MASH-ing It All Together

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Introduction

Several variations of existing bridge rail have been built over the years. While the structure may not be due for an update, the guardrail connecting to it is often replaced with new standards.
Introduction

How do you get bridge railing built 30-40 years ago to transition to current guardrail?
Objectives

- When does Bridge Railing need to be upgraded?
- How does MGS transition to Standard Bridge Railing?
- How does MGS transition to existing Bridge Railing?
When does Bridge Railing need to be upgraded?

BDM Section 304.1

- New Construction
- Complete Deck Replacements
- Replacement of Deck Edges
- Superstructure Widening
- Rigid Overlays on NHS ...or ...
  on Non-NHS with design speeds > 40 mph

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For other types of proposed work:

Maintain a positive connection between the approach railing and the existing bridge railing.
Current Standard Bridge Railings

- BR-1-13
- BR-2-98
- DBR-2-73 & DBR-3-11
- SBR-1-13
- SBR-2-13 (No BTA required)
- TST-1-99
- TBR-1-11
BR-1-13 & SBR-1-13

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BR-1-13 & SBR-1-13

- New standard introduced 07/19/13
- BTA attachment location revised
BR-1-13 & SBR-1-13

First Post off Structure

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BR-1-13 & SBR-1-13 Transition

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BR-2-98

FHWA accepted upgrade to TL-4 with/without sidewalk
BR-2-98 Transition

* - Requires special 15'-0½” long nested thrie beam sections
DBR-2-73

- Maintained as active ODOT standard for rehabilitation work
- Not intended for new installations
- FHWA requires TL-3 on NHS
- ODOT requires TL-3 on all routes
- Unless supported by a Rational Selection Procedure
DBR-2-73

Rational Selection Procedure

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Rational Selection Procedure

- FHWA accepted method to allow TL-2 systems
- Utilizes project specific information
  - Geometry
  - Shoulder width
  - Design Speed
  - Traffic and Truck Traffic Data
- Most low volume routes typically qualify as TL-2
DBR-2-73

Issues affecting new installations

- Where do you set w-beam?
- Top of w-beam rail height: 27”
  \(\text{MGS} = 31” \& \text{Type 5} = 29”\)
- Potential for wheel snagging with post
DBR-3-11

- 2008 ODOT Research Project
- Develop cost effective TL-3 retrofit for projects without deck construction
  - Minimize impact to existing railing
  - Constructible
DBR-3-11

Result:
- Maintain existing posts & anchorages
- Maintain existing w-beam location
- Upper rail added to increase height
- Lower rail added to prevent wheel snag
DBR-3-11

When to use:

- Railing upgrade projects where top of w-beam < 27”
- All overlay projects with DBR-2-73
DBR-3-11

Issues affecting installations:

- Issued as Retrofit to existing DBR-2-73 installations – Not intended for new installations
  - TST-1-99 for side-mounted installations
  - Only TL-2 without top rail

- **W-beam Height Transition Required**
  - July 2012 – Type 5 Height = 29”
  - January 2013 – Type MGS Height = 31”
DBR-2-73 & DBR-3-11

Bridge Railing (DBR-2-73, DBR-3-11) → PIS GR-3.4 (BTA Type 4) → Height Transition - 4 panels (Max.) → MGS-4.3* → MGS-2.1

* - Provide Height Transition as quickly as possible
TST-1-99

- Department standard for side-mounted railing system
- TL-4
- Requires top-mounted posts at abutment
TST-1-99 Transition

Bridge Railing (TST-1-99)  MGS-3.1 (BTA Type 1)  MGS-2.1

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TBR-1-11

- Thrie Beam Retrofit Railing for Non-tested concrete safety curb systems
- TL-4
TBR-1-11 Transition

* - Provide Height Transition as quickly as possible
Retired Standard Bridge Railings

- AR-1-57
- BR-1-65
- BR-1-67
- BR-1 (1979)
- BR-1 (1990)
- BR-1 (1994)
AR-1-57

Concrete parapet with Safety Curb and Handrail

1957~1965

Not Tested
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AR-1-57 Transition

* - Provide Height Transition as quickly as possible
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BR-1-65

Concrete parapet with Safety Curb and Handrail

1965~1968

Not Tested
BR-1-65

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BR-1-65 Transition

Bridge Railing (BR-1-65)

BTA GR-3A (Retired SCD Dated 2/5/82)

Height Transition - 4 panels (Max.)

MGS-4.3*

MGS-2.1

* - Provide Height Transition as quickly as possible

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BR-1-67

- Crash Testing pre-dates TL’s
- “GM Shape”
- 1968-1979

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BR-1-67 Transition (Option 1)

Preferred Option

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BR-1-67 Transition (Option 2)

Not for use on high traffic facilities

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BR-1 (1979)

- New Jersey Shape
- 1979 – 1990
- TL-4
BR-1 (1979) Transition (Option 1)

Preferred Option

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BR-1 (1979) Transition
(Option 2)

BTA Type A
(Retired GR-3
Dated 1/21/85)

Bridge
Railing
BR-1 (1979)

MGS-4.3*
Height Transition - 4 panels (Max.)

MGS-2.1

* - Provide Height Transition as quickly as possible

Not for use on high traffic facilities
BR-1 (1990)

- New Jersey Shape
- 1990 – 1994
- TL-4
BR-1 (1990)

* - Requires special 15'-0\(\frac{1}{2}\)" long nested thrie beam sections
BR-1 (1994)

- New Jersey Shape (36” & 42”)
- 1994 – Current
- TL-4
BR-1 (1994)

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BR-1 (1994) Transition

* Requires special 15'-0½" long nested thrie beam sections
Questions