

PENNDOT - Revised Inlet Standards

Presentation By:
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General Information

- Current RC-34M (10 Shts) – Inlets to be Eliminated
- New Standards
 - RC-45M (16 Shts) – Inlet Tops, Grates and Frames
 - RC-46M (44 Shts) – Inlet Boxes

General Information

- Concrete
 - Cast-in-Place – Class A Cement Concrete (3,000 psi)
 - Precast Concrete – Class AA Cement Concrete, Modified (4,000 psi)

Why new Standards?

- Resolve Construction Problems
- Update for New Design Criteria
- Provide a level playing field for all Fabricators
- Eliminate the need for most Shop Drawings

Design Criteria

- PENNDOT Design Manual, Part 4, Structures
- AASHTO LRFD Design Specifications, 1998

Meetings

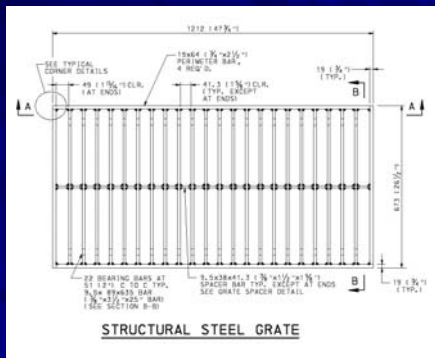
- PENNDOT
- Industry

RC-45M Inlet Tops, Grates, and Frames

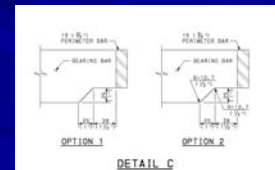
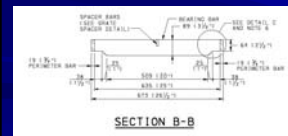
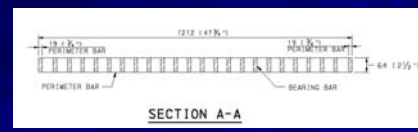
RC-45M - Grates

- Overall Length and Width of Grates Remains the Same (26½" x 47¾")
- Structural Steel Grates (Grade 50)
 - Revised Bearing Bars from ½" x 2½" to 3/8" x 3½" (2½" Perimeter Depth)
- Cast Iron Grates
 - Minor Changes

RC-45M - Grates



RC-45M - Grates



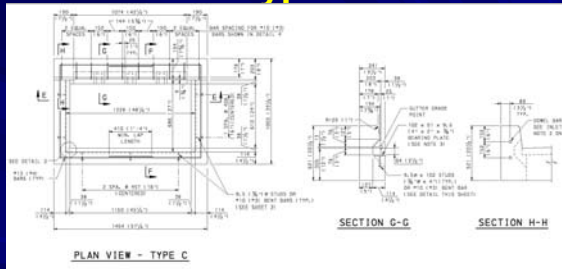
RC-45M – Concrete Top Units

- General:
 - Type C, C Alternate, M and S
 - Overall Length and Width of Top Units Remains the Same as Current Standard
 - Increased Depth (12")
 - Revised Reinforcement Details

RC-45M – Concrete Top Units

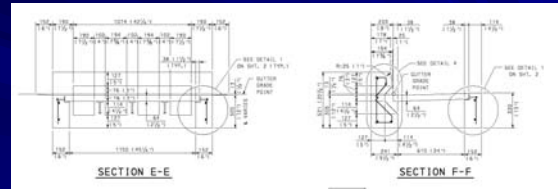
- General:
 - Increase Angle Size from 1¼" x 1¼" x 1/8" to 1¾" x 1¾" x 1/4"
 - Added Studs and a Bent Bar Detail for connection of angle to concrete
 - New Tops
 - Type D-H
 - Type D-H Level

RC-45M – Concrete Top Units Type C

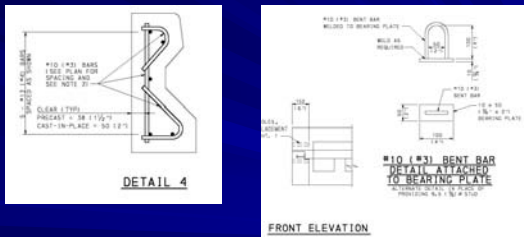


➤ Increased Supports from 1 to 3

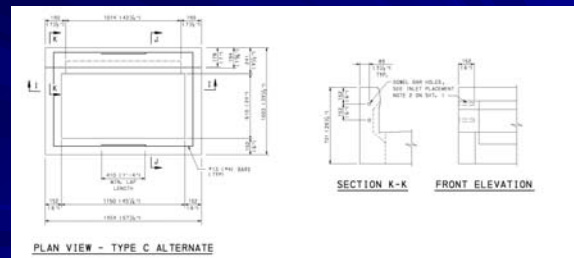
RC-45M – Concrete Top Units Type C



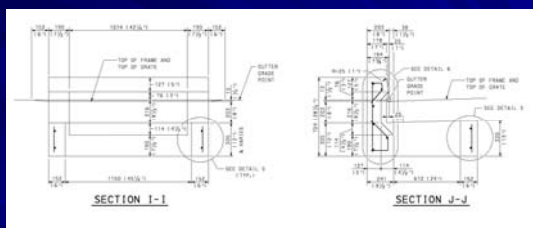
RC-45M – Concrete Top Units Type C



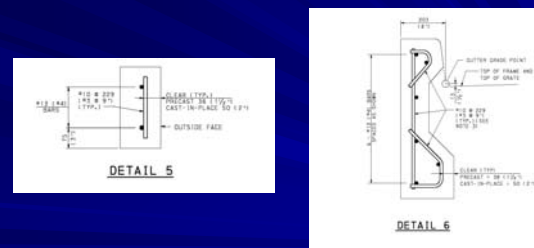
RC-45M – Concrete Top Units Type C - Alternate



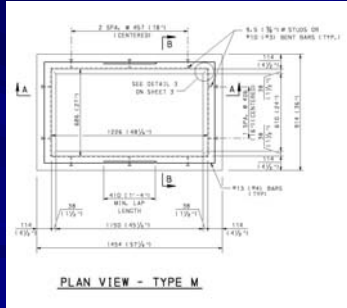
RC-45M – Concrete Top Units Type C - Alternate



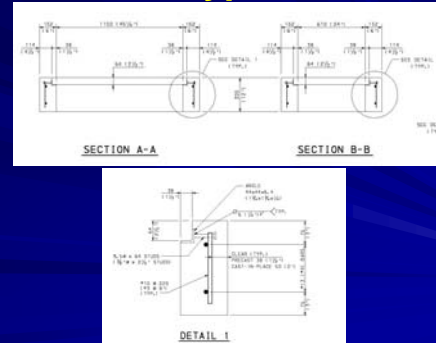
RC-45M – Concrete Top Units Type C - Alternate



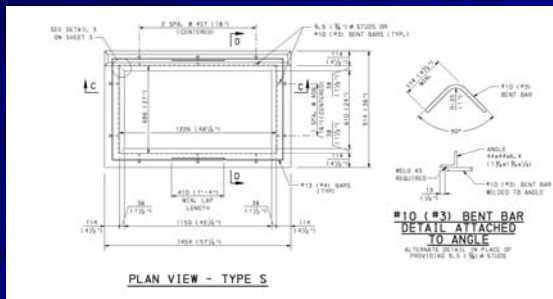
RC-45M – Concrete Top Units Type M



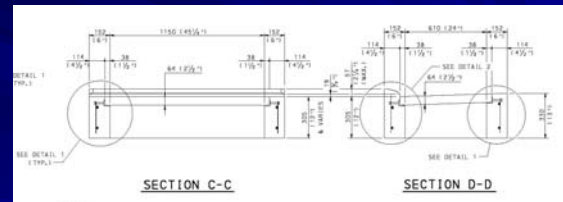
RC-45M – Concrete Top Units Type M



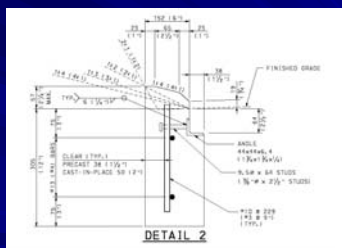
RC-45M – Concrete Top Units Type S



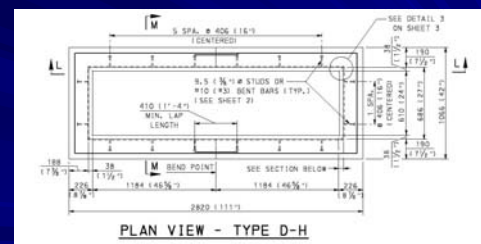
RC-45M – Concrete Top Units Type S



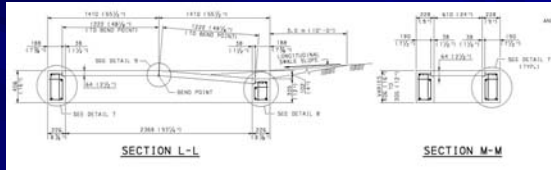
RC-45M – Concrete Top Units Type S



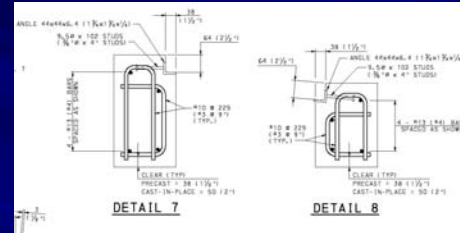
RC-45M – Concrete Top Units Type D-H



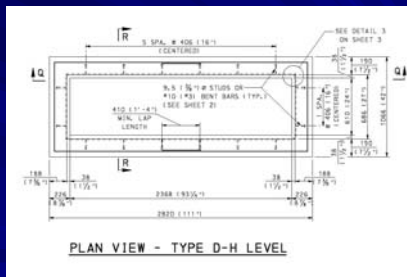
RC-45M – Concrete Top Units Type D-H



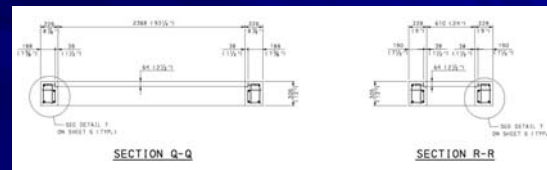
RC-45M – Concrete Top Units Type D-H



RC-45M – Concrete Top Units Type D-H Level



RC-45M – Concrete Top Units Type D-H Level



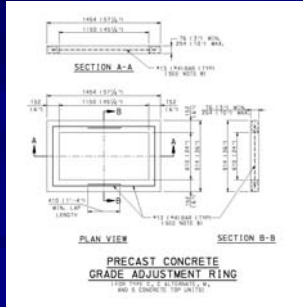
RC-45M – Frames

- General:
 - Type C and M Frame
 - Minor Changes
 - Type C Frames – Grade 50 Steel

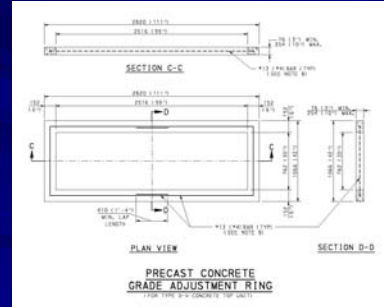
RC-45M – Grade Adjustment Rings

- Precast Concrete:
 - Permitted Depths from 3" to 10" (Tapers Permitted) (Previous depths – 2" to 6")
 - Added Details for Type D-H Top
 - Permitted to be Fabricated in any shape to form the Rectangular dimensions of the top unit.

RC-45M – Precast Concrete Grade Adjustment Rings



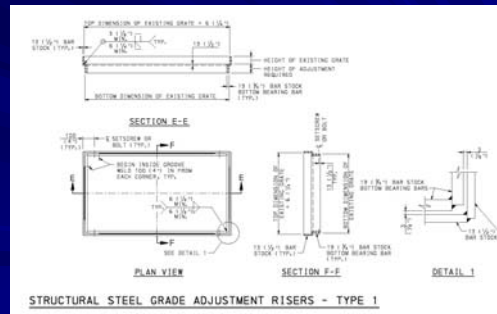
RC-45M – Precast Concrete Grade Adjustment Rings



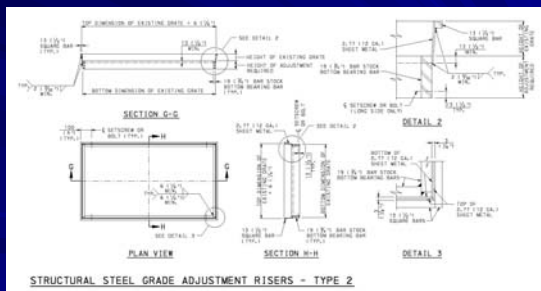
RC-45M – Grade Adjustment Risers

- Structural Steel:
 - Two types (per SOL 432-07-04)
 - Type 1 – Existing Grate Thickness + 1/2" to 6" maximum
 - Type 2 – 1" minimum to Existing Grate Thickness + 1/2" maximum
 - Risers to be Custom Fabricated

RC-45M – Structural Steel Grade Adjustment Risers



RC-45M – Structural Steel Grade Adjustment Risers



RC-46M Inlet Boxes

RC-46M – Inlet Boxes

- Box Types (Inside Dimensions):
 - Standard (2'-0" x 3'-9¹/₄"
 - Type 4 (4'-0" x 4'-0")
 - Type 5 (5'-0" x 5'-0")
 - Type 6 (6'-0" x 6'-0")
 - Type 7 (7'-0" x 7'-0")
 - Type 8 (8'-0" x 8'-0")
 - Type 9 (9'-0" x 9'-0")
 - Type 10 (10'-0" x 10'-0")
 - Type D-H (2'-6" x 8'-3")

RC-46M – Inlet Boxes

- 3 Separate Design Tables:
 - Cast-in-Place Concrete with Reinforcement Bars (WWF not permitted with CIP Boxes)
 - Precast Concrete with Reinforcement Bars
 - Precast Concrete with Welded Wire Fabric

RC-46M – Inlet Boxes

- Design Depths (Finished Grade Elevation to Bottom Slab Elevation):
 - 5'-0" minimum
 - 30'-0" maximum
- Box segments to be marked with maximum installation depth

RC-46M – Inlet Boxes

- Design Tables:
 - Determine Box Type
 - Determine Depth
 - Go to appropriate Table to determine member thicknesses and reinforcement requirements

RC-46M – Inlet Boxes

- Customized Rectangular Boxes:
 - Rectangular Boxes may be used provided the Design Requirements are based on the larger inside dimension
 - Fabricator to determine the minimum inside box size dimensions required and then determine the appropriate Design Table to be used

RC-46M – Inlet Boxes

- Customized Rectangular Boxes:
 - Min. Required Inside Dimensions:
 - L = 6'-5"
 - W = 2'-0"
 - Fabricated Dimensions
 - L = 6'-6"
 - W = 2'-0"
 - Design Table:
 - Type 7 → 6'-6" < 7'-0"

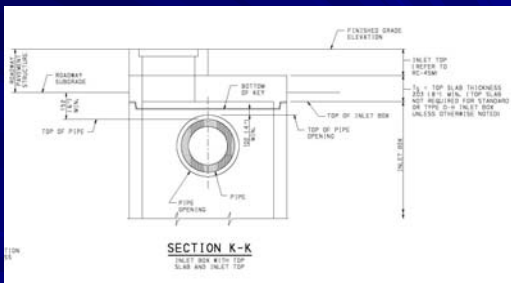
RC-46M – Inlet Boxes

- Combining Reinforcement Bars and WWF in Precast Boxes:
 - Member Thicknesses and Reinforcement Requirements must meet the Requirements of the Reinforcement Bar Tables and the following requirements:
 - Bar Size and Spacing
 - Wire Size and Spacing
 - Cover and Clearance Between Layers

RC-46M – Inlet Boxes

- Top Slabs:
 - Design to support the Top Units when the inlet box is larger than the Standard Box

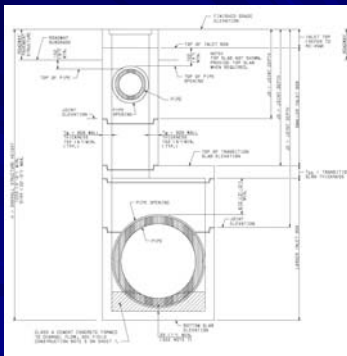
RC-46M – Top Slabs



RC-46M – Inlet Boxes

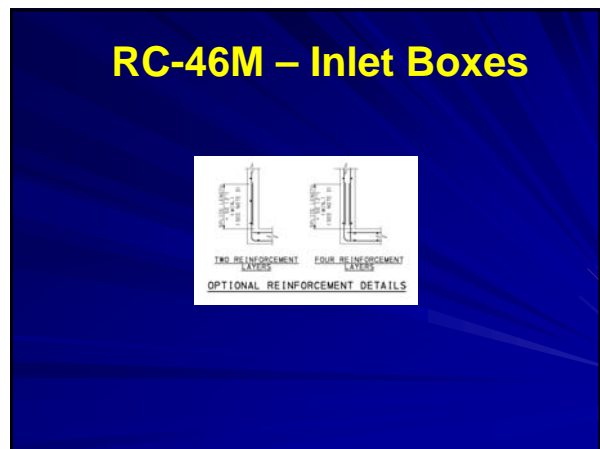
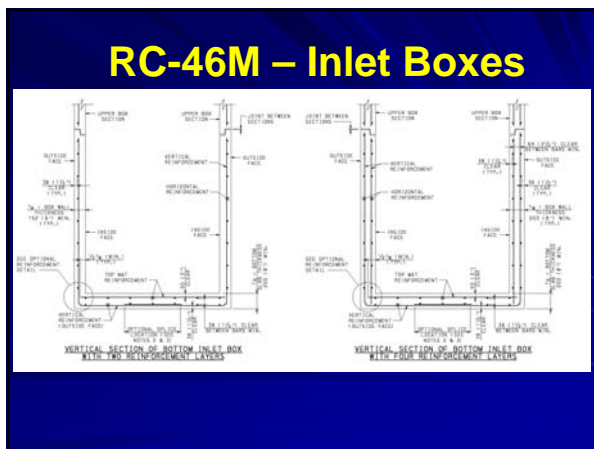
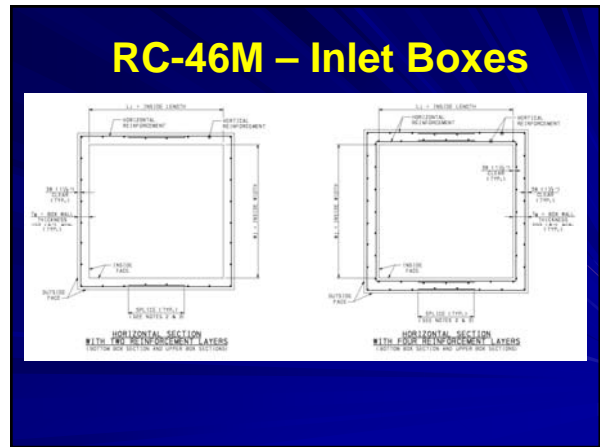
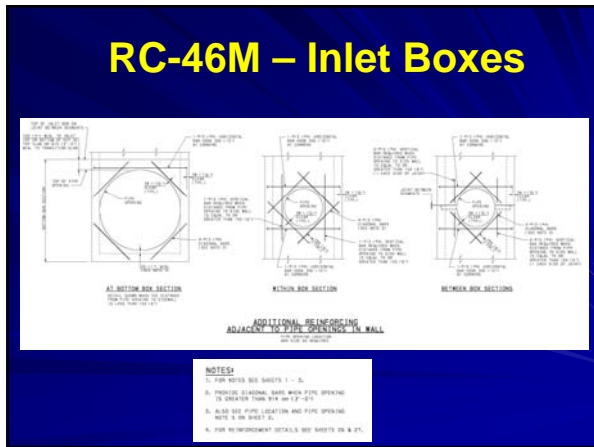
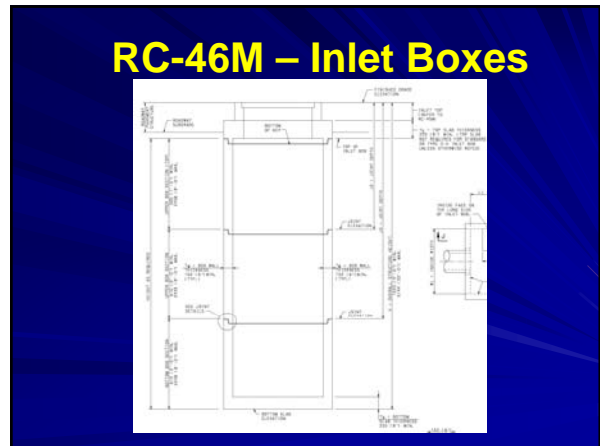
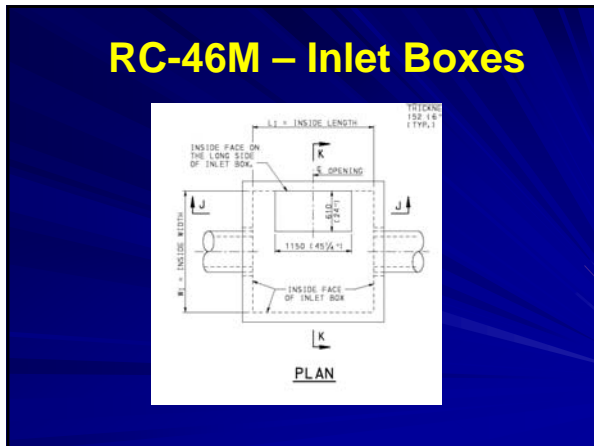
- Transition Slabs:
 - Use to transition a larger box to a smaller box
 - Contractor / Fabricator to determine when a Transition Slab will be used
 - Only 1 Transition Slab is permitted within an Inlet Assembly

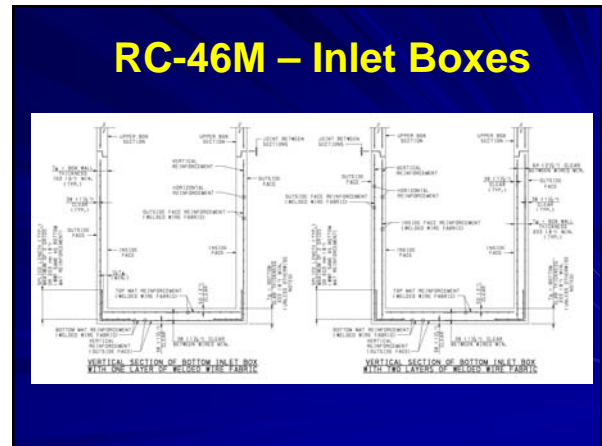
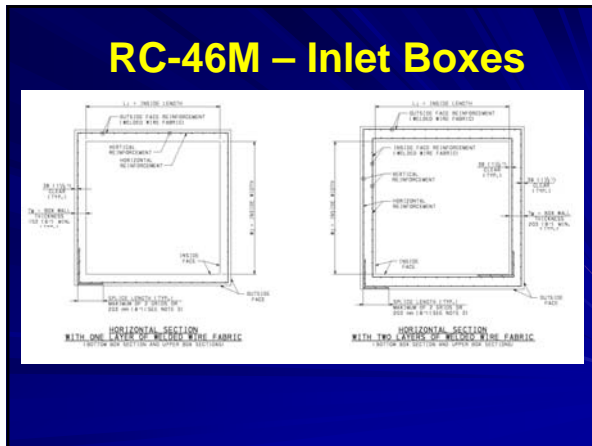
RC-46M – Transition Slabs



RC-46M – Inlet Boxes

- Shop Drawings:
 - Shop Drawings are not required when the inlet boxes are Constructed / Fabricated in accordance with the Standard
 - Shop Drawings are required if Contractor / Fabricator chooses to construct a customized inlet box and / or provide a transition slab





RC-46M – Inlet Boxes

**PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - STANDARD
U. S. CUSTOMARY UNITS**

Overall Length (ft.)	Overall Height (ft.)	Wall Thickness (in.)	Slab Thickness (in.)	BOTTOM FACE REINFORCEMENT				TOP FACE REINFORCEMENT			
				Horizontal (ft.)	Vertical (ft.)	Horizontal (ft.)	Vertical (ft.)	Horizontal (ft.)	Vertical (ft.)		
12.0	24.0	8	4	0	0	0	0	0	0	0	0
12.0	24.0	8	4	0	0	0	0	0	0	0	0
12.0	24.0	8	4	0	0	0	0	0	0	0	0
12.0	24.0	8	4	0	0	0	0	0	0	0	0
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RC-46M – Inlet Boxes

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12.0	24.0	8	4	0	0	0	0	0	0	0	0
12.0	24.0	8	4	0	0	0	0	0	0	0	0
12.0	24.0	8	4	0	0	0	0	0	0	0	0
12.0	24.0	8	4	0	0	0	0	0	0	0	0

- ### RC-46M – Inlet Boxes
- Design Revisions from PPA Letter:
 - No. 3 bars will be permitted
 - Minimum Area of Steel:
 - Minimum of #4 @ 12" (0.20 in² / ft.) in the walls is not required
 - Walls:
 - WWF - 0.12 in² / ft. Each Way (per current standard)
 - Reinforcement bars - 0.15 in² / ft. Each Way (#3 @ 9")

- ### RC-46M – Inlet Boxes
- Design Revisions from PPA Letter:
 - Minimum Area of Steel:
 - Bottom Slab: (per current standard)
 - Top Mat - 0.20 in² / ft. Each Way
 - Bottom Mat - 0.20 in² / ft. Each Way
 - Bottom Slab Thickness:
 - 7" Thick is Required
 - 2" top cover + 1½" bottom cover + 1½" clear between layers + 6 layers of W4 wire (0.226) = 6.356" → Use 7"

Other Revisions

Other Revisions

- Publication 408 (Specifications):
 - Section 605 – Endwalls, Inlets, Manholes and Spring Boxes
 - Section 606 – Grade Adjustment of Existing Misc. Structures
 - Section 705 – Joint Material
 - Section 714 – Precast Concrete Products
 - Section 1105 – Fabricated Structural Steel

Other Revisions

- Design Manual, Part 2 – Highway Design
- Design Manual, Part 3 – Plans Presentation

Other Revisions

- New Pay Items
- Tops – Tops will be paid for separately from the inlet boxes
- Inlet Boxes – Two pay items will be required (at this time)
 - Precast Alternate
 - Cast-in-Place Alternate

Other Revisions

- Inlet Tops:
 - Paid for based on Type of Box
 - Paid for based on Depth of box
 - Less than or equal to 10'
 - Greater than 10' and less than or equal to 20'
 - Greater than 20' and less than or equal to 30'
 - Greater than 30'

Schedule

- Clearance Transmittal:
 - Hopefully before June 2008
- Release of Standards
 - Hopefully before September 2008
 - PENNDOT will determine when the new Standards will be fully implemented

Acknowledgments

- Mark Burkhead, PENNDOT HQAD
- Bob Horwhat, PENNDOT, Materials
- Rhett Heiple, Gannett Fleming
- Hank Bonstedt, PPA
- Fabricators

Questions