FY 2019-20 Standard Plans Update Training

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Standard Plans – Primary Index Updates:

1) **Index 536-001 – Guardrail**
   - *New “Trailing Anchorage”*
     - Updated Downstream Placement Policy

2) **Index 521-001 – Concrete Barrier**
   - *New* Barrier-Mounted Sign Support Option – Dual Supports
   - *New* Callouts for “Variable Section Width” Start/Stop Points
   - *New* “Wall Shielding Barrier” & General “Max. Taper Rates”

3) **Index 521-010 – Opaque Visual Barrier (OVB)**
   - *Redeveloped* Index Sheets for Clarity
     - Durability Improvements
     - Varying Barrier Heights
   - *New* SPI and FDM Section

4) **Index 544-001 – Crash Cushion Details**
   - *Redeveloped* Index Sheets and SPI for Clarity
   - *Redeveloped* Summary of Permanent Crash Cushion Table
   - *New* Pay Items
Standard Plans – Primary Index Updates:

1) **Index 536-001** – Guardrail
   - *New* “Trailing Anchorage”
   - *Updated* Downstream Placement Policy
Sheet 9: No More “Type II”!

- Soil Plate System Removed
- Rectangular Washers Removed
Sheet 9: New Trailing Anchorage!

- New Strut System Added
  - 2 Struts Total (1 Each Side)

- New Short Timber Breakaway Post & Steel Tube Foundation at Post 2

- Changes follow latest designs for MASH, following discussions with MwRSF
Sheet 10:  New Trailing Anchorage!

- New Strut System Added
- Steel Tube Foundations lengthened by 1 foot
BOE - DQE: New Trailing Anchorage!

536- 85- AA Guardrail End Treatment, EA

AA = Type

Single Face

20 (Trailing Anchorage) effective July 2019 lettings
22 (Flared Approach Terminal) valid through June 2019 lettings
24 (Parallel Approach Terminal)

25 (Type II Trailing Anchorage) valid through June 2019 lettings; see AA-20 for replacement
26 (CRT End Treatment)
PENDING: ?? (Flared Approach Terminal- NCHRP 350 TL-3) For Maintenance Use ONLY

Double Face

27 (Double Face Approach Terminal)

28 (Double Face Type II Trailing Anchorage) valid through June 2019 lettings; see AA-20 for replacement

29 (Double Face Trailing Anchorage) effective July 2019 lettings

• New Pay Items in Basis of Estimates (BOE – DQE):
  • 536-85-20
  • 536-85-29
SPI, Part C: New Trailing Anchorage!

- Extend Trailing Anchorage to **25 feet** downstream of hazard being shielded
- Based on latest MASH crash testing report
Standard Plans – Primary Index Updates:

1) Index 536-001 – Guardrail
   • New “Trailing Anchorage”
     • Updated Downstream Placement Policy

2) Index 521-001 – Concrete Barrier
   • New Barrier-Mounted Sign Support Option – Dual Supports
   • New Callouts for “Variable Section Width” Start/Stop Points
   • New “Wall Shielding Barrier” & General “Max. Taper Rates”
Sheet 8: **New Barrier-Mounted Dual Sign Supports**

- This is an alternative to larger sign supports with barrier widening
- Design is for **least use of space**
- **No shoulder reduction:** Barrier Gutter Lines remain at 2 foot barrier width
BOE - DQE: **Variable Section Width Callouts**

*******************************************************************************

521- 1- A Median Concrete Barrier, LF

A= Type, Single Slope, effective July 2018
11 (38” Height) Symmetrical
12 (Short Grade-Separated)
13 (Tall Grade-Separated)
14 (Variable Section Width for Sign or Pier Shielding)

Segments included under -14 pay item:
Median Barrier – 56” Height Section” (with transitions)
Median Barrier – 38” Height Split Section” (with transitions)
Median Barrier – 44” Height Split Section” (with transitions)

- **Existing Pay Item** – Descriptions now added
- **Median Concrete Barrier 521-1-14** is for *double-faced* application
BOE - DQE: Variable Section Width Callouts

521-72- AA Shoulder Concrete Barrier, LF

40 (38” or 44” Height) Index 521-001
41 (38” Retaining Section) Index 521-001, sheet 14 of 22
42 (38” Trench Footing Section) Index 521-001
43 (38” Curb & Gutter Barrier) Index 521-001
44 (44” Pier Protection Barrier/ Crash Wall) Index 521-002
56 (56” Pier Protection Barrier/ Crash Wall) Index 521-002
60 (38” Wall Shielding Barrier) Index 521-001, effective July 2019

61 (Variable section width for wall or sign shielding) Index 521-001, effective July 2019

- **New Pay Item** for single-faced Wall Shielding Barrier
- **Shoulder Concrete Barrier 521-72-61** is for *single-faced* application
• Example of...
Variable Section Width Pay Item (Double-Faced)
Sheet 8: Variable Section Width Callouts

• Example of... Variable Section Width Pay Item (Double-Faced)

NOTE:
Even though gutter line width doesn’t change, the barrier face width changes, so the concept still applies.
NOTE:
Measurement is along centerline of entire Variable Section Width system per the SPI and Specifications.
• Example of... Variable Section Width Pay Item (Double-Faced)

NOTE: Measurement is along centerline of entire Variable Section Width system per the SPI and Specifications.
Sheet 25: Variable Section Width Callouts

- Example of... Variable Section Width Pay Item (Single-Faced)
- Sneak Peak of Wall Shielding Barrier
Wall Shielding Barrier – Past Examples (Non-Standard)
• **Usage:** Decision is project-specific per the SPI, Part B (District-level decision)

• **Space Needed:** Requires 1’-3½” from retaining wall to gutter line (Barrier Section plus half-inch joint filler)
Wall Shielding Barrier – Past Examples (Non-Standard) 
Approach and Trailing Taper (For Overhead Sign Support)
• **Tapers:** Requires project-specific approach and trailing taper rates based on Design Speed (upcoming slides)

• **Overhead Sign Support:** Project-specific Design, similar to Median Version, (Sheets 9-10)
Wall Shielding Barrier – Past Examples (Non-Standard) Guardrail Connection
Sheet 24:  Wall Shielding Barrier – Guardrail Connection

- **Space Needed:** Requires 5’-3½” from retaining wall to gutter line (for proper Guardrail setback)

- **Overhead Sign Support:** Project-specific design, similar to median version, (Sheets 9-10)
**Sheet 25: Wall Shielding Barrier – Barrier-mounted Sign Support**

- **Space Needed:** Requires minimal space for a sign support that is governed by project-specific width of Overhead Sign Support.

- **Overhead Sign Support:** Project-specific design, similar to median version, (Sheets 6-8)
• **Tapers:** Requires project-specific approach and trailing taper rates based on Design Speed (upcoming slides)
G. Barrier Taper Rates:

Where conditions require the face of barrier to deviate from running parallel to the roadway, the shift in lateral offset must not exceed the taper rates provided below.

<table>
<thead>
<tr>
<th>Barrier Type</th>
<th>Design Speed (mph)</th>
<th>Approach End *Maximum Taper Rate</th>
<th>Trailing End *Maximum Taper Rate</th>
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<tr>
<td>Median Barrier</td>
<td>All</td>
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<td>Shoulder Barrier, Curb &amp; Gutter Barrier, and Wall Shielding Barrier</td>
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<td>1:16</td>
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*Taper Rate is measured relative to the roadway centerline (lateral offset : length)

- **Median Barrier**: (double faced) is a consistent 1:20
- **Shoulder Barrier**: (single-faced) varies by Design Speed and approach direction to assist with minimizing space requirements
**New General Barrier Taper Rates**

- **Taper Example** – Wall Shielding Barrier

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**Table 2: Maximum Barrier Taper Rates**

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**NOTES:**

1. **TAPER SEGMENTS AND OFFSET SEGMENT:** The plan view shown is an example only, showing general geometry for the taper segments and offset segment. For the actual geometry, refer to the section for the specific barrier. For the actual placement of the corresponding taper rates, refer to the barrier placement information in the Plan.

2. **OFFSET SEGMENT:** The overall taper support shown is an example only, as the plans for the project specify dimensions and requirements if applicable.

3. **CONNECTION TO SHIELDING BARRIER:** The connection to the Shielding Barrier is shown using a continuous pour or tapered pour, where longitudinal slab that/deck slope meets the adjacent section. In multiple situations between sections or for a U-turn, verify with the adjacent section’s longitudinal slope.
Standard Plans – Primary Index Updates:

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   - **New Callouts for “Variable Section Width” Start/Stop Points**
   - **New “Wall Shielding Barrier” & General “Max. Taper Rates”**

3) **Index 521-010 – Opaque Visual Barrier (OVB)**
   - **Redeveloped Index Sheets for Clarity**
     - Durability Improvements
     - Varying Barrier Heights
   - **New SPI and FDM Section**
Opaque Visual Barrier – Past Examples (Previous-Standard)
**FDM:** New FDOT Design Manual Section

215.5.1.2 Opaque Visual Barrier

Opaque Visual Barrier is used on top of median concrete barrier and traffic railing to reduce headlight glare from opposing traffic lanes. Opaque Visual Barrier may be considered on LA Facilities that have glare issues when the facility has high-traffic volumes and a separation between opposing traffic lanes of 26 feet or less.

When Opaque Visual Barrier is used, a minimum shoulder width of 4 feet is required on both sides of the median concrete barrier or traffic railing.

*Standard Plans, Index 521-010* and the associated *Standard Plans Instructions* provide additional information.

- **Usage Considerations:**
  - Remains a project-specific, District level decision

- **Guideline for LA Facilities...** (see highlighted)

- **Usage Limitations:**
  Median Barrier use only with min. 4 feet shoulder either side
  (Further explanation in SPI)
SPI: New Standard Plans Instructions

Index 521-010 Opaque Visual Barrier (OVB)

Design Criteria

Design Assumptions and Limitations
For usage information, see FDM 215.

OVB is only intended for use as a visual screen; it is designed to withstand wind loading, light debris, and minor contact from errant vehicles.

OVB is not intended to resist or shield against errant vehicle impact loads; it is designed to yield upon large vehicle strikes.

A. Placement:

Per Index 521-010, align the centerline of the OVB with the centerline of the top face of the supporting Concrete Barrier or Traffic Railing. ……

Covers:
- Crash-worthiness design limitations
- General placement practices
- Callout locations (corresponds to Index drawing’s Begin/End OVB Sta.)
- Pay Item information
Sheet 1: Redeveloped OVB – New Heights and Features

- Notes rewritten for clarity with new headings
- New OVB Heights:
  - Now accommodates multiple cases:
    - New Single-Slope Concrete Barrier & Bridge Traffic Railing
    - Old F-Shape Barrier (Existing)
**Sheet 1: Redeveloped OVB – New Heights and Features**

- **Tighter Reinforcing:**
  - web now 6” spacing

- **Longer Panel Lengths:**
  - minimum joint spacing of 20 feet
Sheet 2: **New Sheet – “Leave-Out” & Variable Height Details**

- Large Sign Support with 56” Height Barrier (per Index 521-001)
• **“Leave-Out” Example:** Per General Note 7, “Leave-Outs” of up to 15 feet are permitted with one continuous Pay Item measurement (to accommodate barrier-mounted signs and light poles).
**Variable Heights:**
Detail for OVB Panels over raised barrier height sections
(Uses same Pay Item)

**Example here shows**
44” Height Barrier with height transition (other heights and transitions similar)
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   - New SPI and FDM Section

4) **Index 544-001 – Crash Cushion Details**
   - Redeveloped Index Sheets and SPI for Clarity
   - Redeveloped Summary of Permanent Crash Cushion Table
   - New Pay Items
544-001 is for “Permanent Crash Cushions” on the APL...
GENERAL NOTES:

1. GENERAL: Work this Index in accordance with Specification Item and the "Summary of Permanent Crash Cushion" table in the Plans.

2. TRANSITION PANELS: Where crash cushions are placed between two-way traffic or adjacent to narrow,emed traffic, place a Transition Panel from the concrete barrier to the Crash Cushion on the downstream side of the barrier end as shown. Follow the requirements of the AP, placing,

3. MANUFACTURER'S TRANSITION: Construct the proprietary transition only if shown in the applicable AP, placing the Transition Panel from the concrete barrier to the Crash Cushion on the downstream side of the barrier end as shown. Follow the requirements of the AP, placing,

4. STANDARD GUARDRAIL TRANSITION: If the AP drawing does not provide a guardrail transition, construct the Transition Panel from the concrete barrier to the Crash Cushion on the downstream side of the barrier end as shown. Follow the requirements of the AP, placing,

5. "Length of Need": Simplified

6. "Summary of Permanent Barrier Wall" Table Simplified

7. Pay Item Updates

- Drawings and Notes Redefined for Clarity
- "Length of Need" Process Simplified
- "Summary of Permanent Barrier Wall" Table Simplified
- Pay Item Updates
First Concept:

Crash Cushion Callout Point is the same as the:

- ‘Length of Need’ Location
- Begin/End Guardrail Station or...
- Begin/End Concrete Barrier Station
Concrete Barrier LON Design Tool (Excel):

First Concept:

Crash Cushion Callout Point is the same as the:

- ‘Length of Need’ Location
- Begin/End Guardrail Station or...
- Begin/End Concrete Barrier Station
Second Concept:

‘Length of End Treatment’ – Segment upstream of the connecting Concrete Barrier or Guardrail...

- Includes all proprietary elements required per the APL drawings
- For Guardrail, this includes the “Manufacturer’s Transition”
Second Concept:
‘Length of End Treatment’ – Segment upstream of the connecting Concrete Barrier or Guardrail...

- Length varies by type and manufacturer
- **Default length** for designers is **27’-6”** (to accommodate contractor’s choice)

*See SPI Part D*
Sheet 2: **Redeveloped – Standard Guardrail Transition**

**Third Concept:**

‘Standard Guardrail Transition’

- Always a required **parallel segment** that is **21’-10½” Long**
- This post and panel configuration may change depending on Manufacturer’s needs, but **for Designer’s planning, the segment is always parallel to roadway and 21’-10½”**.
‘LON’ Design Tool (Excel): 

Redeveloped – Standard Guardrail Transition

Third Concept:

‘Standard Guardrail Transition’

• \( L_{p2} = \text{‘Length of Standard Guardrail Transition by Default!’} \)

Parallel C.C. Trans. Length, \( L_{p2} \) (Ft.)

21.9

the length of the parallel segment required for Guardrail Transition, just beyond the taper. This is the length between Post (1) and Post (10) per Index 544-001 (21.9 Ft.)
Sheet 2: **Redeveloped – Standard Guardrail Transition**

**Reminders!**:

- ‘Standard Guardrail Transition’ is downstream of ‘LON’ point
- ‘Begin/End Guardrail Station’, ‘Crash Cushion Station,’ and ‘LON’ point
- The ‘Length of End Treatment’ Treatment is upstream of the ‘LON’ point (27’-6” default)
SPI: **Redeveloped Standard Plans Instructions**

### Index 544-001 Crash Cushion Details

**Design Criteria**


**Design Assumptions and Limitations**

*Index 544-001* is only applicable for permanent crash cushion installations which shield the ends of Concrete Barrier and Guardrail.

For general usage information for crash cushions, see *FDM 215*. For a listing of crash cushion types and the corresponding usage limitations, see the Approved Products List (APL) webpage.

**A. Location:**

A crash cushion is located by the Crash Cushion Station, which corresponds the end station of the connecting barrier. See the drawings in *Index 544-001* for a depiction of the Crash Cushion Station for guardrail and concrete barrier connections.

Crash cushions are typically placed to shield the ends of barrier systems that are either providing median crossover protection or shielding against a hazard per Part B below. …..

**Topics Covered:**

A. ‘Location’ of callout station
B. ‘Length of Need’ process
C. ‘Test Level’ selection
D. ‘System Width’ selection
E. ‘Length of End Treatment’ (default value 27’-6”)
F. ‘Constrained Conditions’ (Methods for Reducing Space Needed for Crash Cushions)
G. ‘Temporary Crash Cushions’ (where to look for more info)
H. ‘Alternative Crash Cushion Usage’ (not barrier ends)
SPI: *Redeveloped Standard Plans Instructions*

**Old Pay Item:**

544-75- AA Crash Cushion, EA

AA= Type
1 (Optional) PENDING: Valid through 6-30-2019 lettings; replaced by 544-2- or 544-3- items.

**New Pay Items:**

544-2- Crash Cushion, TL-2, EA *(45 mph or less)*

A= Width
1 (Narrow)
2 (Wide)

544-3- Crash Cushion, TL-3, EA *(Over 45 mph)*

A= Width
1 (Narrow)
2 (Wide)

**Per SPI, Part D:**

- **“Narrow” system:** connects to barriers (or objects)... *24” width or less*
- **“Wide” system:** connects to barriers (or objects)... *Over 24” width*
SPI: Redeveloped Standard Plans Instructions

Plan Content Requirements

Summary Boxes:

Summarize the following information in the Summary of Permanent Crash Cushions table per the BOE, Chapter 8 (include “N/A” for categories that are not applicable):

1. *Location (Station and Side), See the Crash Cushion Station in Index 544-001
2. *Crash Cushion System Width (Narrow or Wide)
3. *Crash Test Level (TL-2 or TL-3)
4. *Barrier Width (Inches)
5. **Length Restriction (Based on site specific space constraints)

“LOCATION”:
Defined in SPI, Part A

<table>
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<tr>
<th>PAY ITEM NO.</th>
<th>PAY ITEM DESCRIPTION</th>
<th>LOCATION</th>
<th>BARRIER WIDTH</th>
<th>LENGTH RESTRICTION</th>
<th>QUANTITY (EA)</th>
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**SPI:**  
*Redeveloped Standard Plans Instructions*

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3. *Crash Test Level (TL-2 or TL-3)*
4. *Barrier Width (Inches)*
5. **Length Restriction (Based on site specific space constraints)**

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**SUMMARY OF PERMANENT CRASH CUSHIONS**

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<th>LOCATION</th>
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</table>

*SYSTEM WIDTH*:
Defined in SPI, Part D

Added to *Pay Item Description* Automatically When Pay Item Selected (D&C Manager CADD Tool)
**SPI:**  Redveloped Standard Plans Instructions

**Plan Content Requirements**

Summary Boxes:

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4. *Barrier Width (Inches)*
5. **Length Restriction (Based on site specific space constraints)**

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**“CRASH TEST LEVEL”:**

Defined in SPI, Part C

Added to *Pay Item Description* Automatically When Pay Item Selected (D&C Manager CADD Tool)

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SPI: Redveloped Standard Plans Instructions

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5. **Length Restriction (Based on site specific space constraints)

“BARRIER WIDTH”:
Defined in SPI, Part D

For example: 24” for Concrete Median Barrier
**SPI: Redveloped Standard Plans Instructions**

**Plan Content Requirements**

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2. *Crash Cushion System Width (Narrow or Wide)*
3. *Crash Test Level (TL-2 or TL-3)*
4. *Barrier Width (Inches)*
5. **Length Restriction (Based on site specific space constraints)**

"**LENGTH RESTRICTION**: Defined in SPI, Part F

If default crash cushion length of 27’-6” does not fit project, then contractors choice may be limited with a “Length Restriction”

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<th>DESIGN NOTES</th>
<th>CONSTRUCTION REMARKS</th>
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Questions?

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