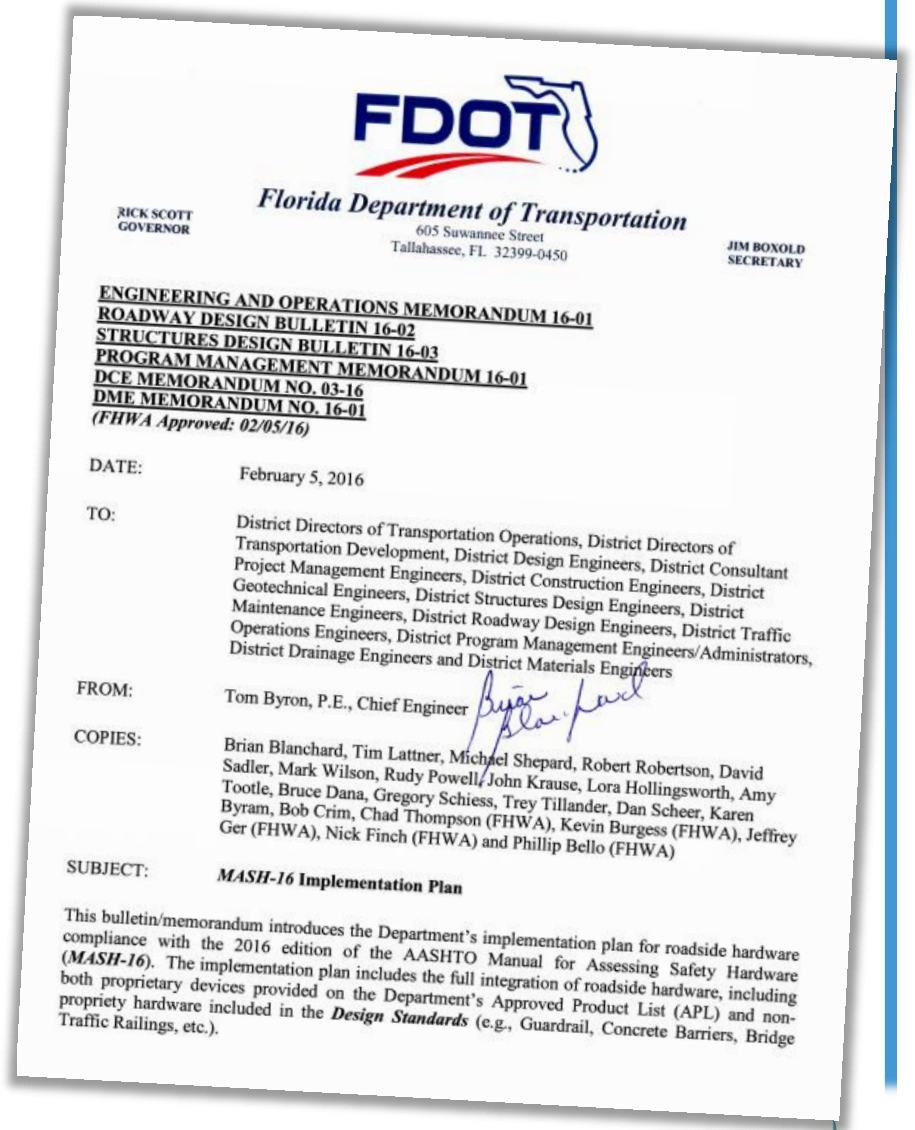
FDOT Policy

- Engineering and Operations Memorandum 16-01 / Roadway Design Bulletin 16-02 / Structures Design Bulletin 16-03 / …

  MASH-16 Implementation Plan

  (*FHWA Approved: 2/5/2016*)

http://www.fdot.gov/design/Bulletins/Default.shtm



FDOT

Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JIM BOXOLD
SECRETARY

ENGINEERING AND OPERATIONS MEMORANDUM 16-01
ROADWAY DESIGN BULLETIN 16-02
STRUCTURES DESIGN BULLETIN 16-03
PROGRAM MANAGEMENT MEMORANDUM 16-01
DCE MEMORANDUM NO. 03-16
DME MEMORANDUM NO. 16-01
(FHWA Approved: 02/05/16)

DATE: February 5, 2016

TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Consultant Project Management Engineers, District Construction Engineers, District Geotechnical Engineers, District Structures Design Engineers, District Maintenance Engineers, District Roadway Design Engineers, District Traffic Operations Engineers, District Program Management Engineers/Administrators, District Drainage Engineers and District Materials Engineers

FROM: Tom Byron, P.E., Chief Engineer

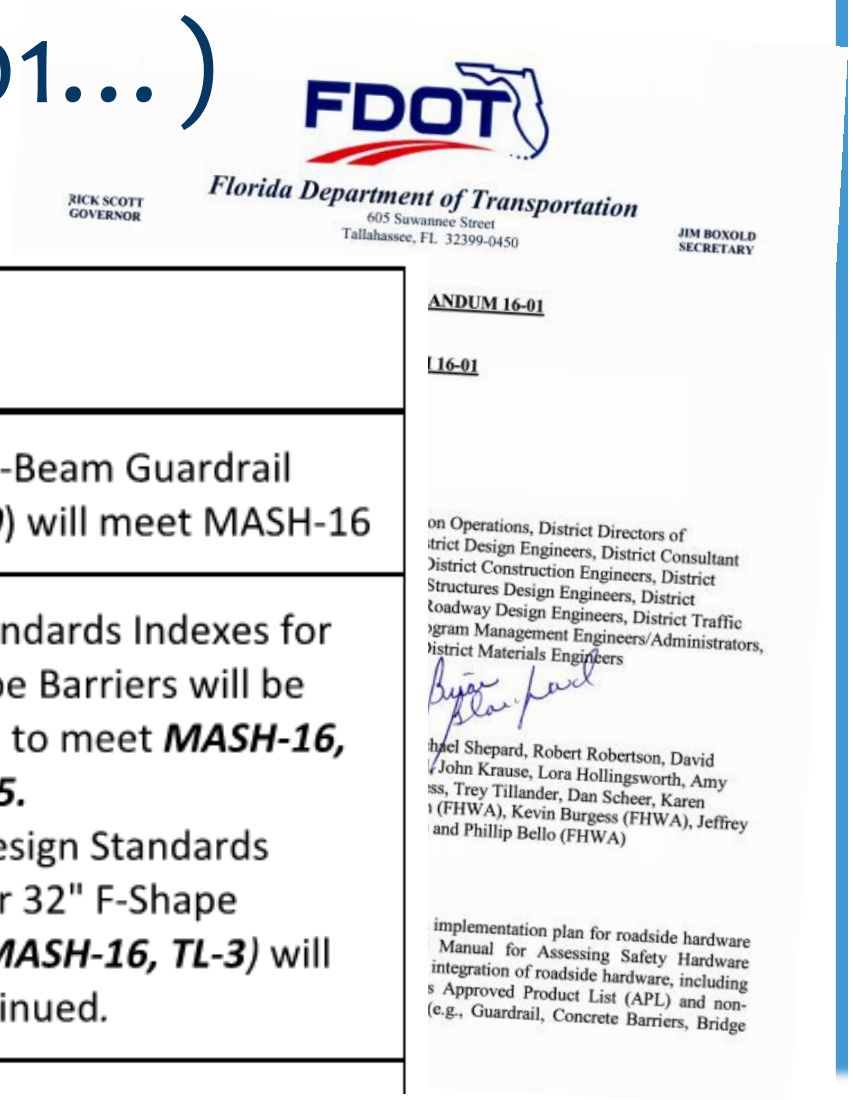
COPIES: Brian Blanchard, Tim Lattner, Michael Shepard, Robert Robertson, David Sadler, Mark Wilson, Rudy Powell, John Krause, Lora Hollingsworth, Amy Tootle, Bruce Dana, Gregory Schiess, Trey Tillander, Dan Scheer, Karen Byram, Bob Crim, Chad Thompson (FHWA), Kevin Burgess (FHWA), Jeffrey Ger (FHWA), Nick Finch (FHWA) and Phillip Bello (FHWA)

SUBJECT: ***MASH-16* Implementation Plan**

This bulletin/memorandum introduces the Department's implementation plan for roadside hardware compliance with the 2016 edition of the AASHTO Manual for Assessing Safety Hardware (***MASH-16***). The implementation plan includes the full integration of roadside hardware, including both proprietary devices provided on the Department's Approved Product List (APL) and non-propriety hardware included in the ***Design Standards*** (e.g., Guardrail, Concrete Barriers, Bridge Traffic Railings, etc.).

FDOT Policy (E&O Memo 16-01…)

Implementation Date	Hardware Category	Notes
July 1, 2017	- W-Beam Guardrail - ***Design Standards, Index 400***	Current W-Beam Guardrail (***Index 400***) will meet MASH-16
July 1, 2018	- Guardrail Approach End Terminals - ***Specification Section 536, APL*** (will be implemented earlier if products become available prior to July 1, 2018) - Concrete Barrier (36" Single Slope) - ***Design Standards, Index 410*** - Pier Protection Barrier (Single Slope) - Integrated into ***Design Standards, Index 410*** - Bridge Traffic Railing (Single Slope) - ***NEW Design Standards, Indexes***	Design Standards Indexes for Single Slope Barriers will be developed to meet ***MASH-16, TL-4 & TL-5.*** Current Design Standards Indexes for 32" F-Shape Barriers (***MASH-16, TL-3***) will be discontinued.
	- High Tension Cable Barrier - ***Developmental***	


FDOT
Florida Department of Transportation
605 Suwannee Street
Tallahassee, FL 32399-0450
RICK SCOTT
GOVERNOR
JIM BOXOLD
SECRETARY

ANDUM 16-01

16-01

on Operations, District Directors of
trict Design Engineers, District Consultant
District Construction Engineers, District
Structures Design Engineers, District
Roadway Design Engineers, District Traffic
gram Management Engineers/Administrators,
District Materials Engineers

hael Shepard, Robert Robertson, David
John Krause, Lora Hollingsworth, Amy
ss, Trey Tillander, Dan Scheer, Karen
(FHWA), Kevin Burgess (FHWA), Jeffrey
and Phillip Bello (FHWA)

implementation plan for roadside hardware
Manual for Assessing Safety Hardware
integration of roadside hardware, including
s Approved Product List (APL) and non-
(e.g., Guardrail, Concrete Barriers, Bridge

http://www.fdot.gov/design/Bulletins/Default.shtm

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MASH-16 (Second Edition)

Minor updates from 2009 (no significant change for concrete traffic railings)

https://bookstore.transportation.org/item_details.aspx?ID=2707

Crash Testing/Acceptance History:

- 1962: HRCS Circular 482
- 1973: NCHRP Report 153
- 1978: TR Circular 191
- 1980: NCHRP Report 230
- 1993: NCHRP Report 350
- 2009: Manual for Assessing Safety Hardware (MASH)

NCHRP 350 vs. MASH: Vehicles

Vehicle Class	NCHRP 350	MASH – 2009/2016
Small car 	820C Weight: 1,809 lb.	1100C Weight: 2,420 lb.
Pickup Truck 	2000P Weight: 4,409 lb.	2270P Weight: 5,000 lb. Min. c.g. height: 28 in.
Single Unit Truck 	8000S Weight: 17,636 lb.	10000S Weight: 22,000 lb.
Tractor Trailer 	36000V Weight: 79,366 lb.	36000V Weight: 79,300 lb. Trailer Length: 53 ft.

Example:
Pickup Tuck - Old vs. New

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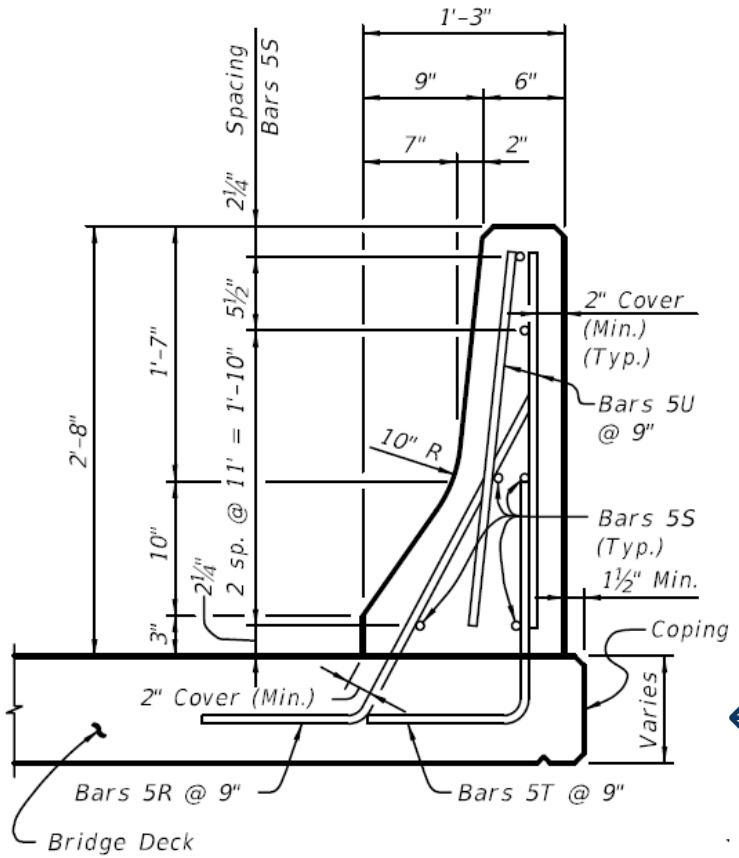
NCHRP 350 vs. MASH: Impact Conditions

Test Level	Test Vehicle	NCHRP 350	MASH – 2009/2016
TL-3	Small Car	Speed: 62 mph Angle: 20°	Speed: 62 mph Angle: 25°
TL-3	Pickup Truck	Speed: 62 mph Angle: 25°	Speed: 62 mph Angle: 25°
TL-4	Single Unit Truck	Speed: 50 mph Angle: 15°	Speed: 56 mph Angle: 15°
TL-5	Tractor Trailer	Speed: 50 mph Angle: 15°	Speed: 50 mph Angle: 15°

Full-Scale Crash Tests under NCHRP Project 22-14(02) *for development of MASH*



TYPICAL SECTION THRU
NEW JERSEY SHAPE RAILING
INDEX NOS. 11407 & 11460

- Conducted several full-scale crash tests of existing hardware, including:
  - 32" New Jersey Shape Traffic Railing – Passed pickup and small vehicle, but failed Single Unit Truck (Test 4-12)

← FDOT version of NJ Shape from 1970's (*source **IDS-402***)

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Crash Testing…

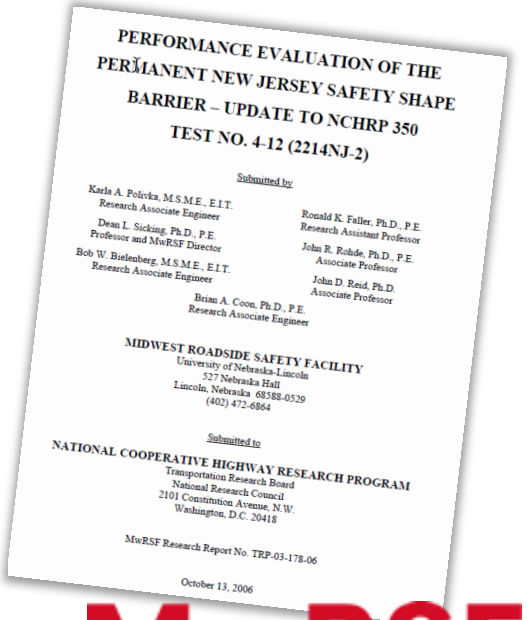
***M**idwest **R**oadside **S**afety **F**acility* crash test conducted 4/13/2006.

***MwRSF* Report No. TRP-03-178-06**:

> "PERFORMANCE EVALUATION OF THE PERMANENT NEW JERSEY SAFETY SHAPE BARRIER – UPDATE TO NCHRP 350 TEST NO. 4-12 (2214NJ-2)"

- *Conclusion: 32" NJ Shape too short for larger Single Unit Truck!*
  (Note: cargo ballast c.g. height = 67", suggested 4" reduction)

http://mwrsf.unl.edu/researchhub/files/Report145/TRP-03-178-06.pdf


PERFORMANCE EVALUATION OF THE PERMANENT NEW JERSEY SAFETY SHAPE BARRIER – UPDATE TO NCHRP 350 TEST NO. 4-12 (2214NJ-2)

Submitted by:

Karla A. Polivka, M.S.M.E., E.I.T.
Research Associate Engineer

Dean L. Sicking, Ph.D., P.E.
Professor and MwRSF Director

Bob W. Bielenberg, M.S.M.E., E.I.T.
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Submitted to

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
Transportation Research Board
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

MwRSF Research Report No. TRP-03-178-06

October 13, 2006

MwRSF
Midwest Roadside Safety Facility

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Crash Testing…

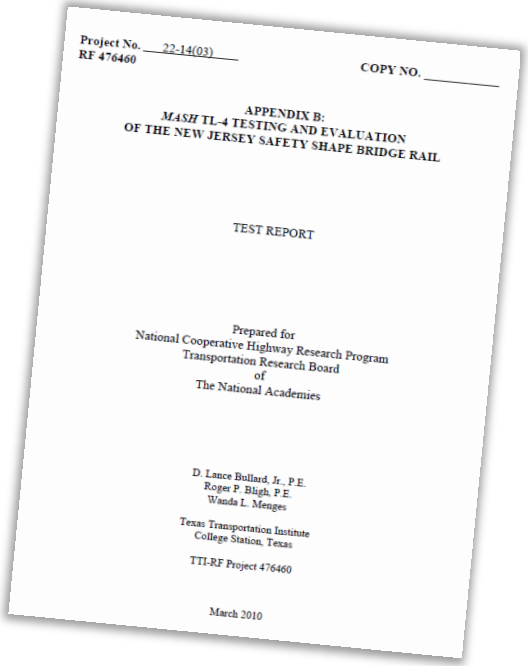
***T**exas **T**ransportation **I**nstitute* conducted another test for the 32” New Jersey Shape using the revised SUT cargo ballast c.g. at height of 63”.

TTI crash test conducted 2/19/2008 (MASH Test 4-12, No. 476460-1b)

NCHRP Project 22-14(03) Appendix B:

“MASH TL-4 TESTING AND EVALUATIONOF THE NEW JERSEY SAFETY SHAPE BRIDGE RAIL”

- *Conclusion: 32” NJ Shape too still short for larger Single Unit Truck!*


Project No. 22-14(03)
RF 476460

COPY NO.

APPENDIX B:
MASH TL-4 TESTING AND EVALUATION
OF THE NEW JERSEY SAFETY SHAPE BRIDGE RAIL

TEST REPORT

Prepared for
National Cooperative Highway Research Program
Transportation Research Board
of
The National Academies

D. Lance Bullard, Jr., P.E.
Roger P. Bligh, P.E.
Wanda L. Menges

Texas Transportation Institute
College Station, Texas

TTI-RF Project 476460

March 2010

Texas A&M Transportation Institute

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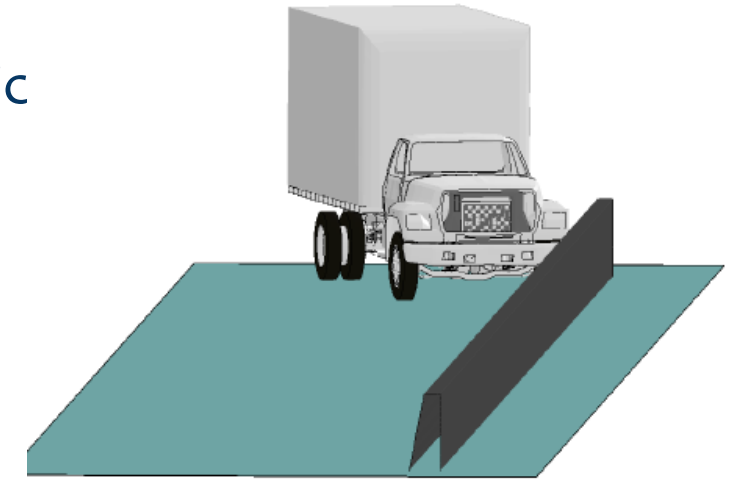
Crash Testing…

TxDOT sponsored FEA simulation for MASH revealing traffic railing needs to be 36” tall. Subsequently confirmed with successful full-scale test using Single Unit Truck.

Crash Test (MASH test 4-12) conducted 3/10/2011 at ***TTI.***

TTI Report No. FHWA/TX-12/9-1002-5
https://ntl.bts.gov/lib/43000/43500/43562/9-1002-5



Finite Element Model of the Single Unit Truck Impacting a Rigid Single Slope Barrier under *MASH* TL-4 Impact Conditions.

Ongoing Research related to MASH Bridge Rails

- ***NCHRP 20-7 (395)*** - MASH Equivalency of NCHRP 350 Approved Bridge Railings
  - *Texas Transportation Institute* 6/7/2016 – 6/6/2017
  - Evaluate "grandfathering" of historical bridge rail designs
  - *http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4214*

- Roadside Safety Pooled Fund *(TTI and various DOT's)*
  - MASH Coordination Effort (**607241**)
  - Build and maintain Database of Crash Tested Devices
  - *https://www.roadsidepooledfund.org/607241-2/*

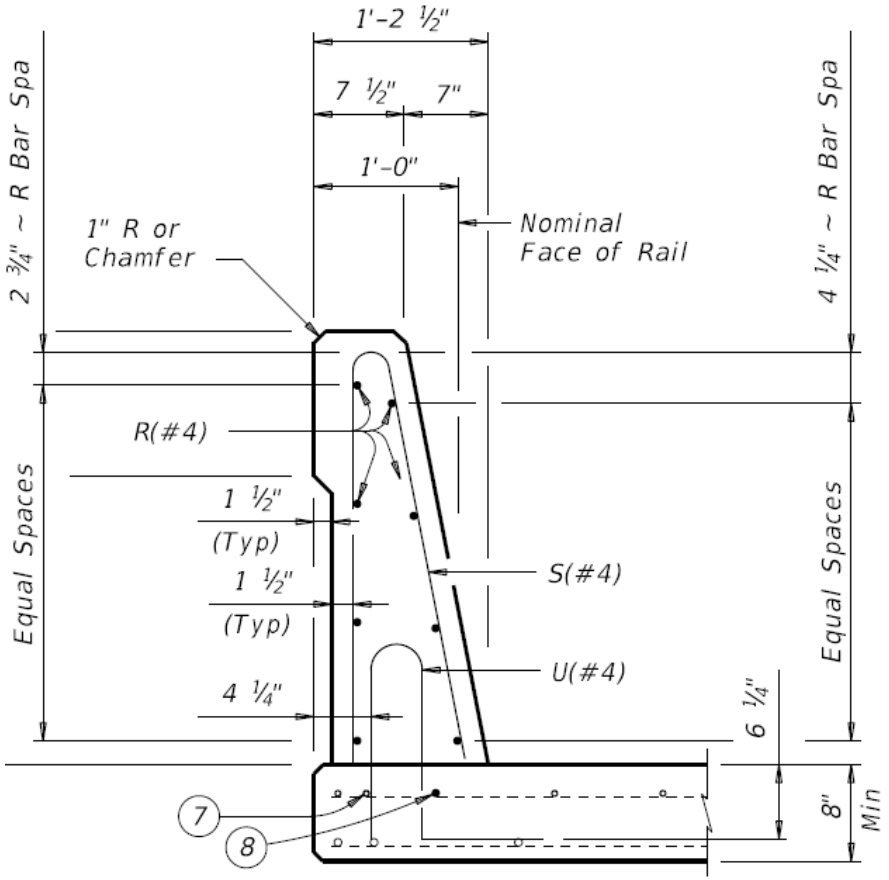
Why Single-Slope Traffic Railing?

- Need a minimum 36” height for TL-4 (MASH);
- Many other states have adopted the single-slope shape (Texas, California, New York…);
- Simplified forming;
- Existing MASH crash tested design available (TxDOT version);
  - ***TTI Report No.*** **FHWA/TX-12/9-1002-5**

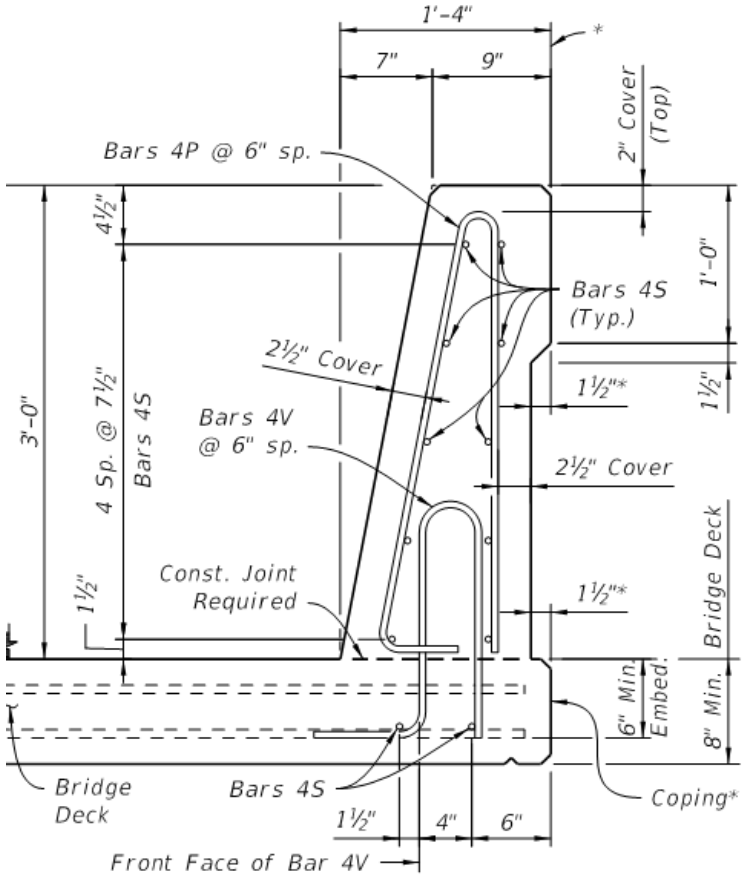
    “DETERMINATION OF MINIMUM HEIGHT AND LATERAL DESIGN LOAD FOR MASH TEST LEVEL 4 BRIDGE RAILS”

TxDOT vs. FDOT 36” Single-Slope (TL-4)

- Different concrete cover required minor width changes



TxDOT Standard: **Type SSTR**



FDOT Standard: **Index 427**

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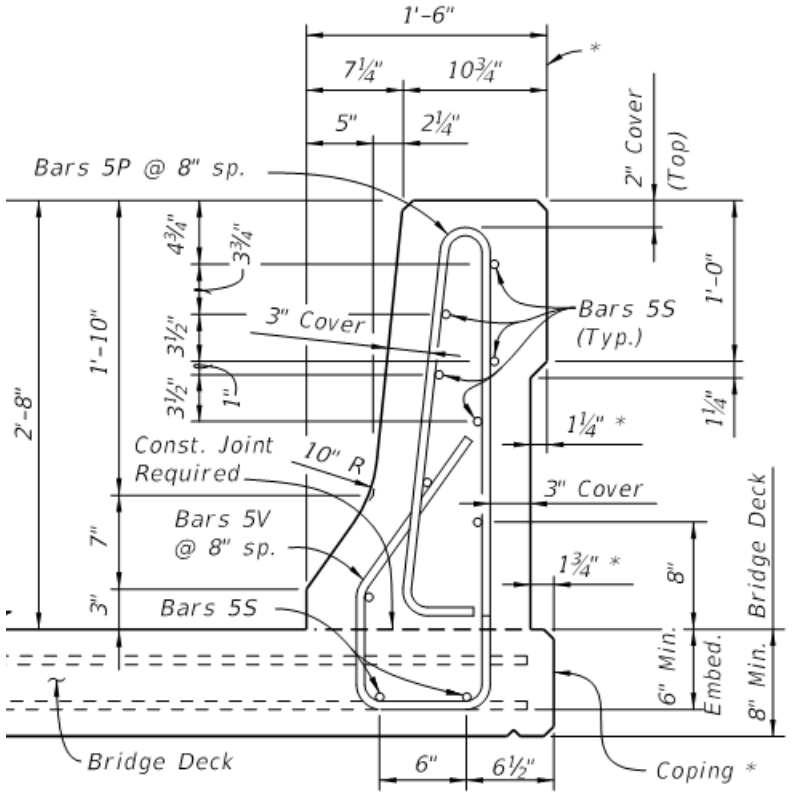
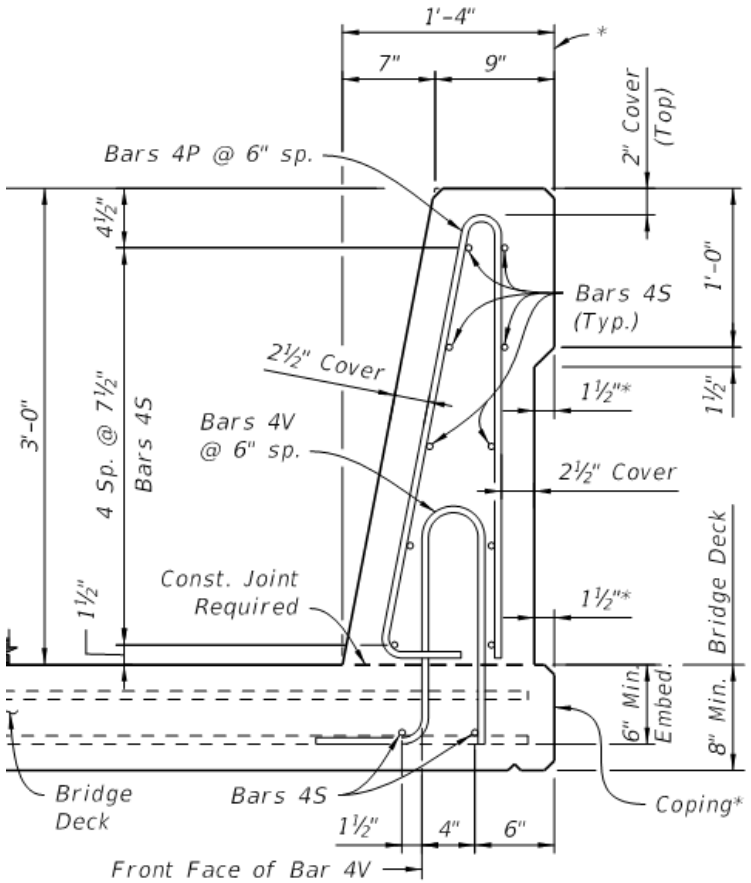
FDOT 32” F-Shape vs. 36” Single-Slope (Edge)

- Different concrete cover, weight, rebar spacing and base width (reduced 2 ½”)
- Weight 420 lb/ft vs. 433 lb/ft.



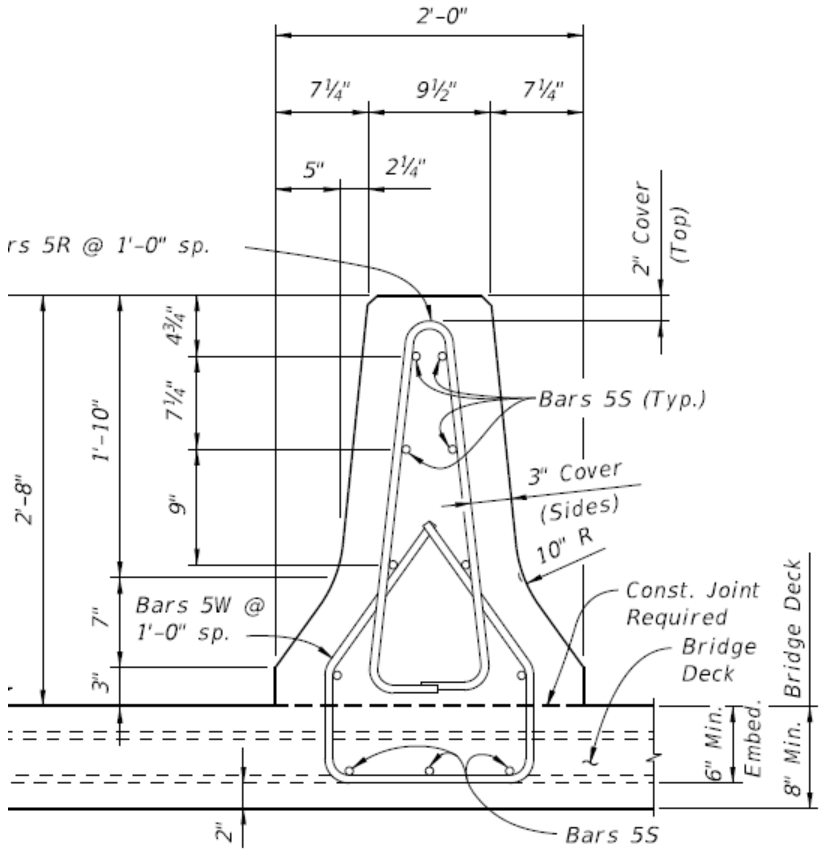
FDOT Standard: **Index 420**



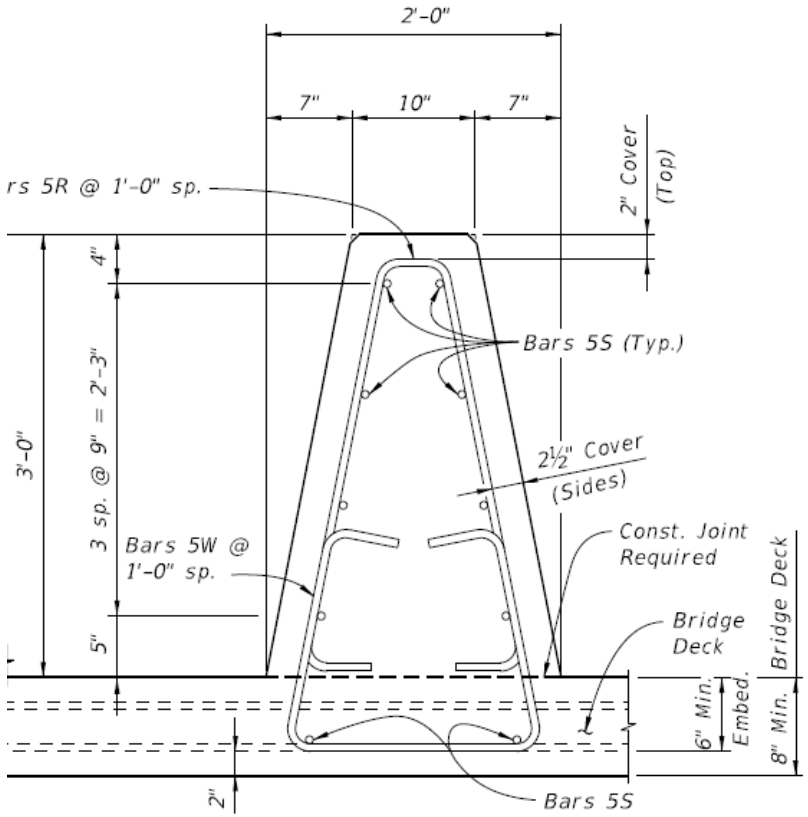
FDOT Standard: **Index 521-427**

FDOT 32” F-Shape vs. 36” Single-Slope (Median)

- Different concrete cover & weight; Same vertical rebar spacing & base width
- Weight 485 lb/ft vs. 648 lb/ft.



FDOT Standard: **Index 421**



FDOT Standard: **Index 521-426**

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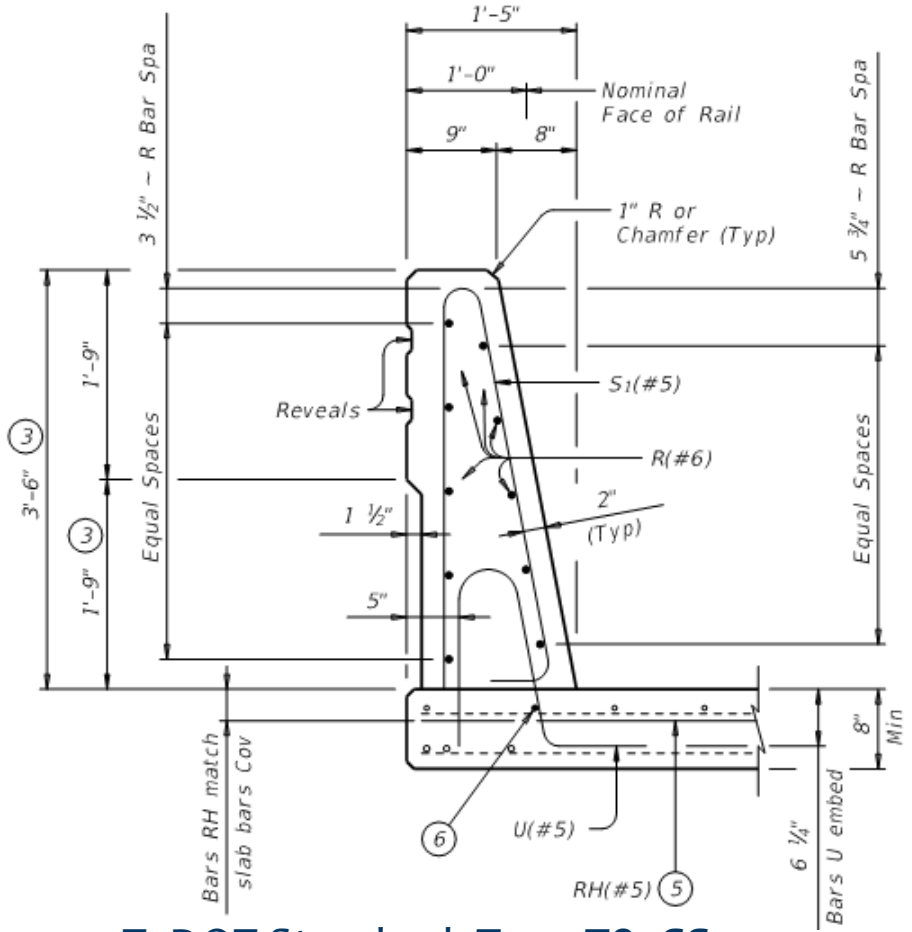
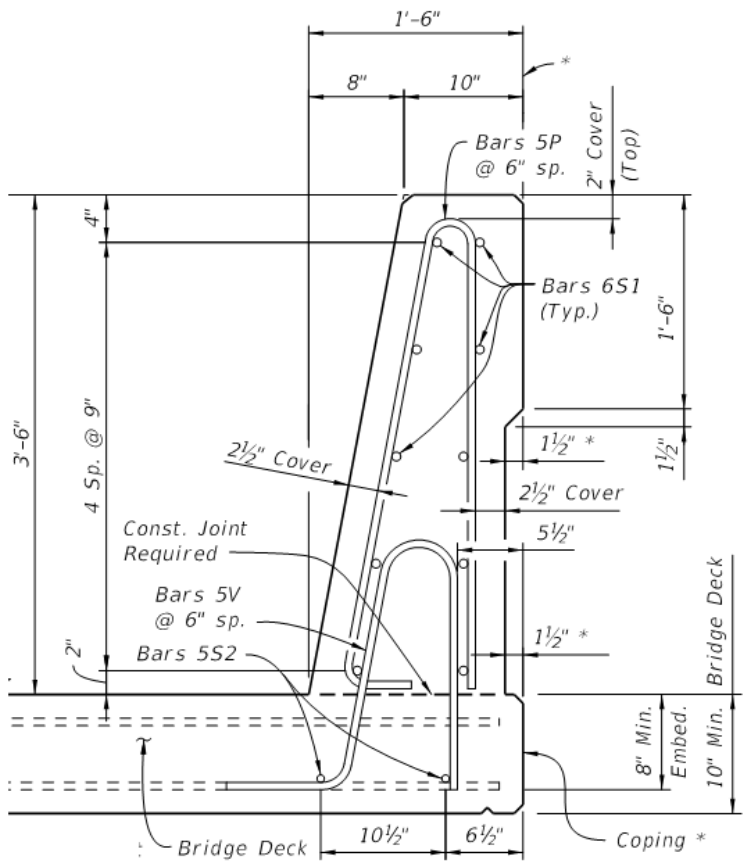
TxDOT vs. FDOT 42” Single-Slope (TL-5)

- Different concrete cover required minor width changes



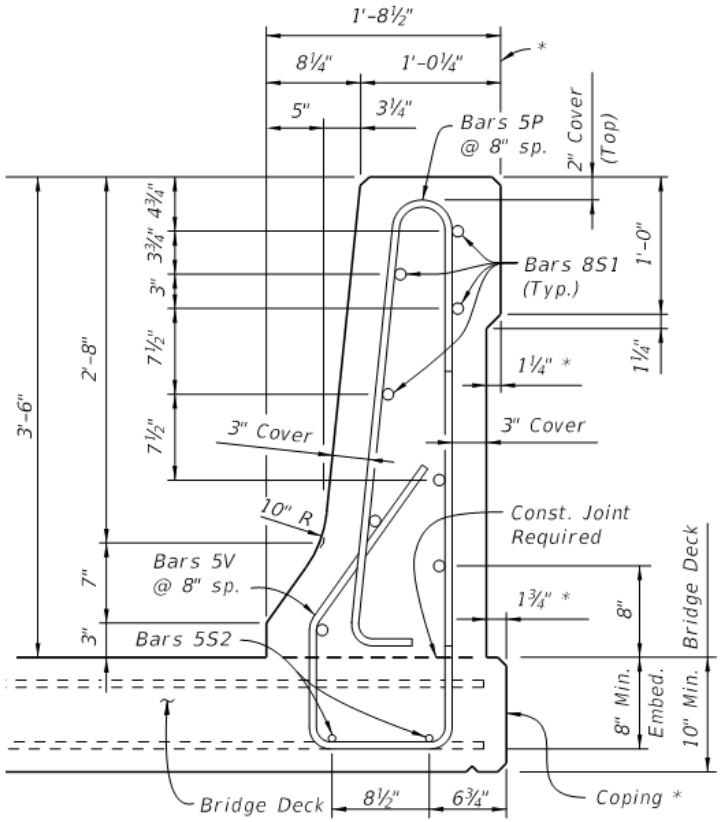
TxDOT Standard: **Type T80SS**



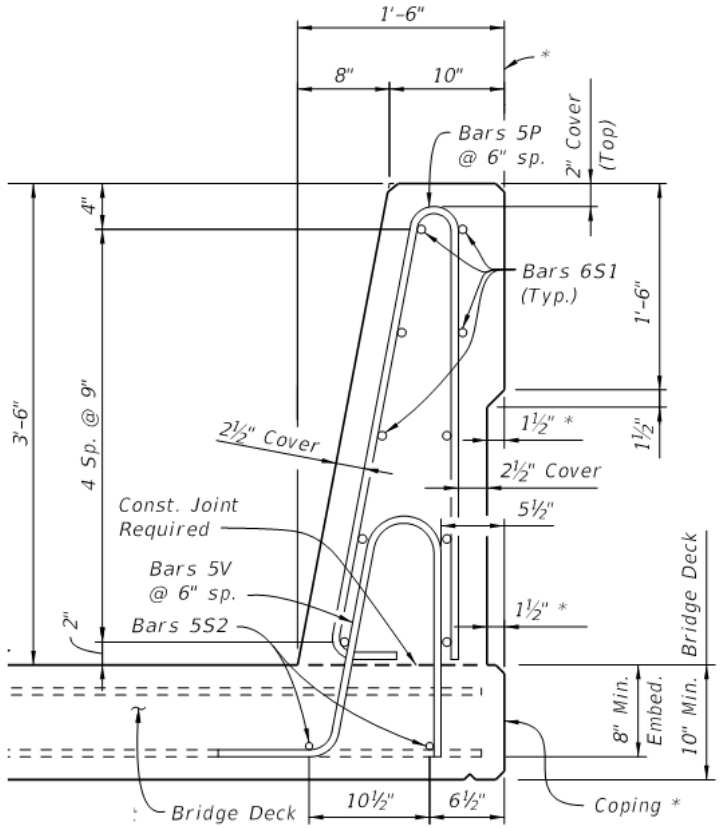
FDOT Standard: **Index 521-428**

FDOT 42” F-Shape vs. 42” Single-Slope

- Different concrete cover, weight, rebar spacing and base width (reduced 3”)
- Weight 625 lb/ft vs. 580 lb/ft.



FDOT Standard: **Index 425**



FDOT Standard: **Index 521-428**

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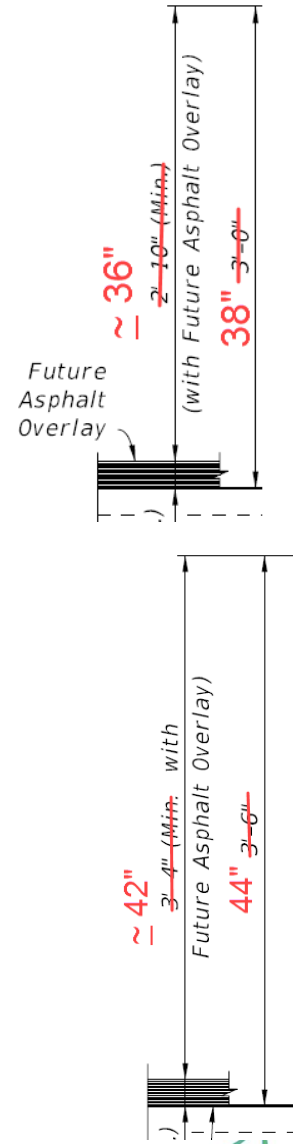
Approach Roadway Barrier Height

- Due to potential future asphalt overlay, roadway approaches will have 2” additional barrier height:
  - 36” Single-Slope on Bridge (Index 426 & 427)
    → 38” Single-Slope on Roadway & Walls (Index 410 & 6110)
  - 42” Single-Slope on Bridge (Index 428)
    → 44” Single-Slope on Roadway & Walls (Index 410 & 6110)

See ***Roadway Design Bulletin 16-04*** for preliminary shapes:
http://www.fdot.gov/design/bulletins/RDB16-04.pdf



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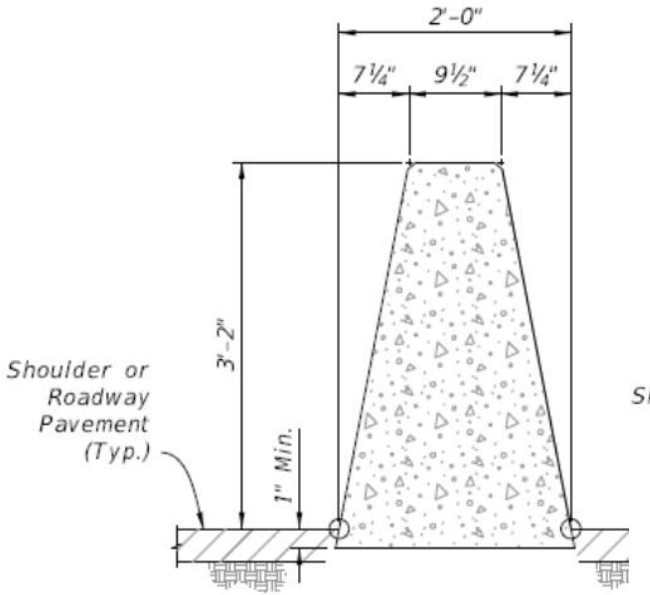
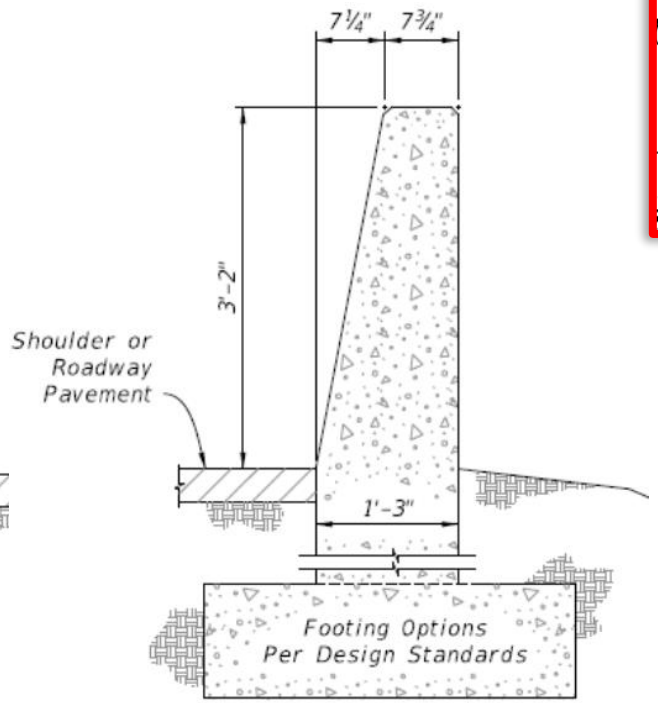
Approach Roadway Barrier Height

38” Single-Slope (Index 410 / 521-001) On Roadway:



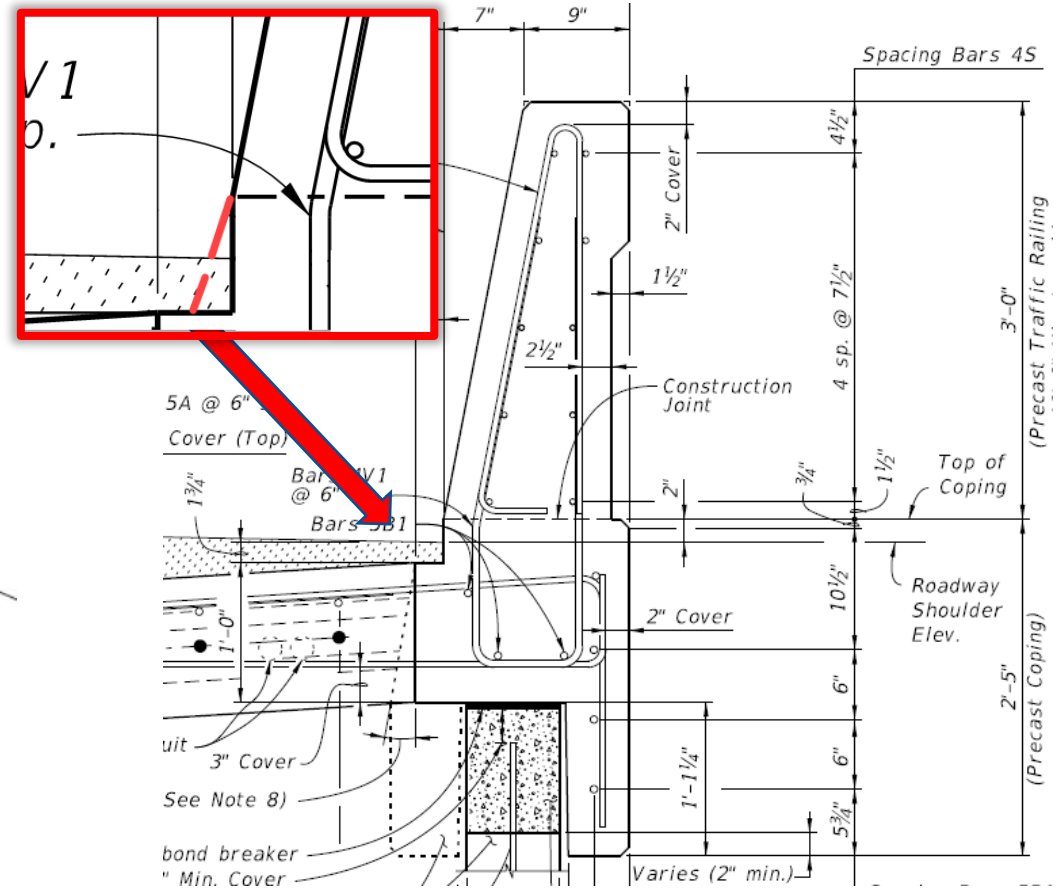
38" FULL MEDIAN BARRIER



38" SHOULDER BARRIER

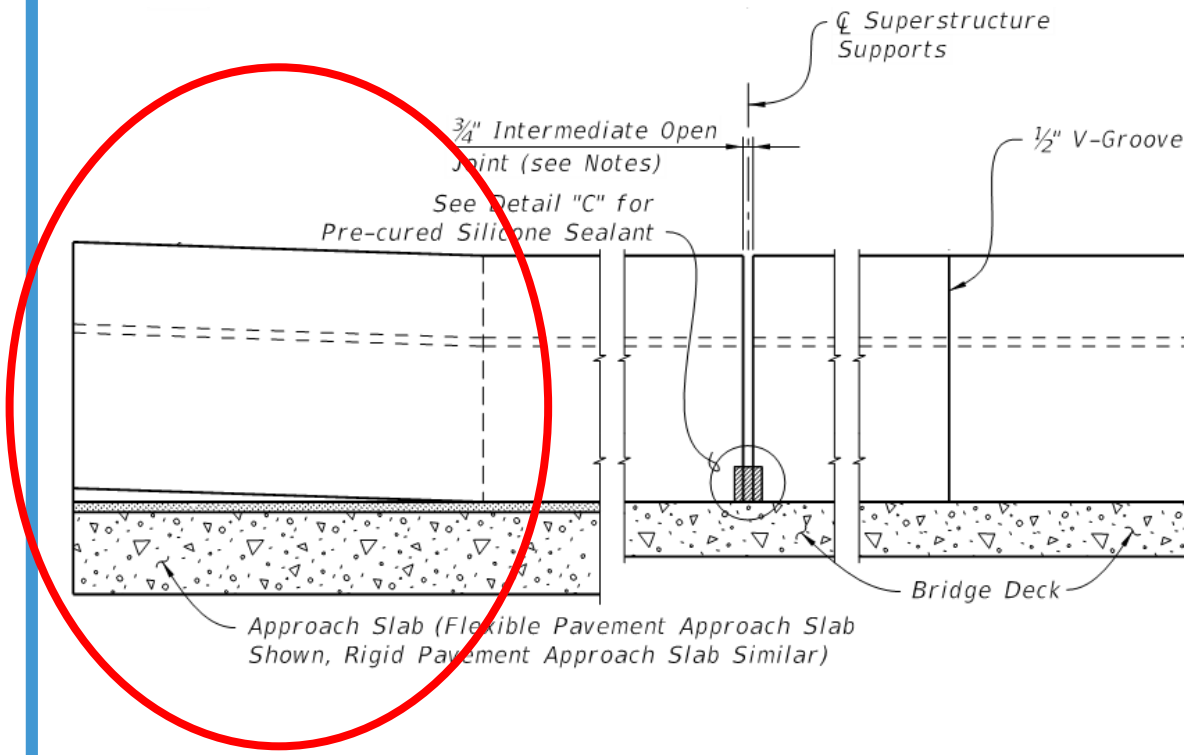
RDB16-04

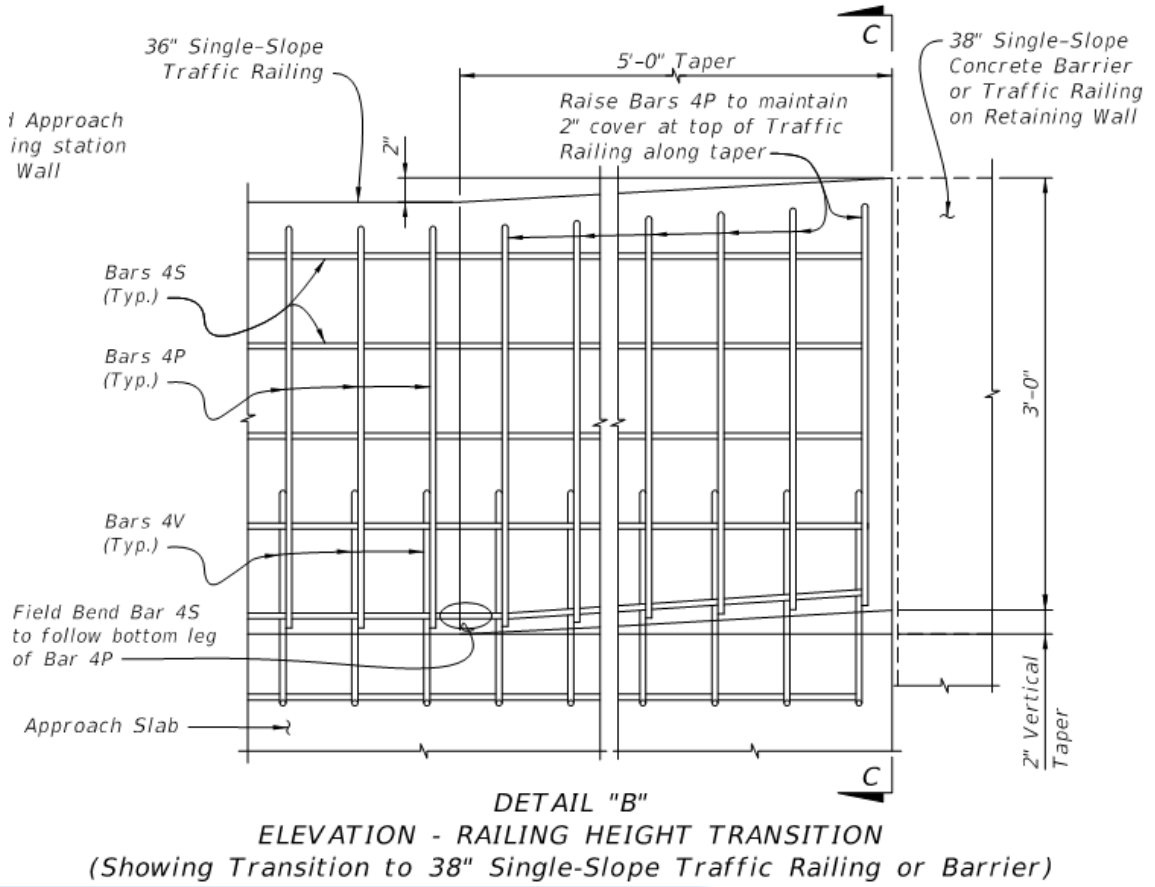
38” Single-Slope (Index 6110 / 521-610) On Retaining Walls:



Height Transition on Approach Slab

- 36” Single-Slope on Bridge (Index 426 & 427)
  - → 38” Single-Slope on Roadway/Walls (Index 410 & 6110)

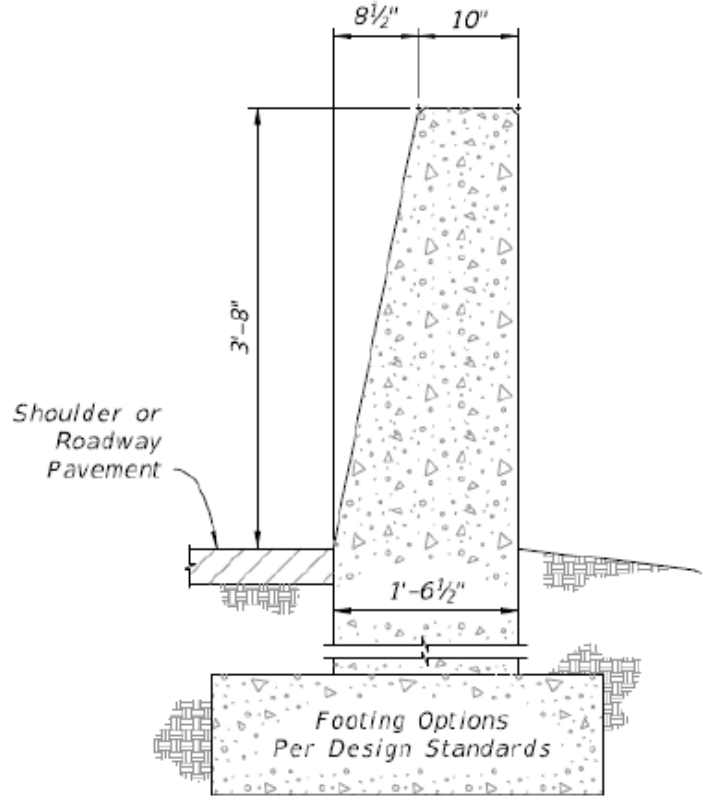




DETAIL "B"
ELEVATION - RAILING HEIGHT TRANSITION
(Showing Transition to 38" Single-Slope Traffic Railing or Barrier)

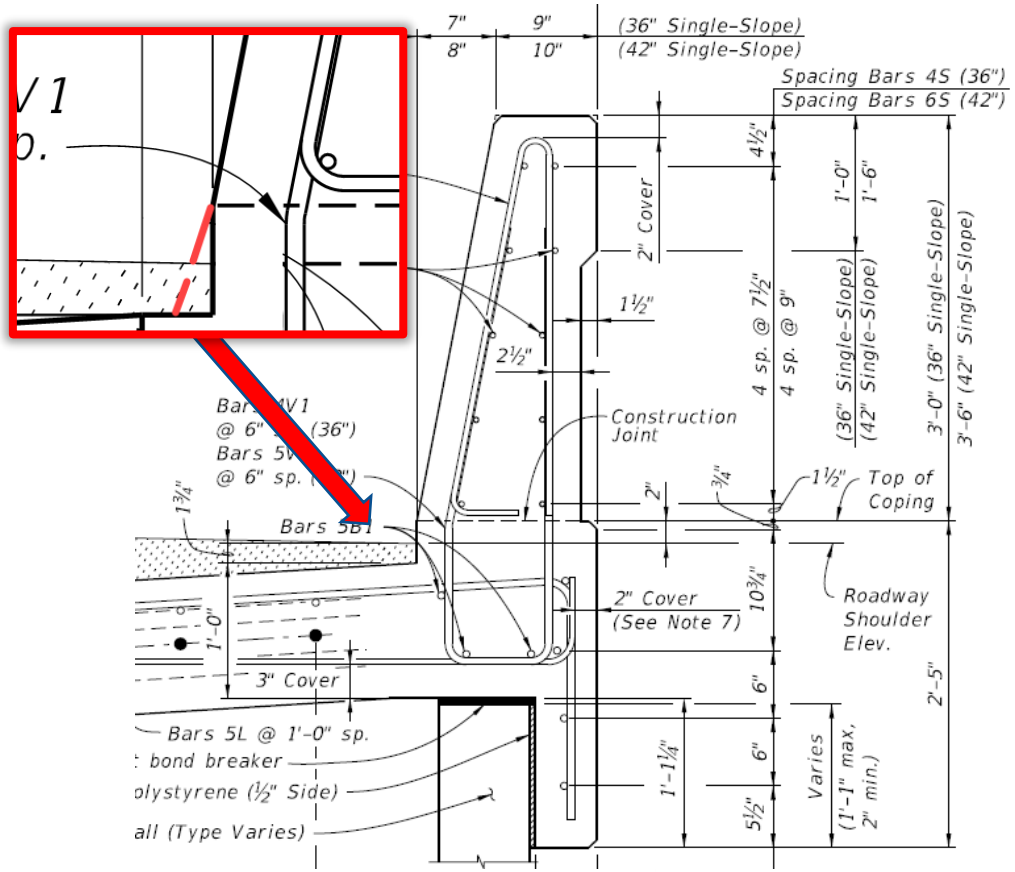
Approach Roadway Barrier Height

44” Single-Slope (Index 410 / 521-001) On Roadway:



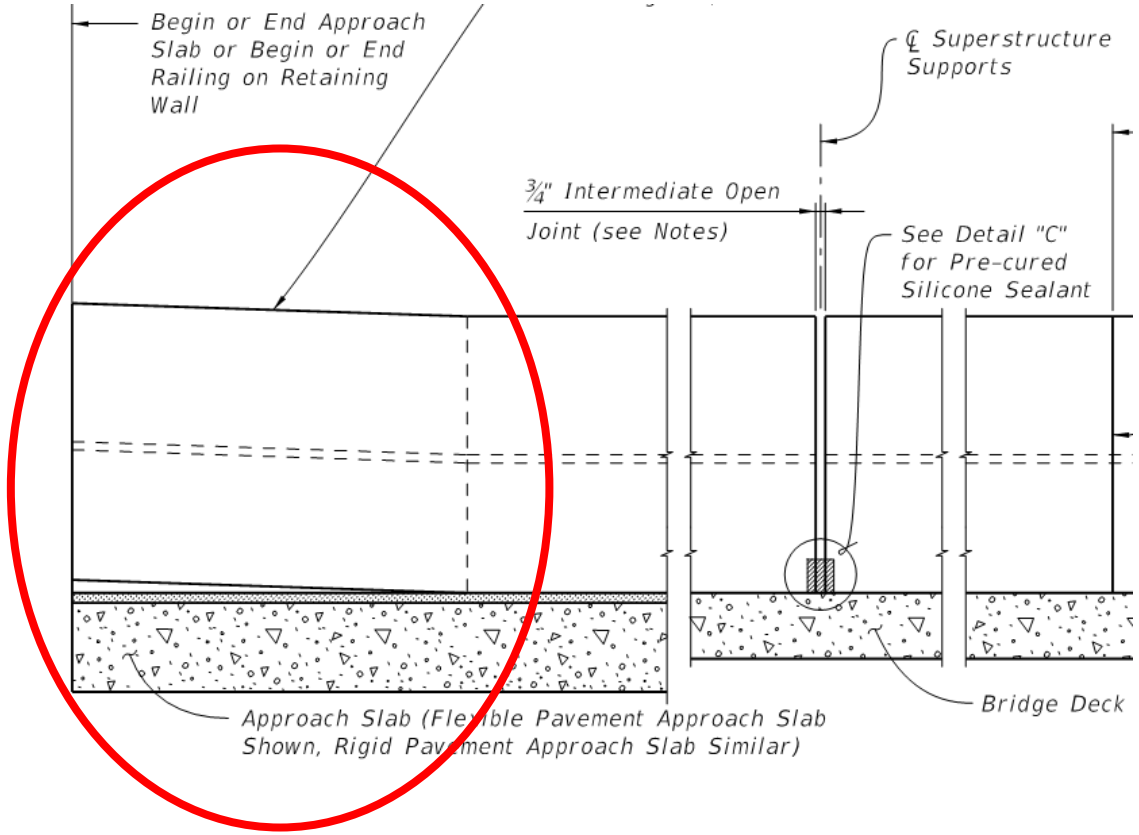
RDB16-04

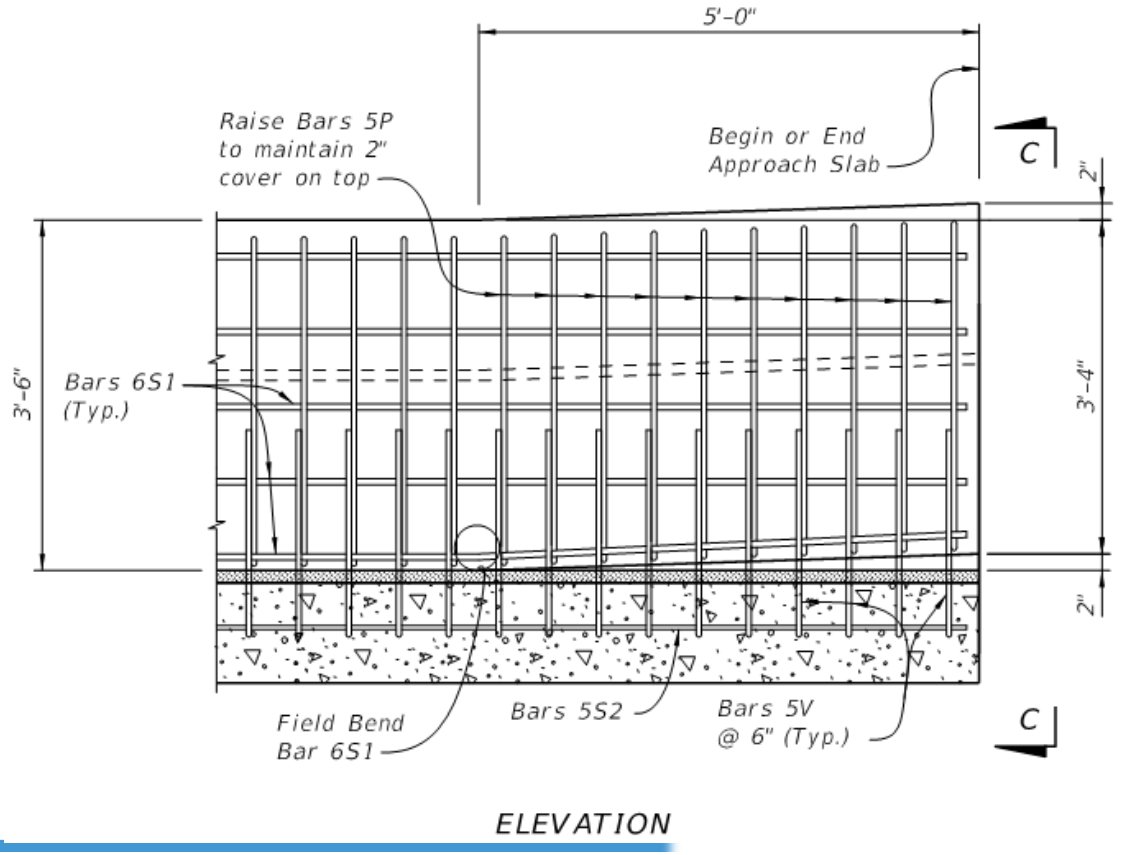
44” Single-Slope (Index 6110 / 521-610) On Retaining Walls:



Height Transition on Approach Slab

- 42” Single-Slope on Bridge (Index 428)
  - → 44” Single-Slope on Roadway/Walls (Index 410 & 6110)





Where can you get these Details?

Now Available:

FY 2017-18 Design Standards - Index 426, 427 & 428 (basic shape on bridge deck)

http://www.fdot.gov/roadway/DS/18/STDs.shtm

Coming November 1st, 2017:

FY 2018-19 Standard Plans for Road and Bridge Construction

– Index 426, 427 & 428 (521-426 thru 427, Height transition details)

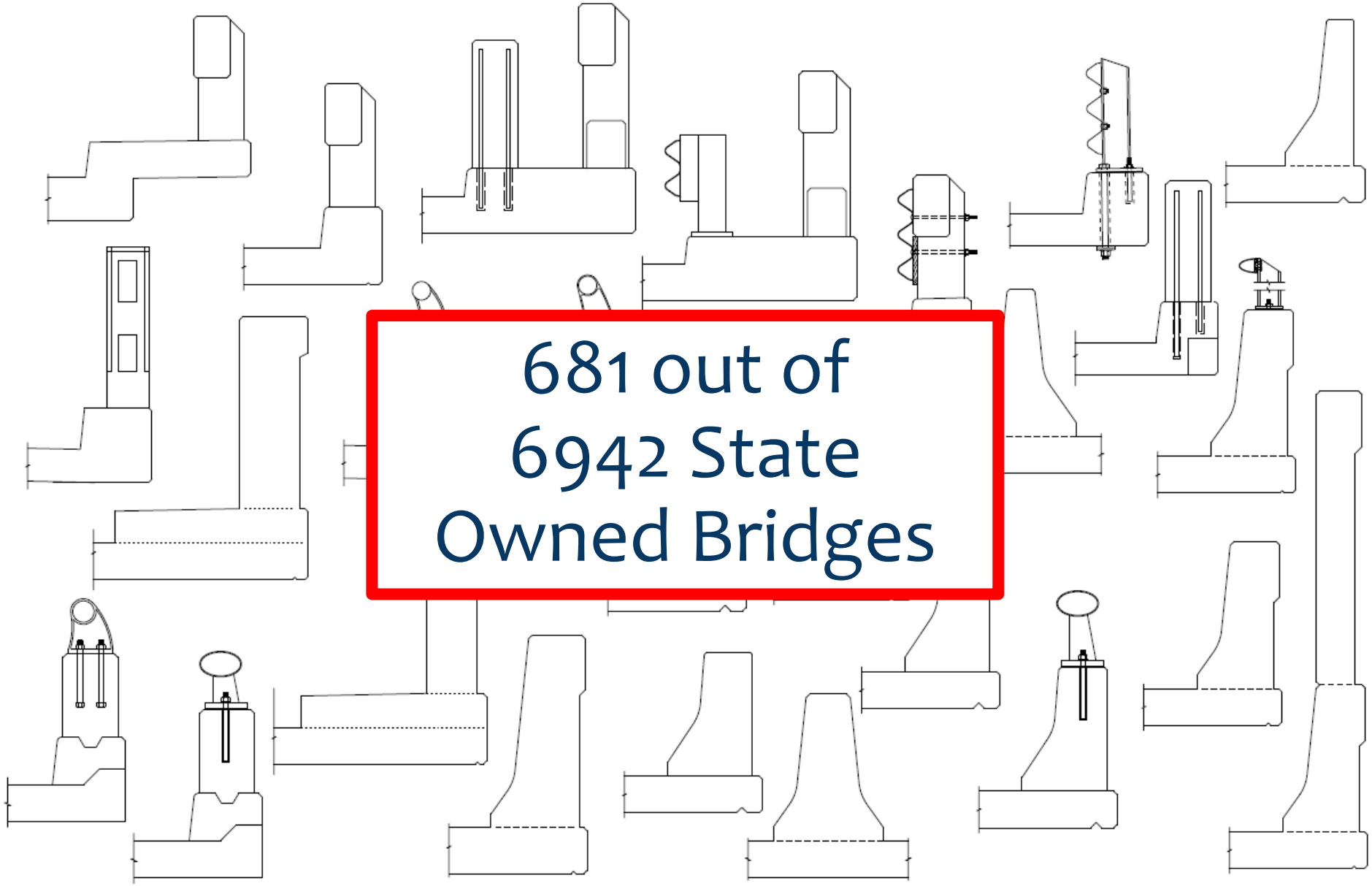
– Index 410 (521-001) & 6110 (521-610) barrier on roadway & walls.

– Index 5210 & 5211 (521-510, 521-511) traffic railing/noise walls.

Part 2
New Policy for Retrofitting Existing Bridge Traffic Railings

- Policy Overview
- Example applications
- New Retrofit Standard (Index 490)

What does an existing traffic railing look like?

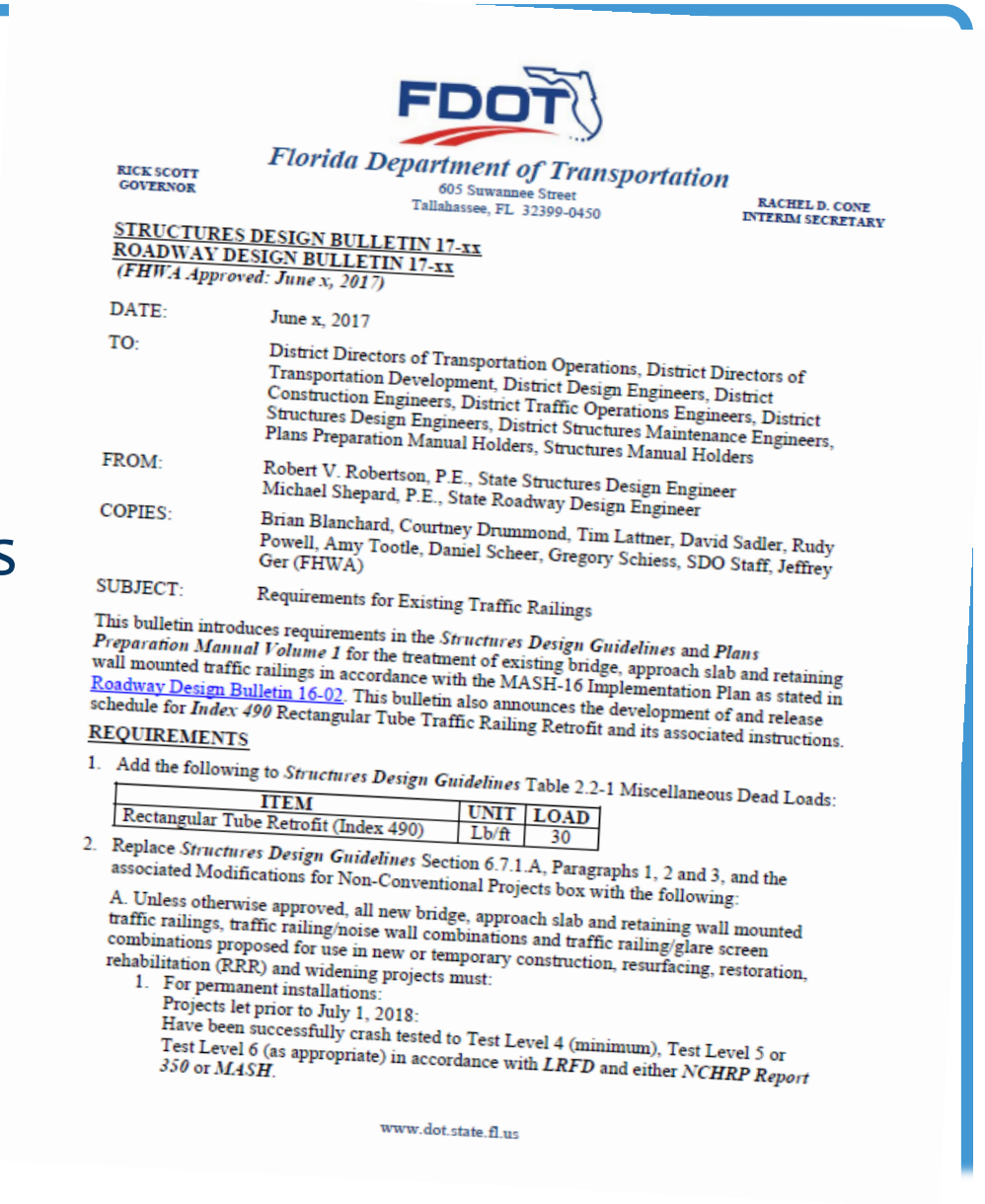


681 out of
6942 State
Owned Bridges

FDOT Policy for Existing Traffic Railings

- **Structures Design Bulletin 17-XX / Roadway Design Bulletin 17-XX** Requirements for Existing Traffic Railings
- Revises the ***Structures Design Guidelines*** and ***Plans Preparation Manual Volume 1***

http://www.fdot.gov/design/Bulletins/Default.shtm



FDOT

Florida Department of Transportation

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GOVERNOR

605 Suwannee Street
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RACHEL D. CONE
INTERIM SECRETARY

STRUCTURES DESIGN BULLETIN 17-xx
ROADWAY DESIGN BULLETIN 17-xx
(FHWA Approved: June x, 2017)

DATE: June x, 2017

TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Construction Engineers, District Traffic Operations Engineers, District Structures Design Engineers, District Structures Maintenance Engineers, Plans Preparation Manual Holders, Structures Manual Holders

FROM: Robert V. Robertson, P.E., State Structures Design Engineer
Michael Shepard, P.E., State Roadway Design Engineer

COPIES: Brian Blanchard, Courtney Drummond, Tim Lattner, David Sadler, Rudy Powell, Amy Tootle, Daniel Scheer, Gregory Schiess, SDO Staff, Jeffrey Ger (FHWA)

SUBJECT: Requirements for Existing Traffic Railings

This bulletin introduces requirements in the *Structures Design Guidelines* and *Plans Preparation Manual Volume 1* for the treatment of existing bridge, approach slab and retaining wall mounted traffic railings in accordance with the MASH-16 Implementation Plan as stated in Roadway Design Bulletin 16-02. This bulletin also announces the development of and release schedule for *Index 490* Rectangular Tube Traffic Railing Retrofit and its associated instructions.

REQUIREMENTS

1. Add the following to *Structures Design Guidelines* Table 2.2-1 Miscellaneous Dead Loads:

ITEM	UNIT	LOAD
Rectangular Tube Retrofit (Index 490)	Lb/ft	30

2. Replace *Structures Design Guidelines* Section 6.7.1.A, Paragraphs 1, 2 and 3, and the associated Modifications for Non-Conventional Projects box with the following:

A. Unless otherwise approved, all new bridge, approach slab and retaining wall mounted traffic railings, traffic railing/noise wall combinations and traffic railing/glare screen combinations proposed for use in new or temporary construction, resurfacing, restoration, rehabilitation (RRR) and widening projects must:

1. For permanent installations:
   Projects let prior to July 1, 2018:
   Have been successfully crash tested to Test Level 4 (minimum), Test Level 5 or Test Level 6 (as appropriate) in accordance with *LRFD* and either *NCHRP Report 350* or *MASH*.

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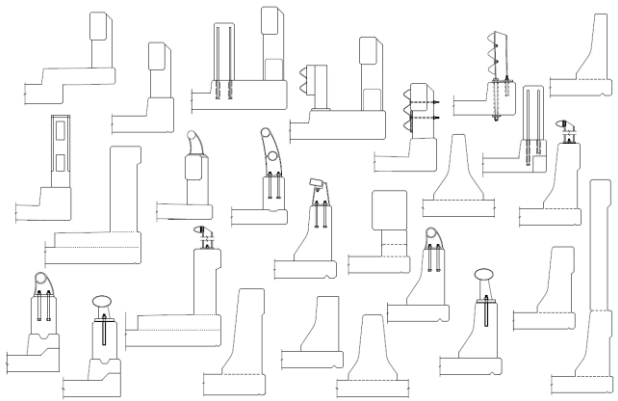
What's in the Bulletin?

- Requirements for the treatment of existing bridge, approach slab and retaining wall mounted traffic railings in accordance with the MASH-16 Implementation Plan as stated in Roadway Design Bulletin 16-02.
- Much of existing policy regarding existing bridge traffic railings is retained, e.g. "Practical Design" allowances for certain post and beam railings.

SDG Table 6.7.4-1 – 11 pages long!

Table 6.7.4-1 Treatment of Existing Traffic Railings

Existing Traffic Railing	Required Minimum Treatment of Existing Traffic Railing Installations			
	Design Speed ≤ 45 mph		Design Speed ≥ 50 mph	
	RRR criteria	Widenings (Treatment of remaining railing)	RRR criteria	Widenings (Treatment of remaining railing)



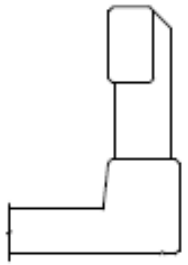
Existing Traffic Railings

Table 6.7.4-1 Treatment of Existing Traffic Railings

Existing Traffic Railing	Required Minimum Treatment of Existing Traffic Railing Installations			
	Design Speed ≤ 45 mph		Design Speed ≥ 50 mph	
	RRR criteria	Widenings (Treatment of remaining railing)	RRR criteria	Widenings (Treatment of remaining railing)
32" F-Shape  See ***IDS 402*** and ***Index 420*** for details 32" New Jersey Shape  See ***IDS 402*** for details	No action required.			On Interstates and other high speed limited access facilities, retrofit outside shoulder installations and back-to-back inside shoulder installations with more than a 2'-0" separation using ***Index 490***; or replace with ***Index 426***, ***427***, ***428*** or ***5210***. No action required on all other facilities.

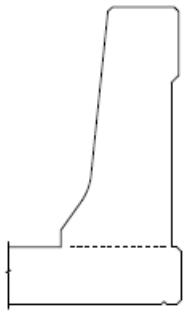
Existing Traffic Railings

Table 6.7.4-1 Treatment of Existing Traffic Railings (cont.)

Existing Traffic Railing	Required Minimum Treatment of Existing Traffic Railing Installations			
	Design Speed ≤ 45 mph		Design Speed ≥ 50 mph	
	RRR criteria	Widenings (Treatment of remaining railing)	RRR criteria	Widenings (Treatment of remaining railing)
Narrow and Recessed Curb Continuous Post and Beam  See ***IDS 404*** for details	No action required if all of the following three criteria are met: • there is no crash history or evidence of any impact • no structural work is being performed on the bridge • the approach roadway alignment or cross section are to remain unchanged	Retrofit with ***Index 470 Series*** or ***480 Series***; or replace with ***Index 422*** (with raised sidewalk), ***423*** (with raised sidewalk), ***426***, ***427***, ***428*** or ***5210***.	On Interstates and other high speed limited access facilities, replace with ***Indexes 426***, ***427***, ***428*** or ***5210***. On all other facilities, no action required if all of the following three criteria are met: • there is no crash history or evidence of any impact • no structural work is being	On Interstates and other high speed limited access facilities, replace with ***Index 426***, ***427***, ***428*** or ***5210***. On all other facilities, retrofit with ***Index 470 Series*** or ***480 Series***; or replace with ***Index 426***, ***427***, ***428*** or ***5210***.

Existing Traffic Railings

Table 6.7.4-1 Treatment of Existing Traffic Railings (cont.)

Existing Traffic Railing	Required Minimum Treatment of Existing Traffic Railing Installations			
	Design Speed ≤ 45 mph		Design Speed ≥ 50 mph	
	RRR criteria	Widenings (Treatment of remaining railing)	RRR criteria	Widenings (Treatment of remaining railing)
42" F-Shape  See ***Index 425*** for details	No action required.			

Existing Bridge Traffic Railings

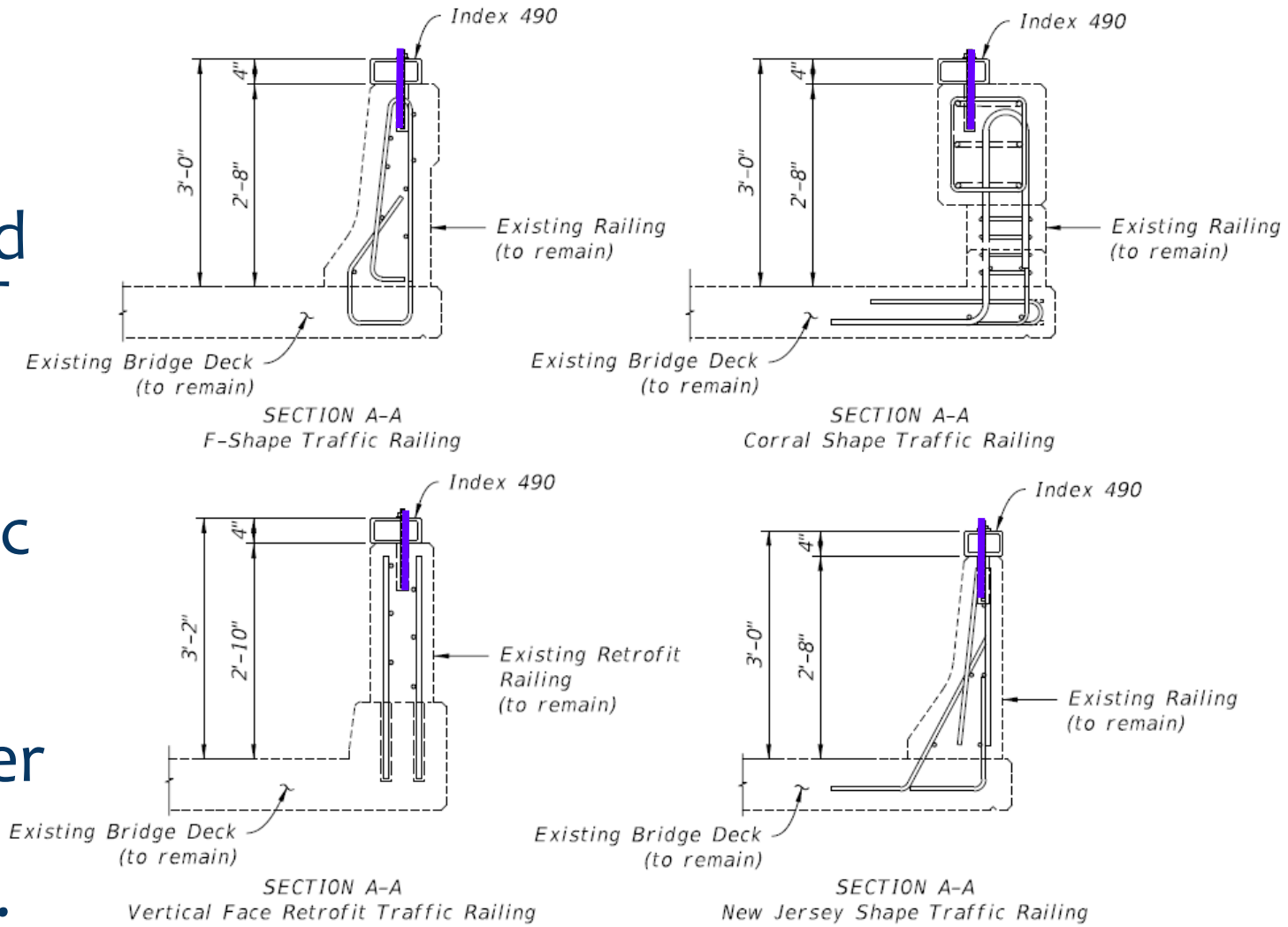
- Requirements stated in the table are minimums and are based on applicable ***Design Standards***.
- Guardrail to bridge railing transitions in ***PPM Volume 1*** Section 4.7.5, pedestrian related requirements and/or crash histories at a given site may necessitate retrofitting or replacing existing bridge traffic railings beyond the minimums.
- Existing bridge traffic railings must be in good condition for them to be left in place with no action required or where the railings are required to be retrofitted.

What else is in the Bulletin?

- Announcement of the development of and release schedule for ***Index 490*** Rectangular Tube Traffic Railing Retrofit and its associated ***IDS***.
- Details from the *pending* ***Index 490***.
- Various ***SDG*** "housekeeping" items related to the above.

Index 490

- Based on a crash tested design from Texas DOT
- Rectangular steel tube that is bolted to top of existing concrete traffic railing using adhesive bonded anchor bolts.
- Use on outside shoulder railings where called for in ***SDG*** Table 6.7.4-1.



Why Retrofit or Replace 32” Traffic Railings?

AASHTO LRFD Bridge Design Specifications

13.7.2—Test Level Selection Criteria

One of the following test levels should be specified:

- TL-1—Test Level One—taken to be generally acceptable for work zones with low posted speeds and very low volume, low speed local streets;
- TL-2—Test Level Two—taken to be generally acceptable for work zones and most local and collector roads with favorable site conditions as well as where a small number of heavy vehicles is expected and posted speeds are reduced;
- TL-3—Test Level Three—taken to be generally acceptable for a wide range of high-speed arterial highways with very low mixtures of heavy vehicles and with favorable site conditions;
- TL-4—Test Level Four—taken to be generally acceptable for the majority of applications on high speed highways, freeways, expressways, and Interstate highways with a mixture of trucks and heavy vehicles;
- TL-5—Test Level Five—taken to be generally acceptable for the same applications as TL-4 and where large trucks make up a significant portion of the average daily traffic or when unfavorable site conditions justify a higher level of rail resistance; and
- TL-6—Test Level Six—taken to be generally acceptable for applications where tanker-type trucks or similar high center of gravity vehicles are anticipated, particularly along with unfavorable site conditions.

No changes to existing policies for:

- ***SDG*** 6.7.2: Non-standard or new bridge traffic railings must be approved by the SDO

No changes to existing policies for:

- ***SDG*** 6.7.2: Non-standard or new bridge traffic railings must be approved by the SDO

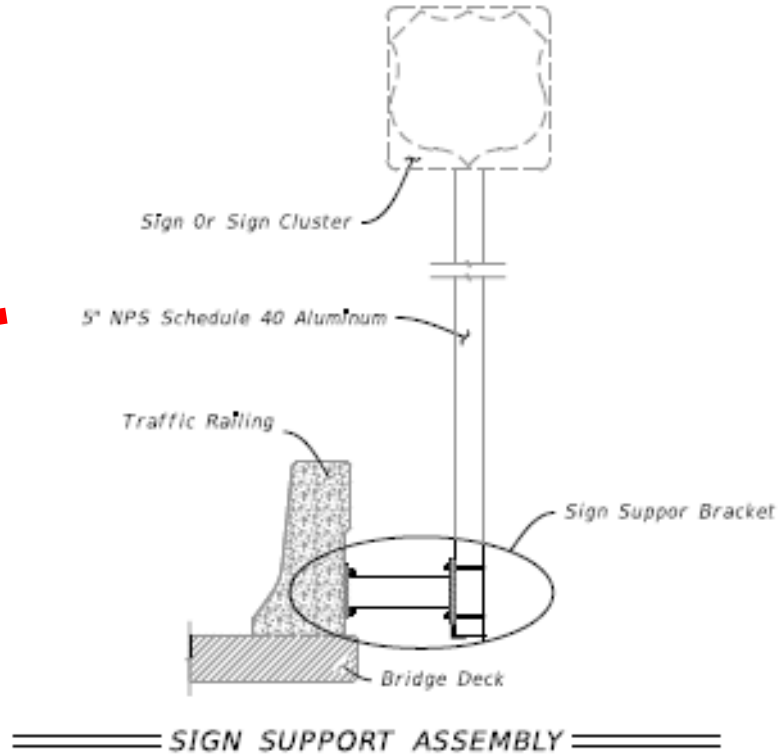
No changes to existing policies for:

- ***PPM Volume 1*** 4.5 and 7.2.5: Attachments to traffic railings are strictly limited

- No U-Turns (R3-1) w/ Official Use Only (FTP 65-06)
- Left Lane Ends (W9-1)
- Lane Ends Merge Right (W9-2)
- Merge Symbol (W4-2)

No changes to existing policies for:

- ***PPM Volume 1*** 4.5: Attachments to traffic railings are strictly limited



No changes to existing policies for:

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Questions

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