FY 2018-19 Standard Plans Update Training

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Standard Plans – Primary Index Updates:

1) *Index 536-001* – Guardrail
   • Miscellaneous Updates

2) *Index 521-001* – Concrete Barrier
   • Complete Redevelopment – *Single-Slope Barrier*

3) *Index 521-002* – Pier Protection Barrier
   • Extensive Redevelopment – *Single-Slope Barrier*

4) *Index 425-030* – Median Barrier Inlets Types 1 & 2
   • Modified – *Single-Slope Barrier*
   • Removed Approach and Trailing “Throats”

5) *Index 425-031* – Shoulder Barrier Inlet
   • Modified – *Single-Slope Barrier*

6) *Index 425-032* – Curb & Gutter Barrier Inlet
   • Modified – *Single-Slope Barrier*
   • New PVC Drainage Pipes from Sidewalk

7) *Index 715-002* – Standard Aluminum Lighting
   • Modified – *Single-Slope Barrier*
Standard Plans – Primary Index Updates:

1) Index 536-001 – Guardrail
   • Miscellaneous Updates
Guardrail -
Summary of Changes:

• Single-Slope Barriers – updated all connecting barrier and offset blocks details throughout

• Miscellaneous updates for constructability and clarity

• Today’s presentation covers select items of interest for designers

• For complete red lines of all changes, see the Office of Design - Industry Review website at: http://www.fdot.gov/design/standardplans/IRR/Default.shtm
Sheets 6, 7, & 8; Example Sections Throughout:

- Removed “1:10 Max.” cross-slope on Shoulder Depictions
- “1:10 Max.” does not conflict with FDM requirements, but...
- Removal avoids misconception that “1:10 Max.” supersedes Plans and FDM requirements
“1:10 Max.” label remains on generic approach, sidewalk, and misc. asphalt details

Added new note explaining “1:10 Max.” is for guardrail function only; the slope shown in Plans governs (FDM requirements)
- Example of Changes for Single-Slope Barrier (which show up on numerous other Sheets)
- Barrier Height now Tapers Down for GR Connection
- Offset Blocks Revised
- Overall Guardrail System Width Unchanged!
- **Added Option to Terminate Pipe Rail on Steel Post**

- **If Pipe Rail is no longer needed because a sidewalk veers greater than 4 feet from guardrail, a timber post is no longer required within the steel post run.**
Standard Plans – Primary Index Updates:

1) *Index 536-001* – Guardrail
   - Miscellaneous Updates

2) *Index 521-001* – Concrete Barrier
   - Complete Redevelopment – *Single-Slope Barrier*
Concrete Barrier -
Summary of Changes:

• All barriers upgraded to **Single-Slope** sections to accommodate larger vehicles for MASH compliance

• “**Standard Plans**” sheets were completely redrawn, rewritten, and reorganized to improve clarity of notes and details for designers and contractors

• **New “Standard Plans Instructions (SPIs)”** for improved clarity of process for designers

• **New “Length of Need (LON) Design Tool”** to assist designers with learning the **AASHTO Roadside Design Guide** barrier length process

• Today’s presentation covers select items of interest for designers
GENERAL NOTES:

1. CONCRETE: Use Class 14 concrete for all barriers constructed in aggressive environments, and use Class 16 concrete for all barriers constructed in moderately or extremely aggressive environments. On all exposed surfaces, apply a Class 2 surface finish in accordance with Specification 401.

2. STEEL BAR REINFORCEMENT: Where required to maintain stability, provide top layers of at least 18 inches for N, 6 bars and 20 inches for N3, N bars, unless otherwise shown herein (including shorter splices as provided by the qualified bent bar bending diagrams).

3. OPTIONAL WELDED WIRE REINFORCEMENT: With the approval of the Engineer, steel welded wire reinforcement in accordance with Specification 445 may be substituted for the steel bars shown herein. Place the welded wire at the locations shown for the steel bars, and maintain the least clear distance, center-to-center spacing, and continuity requirements.

4. TOP FACE CONSTRUCTION: Concretes otherwise specified, the top horizontal reinforcement shown should be placed to the top face of the barrier has a maximum cover of 40", measured from the top face of the barrier.

5. MINIMUM BARRIER LENGTH: Unless otherwise shown in the Plans, the minimum Concrete Barrier length is 40 feet.

6. CONSTRUCTION JOINTS: Install Construction Joints only as needed for discontinuous concrete casting or cast joints. Maintain continuity of steel reinforcement across construction joints. Construction Joints are identified herein as Transverse joints or longitudinal joints.

7. Transverse joints are permitted at 20-foot or greater intervals along the barrier, for Tall Grade-Separated Sections, see Sheet 5 for additional Transverse Joint requirements.

8. Longitudinal joints are only permitted where indicated in the following details and notes, with a vertical position tolerance of ± 1/8" from the locations shown.

9. DOUBLE JOINTS: As shown in the Details as Sections B-12, install W-4 Double Joints for Concrete Barrier connections. These Double Joints and Traffic Railing, Bowled Joints are also required for expansion mitigation in Medium Barrier as defined per Sections B-2 & B-3. Bowled Joints are not permitted within Grade-Separated Medium Barrier.

10. CRACK CONTROL: V-GROOVES: At 20-foot intervals, place 4" V-grooves that run vertically and/or transversely in the top, top, and base face of barriers. The V-grooves can be either molded or scored to the concrete as cast plastic.

11. SURFACING: Combine the top layer of subgrade with Type II Stabilization (LR 40-121 mix).

12. FINISH GRADE ELEVATION: At the barrier face location, the finished grade pavement has a vertical deviation tolerance of ± 1/2" from the location shown herein, related to the barrier elevation. Maintain visually smooth and even pavement at the barrier face, per the approval of the Engineer.

13. DRAINAGE TRENCHES: Where called for in the Plans, install corresponding trenches per Item 426-030 or Item 426-032.


15. CRACK VISION BARRIER: Where called for in the Plans, install Crack Vision Barrier per Item 521-010.

16. BARRIER END MARKERS: For all four ends of concrete barriers that are not shielded with an end treatment or connection to another barrier or traffic railing type, install V Type 3 Object Markers on the end face per Specification 704.

17. BARRIER TERMINAL ADJUSTMENT: To facilitate adjustments in accordance with Specification 304. For median barriers, mount the hit-plate on the top of the barrier, at the criteria of barrier, with deflective shielding facing traffic on both approaches. For shoulder barriers, mount the deflective shielding facing traffic on one approach only.
GENERAL NOTES:
1. CONCRETE: Use Class 4A concrete for all barriers constructed in highly or extremely aggressive environments, and use Class 4C for all barriers constructed in moderately or extremely aggressive environments. On all exposed surfaces, apply a Class 4A surface finish in accordance with Specification 460.

2. MINIMUM REQUIRED REINFORCEMENT: Shown required to maintain strength, provide top edges of at least 16 inches for 3, 6, and 9 inches thick barriers, unless otherwise shown herein (including shoulder details as provided by the default bar bending diagrams).

3. OPTIONAL RIBBED WIRE REINFORCEMENT: With the approval of the Engineer, steel welded wire reinforcement in accordance with Specification 415 may be substituted for the steel bars shown herein. Place the welded wire in the nose locations specified for the steel bars, and maintain the worthwhile strength, cover, maximum spacing, and continuity requirements.

4. TOP FACE CONCRETE REINFORCEMENT: Unless otherwise specified, the longitudinal reinforcement shown closest to the top face of the barrier has a maximum cover of 40 inches, measured from the top face of the barrier.

5. MINIMUM BARRIER LENGTH: Unless otherwise shown in the Plans, the minimum Concrete Barrier length is 40 feet.

6. CONSTRUCTION JOINTS: Install Construction Joints only as needed for discontinuous concrete casting or cold joints. Maintain continuity of steel reinforcement across Construction Joints. Construction Joints are identified herein as Transverse Joints at shoulder aids.

Transverse Joints are permitted at 20-foot or greater intervals along the barrier. For all Grade-Separated Sections, see Sheet 9 for additional Transverse Joint requirements.

Concrete Joint details are only permitted where indicated in the following detail notes, with a vertical position tolerance of ± 1/8 inch from the locations shown.

7. DOWEL JOINTS: As shown in the Detail Sections on Sheets 2 & 10, install 6’ Dowel Joints for Concrete Barrier connections to Metal Precast Barrier and Traffic Railings. Dowel Joints are also required for expansion reliefs in Metal Barrier as defined per Sheets 2 & 10. Dowel Joints are not permitted within Grade-Separated Median Barrier.

8. CRACK CONTROL V-GROOVES: At 10-foot intervals, place 9′ 0″ depth V-grooves that run vertically and transversely in the form, top, and back faces of barriers. The V-grooves can be either installed or struck-in before the concrete is cast in place.

9. FORMING: Compress the top layer of subgrade with Type IV Stabilized Soil (LR 40-111). Integrate

10. FINISHING: Apply continuous concrete cover at the barrier face line of the finished top surface pavement. Maintain visually smooth and even pavement at the barrier face, per the approval of the Engineer.

11. DRAINAGE DEVICES: Where called for in the Plans, install corresponding drainage devices per Index 325-030 thru 425-032.

12. TRANSFER MOUNTING: Where called for in the Plans, install aluminum light poles per Index 745-007.


14. BARRIER END MARKERS: For all free ends of concrete barriers that are not topped with an end treatment or connection to another barrier or traffic railing type, install a Type 1 Object Marker on the end face per Specification 750.

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16. BARRIERS ATTACHMENTS: General conditions, installation of Attachments in accordance with Specification 590. For median barriers, mount the shoulder in the nose of the barrier, at the centerline of the barrier, with reflective sheathing facing traffic on both approaches. The shoulder shoulder and shall extend, mount the shoulder on the top of the barrier, with the noseway side of the shoulder located 3′ from the free face of the barrier and the reflective sheathing facing traffic of the nearest approach.
Index 521-001 – Concrete Barrier

Sheet 2: All new!

- Shows a basic Plan, Elevation, & Section at the start of each barrier type grouping
- Shows connection to guardrail and bridge Traffic Railing as applicable
- 16’-0” end segment for guardrail connection
4 Pay Items for Median Barrier:

- **38” Height Symmetrical** (Shown here)
- **Short Grade-Separated** (Upcoming Slides)
- **Tall Grade-Separated** (Upcoming Slides)
- **Variable Section for Sign or Pier Shielding** (Upcoming Slides)
Sheet 3: All new!

- New reinforcing details for normal run and connection to guardrail
- Provides minimum reinforcing required for slip-forming
Permitted for Median Barriers on the Trailing End or outside of any approaching lane’s Clear Zone.

Usage explained in the Standard Plans Instructions (SPI) table.
Sheet 5:  All new!

- Similar to Previous Standard from Design Standpoint
- Larger foundations and footings for MASH
- Clarified where project-specific steel design is required for connection to sign support foundation
- Pedestal Width varies as required
- May be used at 2’-0” wide Pedestal Width (zero taper)
Sheet 7: All new!

- Similar to previous sheet, but asymmetrical – shoulder reduction only on one side
An alternative for sign support shielding where...

- Shielding an existing sign support, or...
- Designer prefers independent foundation for sign support
- Lateral space is available
Sheet 9: All new!

- For shielding pier for crashworthiness benefit to vehicle only (assumes pier is designed to withstand impact)

- Where a pier is not designed to withstand impacts, use “Pier Protection Barrier” per 521-002 (See SPI & FDM for Guidance)
Sheet 10: All new!

- Required Section dimensions and reinforcing details for the previous sheet.
For transitioning any existing F-Shape to Single-Slope Section

Requires 12’-6” minimum length between connecting section types
This sheet begins the “Shoulder Barrier” grouping with basic Plan, Elevation, & Section

Typically used on “outside” shoulders (where Median Barrier or Curb & Gutter Barrier is not used)
3 Pay Items for Shoulder Barrier:
- 38” or 44” Height (Shown here)
- Retaining Section (Upcoming Slides)
- Trench Footing Section (Upcoming Slides)
Sheet 13: All new!

Sheet shows reinforcing details, both in a normal run and as required to taper down for a guardrail connection.
- Section alternatives as required
- Retaining Section Heel larger than previous
- New Trench footing option
A few more sections as they work with pier shielding on following sheets

44” Height Section has same Pay Item as “regular” 38” Height Section (named: 38” or 44” Height Shoulder Barrier in BOE)
• For shielding pier for crashworthiness benefit to vehicle only (assumes pier is designed to withstand impact)

• Where a pier is not designed to withstand impacts, use “Pier Protection Barrier” per 521-002 (See SPI & FDM for Guidance)
For “Low Speed” Pier Shielding (≤45 mph)

- Setback requirement is 0 feet for “Low-Speed”, so height maintained at 38”

- Two options: Full Barrier Width (when space permits) or 3” width reduction.
Same width options as previous

Used for all design speeds.

Difference from previous... The Barrier height is raised to reduce setback requirement for Zone of Intrusion (ZOI) per FDM Table 215.4.2
• Transition to F-Shape for Single-Faced Barrier

• Similar concept to double-faced Median Barrier already seen on Sheet 11!
“Curb & Gutter Barrier” is the third category of concrete barrier.

- Typically used in urban areas
- Design Speed (≤45 mph)
- Aligns with “Type F” curb for water conveyance
Has its own “Curb and Gutter Barrier” Pay Item

New Guardrail connection details

Guardrail Approach Terminal is primary “first-choice” End Treatment (where space permits)
Sheet 20: All new!

- Reinforcing details for general run and connection to guardrail
• Use Sloped End Treatment only where Guardrail Approach Terminal will not fit

• Design Speed (≤35 mph)

• Requires DDE approval per FDM 215

• Requirements explained in SPI
Index 521-001 – Concrete Barrier

Sheet 22: All new!

**BIL** of reinforcing steel

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**Notes:**
1. Refer to the standard bar bending details per index 419-002.
2. All bar extensions in the bending diagrams are not to scale.

**Reinforcing bar bending diagrams**
## STANDARD PLANS INSTRUCTIONS:

### All new!

Standard Plans Website: [http://www.fdot.gov/design/standardplans/current/default.shtm](http://www.fdot.gov/design/standardplans/current/default.shtm)

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[http://www.fdot.gov/design/standardplans/current/XLS/ConcreteBarrier-LON.XLSM](http://www.fdot.gov/design/standardplans/current/XLS/ConcreteBarrier-LON.XLSM)
Standard Plans – Primary Index Updates:

1) **Index 536-001** – Guardrail
   - Miscellaneous Updates

2) **Index 521-001** – Concrete Barrier
   - Complete Redevelopment – Single-Slope Barrier

3) **Index 521-002** – Pier Protection Barrier
   - Extensive Redevelopment – Single-Slope Barrier
GENERAL NOTES:

1. CONCRETE: Use Class 90 or 115 concrete unless otherwise called for in the Plans.

2. CONSTRUCTION JOINTS: Maintain continuity of reinforcement steel across Construction Joints; reinforcement lap splices are prohibited. Transverse joints are permitted between barriers or across joints. Construct all Pier Protection Barrier continuously, with the expansion or contraction joints. Construction joints are located per Theme as Transverse joints or Longitudinal Joints.

3. SUBGRADE: Compact the top layer of subgrade with Type B Stabilization, (21240 (12 in).

4. CUTFILL SHEETS: See Index 424-086 for Shoulder Barrier Sheets, and isolate these structures from Pier Protection Barriers and Fencing with 4" of preformed sheet fiber.

5. BARRIER END BARRIERS: For all ends of barriers that are not connected to guardrail or concrete barrier, install a Type 3 End Barrier in the end face per Specification 705.

6. BARRIER DELINEATORS: Install Barrier Delineators in accordance with Specification Section 705. Mount the delineators on the top face of the barriers with the roadway side of the delineator located 24" from the front face of the barrier and the reflective sheathing facing traffic of the named approach.

7. CRACK CONTROL: Provide 6" deep crack control 4"/4" spaced at 3' to 3' spacing. Locate V-Drives above any joint or discontinuity in the barrier footing. Align V-Drives perpendicular to the longitudinal axis of the Pier Protection Barrier and make continuous across the top surface and both sides. For split furred barriers, score V-Drives while the concrete is still plastic, otherwise pre-form the joints when stationary forms are utilized.
Sheet 2: Revised!

- More detail added to example layouts
- Now shows Station & Offset Points to correspond with Plans
- Now shows optional Crash Wall
Crash Wall connection to PPB location differs per Guardrail or Concrete Barrier connection:

- **Guardrail Connection:** 3 Ft. Offset
- **Concrete Barrier Connection:** Zero Offset
New plan and elevations show all height and end connection configurations.

Heights Required:
- ~56” for pier within 10’-0” of PPB
- ~44” for pier beyond 10’-0” from PPB

Guidance per SPI and LRFD
• Reinforcing details when connecting to Concrete Barrier (38” height at end)
- Reinforcing details when connecting to Guardrail (32” Height at end)
Sheet 6: Revised!

- Differing footing options for fitting around piers, drainage, utilities, etc...
- Same dimensions as FY 2017-18 Standard
**Crash Wall**
- Used to reduce Length of Need and overall system length of barrier

**Same design dimensions as FY 2017-18 Standard**

**New Crash Wall Sta. and Offset Point to corresponds to Plans**
Sheet 8: All new!

- Reinforcing details for contractors!

**Bill of Reinforcing Steel**

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**NOTES:**

1. Work with the Standard Bar Bending Details per Index 425-002.
2. All bar dimensions in the bending diagrams are cut to size.

**Bar Bending Diagrams**
STANDARD PLANS INSTRUCTIONS: Redeveloped!

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## DESIGN TOOL – ‘Length of Need’ (Excel): All new!

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4) Index 425-030 – Median Barrier Inlets Types 1 & 2
   • Modified – Single-Slope Barrier
   • Removed Approach and Trailing “Throats”
** Clarified Usage Note, Plan, Elevation, and Section Views 

** Removed upstream "throat" indentation 

** Reduced inlet Type quantity from 5 to 2 

** Clarified Label: Type 1 inlet for symmetrical barrier only
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5) **Index 425-031 – Shoulder Barrier Inlet**
   • Modified – Single-Slope Barrier
Clarified usage with specific Index numbers in Note 1.

Previously, this Index was named “Barrier Wall Inlet”... similar sounding to other inlet Index titles.

GENERAL NOTES:
1. Where called for in the Plans, use this inlet in conjunction with Shoulder Barrier per Index 425-031 or a Road Capping with Traffic Railings/Transition Strip per Index 521-048 (see of this Index adjacent to other Concrete Barrier or Traffic Railing titles). Requires approval of the Drainage Engineer. This inlet is suitable for simple and occasional pedestrian traffic with roller bar installation (see INLET B) but should not be placed in a designated pedestrian travel way.

2. Inlets located in embankments constructed with earth embankment retaining wall shall be designed with minimum depths to reduce adverse impact on the embankment system. Front of wall parallel to and near embankment wall shall be graded where practicable. Special coordination must be observed during the design and construction of storm water systems within embankment wall systems.

3. Inlet bottom and sides shall be either precast or shop-made. Member can be a single unit or as multiple segments, and when precast or cast-in-place the upper 2/3 of the inlet shall be reinforced in accordance with sections CC, DD, and EE.

4. All exposed edges and corners shall be 1/2” chamfer or rounded to 1/8” radius.

5. When alternate 6 grate is specified in the Plans, the grate to be hot-dip galvanized after fabrication. Final installation of the filter bar called for in Item b will not be permitted, thereby requiring tolerance adjustment during fabrication and/or casting; or matching grate to structure prior to glazing.

6. All reinforcing is Grade 40 Bars. See Index 425-001 for equivalent area of welded wire fabric.

7. All dimensions are for both precast and cast-in-place units unless otherwise noted.

8. For supplemental details see Indices 425-001 and 425-046.

9. Inlets to be paid for under the contract unit for Inlets (Concrete Barriers, Co.)
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6) Index 425-032 – Curb & Gutter Barrier Inlet
   • Modified – Single-Slope Barrier
   • New PVC Drainage Pipes from Sidewalk
- Clarified Usage Note 1, Plan, Elevation, and Section Views
- Removed upstream “throat” indentation
Replaced 18” drainage slot with 3 ~ 3.5” PVC pipes (improved constructability, less interference with rebar)

Revised reinforcing
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   - New PVC Drainage Pipes from Sidewalk

7) **Index 715-002 – Standard Aluminum Lighting**
   - Modified – Single-Slope Barrier
- Updated reinforcing: vertical bars now throughout
- Reminder: For roadside Concrete Barrier, longitudinal conduit runs underground (not in the barrier itself!)
• Updated reinforcing: vertical bars now throughout

• Reminder: For roadside Concrete Barrier, longitudinal conduit runs underground (not in the barrier itself!)
Updated reinforcing

Reminder: For bridge deck Traffic Railing, longitudinal conduit runs within the Traffic Railing
Standard Plans – Primary Index Updates:

1) **Index 536-001 – Guardrail**
   - Miscellaneous Updates

2) **Index 521-001 – Concrete Barrier**
   - Complete Redevelopment – *Single-Slope Barrier*

3) **Index 521-002 – Pier Protection Barrier**
   - Extensive Redevelopment – *Single-Slope Barrier*

4) **Index 425-030 – Median Barrier Inlets Types 1 & 2**
   - Modified – *Single-Slope Barrier*
   - Removed Approach and Trailing “Throats”

5) **Index 425-031 – Shoulder Barrier Inlet**
   - Modified – *Single-Slope Barrier*

6) **Index 425-032 – Curb & Gutter Barrier Inlet**
   - Modified – *Single-Slope Barrier*
   - New PVC Drainage Pipes from Sidewalk

7) **Index 715-002 – Standard Aluminum Lighting**
   - Modified – *Single-Slope Barrier*
Questions?

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