

# *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**

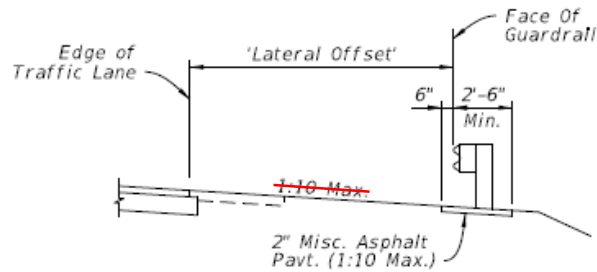
## Standard Plans – Primary Index Updates:

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

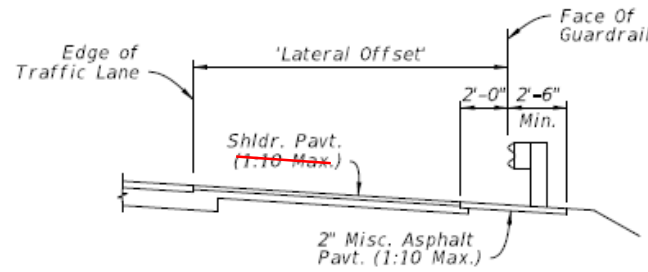
## Guardrail - Summary of Changes:

- 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>

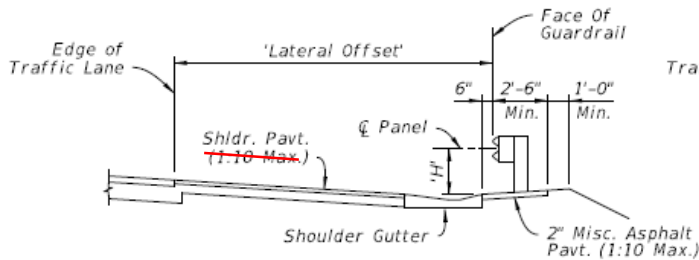
## Sheets 6, 7, & 8; Example Sections Throughout:



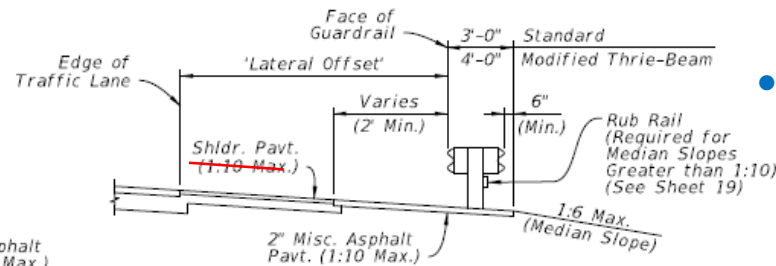
UNPAVED OR PARTIALLY  
PAVED SHOULDER



FULLY PAVED SHOULDER



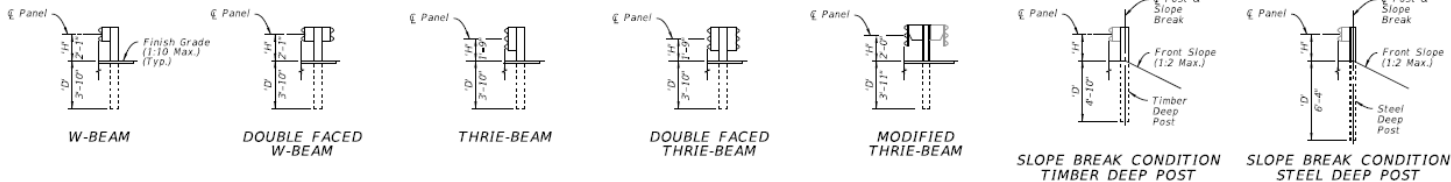
SHOULDER GUTTER



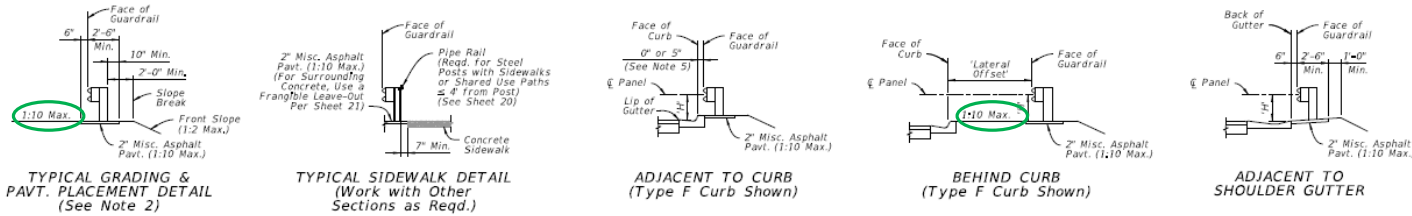
DOUBLE FACED GUARDRAIL  
(Shown In Median)

- 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

## Sheet 6:

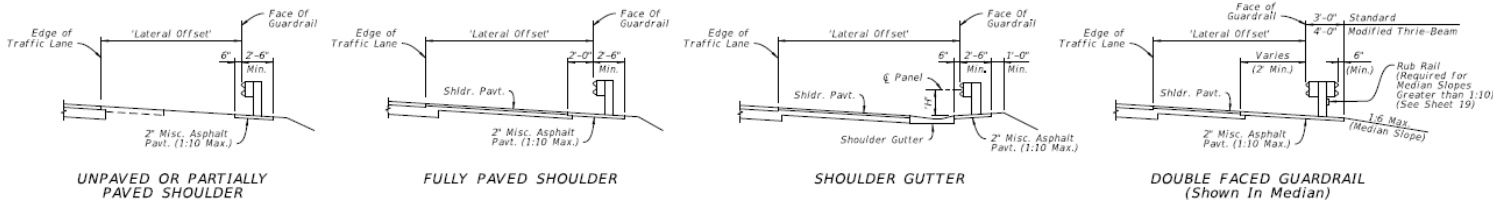


GUARDRAIL TYPES - MOUNTING HEIGHTS & POST DEPTHS



GUARDRAIL SECTIONS - TYPICAL

GUARDRAIL SECTIONS - CURB & GUTTER



GUARDRAIL SECTIONS - SHOULDERS

GUARDRAIL HEIGHT SUMMARY TABLE:			
Type:	Min. Depth 'D':	Mounting Height 'H':	Post Length 'L':
W-Beam (Single and Double Faced)	3'-10"	2'-1"	6'-6"
Thrie-Beam (Single and Double Faced)	3'-10"	1'-9"	6'-6"
Modified Thrie-Beam	3'-11"	2'-0"	6'-9"
Timber Deep Post	4'-10"	See Above	7'-6"
Steel Deep Post	6'-4"	See Above	9'-0"

**NOTES:**

- GUARDRAIL SECTIONS:** Construct Sections as indicated in the plans. The details shown here depict W-Beam Guardrail, but are applicable to the other defined steel and timber post types are interchangeable unless otherwise noted. The 1:10 Max. cross slope shown is the maximum slope for proper guardrail function, but project-specific cross slope requirements are governed per the plans.
- TYPICAL GRADING & PAVEMENT PLACEMENT DETAIL:** Construct features as depicted except where superseded by specific Guardrail Sections or the plans. Place the Slope Break a Minimum of 2' behind the post. For Deep Posts, the slope break may be placed at the  $\epsilon$  Post with the 2" Miscellaneous Asphalt Pavement omitted.
- SLOPE BREAK CONDITION:** Install Deep Posts only where called for in the plans. Deep Posts are only permitted where post spacing is 6'-3" or less.
- LATERAL OFFSETS:** The Lateral Offsets shown are governed by the station and offset call outs for Face of Guardrail, as shown in the plans.
- ADJACENT TO CURB:** Place the Face of Guardrail consistently either flush with the Face of Curb or 5" behind the Face of Curb, as indicated by the plans station and offset callout. For offset changes, transition the Face of Guardrail as shown in the plans.

GUARDRAIL SECTIONS

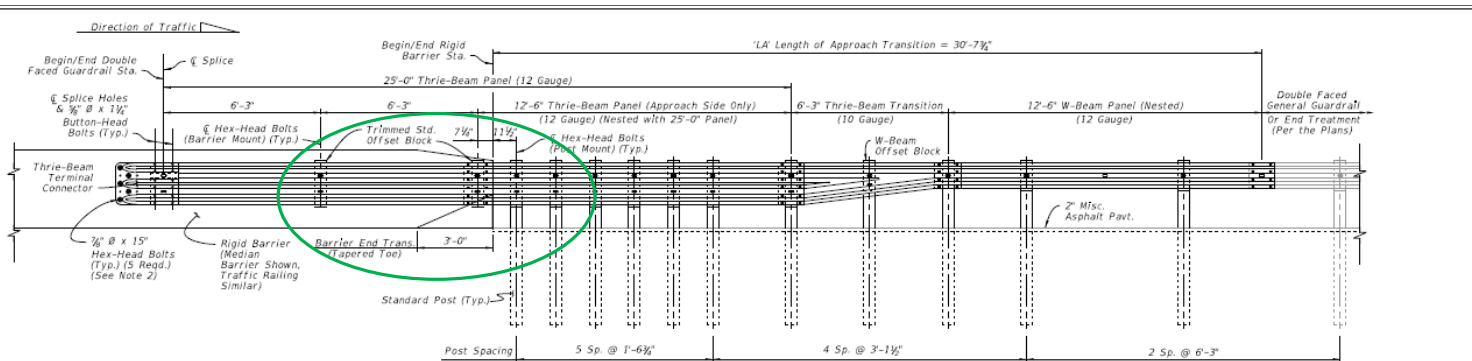
- "1:10 Max." label remains on generic approach, sidewalk, and misc. asphalt details

- Added new note explaining "1:10 Max." is for guardrail function only; the slope shown in Plans governs (FDM requirements)

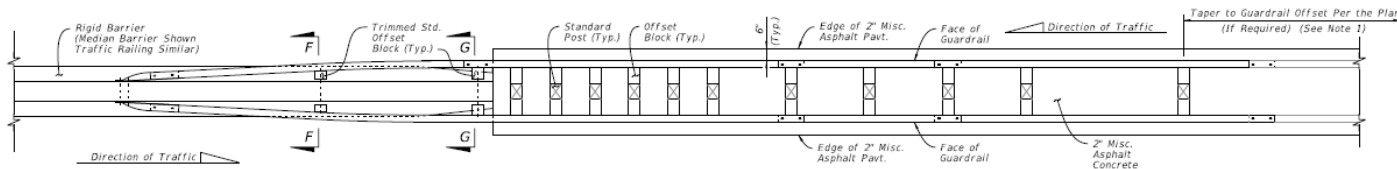
**New** →

## Sheet 16:

- 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!



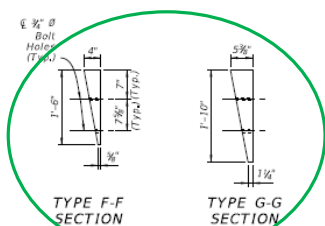
TL-3 DOUBLE FACED APPROACH TRANSITION  
INSTALLED ELEVATION



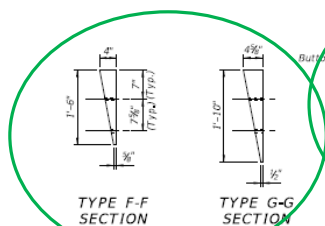
TL-3 DOUBLE FACED APPROACH TRANSITION  
INSTALLED PLAN

**NOTES:**

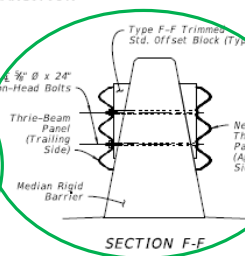
- INSTALLATION:** Construct the Approach Transition segment where indicated in the plans. The required offset of the connecting adjacent guardrail is shown in the plans.
- THRIE-BEAM TERMINAL CONNECTOR:** See Sheet 15 for Details. The installed bolts threaded portion is not permitted to extend beyond  $\frac{3}{8}$ " from the face of the nut; trim the threaded portion as needed and galvanize in accordance with Specification Section 562.
- GENERAL GUARDRAIL:** General Guardrail typically includes Panels and Post Spacing as shown on Sheet 2, including parallel and tapered segments. End Treatments or Reduced Post Spacing Guardrail segments may be substituted for the General Guardrail shown herein if indicated in the plans.



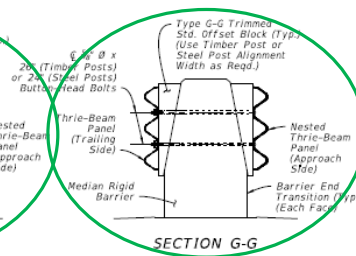
TYPE F-F SECTION  
TRIMMED STD. OFFSET BLOCKS  
TIMBER POST ALIGNMENT WIDTH



TYPE F-F SECTION  
TRIMMED STD. OFFSET BLOCKS  
STEEL POST ALIGNMENT WIDTH



SECTION F-F

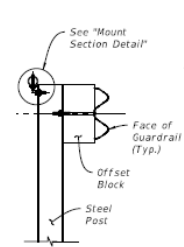


SECTION G-G

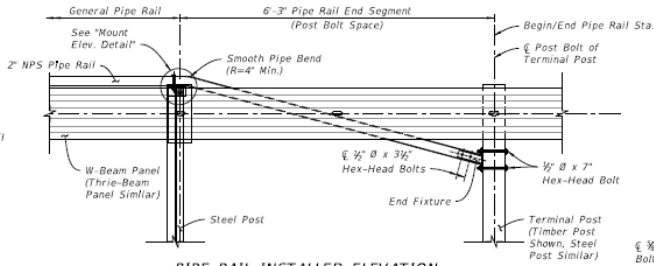
APPROACH TRANSITION CONNECTION TO  
RIGID BARRIER WITH DOUBLE FACED GUARDRAIL

LAST REVISION 11/01/17	DESCRIPTION	FY 2018-19 STANDARD PLANS	GUARDRAIL	INDEX 536-001	SHEET 16 of 22
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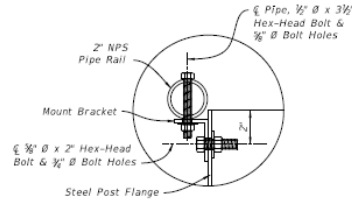
## Sheet 20:



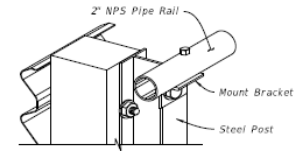
GENERAL PIPE RAIL SECTION



PIPE RAIL INSTALLED ELEVATION (End Segment Shown)



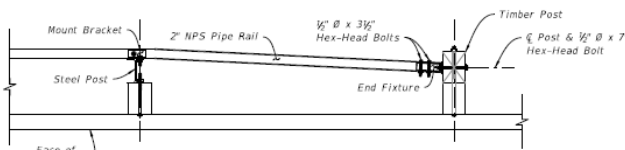
MOUNT SECTION DETAIL



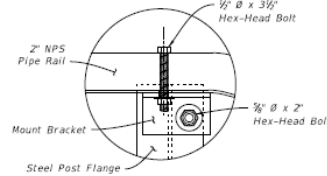
MOUNT ISOMETRIC CUT-AWAY

**NOTES:**

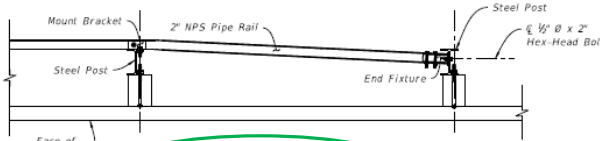
1. GENERAL: Install General Pipe Rail where indicated in the plans or when existing sidewalks or shared use paths are located less than 4'-0" from the back of Steel Posts as shown on Sheet 6.
2. PIPE RAIL END SEGMENTS: Place End Segments on both ends of General Pipe Rail runs, with End Fixtures mounted to Terminal Posts located outside of Approach Terminal Assembly ("LE"), Trailing Anchorage Assembly ("LT"), and Approach Transition ("LA") segments.
3. MATERIALS: Use steel brackets, fixtures, and pipes in accordance with Specification Section 967.
4. RAIL SPLICES: Install Rail Splices to join pieces of 2" NPS Pipe Rail into a continuous system. Place splices as needed, at a spacing of 18'-0" or greater. Orient the head of bolt on the top of the pipe.



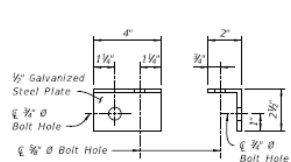
PIPE RAIL INSTALLED PLAN END AT TIMBER POST OPTION



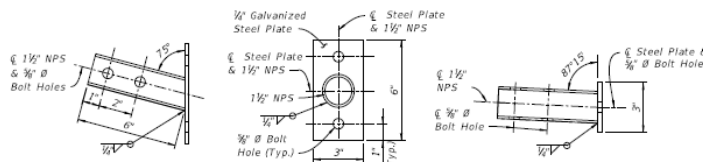
MOUNT ELEVATION DETAIL (Back View - Mirrored)



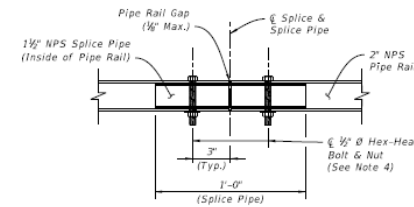
PIPE RAIL INSTALLED PLAN END AT STEEL POST OPTION



ELEVATION SECTION



ELEVATION SECTION PLAN



RAIL SPLICE DETAIL

PEDESTRIAN SAFETY TREATMENT - PIPE RAIL

- 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.

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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**

## 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


## Sheet 1: All new!

SHEET NO.	CONTENTS
1	Index Contents; General Notes
2	Median Barrier
3	Median Barrier – Reinforcing Details
4	Median Barrier – Sloped End Treatment
5	Median Barrier – Grade Separated
6	Median Barrier – 56" Height Section for Barrier-Mounted Sign Support Shielding – Symmetrical
7	Median Barrier – 56" Height Section for Barrier-Mounted Sign Support Shielding – Asymmetrical
8	Median Barrier – 38" Height Split Section for Stand-Alone Sign Support Shielding
9	Median Barrier – 44" Height Split Section for Pier Shielding
10	Median Barrier – 44" Height Split Section for Pier Shielding – Details
11	Median Barrier – Connection to F-Shape
12	Shoulder Barrier
13	Shoulder Barrier – Reinforcing Details
14	Shoulder Barrier – Section Options
15	Shoulder Barrier – Section Options (Continued)
16	Shoulder Barrier – 38" Height Rear-Flush Section for Reduced Setback Pier Shielding (Low-Speed)
17	Shoulder Barrier – 44" Height Rear-Flush Section for Reduced Setback Pier Shielding
18	Shoulder Barrier – Connection to F-Shape
19	Curb and Gutter Barrier
20	Curb and Gutter Barrier – Reinforcing Details
21	Curb and Gutter Barrier – Sloped End Treatment
22	Reinforcing Bar Bending Diagrams

### GENERAL NOTES:

- CONCRETE:** Use Class II concrete for all barriers constructed in slightly aggressive environments, and use Class IV concrete for all barriers constructed in moderately or extremely aggressive environments. On all exposed surfaces, apply a Class 3 surface finish in accordance with Specification 400.
- STEEL BAR REINFORCEMENT:** Where required to maintain continuity, provide lap splices of at least 18 inches for No. 4 bars and 20 inches for No. 5 bars, unless otherwise shown herein (including shorter splices as provided by the default bar bending diagrams).  
  
The default reinforcing details shown herein, including bar shapes and lap splice positions, are intended to show required steel locations and provide for a constructible design. However, with the approval of the Engineer, alternate steel configurations may be used in the same locations shown herein, given that the equivalent strength reinforcing is provided and the cover, maximum spacing, and continuity requirements are maintained.
- OPTIONAL WELDED 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 same locations specified for the steel bars, and maintain the equivalent strength, cover, maximum spacing, and continuity requirements.
- TOP FACE LONGITUDINAL REINFORCEMENT:** Unless otherwise specified, the longitudinal reinforcement shown closest to the top face of the barrier has a maximum cover of 4½", measured from the top face of the barrier.
- MINIMUM BARRIER LENGTH:** Unless otherwise shown in the Plans, the minimum Concrete Barrier length is 40 feet.
- 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 classified herein as Transverse Joints or Longitudinal Joints.  
  
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.  
  
Longitudinal Joints are only permitted where indicated in the following details and notes, with a vertical position tolerance of ± 1½" from the locations shown.
- DOWELED JOINTS:** As shown in the Dowel Details on Sheets 2 & 12, install ¾" Doweled Joints for Concrete Barrier connections to Pier Protection Barrier and Traffic Railings. Doweled Joints are also required for expansion mitigation in Median Barrier as defined per Sheets 2 & 5. Doweled Joints are not permitted within Grade-Separated Median Barrier.
- CRACK CONTROL V-GROOVES:** At 20-foot intervals, place ¾" depth V-grooves that run vertically and/or transversely in the front, top, and back faces of barriers. The V-grooves can be either molded or scored while the concrete is still plastic.
- SUBGRADE:** Compact the top layer of subgrade with Type B Stabilization, LBR 40 (12 in.).
- FOOTING BOTTOM CONCRETE COVER:** At the bottom of barrier footings shown throughout this Index, up to 2 inches of additional concrete cover is permitted beyond what is shown herein to accommodate soil grade irregularities.
- FINISH GRADE ELEVATION:** At the barrier face location, the finish grade pavement has a vertical position tolerance of ± ½" from the locations shown herein, relative to the barrier elevation. Maintain visually smooth and even pavement at the barrier face, per the approval of the Engineer.
- DRAINAGE INLETS:** Where called for in the Plans, install corresponding inlets per Indexes 425-030 thru 425-032.
- LIGHT POLE MOUNTING:** Where called for in the Plans, install aluminum light poles per Index 715-002.
- OPAQUE VISUAL BARRIER:** Where called for in the Plans, install Opaque Visual Barrier per Index 521-010.
- BARRIER END MARKERS:** For all free ends of concrete barriers that are not shielded with an end treatment or connection to another barrier or traffic railing type, install a Type 3 Object Marker on the end face per Specification 705.
- BARRIER DELINEATORS:** Install Barrier Delineators in accordance with Specification 705. For median barriers, mount the delineator on the top of the barrier, at the centerline of barrier, with reflective sheeting facing traffic on both approaches. For shoulder barriers and split sections, mount the delineators on the top of the barrier, with the roadway side of the delineator located 2' from the front face of the barrier and the reflective sheeting facing traffic of the nearest approach.

- New Table of Contents
- Three Distinct Barrier Types
- Re-written notes throughout—Concise active voice with headings
- New welded-wire reinforcement option

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## Sheet 1: All new!

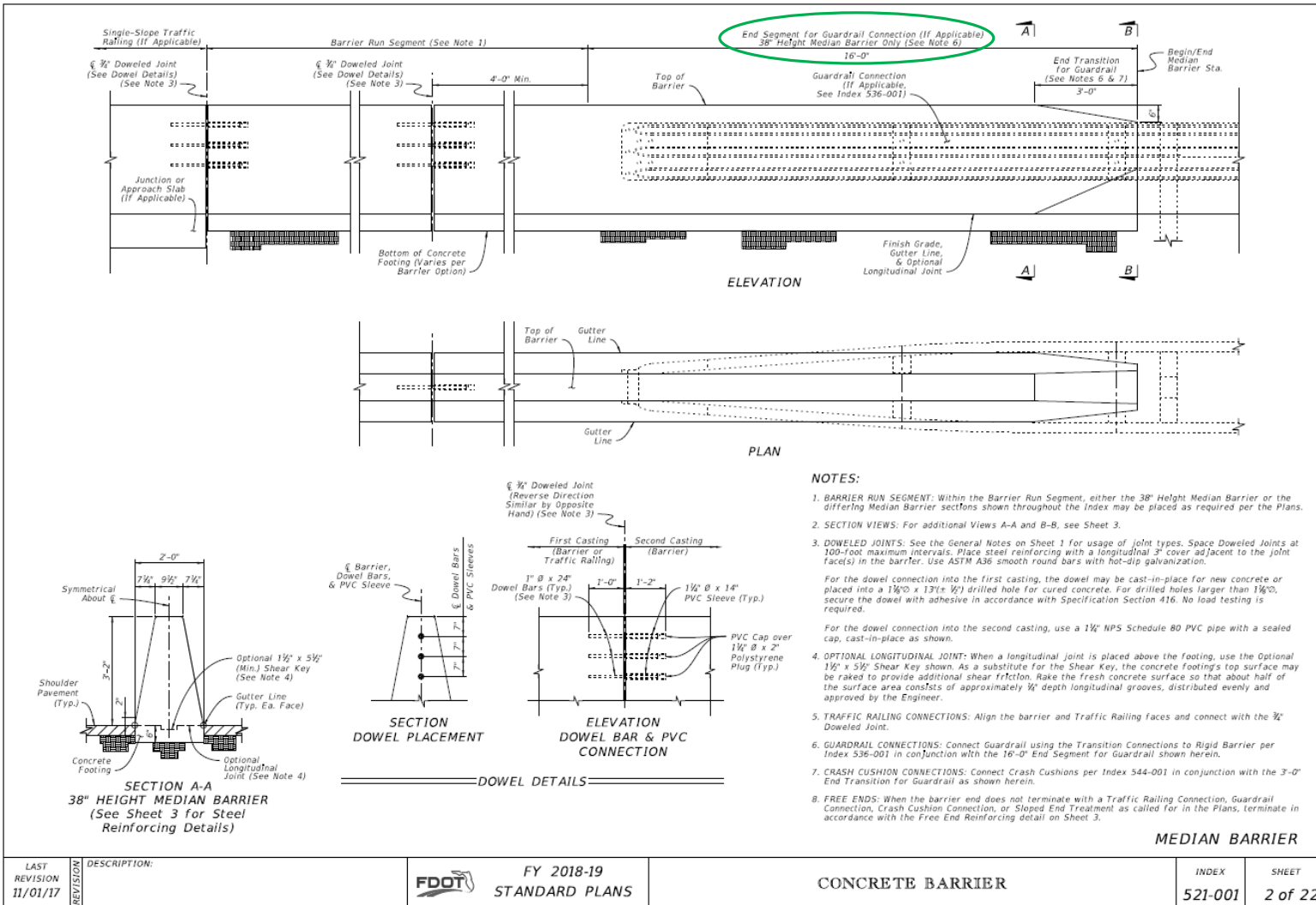
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- OPTIONAL WELDED WIRE REINFORCEMENT:** With the approval of the Engineer, steel welded wire reinforcement in accordance with Specification 415 may be substituted for the steel bars shown herein. Place the welded wire in the same locations specified for the steel bars, and maintain the equivalent strength, cover, maximum spacing, and continuity requirements.
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- 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 classified herein as Transverse Joints or Longitudinal Joints.  
  
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.  
  
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- SUBGRADE:** Compact the top layer of subgrade with Type B Stabilization, LBR 40 (12 in.).
- FOOTING BOTTOM CONCRETE COVER:** At the bottom of barrier footings shown throughout this Index, up to 2 inches of additional concrete cover is permitted beyond what is shown herein to accommodate soil grade irregularities.
- FINISH GRADE ELEVATION:** At the barrier face location, the finish grade pavement has a vertical position tolerance of ± ½" from the locations shown herein, relative to the barrier elevation. Maintain visually smooth and even pavement at the barrier face, per the approval of the Engineer.
- DRAINAGE INLETS:** Where called for in the Plans, install corresponding inlets per Indexes 425-030 thru 425-032.
- LIGHT POLE MOUNTING:** Where called for in the Plans, install aluminum light poles per Index 715-002.
- OPAQUE VISUAL BARRIER:** Where called for in the Plans, install Opaque Visual Barrier per Index 521-010.
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- Minimum Barrier Length is 40 feet (dead load required to resist barrier overturn)
- Other miscellaneous details for contractors

## Sheet 2: All new!



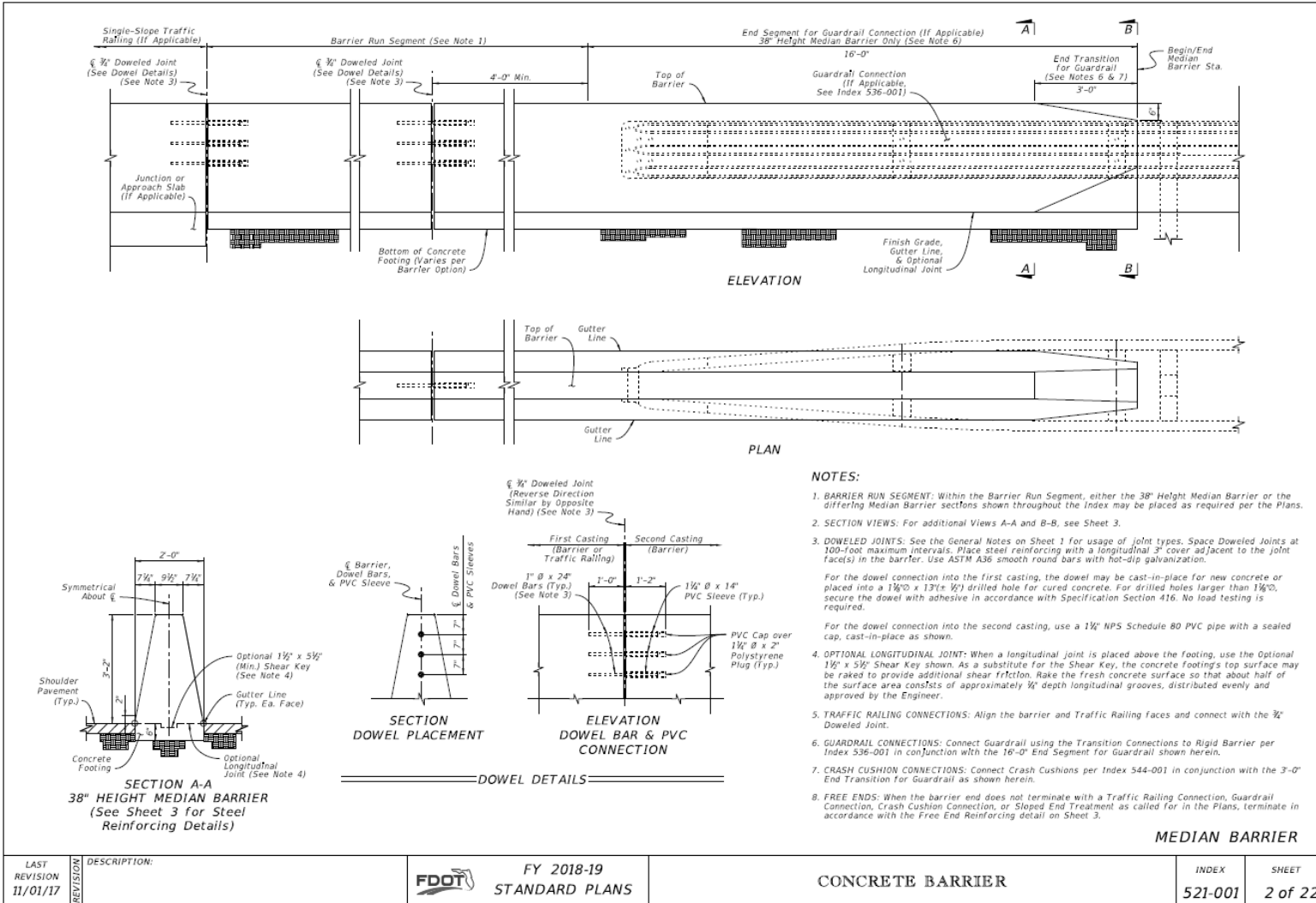
- Shows a basic Plan, Elevation, & Section at the start of each barrier type grouping
- Shows connection to guardrail and bridge Traffic Railing as applicable
- 16'-0" end segment for guardrail connection

LAST REVISION 11/01/17	DESCRIPTION:	FY 2018-19 STANDARD PLANS	CONCRETE BARRIER	INDEX 521-001	SHEET 2 of 22
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## Sheet 2: All new!

### 4 Pay Items for Median Barrier:

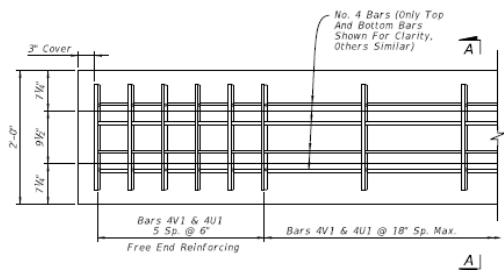
- 38" Height Symmetrical (Shown here)
- Short Grade-Separated (Upcoming Slides)
- Tall Grade-Separated (Upcoming Slides)
- Variable Section for Sign or Pier Shielding (Upcoming Slides)



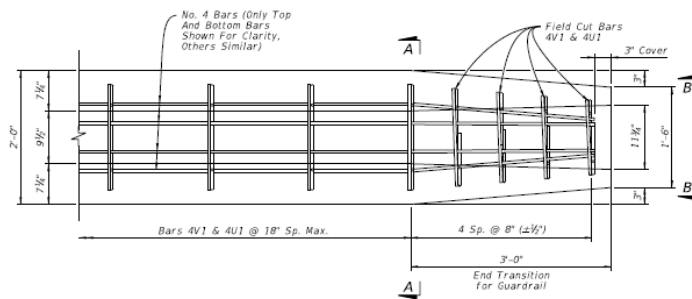
MEDIAN BARRIER

LAST REVISION 11/01/17	DESCRIPTION:	FY 2018-19 STANDARD PLANS	CONCRETE BARRIER	INDEX 521-001	SHEET 2 of 22
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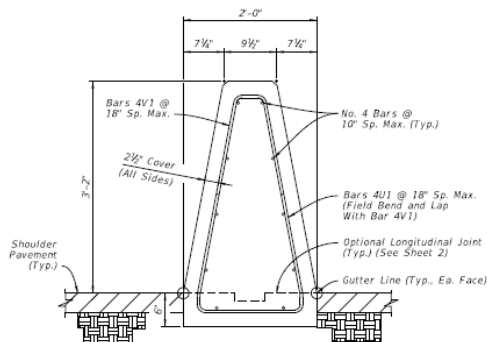
## Sheet 3: All new!



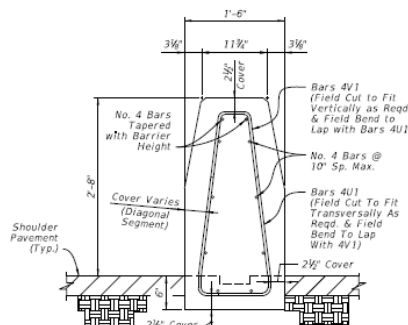
PLAN VIEW - 38" HEIGHT MEDIAN BARRIER  
FREE END REINFORCING (See Note 3)



PLAN VIEW - END SEGMENT FOR  
GUARDRAIL CONNECTION (See Note 3)



SECTION A-A  
38" HEIGHT  
MEDIAN BARRIER  
Concrete Qty. = 0.20 CY/FT  
Steel Qty. = 11.8 LB/FT



VIEW B-B  
REDUCED SECTION  
OF END TRANSITION  
FOR GUARDRAIL  
(End of Barrier)

MEDIAN BARRIER - REINFORCING DETAILS

NOTES:

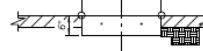
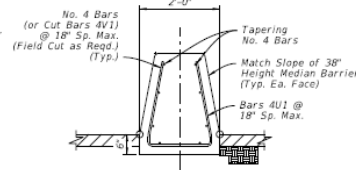
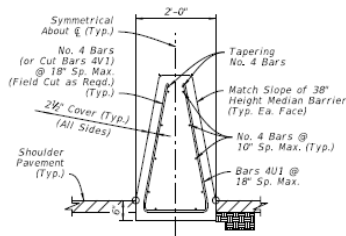
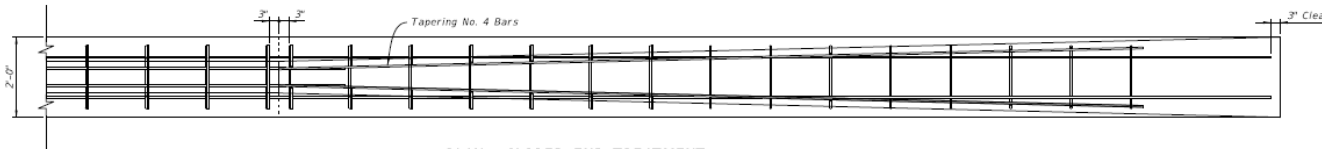
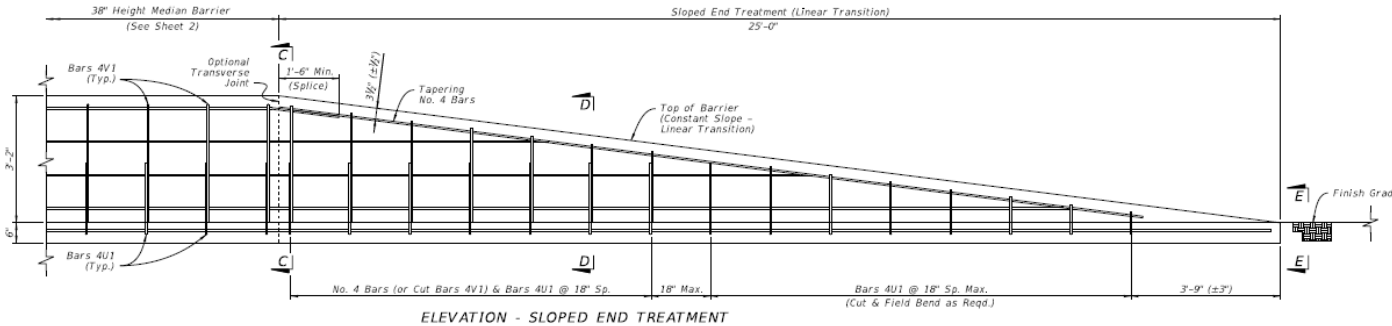
1. GENERAL: Work with the Plan and Elevation Views on Sheet 2.
2. BAR BENDING DIAGRAMS: For additional information on Bars 4V1 and 4U1, see the details on Sheet 22.
3. PLAN VIEWS: Only top and bottom longitudinal reinforcing is shown for clarity. For all longitudinal steel locations, see the section views.

- New reinforcing details for normal run and connection to guardrail
- Provides minimum reinforcing required for slip-forming

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## Sheet 4: All new!



**NOTES:**

1. GENERAL: Install Sloped End Treatment only where called for in the plans.
2. JOINTS: Construction or Doweled Joints are not permitted within the Sloped End Treatment segment.

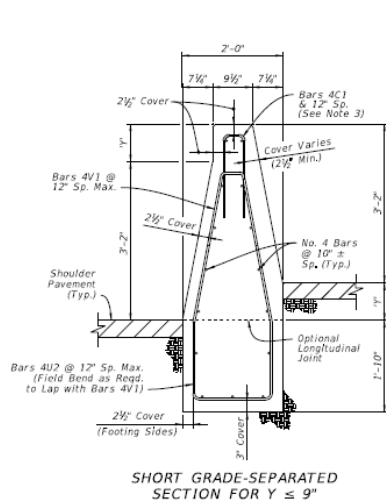
**MEDIAN BARRIER - SLOPED END TREATMENT**

- 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

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## Sheet 5: All new!



**NOTES:**

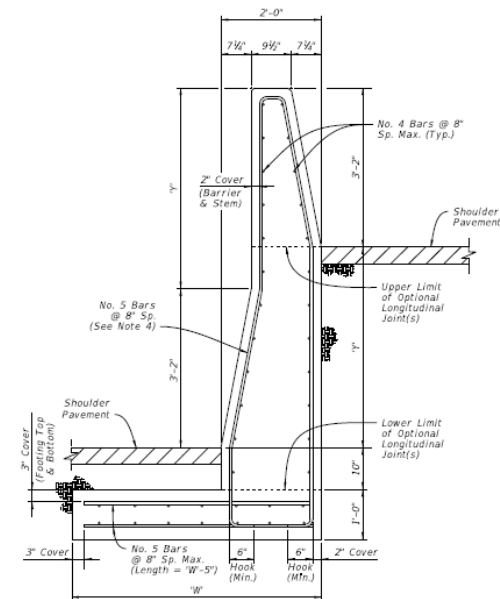
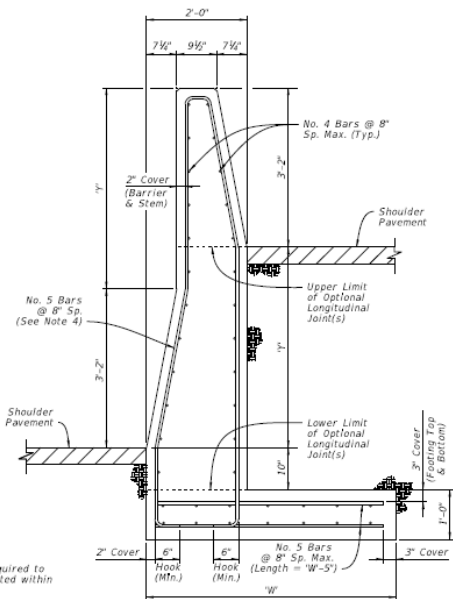
1. GENERAL: Install the Grade-Separated sections where shown in the Plans and as required to accommodate vertical offsets in pavement of Height Y. Doweled Joints are not permitted within Grade-Separated sections.
2. CONNECTIONS BETWEEN DIFFERENT SECTIONS: Connect Short Grade-Separated sections and Tall Grade-Separated sections using a continuous pour or Transverse Joint, where longitudinal steel that aligns within the adjacent section is maintained continuously between sections or has a full lap splice with the adjacent section's longitudinal steel. Connect Short Grade-Separated sections and 38" Height Median Barrier sections of Sheet 2 using a 3/4" Doweled Joint.
3. SHORT GRADE-SEPARATED SECTIONS: Bars 4C1 and the two uppermost longitudinal bars may be omitted for segments where  $Y < 2"$ .
4. TALL GRADE-SEPARATED SECTIONS: For the vertical and transverse steel reinforcement shown in the Tall Grade-Separated Sections, bar bending diagrams are not provided due to varying section dimensions and Longitudinal Joint locations. Use any combination of spliced reinforcing steel to position the reinforcement with the same cover, spacing, continuity, and equivalent strength shown herein, as approved by the Engineer.

Longitudinal Joints are permitted between the vertical limits shown, and must remain level and at a consistent height per each continuous casting of concrete. Longitudinal Joints may change elevations at Transverse Joint locations. Field bending of bars is permitted at Longitudinal Joint locations.

Transverse Joints between Tall Grade-Separated Sections do not require continuous steel across the joint if the following conditions are met:

- i. The barrier length on both sides is at least 40 feet, where each segment has continuous steel reinforcement.
- ii. The barrier's vertical steel spacing is reduced to 4" O.C. for a total of 12 spaces on both sides of the joint.

Grade separation Heights of  $Y \leq 9"$  are permitted on a limited basis using the Tall Grade-Separated section; this is to accommodate cases where maintaining the spread footing through lower height segments is more practical than changing to the Short Grade-Separated section.



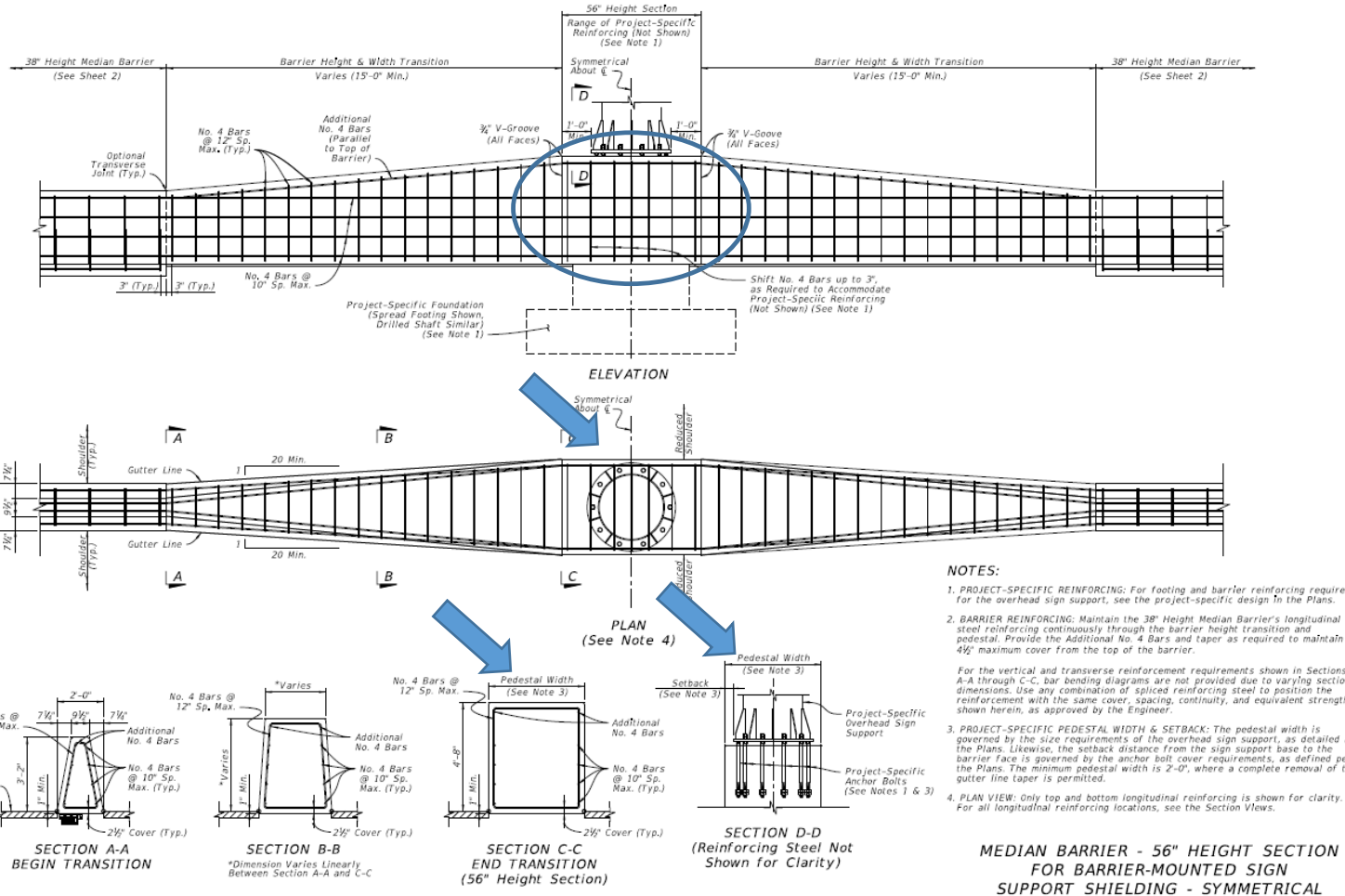
**TALL GRADE-SEPARATED SECTIONS DIMENSION TABLE**

Max. Height, Y	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"
Footing Width, W	3'-3"	3'-6"	3'-9"	4'-0"	4'-3"	4'-6"	4'-6"

**MEDIAN BARRIER - GRADE-SEPARATED**

- Similar to Previous Standard from Design Standpoint
- Larger foundations and footings for MASH

## Sheet 6: All new!

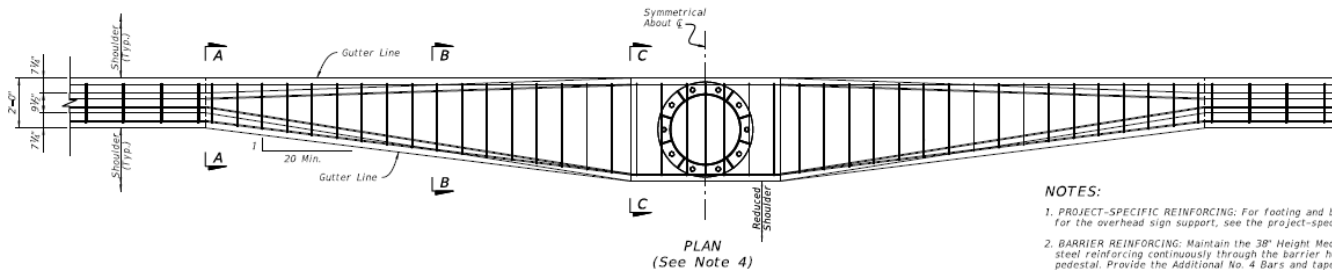
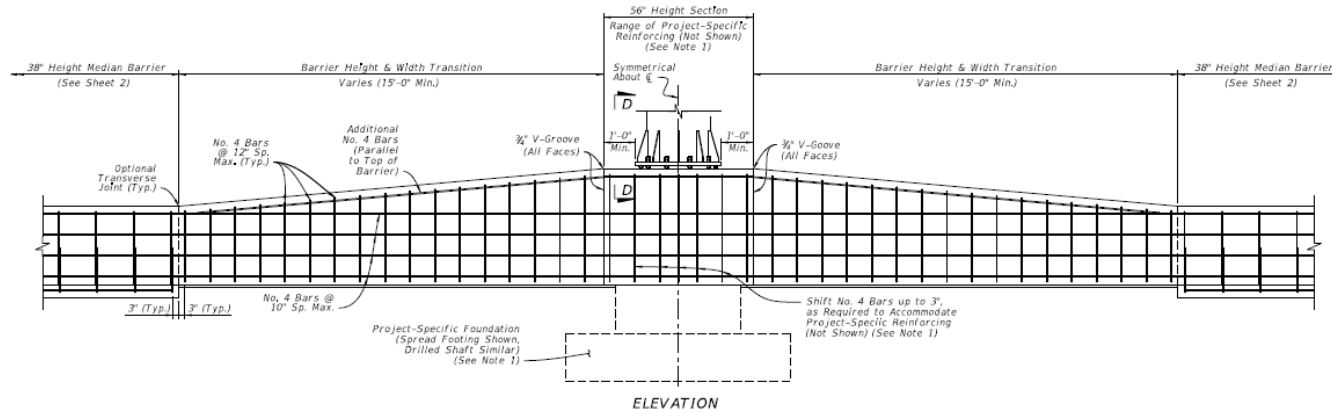


- Clarified where project-specific steel design is required for connection to sign support foundation
- Pedestal Width varies as required
- May be used at 2'-0" wide Pedestal Width (zero taper)

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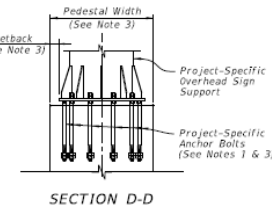
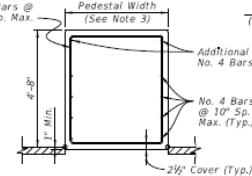
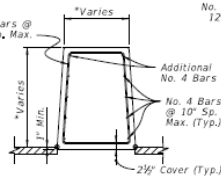
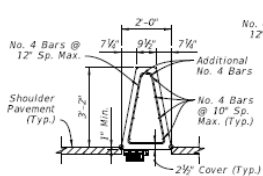
## Sheet 7: All new!

- Similar to previous sheet, but asymmetrical – shoulder reduction only on one side



**NOTES:**

- PROJECT-SPECIFIC REINFORCING:** For footing and barrier reinforcing required for the overhead sign support, see the project-specific design in the Plans.
- BARRIER REINFORCING:** Maintain the 38" Height Median Barrier's longitudinal steel reinforcing continuously through the barrier height transition and pedestal. Provide the Additional No. 4 Bars and taper as required to maintain a 4 1/2" maximum cover from the top of the barrier.  
*For the vertical and transverse reinforcement requirements shown in Sections A-A through C-C, bar bending diagrams are not provided due to varying section dimensions. Use any combination of spliced reinforcing steel to position the reinforcement with the same cover, spacing, continuity, and equivalent strength shown herein, as approved by the Engineer.*
- PROJECT-SPECIFIC PEDESTAL WIDTH & SETBACK:** The pedestal width is governed by the size requirements of the overhead sign support, as detailed in the Plans. Likewise, the setback distance from the sign support base to the barrier face is governed by the anchor bolt cover requirements, as defined per the Plans. The minimum pedestal width is 2'-0", where a complete removal of the gutter line taper is permitted.
- PLAN VIEW:** Only top and bottom longitudinal reinforcing is shown for clarity. For all longitudinal reinforcing locations, see the Section Views.



**MEDIAN BARRIER - 56" HEIGHT SECTION  
FOR BARRIER-MOUNTED SIGN  
SUPPORT SHIELDING - ASYMMETRICAL**

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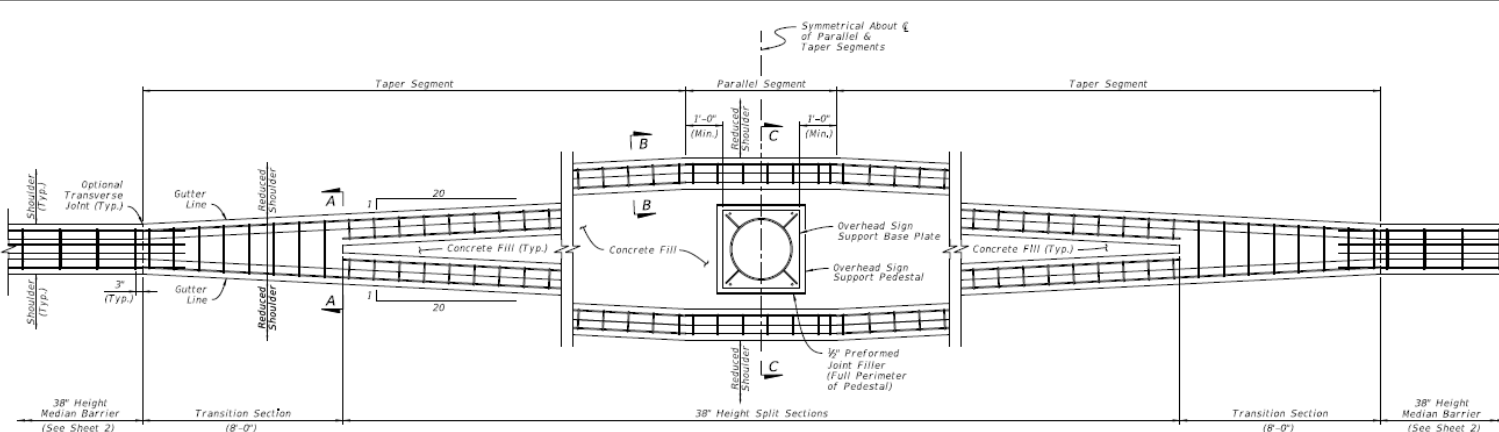
## Sheet 8: All new!

An alternative for sign support shielding where...

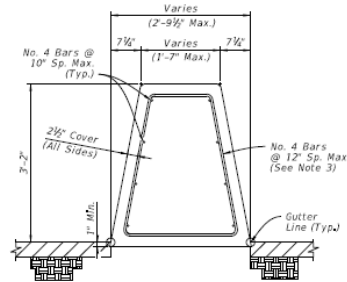
- Shielding an existing sign support, or...

- Designer prefers independent foundation for sign support

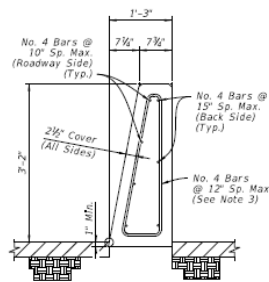
- Lateral space is available



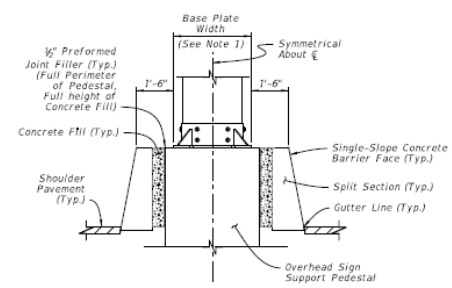
PLAN (See Note 4)



SECTION A-A  
TRANSITION SECTION  
(AT BEGIN  
SPLIT SECTIONS)



SECTION B-B  
38" HEIGHT SPLIT SECTION  
(OPPOSITE SIDE SIMILAR  
BY OPPOSITE HAND)



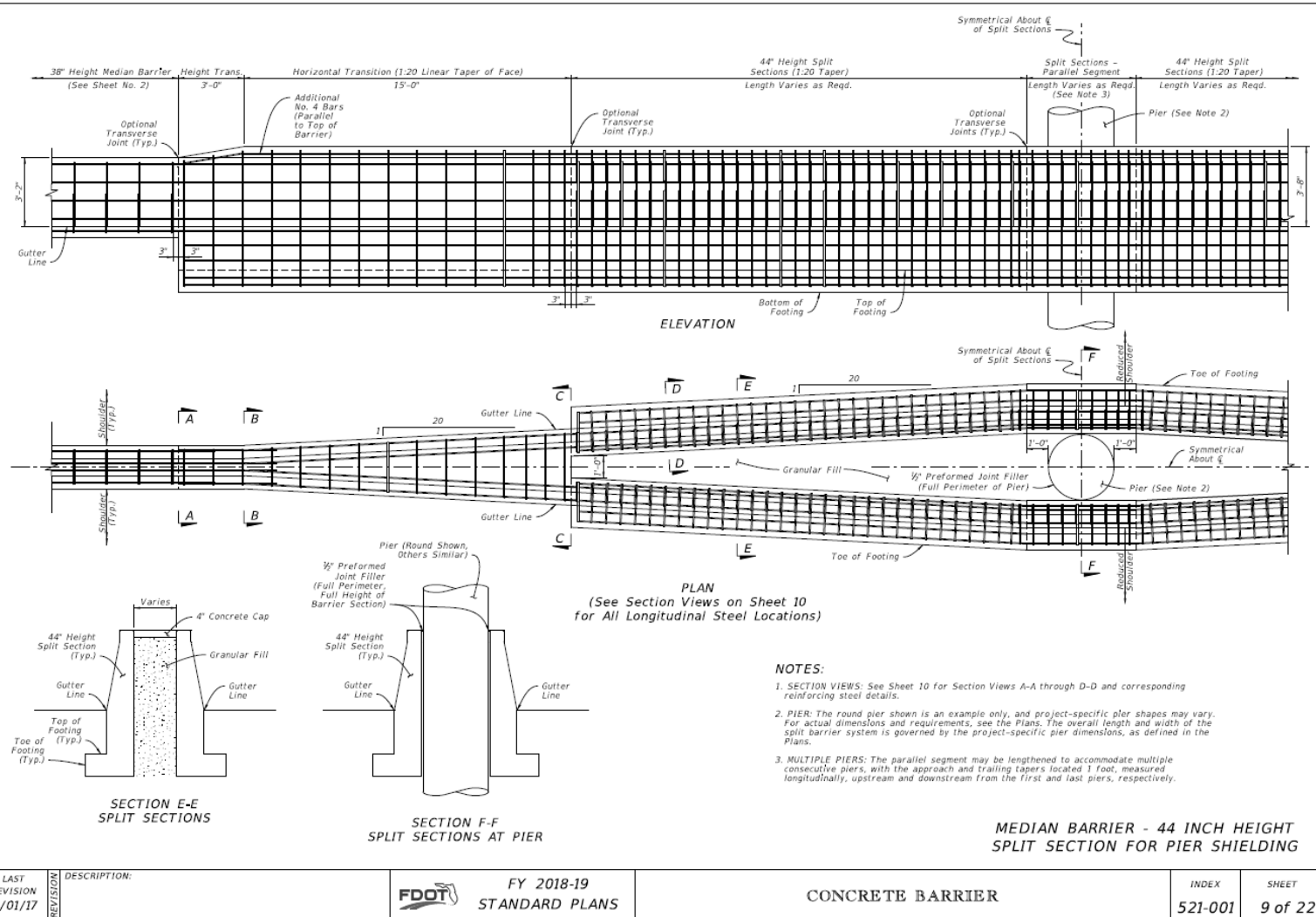
SECTION C-C

MEDIAN BARRIER - 38" HEIGHT SPLIT SECTION FOR STAND-ALONE SIGN SUPPORT SHIELDING

- NOTES:**
- OVERHEAD SIGN SUPPORT:** The overhead sign support shown is an example only; see the Plans for the actual shape dimensions and requirements. The overall length and width of the split barrier system is governed by the project-specific overhead sign support dimensions, as defined in the Plans.
  - MULTIPLE SIGN SUPPORTS:** The parallel segment may be lengthened to accommodate multiple sign supports, with the approach and trailing tapers located 1 foot, measured longitudinally, upstream and downstream from the first and last sign support bases, respectively.
  - STIRRUP BARS:** For the vertical and transverse reinforcement requirements shown in Sections A-A and B-B, bar bending diagrams are not provided due to varying section dimensions. Use any combination of spliced reinforcing steel to position the reinforcement with the same cover, spacing, continuity, and equivalent strength shown herein, as approved by the Engineer.
  - PLAN VIEW:** Only outermost longitudinal reinforcing is shown for clarity. For all longitudinal reinforcing locations, see the Section Views.

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## Sheet 9: All new!

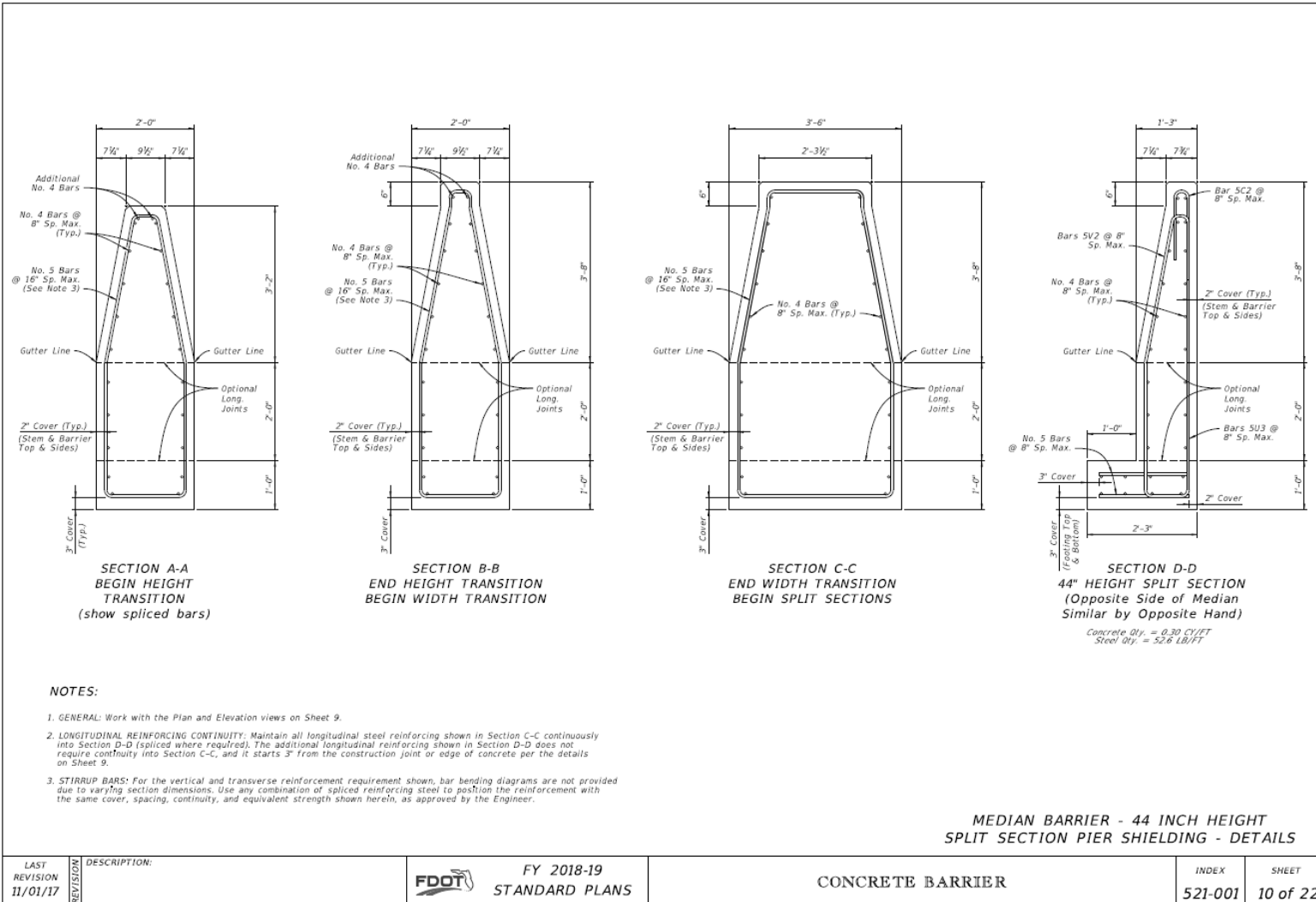


- For shielding pier for crash-worthiness benefit to vehicle only (assumes pier is designed to withstand impact)
- Where a pier is not designed to withstand impacts, use “Pier Protection Barrier” per 521-002 (See SPI & FDM for Guidance)

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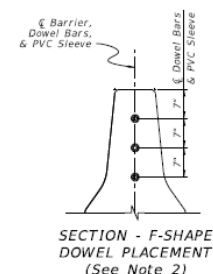
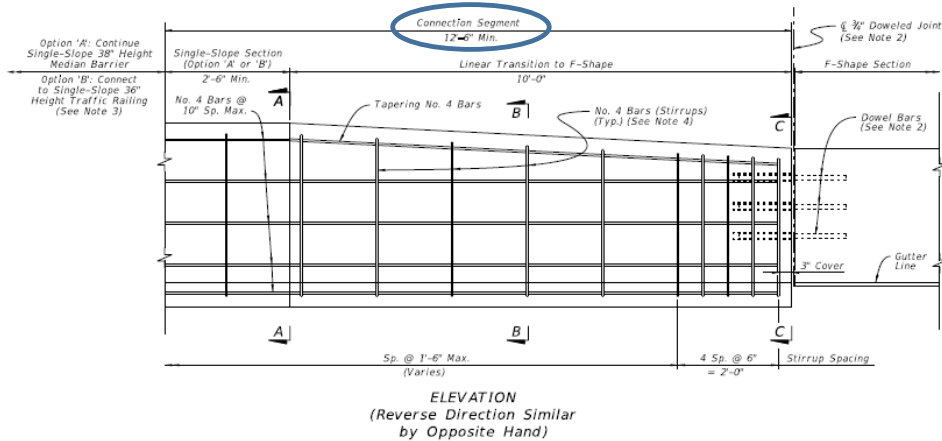
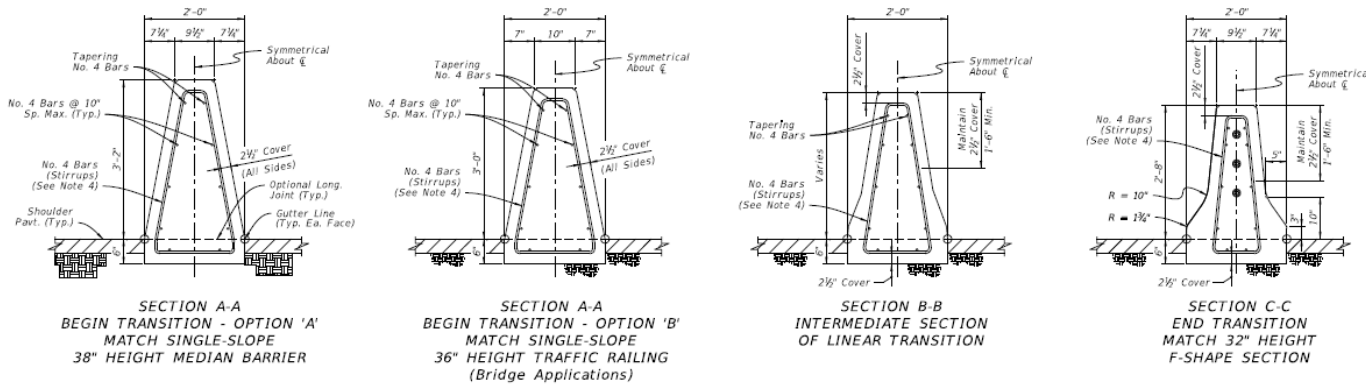
## Sheet 10: All new!

- Required Section dimensions and reinforcing details for the previous sheet





## Sheet 11: All new!



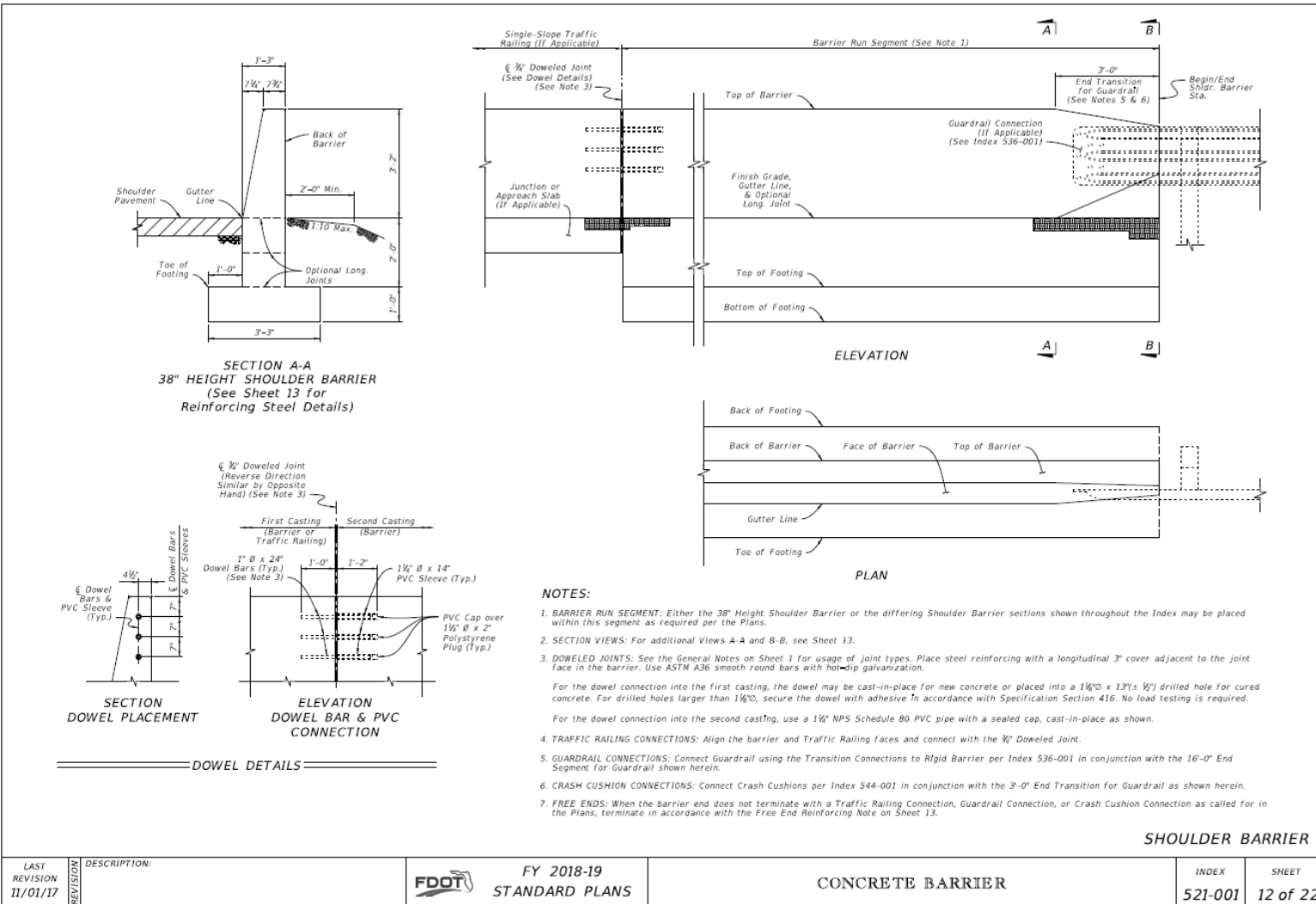
- NOTES:**
1. GENERAL: Construct the Connection Segment as required per the Plans to connect existing F-Shape sections to Single-Slope Median Barrier or Traffic Railing sections. Construct Option 'A' or 'B' as required to match the heights of the connecting sections.
  2. DOWELED JOINT: Install Dowel Bars per the Dowel Details on Sheet 2.
  3. TRAFFIC RAILING CONNECTION: For the Option 'B' connection, use a Doweled Joint per Sheet 2 and the additional Free End Reinforcing with reduced bar spacing per Sheet 3.
  4. STIRRUP BARS: For the vertical and transverse reinforcement requirements shown, bar bending diagrams are not provided due to varying section dimensions. Use any combination of spliced reinforcing steel to position the reinforcement with the same cover, spacing, continuity, and equivalent strength shown herein, as approved by the Engineer.

- For transitioning any existing F-Shape to Single-Slope Section
- Requires 12'-6" minimum length between connecting section types

**MEDIAN BARRIER - CONNECTION TO F-SHAPE**

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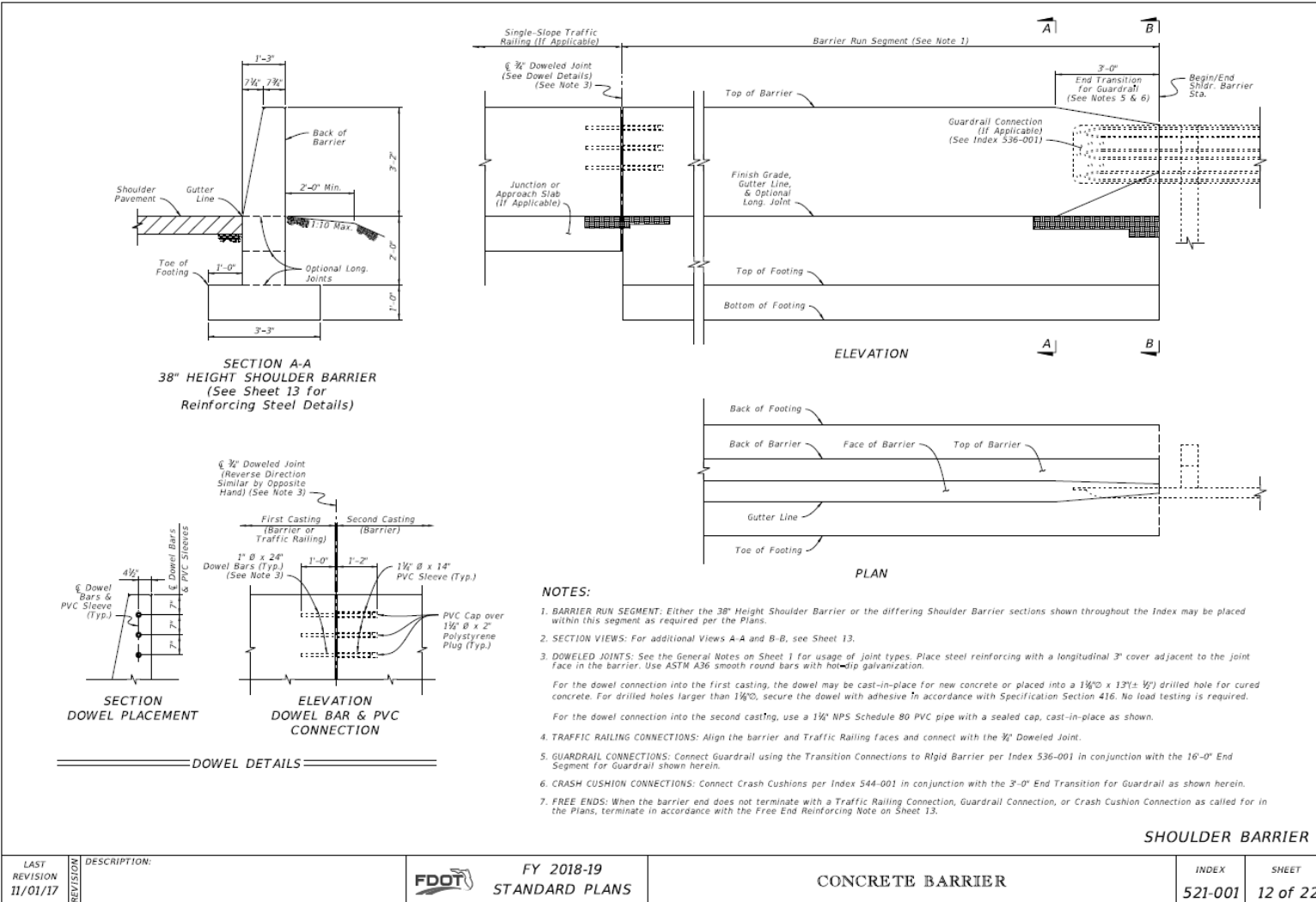
## Sheet 12: All new!



- 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)



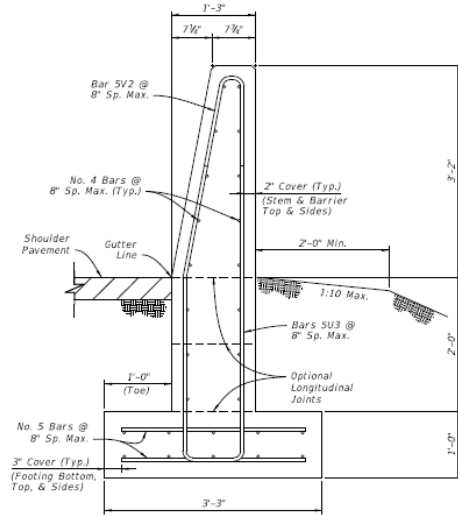
## Sheet 12: All new!



### 3 Pay Items for Shoulder Barrier:

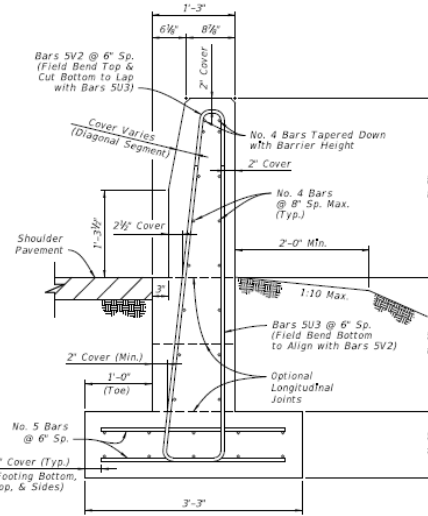
- 38" or 44" Height (Shown here)
- Retaining Section (Upcoming Slides)
- Trench Footing Section (Upcoming Slides)

## Sheet 13: All new!

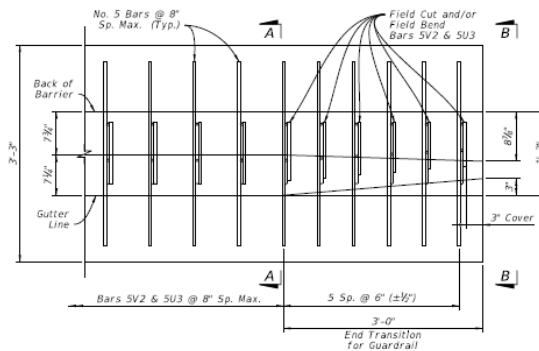


**SECTION A-A**  
**38\"/>**

Concrete Qty. = 0.32 CY/FT  
Steel Qty. = 50.9 LB/FT



**VIEW B-B**  
**REDUCED SECTION OF**  
**END TRANSITION**  
**FOR GUARDRAIL**  
**(End of Barrier)**



**PLAN VIEW - END SEGMENT FOR GUARDRAIL CONNECTION**  
**(Longitudinal Steel Not Shown for Clarity)**

**SHOULDER BARRIER - REINFORCING DETAILS**

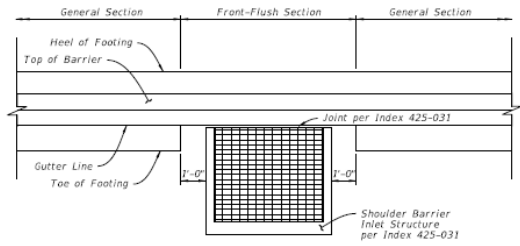
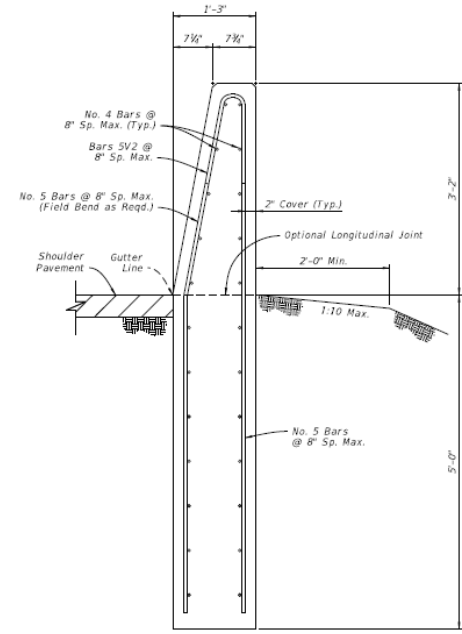
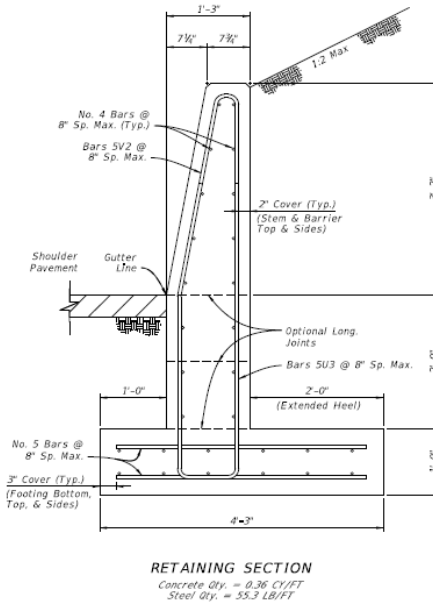
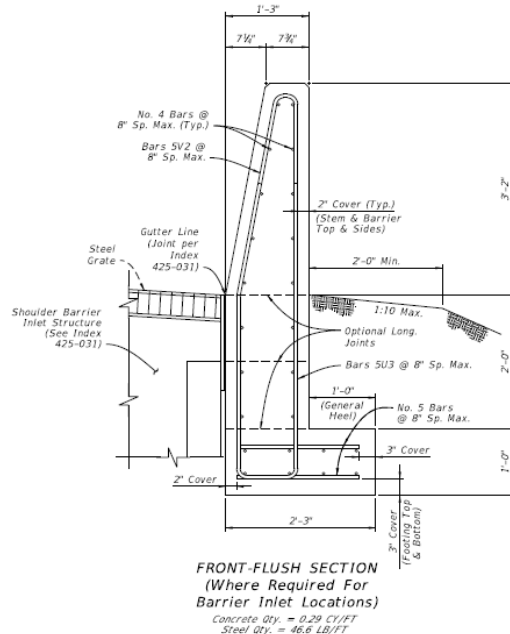
- Sheet shows reinforcing details, both in a normal run and as required to taper down for a guardrail connection

**NOTES:**

- GENERAL:** Work with the Plan and Elevation Views on Sheet 12. The Section Option Footings shown on Sheet 14 may be substituted where called for in the Plans.
- FREE END REINFORCING:** Where shown in the Plans, terminate the 38" Height Barrier section with a transverse vertical end face. Reduce the spacing of Bars SV2 and SU3 to 6" for 5 Spaces, placed with 3" cover from the barrier's end face.
- BAR BENDING DIAGRAMS:** For additional details for bars SV2 and SU3, see the Bar Bending Diagrams on Sheet 22.

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## Sheet 14: All new!

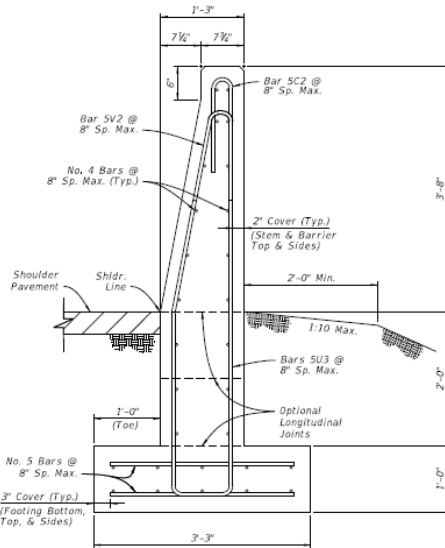


- NOTES:**
1. GENERAL: Install the differing Section Options as required per the Plans.
  2. CONNECTIONS BETWEEN DIFFERENT SECTIONS: Connect differing Shoulder Barrier sections using a continuous pour or Transverse Joint, where longitudinal steel that aligns within the adjacent section is maintained continuously between sections. Alternatively, a Doweled Joint may be used as shown on Sheet 12.
  3. FLUSH RETAINING SECTION COMBINATION: Where Barrier Inlets are required in retaining segments, install the Flush Section, except replace the 1'-0" General Heel with the 2'-0" Extended Heel as shown in the Retaining Section. Use longer lateral reinforcing bars of 2'-10" length to maintain the cover shown.

**SHOULDER BARRIER - SECTION OPTIONS**

- Section alternatives as required
- Retaining Section Heel larger than previous
- New Trench footing option

## Sheet 15: All new!

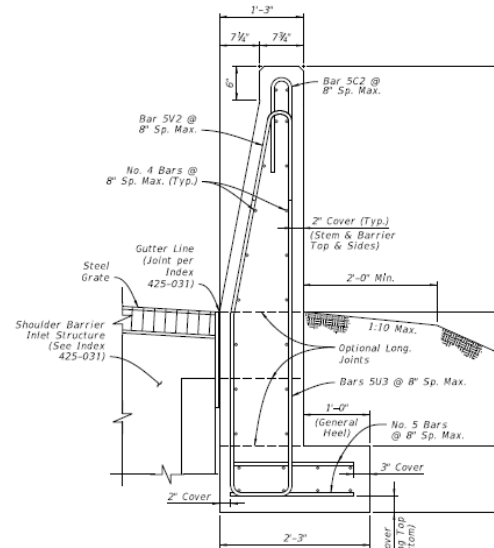


**44" HEIGHT SECTION**  
(For Use Adjacent to Rear-Flush Section on Sheet 17)

Concrete Qty. = 0.34 CY/FT  
Steel Qty. = 36.6 LB/FT

**NOTE:**

1. GENERAL: See the applicable Notes on Sheet 14.



**44" HEIGHT FRONT-FLUSH SECTION**  
(For Use Adjacent to Rear-Flush Section on Sheet 17, as Required for Barrier Inlets)

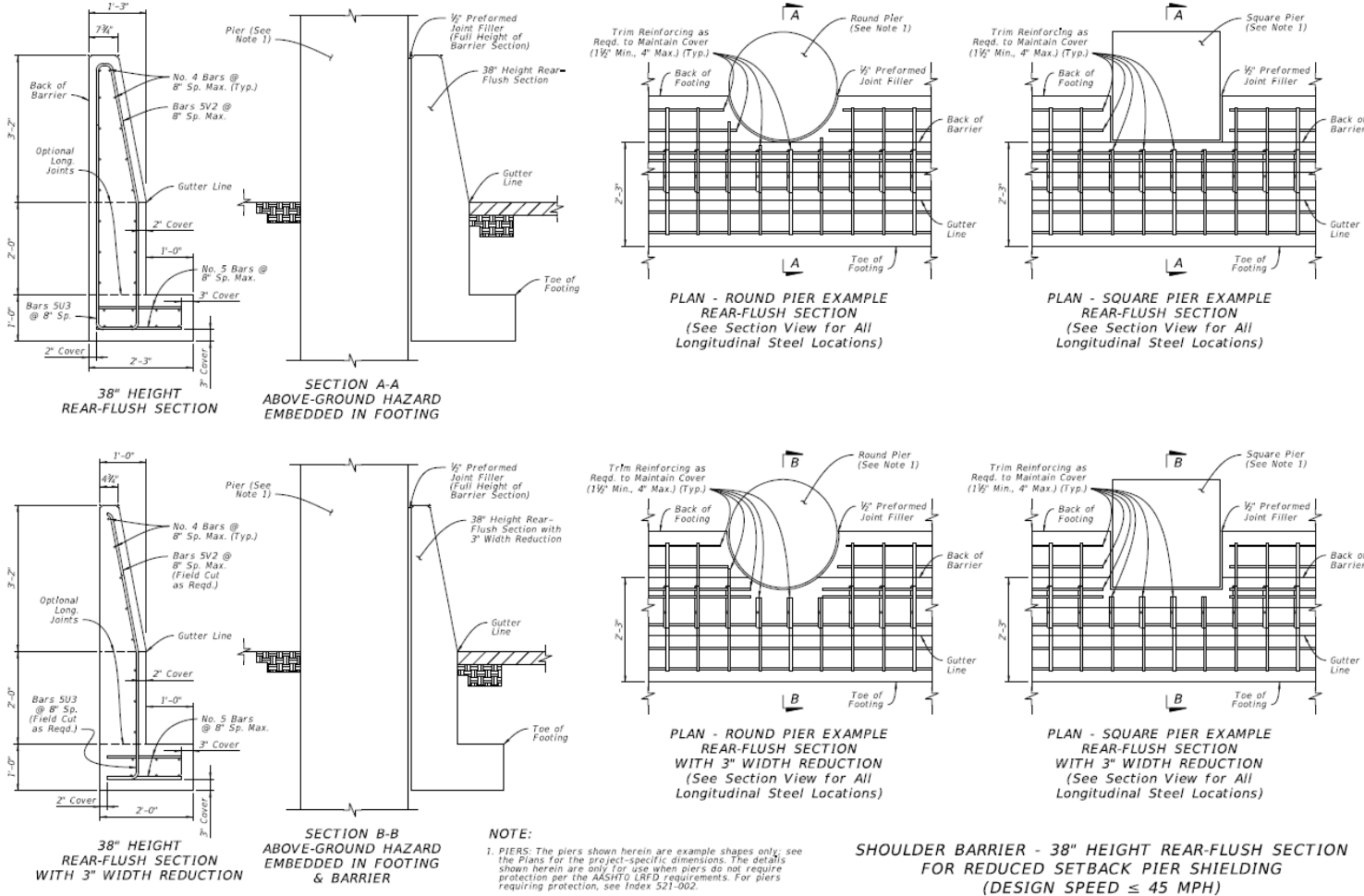
Concrete Qty. = 0.30 CY/FT  
Steel Qty. = 52.6 LB/FT

SHOULDER BARRIER - SECTION OPTIONS (CONTINUED)

- 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)

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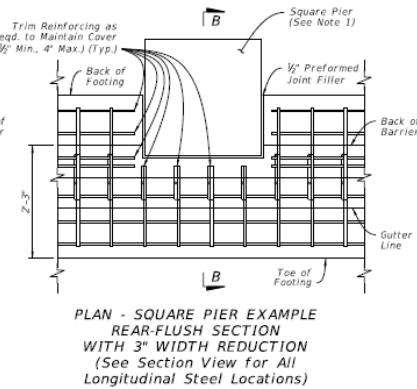
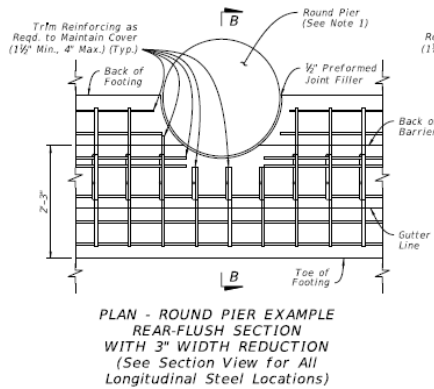
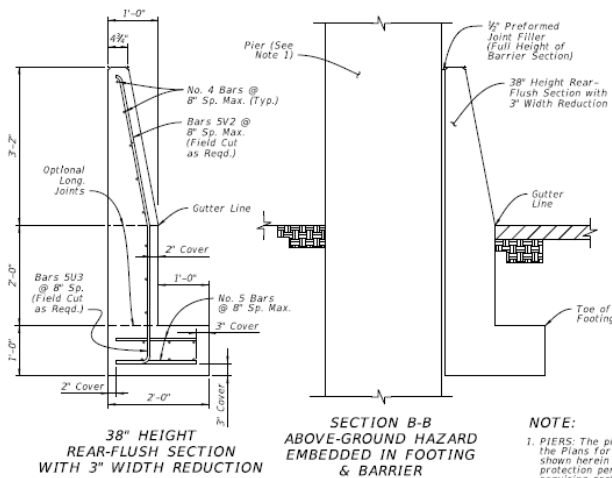
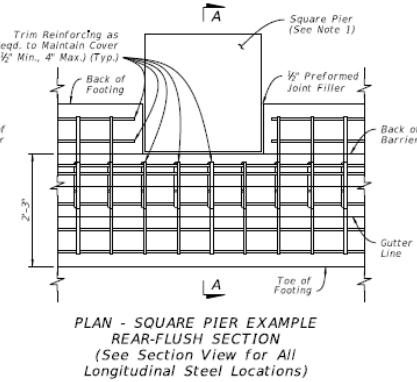
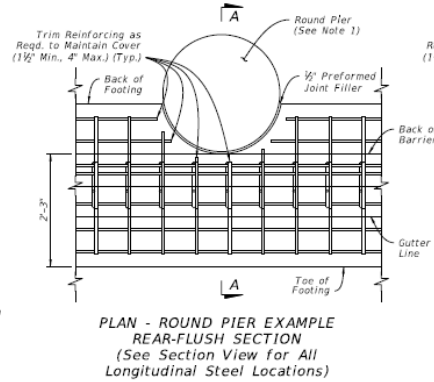
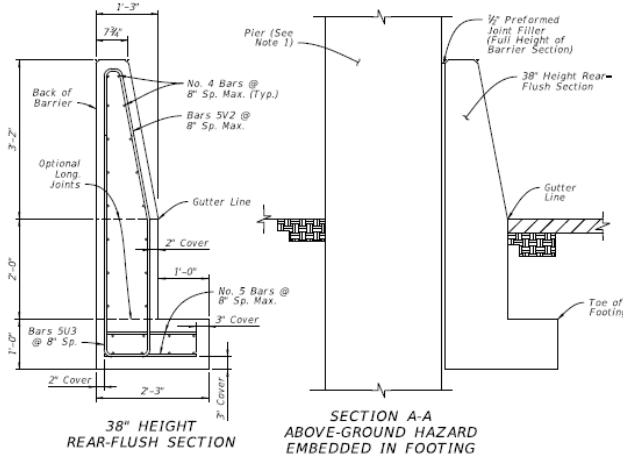
## Sheet 16: All new!



- For shielding pier for crash-worthiness 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)

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## Sheet 16: All new!



**NOTE:**  
1. PIERS: The piers shown herein are example shapes only; see the Plans for the project-specific dimensions. The details shown herein are only for use when piers do not require protection per the AASHTO LRFD requirements. For piers requiring protection, see Index 521-002.

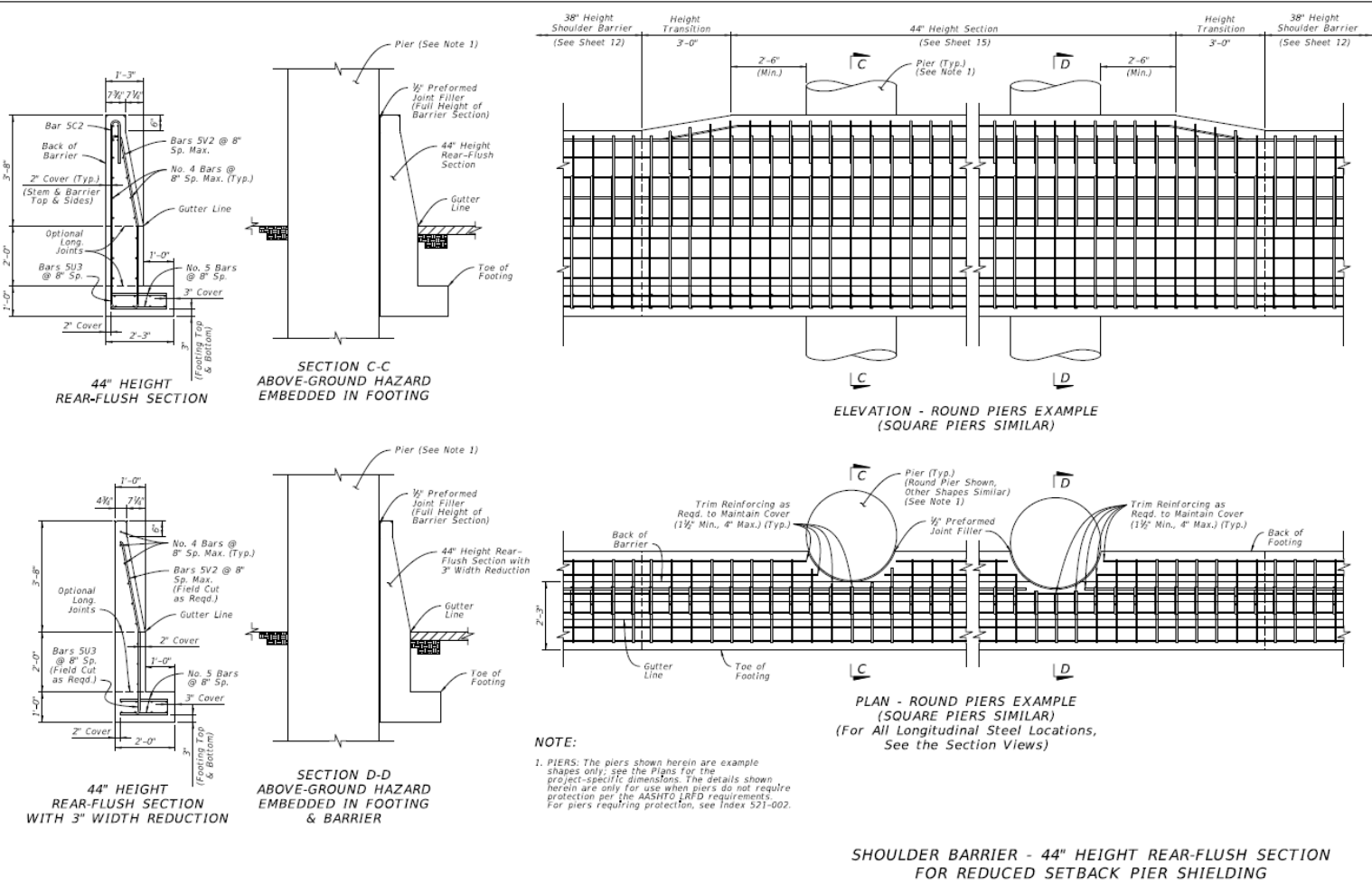
**SHOULDER BARRIER - 38" HEIGHT REAR-FLUSH SECTION FOR REDUCED SETBACK PIER SHIELDING (DESIGN SPEED ≤ 45 MPH)**

- 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.

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## Sheet 17: All new!

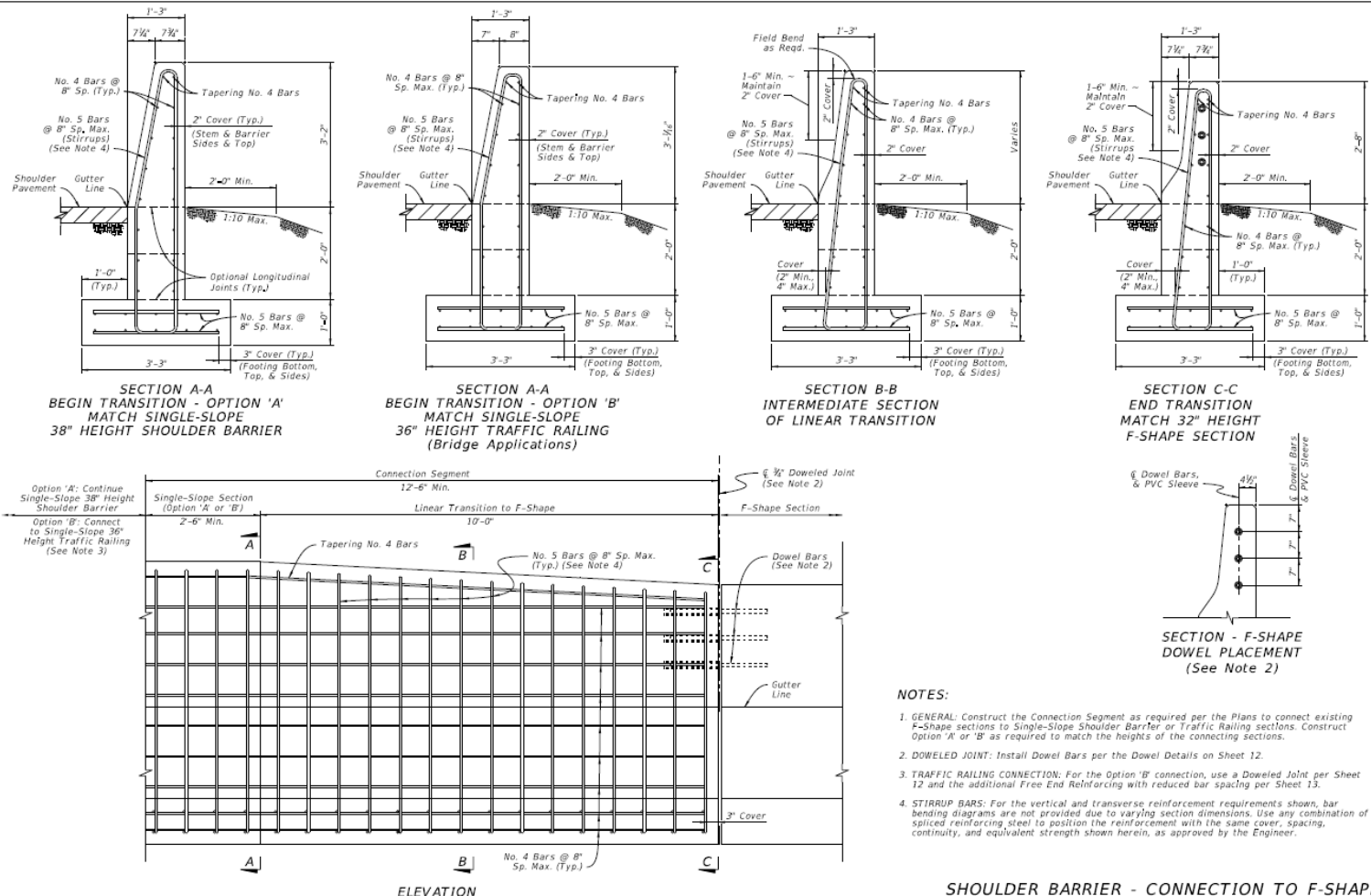
- Same width options as previous
- Used for all design speeds.
- Difference from previous... The Barrier height is raised to reduce setback requirement for Zone of Intrusion (ZOI) per FDM Table 215.4.2



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## Sheet 18: All new!



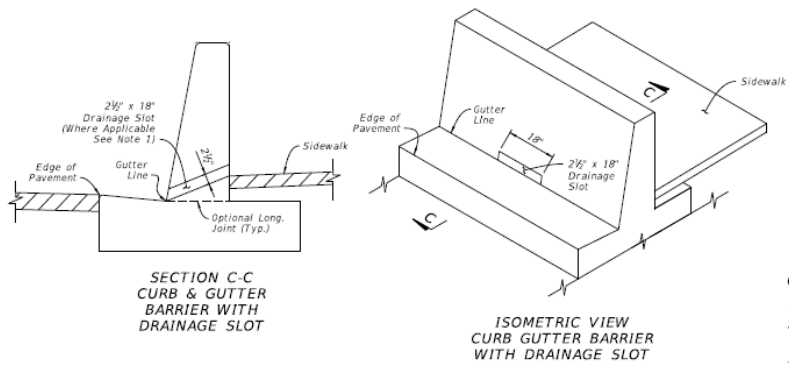
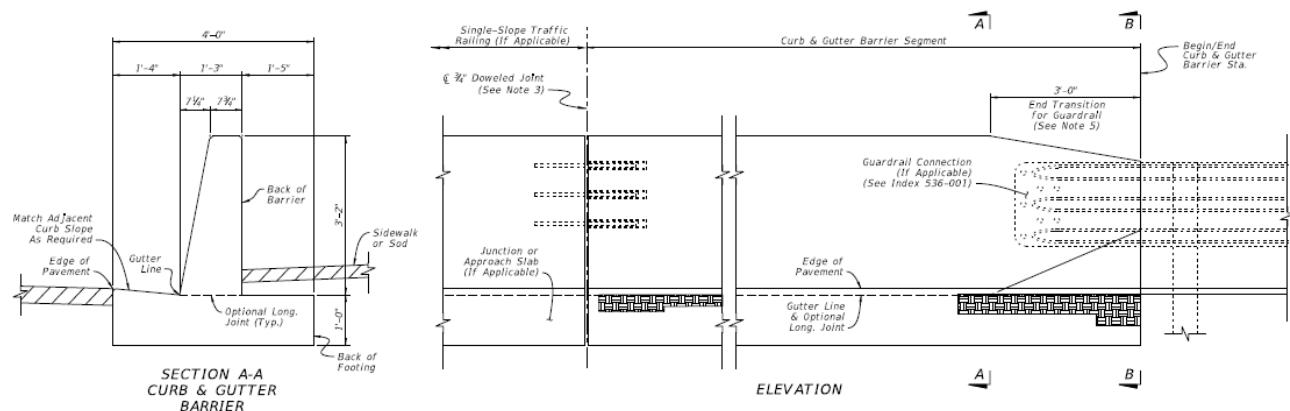
- NOTES:**
1. GENERAL: Construct the Connection Segment as required per the Plans to connect existing F-shape sections to Single-Slope Shoulder Barrier or Traffic Railing sections. Construct Option 'A' or 'B' as required to match the heights of the connecting sections.
  2. DOWELED JOINT: Install Dowel Bars per the Dowel Details on Sheet 12.
  3. TRAFFIC RAILING CONNECTION: For the Option 'B' connection, use a Doweled Joint per Sheet 12 and the additional Free End Reinforcing with reduced bar spacing per Sheet 13.
  4. STIRRUP BARS: For the vertical and transverse reinforcement requirements shown, bar bending diagrams are not provided due to varying section dimensions. Use any combination of spliced reinforcing steel to position the reinforcement with the same cover, spacing, continuity, and equivalent strength shown herein, as approved by the Engineer.

- Transition to F-Shape for Single-Faced Barrier
- Similar concept to double-faced Median Barrier already seen on Sheet 11!

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## Sheet 19: All new!



- CURB AND GUTTER BARRIER NOTES:**
- SECTION VIEWS: For additional Views A-A and B-B, see Sheet 20.
  - EXPANSION JOINTS: Place  $\frac{1}{2}$ " width transverse expansion joints through the barrier and footing spaced at 100-foot maximum intervals. On both sides of each joint, use the Free End Reinforcing bar spacing per Sheet 20.
  - DOWELED JOINTS: See the General Notes on Sheet 1 for usage of joint types. Where required, install  $\frac{3}{4}$ " Doweled Joints as defined on Sheet 12.
  - TRAFFIC RAILING CONNECTIONS: Align the barrier and Traffic Railing faces and connect with the  $\frac{3}{4}$ " Doweled Joint per Sheet 12.
  - GUARDRAIL CONNECTIONS: Connect Guardrail using the Transition Connections to Rigid Barrier per Index 536-001 in conjunction with 3'-0" End Transition for Guardrail as shown herein.
  - FREE ENDS: When the barrier end does not terminate with a Traffic Railing connection or Guardrail connection as called for in the Plans, terminate the barrier in accordance with the Free End Reinforcing Note on Sheet 20.

- “Curb & Gutter Barrier” is the third category of concrete barrier.
- Typically used in urban areas
- Design Speed ( $\leq 45$  mph)
- Aligns with “Type F” curb for water conveyance

**DRAINAGE SLOT DETAILS:**

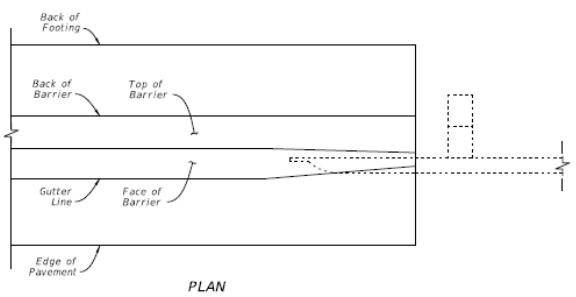
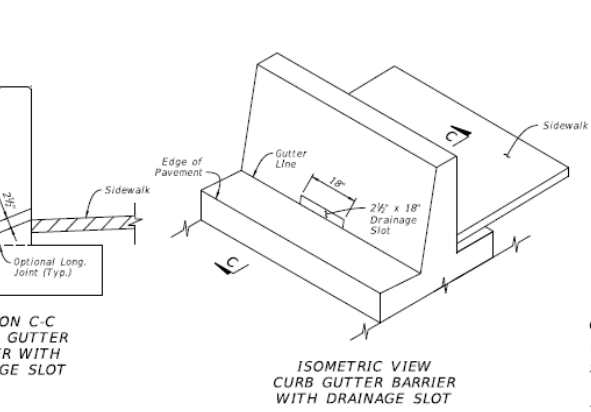
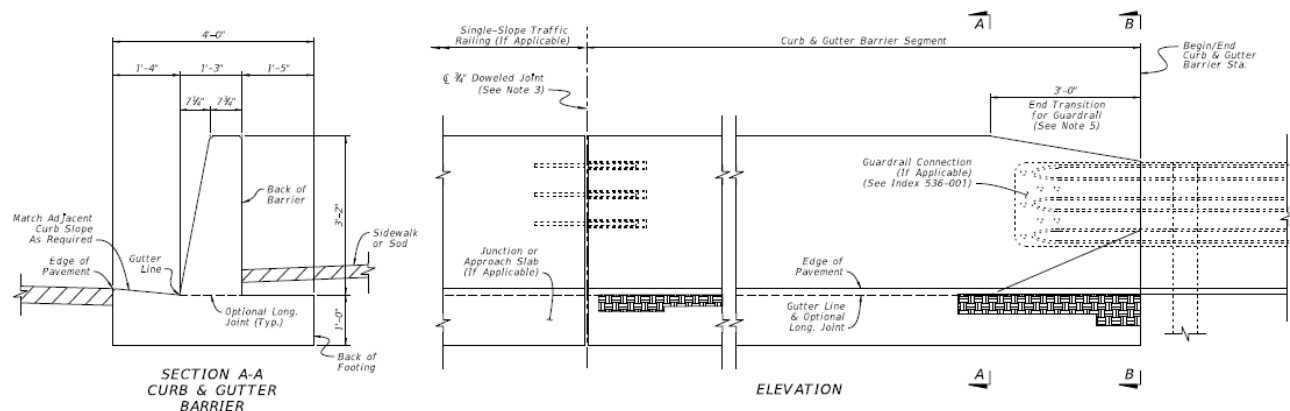
**DRAINAGE SLOT NOTES:**

- GENERAL: Place  $2\frac{1}{2}$ " x 18" Drainage Slots at locations and/or spacing called for in the Plans.
- STEEL REINFORCEMENT CONFLICT: When the Drainage Slot encounters a conflict with reinforcing steel, shift or cut the reinforcing steel to provide  $2\frac{1}{2}$ " (e.  $\frac{3}{8}$ ") of concrete cover for the reinforcing around the Drainage Slot. If cutting the vertical bars, maintain 8" bar spacing. If shifting the vertical bars, move the bars from the standard 8" spacing location to the closest end of the drainage slot (distributing additional vertical reinforcement evenly on each side of the Drainage Slot).

**CURB AND GUTTER BARRIER**

LAST REVISION 11/01/17	DESCRIPTION:	FY 2018-19 STANDARD PLANS	CONCRETE BARRIER	INDEX 521-001	SHEET 19 of 22
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## Sheet 19: All new!



- CURB AND GUTTER BARRIER NOTES:**
- SECTION VIEWS: For additional Views A-A and B-B, see Sheet 20.
  - EXPANSION JOINTS: Place  $\frac{1}{2}$ " width transverse expansion joints through the barrier and footing spaced at 100-foot maximum intervals. On both sides of each joint, use the Free End Reinforcing bar spacing per Sheet 20.
  - DOWELED JOINTS: See the General Notes on Sheet 1 for usage of joint types. Where required, install  $\frac{3}{4}$ " Doweled Joints as defined on Sheet 12.
  - TRAFFIC RAILING CONNECTIONS: Align the barrier and Traffic Railing faces and connect with the  $\frac{3}{4}$ " Doweled Joint per Sheet 12.
  - GUARDRAIL CONNECTIONS: Connect Guardrail using the Transition Connections to R/gld Barrier per Index 536-001 in conjunction with 3'-0" End Transition for Guardrail as shown herein.
  - FREE ENDS: When the barrier end does not terminate with a Traffic Railing connection or Guardrail connection as called for in the Plans, terminate the barrier in accordance with the Free End Reinforcing Note on Sheet 20.

CURB AND GUTTER BARRIER

- 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)

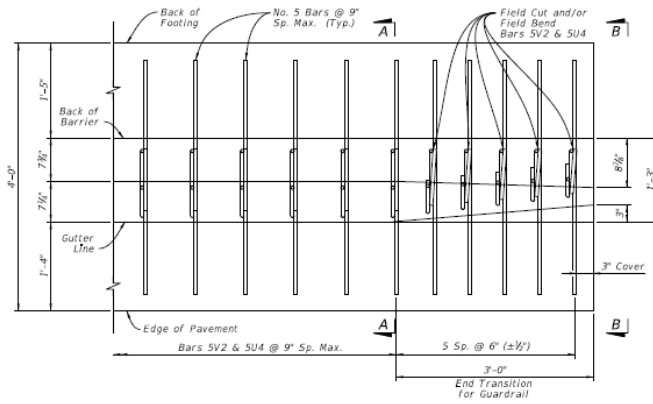
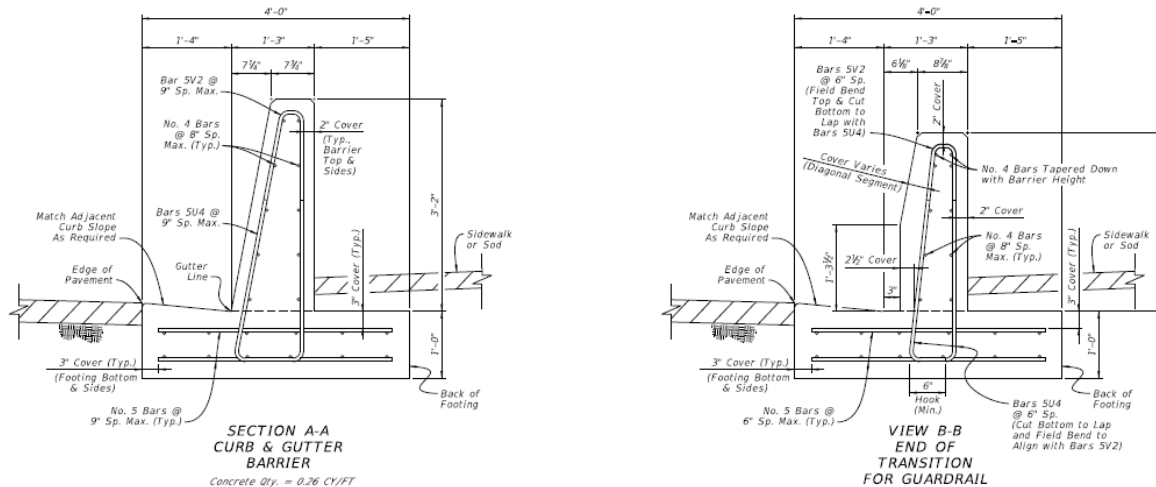
**DRAINAGE SLOT NOTES:**

- GENERAL: Place 2 1/2" x 18" Drainage Slots at locations and/or spacing called for in the Plans.
- STEEL REINFORCEMENT CONFLICT: When the Drainage Slot encounters a conflict with reinforcing steel, shift or cut the reinforcing steel to provide 2 1/2" (± 1/2") of concrete cover for the reinforcing around the Drainage Slot. If cutting the vertical bars, maintain 8" bar spacing. If shifting the vertical bars, move the bars from the standard 8" spacing location to the closest end of the drainage slot (distributing additional vertical reinforcement evenly on each side of the Drainage Slot).

DRAINAGE SLOT DETAILS

LAST REVISION 11/01/17	DESCRIPTION:		FY 2018-19 STANDARD PLANS	CONCRETE BARRIER	INDEX 521-001	SHEET 19 of 22
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## Sheet 20: All new!



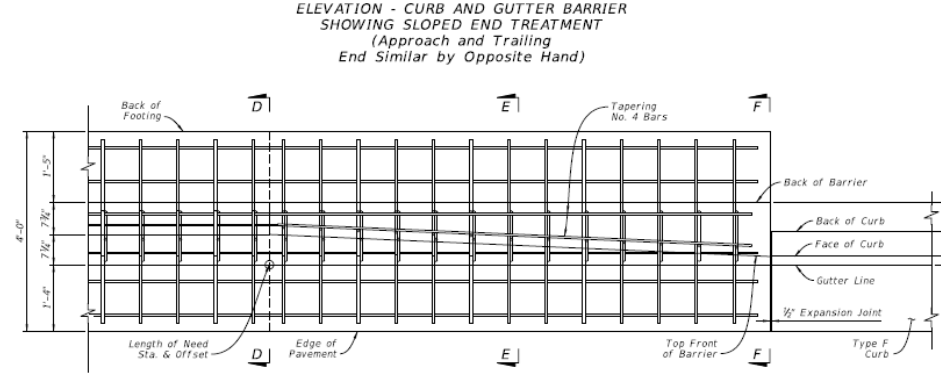
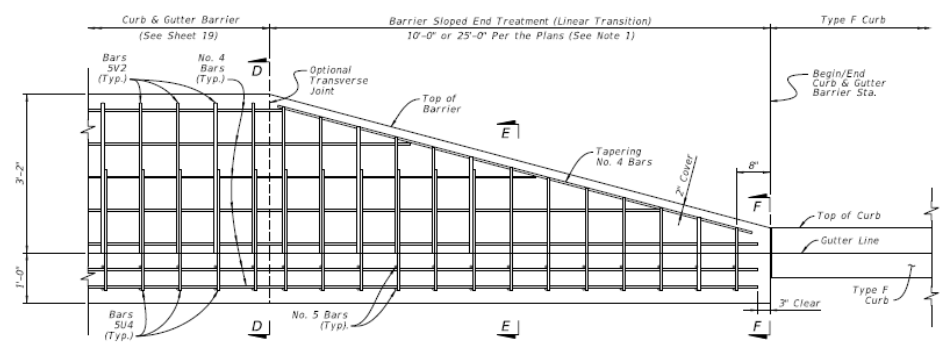
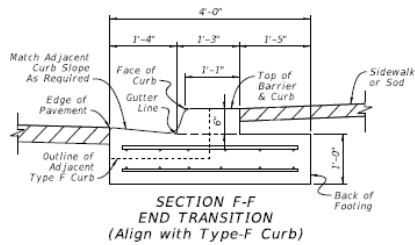
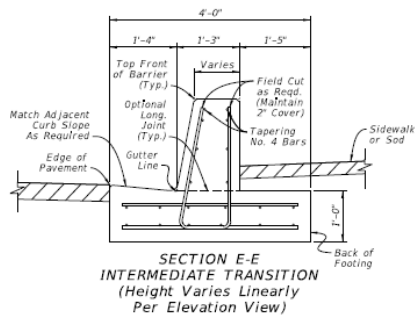
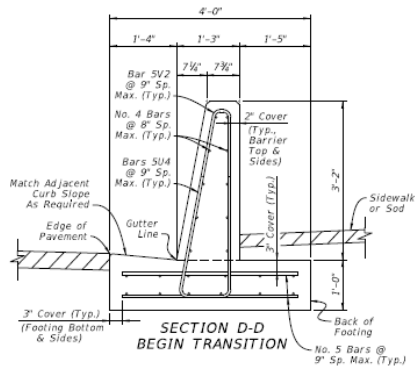
- NOTES:**
1. GENERAL: Work with the Plan and Elevation Views on Sheet 19.
  2. FREE END REINFORCING: Where shown in the Plans, terminate the 38" Curb & Gutter Barrier section with a transverse vertical end face. Reduce the spacing of Bars SV2 and SU4 to 6" for 5 Spaces, placed with 3" cover from the barrier's end face.
  3. BAR BENDING DIAGRAMS: For additional details for bars SV2 and SU4, see the Bar Bending Diagrams on Sheet 22.

- Reinforcing details for general run and connection to guardrail

**CURB AND GUTTER BARRIER - REINFORCING DETAILS**

<table border="1"> <tr> <th>LAST REVISION</th> <th>DESCRIPTION</th> </tr> <tr> <td>11/01/17</td> <td></td> </tr> </table>	LAST REVISION	DESCRIPTION	11/01/17		<table border="1"> <tr> <td>FY 2018-19</td> <td>CONCRETE BARRIER</td> </tr> <tr> <td>STANDARD PLANS</td> <td></td> </tr> </table>	FY 2018-19	CONCRETE BARRIER	STANDARD PLANS		<table border="1"> <tr> <td>INDEX</td> <td>SHEET</td> </tr> <tr> <td>521-001</td> <td>20 of 22</td> </tr> </table>	INDEX	SHEET	521-001	20 of 22
LAST REVISION	DESCRIPTION													
11/01/17														
FY 2018-19	CONCRETE BARRIER													
STANDARD PLANS														
INDEX	SHEET													
521-001	20 of 22													

## Sheet 21: All new!



- NOTES:**
1. GENERAL: Install a Sloped End Treatment only where called for in the Plans, using either a 10'-0" length or 25'-0" length treatment as specified in the Plans. The 10'-0" length option is shown herein, while the 25'-0" length option requires additional trimmed Bars 5U4 & 5V2 at the same 9" longitudinal spacing.
  2. BAR BENDING DIAGRAMS: For additional details on Bars 5V2 & 5U4, see the Bar Bending Diagrams on Sheet 22.

CURB AND GUTTER BARRIER - SLOPED END TREATMENT

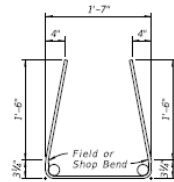
- Use Sloped End Treatment only where Guardrail Approach Terminal will not fit
- Design Speed ( $\leq 35$  mph)
- Requires DDE approval per FDM 215
- Requirements explained in SPI

LAST REVISION 11/01/17	DESCRIPTION:	FDOT FY 2018-19 STANDARD PLANS	CONCRETE BARRIER	INDEX 521-001	SHEET 21 of 22
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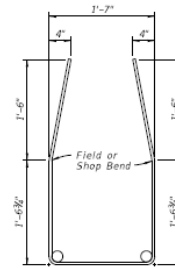
## Sheet 22: All new!

- Reinforcing details for contractors!

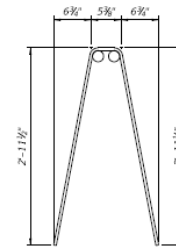
BILL OF REINFORCING STEEL		
MARK	SIZE	LENGTH
C1	4	3'-8"
C2	5	3'-0"
U1	4	5'-1"
U2	4	7'-8"
U3	5	9'-7"
U4	5	5'-9"
V1	4	6'-4"
V2	5	6'-3"



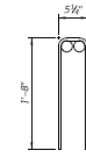
BARS 4U1



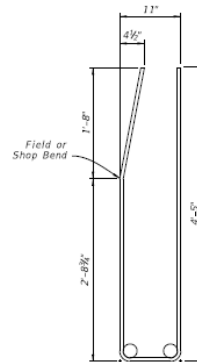
BAR 4U2



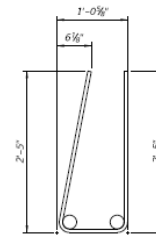
BAR 4V1



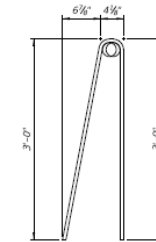
BAR 4C1



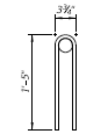
BAR 5U3



BAR 5U4



BAR 5V2



BAR 5C2

**NOTES:**

1. Work with the Standard Bar Bending Details per Index 415-001.
2. All bar dimensions in the bending diagrams are out to out.

REINFORCING BAR BENDING DIAGRAMS

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## STANDARD PLANS INSTRUCTIONS:

All new!

Standard Plans Website: <http://www.fdot.gov/design/standardplans/current/default.shtm>

Concrete Barriers, Traffic Railings, and Parapets						
521-001		Concrete Barrier	410	SPI	XLS	Roadway
521-002		Pier Protection Barrier	411	SPI	XLS	
521-010		Opaque Visual Barrier	461			



<http://www.fdot.gov/design/standardplans/current/SPI/SPI-521-001.pdf>



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

Standard Plans Website: <http://www.fdot.gov/design/standardplans/current/default.shtm>

Concrete Barriers, Traffic Railings, and Parapets						
521-001		Concrete Barrier	410	SPI	XLS	Roadway
521-002		Pier Protection Barrier	411	SPI	XLS	
521-010		Opaque Visual Barrier	461			



<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**



## Sheet 1: Revised!

SHEET NO.	CONTENTS
1	Index Contents; General Notes
2	Example Layouts – Footing Placement and Connections
3	Barrier Plan and Elevation – Connection to Concrete Barrier – Connection to Guardrail
4	Barrier Details – Connection to Concrete Barrier
5	Barrier Details – Connection to Guardrail
6	Barrier Footing Options
7	Crash Wall Details
8	Reinforcing Bar Bending Diagrams

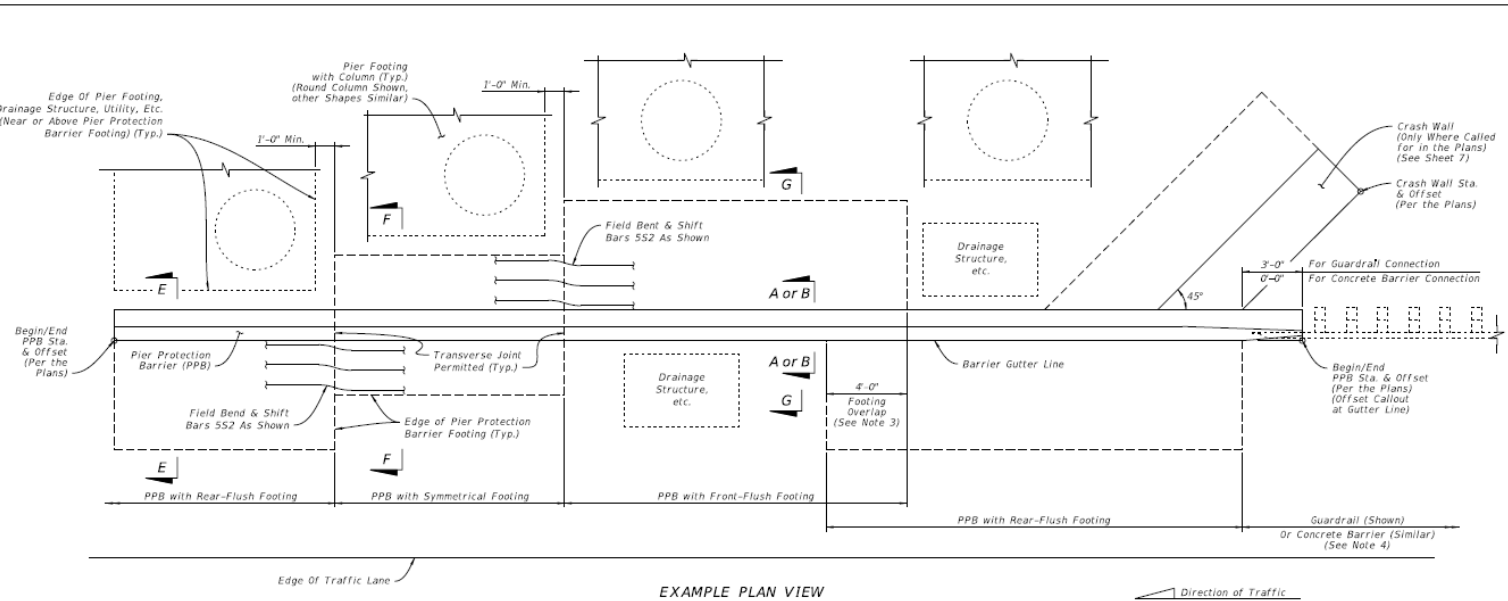
### GENERAL NOTES:

- CONCRETE:** Use Class III or IV concrete unless otherwise called for in the Plans.
- CONSTRUCTION JOINTS:** Maintain continuity of reinforcement steel across Construction Joints; reinforcement lap splices are permitted immediately adjacent to joints. Construct all Pier Protection Barrier continuously, with no expansion or contraction joints. Construction joints are classified herein as Transverse Joints or Longitudinal Joints.  
  
Transverse Joints are permitted at 40 foot or greater intervals along the barrier.  
  
Longitudinal Joints may only be installed where indicated in the following details and notes, with a location tolerance of  $\pm 1"$  from the locations shown.
- SUBGRADE:** Compact the top layer of subgrade with Type B Stabilization, LBR 40 (12 in.).
- DRAINAGE INLETS:** See Index 425-001 for Shoulder Barrier Inlets, and isolate these structures from Pier Protection Barriers and Footings with 1" Preformed Joint Filler.
- BARRIER END MARKERS:** For all free ends of barriers that are not connected to guardrail or concrete barrier, install a Type 3 Object Marker on the end face per Specification 705.
- BARRIER DELINEATORS:** Install Barrier Delineators in accordance with Specification Section 705. Mount the delineators on the top face of the barrier, with the roadway side of the delineator located 2" from the front face of the barrier and the reflective sheeting facing traffic of the nearest approach.
- CRACK CONTROL:** Provide  $\frac{1}{2}"$  depth crack control V-Grooves at 15' to 30' spacing. Locate V-Grooves above any joint or discontinuity in the barrier footing. Align V-Grooves perpendicular to the longitudinal axis of the Pier Protection Barrier and make continuous across the top surface and both side faces. For slip formed barriers, score  $\frac{1}{2}"$  V-Grooves while the concrete is still plastic, otherwise pre-form the joints when stationary forms are utilized.

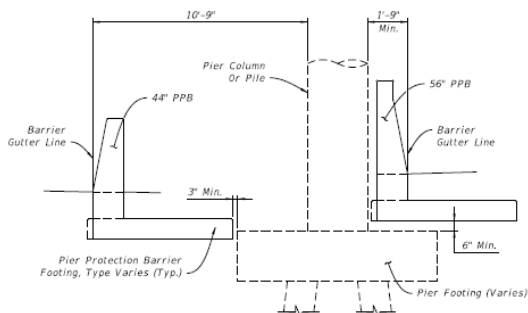
- New Table of Contents
- Revised some notes for clarity.
- Added note headings

## Sheet 2: Revised!

- More detail added to example layouts
- Now shows Station & Offset Points to correspond with Plans
- Now shows optional Crash Wall



EXAMPLE PLAN VIEW



EXAMPLE SECTION VIEW

**NOTES:**

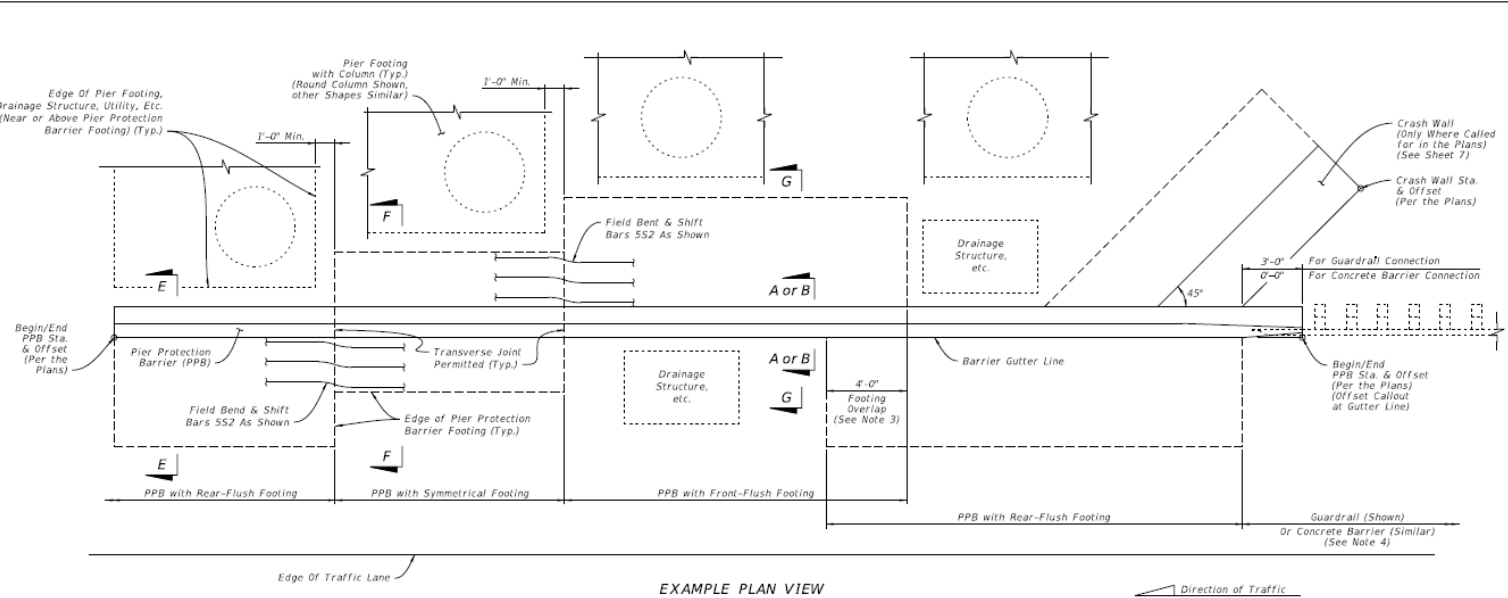
1. GENERAL: The views shown herein are schematic only, showing example layouts for Pier Protection Barrier (PPB) footings and Crash Wall placement in relation to adjacent miscellaneous structures (including bridge piers, footings, drainage structures, etc.). The actual PPB footing placement depends on the project-specific configuration of adjacent structures and obstacles. For project-specific locations of PPB and adjacent features, see the Plans.
2. MINIMUM FOOTING LENGTH: The minimum length of a single footing option (i.e. Symmetrical Footing, Rear-Flush Footing, Front-Flush Footing), is 8'-0", measured longitudinally. See Sheet 6 for the footing option details.
3. FOOTING OVERLAP: When a Front-Flush Footing section connects to a Rear-Flush Footing section, a 4'-0" footing overlap is required as shown. In footing overlap segments, place all lateral steel reinforcement continuously for the entire width of the combined footing while maintaining the cover requirements per Sheet 6.
4. CONNECTING GUARDRAIL OR CONCRETE BARRIER: Connect the PPB to either Guardrail or Concrete Barrier as specified in the Plans. For additional Guardrail Details, see Sheet 3 and Index 536-001. For additional Concrete Barrier Details, see Sheet 3 and Index 521-001.

EXAMPLE LAYOUTS - FOOTING PLACEMENT AND CONNECTIONS

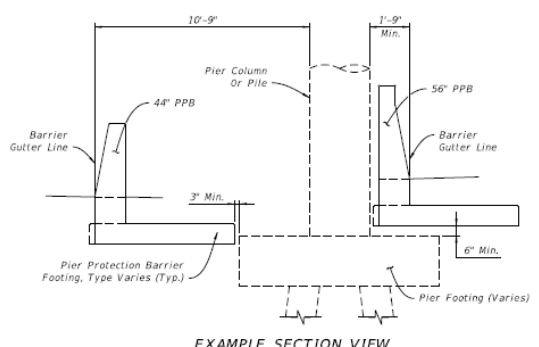
## Sheet 2: Revised!

Crash Wall connection to PPB location differs per Guardrail or Concrete Barrier connection:

- Guardrail Connection:  
3 Ft. Offset
- Concrete Barrier Connection:  
Zero Offset



EXAMPLE PLAN VIEW



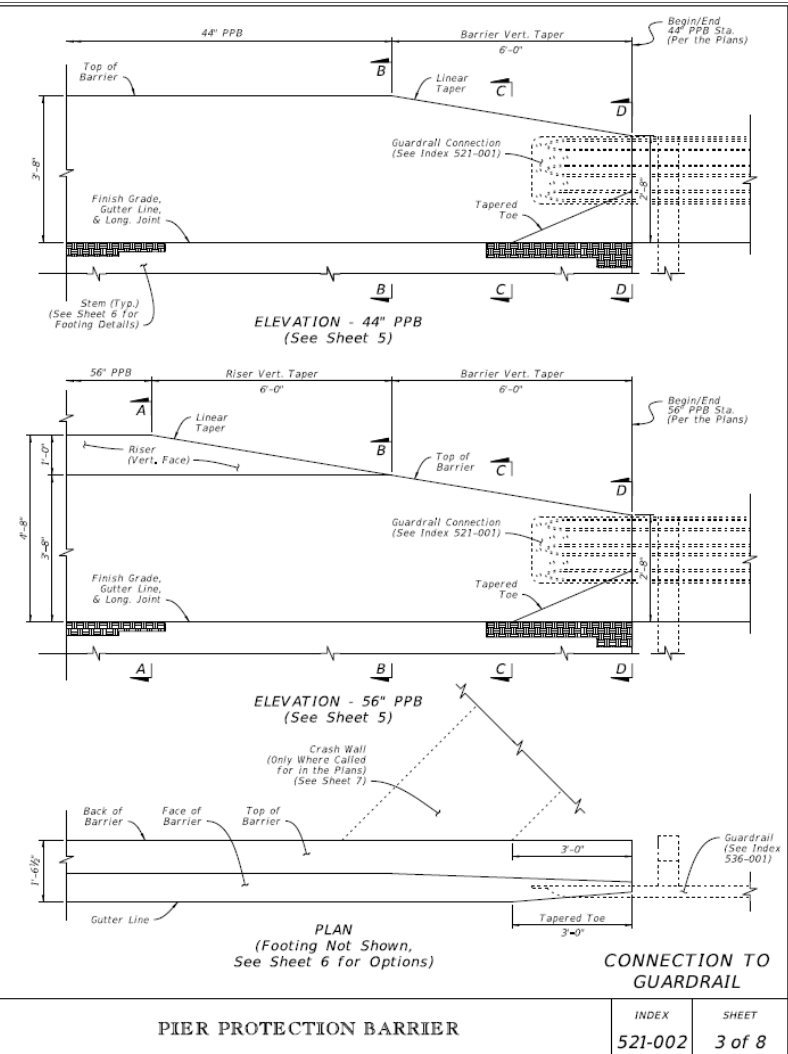
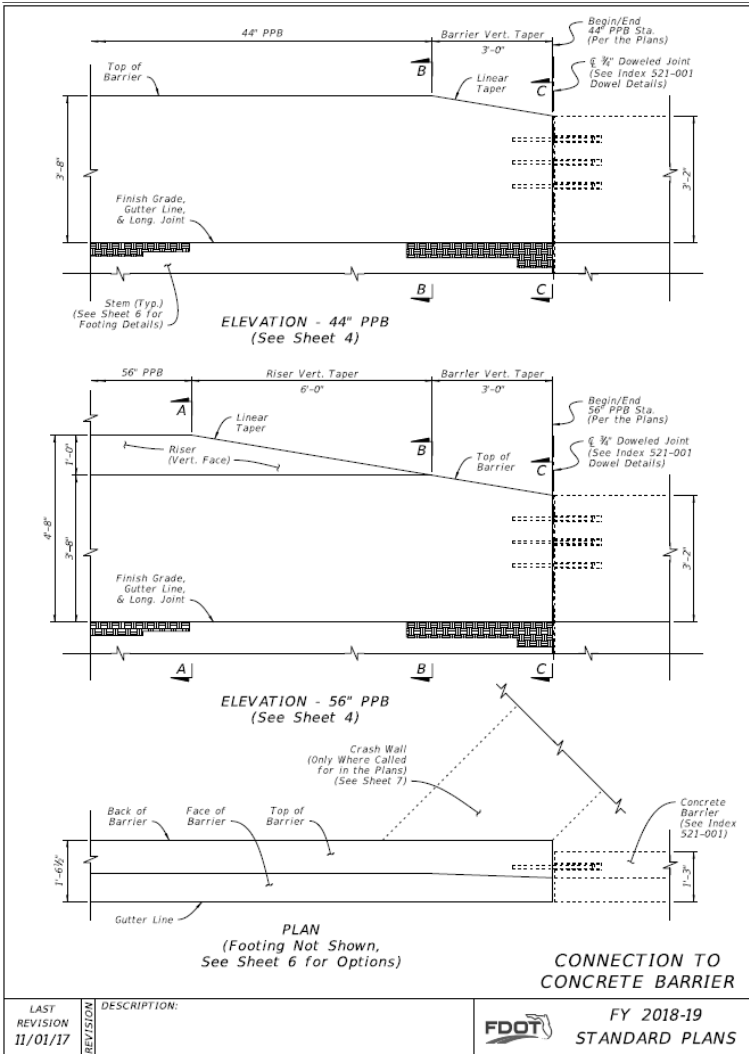
EXAMPLE SECTION VIEW

**NOTES:**

1. GENERAL: The views shown herein are schematic only, showing example layouts for Pier Protection Barrier (PPB) footings and Crash Wall placement in relation to adjacent miscellaneous structures (including bridge piers, footings, drainage structures, etc.). The actual PPB footing placement depends on the project-specific configuration of adjacent structures and obstacles. For project-specific locations of PPB and adjacent features, see the Plans.
2. MINIMUM FOOTING LENGTH: The minimum length of a single footing option (i.e. Symmetrical Footing, Rear-Flush Footing, Front-Flush Footing), is 8'-0", measured longitudinally. See Sheet 6 for the footing option details.
3. FOOTING OVERLAP: When a Front-Flush Footing section connects to a Rear-Flush Footing section, a 4'-0" footing overlap is required as shown. In footing overlap segments, place all lateral steel reinforcement continuously for the entire width of the combined footing while maintaining the cover requirements per Sheet 6.
4. CONNECTING GUARDRAIL OR CONCRETE BARRIER: Connect the PPB to either Guardrail or Concrete Barrier as specified in the Plans. For additional Guardrail Details, see Sheet 3 and Index 536-001. For additional Concrete Barrier Details, see Sheet 3 and Index 521-001.

EXAMPLE LAYOUTS - FOOTING PLACEMENT AND CONNECTIONS

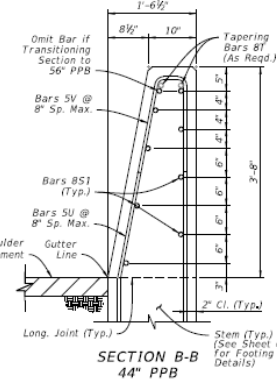
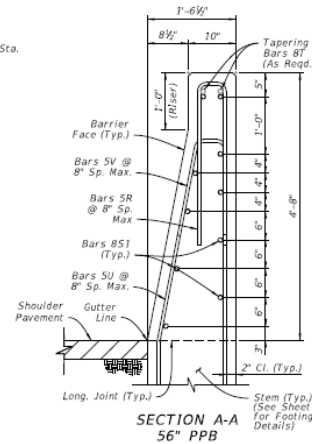
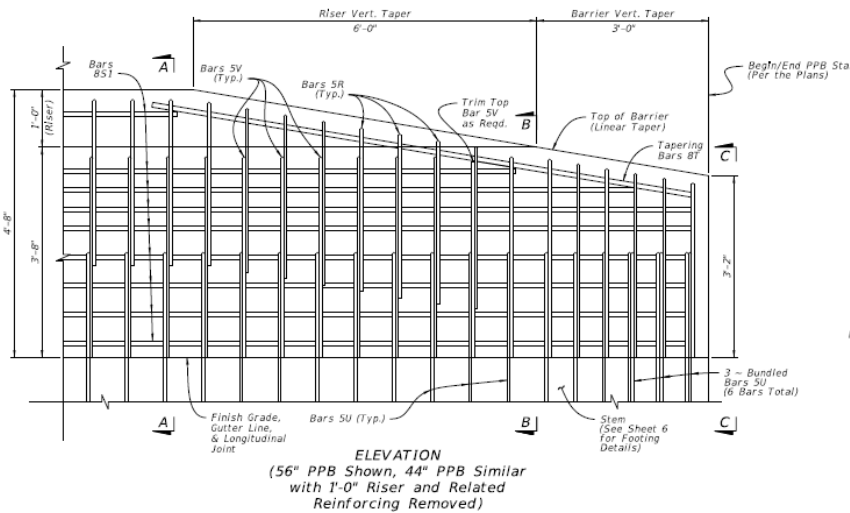
## Sheet 3: All new!



- 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

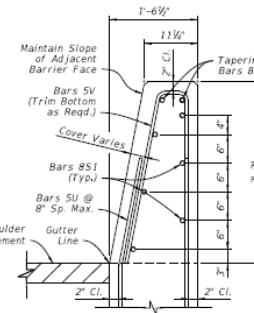
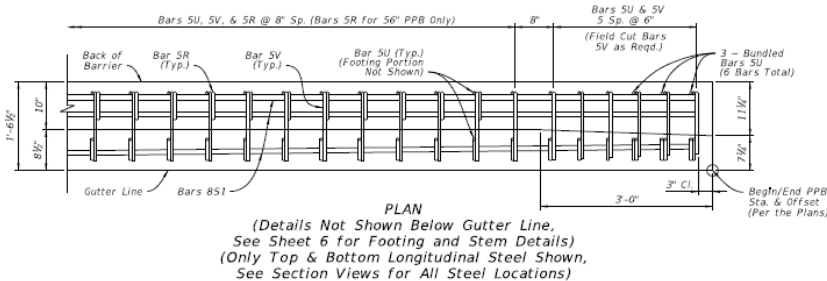
LAST REVISION	DESCRIPTION:
11/01/17	

## Sheet 4: All new!



Concrete Qty. = 0.19 CY/FT (Above Gutter Line)  
Steel Qty. = 47.7 LB/FT (Excluding Bars SU & ST)

Concrete Qty. = 0.16 CY/FT (Above Gutter Line)  
Steel Qty. = 35.7 LB/FT (Excluding Bars SU & ST)



**NOTES:**

1. GENERAL: Construct either the 56" PPB or the 44" PPB height as called for in the Plans. See Sheets 2 & 3 for additional plan and elevation details.
2. FOOTING OPTIONS: See Sheet 6 for the supporting stem and footing details.

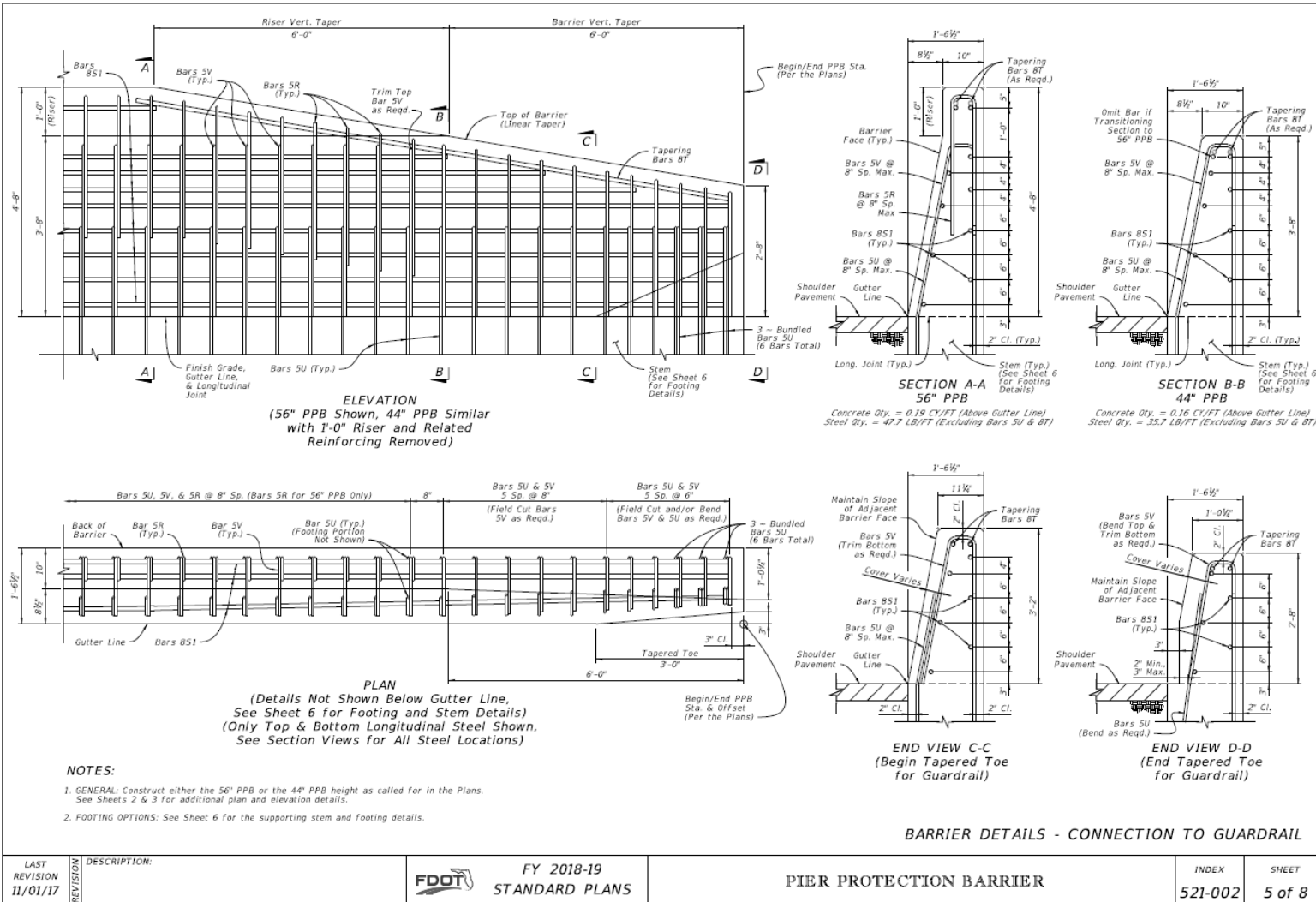
**BARRIER DETAILS - CONNECTION TO CONCRETE BARRIER**

- Reinforcing details when connecting to Concrete Barrier (38" height at end)

LAST REVISION 11/01/17	DESCRIPTION:	FY 2018-19 STANDARD PLANS	PIER PROTECTION BARRIER	INDEX 521-002	SHEET 4 of 8
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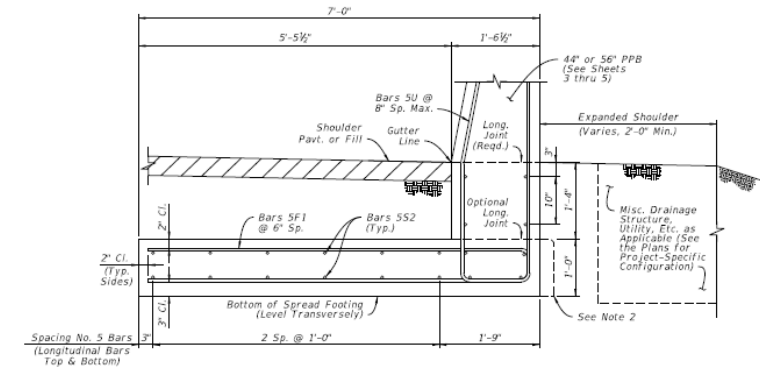
## Sheet 5: All new!

- Reinforcing details when connecting to Guardrail (32" Height at end)

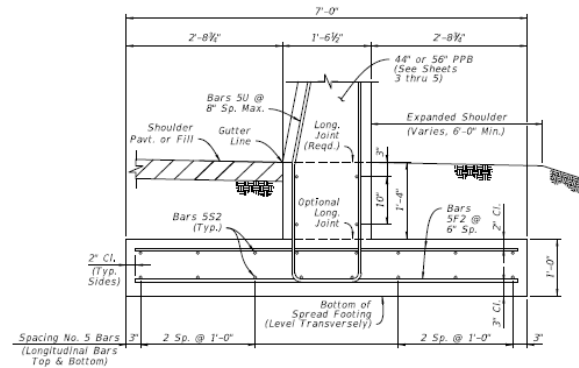


LAST REVISION 11/01/17	DESCRIPTION:	FDOT FY 2018-19 STANDARD PLANS	PIER PROTECTION BARRIER	INDEX 521-002	SHEET 5 of 8
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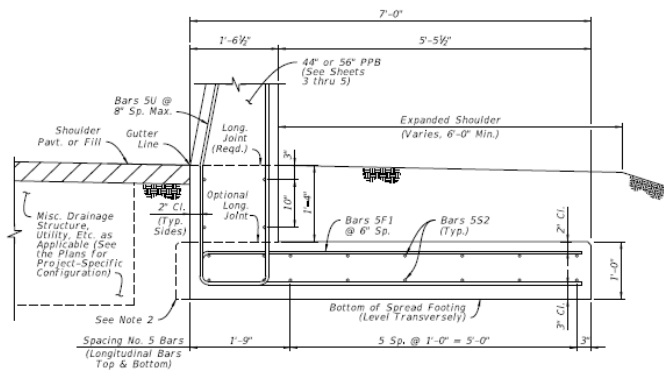
## Sheet 6: Revised!



**SECTION E-E  
FRONT-FLUSH FOOTING OPTION**  
Concrete Qty. = 0.34 CY/FT (Below Gutter Line)  
Steel Qty. = 63.5 LB/FT (Including Bars SU)



**SECTION F-F  
SYMMETRICAL FOOTING OPTION**  
Concrete Qty. = 0.34 CY/FT (Below Gutter Line)  
Steel Qty. = 62.6 LB/FT (Including Bars SU)



**SECTION G-G  
REAR-FLUSH FOOTING OPTION**  
Concrete Qty. = 0.34 CY/FT (Below Gutter Line)  
Steel Qty. = 63.5 LB/FT (Including Bars SU)

**NOTES:**

1. GENERAL: Install the footing options per project-specific requirements, as defined on Sheet 2 and specified per the Plans.
2. OPTIONAL SLIP FORMING SUPPORT: The 1'-0" depth spread footing may be extended by 3" laterally beyond the face of the stem to provide support for a subsequent slip forming operation above. Do not adjust the steel reinforcement location for the additional concrete.
3. GUARDRAIL CONNECTION TAPERED TOE: For tapering the barrier as shown on Sheet 5, View D-D, bend Bars U away from the stem face as required. For this case, the cover requirement is variable for one side of the stem (only at the tapered toe locations).

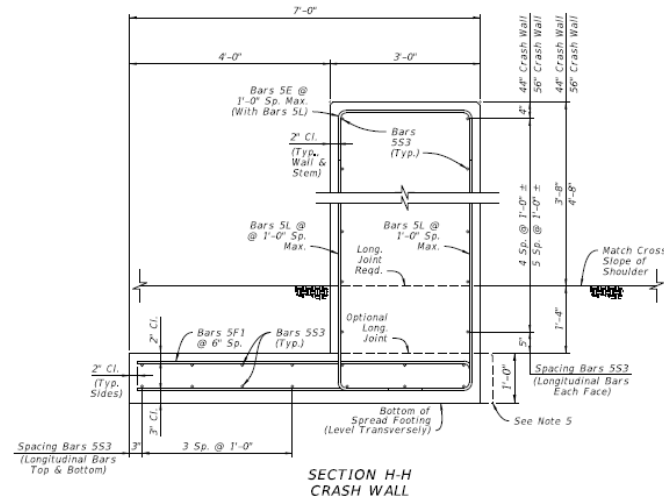
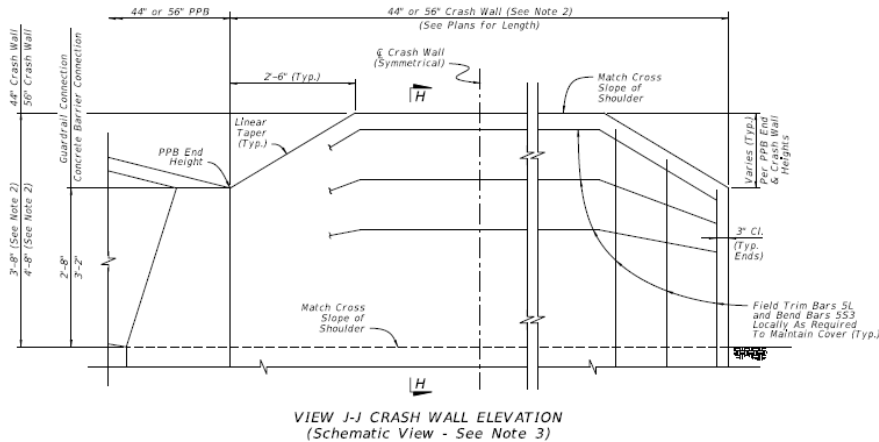
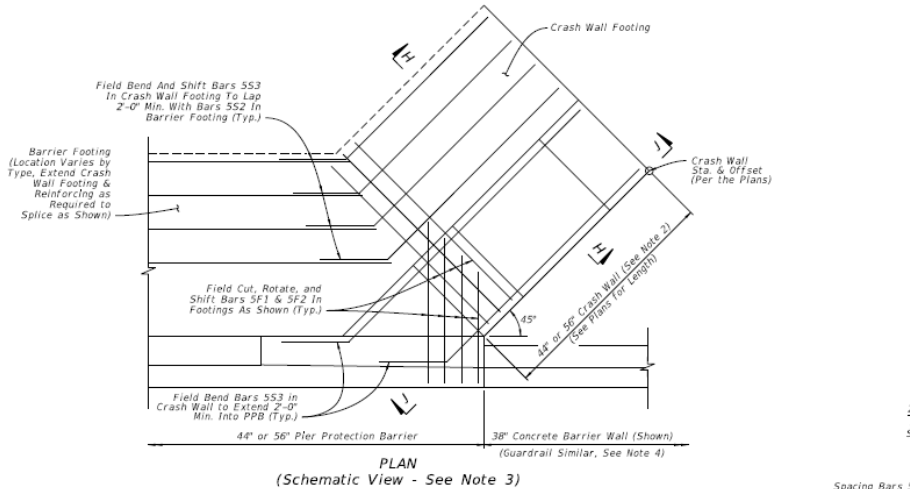
**BARRIER FOOTING OPTIONS**

- Differing footing options for fitting around piers, drainage, utilities, etc...
- Same dimensions as FY 2017-18 Standard

LAST REVISION 11/01/17	DESCRIPTION:	<b>FY 2018-19 STANDARD PLANS</b>	<b>PIER PROTECTION BARRIER</b>	INDEX 521-002	SHEET 6 of 8
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## Sheet 7:



Concrete Qty. = 0.82 CY/FT (44" Crash Wall) or 0.93 CY/FT (56" Crash Wall)  
Steel Qty. = 71.8 LB/FT (44" Crash Wall) or 76.0 LB/FT (56" Crash Wall)

**NOTES:**

- GENERAL: Only where called for in the Plans, install the Crash Wall as a supplement for PPB. If applicable, see the Plans for the corresponding Station and Offset required.  
For additional layout details, see Sheets 2 & 3.
- CRASH WALL HEIGHT: Install the Crash Wall at a height which matches the adjacent PPB (either 44" or 56").
- SCHEMATIC VIEWS: Only partial reinforcing is shown in the Schematic Views to establish a trend while keeping clarity. For all reinforcing steel locations and spacing requirements, see Section H-H.
- GUARDRAIL CONNECTIONS: To facilitate guardrail connections, shift the Crash Wall 3 feet from the end of the PPB as shown on Sheets 2 & 3.
- OPTIONAL SLIP FORMING SUPPORT: The 1'-0" depth spread footing may be extended by 3" laterally beyond the face of the wall to provide support for a subsequent slip forming operation above. Do not adjust the steel reinforcement location for the additional concrete.

**CRASH WALL DETAILS**

- 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

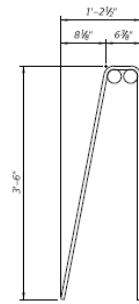
LAST REVISION 11/01/17	DESCRIPTION:		FY 2018-19 STANDARD PLANS	PIER PROTECTION BARRIER	INDEX 521-002	SHEET 7 of 8
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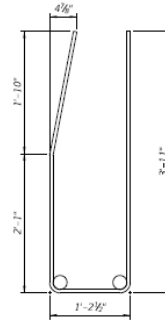
## Sheet 8: All new!

- Reinforcing details for contractors!

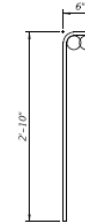
BILL OF REINFORCING STEEL		
MARK	SIZE	LENGTH
V	5	7'-5"
U	5	8'-11"
R	5	6'-0"
F1	5	13'-9"
F2	5	Varies (Straight)
L	5	6'-5" / 7'-5"
E	5	4'-6"
S1	8	Varies (Straight)
S2, S3	5	Varies (Straight)



BARS SV



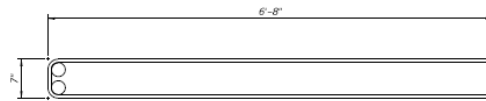
BARS SU



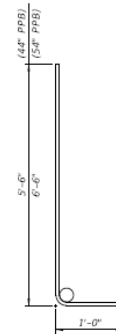
BARS SR

**NOTES:**

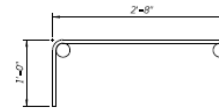
- Work with the Standard Bar Bending Details per Index 415-001.
- All bar dimensions in the bending diagrams are out to out.



BARS SF1



BARS SL



BARS SE

BAR BENDING DIAGRAMS

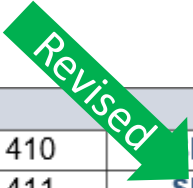


# Index 521-002 – Pier Protection Barrier

**STANDARD PLANS INSTRUCTIONS:      Redeveloped!**

Standard Plans Website: <http://www.fdot.gov/design/standardplans/current/default.shtm>

		Concrete Barriers, Traffic Railings, and Parapets				
<b>521-001</b>		Concrete Barrier	410	PI	XLS	Roadway
<b>521-002</b>		Pier Protection Barrier	411	SPI	XLS	
<b>521-010</b>		Opaque Visual Barrier	461			



<http://www.fdot.gov/design/standardplans/current/SPI/SPI-521-002.pdf>




# Index 521-002 – Pier Protection Barrier

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

**Standard Plans Website:** <http://www.fdot.gov/design/standardplans/current/default.shtm>

Concrete Barriers, Traffic Railings, and Parapets						
521-001		Concrete Barrier	410	SPI	XLS	Roadway
521-002		Pier Protection Barrier	411	SPI	XLS	
521-010		Opaque Visual Barrier	461			

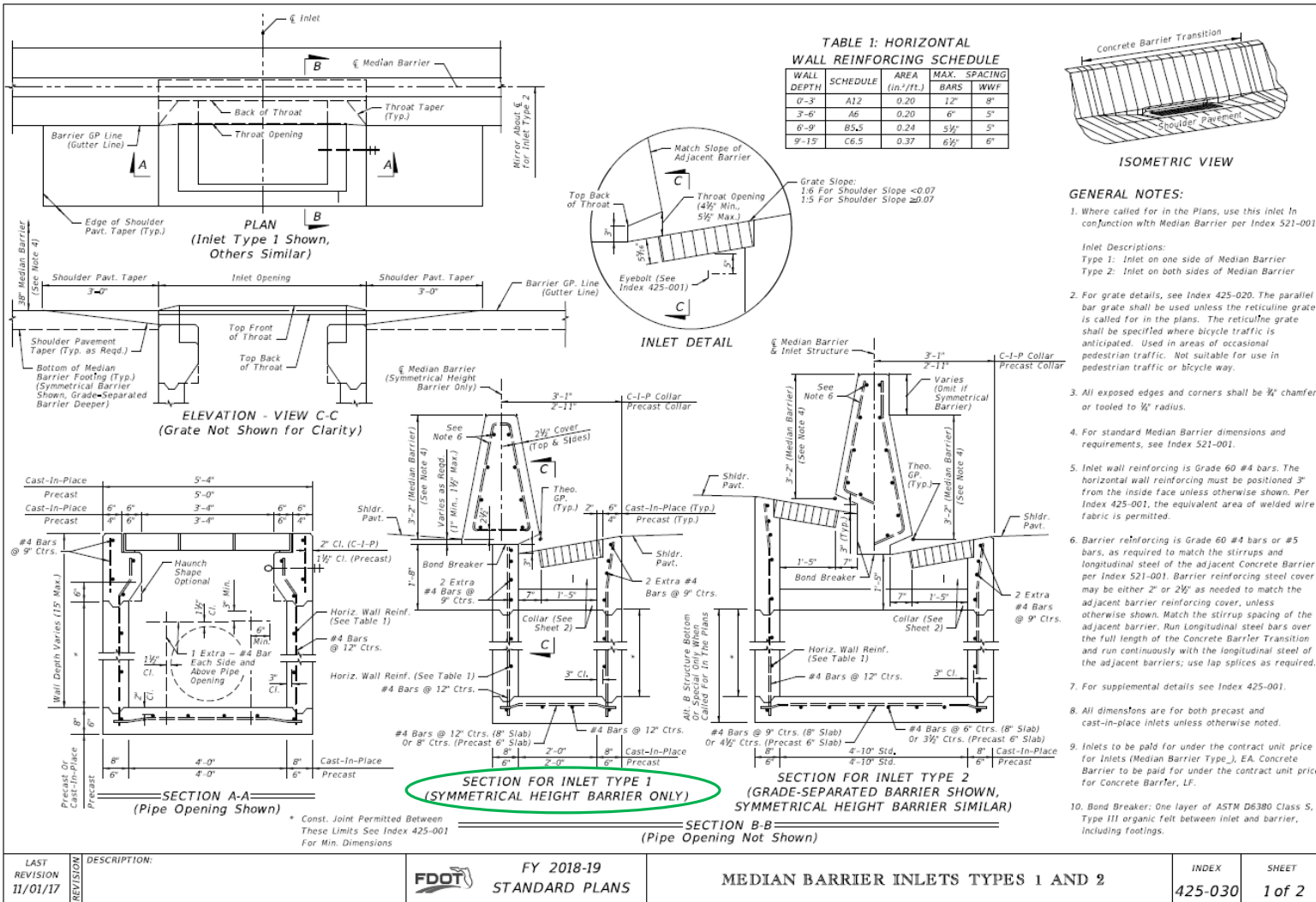


<http://www.fdot.gov/design/standardplans/current/XLS/PierProtectionBarrier-LON.XLSM>

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

## Sheet 1: Revisions for Single-Slope

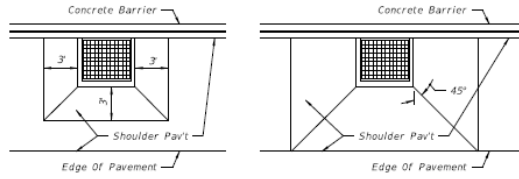


- Clarified Usage Note, Plan, Elevation, and Section Views
- Removed upstream "throat" indentation
- Reduced inlet Type quantity from 5 to 2
- Clarified Label: Type 1 inlet for symmetrical barrier only

## Standard Plans – Primary Index Updates:

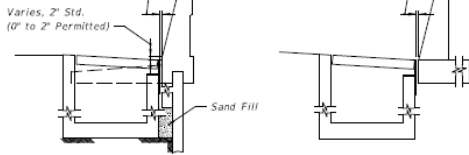
- ✓ 1) **Index 536-001 – Guardrail**
  - Miscellaneous Updates
- ✓ 2) **Index 521-001 – Concrete Barrier**
  - Complete Redevelopment – **Single-Slope Barrier**
- ✓ 3) **Index 521-002 – Pier Protection Barrier**
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- ✓ 4) **Index 425-030 – Median Barrier Inlets Types 1 & 2**
  - Modified – **Single-Slope Barrier**
  - Removed Approach and Trailing “Throats”
- ➔ 5) **Index 425-031 – Shoulder Barrier Inlet**
  - Modified – **Single-Slope Barrier**

## Sheet 1: Revisions for Single-Slope

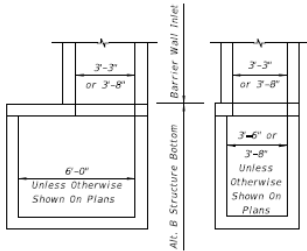


LOW SIDE SUPERELEVATION PAVEMENT WARP FOR SHOULDERS IN SUPERELEVATION  
HIGH SIDE TRANSITION PAVEMENT WARP FOR SHOULDERS IN SUPERELEVATION

**Joint And Bond Breaker:**  
Cast-In-Place Inlets:  
One layer ASTM D6380 Class S, Type III Organic Felt bond breaker between inlet and barrier, including footings.  
**Precast Inlets:**  
Joint width 1" max. Seal with backer rod and Department-approved pavement joint sealant. See Section BB For Other Barrier Shape.

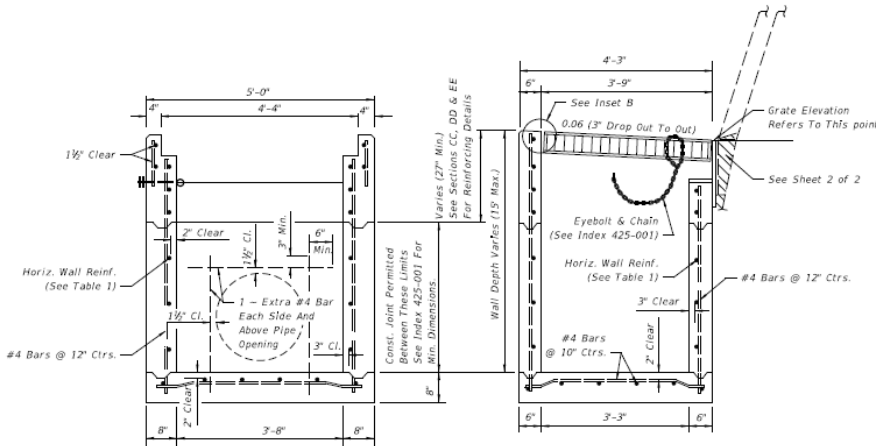


INLET SECTION AT WALLS



Note: Alt. B Structure Bottom Only. See Index 425-010

INLET WITH STRUCTURE BOTTOM

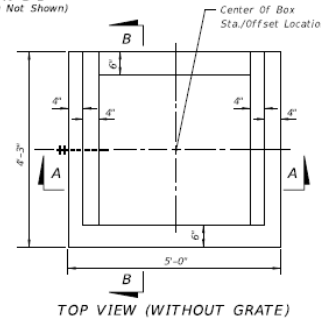


SECTION A-A (WITHOUT GRATE)  
(Pipe Opening Shown)

SECTION B-B  
(Pipe Opening Not Shown)

**GENERAL NOTES:**

- Where called for in the Plans, use this inlet in conjunction with Shoulder Barrier per Index 521-001 or a Wall Coping with Traffic Railing/Junction Slab per Index 521-610. Use of the inlet adjacent to other Concrete Barrier or Traffic Railing types requires approval of the Drainage Engineer. The inlet is suitable for bicycle and occasional pedestrian traffic, with roller bar installation (see INSET B), but should not be placed in a designated pedestrian travel way.
- Inlets located in embankments constructed with earth anchored retaining wall shall be designed with minimum depths to reduce adverse impact on the anchorage system. Runs of pipe parallel to and near anchored wall shall be avoided wherever practical. Special coordination must be exercised during the design and construction of storm water systems within anchored wall systems.
- Inlet bottoms and/or tops may be either precast or cast-in-place. Whether cast as a single unit or as multiple segments, and whether precast or cast-in-place, the upper 2'-3" of the inlet shall be reinforced in accordance with sections CC, DD and EE.
- All exposed edges and corners shall be 1/4" chamfer or tooled to 1/4" radius.
- When Alternate G grate is specified in the plans, the grate is to be hot-dip galvanized after fabrication. Field installation of the filler bar called for in Inset B will not be permitted, thereby requiring tolerance adjustment during fabrication and/or casting, or, matching grate to structure prior to galvanizing.
- All reinforcing is Grade 60 bars, See Index 425-001 for equivalent area of welded wire fabric.
- All dimensions are for both precast and cast-in-place inlets unless otherwise noted.
- For supplemental details see indexes 425-001 and 425-010.
- Inlets to be paid for under the contract unit for Inlets (Concrete Barrier), Ea.



TOP VIEW (WITHOUT GRATE)

TABLE 1: HORIZONTAL WALL REINFORCING SCHEDULE

WALL DEPTH	SCHEDULE	AREA (in. <sup>2</sup> /ft.)	MAX. SPACING BARS	WWF
0'-5"	A12	0.20	12"	8"
5'-10"	A6	0.20	6"	5"
10'-15"	A4	0.20	4"	3"
10'-15"	B5.5	0.24	5 1/2"	5"

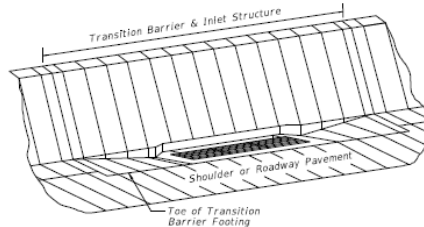
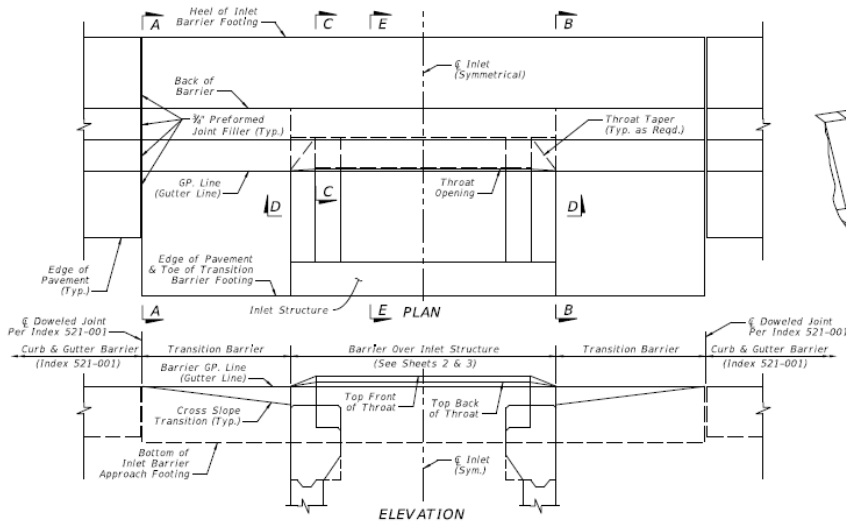
- Clarified usage with specific Index numbers in Note 1.
- Previously, this Index was named "Barrier Wall Inlet" ... similar sounding to other inlet Index titles

## 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

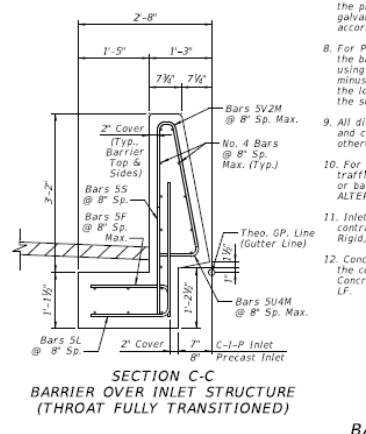
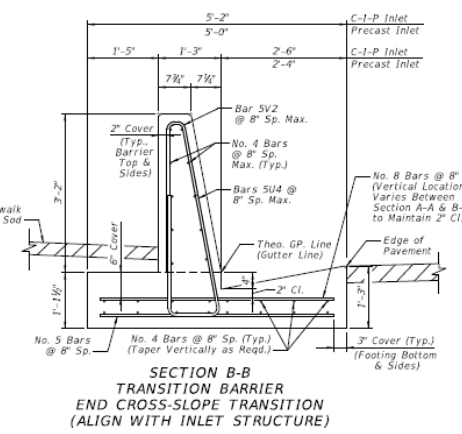
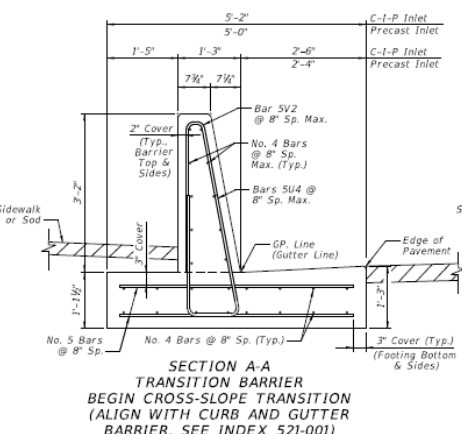


## Sheet 1: Revised for Single-Slope



### GENERAL NOTES:

- Where called for in the Plans, use this inlet in conjunction with Curb and Gutter Barrier per Index 521-001. Construct Barrier segments shown herein in accordance with requirements of Index 521-001, including connections to adjacent barrier segments using the Doweled Joint.
- Reinforcing shown is grade 60 steel bars. For the equivalent area of welded wire reinforcement for the inlet, see Index 425-001. Reinforcing shall have 2" minimum cover unless otherwise shown. Trim or bend bars to provide 1/2" clearance around pipe openings. The cost for additional reinforcing in the barrier is included in the cost of the concrete barrier.
- All barrier is Class II or IV concrete per Index 521-001.
- Apply a 1/8" chamfer or 1/4" radius to all exposed concrete edges.
- For pipe connections to inlet structure bottoms, the recommended maximum pipe sizes are 18" longitudinal and 30" transverse. For larger pipe, use Alternate B bottoms, Index 425-010.
- Grates may be fabricated with reticulate bars or with either 1/2" welded or 3/8" electroforged cross bars and bearing bars as detailed on Sheet 3.
- When Alternate G grate is specified in the plans, the grate is to be hot-dip galvanized after fabrication, in accordance with Specification 962-9.
- For Pay Item purposes, the depth of the barrier inlet shall be computed using the center of box grate elevation, minus either the flow line elevation of the lowest pipe flow line or the top of the sump floor elevation.
- All dimensions are for both precast and cast in place (C-I-P) inlets unless otherwise indicated.
- For inlets placed in areas of bicycle traffic, provide the extended crossbar or bar stub (See Insets "A" and "B ALTERNATE").
- Inlets to be paid for under the contract unit price for Inlets, Barrier Rigid, Curb and Gutter, Each.
- Concrete Barrier to be paid for under the contract unit price for Shoulder Concrete Barrier, Rigid-curb & Gutter, LF.

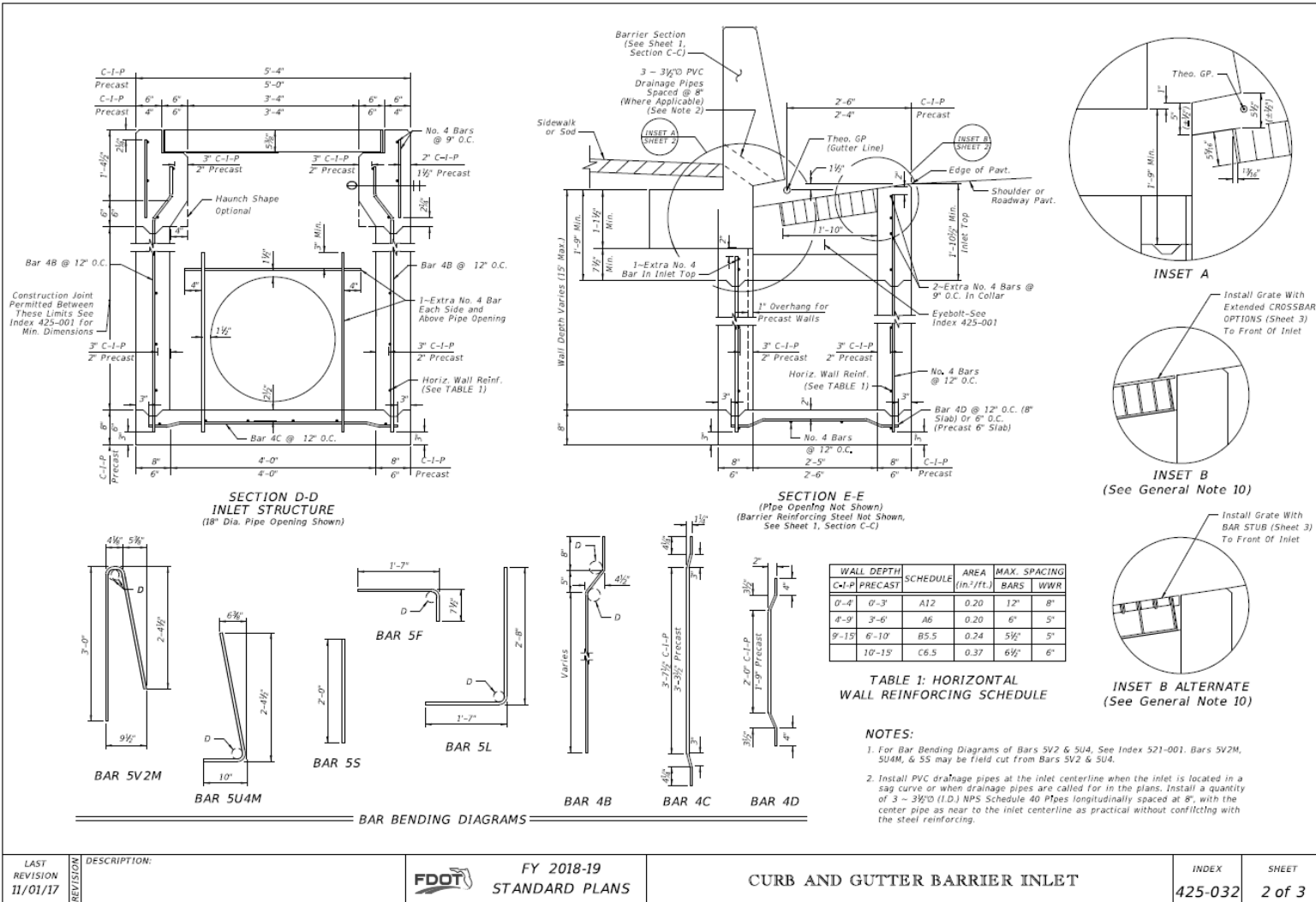


### BARRIER SECTIONS

- Clarified Usage Note 1, Plan, Elevation, and Section Views
- Removed upstream "throat" indentation

LAST REVISION 11/01/17	DESCRIPTION:	FY 2018-19 STANDARD PLANS	CURB AND GUTTER BARRIER INLET	INDEX 425-032	SHEET 1 of 3
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## Sheet 2: Revised for Single-Slope

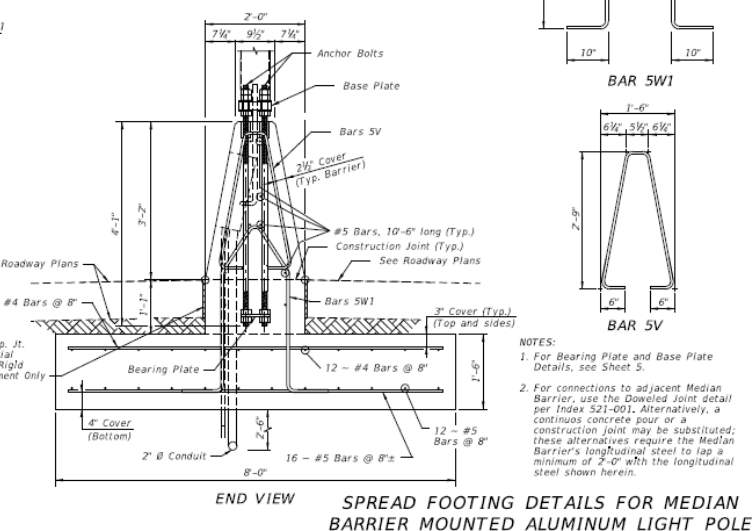
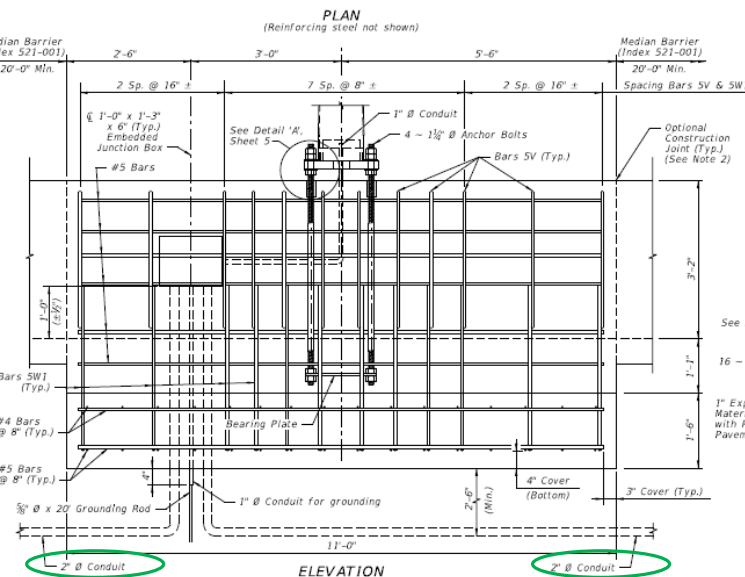
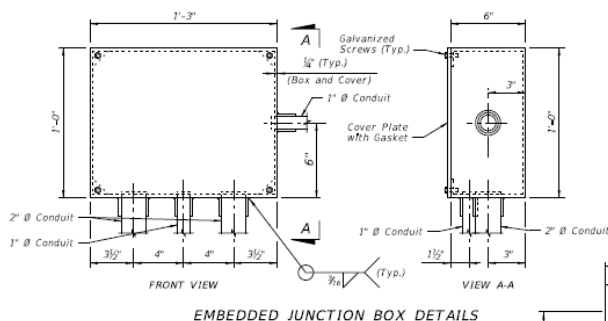
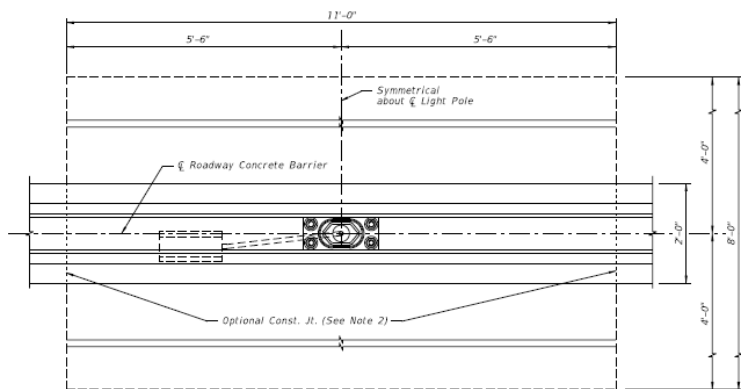


- Replaced 18" drainage slot with 3 ~ 3.5" PVC pipes (improved constructability, less interference with rebar)
- Revised reinforcing

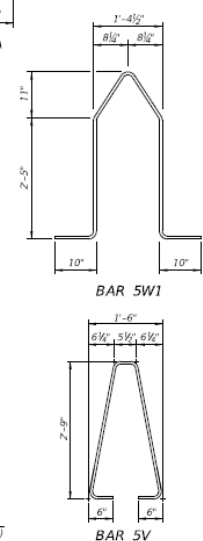
## Standard Plans – Primary Index Updates:

- ✓ 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**

## Sheet 6: Revised for Single-Slope



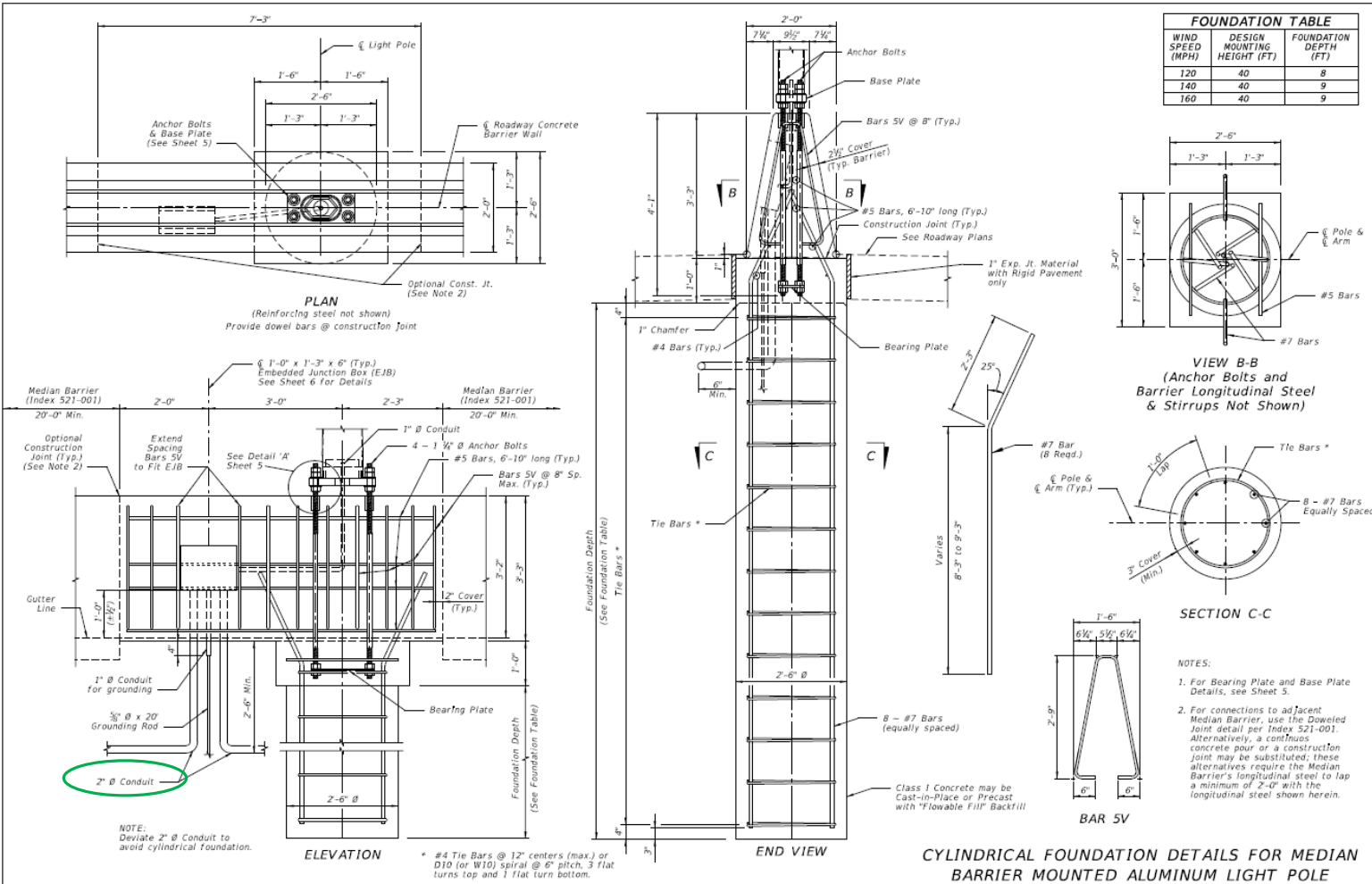
NOTES:  
 1. For Bearing Plate and Base Plate Details, see Sheet 5.  
 2. For connections to adjacent Median Barrier, use the Doweled Joint detail per Index 521-001. Alternatively, a continuous concrete pour or a construction joint may be substituted; these alternatives require the Median Barrier's longitudinal steel to lap a minimum of 2'-0" with the longitudinal steel shown herein.



- Updated reinforcing: vertical bars now throughout
- Reminder: For roadside Concrete Barrier, longitudinal conduit runs underground (not in the barrier itself!)

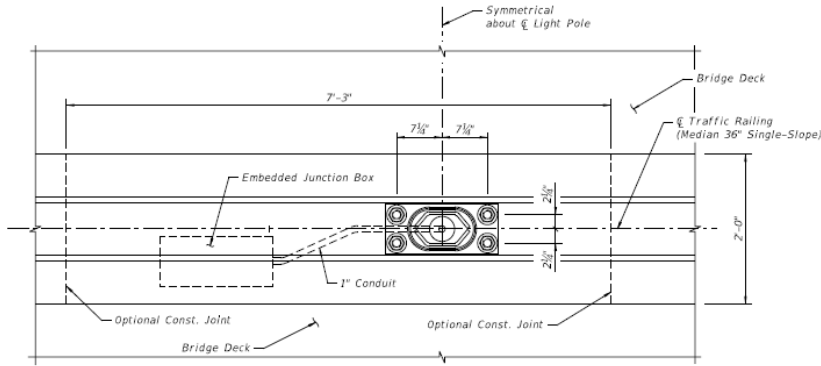
LAST REVISION 11/01/17	DESCRIPTION:	FY 2018-19 STANDARD PLANS	STANDARD ALUMINUM LIGHTING	INDEX 715-002	SHEET 6 of 8
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## Sheet 7: Revised for Single-Slope



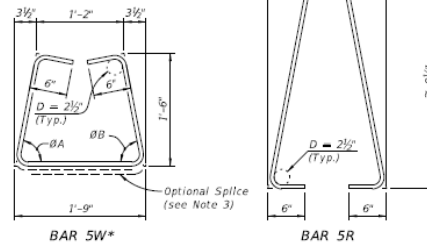
- Updated reinforcing: vertical bars now throughout
- Reminder: For roadside Concrete Barrier, longitudinal conduit runs underground (not in the barrier itself!)

## Sheet 8: Revised for Single-Slope



PLAN  
(Reinforcing steel and 2" Ø Conduit not shown)

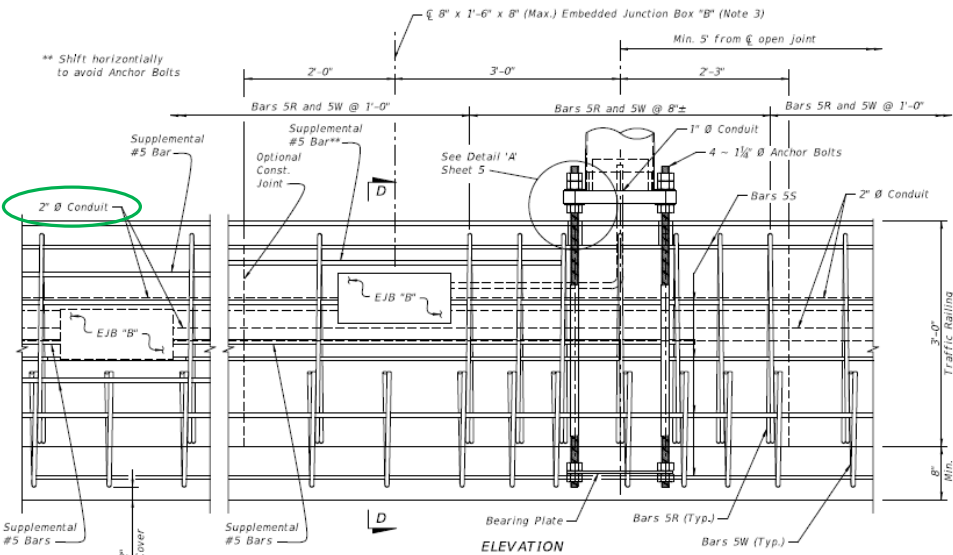
\*At the Contractor's option, Bars 5W may be fabricated as a two piece bar with a 1'-2" lap splice at the bottom legs.



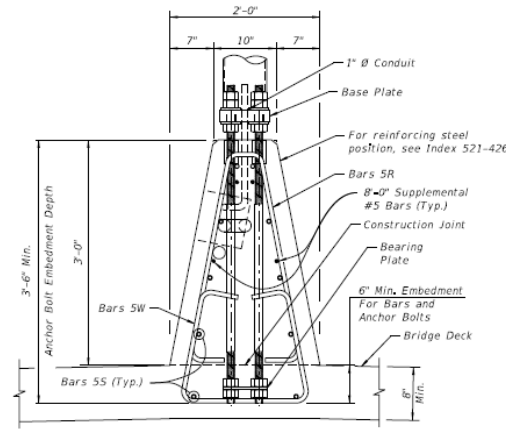
BAR 5W\*

BAR 5R

\*\* Shift horizontally to avoid Anchor Bolts



ELEVATION



SECTION D-D

(Longitudinal and transverse deck reinforcing steel not shown)

NOTES:

1. For Base Plate Details, Bearing Plate Details, and Detail 'A', see Sheet 5.
2. See Index 521-426 for details of adjacent Traffic Railing (Median 36° Single-Slope) and for angles OA and OB.
3. See Index 630-010 for Conduit, EJB and supplemental reinforcing details.

DETAILS FOR TRAFFIC RAILING (MEDIAN 36° SINGLE-SLOPE) MOUNTED ALUMINUM LIGHT POLE

- Updated reinforcing
- Reminder: For bridge deck Traffic Railing, longitudinal conduit runs within the Traffic Railing

LAST REVISION	DESCRIPTION
11/01/17	



## Standard Plans – Primary Index Updates:

- ✓ 1) **Index 536-001 – Guardrail**
  - Miscellaneous Updates
- ✓ 2) **Index 521-001 – Concrete Barrier**
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  - 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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**Standard Plans Engineer**  
**Central Office, Roadway Design**  
**(850) 414-4313**  
**[richard.stepp@dot.state.fl.us](mailto:richard.stepp@dot.state.fl.us)**