OS-299 (7-08)	TRANSMITTAL LETTER	**PUBLICATION:** Publication 72M June 2010 Edition
pennsylvania DEPARTMENT OF TRANSPORTATION		**DATE:** June 1, 2010

SUBJECT:

Standards for Roadway Construction, RC 1M-100M
June 2010 Edition

INFORMATION AND SPECIAL INSTRUCTIONS:

Publication 72M (Standards for Roadway Construction) is to be re-issued with this letter. The enclosed June 2010 Edition represents a complete Metric and English combined publication. This Edition supersedes the April 2004 Edition and all subsequent changes.

The new standard drawings should be adopted as soon as possible on all new and existing designs without affecting any Letting schedules and in conjunction with the current Publication 408 Specifications and Bridge Standards. PS&E submissions to Central Office after September 1, 2010, should use these new standards.

The major revisions for each Standard Drawing are presented below. Since minor changes are not indicated, it is strongly advised that all recipients thoroughly examine the changes and revisions incorporated in this new Edition.

STANDARD	SHEET	DESCRIPTION OF CHANGES
INDEX	---	Deleted RC-34M and RC-55M.
		Added RC-78M and RC-92M.
		Revised RC-23M's description from "BRIDGE APPROACH SLAB" to "BRIDGE APPROACH SLABS".
		Revised RC-67M's description from "CURB RAMPS" to "CURB RAMPS AND SIDEWALKS".
RC-10M	Sheet 1	In Diversion Ditch detail, revised end of note to read, "METER (LINEAR FOOT)" and changed "1.0 m" to "900".
		In Parallel Ditch detail, changed "1.0 m" to "900" and "0.5 m" to "450".
		Deleted Note 3.
		Changed "COMMON BORROW EXCAVATION" to "BORROW EXCAVATION" (3 locations).
		In Excavation Adjacent to Roadway in Lieu of Borrow Excavation detail, revised patterned area for Roadway Excavation within the construction or slope easement.
RC-11M	All Sheets	For triangle symbol, revised slope to read, "1:1.5 (1 1/2:1)".
	Sheet 1	In Note 1, changed "4000" to "3600".

		In Structures over Streams detail, added English dimension of 8'-0" with metric dimension of 2500 mm (3 locations).
	Sheet 2	Revised Sections B-B and C-C to indicate a maximum depth of 1200 mm (4'-0") for Class 1 Excavation over the pipes and with a layer of embankment above the Class 1 Excavation. Revised Note 5.
RC-12M	Sheet 1	No Major Changes.
	Sheet 2	In Limits of Backfill Integral Abutment detail, revised shape of subbase material under the pavement, sleeper slab, and approach slab; added note with reference to RC-23M or contract drawings. In Note 12, deleted "mm" after "300".
RC-13M	Sheet 1	In detail with Plain Cement Concrete Curb Gutter, added text to indicate subgrade. Revised "NOTE" to "NOTES". Revised "0.6 m" to "600". Revised Note 1.
RC-20M	Sheet 1	Revised Note 4 for metric diameter of dowel bars in millimeters. Added Note 14 to align concrete pavement joints with inlet joints, curb joints, and other adjacent structures. Added "SEE NOTE 14" under Typical Layout detail.
	Sheet 2	At top of sheet, relabeled "CONSTRUCTION JOINT" to "TYPE L CONSTRUCTION JOINT" for consistency with RC-23M, Sheet 1, Note 8. Revised Note 9 to reference Section 501.3(j).
	Sheet 3	Revised Note 11 for wire tolerances from "0.05 mm (0.003 in.)" to "0.05 (0.003")".
RC-21M	Sheet 1	In Wire Fabric Reinforcement detail: *Revised distance between transverse joint and the wire fabric reinforcement from "300 +/- 75 (12" +/- 3")" to "300 TO 375 (12" TO 15")" (2 locations). *Added the dimension "750 (30")" between the transverse joint and the tie bar or tiebolts. Revised Note 9 to refer to depth as uppercase "D".
RC-22M	All Sheets	Added new Standard Drawings (4 sheets) for several types of Milled Rumble Strips (Centerline, Bicycle Tolerable Shoulder, Edgeline, and Temporary Bituminous).
RC-23M	All Sheets	No Major Changes.
RC-24M	Sheets 1, 3	In Section A-A (Sheet 1) and Section D-D (Sheet 3):

		*Changed "TACK AS PER SEC. 460, PUB. 408" to "PAINT SURFACE WITH PG 64-22". *Revised pavement relief joint to indicate Superpave binder and base courses.
	Sheet 2	No Major Changes.
RC-25M	Sheet 1	In Full Depth Flexible Pavement Shoulders detail, added ", SEE NOTE 10" after "SHOULDER". Revised Note 9 to read "RUMBLE STRIP". Revised Note 10 to indicate pay quantities for full depth flexible pavement shoulders. In Concrete Widened Lane detail, revised reference to Note 12.
	Sheet 2	In Typical Shoulder Detail with Bituminous Taper Shoulder Wedge detail, changed "PAVED SHOULDERS TYPE 6 (TYP)" to "PAVED SHOULDER (TYP)". Revised Note 3 to read "710 (28")" instead of "700 (27")". Revised Note 5 to read "TONNES (TONS)".
	Sheet 3	In Concrete Shoulders Adjacent to RCC Pavement and PCC Pavement for Interstate and Other Limited Access Freeways, Arterials and Ramps detail: *Deleted dowel-related information. *Modified description for outside concrete shoulder. In Section B-B, deleted reference to ID-2 wearing course. In Typical Sections, deleted detail for Concrete Shoulder - Type 1. In Full Depth Concrete Shoulder detail, revised the text for the wedge of subbase to be consistent with Concrete Shoulder - Type 2. Added Note 13 to align concrete pavement joints with inlet joints, curb joints, and other adjacent structures and how to construct and seal the joint.
	Sheet 4	In Typical Plan View for Rumble Strips on Bituminous Shoulders detail, replaced offset dimensions with "SEE NOTE 5" (2 locations). Added Note 5.
	Sheet 5	In Typical Intersection and Driveway details, updated curve references with PCs and PTs for consistency with depictions of curve radii in RC-22M.
	Sheets 6-7	No Major Changes.
RC-26M	Sheet 1	In Patching Joint Details: *Deleted Detail B. *Added Detail B and Detail C (matches Detail C and Detail D in RC-20M,

	Sheet 1 of 3). *In Legend, Item B, revised values in table for joint spacing, width (W), and height (H). *Modified Detail A. In Typical Section for Concrete Pavement Patching: *Deleted all wire mesh and associated dimensions. *Revised dimension left of Centerline for Original Joint from "300 (12")" to "600 (2'-0")". In Saw Cuts for Lift Out Method detail, added two sentences at the end of the note. Revised Note 7. Deleted Note 8.
Sheet 2	In Single Lane Pavement Patching details: *For top center detail, changed length of patch from "4.5 m (15'-0")" to "3.6 m (12'-0")". *Deleted top right detail of patch for one full slab length plus 600 mm (2'-0") minimum on each side. *In Legend, deleted Entry "G" for exception to 1.5 m (5'-0") maximum removal. *Deleted Entry "G" in center left and lower left details. *In Note 7, deleted last sentence referring to Entry "G".
Sheets 2-5	Revised Note 3 for length of longitudinal joint for all patches.
Sheets 3-4	In Legend, deleted Entry "G" for exception to 1.5 m (5'-0") maximum removal.
Sheet 4	For detail in upper left corner: *Revised "300 (1'-0") MIN" to "600 (2'-0") MIN". *Revised "600 (2'-0") MIN" to "600 (2'-0") MIN TO 1.5 m (5'-0") MAX". For detail in upper right corner: *Added the text, "DO NOT USE FOR PANELS LESS THAN 6000 (20'-0")". *Modified "600 (2'-0") MIN" to "1.8 m (6'-0") MIN" (2 locations). Deleted detail in left center of sheet of patch for one full slab length. For detail in lower left corner: *Modified "600 (2'-0") MIN" to "1.8 m (6'-0") MIN". *Added linework for new pavement joint "F" and dowel bars.

		*Revised total length of patching from "150 m (500')" to "20.0 m (65'-0")". Added detail in lower right corner for a one-lane patch with the pavement joint located along the skewed centerline of the original joint. In Note 5, indicated "1.5 m (5'-0")" instead of "600 (2'-0")" for deterioration extending into the next slab. In Note 7: *Revised the end of the first sentence from "FAR POINT OF THE SKEW" to "ORIGINAL JOINT OF THE ADJACENT LANE". *Deleted the last sentence, "FOR EXCEPTION, SEE ENTRY "G" IN LEGEND."
	Sheet 5	For detail in upper left corner, modified dimension from "300 (1'-0") MIN" to "600 (2'-0") MIN". Revised Note 5 to indicate "1.5 m (5'-0")" instead of "600 (2'-0")" for deterioration extending into the next slab. For detail in center left, added "SEE NOTE 6".
	Sheet 6	In C R C Patch detail, added "EXISTING CRC PAVEMENT" with dimension lines to indicate its limits.
	Sheet 7	In title block, replaced "(PATCHING)" with "(SLAB STABILIZATION DEFLECTION TESTING)".
	Sheet 8	No Major Changes.
	Sheet 9	For joint spacing, revised "4500 (20'-0")" to "6.0 m (20'-0")" (4 locations) and "1800 (6'-0")" to "1.8 m (6'-0")" (2 locations).
RC-27M	Sheet 1	No Major Changes.
	Sheet 2	Deleted Note 9.
RC-28M	Sheet 1	Revised Overlay Transition with Paving Notch on Concrete and Bituminous Pavements detail. In Table A, for Arterials < 70 km/h (45 mph) and for Collectors and Local Roads: *Revised values of Maximum Slope "M" from 0.83% (1" in 10') to 0.33% (1" in 25'). *Revised Minimum Paving Notch "L" from 3 m (10') to 7.5 m (25'). *Revised "<" to "<=". Revised Note 3 to indicate Section 409 instead of Section 401.
RC-29M	All Sheets	No Major Changes.
RC-30M	Sheet 1	In Longitudinal Base Drain and Outlet Configuration detail, changed the minimum English dimension of outlet invert higher than the swale line

		elevation from 3" to 4".
	Sheet 2	In Prefabricated Pavement Base Drain detail, changed "THK." to "THICK". Added Minimum Cover over Pipe Under Bituminous and Concrete Pavements details. Added Note 5. Added the double asterisk "**" entry in Legend.
	Sheet 3	In Restoration of Pavement over Pipe detail, revised detail of Superpave Base Replacement, Flexible Base Course to: *Define what work activities are incidental to pipe and to base placement. *Add two additional vertical lines in the base course above the trench backfill. *Add vertical dimension line for desirable cover. *Add reference to Note 12. In Pay Limits for Pipe Excavation details, added "SEE NOTE 7" (2 locations). Revised Note 2 to reference Section 601.3(g). Added Note 14.
	Sheet 4	In Legend, for Do, added "(INCHES)". In Concrete Pipe detail, changed "FILLS 1.5 m TO 14.6 m (5' TO 48')" to "GREATER THAN 1.2 m (4') to 14.6 m (48')". In Concrete Pipe detail, changed "1200 (4'-0") MIN" to "GREATER THAN 1200 (4'-0")". Revised Note 8 to match dimensions in Concrete Pipe detail.
	Sheet 5	In Note 3, changed "ENVELOP" to "ENVELOPE". In Note 4, changed "BACK FILL" to "BACKFILL" in the second line.
RC-31M	Sheet 1	No Major Changes.
	Sheet 2	In Base Section for Type D-W, changed "0" to "θ". Copied table for "H" values from Sheet 1 to Sheet 2. In titles for Table A, changed "(mm)" to "(METRIC)" and "(inches)" to "(ENGLISH)".
RC-32M	Sheet 1	In Slope Pipe Fitting detail, Side Elevation, added English thickness of 8 gage for galvanized steel fitting.
RC-33M	Sheet 1	In Note 2, inserted "(2")" for lap joint.

		In Note 3, revised two toe plate lengths for the larger pipe-arch culverts and pipes. In Note 4, revised English pipe-arch culvert for 73" x 55" (first and second bullets) and 81" x 59" (second bullet). In Note 5, changed "DRAWING" to "PLAN".
	Sheet 2	Labeled Tables A, B & C as Metric or English.
RC-34M	All Sheets	Deleted this Standard Drawing. Replaced with RC-45M and RC-46M.
RC-35M	All Sheets	No Major Changes.
RC-36M	All Sheets	No Major Changes.
RC-39M	Sheet 1	No Major Changes.
	Sheet 2	In Note 1, changed "SHEET 5" to "SHEET 6".
	Sheets 3-4	No Major Changes.
	Sheets 5	In Note 7, deleted "SPECIFICATIONS" after "PUBLICATION 408". In Note 8, second sentence, inserted "(1/2")" after "3-M14".
	Sheet 6	In Item 1.E, for acceleration due to gravity, added "(32.2 ft/s2)" and rearranged calculations in English for dry at rest earth pressure. In Item 2.D, changed "MILLIMETERS" to "(MILLIMETERS (INCHES))" and added "(MILLIMETERS) (INCHES))" at the end of the same line.
RC-40M	All Sheets	No Major Changes.
RC-43M	Sheet 1	Revised Note 2. Added Notes 9 and 10. Renumbered Note 9 to Note 11.
	Sheets 2-5	Added Sheets 2 thru 5 with the following details: *Sheet 2: Wire Mesh for Gabion Baskets *Sheet 3: Cross Ties in Exposed (Exterior) Baskets, Basket Staggering, Geotextile Placement *Sheet 4: Cross Tie Details, Woven Wire Mesh Placement, Tie Wire Lacing *Sheet 5: Placement and Frequency of Prefabricated Fasteners, Spiral Fasteners, Interlocking Fastener, Non-Interlocking Fastener
RC-45M	Sheet 1	Placement Notes: *Note 2 – Type C and Type C Alternate – Revised the thickness of the expansion joint material from "6 mm (1/4")" to "20 mm (3/4")" to match RC-64M. Concrete Top Unit Notes:

*Added Note 3: Provide welded inlet angle assemblies supplied by a manufacturer listed in Bulletin 15.

*Revised Note numbers 3 to 18 to 4 to 19.

*Revised Note 9 (Previous Note 8):

-Added second bullet: Lifting holes, with a maximum outside diameter equal to 41 mm (1 5/8"), are permitted in the sidewalls. Locate lifting holes based on the center of gravity of the fabricated inlet top.

-Revised third bullet (previous second bullet): Fill lifting devices with non-shrink grout after installation if the lifting device is located on the top surface. Holes in the side walls are not required to be filled with non-shrink grout.

*Revised Note 18 (Previous Note 17): Increased the permitted taper from "38 mm (1½")" to "50 mm (2")".

*Revised Note 19 (Previous Note 18).

Index of Drawings: Added Sheets 18, 19 and 20.

Sheet 2 Detail 1: Added "MAX." to locate the top horizontal bar.

Detail 2:

*Added "MAX." to locate the top horizontal bar.
*Removed "MAX." from the 57 (2¼") dimension.

#10 (#3) Bent Bar Anchor Detail Attached to Angle: Added Plan views of optional bent bar placements.

Section D-D:

*Removed "MAX." from the 57 (2¼") dimension.
*Added the 25 (1") slope dimension.

New Detail: Added detail "Alternate One Bar Options for #13 (#4) Horizontal U-Bars".

Sheet 3 Plan View - Type C: Added "See Note 4" to the outside stirrup bars.

Section F-F: Added the 25 (1") slope dimension.

Section G-G: Revised "(See Note 3)" to "(See Note 2)".

Detail 4:

*Revised "See Note 2" to "See Note 3".
*Added "See Note 4" to the top stirrup bar.

Notes:

*Revised Note 2 to be Note 3.

*Revised Note 3 to be Note 2.

*Added Note 4: Bend outside stirrup to accommodate dowel bars and

	still maintain clearance requirements.
Sheet 4	Section J-J: Added the 25 (1") slope dimension. Detail 5: Added "MAX." to locate the top horizontal bar. Detail 6: Added "See Note 4" to the top stirrup bar. Notes: *Note 2: Revised "Sheet 13" to "Sheet 14". *Added Note 4: Bend outside stirrup to accommodate dowel bars and still maintain clearance requirements.
Sheet 5	Notes: In Note 3, revised "Sheet 11" to "Sheet 12".
Sheet 6	Section T-T: Added "or Concrete Glare Screen" to barrier callout. Section S-S: Added metric equivalents in the titles for the 1'-0" and 2’-0" shoulders. Notes: In Note 2, revised "Sheet 11" to "Sheet 12".
Sheet 7	Structural Steel Grate Notes: In Note 6, revised "(1½")" to "(½")".
Sheet 8	No Major Changes.
Sheet 9	Cast Iron Grate Notes: In Note 8, revised "Sheet 8" to "Sheet 10".
Sheets 10-11	No Major Changes.
Sheet 12	Precast Concrete Grade Adjustment Ring Notes: Revised Note 4. Grade adjustment rings are permitted to be fabricated in different shapes to form a rectangle to match the required dimensions. Sections are not permitted to be less than 457 mm (1'-6") in length. -Provide 38 mm (1½") concrete cover for reinforcement at each end. -Maximum Gap Between Pieces = 13 mm (1/2").
Sheet 13	No Major Changes.
Sheet 14	Notes: *Note 1: Revised "Sheet 14" to "Sheet 15". *Revised titles of Details T-1, T-2, T-3, and T-4 to Details 1, 2, 3, and 4.
Sheet 15	No Major Changes.
Sheet 16	Type M Concrete Top Unit Placed along Shoulder: Added metric equivalents in the titles for the 1'-0" and 2'-0" shoulders.
Sheet 17	Inlet Box with Top Slab and Double Type M Concrete Top Unit Placed along Shoulder: Added metric equivalents in the titles for the 1'-0" and 2'-0" shoulders.
Sheet 18	New Sheet – Added details for construction of the Type M and S concrete inlet tops for Rehabilitation Projects so RC-34M can be eliminated.

	Sheet 19	New Sheet – Added details for construction of the Type C concrete inlet top for Rehabilitation Projects so RC-34M can be eliminated.
	Sheet 20	New Sheet - Added details for construction of the Type C Alternate concrete inlet top for Rehabilitation Projects so RC-34M can be eliminated.
RC-46M	Sheet 1	General Notes: *Note 7: Revised note to indicate to "Refer to Tables A & B on Sheet 45 for additional information". *Note 14 – Revised Note. Removed "Chamfer exposed concrete edges 12 mm x 12 mm (1/2" x 1/2"), except as noted" and replaced it with the following note: "The top slab is not permitted to be poured monolithically with the adjacent box section." *Index of Drawings: -Added new Sheet 28: Precast Inlet Boxes – 6. -Revised Sheet numbers 28 – 44 to 29 – 45.
	Sheet 2	Revised layout of notes. Pipe Location and Pipe Openings Notes: *Note 1 – Revised Note: Removed "Locate the top of pipe at least 150 mm (6") below the roadway subgrade elevation, except for ductile iron pipe which may be within 75 mm (3") {Subgrade is defined as the bottom of the pavement structure}" and replaced it with the following note: "Locate the top of pipe at least 150 mm (6") below the roadway subgrade elevation. For additional information refer to RC-30M. (Subgrade is defined as the bottom of the pavement structure.)." *Note 2: Added "whenever possible" at end of sentence. *New Note 3 is old Note 4. *New Note 4 (old Note 3): Added "Except corner penetrations". *New Note 5 is old Note 14. *Note 6: New Note – Locate pipe openings to provide a minimum of 305 mm (12") of concrete between the bottom of the Transition Slab and the top of the pipe opening. *Note 7: New Note – If multiple pipe openings are required in a single wall and the pipe openings are greater than 305 mm (12"), locate the pipe openings a minimum of 305 mm (12") apart. *Note 8 is old Note 5. *Note 9 is old Note 6. *Note 10 is old Note 7. Cast-in-Place Concrete Inlet Box Notes: *Note 9 – Revised "Construction Joints and Keys" to "Keyed Construction Joints".

*Note 13 – Revised the minimum height required for the risers.

Transition Slab Notes:

*Note 1 – Revised "Transition Slabs are to be used" to "Use Transition Slabs".

Precast Concrete Inlet Box Notes:

*Notes 12 and 13 – Revised "Provide a Keyed Joint" to "Provide either a Shiplap or Keyed Joint".

*Note 14 – Revised "Provide Keyed Joints" to "Provide either a Shiplap or Keyed Joint".

*Note 15 – Revised the minimum height required for the risers.

Sheet 3 Precast Concrete Inlet Box Design Table Notes:

*Note 7:

-First bullet: Revised sheet numbers "28-33" to "29-34".
-Fifth bullet: Added Note "For Details, see sheet 28".

Sheets 4-5 No Major Changes.

Sheet 6 Type 7, 8, 9, and 10 Inlet Boxes: Revised the "152 (6") Minimum" Wall thickness to "203 (8") Minimum" to match the minimum wall thickness shown in the Design Tables.

Sheet 7 Section C-C:

*Revised title "For Cast-in-Place Inlet Boxes" to "Top Slab with Keyed Joint".

*Revised title "For Precast Inlet Boxes" to "Top Slab with Shiplap Joint (Precast Only)".

Sheet 8 Section D-D:

*Modified existing section to show the Keyed Joints on the bottom of the slab.

*Added new section to show a top slab with a Shiplap Joint.

Added Note 6: "Any reinforcement bars less than 152 mm (6") in length, due to the location of the opening, are not required."

Sheet 9 Additional Reinforcing at Rectangular Openings in Top Slab:

*For Type 4 and 5 Inlet Boxes:

-Detail revised to provide only one bar per side around the opening.

-Indicated length of bar, along the width of the slab, to extend 305 mm (12") beyond bar along its length.

*For Type 6, 7, 8, 9, and 10 Inlet Boxes:

-Detail revised to provide only one bar per side around the opening.
-Added Note "4" to establish when the diagonal bars are required.

Additional Reinforcing at Rectangular Opening in Top Slab for Type D-H Concrete Top Units:

*Detail revised to provide only one bar per side around the opening.
*Added diagonal bars and criteria on when to supply the diagonal bars.

Notes: Added Note 4: "Diagonal bars not required when dimension "A" is less than 150 mm (6")."

Sheet 10 Additional Reinforcing at Round Opening in Top Slab:

*For Standard Inlet Box, detail revised to provide only one bar per side of the opening.

*For Other Inlet Boxes, detail revised to provide only one bar per side of the opening.

Additional Reinforcing at Rectangular Openings in Top Slab for Double Type M Concrete Top Unit:

*For Type 5 Inlet Box:

-Detail revised to provide only one bar per side of the opening.
-Eliminated center bar between the openings.

*For Other Inlet Boxes:

-Detail revised to provide only one bar per side of the opening.
-Eliminated center bar between the openings.

Sheet 11 Section E-E:

*Revised title "For Cast-in-Place Inlet Boxes" to "Transition Slab with Keyed Joint".

*Revised title "For Precast Inlet Boxes" to "Transition Slab with Shiplap Joint (Precast Only)".

Sheet 12 Additional Reinforcing at openings in Transition Slab:

*Detail revised to provide only one bar per side of the opening.
*Diagonal bars – Revise "See Note A" to "See Note 4".
*Note B: Removed note.

Section F-F:

*Modified existing section to show the Keyed Joints on the top and bottom of the transition slab.

*Added new section to show a transition slab with a Shiplap Joint on the top and bottom of the slab.

Notes:

*Added Note 3: "Any reinforcement bars less than 152 mm (6") in length, due to the location of the opening, are not required."

*Added Note 4: "Diagonal bars not required when dimension "A" is less than 150 mm (6")."

Sheet 13 Section G-G:

*Revised the minimum overall structure height from 1220 (4’-0") to 914 (3’-0").

*Riser Sections – Revised the minimum height required for the intermediate risers from 610 (2’-0") to 305 mm (1’-0").

Sheet 14 Section H-H:

*Revised the minimum overall structure height from 1220 (4’-0") to 914 (3’-0").

*Revised the concrete cover between the bottom of the transition slab and the top of the pipe opening from 610 mm (2'-0") to 305 mm (12").

Sheet 15 Additional Reinforcing Adjacent to Pipe Openings in Wall:

*At Base Section:

-Removed the callout for the location of the top of pipe opening since this information is shown on Sheet 14.

-Added a horizontal bar below the pipe opening when pipe opening is greater than 305 mm (12”) from the top of the bottom slab.

-Revised note under title to "Detail shown when the distance from pipe opening to side wall is less than 150 (6"). Provide a vertical bar when the distance from the pipe opening to side wall is equal to or greater than 150 (6")".

*Within Box Section:

-Added 150 mm (6") dimension to length of vertical bar from the horizontal bars.

-Added "Alternate Detail" to show details when pipe opening is located away from the wall.

*At Construction Joint: Added 150 mm (6") dimension to length of vertical bar from the horizontal bars.

Notes: Revised notes to be in a logical order.

Sheet 16 Miscellaneous: Revised titles.

-Revised "Two Reinforcement Layers" to "Outside Face Reinforcement".

-Revised "Four Reinforcement Layers" to "Outside Face and Inside Face Reinforcement".

Optional Reinforcement Details: Added Details to show alternate splice locations in the bottom slab.

Sheets 17-22 No Major Changes.

Sheet 23 Section J-J:

*Revised the minimum overall structure height from 1220 (4'-0") to 914 (3'-0").

*Riser Sections – Revised the minimum height required for the intermediate risers from 610 (2'-0") to 305 mm (1'-0").

*Added callout for "Optional Keyed Construction Joint" between the bottom slab and wall.

Joint Details:

*Option 1:

-Added Callout "Shiplap Joint".

-Corrected line work and revised the depth of the lap to be between 25 mm (1") minimum and 75 mm (3") maximum.

*Option 2:

-Added Callout "Keyed Joint".

-Revised the depth between sections to be 13 mm +/- 3 mm (1/2" +/- 1/8") for the entire joint.

-Corrected line work so the depth of the key is 25 mm +/- 3 mm (1" +/- 1/8").

Notes: In Notes 6 and 7, revised sheet numbers.

Sheet 24 Section K-K:

*Revised the minimum overall structure height from 1220 (4'-0") to 914 (3'-0").

*Revised the concrete cover between the bottom of the transition slab and the top of the pipe opening from 610 mm (2'-0") to 305 mm (12").

*Added callout for "Optional Keyed Construction Joint" between the bottom slab and wall.

Notes: In Notes 5 and 6, revised sheet numbers.

Sheet 25 Additional Reinforcing Adjacent to Pipe Openings in Wall:

*At Base Section:

-Removed the callout for the location of the top of pipe opening since this information is shown on Sheet 24.

-Added a horizontal bar below the pipe opening when pipe opening is greater than 305 mm (12") from the top of the bottom slab.

-Revised note under title to "Detail shown when the distance from pipe opening to side wall is less than 150 (6"). Provide a vertical bar when the distance from the pipe opening to side wall is equal to or greater than 150 (6")".

*Within Box Section:

-Added 150 mm (6") dimension to length of vertical bar from the horizontal bars.

-Added "Alternate Detail" to show details when pipe opening is located away from the wall.

*Between Box Sections: Added 150 mm (6") dimension to length of vertical bar from the horizontal bars.

Notes: Revised notes to be in a logical order.

Sheet 26 Revised Titles:

*Revised "Two Reinforcement Layers" to "Outside Face Reinforcement".

*Revised "Four Reinforcement Layers" to "Outside Face and Inside Face Reinforcement".

Base Sections: Added callout for "Optional Keyed Construction Joint" between the bottom slab and wall.

Optional Reinforcement Details: Added Details to show alternate splice locations in the bottom slab.

Sheet 27 Revised titles:

*Revised "One Layer of Welded Wire Fabric" to "Outside Face Welded Wire Fabric".

*Revised "Two Layers of Welded Wire Fabric" to "Outside Face and Inside Face Welded Wire Fabric".

Base Sections: Added callout for "Optional Keyed Construction Joint" between the bottom slab and wall.

Base Section (with outside and inside face WWF): Added dimension to indicate how far the inside face reinforcement extends into the bottom slab.

New Detail: Added new detail labeled "Optional Splice Detail".

Sheet 28 New Sheet – Added details for details using reinforcement bars in the bottom slab and WWF in the walls.

Sheets 29-44 Revised Sheet Numbers (previous Sheets 28-43).

Sheet 45 Revised Sheet Number (previous Sheet 44).

Detail for Skewed Pipe: Revised the line work for the 0 Min dimension so it goes between the inside wall face and the pipe opening on the outside wall face, not on the inside face.

New Tables: Added Tables A & B to indicate the maximum pipe sizes permitted in each box type.

New Detail: Added detail for "Additional Reinforcement Adjacent to Pipe Opening in Bottom Slab".

RC-50M	Sheets 1-2	Revised Standard Drawing reference for Type C Inlet from "RC-34M" to "RC-45M AND RC-46M".
	Sheet 1	In Plan View for Typ. Concrete Bridge Barrier, modified dimensions for consistency with BC-739M: *For centerline of insert, revised "1570 mm (5' - 1 7/8")" to "1280 mm (4' - 2 3/8")". *For steel spacer tube, revised "355 mm (1' - 2")" to "220 mm (8 1/2")". In Elevation Views for Typ. Concrete Bridge Barrier, relocated / added dimension of "790 (2'-7")" at the far right to indicate the height from the top of the W-beam rail element to the existing surface. In Elevation View for Typ. Concrete Bridge Barrier (with inlet placement), between Posts 1 and 3, changed metric dimension from "810" to "815". In Elevation View for Typ. Concrete Bridge Barrier (without inlet placement), between the end of the bridge barrier and Post 1, changed metric dimension from "290" to "295" for consistency with BC-739M. In Sections A-A and C-C, modified dimension from the top of W-beam rail element to the top of the routed offset bracket from "22 (7/8")" to "10 (3/8")" for consistency with BC-739M. In Legend, changed "SEE STRUCTURE DRAWINGS" to "SEE BC-739M, SHEET 1". Moved Steel Spacer Tube Detail from Sheet 1 to Sheet 2. Revised Notes 2, 3, 18, and 19. Added Note 20. In listing for Reference Drawings, inserted "TYPE-F" for BC-739M.
	Sheet 2	In Rubbing Rail Detail, added indication for type of weld (scarf weld) and adjusted the location of the weld's placement. In Plan View for Alt. Concrete Bridge Barrier, modified dimensions for consistency with BC-739M: *Revised centerline of insert from "1570 (5' - 1 7/8")" to "1280 (4' - 2 3/8")". *Revised steel spacer tube from "355 (1' - 2")" to "220 (8 1/2")". In Elevation View for Alt. Concrete Bridge Barrier (with inlet placement), between Posts 1 and 3, changed metric dimension from "810" to "815" for consistency with BC-739M. In Elevation View for Alt. Concrete Bridge Barrier (without inlet placement), between the end of the bridge barrier and the center of Post 1, changed metric dimension from "290" to "295" for consistency with BC-739M. In Elevation Views for Alt. Concrete Bridge Barrier, relocated / added dimension of "790 (2'-7")" at the far right to indicate the height from the top of the W-beam rail element to the existing surface.

	In Steel Spacer Tube Detail, added "MINIMUM" below "25 (1")".
	Added Note 4.
Sheet 3	In Post Details, Side View, modified dimension from "22 (7/8")" to "10 (3/8")" between the top of the post and the top of the W-Beam rail element.
	Added photos of: Guide Rail to Typical Concrete Bridge Barrier Transition (Without Inlet Placement); Elevation View for Typical Concrete Bridge Barrier (Without Inlet Placement); and Typical Steel Spacer Tube Installation.
Sheet 4	Revised Standard Drawing reference for Type C Inlet from "RC-34M" to "RC-45M AND RC-46M".
Sheet 5	No Major Changes.
Sheet 6	In Connecton Plate Assembly Details, Elevation View, revised the 190 (7 1/2") dimension to extend farther left to the end of the plates instead of to the centerline of the holes.
	In Section F-F, added horizontal dimension of "520 (1' - 8 1/2")" from left edge to angle break.
	In End Connection Angle Details, Elevation View, revised the following vertical dimensions:
	*Lowest dimension from "150 (5 15/16")" to "160 (6 5/16")".
	*Highest dimension from "130 (5 3/16")" to "154 (4 13/16"); shifted top line terminator upward to top of rail tube member.
Sheet 7	In Post 8 for Routed Offset Bracket Details and in Elevation for Midspan Tube Wood Offset Bracket, changed "HOLE" to "HOLES" and dimensions of 20 mm (3/4") diameter holes.
Sheet 8	Revised Standard Drawing reference for Type C Inlet from "RC-34M" to "RC-45M AND RC-46M".
	In Note 4, inserted "AND BC-713M".
Sheet 9	In Routed Offset Bracket Details, Post 6, changed "HOLE" to "HOLES".
Sheet 10	In Note 3, inserted "BC-712M AND".
Sheet 11	In Note 4, inserted "BC-712M, BC-713M, AND THE".
Sheet 12	Revised Standard Drawing reference for Type C Inlet from "RC-34M" to "RC-45M AND RC-46M".
	In Plan and Elevation Views (3 locations):
	*Revised pay limit for approach transition to vertical wall bridge barrier by indicating 2 spaces at 1900 mm (6' - 3") instead of one space previously.
	*Inserted Post 6.

	Sheets 13-14	No Major Changes.
	Sheet 15	In Transition Section, revised length from "3' - 1 1/2' " to "3' - 1 1/2" ". Revised text in Note 1 from "THIRE BEAM" to "THRIE-BEAM". Revised text in Note 2 from "300 mm" to "300".
	Sheet 16	In Thrie-Beam Terminal Section at PA Type 10M Bridge Barrier detail, added the following dimensions: *Width of "75 (3")" from left-most edge to centerline of left-most set of holes. *Width of "108 (4 1/4")" from centerline of left-most set of holes to second left-most set of holes. *Width of "165 (6 1/2")" from third left-most set of holes to 50 (2") width. In Thrie-Beam Terminal Section at PA Type 10M Bridge Barrier detail and Thrie-Beam Terminal Section at PA Bridge Barrier detail, added the following dimensions: *Height of "160 (6 5/16")" from top of thrie-beam down to the centerline of the upper-most set of three circular holes. *Height of "160 (6 5/16")" dimension from bottom of thrie-beam up to the centerline of the lower-most set of three circular holes. *Height of "194 (7 5/8")" dimension between the centerlines of the sets of three circular holes. In Thrie-Beam Terminal Section at Vertical Wall Bridge Barrier detail, added the following dimension: Width of "108 (4 1/4")" to the right of "75 (3")".
RC-52M	General	Deleted previous Sheet 4 of 8 with details for Typical Earth Mound for Burying Guide Rail. Renumbered all subsequent sheets and total number on each sheet. Revised all sheet references.
	Sheet 1	In W150 x 13.5 (W6 X 8.5 OR 9.0) Post Details: *Relabeled "POST" View to "FRONT" View. *Modified Side View dimension(s): -Behind rear face of guide rail post from "0.6 m" to "600". -To indicate guide rail height of 706 mm (27 3/4") from the surface to the top of the W-beam rail element. *Modified Front View, Side View, and Section A-A: -For horizontal dimension between centerline of post and centerline of hole from "30 mm (1 1/4")" to "29 mm (1 1/8")"; and

		-For diameter in Note from "19 mm (3/4")" to "21 mm (13/16")".
		In Steel Posts Over Underground Structures detail:
		*Changed "BC-734" to "BC-734M".
		*Modified dimension to indicate guide rail height of 706 mm (27 3/4") from the surface to the top of the W-beam rail element.
		Split the detail for Guide Rail with Curb or Rubbing Rail into two separate details (i.e., one for curb and one for rubbing rail).
		Added Note 10.
	Sheet 2	In Detail B for Type A Plain Washer, added symbology for inches to indicate minimum width (0.108") and maximum width (0.160").
		In Terminal Section Bridge Connection:
		*Modified orientation of weld with dimension of 6 mm (1/4"); and *Corrected misspelling for "SLOTTED".
	Sheet 3	In Positioning of Rotating Bracket, reorganized subtitle for post to keep metric and English dimensions together.
		In Plan View, revised metric dimension from "0.3 m" to "300".
		Modified Note 2 to indicate "TC-8604" instead of "TC-7604".
	Sheet 4	In Long Breakaway Timber Post, Side View, revised height from "(6"-0")" to "(6'-0")".
		Revised title of detail from "TIMBER GUIDERAIL POST" to "TIMBER GUIDE RAIL POST".
		In Wood or Plastic Offset Bracket detail, added "(TOENAIL TO WOOD POST TO PREVENT ROTATION)".
		In Short Breakaway Timber Post, Front View, added dimension line for 64 (2 1/2") hole.
	Sheets 5-6	Revised word in title of detail from "GUIDERAIL" to "GUIDE RAIL".
		For the top Elevation view, changed "TYPE 2-S END TREATMENT" to "TYPE 2 STRONG POST END TREATMENT".
	Sheets 5-7	Revised "SEE SHEET 5" to "SEE SHEET 4" (multiple locations).
		Revised English height of guide rail from "(27 13/16")" to "(27 3/4")" (multiple locations).
		Revised Note 3.
		In Note 5, changed "LINEAR FOOT" to "METER (LINEAR FOOT)".
		In Note 6, changed dimension from "60.9 m" to "60900".
RC-53M	Sheet 1	In Typical Installation, Elevation detail, changed "SQ." to "SQUARE".

		In Guide Rail over Underground Structures, changed "0.6 m" to "600" and "1.0 m" to "1000". In Detail B, Square Washer, changed "APPR" to "APPROX". Revised Note 6 to include metric dimension for backing plates.
	Sheet 2	Adjusted locations on the end treatments for splices. Deleted Note 2 which referenced RC-52M for end treatments buried into earth mounds. In Plan View for Type 2-Weak Post End Treatment, changed "TYPE 2-W END TREATMENT" to "TYPE 2-WEAK POST END TREATMENT". In Plan Views for Type 2-Weak Post End Treatment and for Type 2-W End Treatment at Driveways and Openings, changed "0.6 m" to "600" and "1.0 m" to "1000". In Plan View for Type 2-W End Treatment, Driveways and Openings, deleted crosslike symbol (2 locations). In Detail C Shop Curved Rail, revised metric dimensions from meters to millimeters.
RC-54M	Sheet 1	In Typical Guide Rail Treatment When the Required Clearance to Obstruction Is Not Available, added dimension with "SEE NOTE 5". In Plan for Type 2-S Post Anchorage, changed "RC-52" to "RC-52M". In Note 4, changed "2-SCC" to "TYPE 2-SCC".
	Sheet 2	In Treatment at Intersections and Driveways detail: *Changed "600 (2'-0")" to "SEE SHEET 1, NOTE 5". *Changed "ES" to "EDGE OF SHOULDER" and "EP" to "EDGE OF PAVEMENT". In Treatment at Obstruction for Median Widths of 6.0 m (20') to 10.0 m (30') Where Continuous Barrier Is Required detail: *Added dimension for "MEDIAN WIDTH". *Added two dimensions with "SEE SHEET 1, NOTE 5". *Replaced all Weak Post Guide Rail (Type 2-WCC, Type 2-WC, and Type 2-WM) with Strong Post Guide Rail (Type 2-S) and Strong Post Median Barrier. In Table 2, deleted row for 120 km/h (75 mph). Revised Note 1 to indicate Chapter 12 in Design Manual, Part 2. Deleted the Treatment for Type 2-WM Median Barrier Cross-Over detail.
	Sheet 3	Deleted Typical Median Earth Mound Detail for At-Grade Dual Bridges. Deleted Section B-B for Typical Median Earth Mound.

		In Length of Barrier Need (LON) Detail, changed "9.0 m" to "9000". In Treatment at Obstructions details: *Added dimension for "MEDIAN WIDTH" (2 locations). *Modified end treatment for bottom detail for traffic traveling from right to left.
	Sheet 4	Changed "GRADING DETAIL FOR PARALLEL TERMINALS" to "GRADING DETAIL FOR TANGENT TERMINALS" for consistency with the August 2009 Edition of Publication 13M, Design Manual, Part 2, "Highway Design", Chapter 12. In Grading Details for Tangent and Flared Terminals, added "SEE SHEET 1, NOTE 5" with 600 (2'-0") dimension in front of the guide rail. In Section C-C and Section D-D, changed "GUIDERAIL" to "GUIDE RAIL" and "1.3" to "1:3".
	Sheet 5	In Plan View, changed "BEGINNING OF HAZARD" to "BEGINNING OF CONCERN". In Plan View, added "(TYP) SEE SHEET 1, NOTE 5" with 600 (2'-0") dimension in front of the guide rail. In Note 2, changed "ONE FOOT" to "300 (1'-0")". In Note 4, changed "HAZARD" to "CONCERN".
	Sheet 6	In Plan View, changed "BEGINNING OF HAZARD" to "BEGINNING OF CONCERN". In Plan View, added "SEE SHEET 1, NOTE 5" with 600 (2'-0") dimension in front of the guide rail. In Elevation View (Profile Along Rail), changed "2ND" to "SECOND". In Note 2, changed "ONE FOOT" to "300 (1'-0")". In Note 5, changed "HAZARD" to "CONCERN".
	Sheet 7	Deleted "mm" in title for Steel Plate. In Partial Plan detail, changed "RUB RAIL" to "SECOND W-BEAM RAIL".
RC-55M	Sheet 1	Deleted this Standard Drawing. As described in Strike-Off Letter 430-98-02, the Weak Post Median Post Median Barrier (Type 2-WM) as shown was not tested as per NCHRP 350 requirements, and the Department has no plans to do so.
RC-57M	General	Moved Sheets 7 and 8 to RC-59M. Renumbered all six remaining sheets in RC-57M.
	Sheet 1	Moved Note 9 to Note 11. Renumbered Notes 10 and 11 to Notes 9 and 10. Added Notes 12 and 13 (Refer to Strike-Off-Letter 430-06-27, "Concrete Median Barrier Dimensions in Roadway Construction Standard Drawings".).

		Added Note 14. In Typical Precast Barrier details: *Changed "SEE NOTE 11" to "SEE NOTE 10". *Deleted the drainage slots shown in the three-dimensional view.
	Sheet 2	Moved text from Note 1's previous first paragraph and Items (A), (B), and (C) to the August 2009 Edition of Publication 13M, Design Manual, Part 2, "Highway Design", Chapter 12, Section 12.5.C (Median Barrier End Treatments). Retained Note 1's previous second paragraph as Note 1. In Note 4, changed "SECTION 714.6(c)" to "SECTION 714.6(d)".
	Sheet 3	In Slotted Plate Connection, changed "STEEL PLATE" to "STRUCTURAL STEEL PLATE". In Table 1, deleted row for 120 km/h (75 mph). Revised Note 1 to indicate galvanizing of structural steel plates for permanent barrier and to not galvanize structural steel plates for temporary barrier (Refer to Strike-Off-Letter 421-08-04, "Structural Steel Plates for Joints - Temporary Concrete Barrier".).
	Sheets 4-6	No Major Changes.
RC-58M	General	Deleted previous Sheet 5 of 5 with details of Typical Earth Mound for Burying Concrete Barrier. Renumbered the four remaining sheets.
	Sheet 1	In Orthographic View, Typical Barrier Section, changed "9.0 m" to "9000" and "3.6 m" to "3600". In Section A-A and Section B-B, replaced "A" dimensions, added 230 mm (9") of depth, and added dimension of 440 mm (17 1/4") for the base's width. Moved Note 7 to Note 10. Renumbered Notes 8 through 10 to Notes 7 through 9.
	Sheet 2	In Barrier Plan, Reinforcement Steel, inserted metric dimension for structural steel plate and changed "3.6 m" to "3600" for the barrier's minimum length. In Slotted Plate Connection, Typical End Transition, changed "2.1 m" to "2100". Revised Note 1 to indicate galvanizing of structural steel plates for permanent barrier and to not galvanize structural steel plates for temporary barrier (Refer to Strike-Off-Letter 421-08-04, "Structural Steel Plates for Joints - Temporary Concrete Barrier".). In Note 1, changed the second instance of "SECTION 1105" to "SECTION 1105.02(s)".
	Sheet 3	In Typical Treatment When Continuous Guide Rail Is Required detail and in Continuous Guide Rail with Single Face Barrier at Pier detail, revised shape of concrete barrier section at the approach end transition with 10

		degree flare for consistency with RC-50M, Sheet 1 of 16. In Continuous Guide Rail with Single Face Barrier at Pier detail, for note with asterisk, changed "TABLE, RC-54M" to "RC-54M, SHEET 1, TABLE 1". In Plan Views, changed "1.5 m" to "1500" (3 locations). In Table 1, deleted row for 120 km/h (75 mph). In Note 3, changed "ONE FOOT" to "300 (1'-0")". In Note 5, changed "GUIDERAIL" to "GUIDE RAIL".
	Sheet 4	In Section C-C, spelled out words for expansion joint material.
RC-59M	General	Moved RC-57M, Sheets 7 and 8 to RC-59M, Sheets 3 and 4. Renumbered total number of sheets.
	Sheet 1	In Typical Precast detail, Elevation, changed "9.0 m" to "9000" and "3.6 m" to "3600". In Typical Precast detail, Section A-A, changed "LG." to "LONG" and "RC-57" to "RC-57M". In Typical Cast-in-Place detail, Elevation, changed "6.0 m" to "6000". In Note 6, changed "SECTION 714.6(c)" to "SECTION 714.6(d)". Moved Note 8 to Note 15. Renumbered Notes 9 through 11 to Notes 8 through 10. Added Note 11 to indicate galvanizing of structural steel plates for permanent barrier and to not galvanize structural steel plates for temporary barrier (Refer to Strike-Off-Letter 421-08-04, "Structural Steel Plates for Joints - Temporary Concrete Barrier".). Added Notes 12 and 13 (Refer to Strike-Off-Letter 430-06-27, "Concrete Median Barrier Dimensions in Roadway Construction Standard Drawings".). Added Note 14.
	Sheet 2	In Typical Treatment at Piers, changed "RC-58M, SHEET 5" to "RC-58M, SHEET 4". In Table 1, deleted row for 120 km/h (75 mph).
	Sheets 3-4	In Section B-B, changed "LG." to "LONG". In Section B-B, changed "SEE SHEET 3" to "SEE RC-57M, SHEET 3".
RC-60M	All Sheets	No Major Changes.
RC-61M	Sheet 1	Changed "TYPE I" to "Type 1" (2 locations).
RC-63M	Sheet 1	Revised Note 1 by deleting the allowable types of retroreflective sheeting (These types are identified in Bulletin 15.).
	Sheet 2	No Major Changes.

RC-64M	Sheet 1	Switched Notes 5 and 6. Revised Note 6 by adding "U.S. CUSTOMARY UNITS IN ( ) PARENTHESES."
RC-65M	Sheet 1	In Typical Construction detail, added asterisk after "100 (4") PLAIN CONCRETE PAVEMENT". In Typical Divisor Area detail, deleted "6.0 m (20'-0") MAXIMUM". Revised Note 3 to space contraction joints to align with adjacent pavement joints to eliminate sawcut and sympathy cracking. Revised Note 4 to decrease thickness of premolded expansion joint filler material from 20 mm (3/4") to 13 mm (1/2") thick and to permit installation of polystyrene bond breaker 6 mm (1/4") thick.
RC-67M	Sheet 1	Revised Note 3 to better match PROWAG definition of clear space. Reworded Note 8 to read better. Deleted Note 9 regarding payment of depressed curb. New Note 9 defines a non-walk area. Adjusted Note 10 to indicate pedestrian pushbuttons should not create an obstruction for pedestrians. Moved Note 11 to Sheet 3 as it only applies to Type 3 ramps. Renumbered Notes 12-17 to Notes 11-16. Split Note 17 into 2 notes, Notes 16 and 17. Adjusted Note 22 to better describe construction of depressed curbs and level landings to provide drainage. Adjusted Note 23 to better describe the use of cheek walls. Added Notes 24-26. Added Sheet Note 20 to address depressed curb matching roadway profile. Removed the pushbutton pedestal from the Type 1 Curb Ramp detail to avoid confusion regarding pushbutton locations. Added a title line to Sheet 1.
	Sheet 2	Removed the pushbutton pedestal from the three Type 1 Curb Ramp details on the left side of the sheet to avoid confusion regarding pushbutton locations. Added a stop sign and grass area to the Type 1 Double Curb Ramps Alternate Installation Detail to better indicate the non-walk area between ramps. Changed the note below Type 1A Curb Ramp, "(Diagonal - Requires Assistant District Executive Approval)", to "Assistant District Executive Approval Required if landing for turning maneuver is not entirely on sidewalk".
	Sheet 3	Added note to middle left Type 2 Curb Ramp detail, "Width of landing at

	depressed curb to match width of detectable warning surface". Changed the note below middle left Type 2 Curb Ramp, "(Diagonal - Requires Assistant District Executive Approval)", "Assistant District Executive Approval Required if landing for turning maneuver is not entirely on sidewalk". Moved old Note 9 from Sheet 1 to Type 3 Curb Ramp. "Construct Type 3 Built-Up Curb ramp of bituminous material as indicated, including surface preparation and tack coat, as required."
Sheet 4	Added Type 4/4A Curb Ramps with shared landing detail. Changed non-traversable rolled flare transition dimension from 610 mm (24") to 610 mm (24") typical, 305 mm (12") minimum.
Sheet 5	Added a note to Type 6 Curb Ramp Combination Diagonal detail, "Width of landing at depressed curb to match width of detectable warning surface". Added Type 6 Curb Ramps with shared landing detail. Adjusted Note on Type 6 Curb Ramp Combination to include "construct top of sidewalk flush with adjacent curb". Moved the pushbutton pedestals from the lower landing to the top of the ramp to prevent wheelchair users from having wheels on multiple planes when using the pushbutton.
Sheet 6	Changed Blended Transition note from 1525 mm x 1525 mm (5’-0" x 5’-0") minimum space for turning to 1220 mm x 1220 mm (4’-0" x 4’-0") minimum space for turning area, there is no confinement to require a 1525 mm x 1525 mm (5’-0" x 5’-0") landing. Deleted Blended Transition note "Diagonal requires Assistant District Executive Approval". Adjusted Note 23 to indicate the Blended Transition detail would be considered a Type 2 ramp if slopes exceed 5%. Changed non-traversable rolled flare transition dimension from 610 mm (24") to 610 mm (24") typical, 305 mm (12") minimum.
Sheet 7	Added Sheet title "Crosswalks, Medians…..". Added Plain Cement Concrete Curb for Median or Island Curb Ramps detail and for Alternate Small Island with Cut Through detail.
Sheet 8	Added Sheet title "Pushbuttons / Triangular Landing". Revised Pedestrian pushbutton details to better reflect MUTCD guidance. Rewrote Note 26 to match MUTCD guidance. Rewrote Note 27 to indicate height to mount pedestrian push button above the sidewalk and the maximum lateral distance from a landing.
Sheet 9	Added a note to the Detectable Warning Surface embedding detail, "Slope of DWS to match the slope of curb or landing".

	Sheet 10	Added "Roadway" to two details to provide clarity - Sidewalk addition due to obstructions and Transition to existing sidewalk.
	Sheet 11	Added a note to the vertical drop at road surface detail. Grinding the curb to a maximum slope of 8.33% is an acceptable option. For Alteration Details, revised recommended correction to indicate reconstructing the entire (or portions of) ramp.
	Sheet 12	Added Note 25 to the Type 3A Driveway Apron detail to indicate the maximum change in grade of 8% between the driveway surface and sidewalk.
	Sheet 13	No Major Changes.
RC-70M	Sheet 1	In Detail A, modified text describing how to extend geotextile into and along the bottom of the trench, backfilling the trench with the excavated soil, and compacting. In Table A, added column for Silt Barrier Fence, Height.
	Sheets 2-3	Deleted notes about dual units in Sheet 2 (Note 8) and Sheet 3 (Note 4). Sheet 1, Note 5 is sufficient.
RC-71M	Sheet 1	No Major Changes.
	Sheets 2-4	Deleted notes about dual units in Sheet 2 (Note 8), Sheet 3 (Note 2), and Sheet 4 (Note 2). Sheet 1, Note 7 is sufficient.
	Sheet 4	Revised references for RC-34M to either RC-45M (3 locations) or RC-45M & RC-46M (2 locations).
RC-72M	Sheet 1	No Major Changes.
	Sheets 2-7	Deleted notes about dual units in Sheet 2 (Note 7), Sheet 3 (Note 10), Sheet 4 (Note 7), Sheet 5 (Note 1), Sheet 6 (Note 3) and Sheet 7 (Note 2). Sheet 1, Note 4 is sufficient.
	Sheets 3-4	Revised reference from RC-34M to RC-45M (multiple locations). Revised Note 1, third sentence to identify Publication 408, Section 860.
	Sheet 4	Revised Note 1 to indicate "PIPE/GRAVEL" instead of "CONCRETE BLOCK/GRAVEL".
	Sheet 6	In Section A-A, deleted dimension for rock of "200 (8") MIN".
RC-73M	Sheet 1	No Major Changes.
	Sheets 2-4	Deleted notes about dual units in Sheet 2 (Note 7), Sheet 3 (Note 5) and Sheet 4 (Note 3). Sheet 1, Note 3 is sufficient.
RC-74M	Sheet 1	In Table A, revised "MM" to "MILLIMETERS" in the second and third columns.
RC-75M	All Sheets	No Major Changes.
RC-76M	All Sheets	No Major Changes.
RC-77M	Sheet 1	Revised Note 6, second sentence by inserting "PUBLICATION 408,".

RC-78M	All Sheets	Added new Standard Drawings (4 sheets) for slope protection using Geocell Cell and Geocell Section Details.
RC-80M	Sheet 1	In Detail of Anchor Bolt: *Changed "1101.04(a)" to "PUBLICATION 408, SECTION 1101.04". *Modified dimensions of the four steel anchor bolts. Revised Note 10.
	Sheet 2	Added Table C to indicate details for various pole heights including base plate thicknesses, the number of anchor bolts, and the minimum anchor bolt diameter. In the Elevation details for Drilled Caisson Foundation and Spread Footing Foundation: *Deleted tack welds around pole between nuts and base plate. *Modified fasteners on vertical steel around pole to heavy hex nuts and washers and to heavy hex jam nuts. *Added optional eye bolts with reference to RC-83M, Sheet 2. *Added "(ROUND OR MULTISIDED)" after "BASE PLATE". *In concrete foundation, added 19 mm (3/4") anchor plate with holes 3 mm (1/8") larger than anchor bolts. In the Elevation detail for Drilled Caisson Foundation: *Added the vertical dimension "25 (1") MAX" between the bottom of the anchor bolt and the top of the concrete foundation. *Deleted 600 (2'-0") dimension of width where backfill with compacted embankment material would be placed. In Note 5, revised wording in first sentence from "GALVANIZED SCREEN" to "STAINLESS STEEL SCREEN" and in second sentence from "SS HARDWARE" to "STAINLESS STEEL HARDWARE". In Note 6, revised dimension in second sentence from "1.5 m (5'-0")" to "1.0 m (3'-0")".
RC-81M	All Sheets	No Major Changes.
RC-82M	Sheet 1	In Junction Box JB-11 detail, Section A-A, added "JB" beside the centerline symbol. Revised wording in Note 2, first sentence from "JUNCTION" to "JUNCTION BOXES".
	Sheet 2	In Junction Box JB-12 detail, Plan, changed "JCT. BOX" to "JB" (2 locations).
RC-83M	Sheet 1	In Table 1, for Type 2-W Guide Rail, modified "X" distance from "2.4 m (8.0')" to "2.1 m (7.0')". Revised Note 7.

		Switched Notes 10 and 11; reworded Note 10 for aluminum poles.
	Sheet 2	In Typical Lower Section Mechanism detail, added sentence for Safety Cables to submit eye bolt detail and calculations with the pole shop drawings. In Typical Circuit Schematic detail, in the 20 Amp enclosed circuit breaker, deleted the dot on line N and deleted the connection between line G and line N. In Typical High Mast Pole detail, removed bulb appearing outside of housing and modified typical graphics for washers and nuts connecting the base plate above with the foundation below. Revised Notes 4 and 7.
RC-84M	Sheet 1	Changed wording from "DIRECT-BURIED CABLE AND CONDUIT" to "UNDERGROUND CABLE AND CONDUIT" (2 locations). In Notes for Underground Cable and Conduit, third bullet, changed "DIRECT-BURIAL CONDUIT" to "UNDERGROUND CABLE AND CONDUIT". In Underground Cable and Conduit detail, revised dimension from "25 MIN" to "25 (1") MIN". Revised total number of sheets.
	Sheet 2	Added new sheet with Wiring Details (Type A, Transformer Base, and Breakaway) and with Cable and Conduit Marker.
RC-91M	Sheet 1	Revised wording in Note 5 from "SECTION" to "SECTIONS".
	Sheet 2	Changed "HT" to "HEIGHT" and "CAL" to "CALIPER" for consistency.
RC-92M	Sheet 1	Added new Standard Drawing for Removal Limits of Tree Trimming.

Any comments or questions on the new Edition relative to revisions, Metric or English numbers, should be directed to the Standards and Criteria Section, Highway Quality Assurance Division, Bureau of Design.

CANCEL AND DESTROY THE FOLLOWING:

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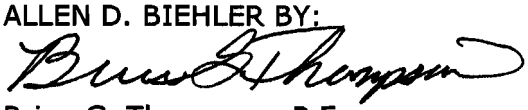

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BUREAU OF DESIGN

STANDARDS FOR ROADWAY CONSTRUCTION
SERIES RC-1M TO 100M

JUNE 2010 EDITION

PDT Pub #72M

INDEX OF STANDARDS FOR ROADWAY CONSTRUCTION

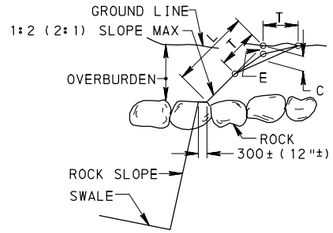
STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
EARTHWORK		
RC-10M	JUN. 1, 2010	CLASSIFICATION OF EARTHWORK
RC-11M (2 Sheets)	JUN. 1, 2010	CLASSIFICATION OF EARTHWORK FOR STRUCTURES
RC-12M (2 Sheets)	JUN. 1, 2010	BACKFILL AT STRUCTURES
RC-13M	JUN. 1, 2010	PAY LIMIT OF SUBBASE
PAVEMENTS		
RC-20M (3 Sheets)	JUN. 1, 2010	CONCRETE PAVEMENT JOINTS
RC-21M	JUN. 1, 2010	REINFORCED CONCRETE PAVEMENT
RC-22M (4 Sheets)	JUN. 1, 2010	RUMBLE STRIPS
RC-23M (3 Sheets)	JUN. 1, 2010	BRIDGE APPROACH SLABS
RC-24M (3 Sheets)	JUN. 1, 2010	PAVEMENT RELIEF JOINT
RC-25M (7 Sheets)	JUN. 1, 2010	SHOULDERS
RC-26M (9 Sheets)	JUN. 1, 2010	CONCRETE PAVEMENT REHABILITATION
RC-27M (2 Sheets)	JUN. 1, 2010	PLAIN CONCRETE PAVEMENT
RC-28M	JUN. 1, 2010	OVERLAY TRANSITIONS AND PAVING NOTCHES
RC-29M (3 Sheets)	JUN. 1, 2010	BRIDGE ANTI-ICING SYSTEM APPROACH INSTALLATION
DRAINAGE		
RC-30M (5 Sheets)	JUN. 1, 2010	SUBSURFACE DRAINS
RC-31M (2 Sheets)	JUN. 1, 2010	ENDWALLS
RC-32M	JUN. 1, 2010	SLOPE PIPE FITTINGS, PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION
RC-33M (2 Sheets)	JUN. 1, 2010	END SECTIONS FOR PIPE CULVERTS
RC-35M	JUN. 1, 2010	DRAINAGE DIKE
RC-36M	JUN. 1, 2010	SPRING BOXES
RC-39M (6 Sheets)	JUN. 1, 2010	STANDARD MANHOLES
RC-40M	JUN. 1, 2010	SLOPE PROTECTION
RC-43M (5 Sheets)	JUN. 1, 2010	GABIONS
RC-45M (20 Sheets)	JUN. 1, 2010	INLET TOPS, GRATES AND FRAME
RC-46M (45 Sheets)	JUN. 1, 2010	INLET BOXES
GUIDE RAIL AND MEDIAN BARRIER		
RC-50M (16 Sheets)	JUN. 1, 2010	GUIDE RAIL TRANSITION AT END OF STRUCTURE
RC-52M (7 Sheets)	JUN. 1, 2010	TYPE 2 STRONG POST GUIDE RAIL
RC-53M (2 Sheets)	JUN. 1, 2010	TYPE 2 WEAK POST GUIDE RAIL
RC-54M (7 Sheets)	JUN. 1, 2010	BARRIER PLACEMENT AT OBSTRUCTIONS
RC-57M (6 Sheets)	JUN. 1, 2010	CONCRETE MEDIAN BARRIER
RC-58M (4 Sheets)	JUN. 1, 2010	SINGLE FACE CONCRETE BARRIER
RC-59M (4 Sheets)	JUN. 1, 2010	CONCRETE GLARE SCREEN

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
FENCES AND CURBS		
RC-60M (3 Sheets)	JUN. 1, 2010	RIGHT-OF-WAY FENCE
RC-61M	JUN. 1, 2010	RIGHT-OF-WAY GATES AND REMOVABLE FENCE SECTIONS
RC-63M (2 Sheets)	JUN. 1, 2010	PERMANENT BARRICADES
RC-64M	JUN. 1, 2010	CURBS AND GUTTERS
RC-65M	JUN. 1, 2010	CONCRETE MOUNTABLE CURBS
RC-67M (13 Sheets)	JUN. 1, 2010	CURB RAMPS AND SIDEWALKS
EROSION AND SEDIMENTATION CONTROL		
RC-70M (3 Sheets)	JUN. 1, 2010	PERIMETER CONTROL DEVICES
RC-71M (4 Sheets)	JUN. 1, 2010	SEDIMENT BASIN AND SEDIMENT TRAP
RC-72M (7 Sheets)	JUN. 1, 2010	INLET AND OUTLET PROTECTION
RC-73M (4 Sheets)	JUN. 1, 2010	CHANNEL AND SLOPE PROTECTION
RC-74M	JUN. 1, 2010	TEMPORARY DIVERSIONS
RC-75M	JUN. 1, 2010	DEWATERING DEVICES
RC-76M	JUN. 1, 2010	STRAW BALE BARRIER
RC-77M	JUN. 1, 2010	ROCK CONSTRUCTION ENTRANCE
RC-78M (4 Sheets)	JUN. 1, 2010	SLOPE PROTECTION GEOCELL CELL AND GEOCELL SECTION DETAILS
HIGHWAY LIGHTING		
RC-80M (2 Sheets)	JUN. 1, 2010	HIGHWAY LIGHTING-FOUNDATIONS
RC-81M	JUN. 1, 2010	HIGHWAY LIGHTING-JUNCTION BOXES-LIGHT DUTY
RC-82M (2 Sheets)	JUN. 1, 2010	HIGHWAY LIGHTING-JUNCTION BOXES-HEAVY DUTY
RC-83M (2 Sheets)	JUN. 1, 2010	HIGHWAY LIGHTING-LIGHTING POLE DETAILS
RC-84M (2 Sheets)	JUN. 1, 2010	HIGHWAY LIGHTING-LIGHTING AND ELECTRICAL DETAILS
ROADSIDE DEVELOPMENT AND PLANTING		
RC-91M (2 Sheets)	JUN. 1, 2010	BRACING AND PLANTING DETAILS
RC-92M	JUN. 1, 2010	REMOVAL LIMITS OF TREE TRIMMING

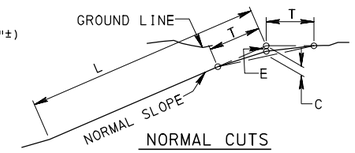
L=LENGTH OF SLOPE
*T=3.0 m (10'-0"), WHERE L IS 3.0 m (10'-0") OR GREATER.
*T=L, WHEN L IS LESS THAN 3.0 m (10'-0")
E=C/2

APPLY ABOVE VALUES FOR ROUNDING THE TOP OF SLOPES OF DRAINAGE SWALES, CHANNELS, DITCHES AND PARALLEL DITCHES.

*EXCEPT IN HARD ROCK WITHOUT OVERBURDEN, AND EXCEPT AS INDICATED ON CONTOUR GRADING AND DRAINAGE PLANS, OR CROSS SECTIONS.



ROCK CUTS

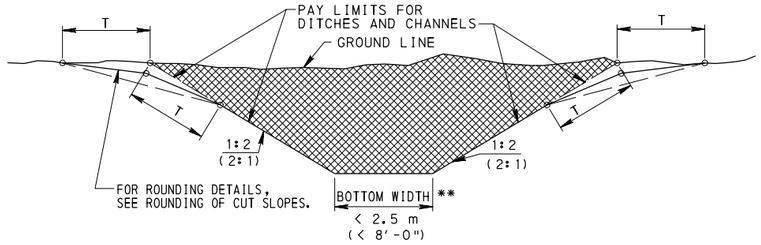


NORMAL CUTS

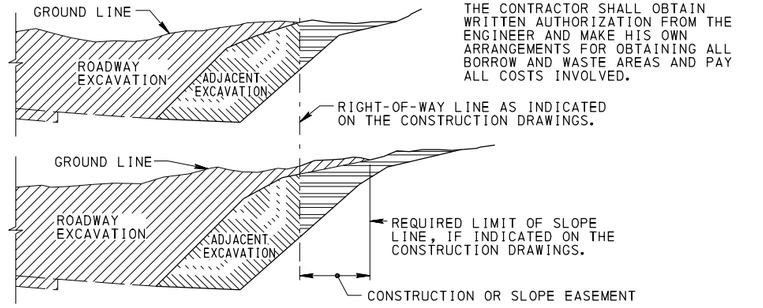
ROUNDING OF CUT SLOPES

SLOPE AS INDICATED ON THE CROSS SECTIONS.

** FOR BOTTOM WIDTHS ≥ 2.5 m (8'-0"), EXCAVATION IS CLASS 1. PAYMENT FOR THIS AREA OF EXCAVATION IS INCIDENTAL TO EXCAVATION OF DITCH OR CHANNEL.

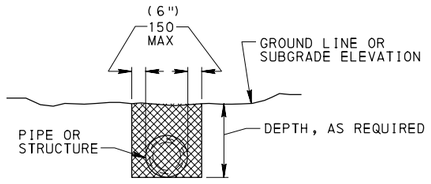


DITCHES AND CHANNELS



THE CONTRACTOR SHALL OBTAIN WRITTEN AUTHORIZATION FROM THE ENGINEER AND MAKE HIS OWN ARRANGEMENTS FOR OBTAINING ALL BORROW AND WASTE AREAS AND PAY ALL COSTS INVOLVED.

EXCAVATION ADJACENT TO ROADWAY IN LIEU OF BORROW EXCAVATION



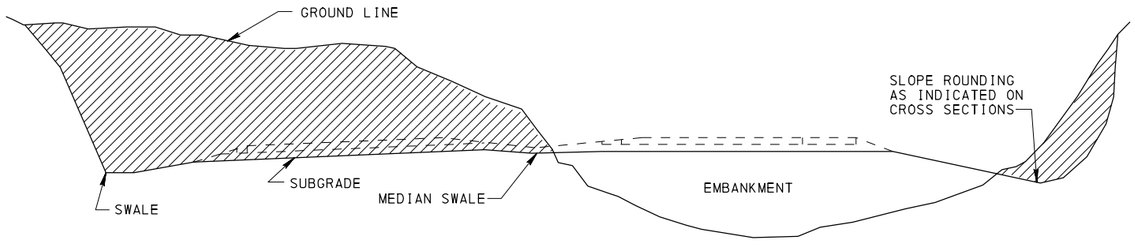
EXCAVATION FOR REMOVAL OF EXISTING PIPE OR STRUCTURE WHERE NO REPLACEMENT IS REQUIRED

NOTES

1. ALLOW NO PAYMENT FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

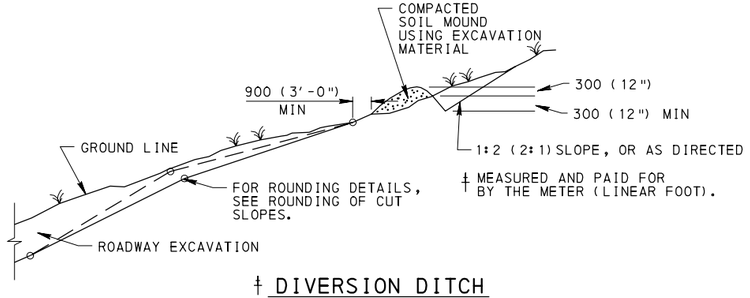
LEGEND

- CLASS 1 EXCAVATION
- CLASS 2 EXCAVATION
- BORROW EXCAVATION
- CLASS 1 OR BORROW EXCAVATION



ROADWAY SECTION SHOWING CLASS 1 EXCAVATION

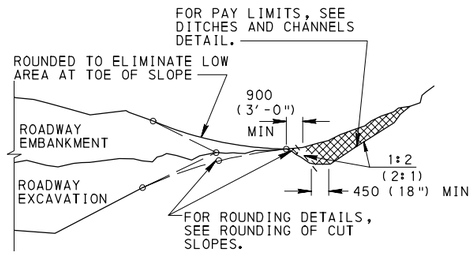
SPILLWAYS



‡ MEASURED AND PAID FOR BY THE METER (LINEAR FOOT).

‡ DIVERSION DITCH

SLOPE AS INDICATED ON THE CROSS SECTIONS.



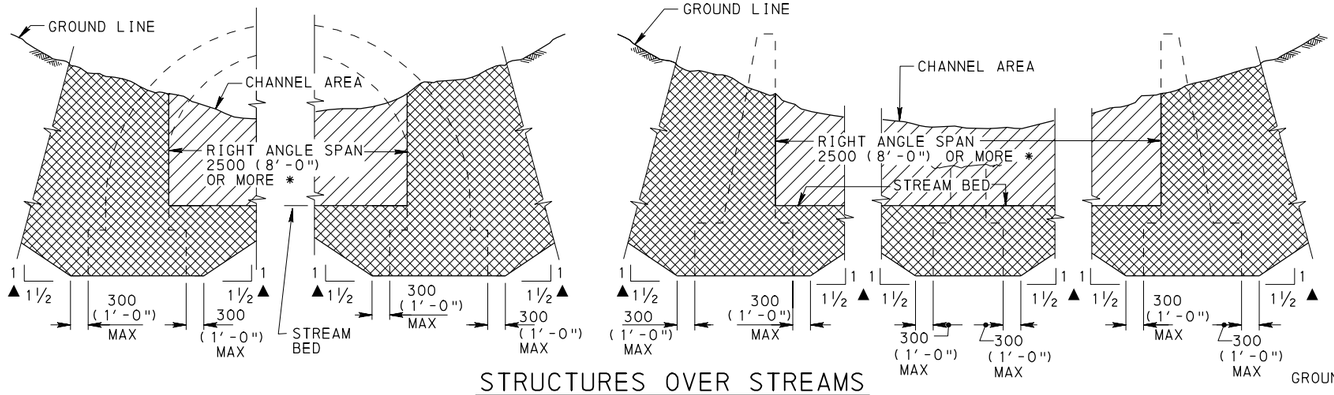
PARALLEL DITCH

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CLASSIFICATION OF EARTHWORK

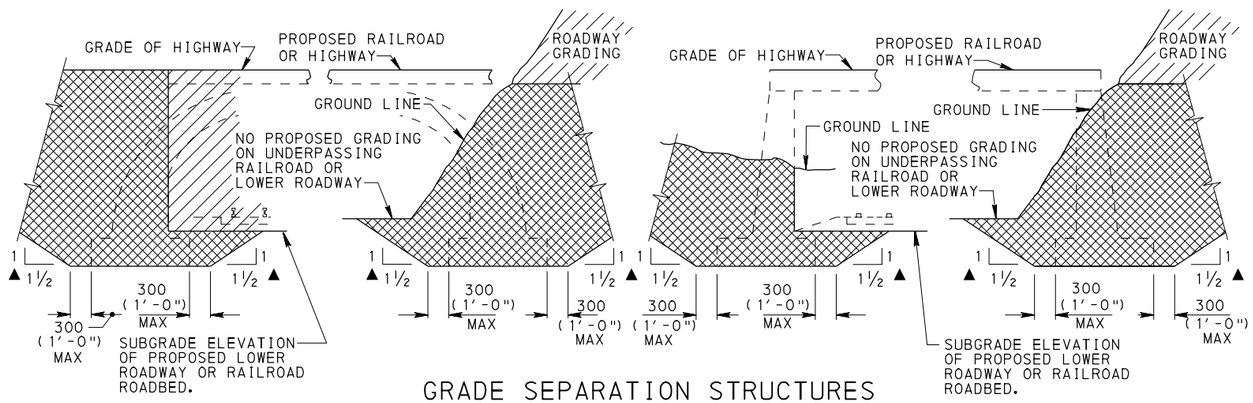
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-10M



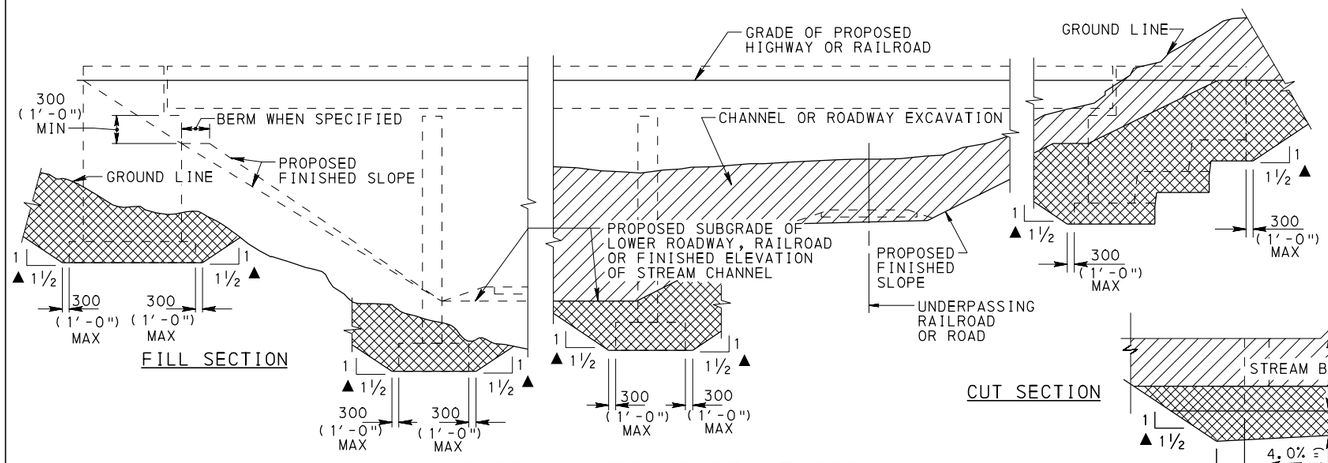
STRUCTURES OVER STREAMS

INCLUDING METAL PLATE ARCH WITH FOOTING

* WHEN RIGHT ANGLE SPAN IS LESS THAN 2500 (8'-0"), ALL EXCAVATION IS CLASS 3.

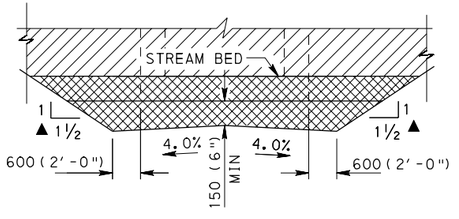


GRADE SEPARATION STRUCTURES

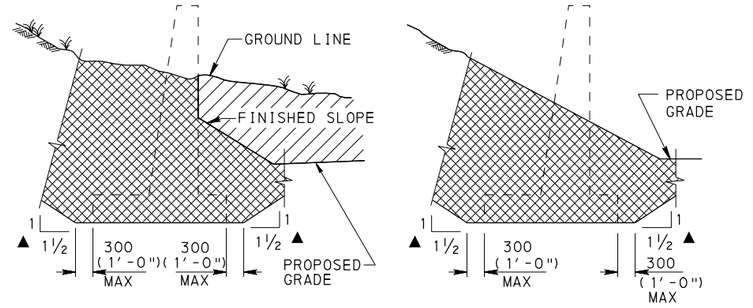


FILL SECTION

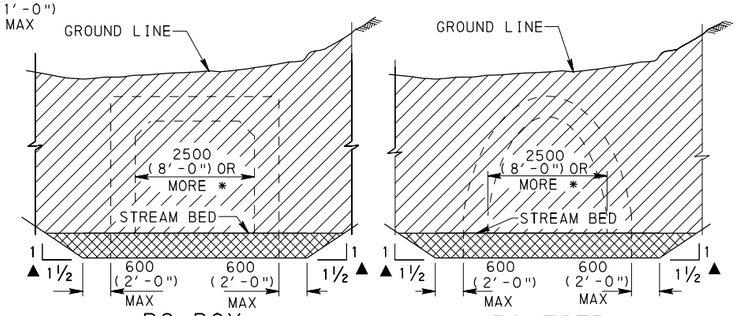
TYPICAL STRUCTURE SECTION



EXTRA DEPTH EXCAVATION FOR RC BOX AND ARCH CULVERTS ON FINE GRAIN SOIL



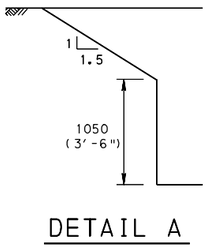
WING WALLS & RETAINING WALLS



RC BOX CULVERTS

RC TIED ARCH CULVERTS

* WHEN LESS THAN 2500 (8'-0"), ALL EXCAVATION IS CLASS 3.



DETAIL A

NOTES

1. FOLLOW OSHA SAFETY REQUIREMENTS IN ALL UNSHORED EXCAVATION AREAS. USE DETAIL 'A' FOR COHESIVE SOILS ONLY AS DEFINED IN OSHA 29 CFR SECTION 1926.652 AND DETERMINED BY APPROPRIATE SOILS REPORT: 1500 (5'-0") MAXIMUM FOR VERTICAL CUT, OTHERWISE 1050 (3'-6") MAXIMUM FROM BOTTOM OF EXCAVATION TO START OF 1:1.5 (1½:1) LAYBACK SLOPE. IF THE TOTAL EXCAVATION DEPTH EXCEEDS 3600 (12'-0"), DO NOT USE DETAIL 'A'.
2. **NO PAYMENT WILL BE ALLOWED FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.**
3. DEFINE SPECIAL SITUATIONS (SUCH AS ROCK EXCAVATION, SHORED CONSTRUCTION, ETC.), INVOLVING EXCAVATION NOT ENTIRELY COVERED BY THIS STANDARD, ON THE DESIGN DRAWING BY SKETCHES AND/OR DESCRIBE IN THE SPECIAL PROVISIONS.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

LEGEND

CLASS 1 EXCAVATION

ROADWAY ITEM

(TO BE INCLUDED IN ROADWAY QUANTITIES)

CLASS 3 EXCAVATION

STRUCTURE ITEM

(TO BE INCLUDED IN STRUCTURE QUANTITIES)

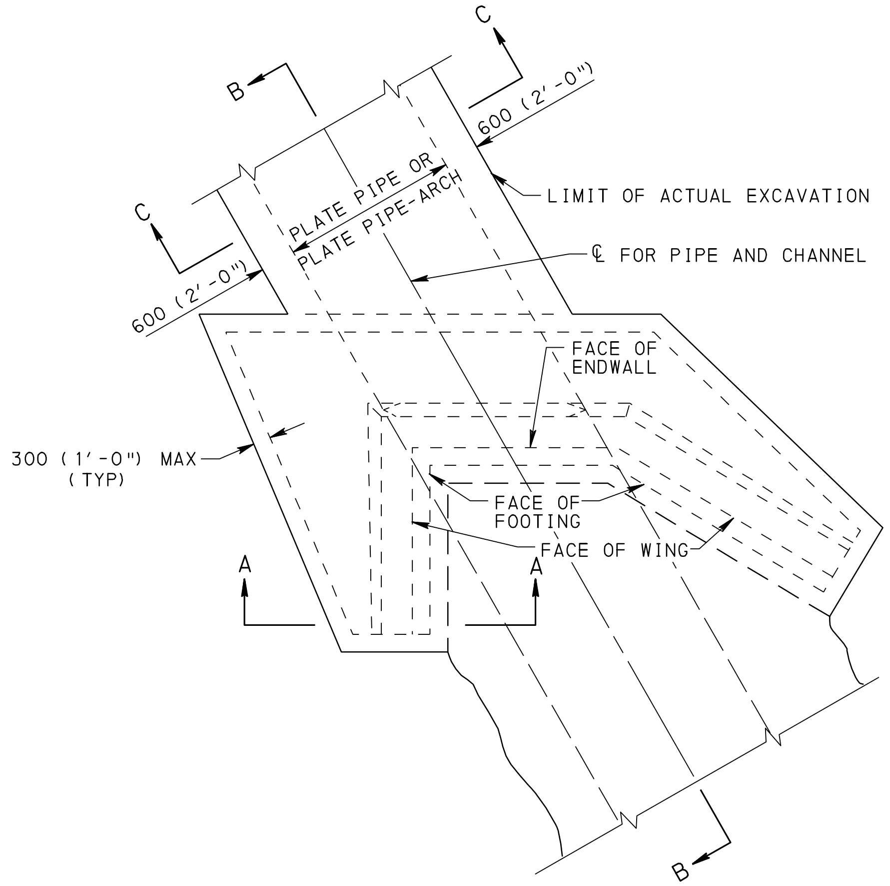
▲ CONTINUE 1:1.5 (1½:1) SLOPE FOR THE APPROPRIATE CLASS OF EXCAVATION TO FINISHED GRADE OR GROUND LINE, WHICHEVER COMES FIRST.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CLASSIFICATION OF EARTHWORK FOR STRUCTURES

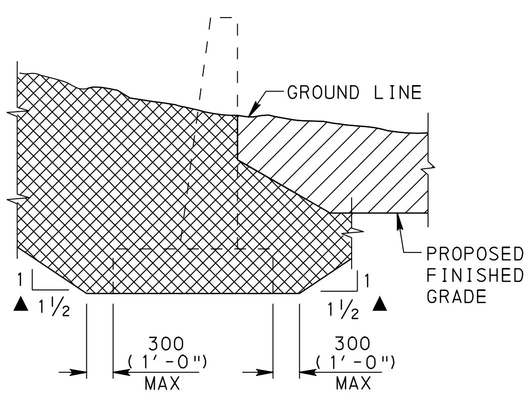
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 2
R. Wade Willy	Bruce E. Hyson	RC-11M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



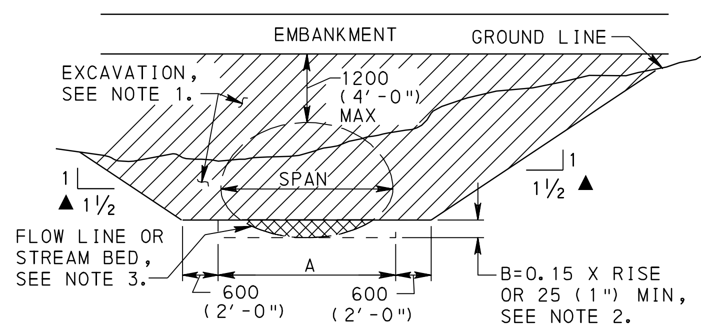
PLAN VIEW

NOTES

1. PROVIDE EXCAVATION, INCLUDING THE PORTIONS OF ENDWALLS ABOVE THE FLOW LINE AND TO A MAXIMUM OF 1200 (4'-0") ABOVE THE TOP OF THE PIPE OR PIPE-ARCH, AS CLASS 4 EXCAVATION FOR PIPE OR PIPE-ARCH LESS THAN 1200 (4'-0") INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND CLASS 1 EXCAVATION FOR PIPE OR PIPE-ARCH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY.
2. FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, PROVIDE EXCAVATION BETWEEN THE FLOW LINE AND THE LOWER LIMIT OF CLASS 1 EXCAVATION CONFORMING TO THE AREA SHOWN WITH THE CLASS 3 EXCAVATION SYMBOL.
3. WHEN DEEMED NECESSARY TO EXCAVATE BELOW THE BOTTOM OF THE FLOW LINE, PAY ALL EXCAVATION WITHIN THE LIMITS OF THE BOTTOM OF THE EXCAVATED TRENCH AND THE TOP OF THE EXISTING GROUND AS CLASS 1 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND AS CLASS 4 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH LESS THAN 1200 (4'-0") INSIDE DIAMETER OR SPAN, RESPECTIVELY. PLACE AND SHAPE BACKFILL MATERIAL FOR THE UNDERCUT AREA CONFORMING TO THE BOTTOM OF THE CULVERT AND CONSIDER INCIDENTAL TO THE CLASS SPECIFIED.
4. MEASURE AND PAY EXCAVATION AS SHOWN IN SECTION A-A, SECTION B-B AND SECTION C-C.
5. SEE RC-30M, SHEET 4 OF 5, NOTE 1.

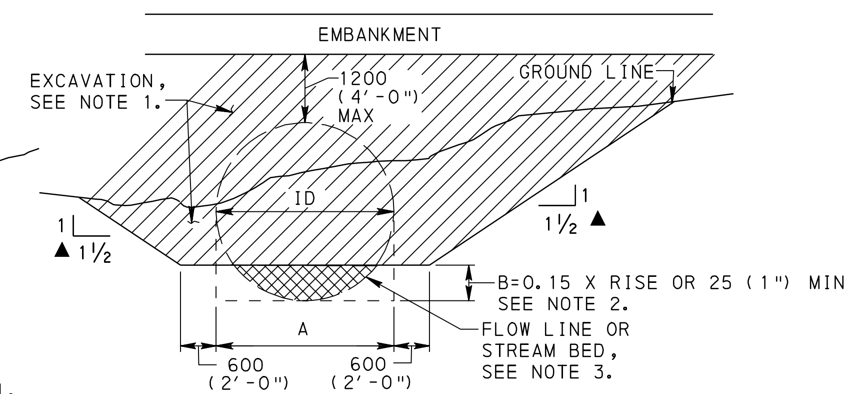


SECTION A-A



SECTION C-C

(METAL PLATE PIPE-ARCH)



SECTION C-C

(METAL PLATE PIPE)

LEGEND

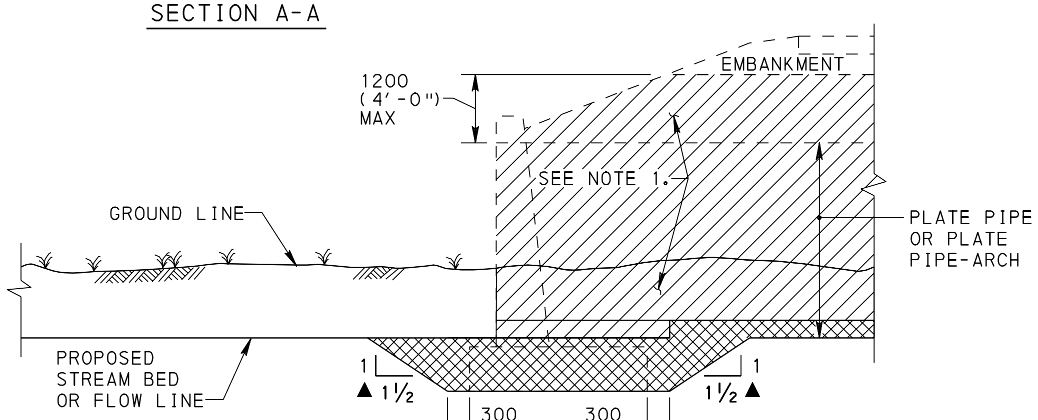
CLASS 1 OR 4 EXCAVATION

ROADWAY ITEM
(TO BE INCLUDED IN ROADWAY QUANTITIES)

CLASS 3 EXCAVATION

STRUCTURE ITEM
(TO BE INCLUDED IN STRUCTURE QUANTITIES)

▲ CONTINUE 1:1.5 (1½:1) SLOPE FOR CLASS 3 EXCAVATION TO FINISH GRADE OR GROUND LINE, WHICHEVER COMES FIRST.



SECTION B-B

METAL PLATE PIPE AND METAL PLATE PIPE-ARCH CULVERTS WITH ENDWALL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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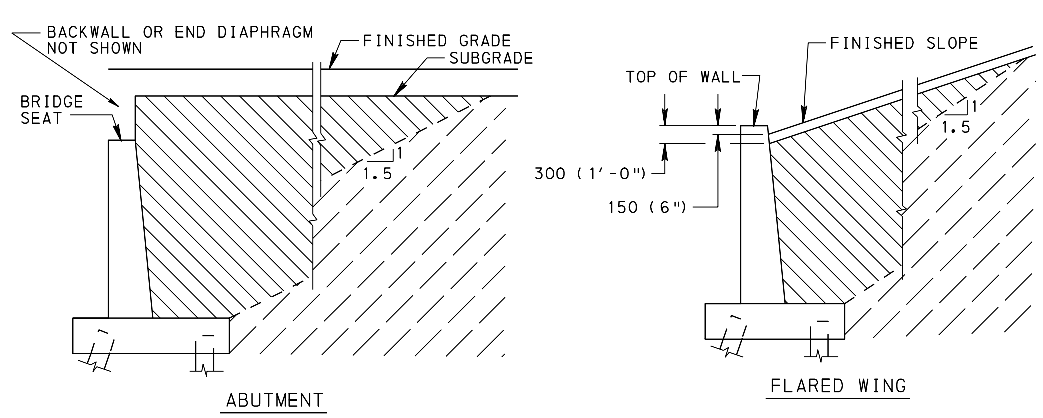
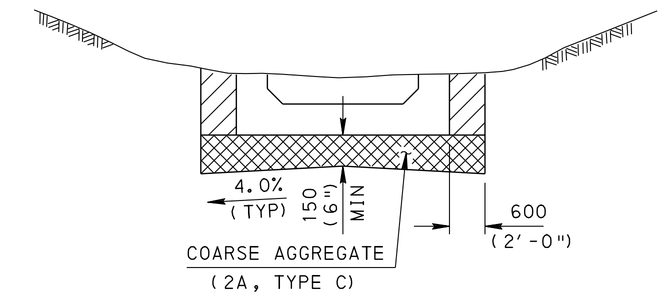
CLASSIFICATION OF EARTHWORK FOR STRUCTURES

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 2
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-11M

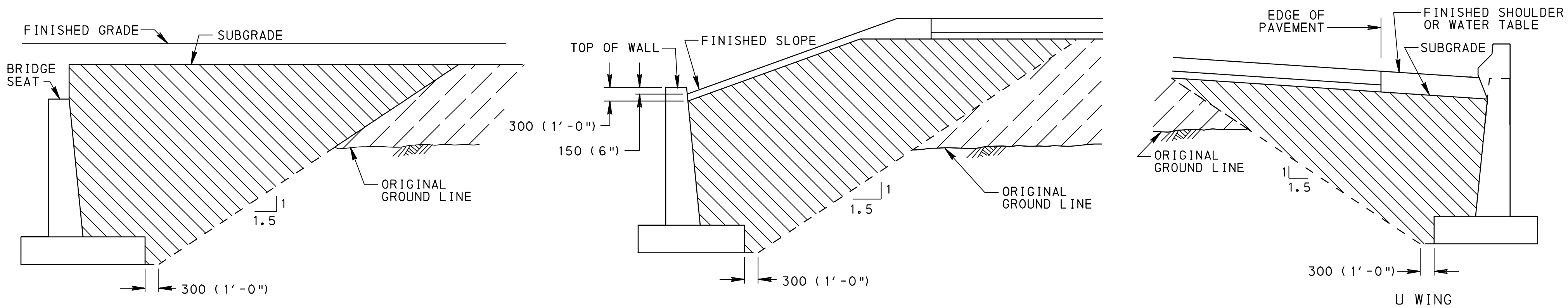


TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL



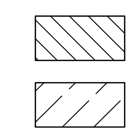
FOUNDATION PREPARATION FOR RC BOX AND ARCH CULVERTS ON FINE GRAIN SOIL ONLY

NOTE: EXCAVATE THE LAST 600 (2'-0") WITH BUCKET WITHOUT TEETH TO KEEP THE FOUNDATION FIRM.
FOR CULVERTS WITH SPANS LESS THAN 2500 (8'-0"), BOTTOM MAY BE SLOPED IN ONE DIRECTION.



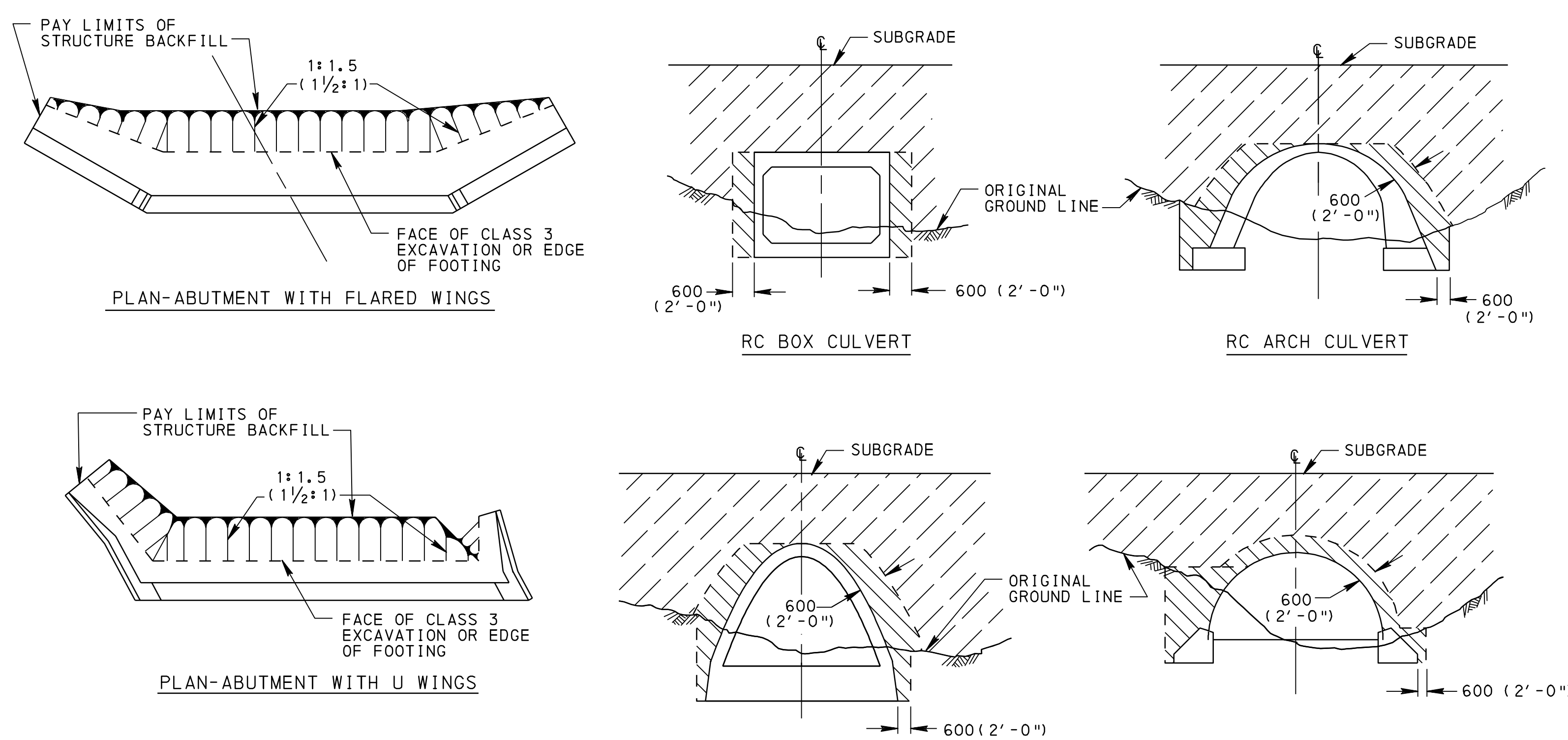
TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT

LEGEND



STRUCTURE BACKFILL

EMBANKMENT MATERIAL



BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES

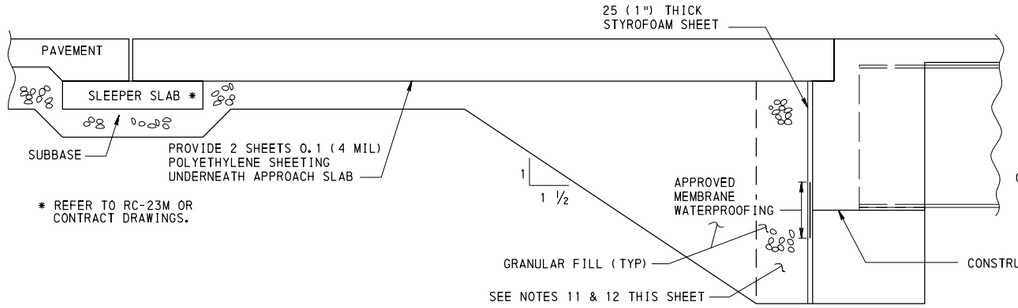
NOTE:
SEE SHEET 2 FOR GENERAL NOTES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

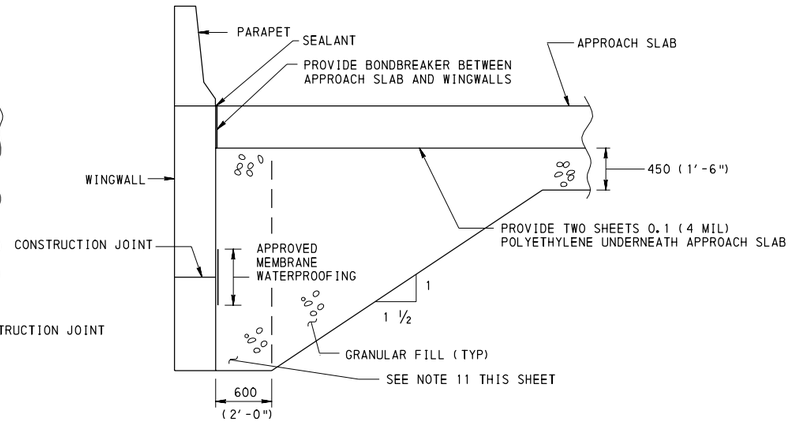
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BACKFILL AT STRUCTURES

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 2 RC-12M



LIMITS OF BACKFILL
INTEGRAL ABUTMENT



LIMITS OF BACKFILL
WINGWALLS OF INTEGRAL ABUTMENTS

GENERAL NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUB 408. PLACE BACKFILL AND EMBANKMENT IN ACCORDANCE WITH THIS STANDARD DRAWING UNLESS OTHERWISE SHOWN ON THE STRUCTURE DRAWINGS.

2. USE ONLY R-3 ROCK LINING, MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 850.2(a); AASHTO NO. 1, 3, 5 OR 57 COARSE AGGREGATES, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN PUBLICATION 408, SECTION 703.2, TABLE B; OR TYPE OGS COARSE AGGREGATE, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN PUBLICATION 408, SECTION 703.2, TABLE B. MEASURE AND PAY STRUCTURE BACKFILL AS SELECTED BORROW EXCAVATION-STRUCTURE BACKFILL. DO NOT USE R-3 FOR STRUCTURE BACKFILL FOR ANY TYPE RC OR METAL PLATE CULVERT. PLACE A CLASS 2, TYPE B GEOTEXTILE BLANKET AS A BARRIER BETWEEN THE STRUCTURE BACKFILL AND EXCAVATION/EMBANKMENT MATERIAL. PLACE A CLASS 2, TYPE B GEOTEXTILE BLANKET ON ENTIRE TOP OF THE COMPLETED STRUCTURE BACKFILL PRIOR TO PLACING ANY SUBBASE MATERIAL FOR THE ROADWAY. THE GEOTEXTILE IS CONSIDERED INCIDENTAL TO THE SELECTED BORROW EXCAVATION STRUCTURE BACKFILL AND WILL NOT BE PAID FOR SEPARATELY.

3. TREAT BACKFILL LIMITS AT RETAINING WALLS AND WINGWALLS FOR CULVERTS THE SAME AS FLARED ABUTMENT WINGWALLS.

4. TREAT BACKFILL CONSTRUCTION AT RC BOX CULVERTS WITH THE TOP SLAB AT ROADWAY GRADE THE SAME AS ABUTMENTS.

5. TREAT BACKFILL CONSTRUCTION AT CULVERTS, WHERE THE TOP OF THE CULVERT IS NEAR SUBGRADE, AS SHOWN ON THE STRUCTURE DRAWINGS OR AS DIRECTED BY THE ENGINEER.

6. PLACE STRUCTURE BACKFILL AND ADJOINING EMBANKMENT SIMULTANEOUSLY UNLESS OTHERWISE PERMITTED BY THE ENGINEER.

7. REPLACE MATERIAL REMOVED BEYOND THE SPECIFIED LIMITS OF CLASS 1, 2 OR 3 EXCAVATION WITH STRUCTURE BACKFILL. CONSIDER MATERIAL REMOVED OR STRUCTURE BACKFILL PLACED BEYOND THE SPECIFIED LIMITS OF CLASS 1, 2 OR 3 EXCAVATION AS INCIDENTAL TO THE CLASS OF EXCAVATION SPECIFIED.

8. REFER TO STRUCTURE DRAWINGS FOR DRAINAGE DETAILS, WEEP HOLES, ETC.

9. INDICATE STRUCTURE BACKFILL QUANTITIES ON THE STRUCTURE DRAWINGS.

10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
U.S. CUSTOMARY UNITS IN () PARENTHESES.

*11. PLACE BACKFILL WITHIN 600 (24") FROM THE REAR FACE OF THE ABUTMENT AND THE WINGWALL IN LOOSE LIFTS OF 150 (6") FOR TYPE OGS, AASHTO NO. 3, 5 OR 57 COARSE AGGREGATE; 225 (9") AASHTO NO.1; 300 (1'-0") FOR R-3 ROCK LINING. COMPACT EACH LAYER WITH TWO PASSES OF A WALK-BEHIND VIBRATORY PLATE SOIL COMPACTOR.

*12. BACKFILL SIMULTANEOUSLY BEHIND BOTH ABUTMENTS. KEEP THE DIFFERENCE BETWEEN THE FILL HEIGHT AT BOTH ENDS OF THE BRIDGE BELOW 300 (12") AT ALL TIMES DURING BACKFILLING.

LEGEND

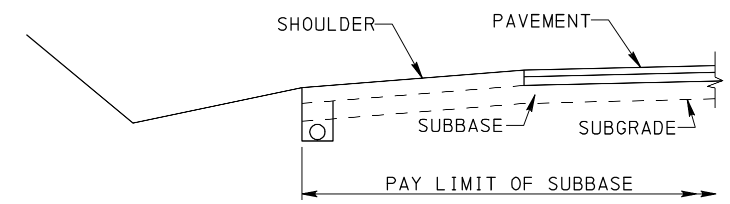
* IDENTIFIES NOTES THAT APPLY ONLY TO INTEGRAL ABUTMENTS.

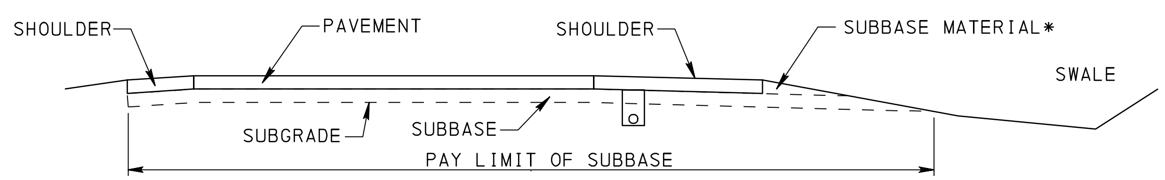
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

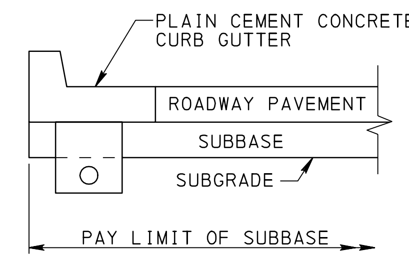
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BACKFILL AT STRUCTURES

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 2
R. Wyatt Dilley	Bruce E. Hyson	RC-12M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



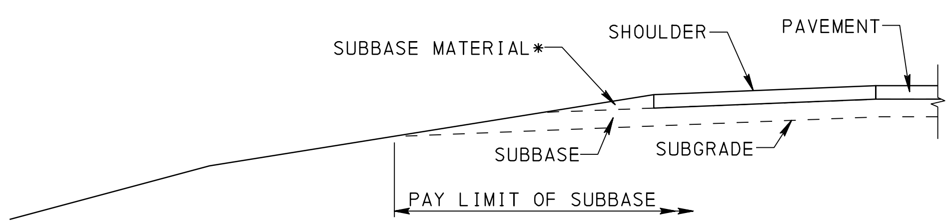


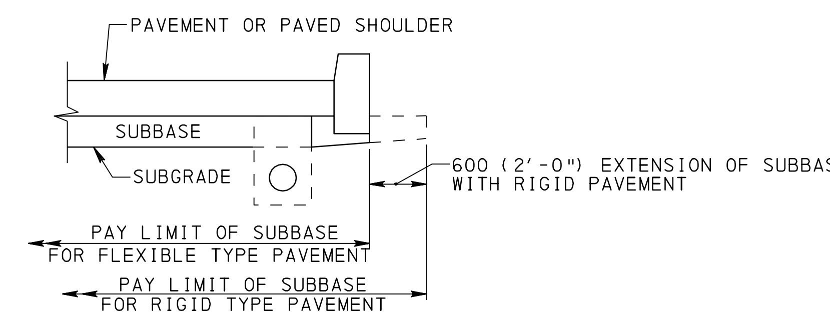


NOTES

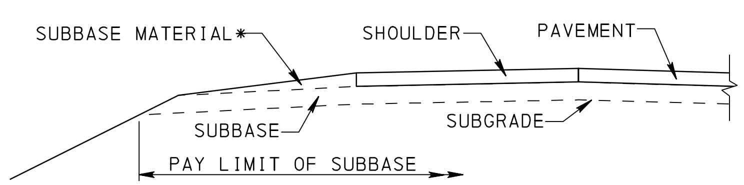
1. SUBGRADE IS INCIDENTAL TO THE IMMEDIATE OVERLYING PAVEMENT STRUCTURE.

2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.





NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

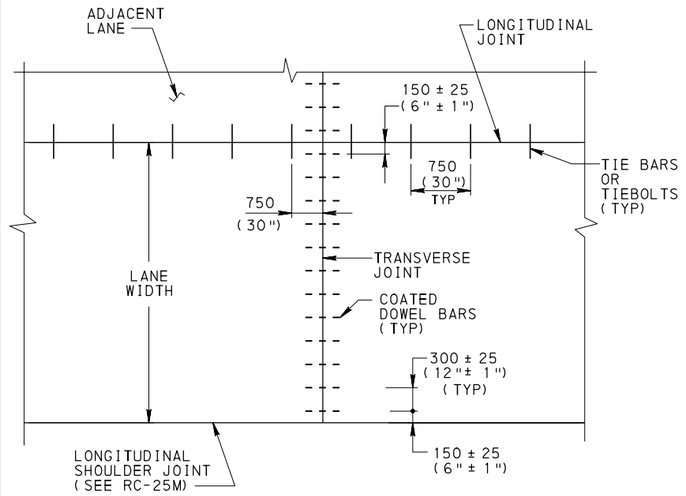


*CONSIDER THE PAYMENT FOR THIS AREA OF SUBBASE INCIDENTAL TO THE SHOULDER.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

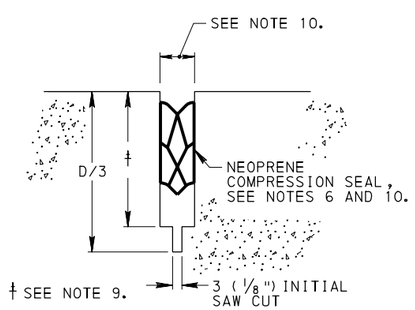
PAY LIMIT OF SUBBASE

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 1 RC-13M

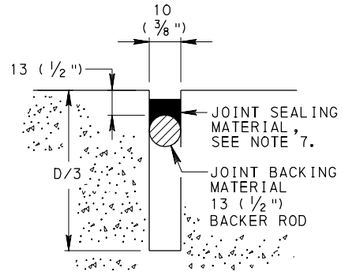


TYPICAL LAYOUT

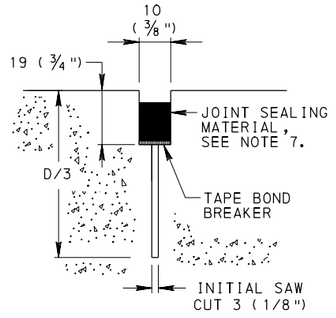
SEE NOTE 14



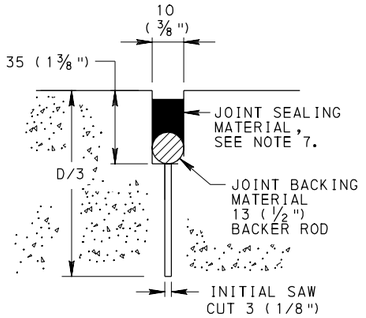
DETAIL A



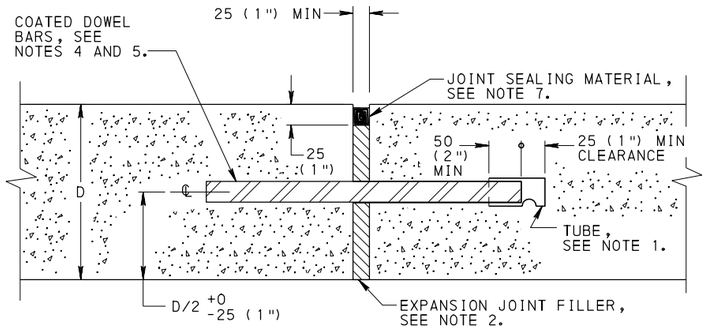
DETAIL B



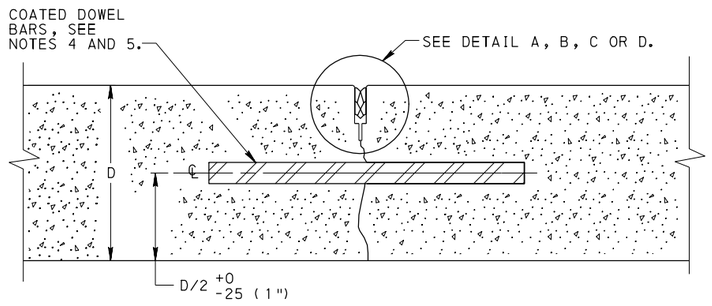
DETAIL C



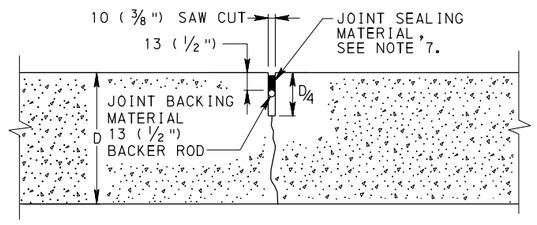
DETAIL D



TYPE E

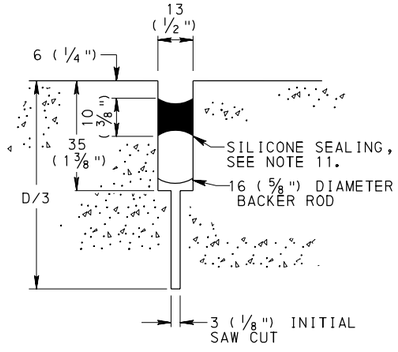


TYPE D



TYPE P

SEE RC-27M



ALTERNATE TYPE P

JOINT DETAIL

NOTES

1. PLACE A TUBE FROM A MANUFACTURER LISTED IN BULLETIN 15 OVER THE LUBRICATED END OF ALL DOWEL BARS USED IN TYPE E JOINTS AND PROVIDE A MINIMUM 25 (1") CLEARANCE POCKET ASSURED BY MEANS OF A POSITIVE SPACING DEVICE.
2. CUT EXPANSION JOINT FILLER MATERIAL TO CONFORM TO THE CROSS SECTION OF THE PAVEMENT AND FURNISH IN STRIPS EQUAL TO THE WIDTH OF THE PAVEMENT SLAB. MAKE THE TOP SURFACE SMOOTH AND HAVE HOLES PUNCHED FOR THE DOWEL BARS. PROVIDE A SNUG FIT WITHOUT LOSS IN THICKNESS OF THE MATERIAL.
3. CONSTRUCT ALL TRANSVERSE JOINTS PERPENDICULAR TO THE CENTERLINE.
4. USE MINIMUM 32ø x 450 (1¼"ø x18") LONG DOWEL BARS FOR PAVEMENT DEPTHS 250 (10") OR LESS AND MINIMUM 38ø x 450 (11#2"ø x 18") LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 250 (10"). APPROVED ALTERNATE DOWEL BARS HAVING EQUIVALENT PROPERTIES TO CONVENTIONAL ROUND DOWEL BARS MAY BE USED. COATED DOWEL BARS TO BE EITHER GRADE 300 (GRADE 40) OR GRADE 420 (GRADE 60).
5. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB.
6. USE ONLY APPROVED NEOPRENE SEALS, AS LISTED IN BULLETIN 15. INSTALL NEOPRENE SEALS TO A UNIFORM DEPTH WITH THE TOP OF THE SEAL FROM 6 (¼") TO 10 (⅜") BELOW THE LEVEL OF THE PAVEMENT SURFACE. MAKE THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDES OF THE SEAL AT THE SAME ELEVATION.
7. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (⅛") TO 6 (¼") BELOW THE SURFACE OF THE PAVEMENT. USE HEAT RESISTANT JOINT BACKING MATERIAL FOR HOT POURED JOINTS.
8. THE INITIAL SAW CUT FOR TYPE D JOINT IS NOT REQUIRED FOR CONSTRUCTION JOINTS.
9. SAW DEPTHS OF NEOPRENE SEALS:

SEAL SIZE	SAW CUT DEPTHS
25 (1")	47-50 (1⅞"-2")
32 (1¼")	50-53 (2"-2⅛")

10. ADJUST THE WIDTH OF THE SECOND SAW CUT ACCORDING TO THE SEAL SIZE AND PAVEMENT SURFACE TEMPERATURE AT THE TIME OF SAWING, AS FOLLOWS:

JOINT SPACING	SEAL SIZE	WIDTH OF SAW CUT		
		<16°C	16°C TO 27°C	>27°C
4.5 m & 6.0 m	25	16	14	13
9.0 m	32	19	16	13

JOINT SPACING	SEAL SIZE	WIDTH OF SAW CUT		
		<60°F	60°F TO 80°F	>80°F
(15' & 20')	(1")	(5⁄8")	(9⁄16")	(½")
(30')	(1¼")	(¾")	(⅝")	(½")

11. WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4(a), IS SELECTED FOR USE IN TRANSVERSE JOINTS (TYPE P ONLY) OR TRANSVERSE SHOULDER JOINTS, USE THE SAME JOINT SEALING MATERIAL IN THE LONGITUDINAL JOINTS (ALTERNATE TYPE L AND ALTERNATE LONGITUDINAL SHOULDER JOINTS).
12. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
13. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408.
14. ALIGN CONCRETE PAVEMENT JOINTS WITH INLET JOINTS, CURB JOINTS AND ANY OTHER ADJACENT STRUCTURES. CONSTRUCT THE JOINT BETWEEN THEM WITH 6 (¼") POLYSTYRENE BONDBREAKER BOARD AND SEAL WITH ASPHALT SEALING MATERIAL.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

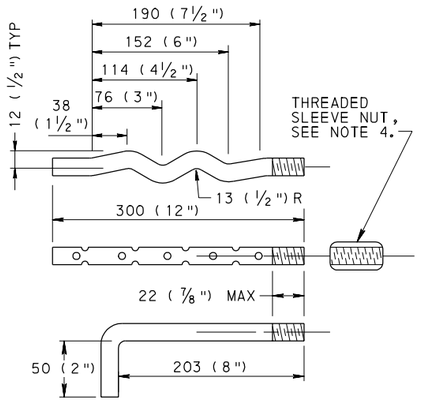
CONCRETE PAVEMENT JOINTS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

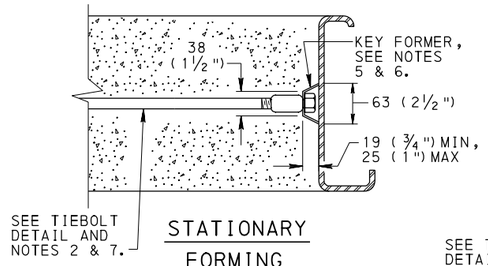
SHT 1 OF 3

RC-20M

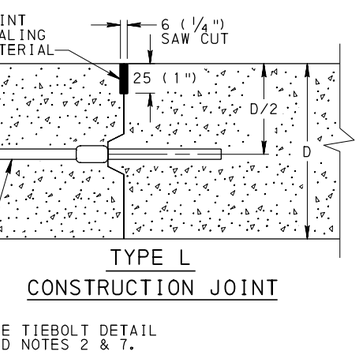


TIEBOLT DETAIL

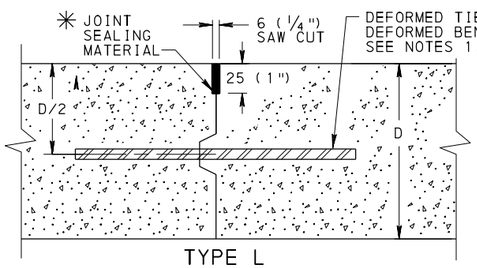
MAKE TIEBOLTS 14 (9/16 ") Ø BAR WITH ROLLED THREADS OR 16 (⅝ ") Ø BAR WITH CUT THREADS. PERMIT ONLY TIEBOLTS WHICH ARE SUPPLIED BY AN APPROVED MANUFACTURER, AS LISTED IN BULLETIN 15. SEE PUBLICATION 408, SECTIONS 709.1 AND 705.2(b).



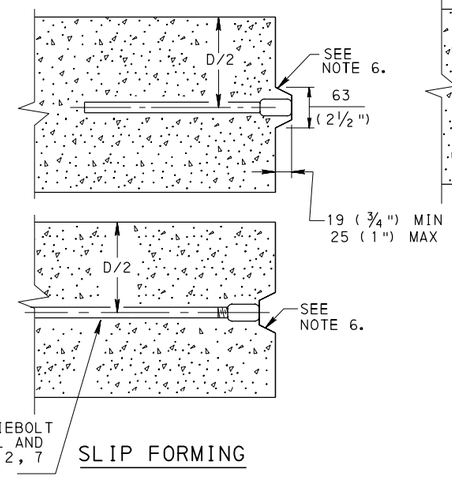
STATIONARY FORMING



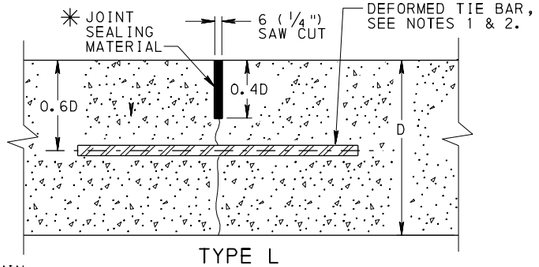
TYPE L CONSTRUCTION JOINT



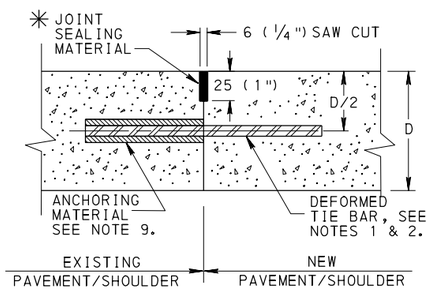
TYPE L CONSTRUCTION JOINT



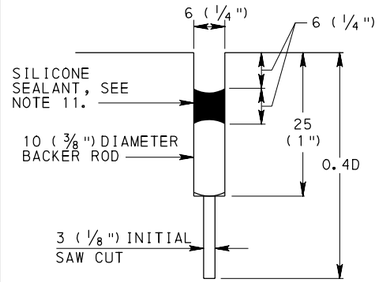
SLIP FORMING



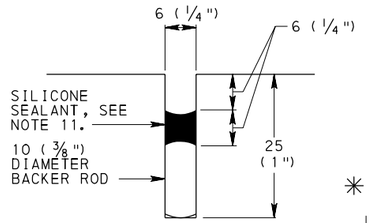
TYPE L CONTRACTION JOINT



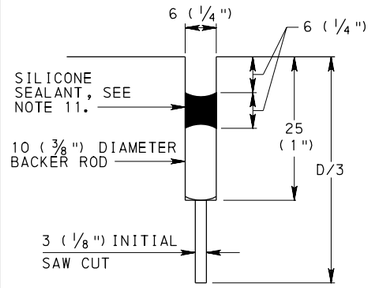
LONGITUDINAL JOINT WHEN TYING INTO EXISTING CONCRETE PAVEMENT/SHOULDER



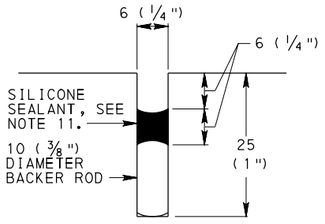
ALTERNATE TYPE L CONTRACTION JOINT



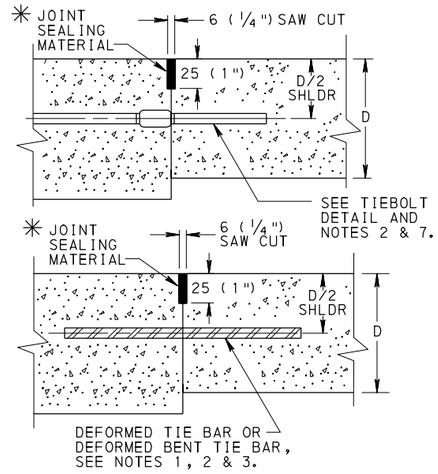
ALTERNATE TYPE L CONSTRUCTION JOINT



ALTERNATE TRANSVERSE SHOULDER JOINT



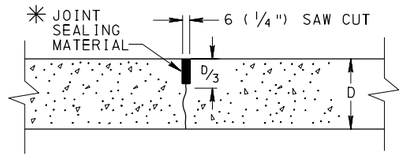
ALTERNATE LONGITUDINAL SHOULDER JOINT



LONGITUDINAL SHOULDER JOINTS

SEE NOTE 8

(✳) DENOTES, SEE NOTE 12.



TRANSVERSE SHOULDER JOINT

NOTES

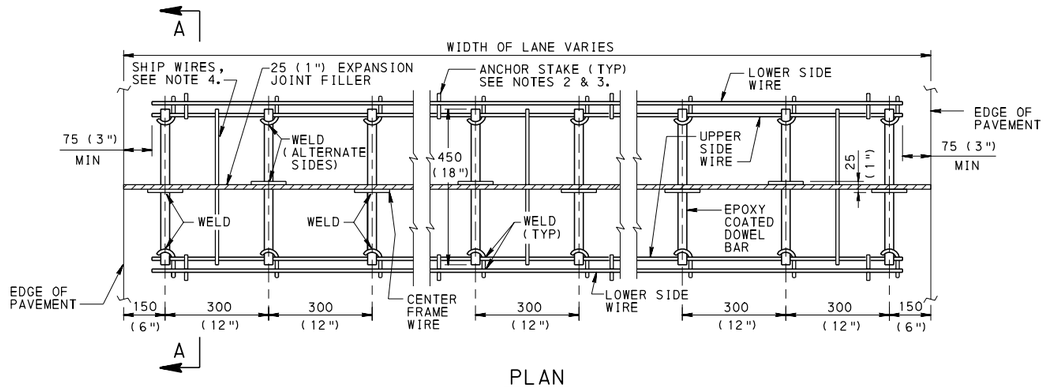
1. SPECIFY #16 (#5) TIE BARS 750 ±6 (30" ± ¼ ") LONG, SPACED 750 (30") CENTER TO CENTER MAXIMUM. PLACE PERPENDICULAR TO AND CENTERED OVER THE LONGITUDINAL JOINT ±25 (±1"). EMBED TIE BARS D/2 ±20 (± ¾ ") OR 100 ±13 (4" ± ½ "), WHICH-EVER IS GREATER, EXCEPT FOR TYPE L CONTRACTION JOINTS. FOR TYPE L CONTRACTION JOINTS EMBED TIE BARS 0.6D. WHEN ADJOINING TO AN UNEQUAL PAVEMENT OR SHOULDER DEPTH, D IS THE DEPTH OF THE THINNER SECTION. TIE BARS MUST MEET THE MINIMUM PULL-OUT RESISTANCE SPECIFIED IN PUBLICATION 408, SECTION 501.3(j).
2. EPOXY COAT TIE BARS AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(c). EPOXY COAT OR GALVANIZE TIEBOLTS AND THREADED SLEEVE NUTS, EXCLUDING THREADS, AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(c) OR SECTION 1105.02(s) RESPECTIVELY. STRAIGHT TIE BARS TO BE EITHER GRADE 300 (GRADE 40) OR GRADE 420 (GRADE 60). BENT TIE BARS TO BE GRADE 300 (GRADE 40) ONLY.
3. STRAIGHTEN DEFORMED BENT TIE BARS SO THAT THE ANGLE MADE WITH THE LONGITUDINAL JOINT IS AT LEAST 60 DEGREES.
4. MAKE THREADED SLEEVE NUT FROM STEEL PIPE OR HEXAGONAL STEEL BAR 27Ø x 48 (1 1/16 "Ø x 1 ⅞ ") LONG OR HIGH STRENGTH STEEL BAR 22Ø x 50 (2 7/32 "Ø x 2") LONG.
5. SECURELY FASTEN THE KEY FORMER TO THE STEEL FORM. THE CONTRACTOR SHALL HAVE A METHOD, ACCEPTABLE TO THE ENGINEER, OF TEMPORARILY SECURING THE TIEBOLT TO THE KEY FORMER OR FORM DURING PLACEMENT OF THE CONCRETE.
6. FORM MALE OR FEMALE KEYWAYS AS INDICATED FOR PAVEMENT DEPTHS GREATER THAN 250 (10").
7. PLACE TIEBOLTS AT 750 (30") CENTER TO CENTER MAXIMUM SPACING. EMBED TIEBOLTS D/2 ± 20 (± ¾ ") OR 100± 13 (4" ± ½ "), WHICH-EVER IS GREATER. WHEN ADJOINING TO AN UNEQUAL PAVEMENT OR SHOULDER DEPTH, D IS THE DEPTH OF THE THINNER SECTION. SCREW TIEBOLTS UNTIL SNUG. FOR 150, 180, AND 200 (6", 7" AND 8") PAVEMENTS AND/OR SHOULDERS, MAKE THE WIGGLE OR HOOK PORTION OF THE TIEBOLT PARALLEL TO THE GRADE. IF NECESSARY, LOOSEN TIEBOLTS SO THAT THE HOOK OR WIGGLE IS PARALLEL TO THE GRADE.
8. AT THE CONTRACTOR'S OPTION, THE CONCRETE SHOULDER MAY BE CONSTRUCTED AT THE SAME TIME AS THE PAVEMENT. IN THIS CASE, USE A TYPE L CONTRACTION JOINT.
9. USE AN APPROVED EPOXY ANCHORING MATERIAL TO WITHSTAND THE NECESSARY MINIMUM PULL-OUT RESISTANCE SPECIFIED IN PUBLICATION 408, SECTION 501.3(j). TIE BAR HOLE DIAMETER IN EXISTING PAVEMENT, AS PER MANUFACTURER'S RECOMMENDATION. USE ROTARY IMPACT DRILL TO AVOID IMPACTING FINES INTO HOLE.
10. DO NOT USE THE HOOK COMPONENT OF THE TIEBOLT ASSEMBLY WHEN SLIP FORMING.
11. WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4(a), IS SELECTED FOR USE IN TRANSVERSE JOINTS (TYPE P ONLY) OR TRANSVERSE SHOULDER JOINTS, USE THE SAME JOINT SEALING MATERIAL IN THE LONGITUDINAL JOINTS (ALTERNATE TYPE L AND ALTERNATE LONGITUDINAL SHOULDER JOINTS).
12. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (⅛ ") TO 6 (¼ ") BELOW THE PAVEMENT SURFACE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

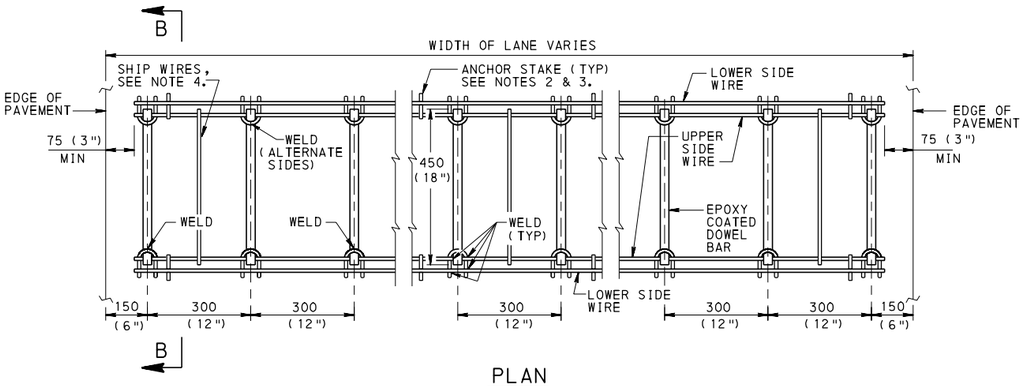
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT JOINTS

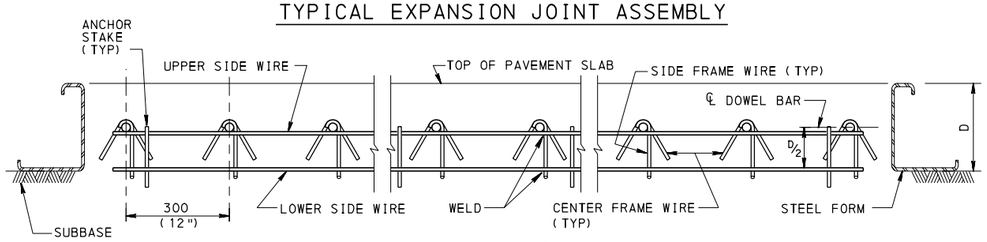
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 3
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-20M



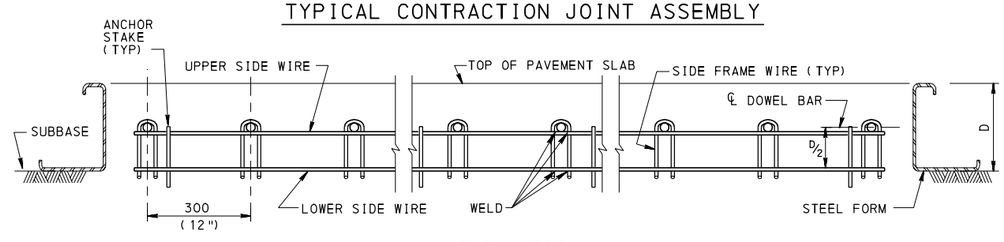
PLAN
TYPICAL EXPANSION JOINT ASSEMBLY



PLAN
TYPICAL CONTRACTION JOINT ASSEMBLY



ELEVATION
EXPANSION JOINT ASSEMBLY



ELEVATION
CONTRACTION JOINT ASSEMBLY

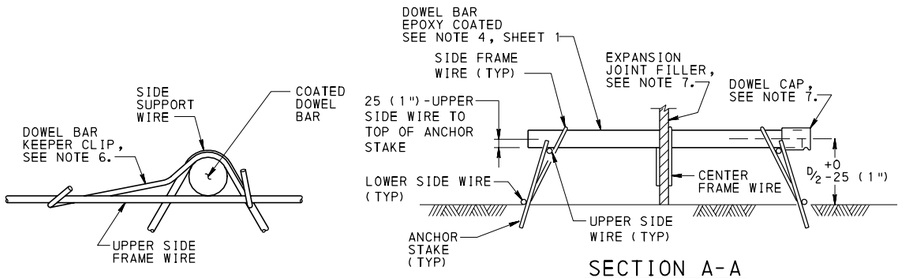
NOTES

1. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. ANCHOR STAKES SHOULD NOT TOUCH ANY DOWEL BAR AND MAY BE SPACED AS NEEDED TO PROVIDE STABILITY.
2. PROVIDE ANCHOR STAKES TO SECURE UNIT FROM MOVEMENT INCLUDING UPLIFT. USE A MINIMUM OF EIGHT STAKES PER 3.6 m (12'-0") LANE UNIT (4 STAKES PER SIDE) THAT EXTEND 25 (1") ABOVE THE UPPER SIDE WIRE. STAKES SHOULD NOT TOUCH DOWEL BARS AND MAY BE SPACED AS NEEDED TO PROVIDE STABILITY.
3. PROVIDE #13 (#4) DEFORMED REINFORCEMENT BARS OR 13 (1/2") SMOOTH RODS AS ANCHOR STAKES. STAKES SHALL BE OF SUFFICIENT LENGTH SUCH THAT A MINIMUM OF 200 (8") WILL BE EMBEDDED IN THE BASE COURSE (OGS, ASPHALT TREATED PERMEABLE BASE COURSE, CEMENT TREATED PERMEABLE BASE COURSE OR 2A). WHEN LEAN CONCRETE BASE COURSE OR UNBONDED CONCRETE OVERLAY IS DESIGNED PROVIDE SUFFICIENT ANCHORAGE TO PREVENT MOVEMENT OF THE BASKET ASSEMBLY. THIS MAY INCLUDE ANCHOR PINS, HILTI NAILS, TIE STRAPS TIED TO THE TOP SIDE OF THE BASKET, OR OTHER ACCEPTABLE MEANS TO HOLD THE ASSEMBLY STATIONARY DURING THE PAVING OPERATION AS DIRECTED BY THE ENGINEER.
4. AFTER EACH LOAD TRANSFER ASSEMBLY IS SECURED IN PLACE, REMOVE AND PROPERLY DISPOSE OF ALL TIE WIRES OR SHIPPING WIRES.
5. PROVIDE SIDE SUPPORT ASSEMBLY WIRES CONFORMING TO THE CURRENT ASTM DESIGNATION A-510 SPECIFICATIONS FOR WIRE RODS AND COURSE ROUND WIRE, CARBON STEEL AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

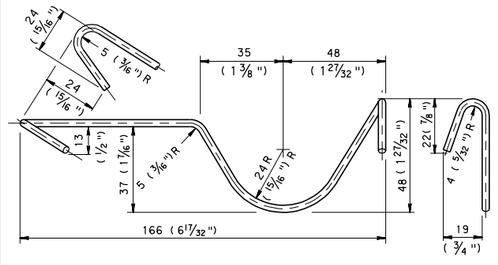
PAVEMENT THICKNESS	UPPER AND LOWER SIDE FRAME WIRES	"J" SIDE SUPPORT WIRES	"A" SIDE SUPPORT WIRES
250 (10") OR LESS	8.41 (0.331"ø MIN) 2/0 GAUGE	10.16 (0.400"ø MIN)	8.41 (0.331"ø MIN) 2/0 GAUGE
GREATER THAN 250 (10")	9.19 (0.362"ø MIN) 3/0 GAUGE	11.35 (0.437"ø MIN)	9.19 (0.362"ø MIN) 3/0 GAUGE

6. DOWEL BAR KEEPER CLIPS MAY BE USED IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONTRACTION AND EXPANSION JOINT ASSEMBLIES.
7. FABRICATE AND SHIP NEST ALL DOWEL, SIDE SUPPORT AND CENTER SUPPORT ASSEMBLIES. ASSEMBLE EXPANSION JOINT FILLER, ANCHOR STAKES AND DOWEL CAPS IN THE FIELD.
8. PROVIDE DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE. MAKE TOLERANCE OF THIS PLACEMENT WITHIN ± 6 (±1/4") PER DOWEL BAR.
9. PROVIDE DOWELS AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408.
10. WELD REQUIREMENTS AS LISTED BELOW AND TESTED PER MANUFACTURER'S QUALITY CONTROL PLAN FOR WELD SHEAR.
11. WIRE TOLERANCES PER ASTM 510M IS 0.05 (0.003").

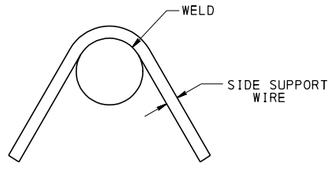
PAVEMENT THICKNESS	UPPER & LOWER WIRE TO "A"&"J" SIDE SUPPORT	DOWEL TO SUPPORT ASSEMBLY
250 (10") OR LESS	360 kg (794 lb)	540 kg (1190 lb)
GREATER THAN 250 (10")	540 kg (1190 lb)	900 kg (1984 lb)



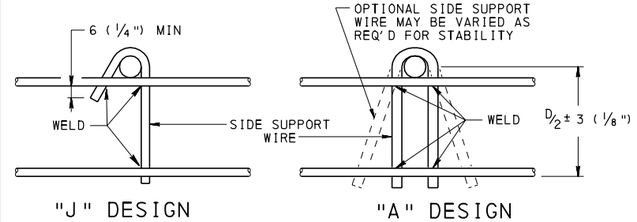
SECTION A-A
EXPANSION JOINT ASSEMBLY



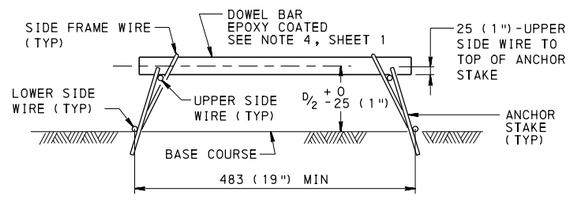
DOWEL BAR KEEPER CLIP



CENTER FRAME WIRE DETAIL



TYPICAL SIDE FRAME DETAILS



SECTION B-B
CONTRACTION JOINT ASSEMBLY

TYPICAL LOAD TRANSFER ASSEMBLY		
LANE WIDTH	OVERALL UNIT LENGTH	NO. OF DOWELS
2.7 m (9'-0")	2.55 m (8'-6")	9
3.0 m (10'-0")	2.85 m (9'-6")	10
3.3 m (11'-0")	3.15 m (10'-6")	11
3.6 m (12'-0")	3.45 m (11'-6")	12

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

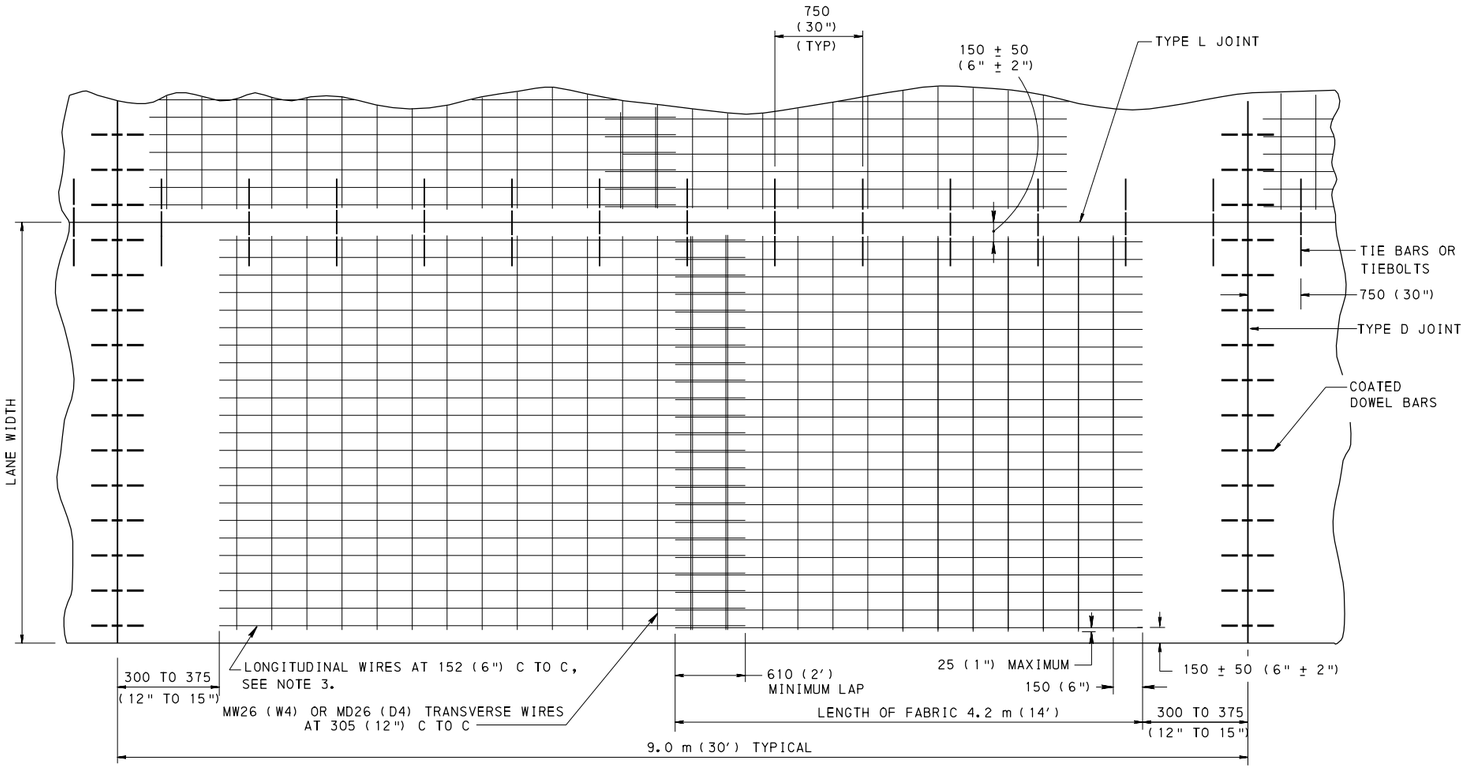
CONCRETE PAVEMENT JOINTS NON-SKEWED LOAD TRANSFER ASSEMBLIES

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

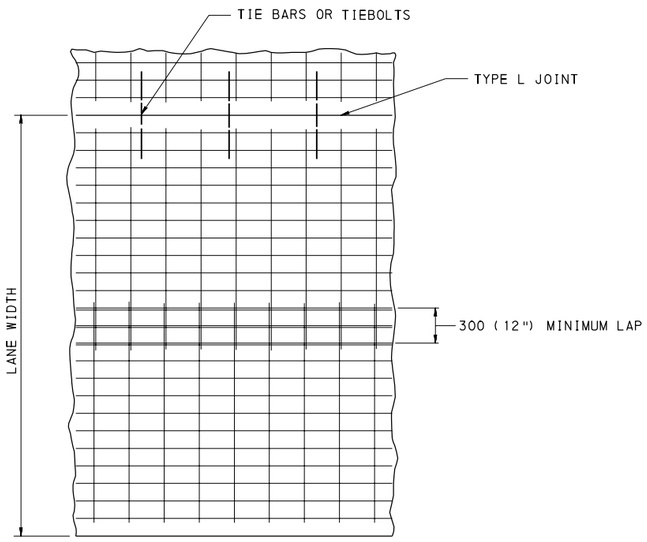
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 3 OF 3

RC-20M



WIRE FABRIC REINFORCEMENT



ALTERNATE LAPPED FABRIC

NOTES

1. FOR VARIABLE WIDTH PAVEMENT CUT THE REINFORCEMENT AS REQUIRED.
2. WIRE FABRIC REINFORCEMENT MAY BE PLACED WITH TRANSVERSE WIRES ABOVE OR BELOW LONGITUDINAL WIRES.
3. PROVIDE LONGITUDINAL WIRES FOR WIRE FABRIC REINFORCEMENT OF THE FOLLOWING MINIMUM SIZES:

PAV'T DEPTH	MIN LONG WIRE SIZE
200 (8")	MW35 OR MD35 (W5.5 OR D5)
230 (9")	MW40 OR MD35 (W6 OR D5.5)
250 (10")	MW45 OR MD45 (W7 OR D6.5)
280 (11")	MW50 OR MD45 (W7.5 OR D7)
300 (12")	MW55 OR MD50 (W8 OR D7.5)
330 (13")	MW60 OR MD50 (W9 OR D8)

4. HINGED FABRIC REINFORCEMENT MAY BE USED. HAVE HINGE DETAIL APPROVED BY THE ENGINEER.
5. SECURELY TIE ALL LONGITUDINAL AND TRANSVERSE LAPS OF WIRE FABRIC REINFORCEMENT.
6. ON PROJECTS WHERE ADDITIONAL LANES ARE ADDED TO EXISTING CEMENT CONCRETE PAVEMENTS AND THE EXISTING JOINT SPACING IS MORE THAN 14.2 m (46.5'), USE A MINIMUM LONGITUDINAL WIRE SIZE OF MW60 OR MD60 (W9.5 OR D9).
7. WIRE FABRIC REINFORCEMENT MAY BE CONSTRUCTED OF SMOOTH WIRE (SIZES DESIGNATED BY W) OR DEFORMED WIRE (SIZES DESIGNATED BY D) OR A COMBINATION OF BOTH.
8. SEE RC-20M FOR JOINT DETAILS.
9. PROVIDE A MINIMUM DEPTH FOR PLACEMENT OF WIRE FABRIC REINFORCEMENT, MEASURED FROM TOP OF PAVEMENT TO TOP OF FABRIC OF 60 (2½") TO A MAXIMUM OF ONE HALF THE PAVEMENT DEPTH MINUS 15 ($^{D}/_{2}$ - ½").
10. WHEN THE RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'), A TYPE L JOINT IS REQUIRED AT THE MID-POINT.
11. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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REINFORCED CONCRETE PAVEMENT

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-21M

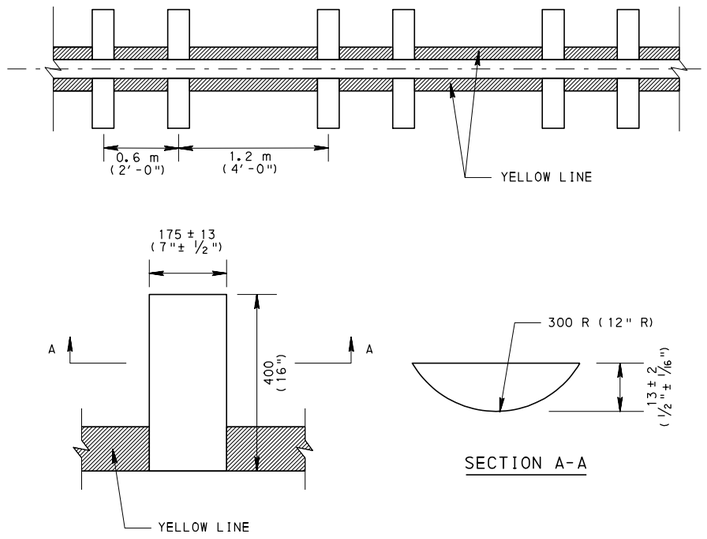

FIGURE 1

SEE TABLE

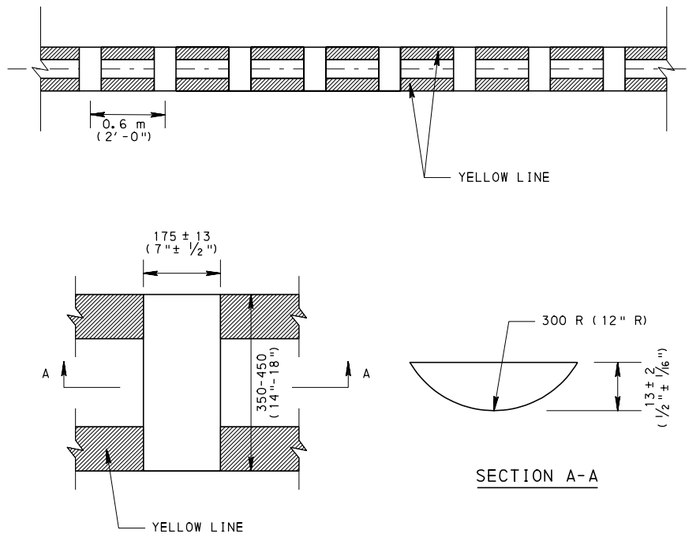

FIGURE 2

SEE TABLE

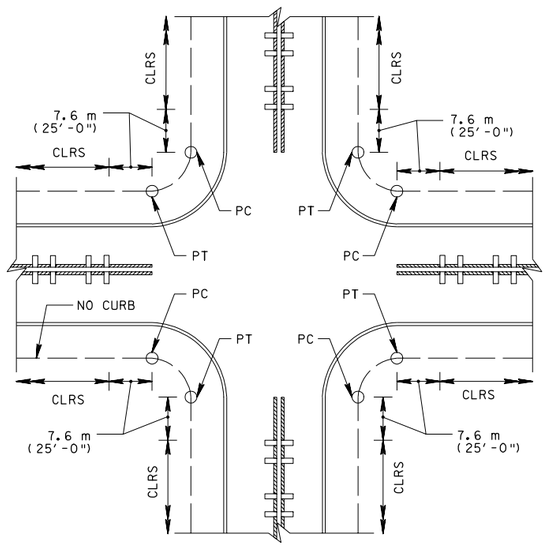

FIGURE 3

TYPICAL INTERSECTION

SEE NOTE 6

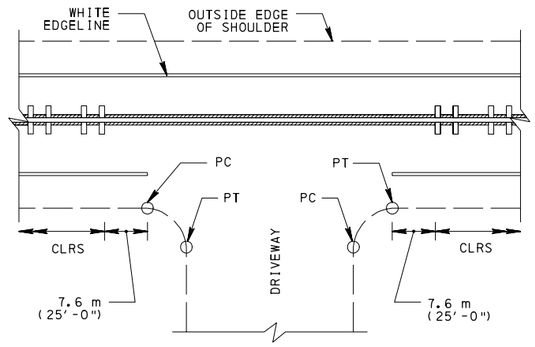

FIGURE 4

TYPICAL DRIVEWAY

SEE NOTE 6

NOTES

1. USE CENTERLINE RUMBLE STRIPS (CLRS) ONLY ON NON-INTERSTATE AND NON-EXPRESSWAY UNDIVIDED TWO-LANE OR FOUR-LANE RURAL AND URBAN ROADWAYS.
2. INSTALL MILLED CLRS ONLY ON BITUMINOUS PAVEMENT WITH AN ID-2, ID-3, OR SUPERPAVE SURFACE WITH BCBC BASE OR BETTER OR CONCRETE BASE WITH GREATER THAN 60 (2.5") OVERLAY.
3. IF CLRS ARE BEING RETROFIT ON EXISTING PAVEMENT, THE PAVEMENT SHOULD BE IN SUFFICIENTLY GOOD CONDITION, AS DETERMINED BY THE DISTRICT, TO EFFECTIVELY ACCEPT THE MILLING PROCESS WITHOUT RAVELING AND DETERIORATING. OTHERWISE, THE PAVEMENT NEEDS TO BE UPGRADED PRIOR TO MILLING ANY DESIRED CLRS.
4. DO NOT INSTALL CLRS ON BRIDGE DECKS.
5. CLRS MAY BE INSTALLED IN PASSING ZONES WHERE DEEMED APPROPRIATE BY DISTRICT SAFETY PERSONNEL. REDUCE DEPTH OF CUT TO 10 (3/8") IN AREAS WHERE PASSING IS PERMITTED.
6. CLRS ARE TO BE BROKEN FOR INTERSECTIONS (SEE FIGURE 3). ALSO CONSIDER BREAKING FOR DRIVEWAYS ACCORDING TO ENGINEERING JUDGMENT (SEE FIGURE 4).
7. COORDINATE THE MILLING OF CLRS WITH ALL NECESSARY PROJECT PHASES. DO NOT MILL THE CLRS UNTIL ALL APPROPRIATE CONSTRUCTION PHASES ARE COMPLETED.
8. COORDINATE THE MILLING OF CLRS WITH TRAFFIC LINE PAINTING OPERATIONS TO AVOID MILLING NEWLY APPLIED TRAFFIC LINES. INSTALL NEW YELLOW CENTERLINES WITHIN 2 WEEKS OF CLRS COMPLETION.
9. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUBLICATION 408.
10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
11. DEVIATION FROM THESE SPECIFICATIONS AND GUIDELINES MAY BE CONSIDERED IN ORDER TO SUIT FIELD CONDITIONS, PROVIDED THAT THE BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING HAS APPROVED.

LANE / SHOULDER CONDITIONS	CLRS FIGURE
LANE WIDTH GREATER THAN OR EQUAL TO 3.6 m (12'-0") AND PAVED SHOULDER A MINIMUM OF 0.9 m (3'-0")	FIGURE 1
LANE WIDTH OF 3.3 m (11'-0") AND PAVED SHOULDER A MINIMUM OF 0.9 m (3'-0")	FIGURE 1 OR 2
LANE WIDTH OF 3.3 m (11'-0") AND EITHER PAVED SHOULDER LESS THAN 0.9 m (3'-0") OR NO SHOULDER	FIGURE 2
LANE WIDTH OF 3.0 m (10'-0") WITH OR WITHOUT SHOULDER	FIGURE 2
LANE WIDTH LESS THAN 3.0 m (10'-0")	CONSULT BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

MILLED RUMBLE STRIPS UNDIVIDED ROADWAYS CENTERLINE RUMBLE STRIPS FOR NON-INTERSTATES AND NON-EXPRESSWAYS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 4

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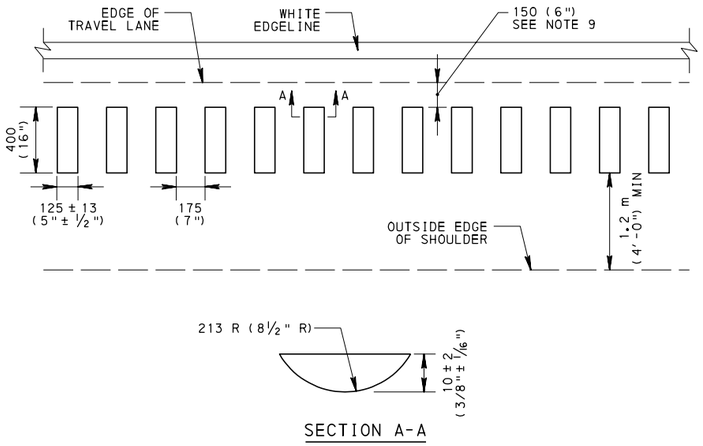
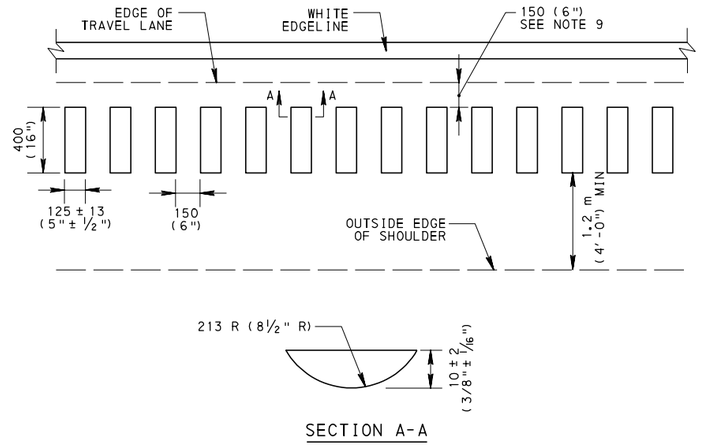


SECTION A-A

FIGURE 1
55 mph OR MORE POSTED SPEED
SEE TABLE



SECTION A-A

FIGURE 2
LESS THAN 55 mph POSTED SPEED
SEE TABLE

NOTES

1. USE BICYCLE TOLERABLE SHOULDER RUMBLE STRIPS (BTSRS) ONLY ON NON-INTERSTATE AND NON-EXPRESSWAY UNDIVIDED TWO-LANE OR FOUR-LANE RURAL AND URBAN ROADWAYS.
2. HAVE THE DISTRICT PEDESTRIAN / BICYCLE COORDINATOR JOINTLY REVIEW THE AREAS TO BE TARGETED.
3. THE PAVED SHOULDER MUST BE TYPE 1-SP, OR 6-SP SHOULDER OR WITH BETTER PAVEMENT STRUCTURE.
4. INSTALL BTSRS ONLY ON BITUMINOUS PAVEMENT WITH AN ID-2, ID-3, OR SUPERPAVE SURFACE WITH BCBC BASE OR BETTER.
5. IF BTSRS ARE BEING RETROFIT ON EXISTING PAVEMENT, THE PAVEMENT SHOULD BE IN SUFFICIENTLY GOOD CONDITION, AS DETERMINED BY THE DISTRICT, TO EFFECTIVELY ACCEPT THE MILLING PROCESS WITHOUT RAVELING AND DETERIORATING. OTHERWISE, THE PAVEMENT NEEDS TO BE UPGRADED PRIOR TO MILLING ANY DESIRED BTSRS.
6. DO NOT INSTALL BTSRS ON BRIDGE DECKS.
7. BTSRS ARE TO BE BROKEN FOR INTERSECTIONS (SEE FIGURE 3). ALSO CONSIDER BREAKING FOR DRIVEWAYS ACCORDING TO ENGINEERING JUDGMENT (SEE FIGURE 4).
8. COORDINATE THE MILLING OF BTSRS WITH ALL NECESSARY PROJECT PHASES. DO NOT MILL THE BTSRS UNTIL ALL APPROPRIATE CONSTRUCTION PHASES ARE COMPLETED.
9. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
10. DEVIATION FROM THESE SPECIFICATIONS AND GUIDELINES MAY BE CONSIDERED IN ORDER TO SUIT FIELD CONDITIONS, PROVIDED THAT THE BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING HAS APPROVED.

LANE / SHOULDER CONDITIONS	BTSRS FIGURE
LANE WIDTH GREATER THAN OR EQUAL TO 3.3 m (11'-0"), PAVED SHOULDER GREATER THAN OR EQUAL TO 1.8 m (6'-0"), AND POSTED SPEED OF 55 mph OR GREATER	FIGURE 1
LANE WIDTH GREATER THAN OR EQUAL TO 3.3 m (11'-0"), PAVED SHOULDER GREATER THAN OR EQUAL TO 1.8 m (6'-0"), AND POSTED SPEED OF LESS THAN 55 mph	FIGURE 2
PAVED SHOULDER LESS THAN 1.8 m (6'-0")	CONSIDER EDGELINE RUMBLE STRIPS

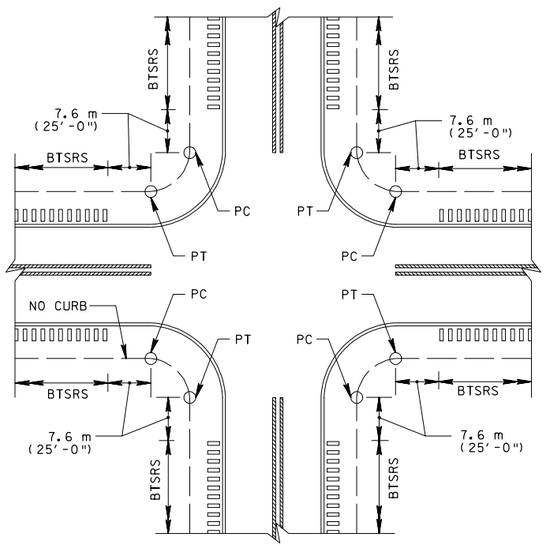


FIGURE 3
TYPICAL INTERSECTION
SEE NOTE 7

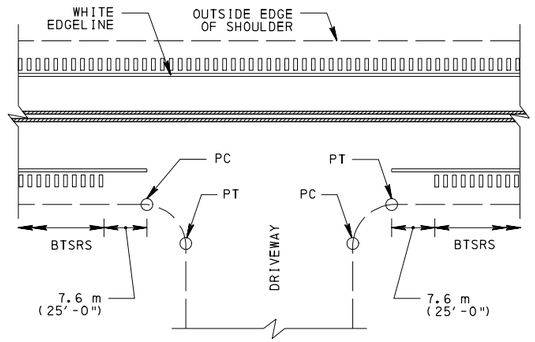


FIGURE 4
TYPICAL DRIVEWAY
SEE NOTE 7

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

MILLED RUMBLE STRIPS UNDIVIDED ROADWAYS BICYCLE TOLERABLE SHOULDER RUMBLE STRIPS FOR NON-INTERSTATES AND NON-EXPRESSWAYS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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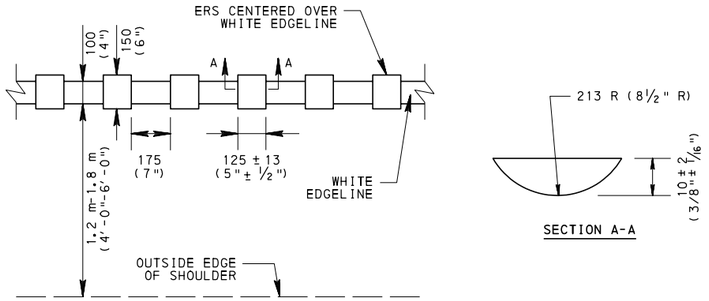

FIGURE 1

SEE TABLE

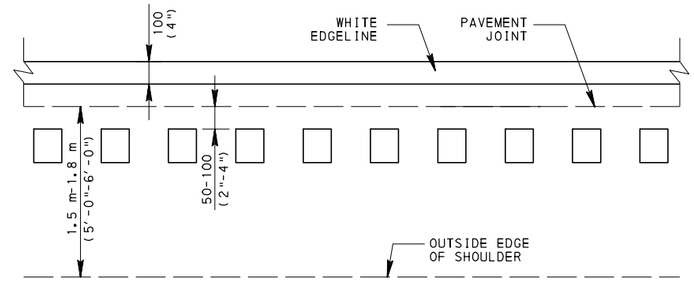

FIGURE 2

SEE NOTE 3

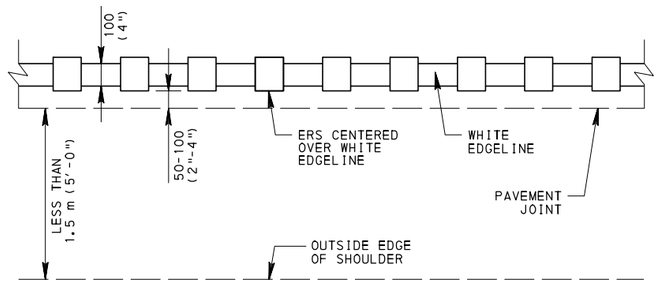

FIGURE 3

SEE NOTE 4

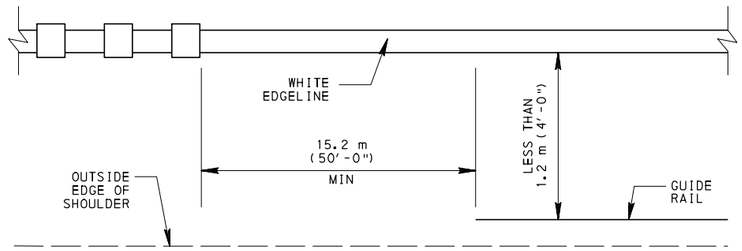

FIGURE 4

SEE NOTE 5

NOTES

1. USE EDGELINE RUMBLE STRIPS (ERS) ONLY ON NON-INTERSTATE AND NON-EXPRESSWAY UNDIVIDED TWO-LANE OR FOUR-LANE RURAL AND URBAN ROADWAYS.
2. HAVE THE DISTRICT PEDESTRIAN/BICYCLE COORDINATOR JOINTLY REVIEW THE AREAS TO BE TARGETED.
3. IF SHOULDER WIDTH IS 1.5 m TO 1.8 m (5'-0" TO 6'-0") AND THERE IS CONCERN WITH THE PAVEMENT JOINT BETWEEN THE ROADWAY AND SHOULDER, OFFSET ERS 50 TO 100 (2" TO 4") FROM THE JOINT INTO THE SHOULDER SURFACE (SEE FIGURE 2).
4. IF SHOULDER WIDTH IS LESS THAN 1.5 m (5'-0") AND THERE IS CONCERN WITH THE PAVEMENT JOINT BETWEEN THE ROADWAY AND SHOULDER, OFFSET ERS 50 TO 100 (2" TO 4") FROM THE JOINT INTO THE TRAVEL LANE SURFACE (SEE FIGURE 3).
5. DISCONTINUE ERS 15.2 m (50'-0") BEFORE AND AFTER ADJACENT GUIDE RAIL, WHERE THE FACE OF THE GUIDE RAIL IS LOCATED LESS THAN 1.2 m (4'-0") FROM THE EDGELINE OF THE ROADWAY (SEE FIGURE 4).
6. THE PAVED SHOULDER SHOULD BE TYPE 1-SP, OR 6-SP SHOULDER OR WITH BETTER PAVEMENT STRUCTURE.
7. INSTALL ERS ONLY ON BITUMINOUS PAVEMENT WITH AN ID-2, ID-3, OR SUPERPAVE SURFACE WITH BCBC BASE OR BETTER.
8. IF ERS ARE BEING RETROFIT ON EXISTING PAVEMENT, THE PAVEMENT AND SHOULDER SHOULD BE IN SUFFICIENTLY GOOD CONDITION, AS DETERMINED BY THE DISTRICT, TO EFFECTIVELY ACCEPT THE MILLING PROCESS WITHOUT RAVELING OR DETERIORATING THE PAVEMENT. OTHERWISE, BOTH THE PAVEMENT AND SHOULDER NEED TO BE UPGRADED PRIOR TO MILLING ERS.
9. DO NOT INSTALL ERS ON BRIDGE DECKS.
10. ERS ARE TO BE BROKEN FOR INTERSECTIONS (SEE FIGURE 5). ALSO CONSIDER BREAKING FOR DRIVEWAYS ACCORDING TO ENGINEERING JUDGMENT (SEE FIGURE 6).
11. COORDINATE THE MILLING OF ERS WITH ALL NECESSARY PROJECT PHASES. DO NOT MILL THE ERS UNTIL ALL APPROPRIATE CONSTRUCTION PHASES ARE COMPLETED.
12. COORDINATE THE MILLING OF ERS WITH TRAFFIC LINE PAINTING OPERATIONS TO AVOID MILLING NEWLY APPLIED TRAFFIC LINES. INSTALL NEW WHITE EDGELINES WITHIN 2 WEEKS OF ERS COMPLETION.
13. DEVIATION FROM THESE SPECIFICATIONS AND GUIDELINES MAY BE CONSIDERED IN ORDER TO SUIT FIELD CONDITIONS, PROVIDED THAT THE BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING HAS APPROVED.

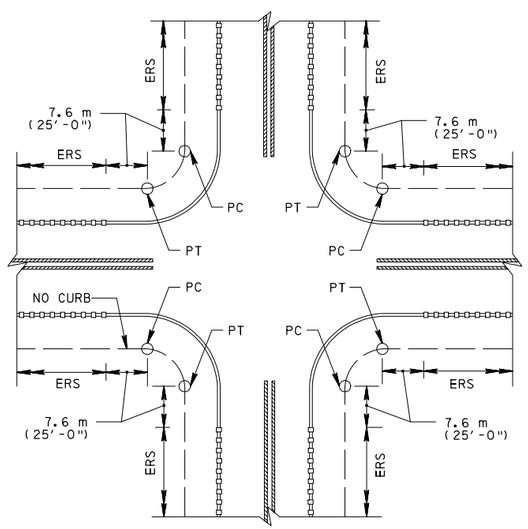

FIGURE 5

TYPICAL INTERSECTION

SEE NOTE 10

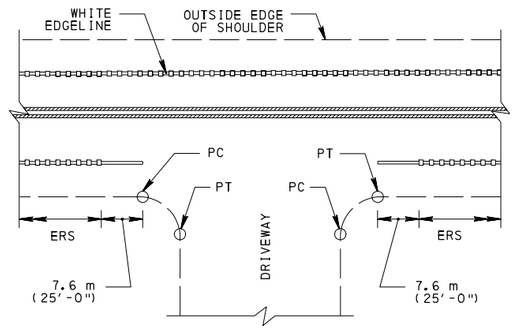

FIGURE 6

TYPICAL DRIVEWAY

SEE NOTE 10

LANE / SHOULDER CONDITIONS	ERS FIGURE
LANE WIDTH GREATER THAN OR EQUAL TO 3.3 m (11'-0") AND 1.2 TO 1.8 m (4'-0" TO 6'-0") OF PAVED SHOULDER	FIGURE 1
SHOULDER WIDTH GREATER THAN OR EQUAL TO 1.8 m (6'-0")	CONSIDER BICYCLE TOLERABLE SHOULDER RUMBLE STRIPS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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MILLED RUMBLE STRIPS UNDIVIDED ROADWAYS EDGELINE RUMBLE STRIPS FOR NON-INTERSTATES AND NON-EXPRESSWAYS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 4
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CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-22M

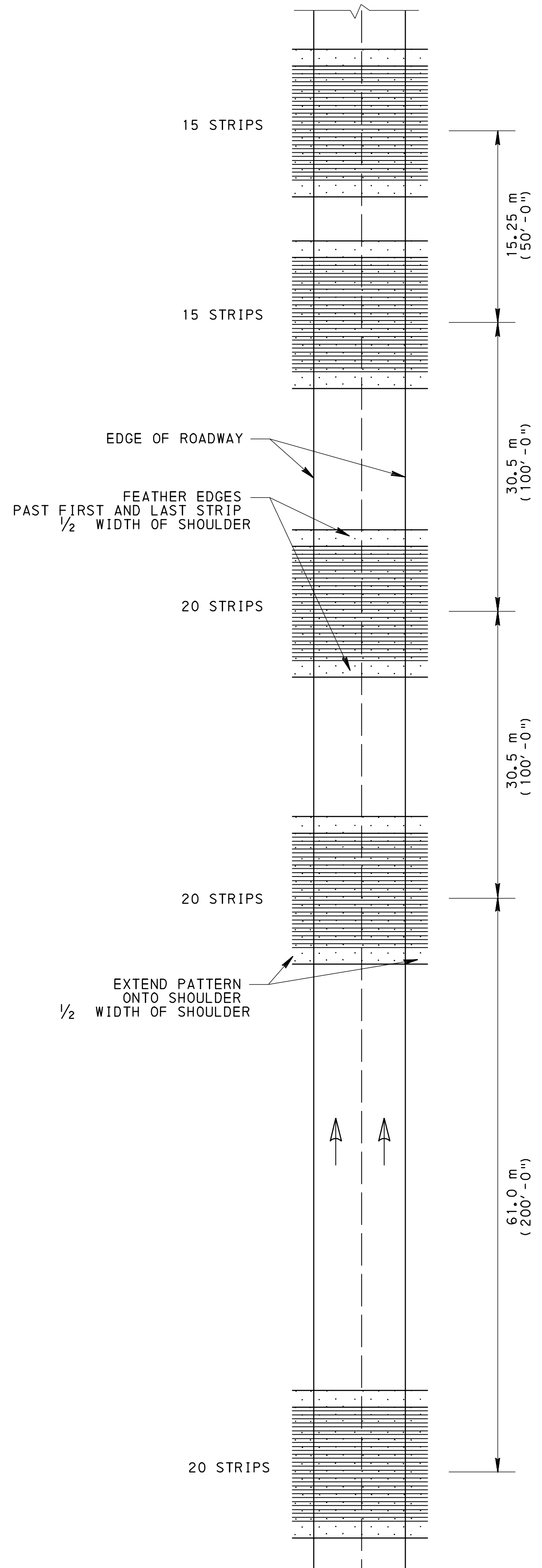

FIGURE 1
RUMBLE STRIP PATTERN A

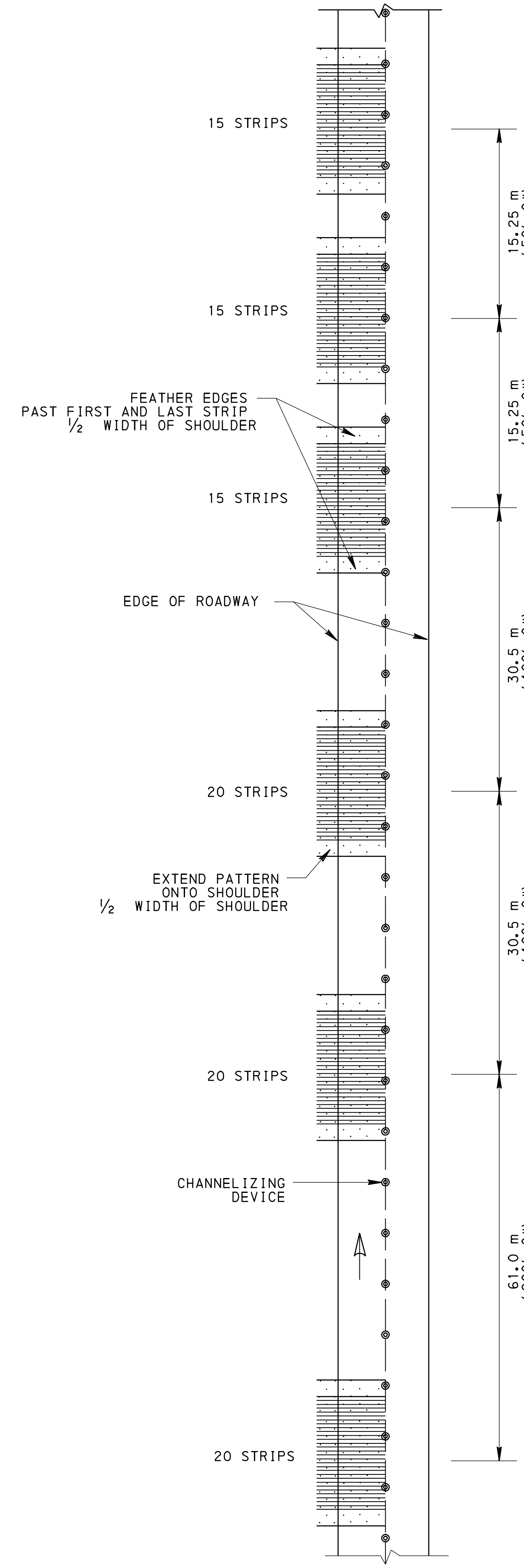

FIGURE 2
RUMBLE STRIP PATTERN B

NOTES

1. NAIL 13 x 100 (1/2" x 4") PLYWOOD STRIPS IN PLACE AT 300 (12") SPACING TO FORM GROOVES. APPLY JF-1 BITUMINOUS OVERLAY, THEN REMOVE PLYWOOD STRIPS (SEE FIGURE 3).
2. DEVIATION FROM THESE SPECIFICATIONS AND GUIDELINES MAY BE CONSIDERED IN ORDER TO SUIT FIELD CONDITIONS, PROVIDED THAT THE BUREAU OF HIGHWAY SAFETY AND TRAFFIC ENGINEERING HAS APPROVED.

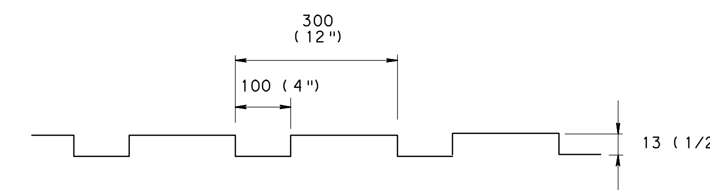

FIGURE 3
LONGITUDINAL CROSS SECTION
SEE NOTE 1

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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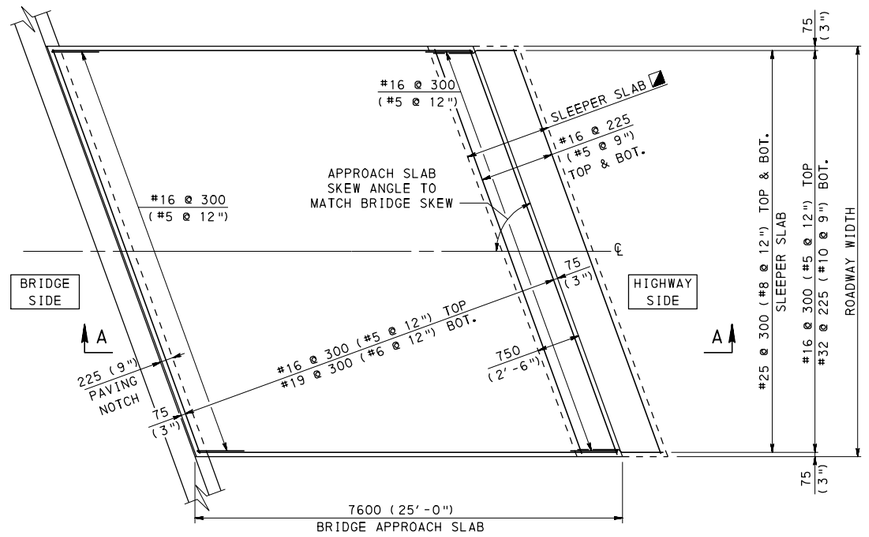
TEMPORARY BITUMINOUS RUMBLE STRIP PATTERNS

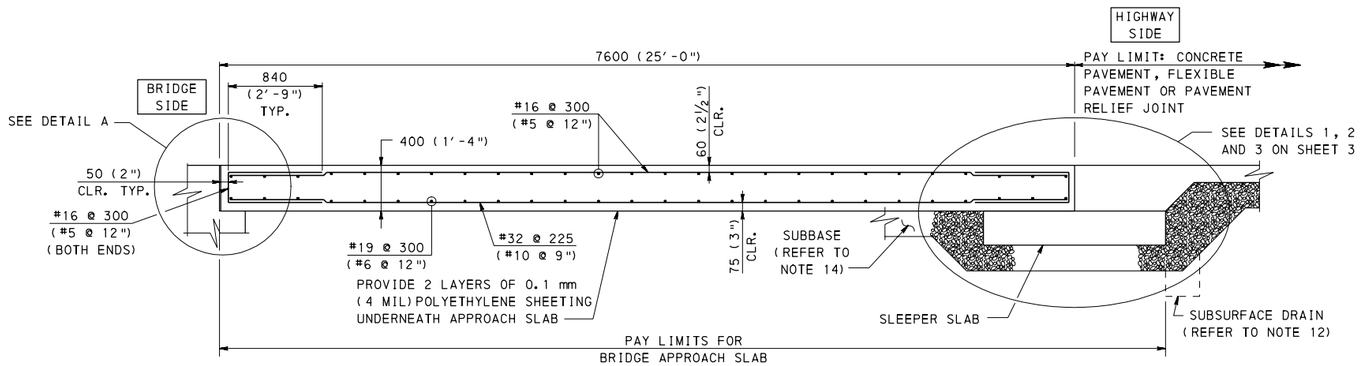
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-22M



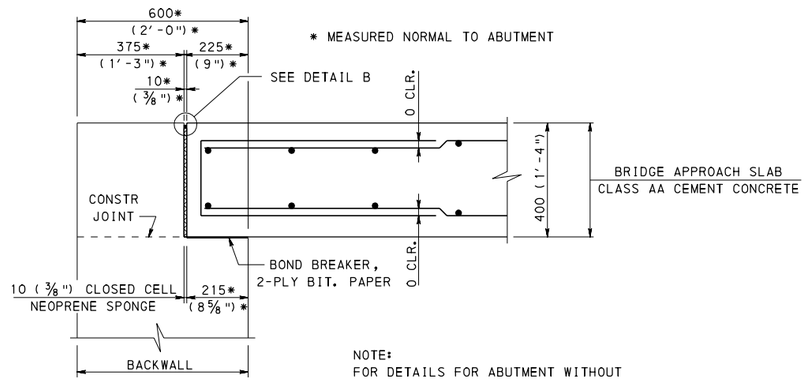
PLAN

APPROACH SLAB SET TO ROADWAY WIDTH

◪ 1500 (5'-0") ADJACENT TO FLEXIBLE PAVEMENT OR CONCRETE PAVEMENT
1800 (6'-0") ADJACENT TO PAVEMENT RELIEF JOINT



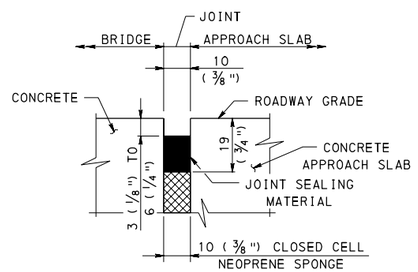
SECTION A-A



NOTE:
FOR DETAILS FOR ABUTMENT WITHOUT BACKWALL, SEE SHEET 2.

DETAIL A

APPROACH SLAB SUPPORTED ON ABUTMENT BACKWALL



DETAIL B

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
2. APPROACH SLAB SKEW ANGLE TO MATCH BRIDGE SKEW ANGLE. BRIDGE SKEW ANGLE MUST BE GREATER THAN OR EQUAL TO 45 DEGREES. IF THE BRIDGE SKEW ANGLE IS LESS THAN 45 DEGREES DETAILS MUST BE SHOWN ON THE STRUCTURE DRAWINGS.
3. CONSTRUCT APPROACH SLAB AND SLEEPER SLAB IN ACCORDANCE WITH THIS STANDARD OR AS INDICATED ON THE STRUCTURE DRAWINGS.
4. SLEEPER SLAB AND REINFORCEMENT BARS ARE INCIDENTAL TO THE BRIDGE APPROACH SLAB PAY ITEM.
5. CONSTRUCT THE BRIDGE APPROACH SLAB AFTER THE BRIDGE DECK IS CONSTRUCTED.
6. PLACE CONCRETE IN ONE CONTINUOUS OPERATION, UNLESS OTHERWISE INDICATED OR DIRECTED.
7. TRANSVERSE CONSTRUCTION JOINTS ARE NOT PERMITTED IN THE CONCRETE APPROACH SLAB OR SLEEPER SLAB.
8. WHEN CONSTRUCTION INVOLVES MORE THAN TWO LANES, CONNECT ADDITIONAL LANES USING TYPE L CONSTRUCTION JOINTS AS SHOWN ON RC-20M.
9. PROVIDE CLASS AA CEMENT CONCRETE IN THE APPROACH SLAB AND SLEEPER SLAB.
10. PROVIDE GRADE 420 (GRADE 60) DEFORMED EPOXY COATED REINFORCEMENT BARS IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.1(a)1 AND SECTION 709.1(c).
11. PROVIDE MINIMUM LAP SPLICES IN ACCORDANCE WITH BC-736M.
12. PROVIDE A SUBGRADE DRAIN (SEE RC-30M) ON THE LOW SIDE OF THE SLEEPER SLAB. MEASURE AND PAY FOR AS SPECIFIED IN PUBLICATION 408, SECTION 612.
13. BURN OFF, TO TOP OF BEAM, REINFORCEMENT AND/OR LIFTING DEVICES PROTRUDING INTO THE APPROACH SLAB.
14. SUBBASE THICKNESS BENEATH APPROACH SLAB AND SLEEPER SLAB TO MATCH THE ROADWAY SUBBASE THICKNESS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

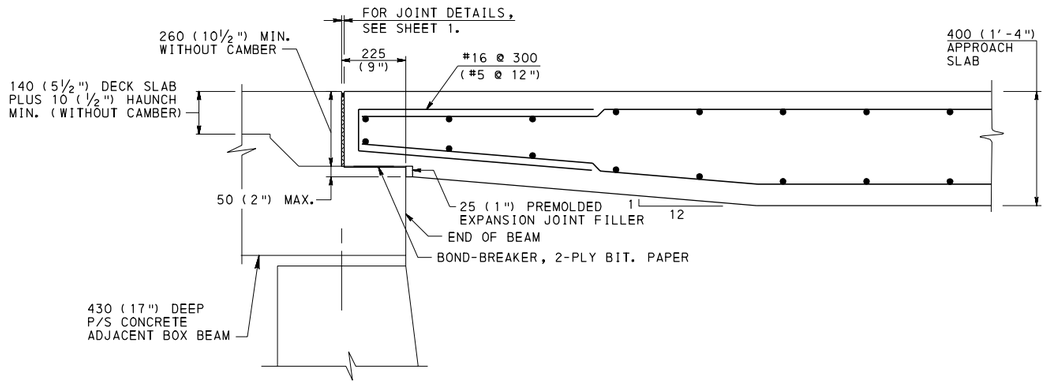
BRIDGE APPROACH SLABS

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

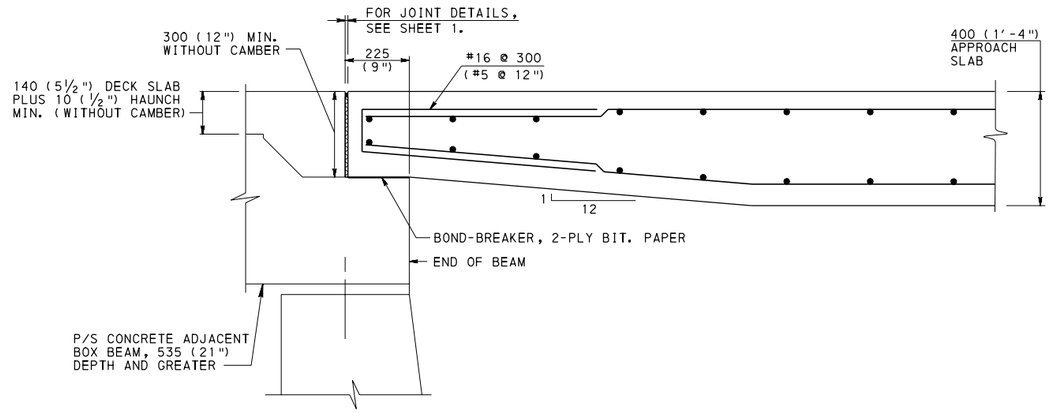
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 3

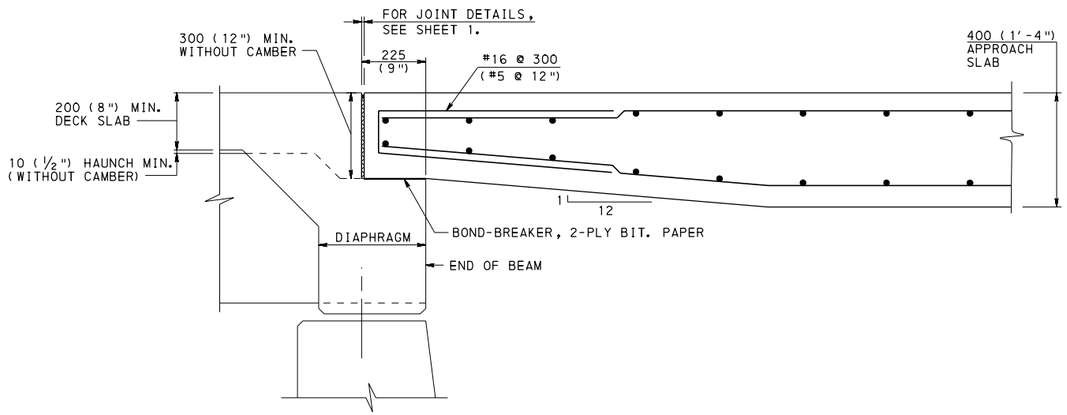
RC-23M



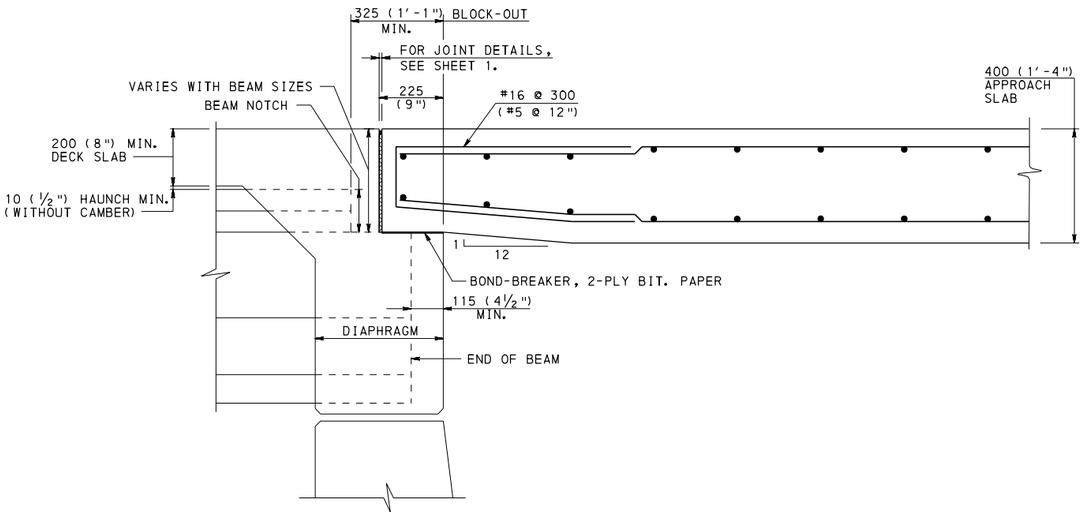
430 (17 ") DEEP P/S CONCRETE ADJACENT COMPOSITE BOX BEAMS



535 (21 ") TO 1675 (66 ") DEEP P/S CONCRETE ADJACENT COMPOSITE BOX BEAMS



P/S CONCRETE SPREAD BOX BEAMS



P/S CONCRETE I-BEAMS

ABUTMENTS WITHOUT BACKWALL DETAILS

NOTE

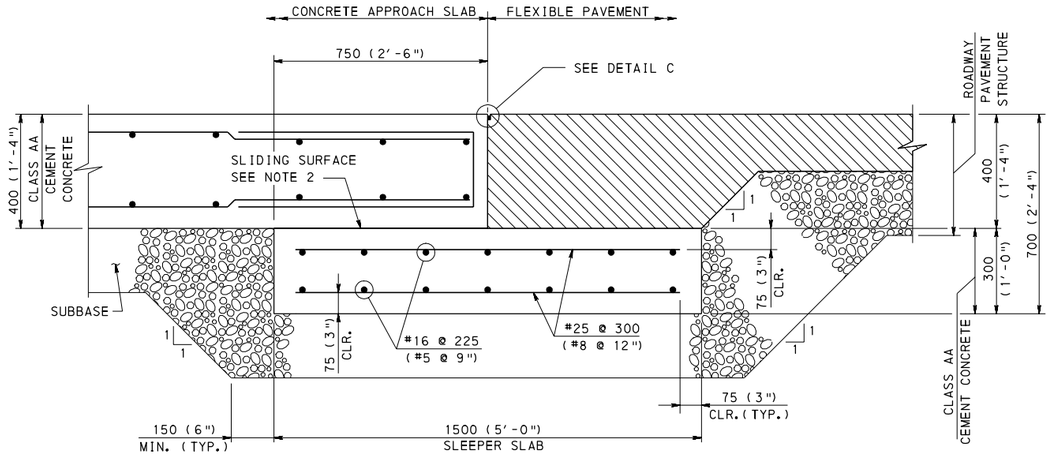
FOR NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

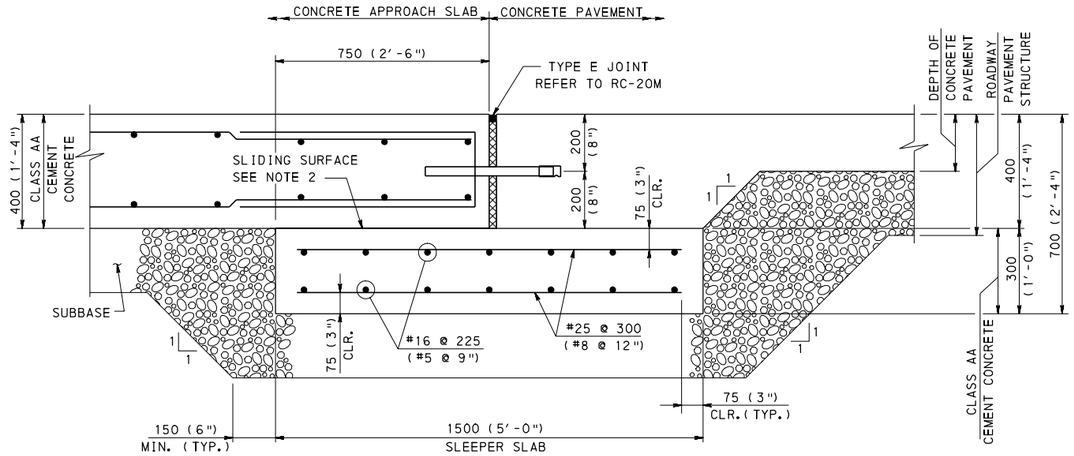
BRIDGE APPROACH SLABS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 3
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-23M



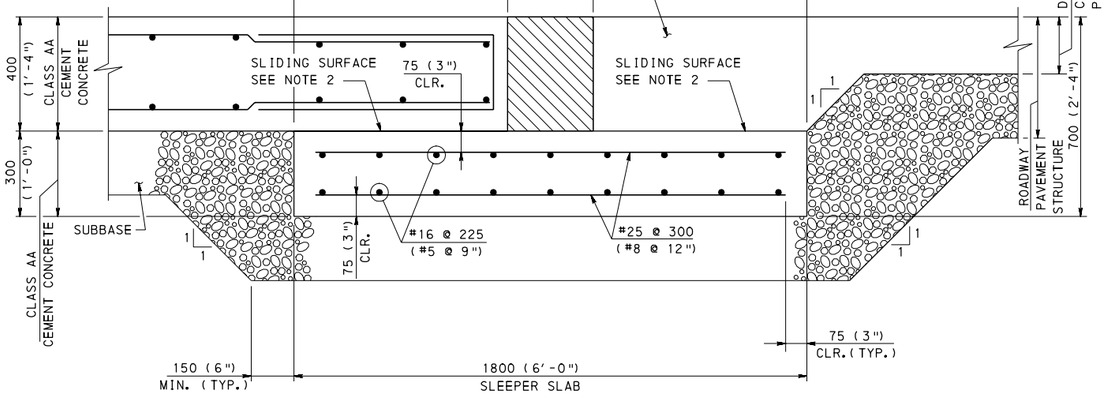
APPROACH SLAB - DETAIL 1

END OF APPROACH SLAB ADJACENT
TO FLEXIBLE PAVEMENT



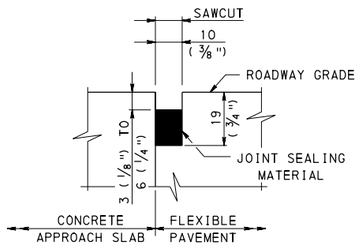
APPROACH SLAB - DETAIL 2

END OF APPROACH SLAB ADJACENT
TO CONCRETE PAVEMENT



APPROACH SLAB - DETAIL 3

END OF APPROACH SLAB ADJACENT TO
PAVEMENT RELIEF JOINT



DETAIL C

NOTES

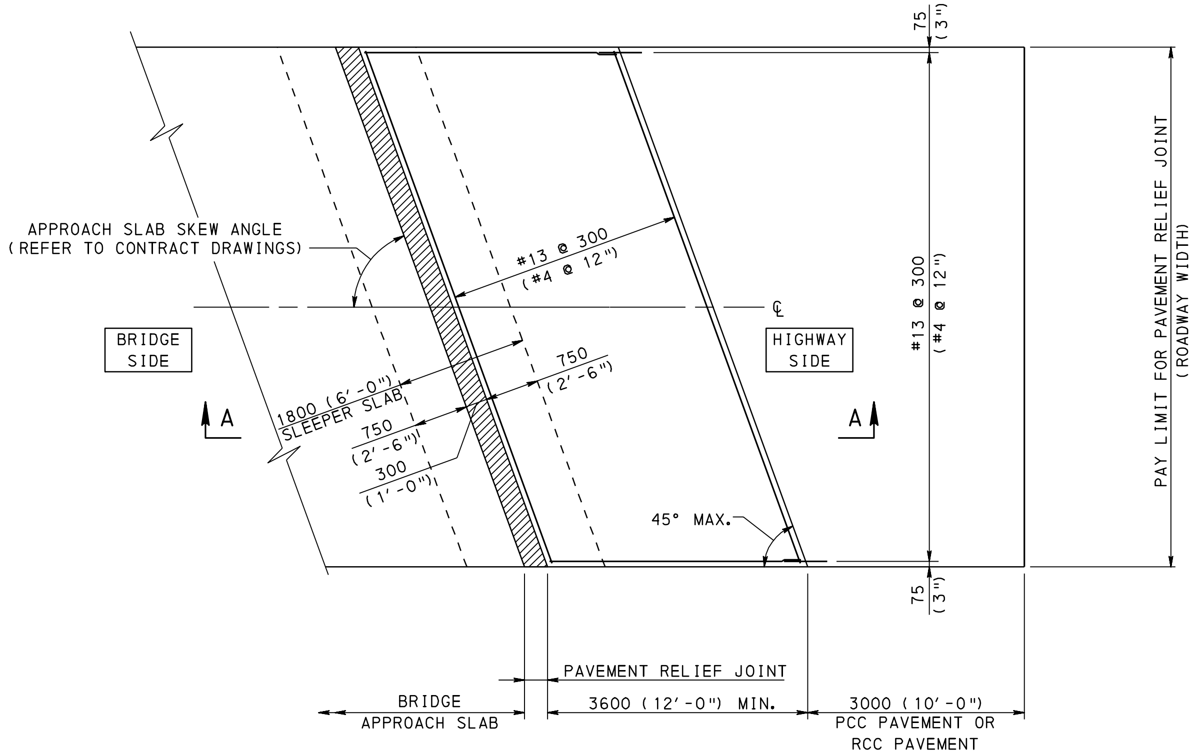
1. FOR NOTES, SEE SHEET 1.
2. TROWEL SMOOTH AND PLACE 2 LAYERS OF 0.1 mm (4 MIL) POLYETHYLENE SHEETING AS BOND BREAKER.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

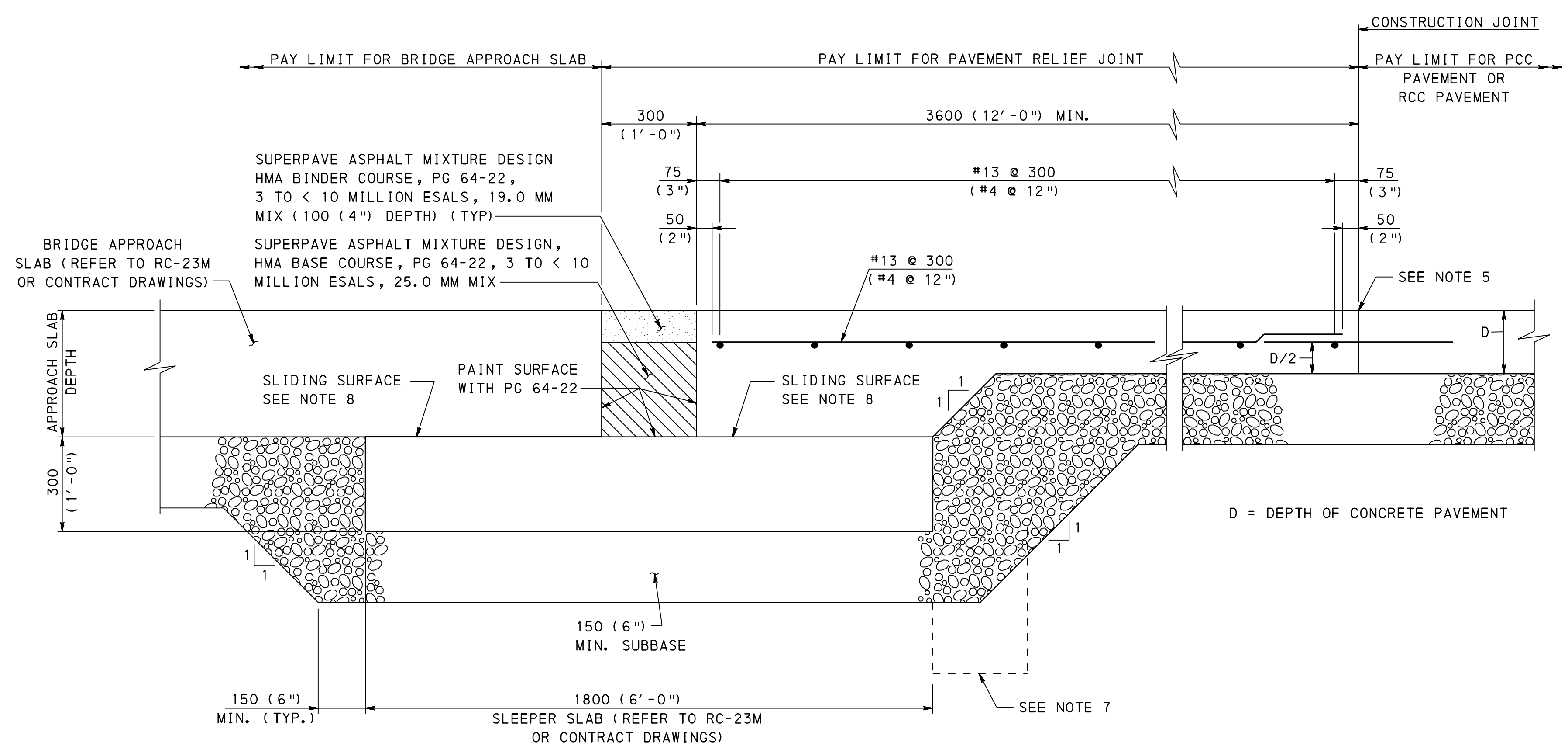
BRIDGE APPROACH SLABS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 3
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-23M



PLAN

WIDTH TO MATCH ROADWAY WIDTH



SECTION A-A

NOTES

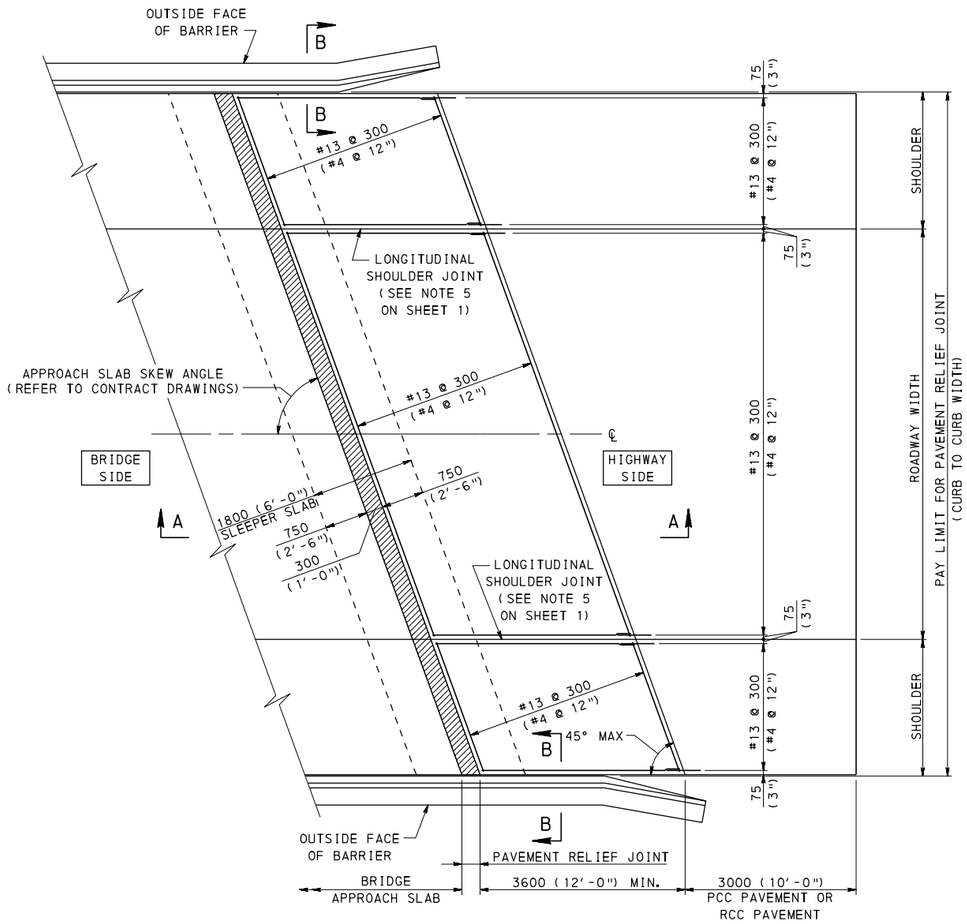
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
2. PAVEMENT RELIEF JOINTS ARE APPLICABLE FOR ALL CEMENT CONCRETE PAVEMENTS.
3. WHERE BRIDGES ARE LOCATED LESS THAN 300 m (900') APART, AS MEASURED FROM THE FACE OF THE NEAREST ABUTMENTS, DO NOT USE A RELIEF JOINT BETWEEN THE BRIDGES.
4. WHERE BRIDGES ARE LOCATED BETWEEN 300 m (900') AND 450 m (1350') APART, AND THE PAVEMENT STRUCTURE IS CEMENT CONCRETE, PLACE ONE RELIEF JOINT MIDWAY BETWEEN THE BRIDGES PERPENDICULAR TO THE PAVEMENT. SEE SHEET 3 FOR DETAILS AND NOTES.
5. FOR JOINT DETAILS ON NEW CONSTRUCTION, SEE RC-20M. FOR JOINT DETAILS ON RECONSTRUCTION, SEE RC-26M. IF THE DISTANCE TO THE NEAREST JOINT IS LESS THAN 3.0 m (10'), REMOVE THE EXISTING PAVEMENT TO THE JOINT.
6. INCLUDE PORTIONS OF REINFORCING BARS WHICH ARE LOCATED OUTSIDE THE INDICATED PAY LIMITS IN BID PRICE FOR PAVEMENT RELIEF JOINT.
7. PROVIDE A SUBGRADE DRAIN (SEE RC-30M) ON THE LOW SIDE OF THE SLEEPER SLAB. MEASURE AND PAY FOR AS SPECIFIED IN PUBLICATION 408, SECTION 612.
8. TROWEL SMOOTH AND PLACE 2 LAYERS OF 0.1 mm (4 MIL.) POLYETHYLENE SHEETING AS BOND BREAKER.
9. EPOXY COAT ALL REINFORCEMENT BARS.
10. WHEN THE PAVEMENT RELIEF JOINT IS ADJACENT TO A BRIDGE APPROACH SLAB, THE SLEEPER SLAB IS PAID WITH THE BRIDGE APPROACH SLAB.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

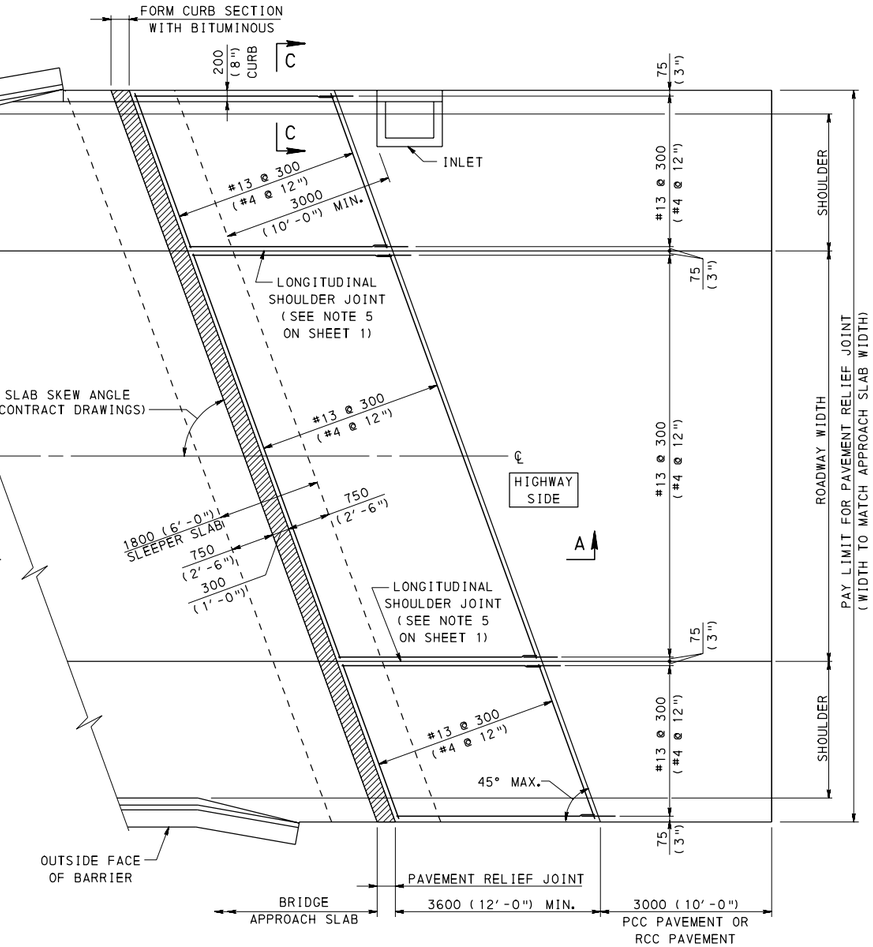
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PAVEMENT RELIEF JOINT

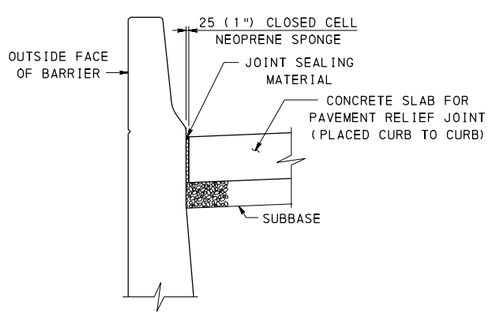
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 3
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-24M



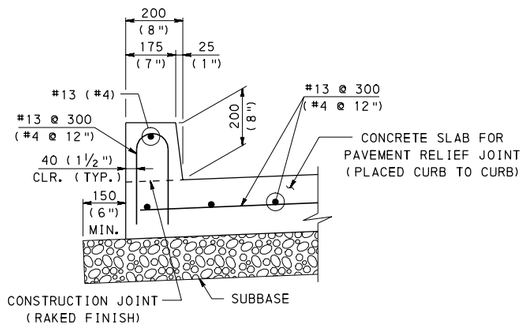
PLAN
WIDTH EXTENDING TO GUTTER LINE



PLAN
WIDTH EXTENDING TO END OF BARRIER



SECTION B-B



SECTION C-C

NOTES

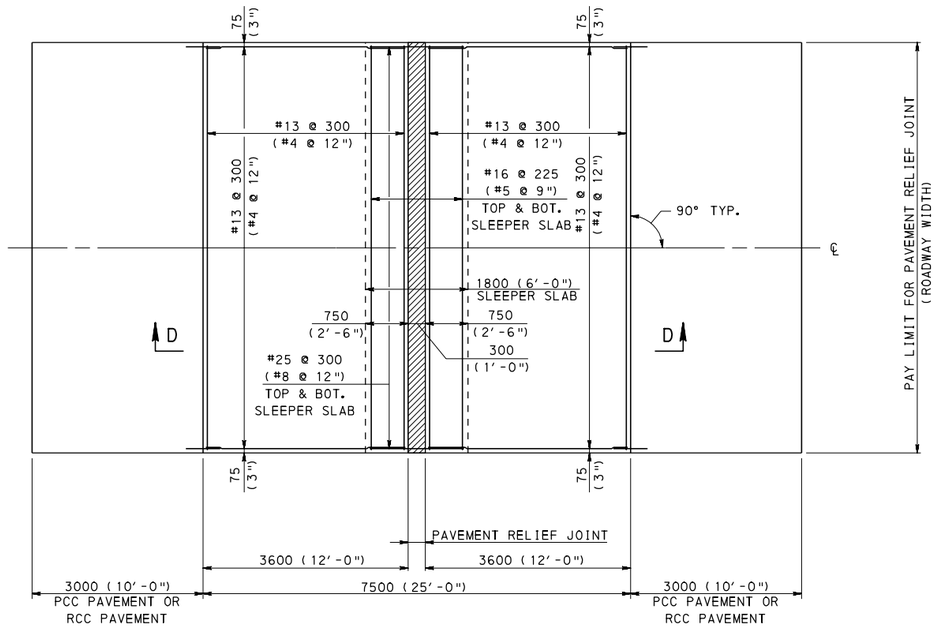
1. FOR NOTES, SEE SHEET 1.
2. FOR SECTION A-A, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

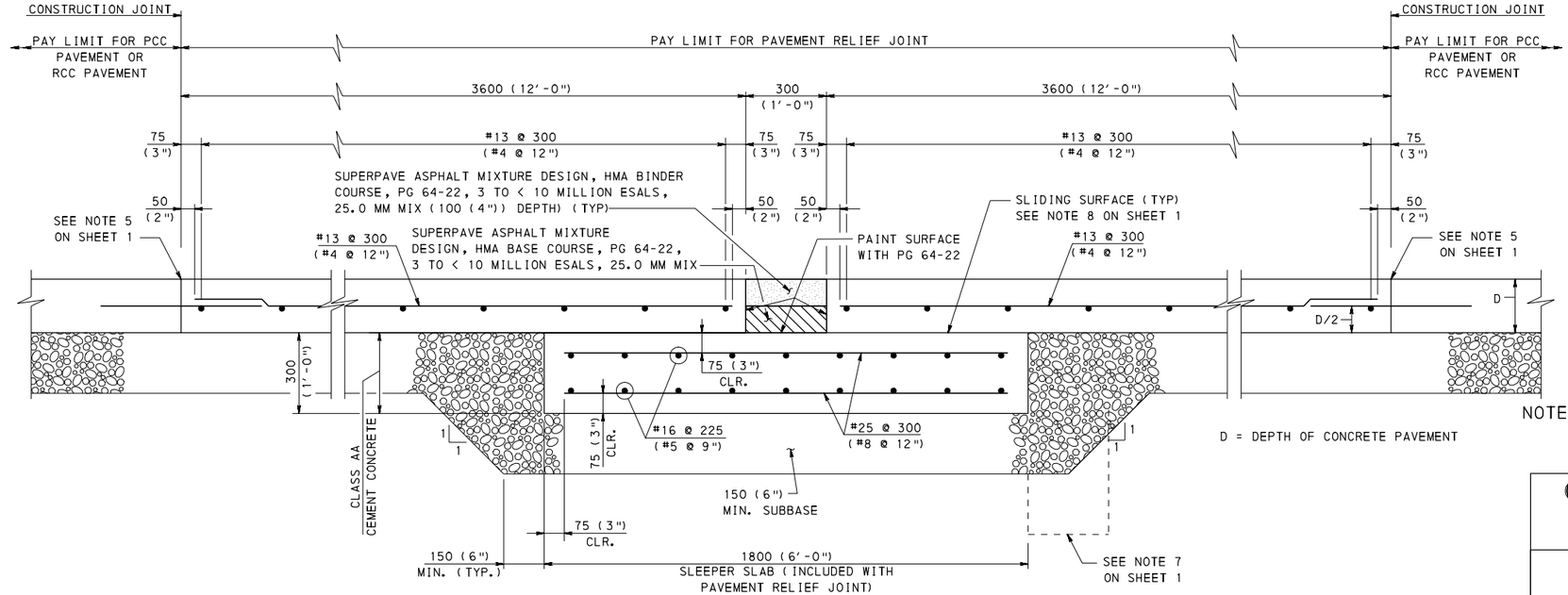
PAVEMENT RELIEF JOINT

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 3
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-24M



PLAN

BRIDGES LOCATED BETWEEN 300 m (900') AND 450 m (1350') APART
WIDTH TO MATCH ROADWAY WIDTH



SECTION D-D

NOTES

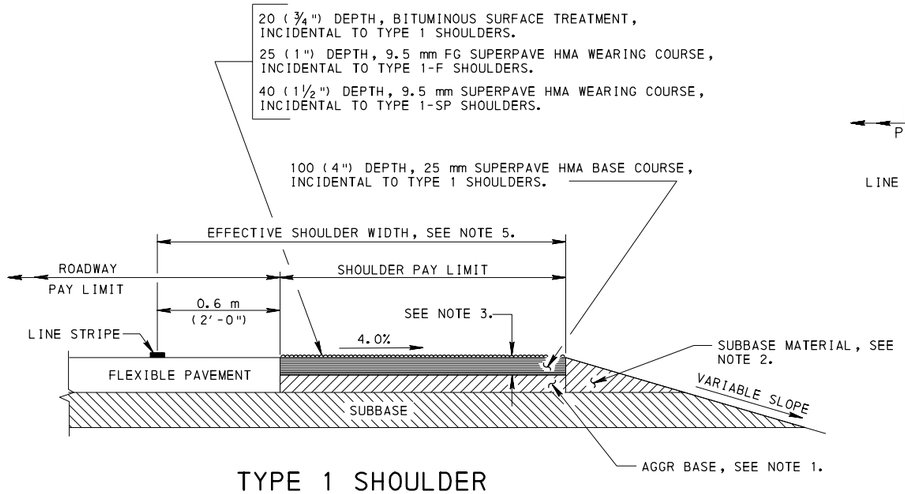
1. FOR NOTES, SEE SHEET 1.
2. WHEN BRIDGE APPROACH SLAB IS NOT ADJACENT TO THE PAVEMENT RELIEF JOINT THE SLEEPER SLAB AND REINFORCEMENT BARS ARE INCIDENTAL TO THE PAVEMENT RELIEF JOINT PAY ITEM.
3. PROVIDE CLASS AA CEMENT CONCRETE IN THE SLEEPER SLAB. AT CONTRACTOR'S OPTION, SLEEPER SLAB MAY BE HIGH EARLY STRENGTH CEMENT CONCRETE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

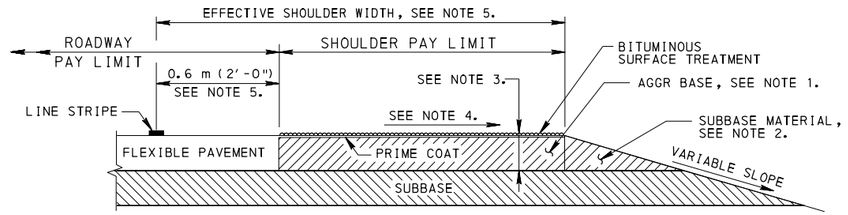
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PAVEMENT RELIEF JOINT

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 3
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-24M



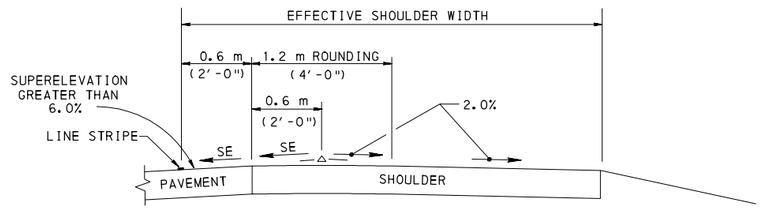
TYPE 1 SHOULDER
TYPE 1-F SHOULDER
TYPE 1-S SHOULDER
TYPE 1-SP SHOULDER



TYPE 3 SHOULDER

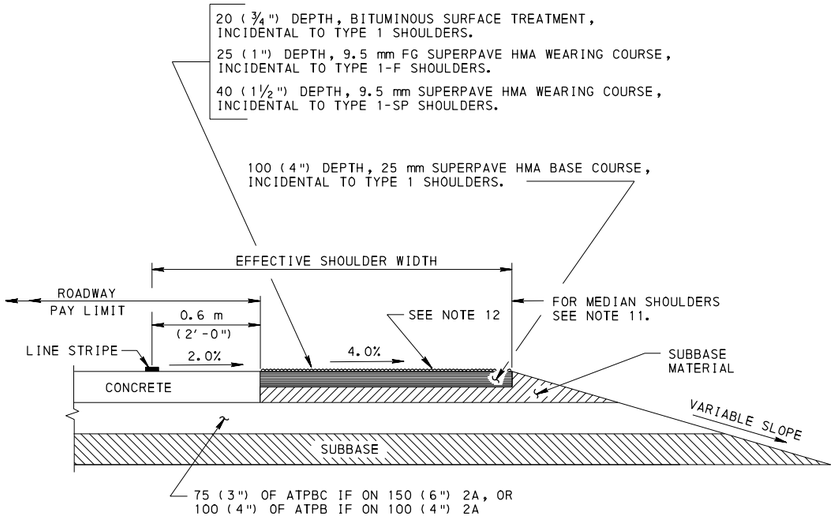
NOTES

1. CONSTRUCT AGGREGATE BASE AS SPECIFIED IN PUBLICATION 408, SECTION 350.3 AND CONSIDER AS PART OF THE SHOULDER.
2. CONSIDER THE PAYMENT FOR THIS AREA OF SUBBASE MATERIAL INCIDENTAL TO THE SHOULDER.
3. MAKE DEPTH OF SHOULDER THE COMBINED DEPTH OF SURFACE AND BASE COURSE.
4. SLOPE SHOULDER AT 6.0% FOR EFFECTIVE SHOULDER WIDTHS ≤ 2.4 m (8' -0"). SLOPE SHOULDER AT 4.0% FOR EFFECTIVE SHOULDER WIDTHS > 2.4 m (8' -0").
5. FOR EFFECTIVE SHOULDER WIDTHS 1.8 m (6' -0") AND LESS, PAVE OUT-TO-OUT OF SHOULDERS WITH FULL DEPTH ROADWAY PAVEMENT.
6. FOR SHOULDERS THAT SPECIFY RUMBLE STRIPS INSTALLATIONS, USE ONLY BITUMINOUS WEARING COURSE SUPERPAVE, 9.5 mm OR 12.5 mm, HMA WEARING COURSE, 40 (1½ ") DEPTH MINIMUM.
7. WHEN INSTALLING RUMBLE STRIPS ON A TYPE 1-SP SHOULDER, CONSTRUCT THE PAVEMENT/SHOULDER JOINT AT THE BEGINNING OF THE EFFECTIVE SHOULDER, OR PAVE FULL DEPTH INTO THE EFFECTIVE SHOULDER FAR ENOUGH SO THAT THE RUMBLE STRIPS ARE NOT CONSTRUCTED OVER THE LONGITUDINAL JOINT.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
9. SEE SHEETS 4 AND 5 FOR RUMBLE STRIP DETAILS.
10. PAY QUANTITIES FOR FULL DEPTH FLEXIBLE PAVEMENT SHOULDERS ARE INCLUDED IN MAINLINE ITEMS FOR SECTION 409 OF PUB.408 PAVING ITEMS.
11. FOR ALL DIVIDED ROADWAY FACILITIES, CONSTRUCT MEDIAN SHOULDERS AS PER TYPE 1 OR TYPE 2 CONCRETE SHOULDER, SEE SHEET 3.
12. CONCRETE WIDENED LANES PLACED ADJACENT TO TRAVEL LANES ONLY.



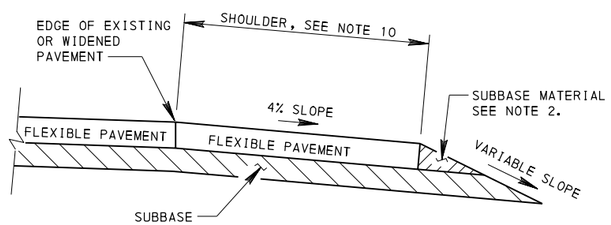
FOR SUPERELEVATION UNDER 6.0%, ELIMINATE THE 1.2 m (4' -0") ROUNDING AND USE THE 2.0% SHOULDER SLOPE BEGINNING FROM THE EDGE OF PAVEMENT.

SHOULDER ROUNDING ON HIGH SIDE OF SUPERELEVATED CURVES



CONCRETE WIDENED LANE

TYPE 1 SHOULDER
TYPE 1-F SHOULDER
TYPE 1-S SHOULDER
TYPE 1-SP SHOULDER



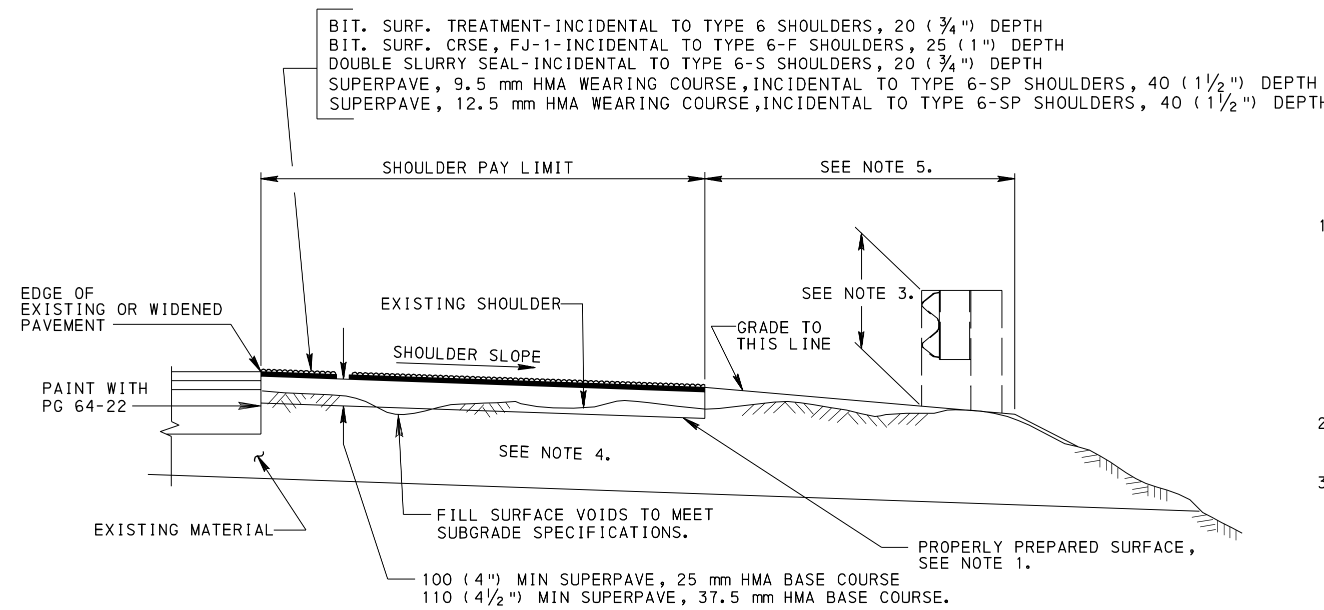
FULL DEPTH FLEXIBLE PAVEMENT SHOULDERS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

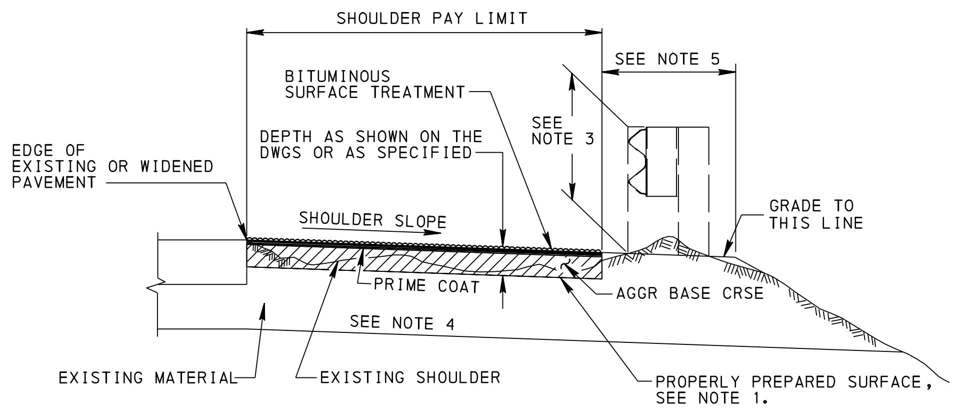
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS

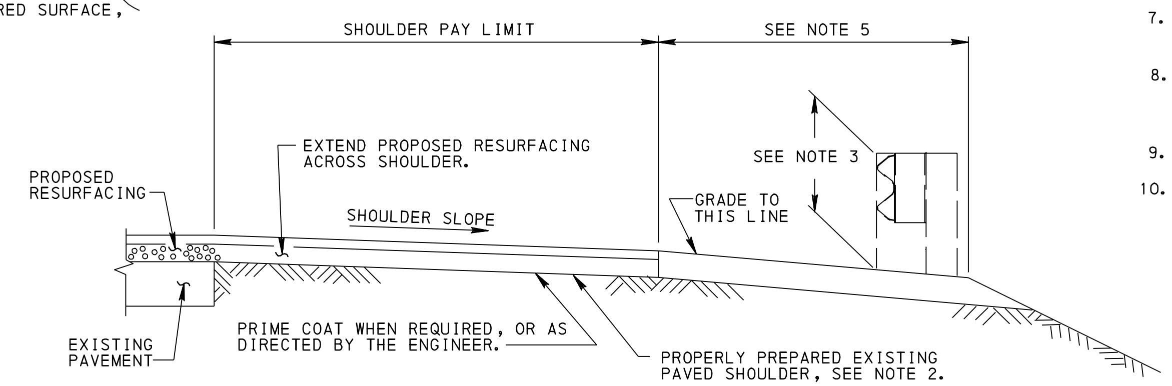
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 7
R. Wood Willey	Bruce E. Thomas	RC-25M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



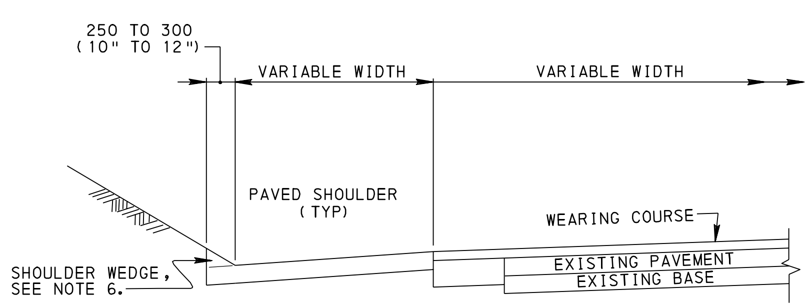
TYPE 6 SHOULDER
TYPE 6-F SHOULDER
TYPE 6-S SHOULDER
TYPE 6-SP SHOULDER



TYPE 4 SHOULDER



TYPE 7 SHOULDER



TYPICAL SHOULDER DETAIL
WITH BITUMINOUS TAPER SHOULDER WEDGE

NOTES

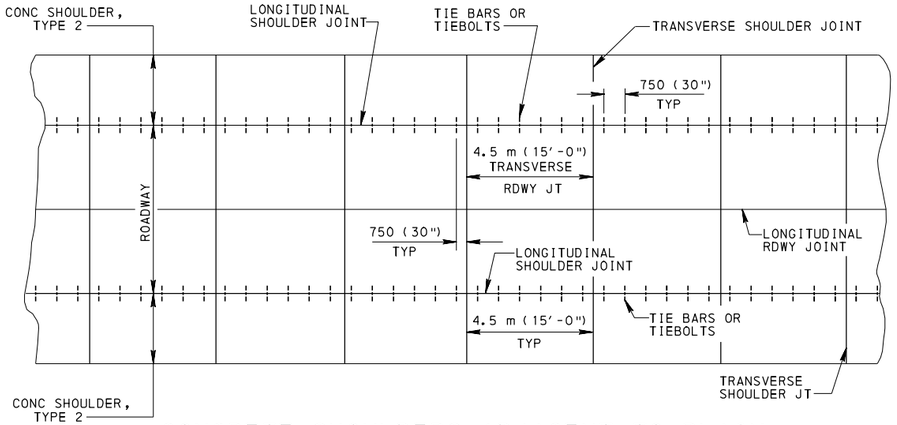
1. FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/OR SCARIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE SHAPING OPERATION, COMPLETE THE WORK BY EITHER ADDING ADDITIONAL AGGR BASE CRSE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 OR MILLED BITUMINOUS MATERIAL. THE ADDITIONAL MATERIAL IS INCIDENTAL TO THE SHOULDER ITEM.
2. FOR TYPE 7 SHOULDERS PROPERLY PREPARE EXISTING PAVED SHOULDER BY CLEANING AND PATCHING.
3. THE GUIDE RAIL TYPE, HEIGHT AND LOCATION FROM SHOULDER MAY VARY, BUT WHEN THE HEIGHT FROM THE TOP OF RAIL TO PROPOSED SURFACE BECOMES LESS THAN 610 (24"), REMOVE, REPLACE AND/OR RESET THE GUIDE RAIL IN ACCORDANCE WITH CURRENT GUIDE RAIL STANDARDS. WHERE GUIDE RAIL HAS RUBBING RAIL ATTACHED, REMOVE THE RUBBING RAIL WHEN THE HEIGHT OF GUIDE RAIL BECOMES LESS THAN 710 (28").
4. REMOVE UNSUITABLE MATERIAL AS DIRECTED, EXCAVATE, AND BACKFILL WITH MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350. MEASURE AND PAY FOR SHOULDER EXCAVATION AND BACKFILL IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 654 AND 656. (CROSS SECTIONS ARE NOT REQUIRED.)
5. CONSIDER GRADING INCIDENTAL TO THE SHOULDER PAY ITEM. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE GRADING OPERATION TO COMPLETE THIS OPERATION, USE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONNES (TONS) OF SELECTED BORROW EXCAVATION. WHERE THERE IS AN EXCESS OF MATERIAL FROM THE SHOULDER EXCAVATION OR GRADING OPERATION, REMOVE THIS MATERIAL AS SOON AS POSSIBLE AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY ITEM.
6. PROVIDE BITUMINOUS TAPER SHOULDER WEDGE IN ALL CUT AREAS AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY ITEM.
7. "LUMP SUM" ITEMS INCLUDE ALL MATERIALS AND OPERATIONS OF WORK NECESSARY TO COMPLETE THAT ENTIRE ITEM WHETHER TABULATED OR NOT.
8. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY SUPERPAVE, 9.5 mm OR 12.5 mm HMA WEARING COURSE, 40 (1½") DEPTH MINIMUM.
9. SEE SHEETS 4 AND 5 FOR RUMBLE STRIP DETAILS.
10. REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL FREE OF ORGANIC MATERIALS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

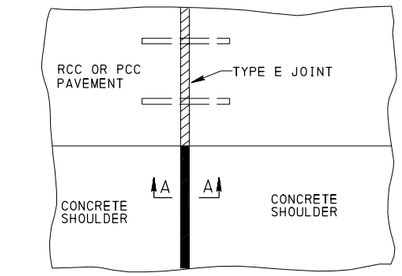
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS
(RECONSTRUCTED)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 7
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-25M

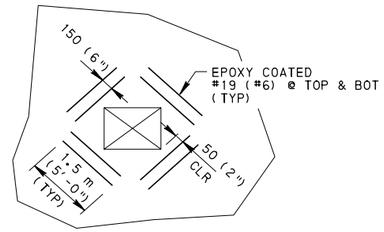


CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS

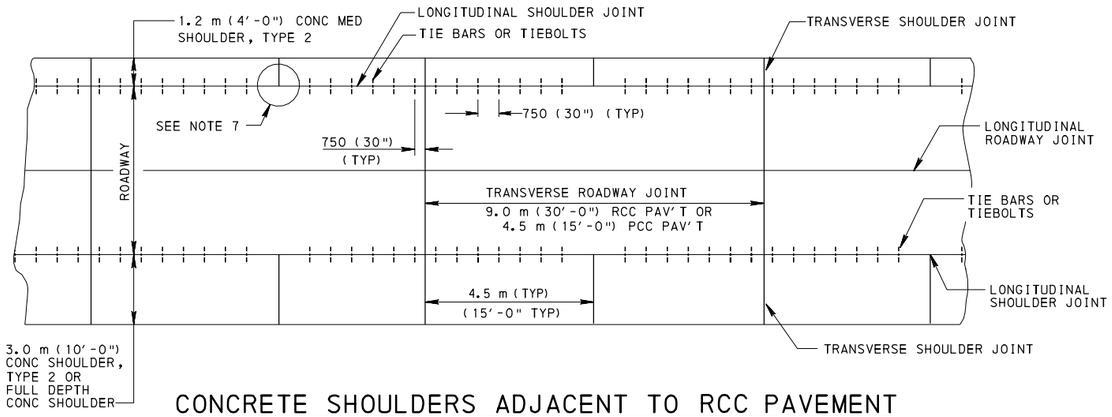


SECTION A-A

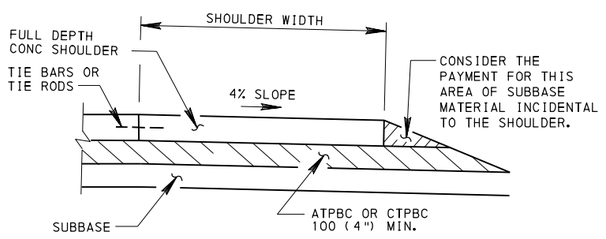
CONCRETE SHOULDER EXPANSION JOINTS



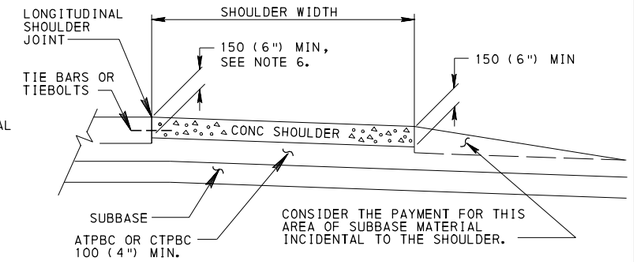
REINFORCEMENT AT OPENINGS



CONCRETE SHOULDERS ADJACENT TO RCC PAVEMENT AND PCC PAVEMENT FOR INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMPS

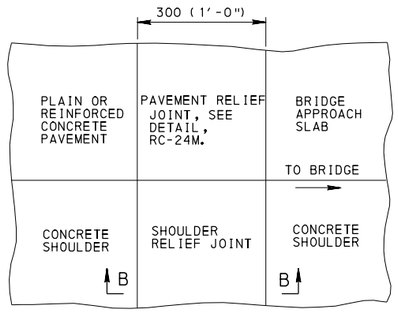


FULL DEPTH CONCRETE SHOULDER



CONCRETE SHOULDER - TYPE 2

TYPICAL SECTIONS



SECTION B-B

SHOULDER RELIEF JOINTS

NOTES

1. ATPBC/CTPBC MAY BE SUBSTITUTED WITH OGS MATERIAL AS PER PUBLICATION 408, SECTION 350.3.
2. SEAL ALL SHOULDER JOINTS IN ACCORDANCE WITH PUBLICATION 408, SECTION 501.3(n).
3. FOR JOINT DETAILS, SEE RC-20M.
4. ALIGN SHOULDER TRANSVERSE JOINTS TO ADJACENT PAVEMENT JOINTS.
5. SEE SHEET 1 FOR SHOULDER ROUNDING DETAIL ON HIGH SIDE OF SUPERELEVATION.
6. AT THE CONTRACTOR'S OPTION, TYPE 2 CONCRETE SHOULDERS MAY BE CONSTRUCTED ON A TAPER, WITH A 150 (6") MINIMUM DEPTH, OR AT THE SAME DEPTH AS THE PAVEMENT, AT NO ADDITIONAL EXPENSE TO THE DEPARTMENT.
7. TYPICALLY, DO NOT PLACE TIE BARS OR TIEBOLTS WITHIN 750 (30") OF EITHER SIDE OF INTERMEDIATE SHOULDER JOINTS ADJACENT TO RCC PAVEMENTS OR PCC PAVEMENT.
8. WHEN THE SHOULDER IS STRUCTURALLY PART OF A BARRIER MOMENT RESISTANCE SLAB (i.e. BARRIER/SLAB ON AN MSE WALL) SEE BC-799M SHEET 3 FOR REQUIRED MINIMUM SPACING OF THE TRANSVERSE SHOULDER JOINTS.
9. SEE SHEETS 4 AND 5 FOR RUMBLE STRIP DETAILS.
10. FOR USE ON FULL DEPTH CONCRETE SHOULDERS. SHOULDER PAY QUANTITIES ARE INCLUDED IN MAINLINE ITEMS FOR SECTION 501 OR 506 OF PUBLICATION 408 PAVING QUANTITIES.
11. CONSTRUCT ONLY RCC SHOULDER ADJACENT TO RCC PAVEMENT AND PCC SHOULDER ADJACENT TO PCC PAVEMENT UNLESS WHEN USING CONCRETE WIDENED LANES AS PER SHEET 1.
12. PROTECT TRANSVERSE JOINTS PRIOR TO PLACEMENT OF SHOULDERS AS PER PUBLICATION 408, SECTION 501.3(i).
13. ALIGN CONCRETE PAVEMENT JOINTS WITH INLET JOINTS, CURB JOINTS AND ANY OTHER ADJACENT STRUCTURES. CONSTRUCT THE JOINT BETWEEN THEM WITH 6 (¼") POLYSTYRENE BONDBREAKER BOARD AND SEAL WITH ASPHALT SEALING MATERIAL.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS (CONCRETE)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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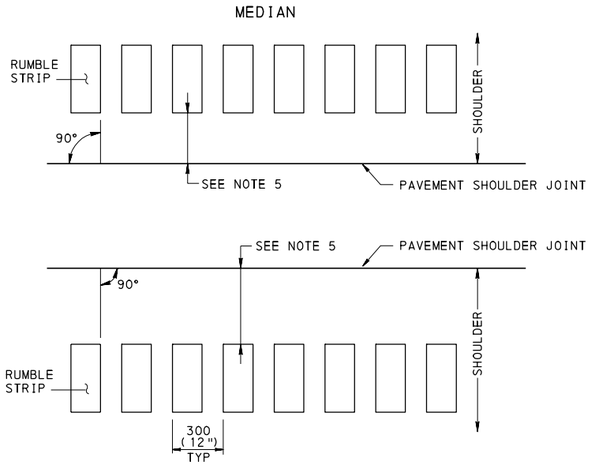
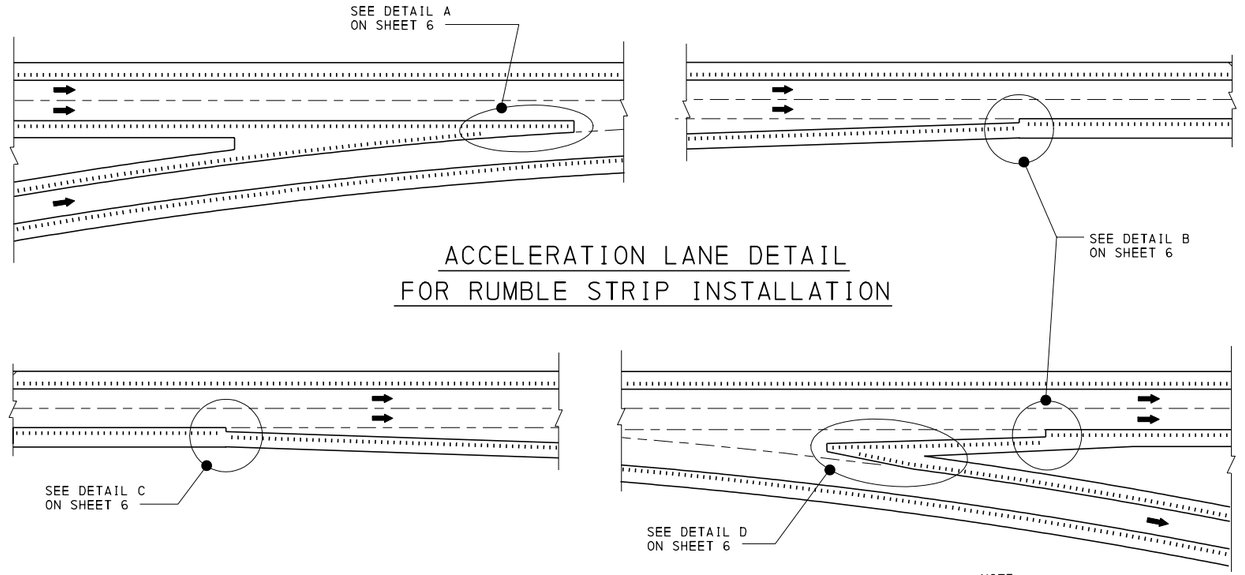


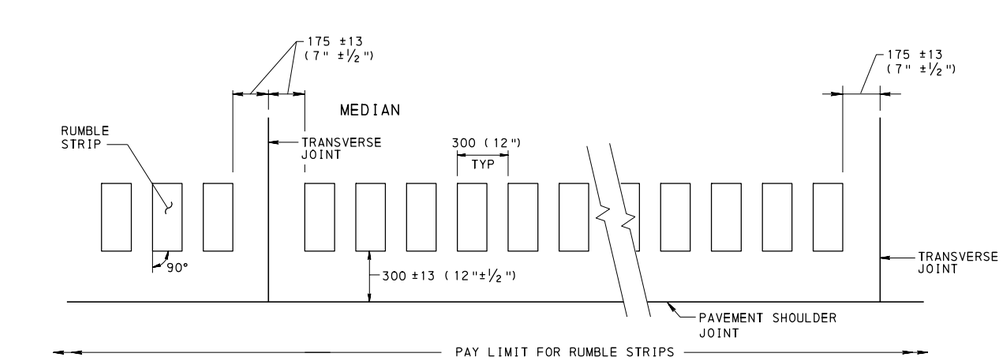
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON BITUMINOUS SHOULDERS

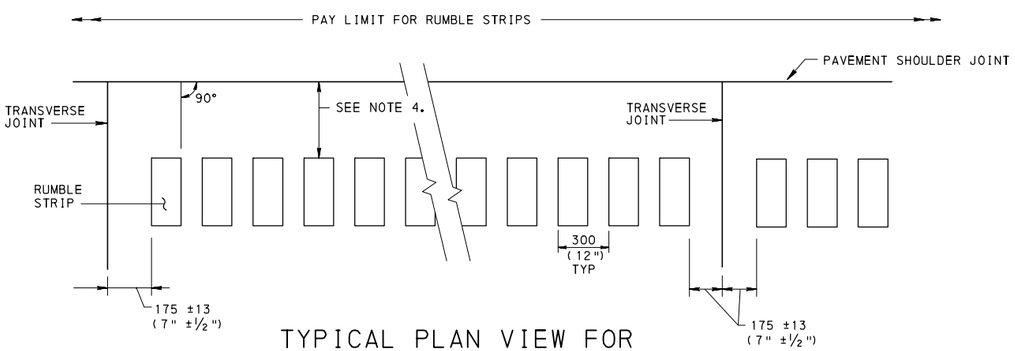


ACCELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION

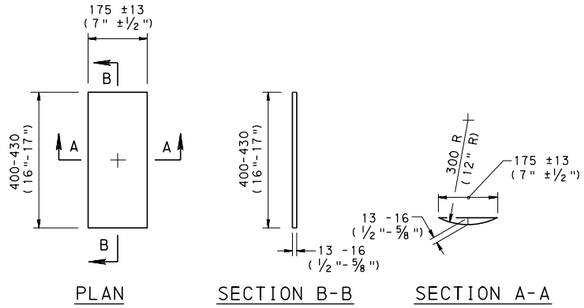
DECELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION

NOTE:
SEE SHEET 5 FOR INTERSECTION DETAILS.





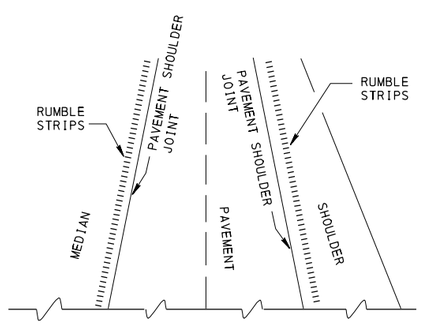
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS OR CONCRETE WIDENED LANE PAVING



SECTION DETAILS OF RUMBLE STRIP PATTERN

NOTES

1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
2. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
4. 450 ±13 (18" ±½") EXCEPT FOR CONCRETE WIDENED LANES, THEN 225 ±13 (9" ±½").
5. 300 ±13 (12" ±1/2") FOR LEFT (MEDIAN) SHOULDERS. 450 ±13 (18" ±1/2") FOR RIGHT SHOULDERS > 2.4 m (8'-0") WIDE. FOR RIGHT SHOULDERS LESS THAN 2.4 m (8'-0") WIDE, SEE CONSTRUCTION PLANS FOR OFFSET DIMENSION.



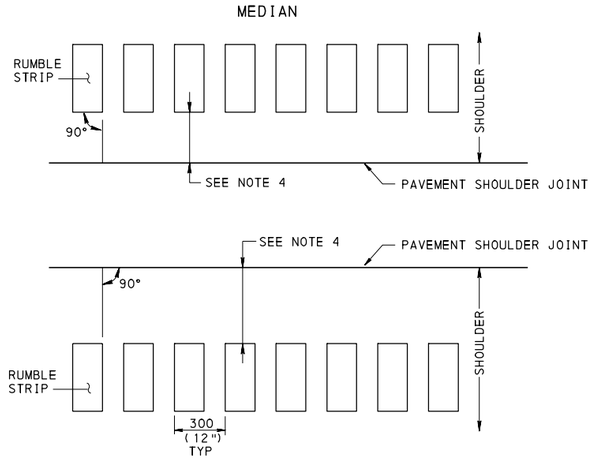
GENERAL PLAN RUMBLE STRIP PATTERN

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

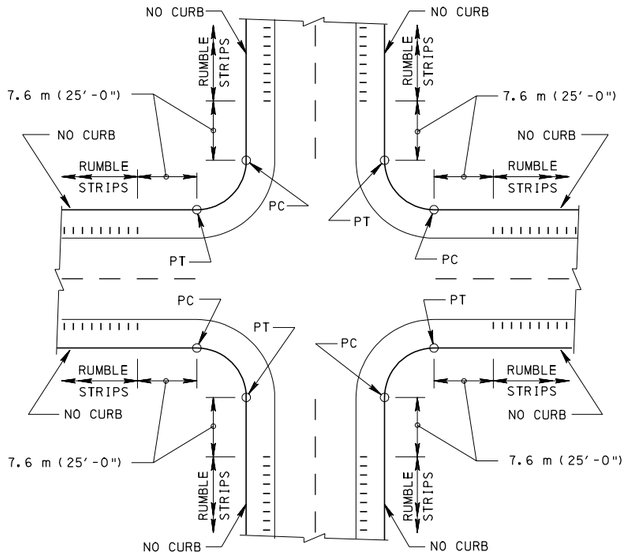
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS
RUMBLE STRIPS
(LIMITED ACCESS HIGHWAYS)

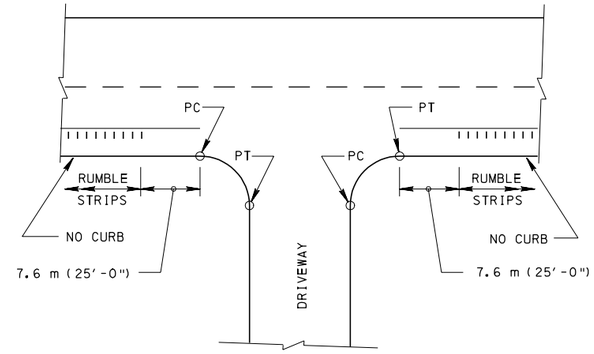
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 7
R. Wood Willey CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-25M



TYPICAL PLAN VIEW FOR RUMBLE STRIP ON BITUMINOUS SHOULDERS



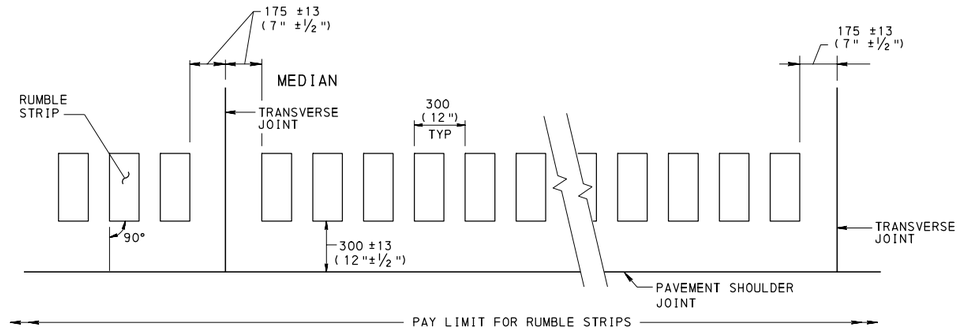
TYPICAL INTERSECTION DETAIL FOR RUMBLE STRIP INSTALLATION



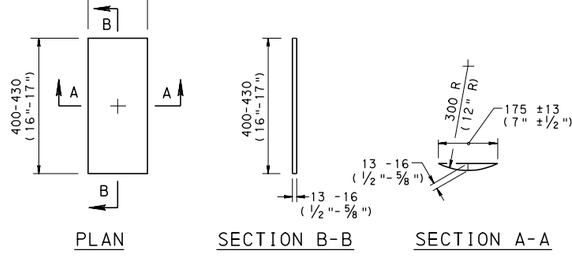
TYPICAL DRIVEWAY DETAIL FOR RUMBLE STRIP INSTALLATION

NOTES

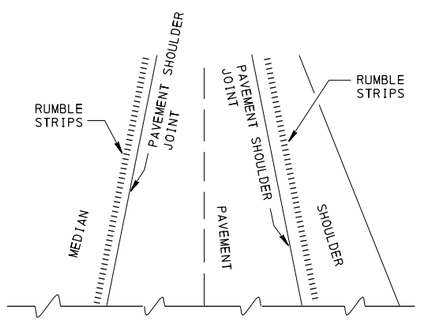
1. SHOULDER RUMBLE STRIPS FOR FREE ACCESS HIGHWAYS ARE CONSIDERED ON A PROJECT BY PROJECT BASIS AS INDICATED ON THE CONSTRUCTION PLANS.
2. CONSTRUCT RUMBLE STRIP IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
3. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
4. 300 ±13 (12" ± ½") FOR LEFT (MEDIAN) SHOULDERS. 450 ±13 (18" ± ½") FOR RIGHT SHOULDERS ≥ 2.4 m (8'-0") WIDE. FOR RIGHT SHOULDERS LESS THAN 2.4 m (8'-0") WIDE, SEE CONSTRUCTION PLANS FOR OFFSET DIMENSION.
5. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC LINE.



TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS



SECTION DETAILS OF RUMBLE STRIP PATTERN



GENERAL PLAN RUMBLE STRIP PATTERN

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS
RUMBLE STRIPS
(FREE ACCESS HIGHWAYS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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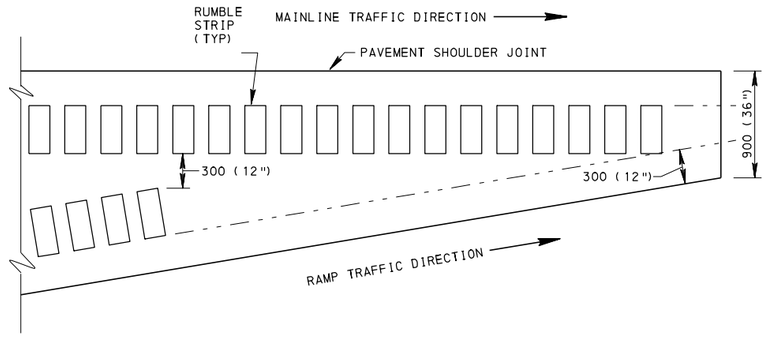
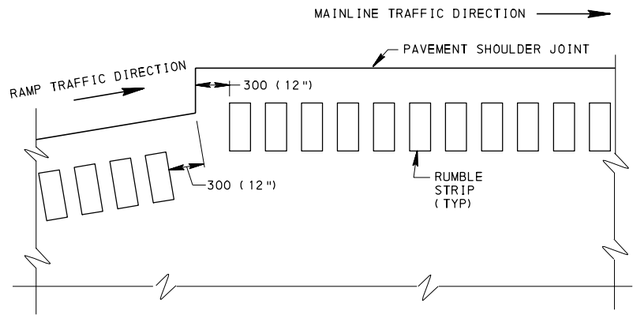
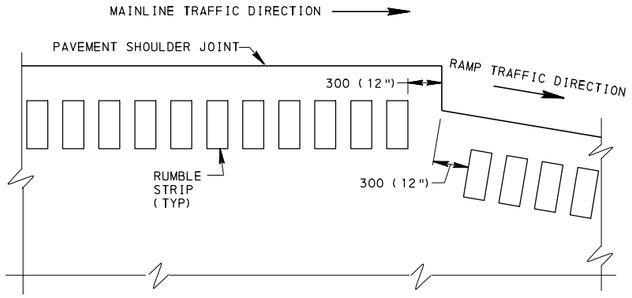


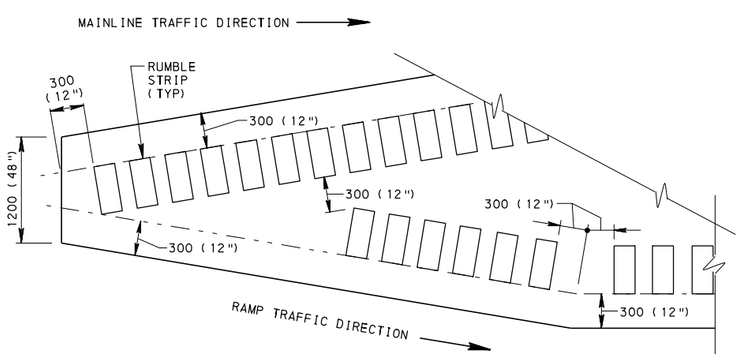
DETAIL A
ACCELERATION LANE
GORE AREA RUMBLE STRIPS



DETAIL B
ACCELERATION LANE
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL C
DECELERATION LANE
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL D
DECELERATION LANE
GORE AREA RUMBLE STRIPS

NOTES

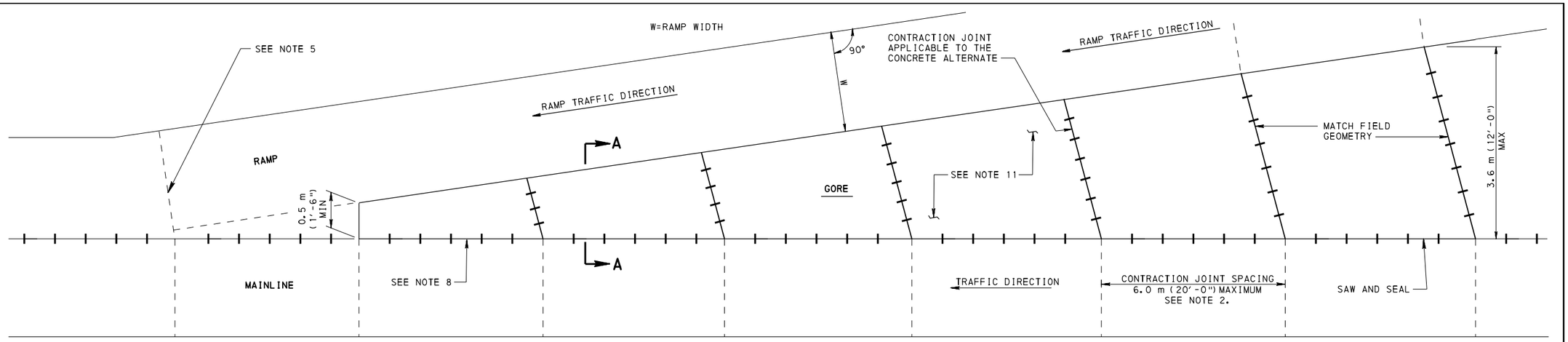
1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
2. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
4. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAMP PAVEMENTS.
5. FORM JOINTS IN GORE AREA CONNECTING MAINLINE AND RAMP TRANSVERSE JOINTS SUCH THAT ANGLES LESS THAN 80° ARE AVOIDED IN GORE PAVEMENT WHERE POSSIBLE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

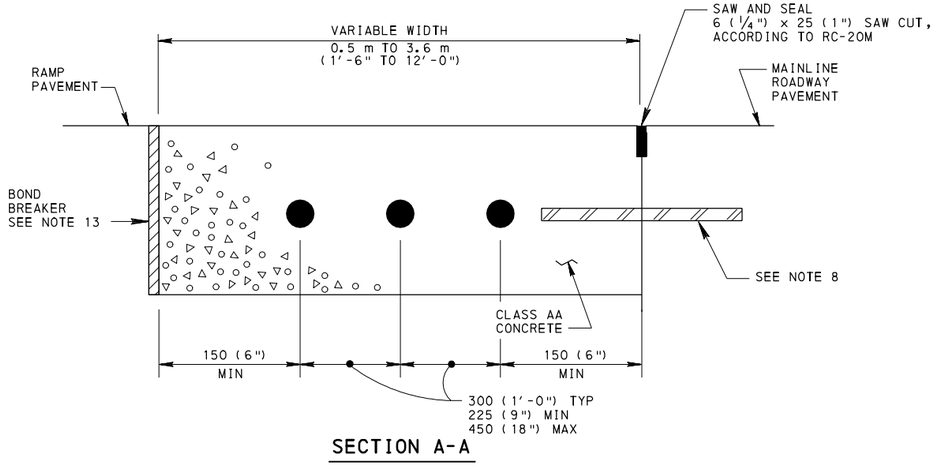
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS
RUMBLE STRIPS
(GORE AREA)

RECOMMENDED JUN. 1, 2010 R. Wood Willey CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 Bruce E. Ryan DIRECTOR, BUREAU OF DESIGN	SHT 6 OF 7 RC-25M



RAMP GORE AREA



SECTION A-A

NOTES

1. USE MATERIALS AND CONSTRUCTION METHODS WHICH MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 501 OR 658.
2. BEGIN AND END PAVEMENT AT MAINLINE TRANSVERSE JOINTS WITH A MINIMUM PAVEMENT WIDTH OF 0.5 m (1'-6") AND A MAXIMUM WIDTH OF 3.6 m (12'-0").
3. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAMP PAVEMENTS.
4. PLACE 19 (3/4") PREMOLDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CROSS SECTIONAL AREA.
5. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'-0"), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
7. CONSTRUCT GORE PAVEMENT THE SAME DEPTH AS MAINLINE SHOULDER DEPTH.
8. TIE GORE TO MAINLINE SHOULDER PAVEMENT IN ACCORDANCE WITH RC-25M.
9. CONSTRUCT GORE UTILIZING SECTION 501 OR 658 (WHICHEVER ITEM NUMBER THE MAINLINE SHOULDER IS CONSTRUCTED OF). MEASUREMENT AND PAYMENT WILL BE USING SAME ITEM NUMBER.
10. DO NOT USE LONGITUDINAL TIE BARS TO TIE GORE TO RAMP/SHOULDER PAVEMENT.
11. INSTALL RUMBLE STRIPS IN ACCORDANCE WITH SHEET 6.
12. USE LOAD TRANSFER UNITS IF MAINLINE SHOULDER IS CONSTRUCTED USING LOAD TRANSFER UNITS. INSTALL IN ACCORDANCE WITH RC-27M.
13. PLACE A 6 (1/4"), FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RAMP GORE AREA

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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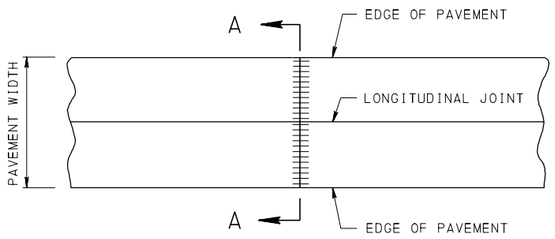
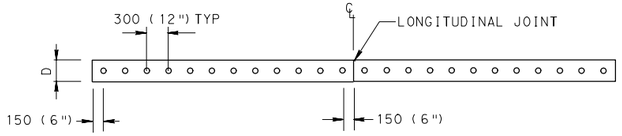


PLAN VIEW



SECTION A-A

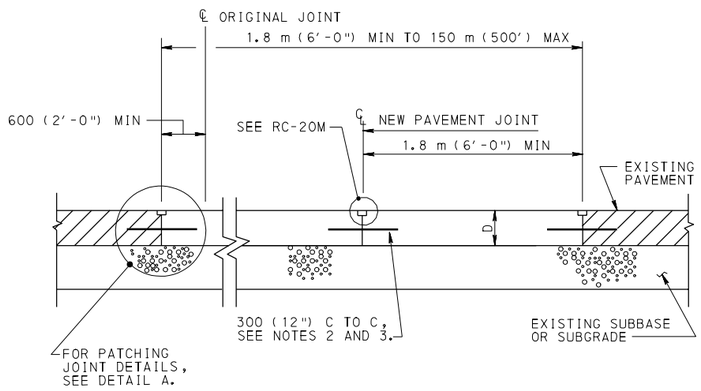
TYPICAL PAVEMENT PATCHING JOINT

LEGEND

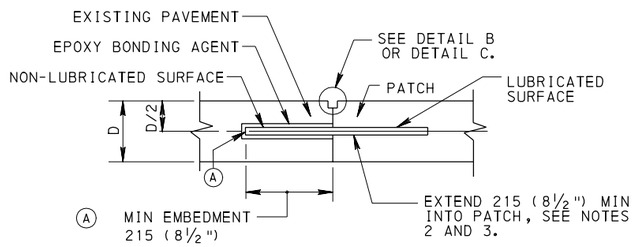
(A) EMBEDDED END OF DOWEL BAR NEED NOT BE SQUARE. IF A CHISEL POINT IS NEEDED FOR EMBEDDING METHOD, INCREASE LENGTH OF DOWEL AND EMBEDMENT BY 25 (1").

(B)

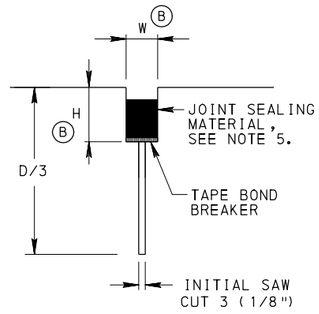
JOINT SPACING	W	H
≥6 m (20')	19 (¾")	25 (1")
<6 m (20')	10 (⅜")	19 (¾")



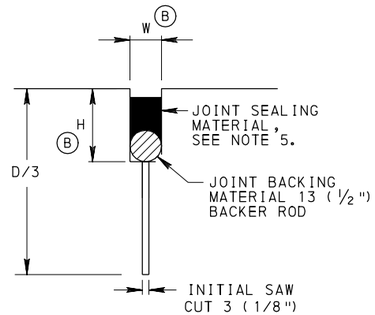
TYPICAL SECTION
CONCRETE PAVEMENT PATCHING
SEE NOTE 1.



DETAIL A

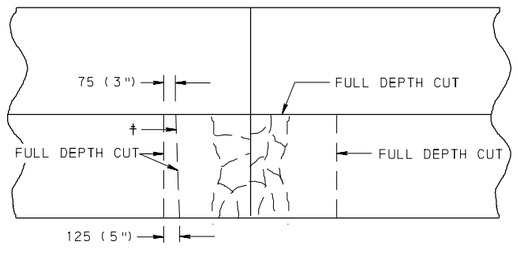


DETAIL B



DETAIL C

PATCHING JOINT DETAILS



PLAN VIEW

† MAKE FULL DEPTH SAWCUT TO FACILITATE OPENING A TRENCH ACROSS THE SLAB TO RELIEVE COMPRESSION IN PAVEMENT PRIOR TO LIFTING OUT FAILED AREA. SAWCUT MAY BE OMITTED PROVIDED NO SPALLING ON SURFACE OR UNDERSIDE OF REMAINING CONCRETE PAVEMENT OCCURS. IF SPALLING OCCURS, MAKE THIS SAWCUT ON SUBSEQUENT PATCHES. SAWCUTS FOR COMPRESSION RELIEF NEED NOT BE AT PATCH EDGE. AT CONTRACTOR'S OPTION, MAKE ADDITIONAL SAWCUTS INSIDE REPAIR LIMITS TO FACILITATE REMOVAL. FULL DEPTH SAWCUTS AT THE PATCH LIMITS WILL BE PERMITTED TO EXTEND INTO THE ADJACENT PAVEMENT UP TO D+50 (D+2") UNLESS OTHERWISE PROHIBITED OR FOR CRC PATCHING. SAWCUTS MADE FOR EASE OR REMOVAL ARE NOT PERMITTED TO EXTEND BEYOND THE LIMITS OF THE PATCH.

SAW CUTS FOR LIFT OUT METHOD

NOTES

1. WHEN ANY PAVEMENT PATCH REPLACES AN EXISTING EXPANSION JOINT AND THE EXISTING EXPANSION JOINT IN AN ADJACENT LANE REMAINS IN PLACE, INSTALL EXPANSION JOINT MATERIAL 19 (¾") THICK IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE REMAINING EXPANSION JOINT. PLACE AN APPROVED TUBE HAVING A MINIMUM 25 (1") CLEARANCE POCKET OVER THE LUBRICATED END OF ALL DOWEL BARS IN THE NEW EXPANSION JOINT.
2. USE 32 (1¼") ø x 450 (1'-6") LONG DOWEL BARS FOR PAVEMENT DEPTHS 250 (10") OR LESS AND 38 (1½") ø x 450 (1'-6") LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 250 (10").
3. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 6 (¼").
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
5. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (⅛") TO 6 (¼") BELOW THE SURFACE OF THE PAVEMENT.
6. INITIAL SAW CUT IS NOT REQUIRED WHEN EXPANSION JOINT MATERIAL IS USED.
7. WHEN ROADWAY IS NOT TO BE OVERLAID, SAW & SEAL JOINTS IN ACCORDANCE WITH DETAIL B OR DETAIL C.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION

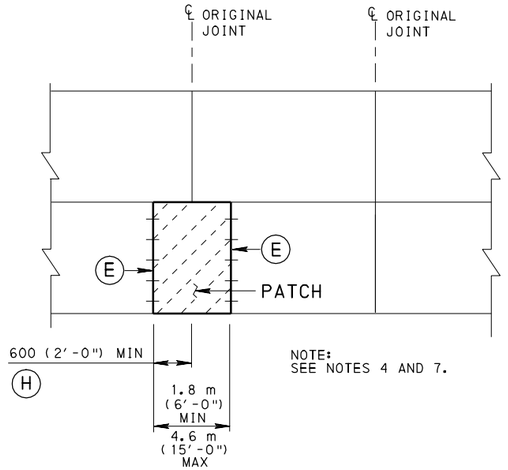
(PATCHING)

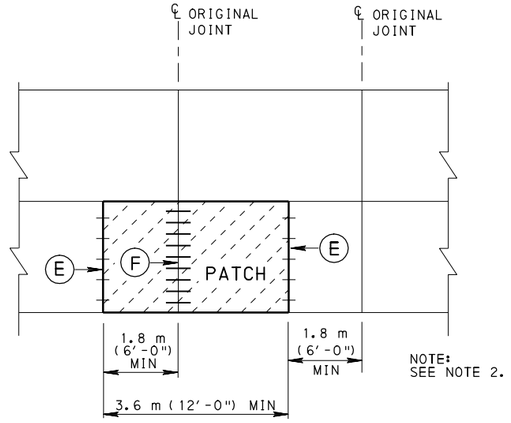
RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

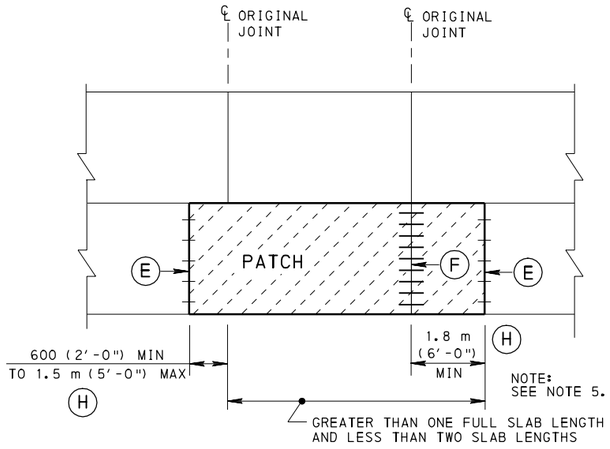
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

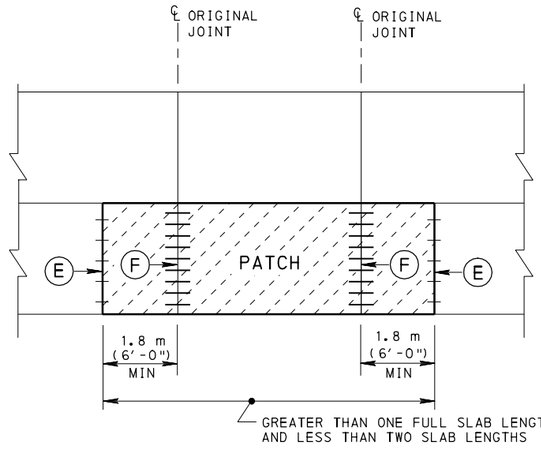
SHT 1 OF 9

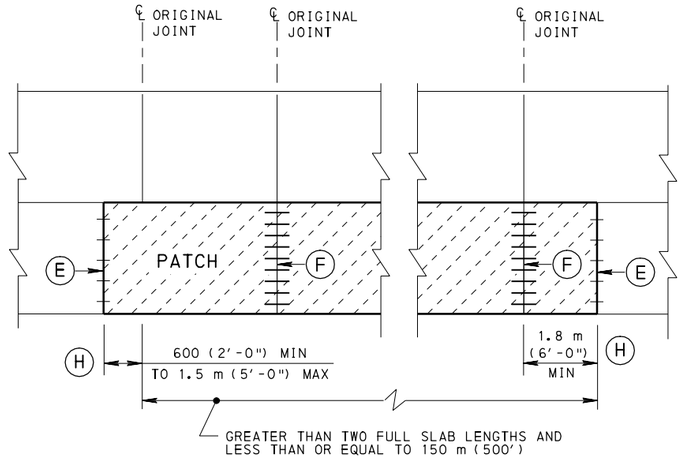
RC-26M

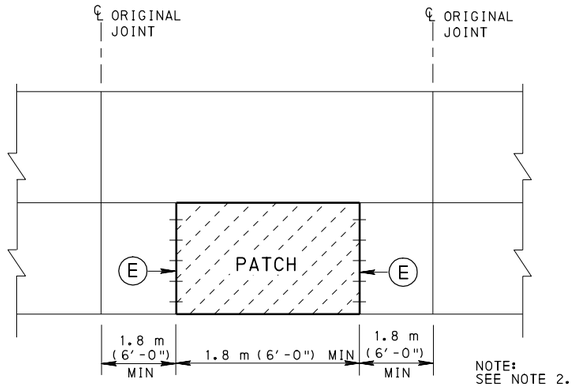












SINGLE LANE PAVEMENT PATCHING

LEGEND

(E) PAVEMENT PATCHING JOINT, SEE SHEET 1.

(F) NEW PAVEMENT JOINT, SEE RC-20M.

(H) DETAILS APPLY TO EITHER END OF PATCH.

NOTES

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6′-0") OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 1.8 m (6′-0"), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 1.8 m (6′-0") OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 6 (1/4"), FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES 20.0 m (65′-0") AND LESS IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 600 (2′-0") OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 600 (2′-0") INTO THE NEXT SLAB, REMOVE A MINIMUM OF 1.8 m (6′-0") AND INSTALL A NEW PAVEMENT JOINT IN THE SAME POSITION AS THE ORIGINAL JOINT.
6. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
7. WHEN ONLY ONE LANE IS BEING PATCHED, DO NOT REMOVE MORE THAN 1.5 m (5′-0") INTO NEXT SLAB. IF MORE THAN 1.5 m (5′-0") IS REQUIRED, REMOVE A MINIMUM OF 1.8 m (6′-0") AND PROVIDE NEW PAVEMENT JOINT AT ORIGINAL JOINT LOCATION.

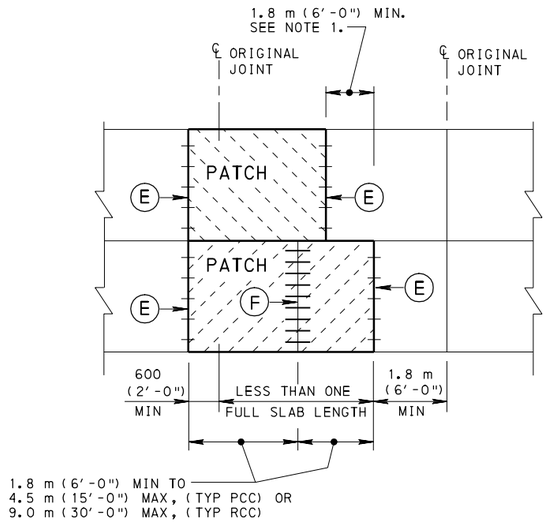
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

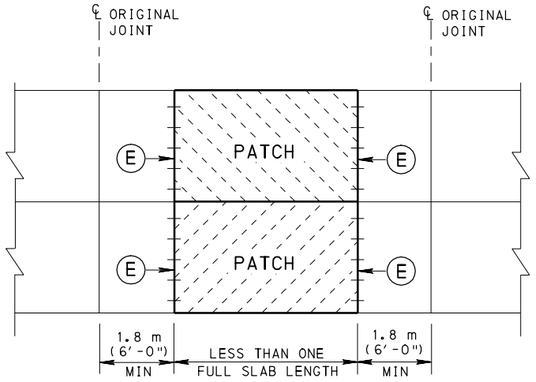
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

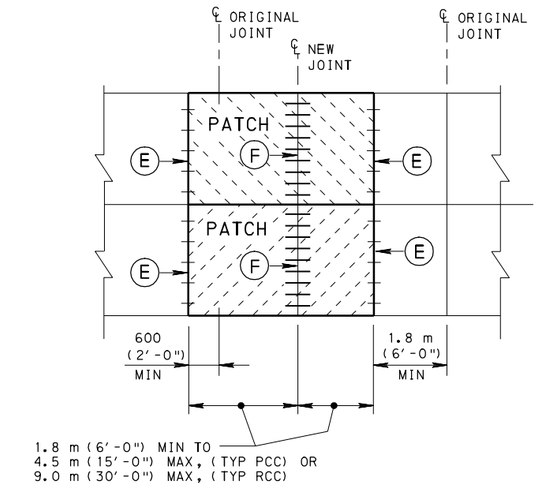
CONCRETE PAVEMENT REHABILITATION

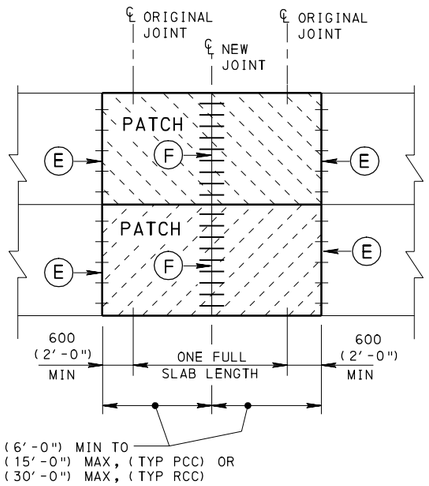
(SINGLE LANE PATCHING)

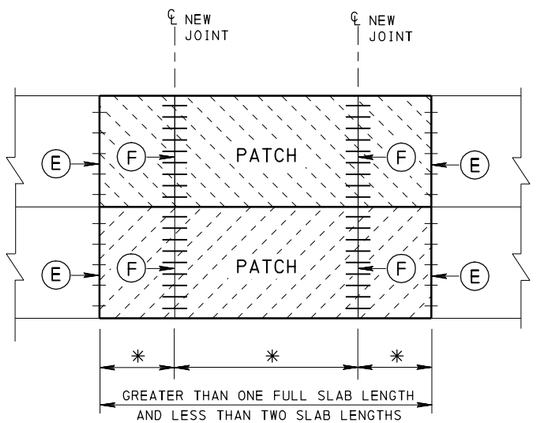
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 9
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-26M

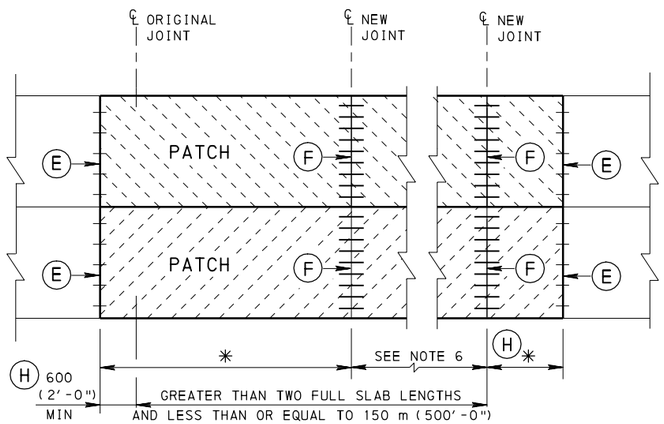












LEGEND

(E) PAVEMENT PATCHING JOINT, SEE SHEET 1.

(F) NEW PAVEMENT JOINT, SEE RC-20M.

(H) DETAILS APPLY TO EITHER END OF PATCH.

NOTES

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6'-0") OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 1.8 m (6'-0"), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
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3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 6 (1/4"), FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES 20.0 m (65'-0") AND LESS IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
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6. WHEN PERFORMING MULTILANE PATCHING, AND THE PATCHES ARE GREATER THAN TWO SLAB LENGTHS AND LESS THAN OR EQUAL TO 150 m (500'-0"), THE JOINT SPACING OF THE AREA BEING PATCHED IS TO CONFORM TO RC-21M OR RC-27M FOR THE SPECIFIC TYPE OF PAVEMENT BEING PLACED (I.E., RCC OR PCC).
7. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
8. WHEN PERFORMING MULTILANE PATCHING, FOR MIDSLAB PROBLEMS, REMOVE ENTIRE SLAB IN BOTH LANES.

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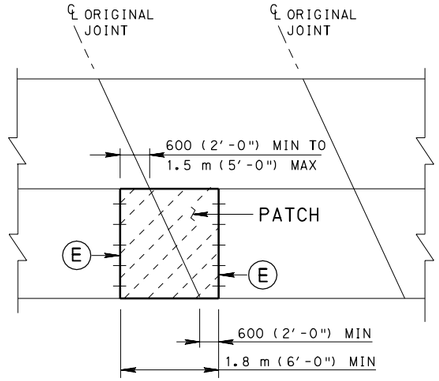
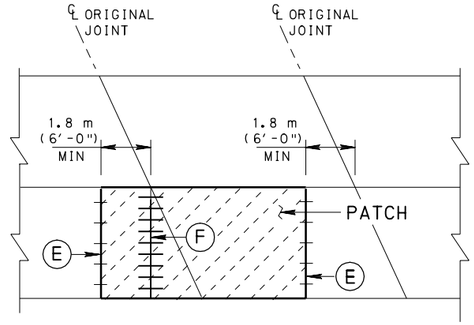
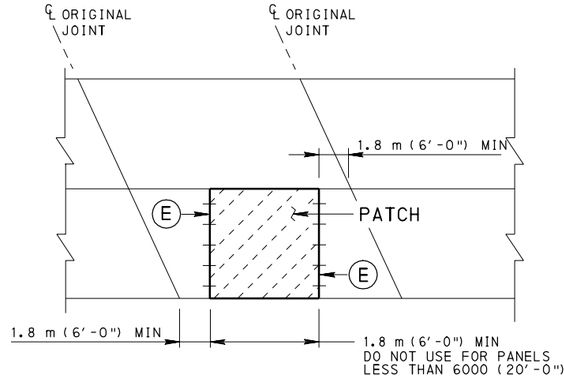
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

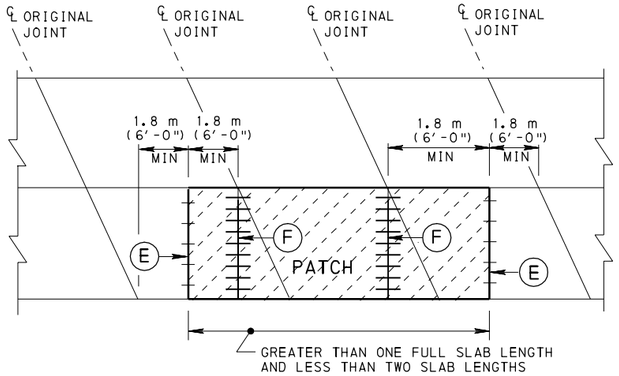
CONCRETE PAVEMENT REHABILITATION (MULTI-LANE PATCHING)

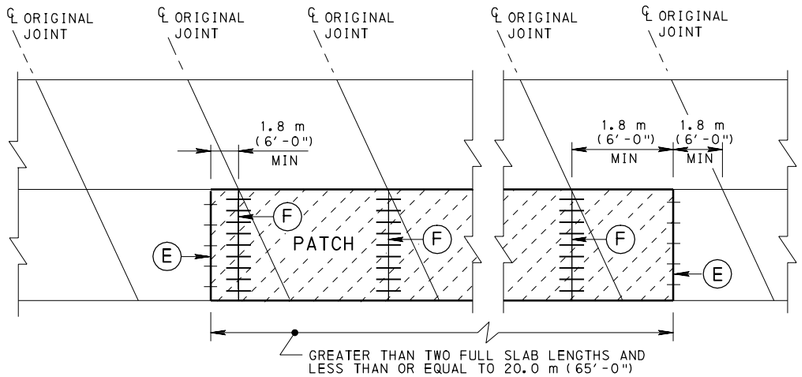
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 9
R. W. [illegible] CHIEF, HWY. QA DIVISION	[illegible] DIRECTOR, BUREAU OF DESIGN	RC-26M

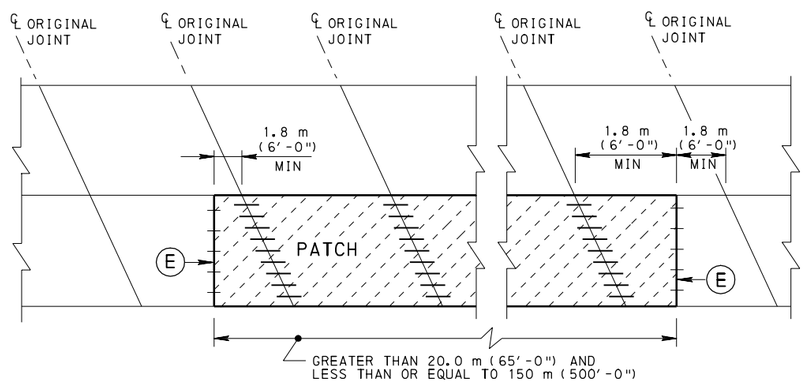












LEGEND

(E) PAVEMENT PATCHING JOINT, SEE SHEET 1.

(F) NEW PAVEMENT JOINT, SEE RC-20M.

NOTES

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6'-0") OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 1.8 m (6'-0"), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
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6. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
7. WHEN ONLY ONE LANE IS BEING PATCHED, DO NOT REMOVE MORE THAN 1.5 m (5'-0") INTO NEXT SLAB FROM THE ORIGINAL JOINT OF THE ADJACENT LANE. IF MORE THAN 1.5 m (5'-0") IS REQUIRED, REMOVE A MINIMUM OF 1.8 m (6'-0") AND PROVIDE NEW PAVEMENT JOINT PERPENDICULAR AT ORIGINAL JOINT LOCATION AT THE ADJACENT SLAB EDGE.

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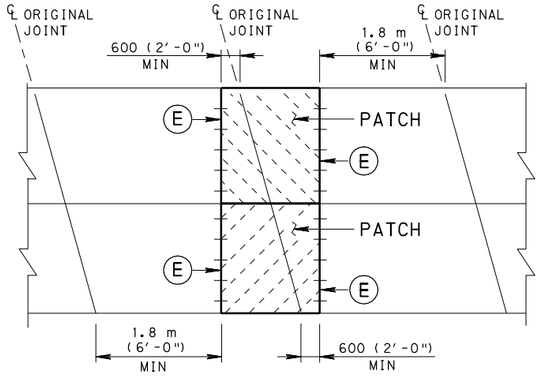
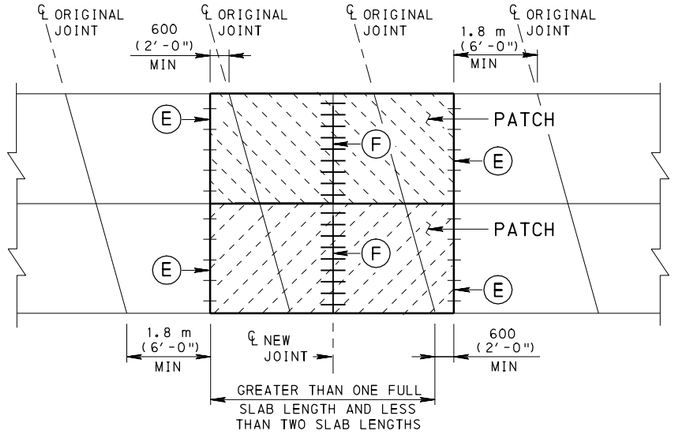
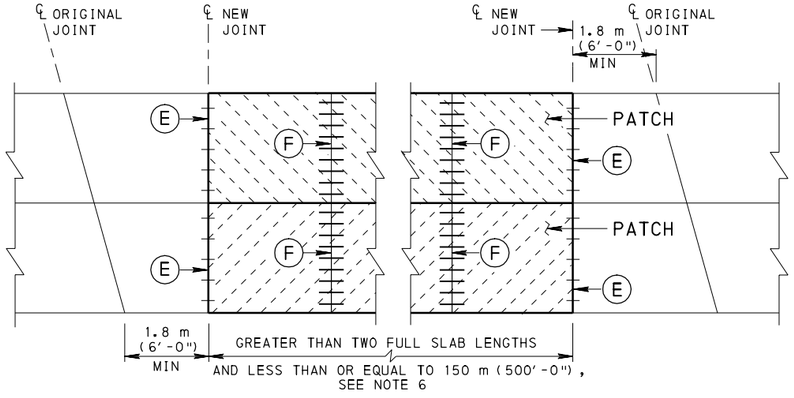
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION
(SINGLE LANE PATCHING) SKEWED JOINTS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 9
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-26M







LEGEND

(E) PAVEMENT PATCHING JOINT, SEE SHEET 1.

(F) NEW PAVEMENT JOINT, SEE RC-20M.

NOTES

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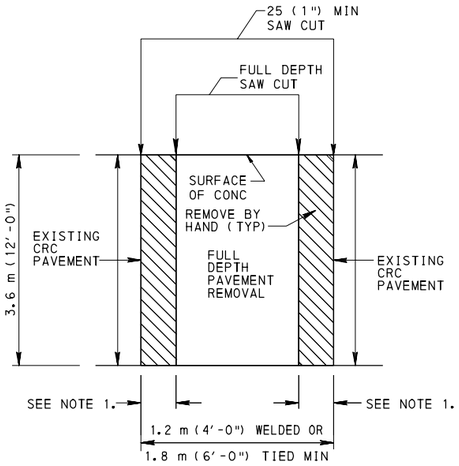
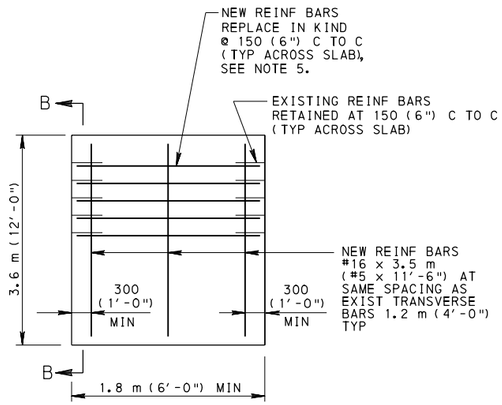
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION
(MULTI-LANE PATCHING) SKEWED JOINTS

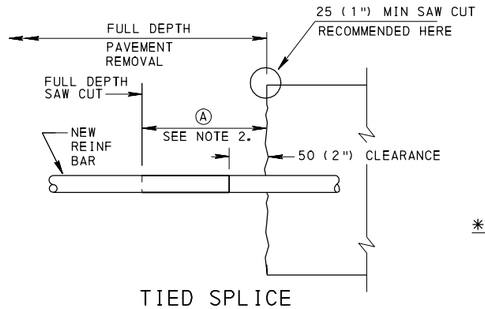
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 5 OF 9
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-26M



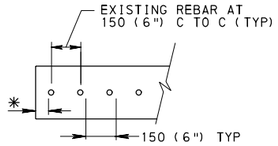
C R C PATCH



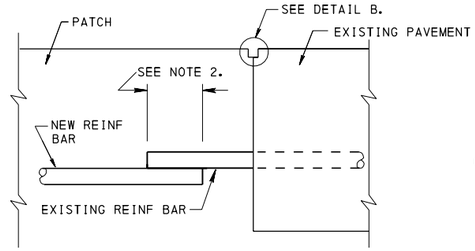
TIED SPLICE
REINFORCEMENT BAR DETAIL



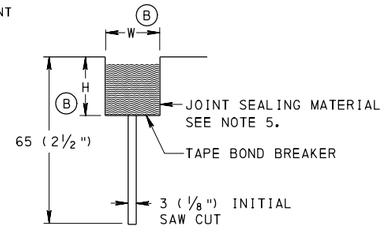
TIED SPLICE
TYPICAL SECTION



SECTION B-B



DETAIL A



DETAIL B

PATCHING JOINT DETAILS

LEGEND

- ✳ MAINTAIN EXISTING EDGE CLEARANCE.
- o EXISTING REBARS
  NEW REBARS

(A) USE THE FOLLOWING TABLE TO DETERMINE DEVELOPMENT LENGTH:

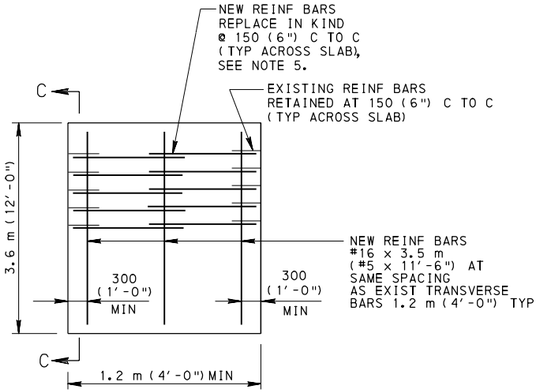
BAR SIZE	DEVELOPMENT LENGTH
#16 (#5)	480 (1'-8")
#19 (#6)	585 (1'-9")
#22 (#7)	755 (2'-3")

(B)

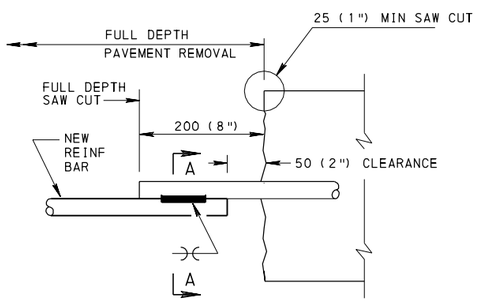
PATCH LENGTH	W	H
≥15 m (50'-0")	25 (1")	32 (1¼ ")
≥6 m (20'-0") & <15 m (50'-0")	19 (¾ ")	25 (1")
<6 m (20'-0")	10 (⅜ ")	19 (¾ ")

NOTES

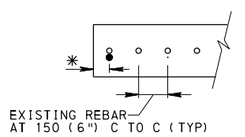
1. REMOVE 510 (20") MIN BY HAND FOR TIED SPLICES. REMOVE 200 (8") BY HAND FOR WELDED SPLICES.
2. OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 150 (6").
3. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS.
4. MINIMUM DISTANCE FROM PATCH EDGE TO EXISTING CRACK IN CRC PAVEMENT IS 600 (2'-0").
5. WHEN TRANSVERSE SPACING OF LONGITUDINAL REINFORCING BARS IS OTHER THAN 150 (6") C TO C, MATCH EXISTING REINFORCING.
6. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (⅛ ") TO 6 (¼ ") BELOW THE PAVEMENT SURFACE.



WELDED SPLICE
REINFORCEMENT BAR DETAIL



WELDED SPLICE
TYPICAL SECTION



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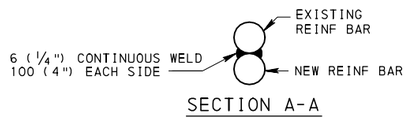

SECTION A-A

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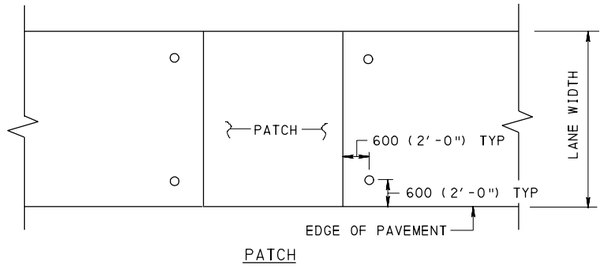
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION

(C R C PATCHING)

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN



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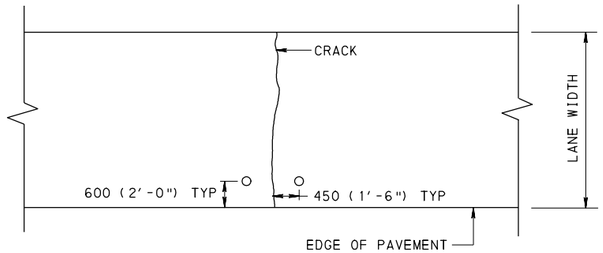
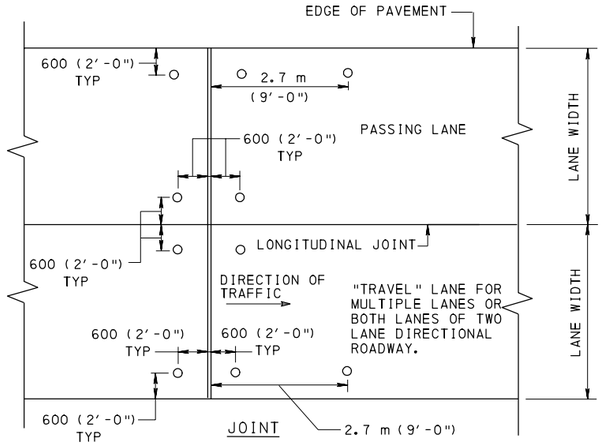
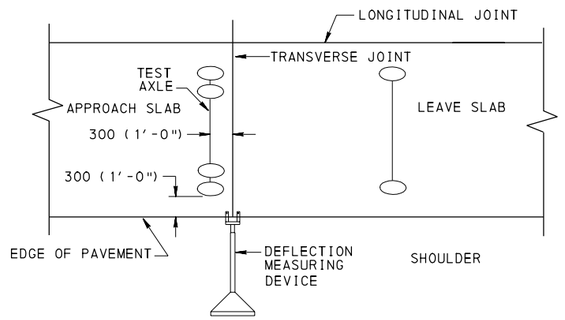


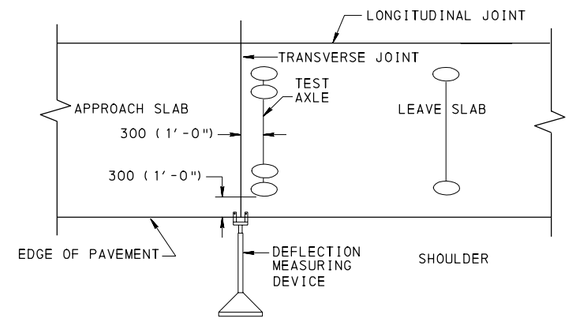
CRACK



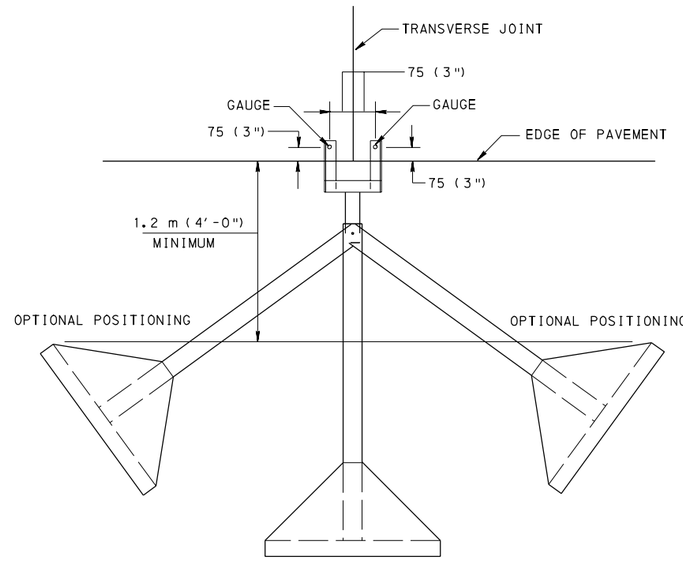
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION



POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED APPROACH SLAB

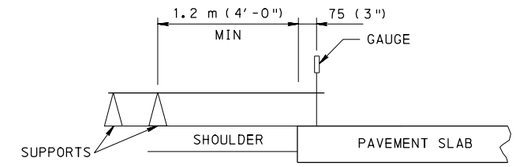


POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED LEAVE SLAB



PLAN VIEW

TYPICAL PLACEMENT OF APPROVED DEFLECTION MEASURING DEVICE AT JOINT



ELEVATION VIEW

NOTE

1. DRILL NEW HOLES FOR REGROUTING 150 (6") CLOSER TO JOINT OR CRACK.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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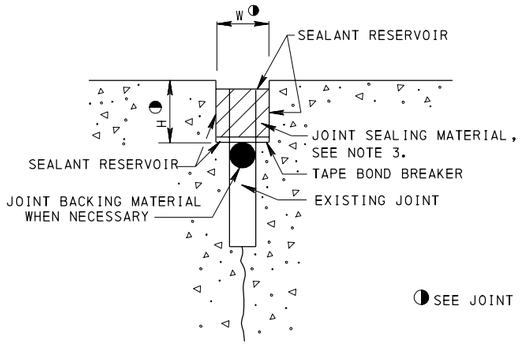
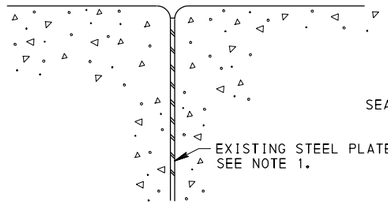
CONCRETE PAVEMENT REHABILITATION (SLAB STABILIZATION DEFLECTION TESTING)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 7 OF 9
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-26M

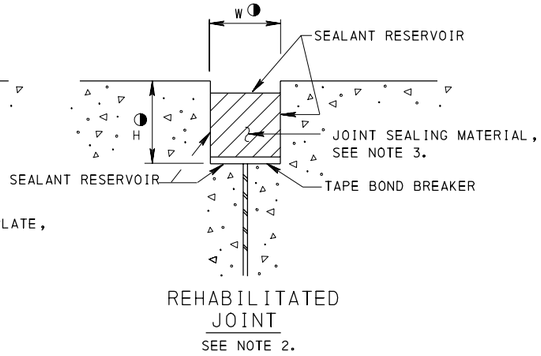


TYPE 1

◑ SEE JOINT SPACING TABLE.



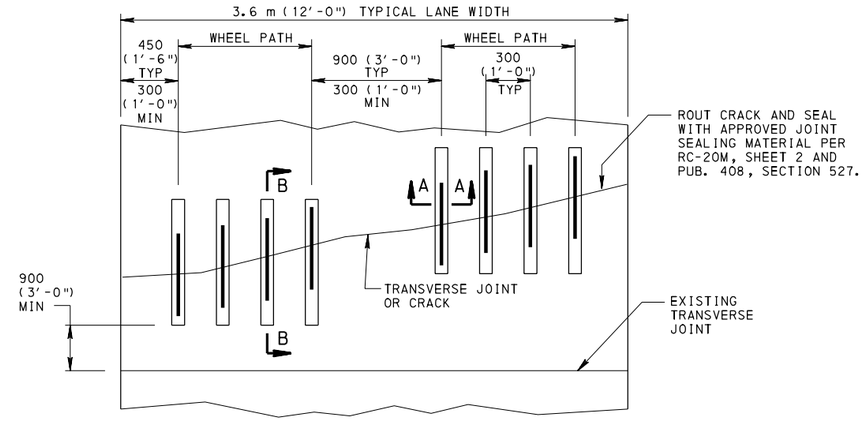
EXISTING JOINT



REHABILITATED JOINT
SEE NOTE 2.

TYPE 2

JOINT REHABILITATION

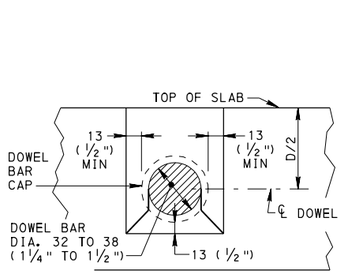


PLAN

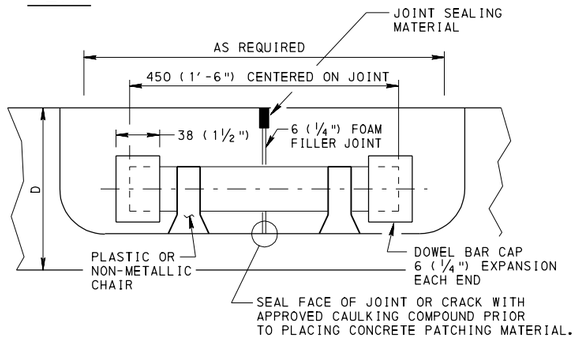
JOINT SPACING	W	H
≥15 m (50'-0")	25 (1")	32 (1¼")
≥6 m (20'-0") AND <15 m (50'-0")	19 (¾")	25 (1")
<6 m (20'-0")	10 (⅜")	19 (¾")

NOTES

1. EXISTING STEEL PLATE IS EITHER 2.01 THICK (14 GAUGE) WITH LAPPED TOP OR FLAT PLATE 3 (⅛") THICK.
2. REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.
3. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (⅛") TO 6 (¼") BELOW THE SURFACE OF THE PAVEMENT.



SECTION A-A



SECTION B-B

DOWEL RETROFIT

NOTES:

- FOR DIFFERENT LANE WIDTHS, ADJUST SPACING FROM OUTSIDE BAR TO LANE EDGE AND SPACING BETWEEN CENTER BARS.
- SIZE DOWEL BAR AS SHOWN ON RC-20M, SHEET 1.
- PLACE DOWEL BAR AT THE MID-DEPTH OF THE THINNER PAVEMENT SLAB WHEN REPAIR AREA SPANS DIFFERENT PAVEMENT SLABS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

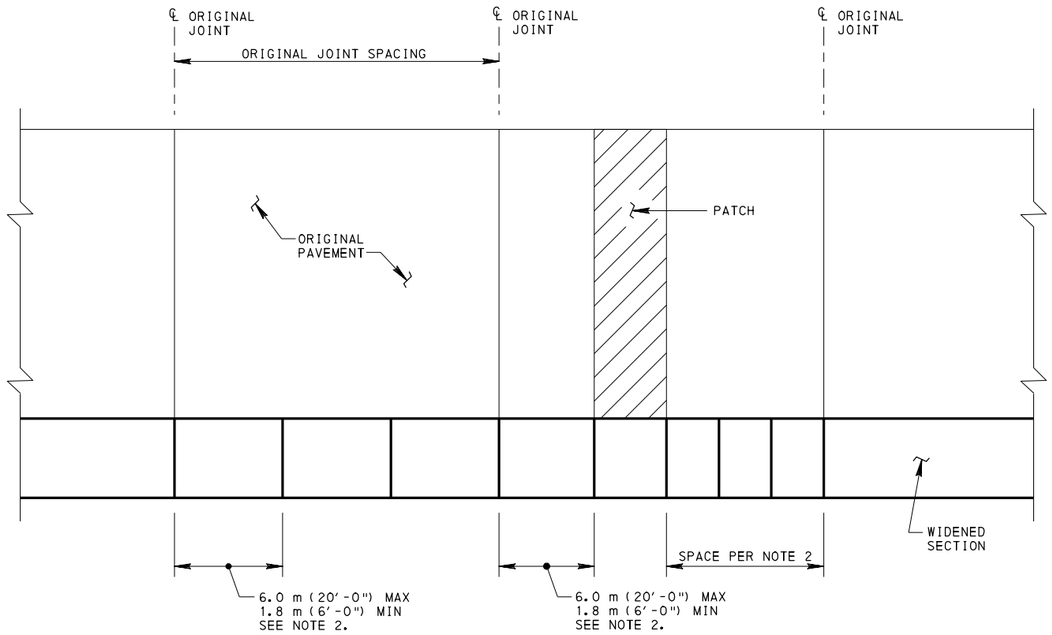
CONCRETE PAVEMENT REHABILITATION (JOINTS)

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 8 OF 9

RC-26M



LANE WIDENING PLAN

NOTES

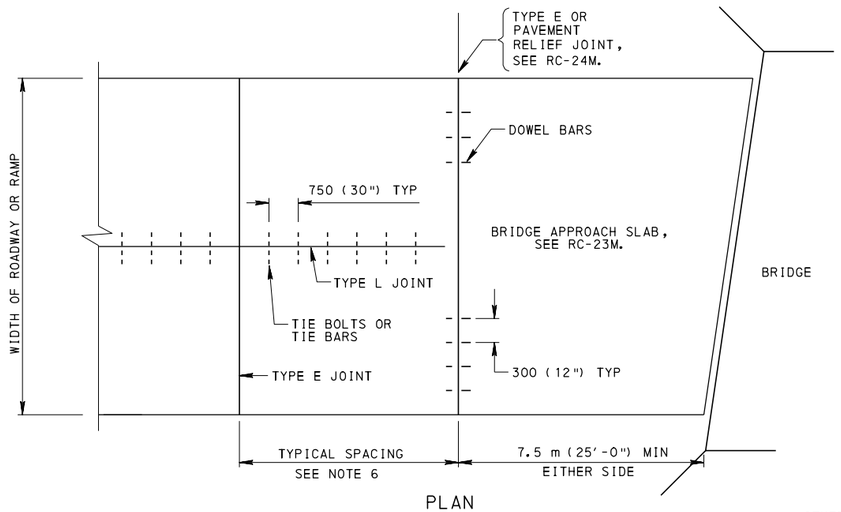
1. MATCH ORIGINAL JOINTS AND PATCH JOINTS. IF INTERMEDIATE JOINTS ARE REQUIRED SPACE EVENLY IN BETWEEN.
2. THE RATIO OF SLAB WIDTH TO LENGTH SHOULD NOT EXCEED 1.25 EXCEPT TO MATCH AN EXISTING JOINT WITHIN 1.5 m (5'-0").
3. SPACE TIE BARS IN ACCORDANCE WITH RC-27M.
4. SPACE LOAD TRANSFER UNIT IN ACCORDANCE WITH RC-20M.
5. FOR JOINT TYPES, SEE RC-27M. MATCH MAINLINE JOINT TYPE REQUIREMENTS, IF JOINTS ARE SPACED AT 6.0 m (20'-0"), USE 6.0 m (20'-0") SPACING FOR WIDENING.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

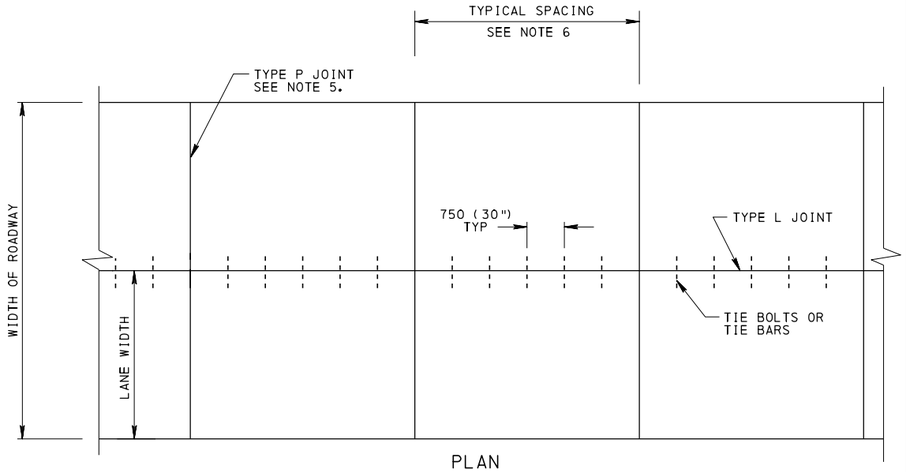
CONCRETE PAVEMENT
REHABILITATION
(LANE WIDENING)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 9 OF 9
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-26M



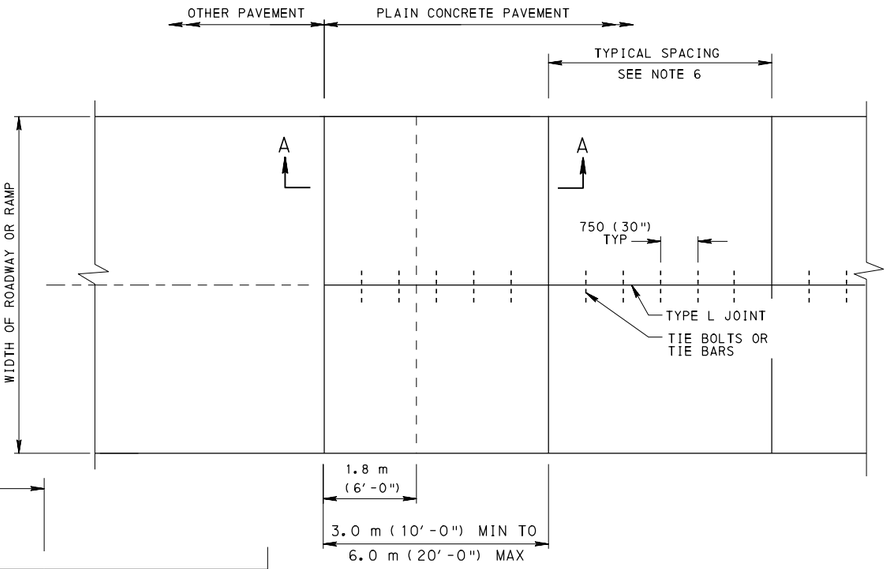
PLAN

BRIDGE APPROACHES



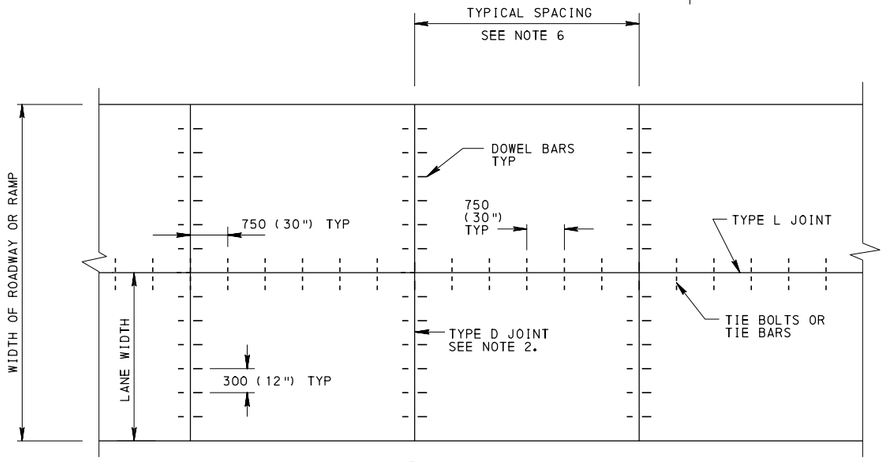
PLAN

COLLECTORS AND LOCAL ROADS

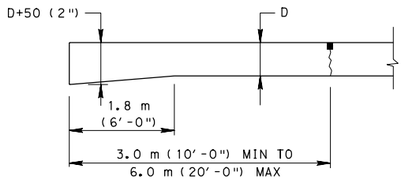


PLAN

TERMINAL SLAB



PLAN



SECTION A-A

INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMPS

NOTES

1. FOR JOINT DETAILS, SEE RC-20M.
2. CONSTRUCT TYPE D JOINTS ON INTERSTATE, EXPRESSWAY, ARTERIAL AND RAMP PAVEMENTS.
3. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
4. CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMPS WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE RAMP GORE.
5. CONSTRUCT TYPE P JOINT, AS INDICATED, ON COLLECTORS AND LOCAL ROADS.
6. USE A 4.5 m (15'-0") JOINT SPACING ON ALL PAVEMENTS.
7. ON CURVES, THE JOINT SHALL BE CONSTRUCTED PERPENDICULAR TO THE TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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DEPARTMENT OF TRANSPORTATION
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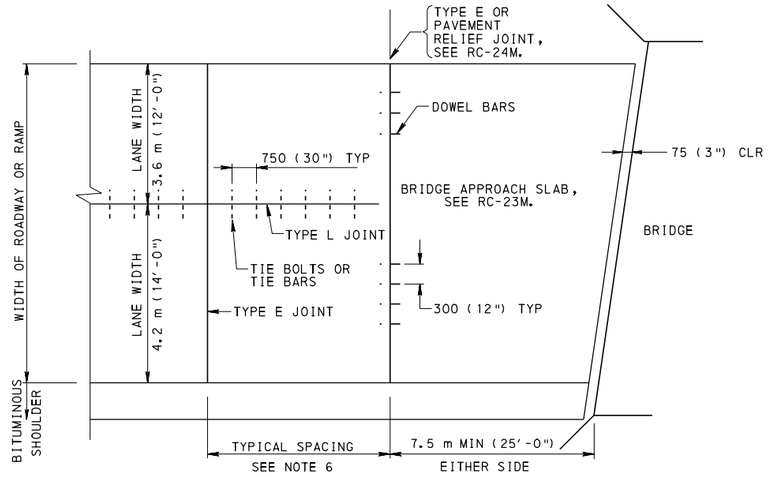
PLAIN CONCRETE PAVEMENT

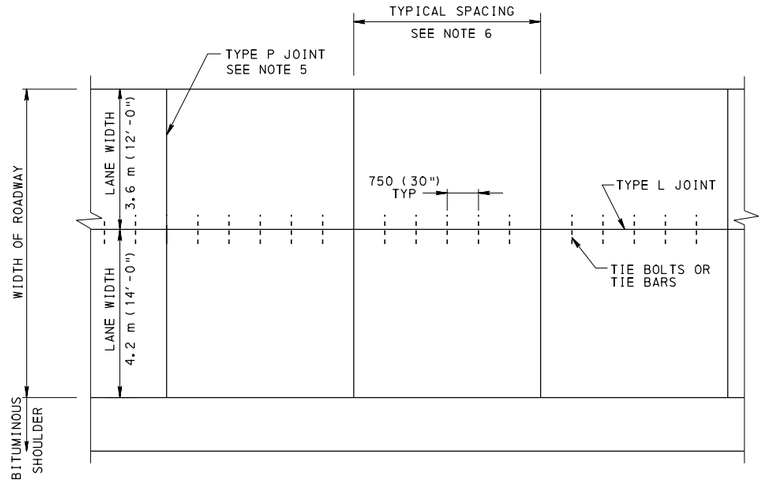
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 2
R. Wood Willey CHIEF, HWY. QA DIVISION	Bruce E. Ryan DIRECTOR, BUREAU OF DESIGN	RC-27M

14-JUN-2010



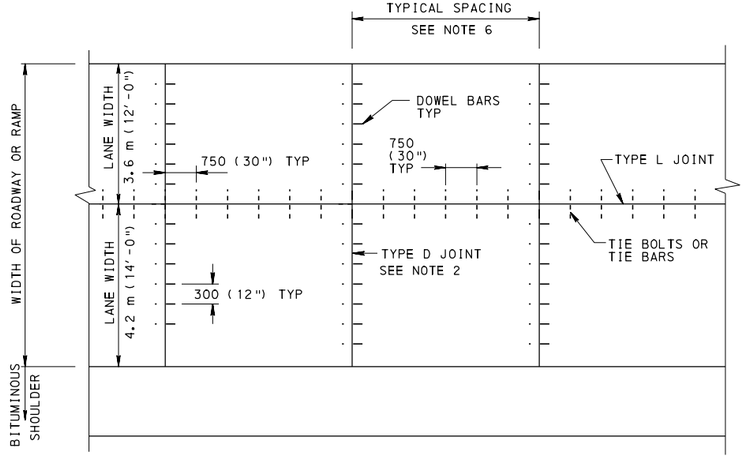
PLAN

BRIDGE APPROACHES WITH WIDENED CONCRETE PAVING



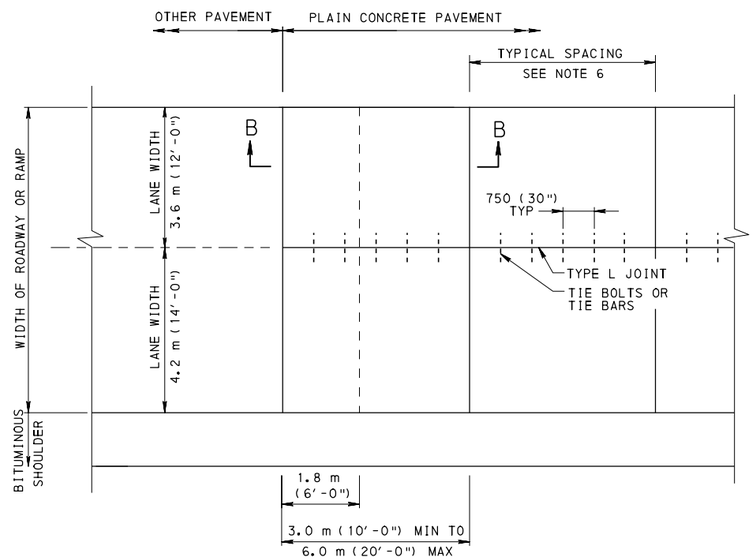
PLAN

COLLECTORS AND LOCAL ROADS



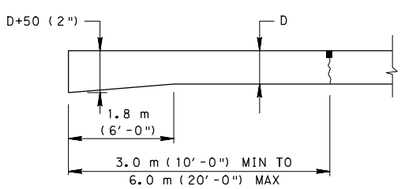
PLAN

INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMPS WITH WIDENED CONCRETE PAVING



PLAN

TERMINAL SLAB WITH WIDENED CONCRETE LANE PAVING



TERMINAL SLAB SECTION B-B WITH WIDENED CONCRETE PAVING

NOTES

1. FOR JOINT DETAILS, SEE RC-20M.
2. CONSTRUCT TYPE D JOINTS ON INTERSTATE, EXPRESSWAY, ARTERIAL AND RAMP PAVEMENTS. PLACE DOWELS AT 300 (12") TYPICAL SPACING ACROSS TRANSVERSE JOINT.
3. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'-0"), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
4. CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMPS WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE RAMP GORE.
5. CONSTRUCT TYPE P JOINT, AS INDICATED, ON COLLECTORS AND LOCAL ROADS.
6. USE A 4.5 m (15'-0") JOINT SPACING ON ALL PAVEMENTS.
7. ON CURVES, CONSTRUCT JOINTS PERPENDICULAR TO THE TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.
8. FOR WIDENED CONCRETE PAVING SHOULDER DETAILS, SEE RC-25M, SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PLAIN CONCRETE PAVEMENT WIDENED PAVING

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

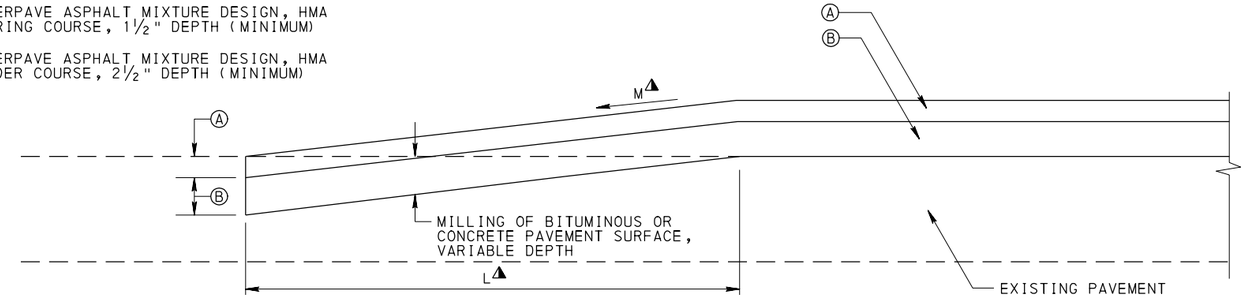
RECOMMENDED JUN. 1, 2010
Bruce E. Thomas
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2

RC-27M

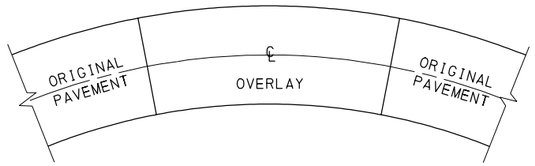
Ⓐ SUPERPAVE ASPHALT MIXTURE DESIGN, HMA WEARING COURSE, 1½" DEPTH (MINIMUM)

Ⓑ SUPERPAVE ASPHALT MIXTURE DESIGN, HMA BINDER COURSE, 2½" DEPTH (MINIMUM)



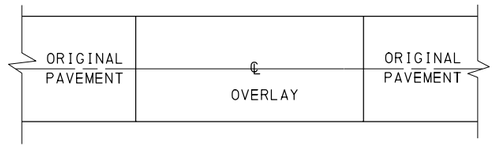
▲ SEE TABLE A FOR DIMENSIONAL REQUIREMENTS.

OVERLAY TRANSITION WITH PAVING NOTCH ON CONCRETE AND BITUMINOUS PAVEMENTS



PLAN VIEW

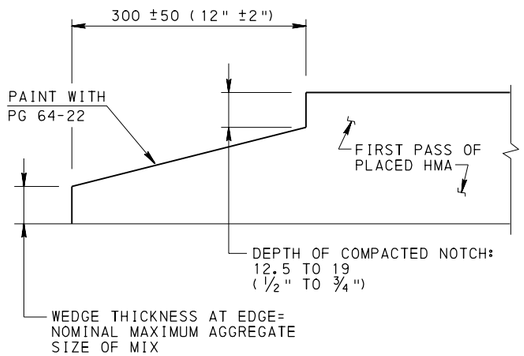
SUPERELEVATION SECTION



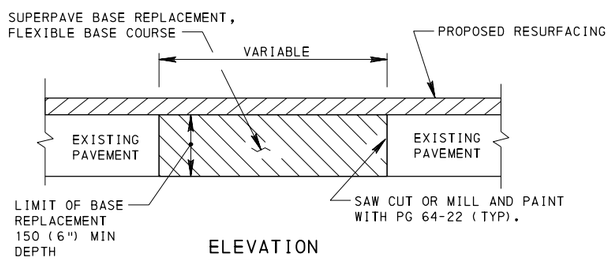
PLAN VIEW

TANGENT SECTION
TWO-LANE, TWO-WAY TRAFFIC AND
TWO-LANE DIRECTIONAL

OVERLAY TRANSITIONS



LONGITUDINAL NOTCHED WEDGE JOINT



ELEVATION

SUPERPAVE BASE REPLACEMENT

SEE NOTES 5, 6, 7 AND 8 THIS SHEET.

TABLE A

FUNCTIONAL CLASSIFICATION	SLOPE M (MAXIMUM)	PAVING NOTCH L (MINIMUM)
INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS	0.17% (1" IN 50')	15 m (50')
ARTERIALS > 70 km/h (45 mph) SEE NOTE 2.	0.28% (1" IN 30')	9 m (30')
ARTERIALS ≤ 70 km/h (45 mph) SEE NOTE 2	0.33% (1" IN 25')	7.5 m (25')
COLLECTORS AND LOCAL ROADS	0.33% (1" IN 25')	7.5 m (25')
CROSS STREETS SEE NOTE 1	8.33% (1" IN 12")	0.3 m (1')
DRIVEWAYS	8.33% (1" IN 12")	NO NOTCH

TABLE B

NOMINAL MAXIMUM AGGREGATE SIZE		
MIX	METRIC	ENGLISH
SP9.5 (ID-2W, ID-2W H.D.)	9.5	⅜"
SP12.5	12.5	½"
SP19 (ID-3B, ID-2B, ID-2B H.D.)	19	¾"

NOTES

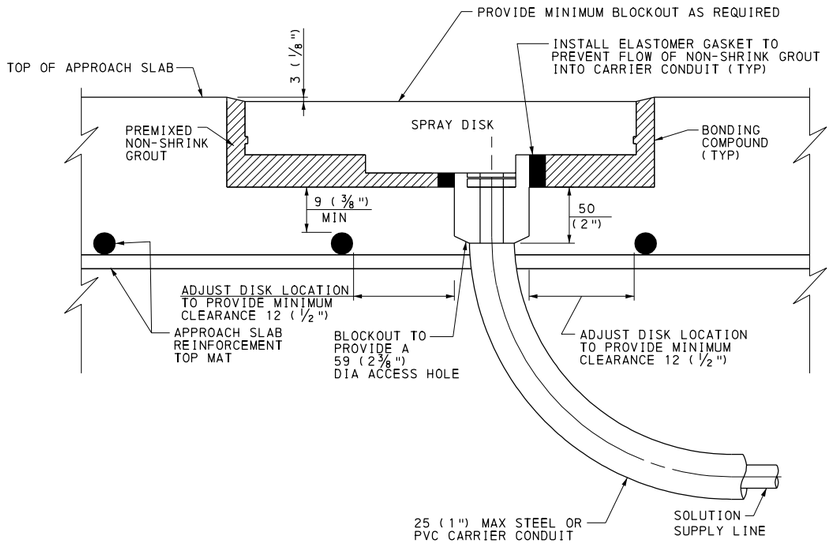
1. USE HIGHER APPROPRIATE CRITERIA IF A CROSS STREET HAS A FUNCTIONAL CLASSIFICATION OF COLLECTORS AND LOCAL ROADS OR HIGHER.
2. USE 85TH PERCENTILE SPEED, IF AVAILABLE. OTHERWISE, USE THE POSTED SPEED.
3. PLACE EDGE FLUSH WITH EXISTING PAVEMENT AND SEAL AS SPECIFIED IN PUBLICATION 408, SECTION 409.3(k)3.
4. CONSTRUCT FLEXIBLE BASE REPLACEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 316.
5. PREPARE EXPOSED VERTICAL AND HORIZONTAL SURFACES AS PER PUBLICATION 408, SECTION 409.3(k).
6. FOR NON-OVERLAY APPLICATIONS, THE TOP 40 (1½") OF BASE REPLACEMENT WILL BE SUPERPAVE WEARING COURSE.
7. FOR RESTORATION OF RIGID PAVEMENT, REFER TO PUBLICATION 408, SECTION 516 AND RC-26M.
8. FOR SUPERPAVE BASE REPLACEMENT, SAW CUTTING, EXCAVATION, HAULING AND DISPOSAL, BITUMINOUS TACK COAT, BITUMINOUS MATERIAL, AND SEALING OF THE JOINTS ARE CONSIDERED AS INCIDENTAL.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

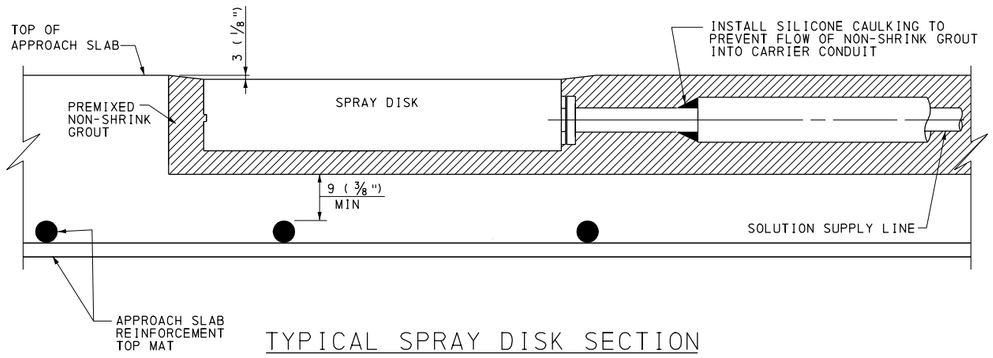
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

OVERLAY TRANSITIONS AND PAVING NOTCHES

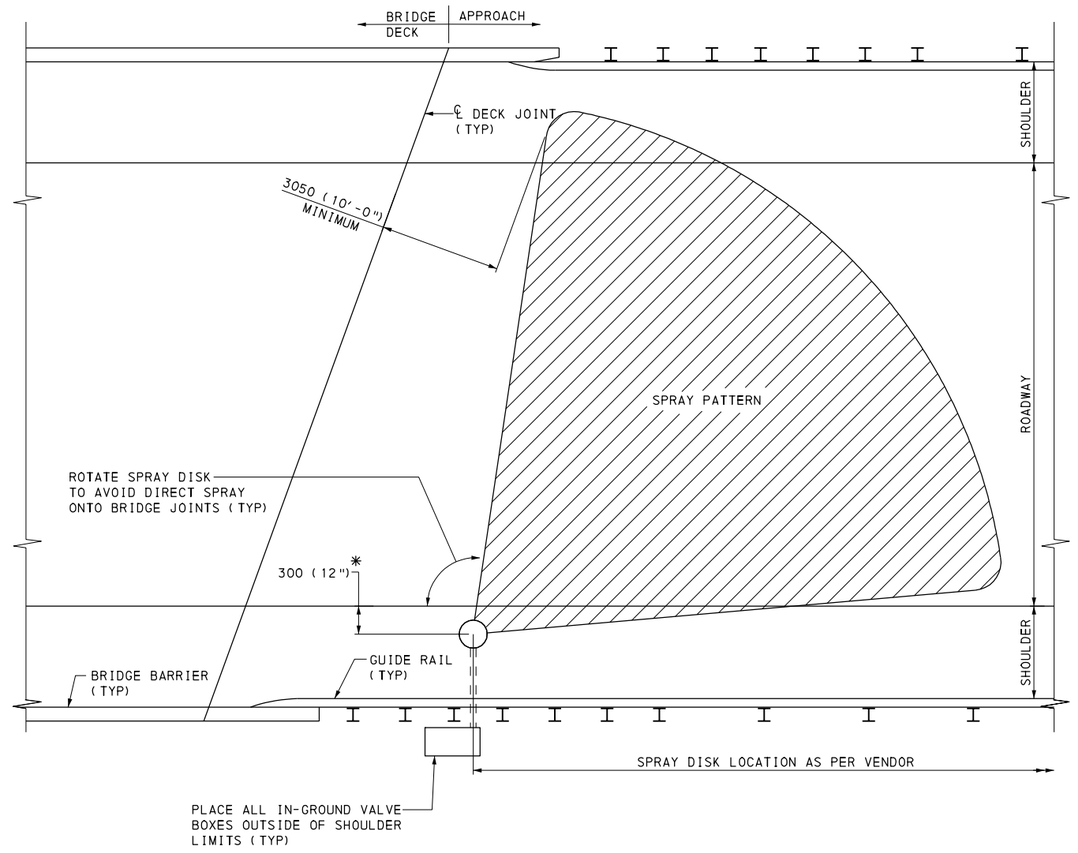
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
R. Wyatt Dilley		
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-28M



TYPICAL SPRAY DISK SECTION
(NEW CONSTRUCTION)



TYPICAL SPRAY DISK SECTION
(EXISTING APPROACH SLAB)



APPROACH PLAN

* PREFERRED LOCATION FOR SPRAY DISKS IS AS SHOWN ON SHOULDER, WHICH MINIMIZES TRAFFIC DISRUPTIONS WHEN SPRAY DISKS REQUIRE MAINTENANCE. THE ADE OF MAINTENANCE MUST APPROVE ALL OTHER LOCATIONS. OTHER ACCEPTABLE LOCATIONS INCLUDE THE CENTER OF THE TRAVEL LANE.

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
2. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUBLICATION 408.
3. THESE STANDARDS ARE PRESENTED TO FACILITATE THE INSTALLATION OF SPRAY DISKS FOR AN ANTI-ICING SYSTEM. SEE BC-723M FOR ADDITIONAL INFORMATION, INSTALLATION METHODS, AND FOR AN ANTI-ICING SYSTEM INSTALLATION ON A BRIDGE STRUCTURE.
4. CONSTRUCT SPRAY DISKS USING STAINLESS STEEL OR OTHER DURABLE MATERIALS THAT ARE UV RESISTANT. PROVIDE SPRAY DISKS THAT WILL ACCOMMODATE ADJUSTMENTS TO THE SPRAY PATTERN AFTER INSTALLATION. ADJUSTMENT CHOICES INCLUDE NOZZLE ROTATION AND NOZZLE REPLACEMENT.
5. ENCLOSE ALL BURIED OR CONCRETE ENCASED SOLUTION SUPPLY LINES AND ELECTRICAL WIRING IN STEEL OR PVC CONDUIT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1101.09(b).
6. WHEN INSTALLING ANTI-ICING SYSTEM IN AN EXISTING CONCRETE APPROACH SLAB, DRILL HOLE AND CUT KERF, PLACE CONDUIT AND SUPPLY LINE IN THE KERF AND THROUGH THE HOLE, AND FILL WITH PREMIXED NON-SHRINK GROUT AS INDICATED.

GENERAL NOTES (CONT'D):

7. USE A PREMIXED FLOWABLE NONSHRINK GROUT AS PER PUBLICATION 408, SECTION 1080.2(c), FOR EMBEDDING ANTI-ICING HARDWARE IN CONCRETE.
8. TO AVOID DAMAGING OR CONFLICTING WITH REINFORCING STEEL IN EXISTING CONCRETE APPROACH SLABS, LIMIT MAXIMUM CORING AND SAW CUTTING FOR SPRAY DISKS AND CONDUITS TO DEPTH OF 60 (2½").
9. NO CONDUIT JOINTS ARE PERMITTED FOR INSTALLATION IN EXISTING CONCRETE. FIELD BENDS ARE PERMITTED WHEN INTERNAL DIAMETER IS MAINTAINED.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

REFERENCE DRAWINGS	
RC-23M	BRIDGE APPROACH SLAB
RC-81M	JUNCTION BOXES - LIGHT DUTY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

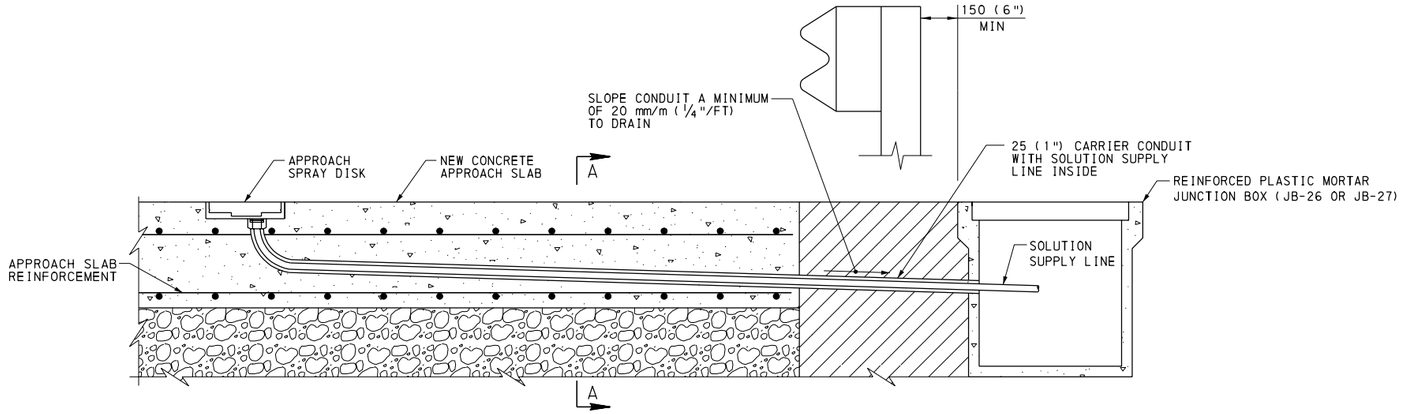
STANDARD
BRIDGE ANTI-ICING SYSTEM
APPROACH INSTALLATION

RECOMMENDED JUN. 1, 2010
R. Hurd Willey
CHIEF, HWY. QA DIVISION

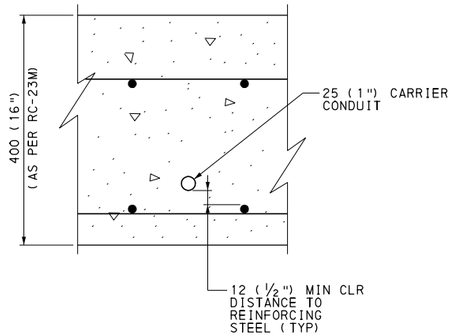
RECOMMENDED JUN. 1, 2010
Bruce Thomas
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 3

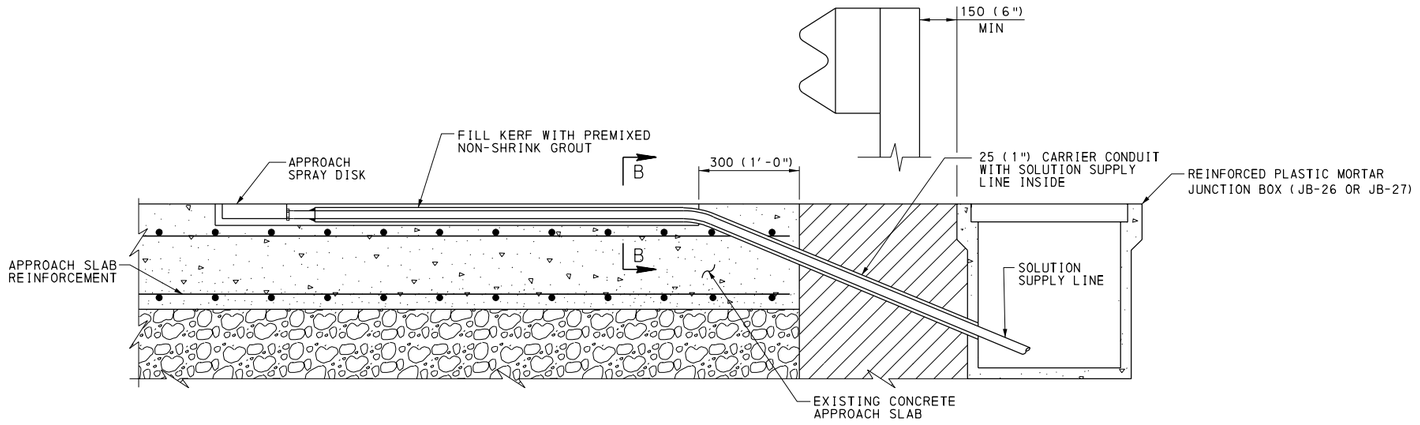
RC-29M



INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM
(NEW APPROACH CONCRETE PAVEMENT)



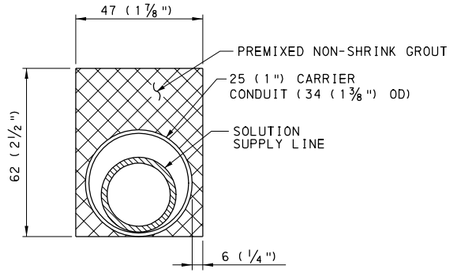
SECTION A-A



INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM
(EXISTING APPROACH CONCRETE PAVEMENT)

NOTE

1. FOR GENERAL NOTES, SEE SHEET 1.



SECTION B-B

(SAW KERF DETAIL FOR CONCRETE PAVEMENT)

LEGEND:

- CONCRETE ROADWAY
- ROADWAY SUBBASE
- EMBANKMENT MATERIAL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

REFERENCE DRAWINGS	
RC-23M	BRIDGE APPROACH SLAB
RC-81M	JUNCTION BOXES - LIGHT DUTY

COMMONWEALTH OF PENNSYLVANIA
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STANDARD
BRIDGE ANTI-ICING SYSTEM
APPROACH INSTALLATION

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
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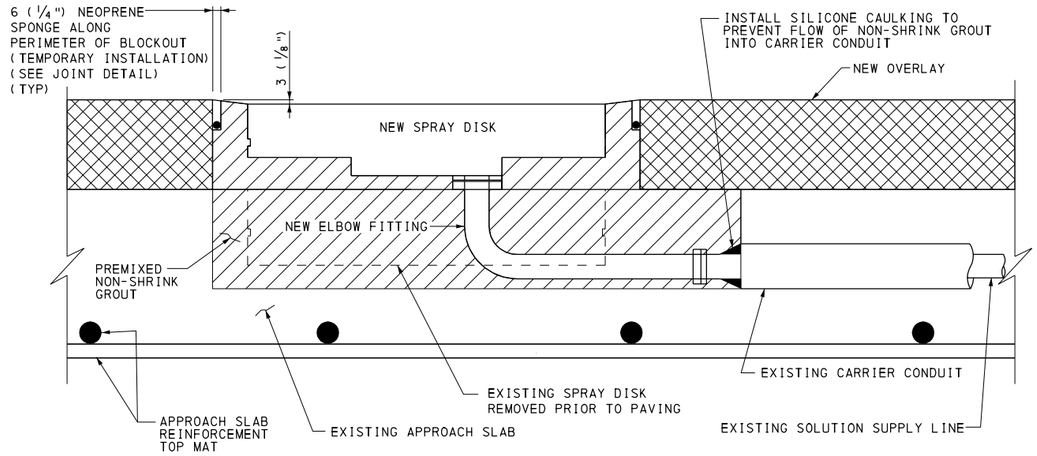
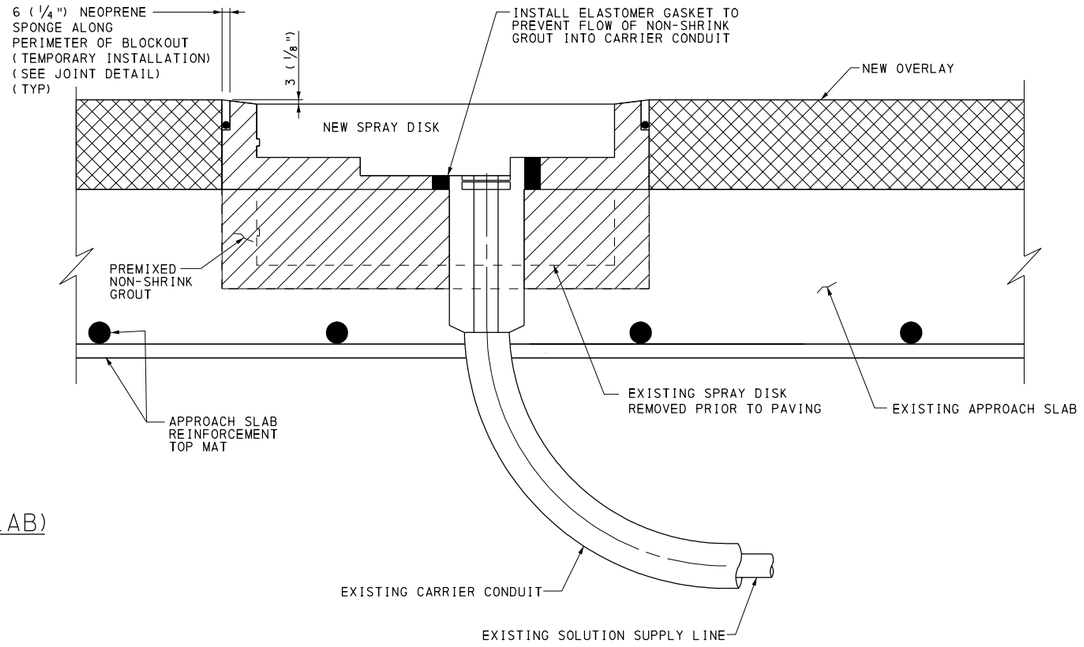
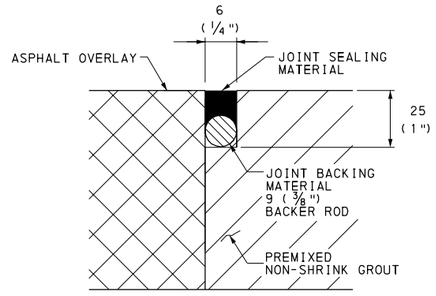


SPRAY DISC ADJUSTMENT TO ACCOMMODATE BITUMINOUS OVERLAY
(ORIGINAL SPRAY DISK INSTALLED AFTER CONSTRUCTION OF APPROACH SLAB)

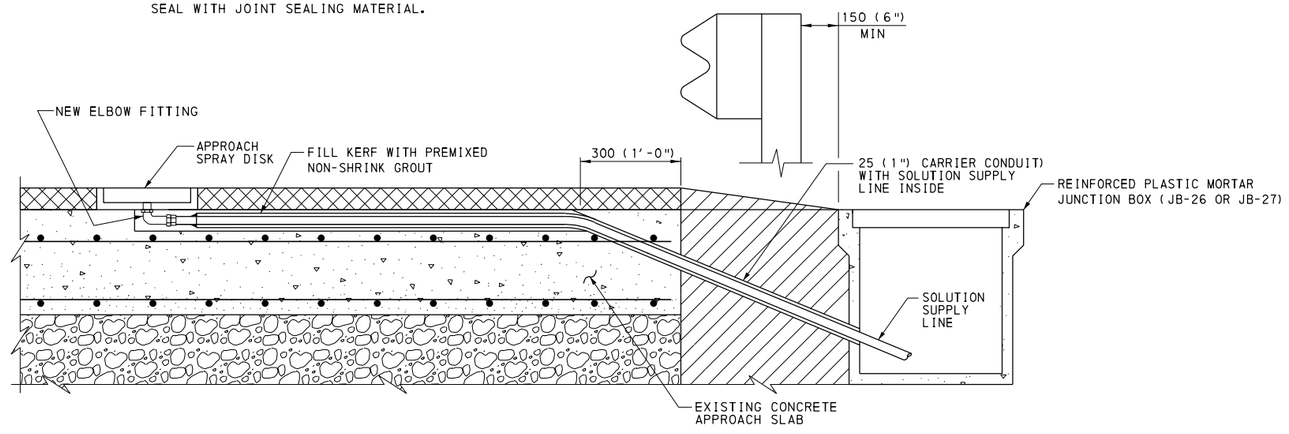


SPRAY DISC ADJUSTMENT TO ACCOMMODATE BITUMINOUS OVERLAY
(ORIGINAL SPRAY DISK INSTALLED CONCURRENTLY WITH APPROACH SLAB)



JOINT DETAIL

NOTE: INSTALL JOINT MATERIAL GROUT WITH 6 (1/4 ") NEOPRENE SPONGE AROUND PERIMETER OF BLOCKOUT/CUTOUT IN THE OVERLAY LAYER ONLY. AFTER GROUT HARDENS, REMOVE SPONGE AND INSTALL 9 (3/8 ") BACKER ROD AND SEAL WITH JOINT SEALING MATERIAL.



INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM
(SPRAY DISK INSTALLED CONCURRENTLY WITH NEW BITUMINOUS OVERLAY)

NOTE: DETAIL SIMILAR FOR SPRAY DISK INSTALLED WITH EXISTING OVERLAY. EMBED CARRIER CONDUIT IN CONCRETE.

LEGEND:

- CONCRETE ROADWAY
- ROADWAY SUBBASE
- EMBANKMENT MATERIAL

NOTES

1. FOR GENERAL NOTES, SEE SHEET 1.
2. FOR KERF DETAILS, SEE SHEET 2.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

RC-23M	BRIDGE APPROACH SLAB
RC-81M	JUNCTION BOXES - LIGHT DUTY
REFERENCE DRAWINGS	

COMMONWEALTH OF PENNSYLVANIA
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STANDARD

BRIDGE ANTI-ICING SYSTEM

SPRAY DISK ADJUSTMENT FOR APPROACH OVERLAY

RECOMMENDED JUN. 1, 2010
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CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
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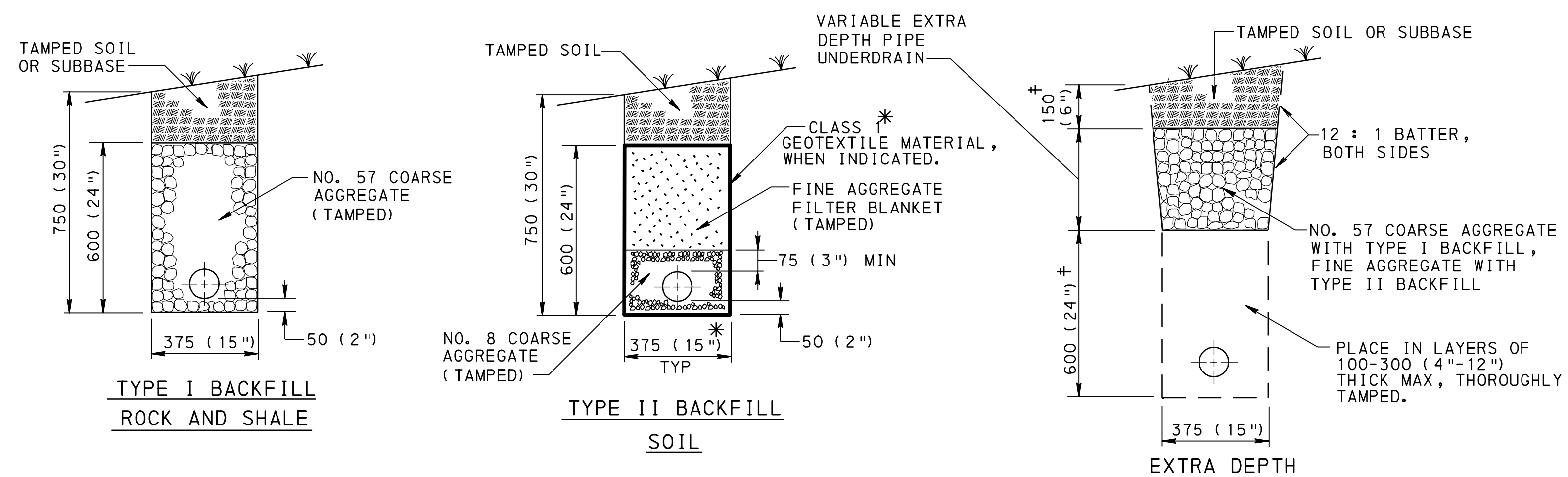
SHT 3 OF 3

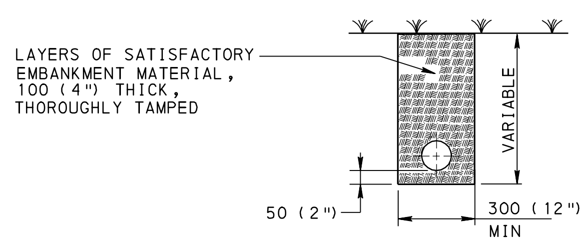
RC-29M



PIPE UNDERDRAIN

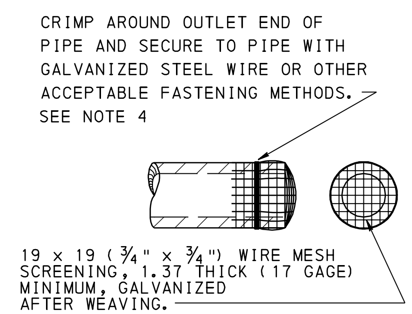
NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 610 FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN.
2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.
3. FOR THE SUBSURFACE DRAIN OUTLET PROVIDE MATERIALS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 615. A MINIMUM OF 600 (24") OF COVER OVER THE PIPE IS REQUIRED FOR OUTLETS CONSTRUCTED WITH THE SAME MATERIAL AS THE UNDERDRAIN OR PAVEMENT BASE DRAIN.
4. USE THE WIRE MESH SHIELD IN AREAS NOT SUBJECT TO MOWING OR DAMAGE BY EQUIPMENT OR VEHICLES. REFER TO RC-31M FOR CONSTRUCTION OF ENDWALLS FOR OUTLET PROTECTION.
5. LONGITUDINAL BASE DRAINS MAY RUN CONTINUOUSLY THROUGH TWO (2) OUTLETS. USE A 45° ELBOW ON THE THIRD OUTLET OF A SERIES. BEGIN THE DRAIN FOLLOWING THE THIRD OUTLET WITH AN END CAP.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

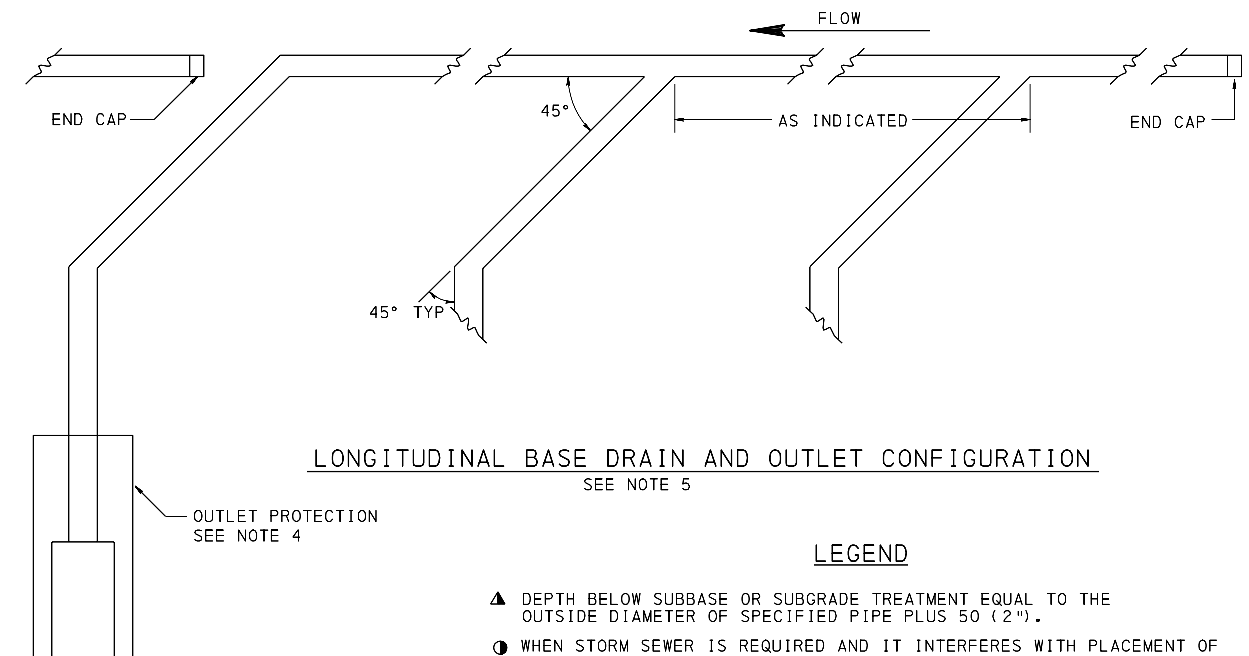


EXCAVATION OVER 900 (36") IN DEPTH AND FOR A MAXIMUM WIDTH OF 600 (24") IS PAYABLE AS CLASS 4 EXCAVATION. USE SUBSURFACE DRAIN OUTLETS FOR ALL PIPE UNDERDRAIN AND PAVEMENT BASE DRAINS.

SUBSURFACE DRAIN OUTLETS
(SEE DETAIL A.)



DETAIL A
WIRE MESH SHIELD



LONGITUDINAL BASE DRAIN AND OUTLET CONFIGURATION
SEE NOTE 5

LEGEND

▲ DEPTH BELOW SUBBASE OR SUBGRADE TREATMENT EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 50 (2").

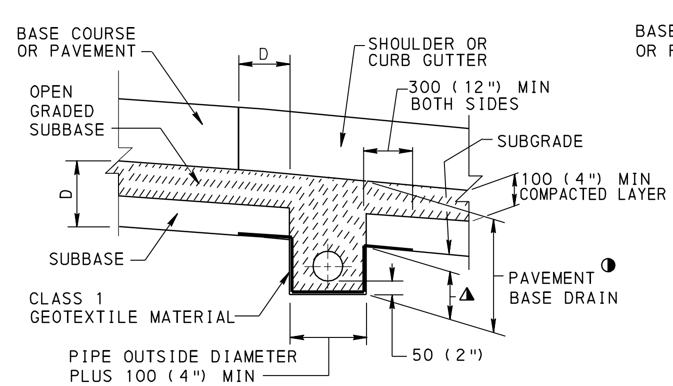
◑ WHEN STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN.

✳ WHEN GEOTEXTILE MATERIAL IS USED FOR TYPE II BACKFILL, REPLACE FINE AGGREGATE FILTER BLANKET WITH EQUIVALENT DEPTH OF NO.8 COARSE AGGREGATE. WHERE ACCESS BY TRENCH EQUIPMENT IS FEASIBLE, PROVIDE TRENCH WIDTH EQUAL TO PIPE OUTSIDE DIAMETER PLUS 50 (2"), BUT NOT LESS THAN 150 (6"), WHEN GEOTEXTILE MATERIAL IS INDICATED.

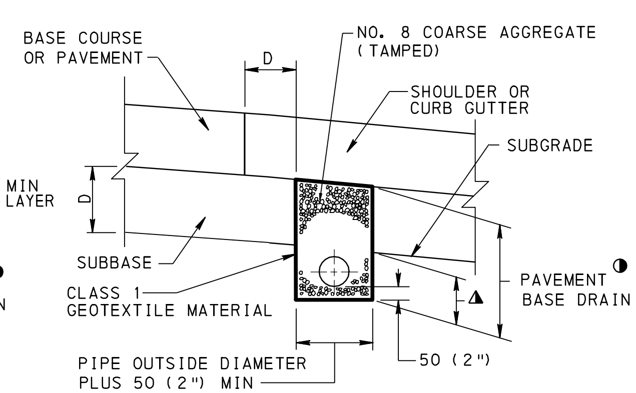
‡ TYPE I OR TYPE II BACKFILL

D= SUBBASE DEPTH

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

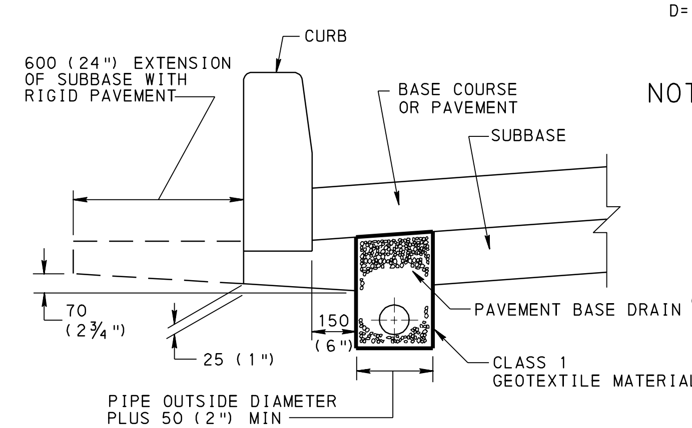


TYPICAL PLACEMENT
(OPEN GRADED SUBBASE)



TYPICAL PLACEMENT
(STANDARD SUBBASE)

PAVEMENT BASE DRAIN

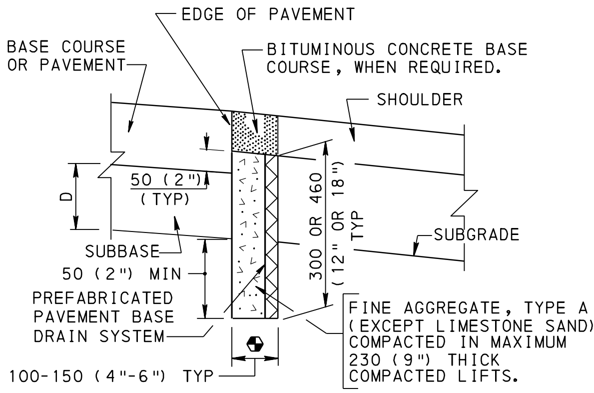


PLACEMENT AT CURB SECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

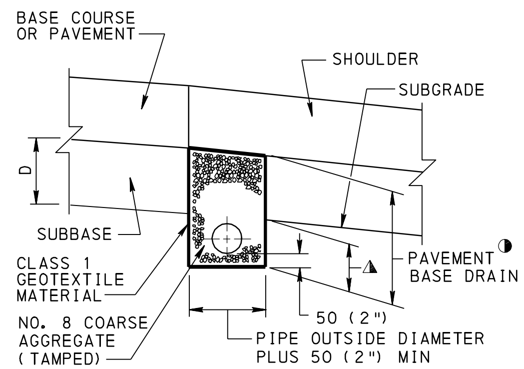
SUBSURFACE DRAINS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 5
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-30M

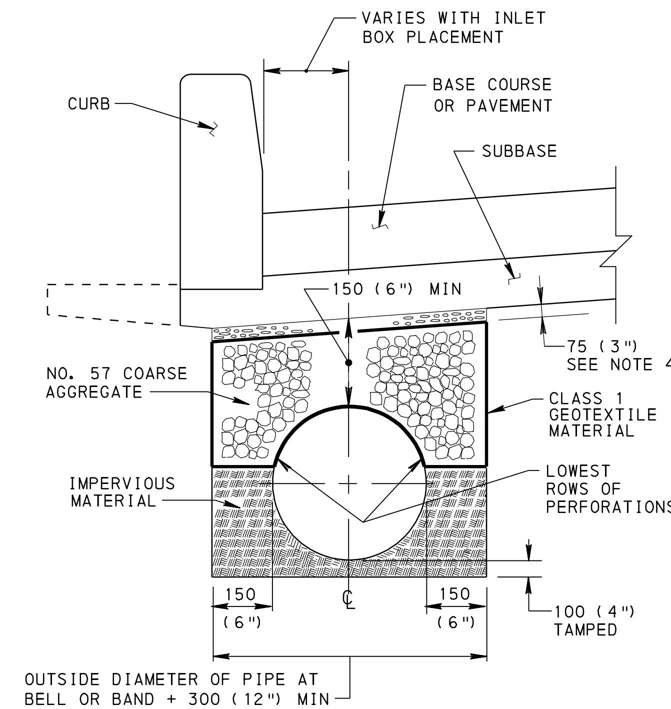


PREFABRICATED PAVEMENT BASE DRAIN (REHABILITATION)

SEE NOTE 3.

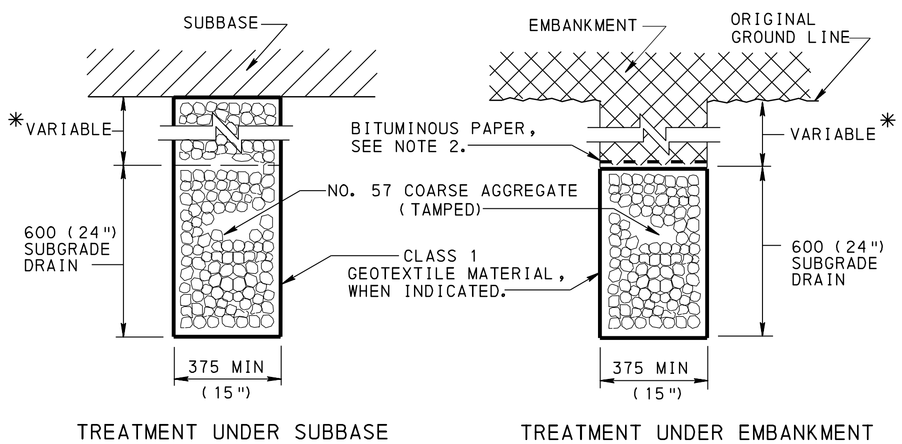


PAVEMENT BASE DRAIN (REHABILITATION)

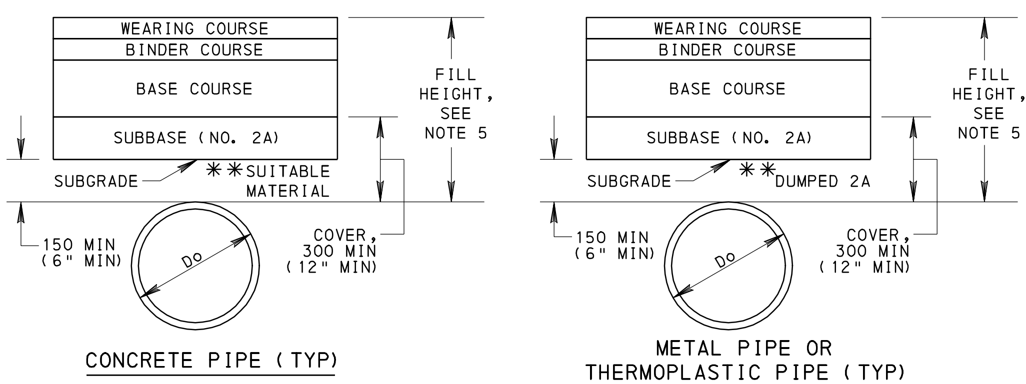


COMBINATION STORM SEWER AND UNDERDRAIN

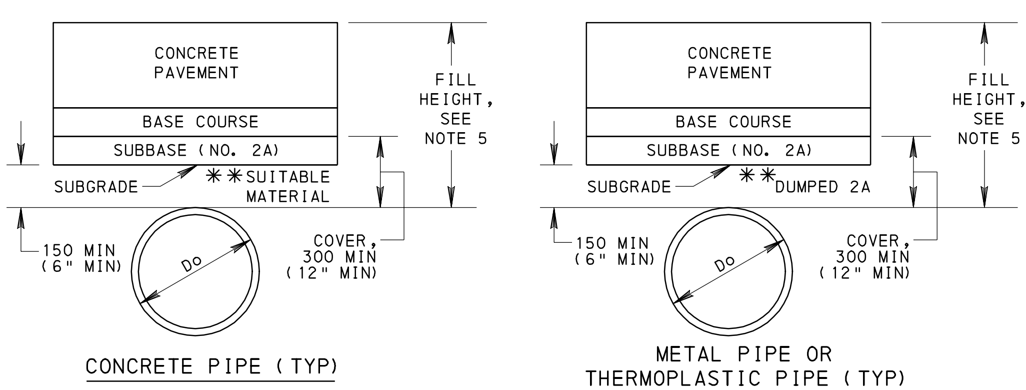
NOTE: PLACE NO. 57 COARSE AGGREGATE, TAMPED IN LAYERS 150 (6") THICK, STARTING AT THE LOWEST ROWS OF PERFORATIONS OR THE START OF THE OPEN JOINT. PLACE GROUPS OF PERFORATIONS OR THE OPEN JOINT (1/3 PIPE CIRCUMFERENCE) SYMMETRICALLY ABOUT THE VERTICAL CENTER LINE.



SUBGRADE DRAIN



MINIMUM COVER OVER PIPE UNDER BITUMINOUS PAVEMENTS



MINIMUM COVER OVER PIPE UNDER CONCRETE PAVEMENTS

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION AS SPECIFIED IN PUBLICATION 408, SECTION 610 FOR PAVEMENT BASE DRAIN, SECTION 612 FOR SUBGRADE DRAINS, SECTION 604 FOR COMBINATION STORM SEWER AND UNDERDRAIN AND SECTION 601 FOR PIPE CULVERTS.
2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.
3. PREFABRICATED PAVEMENT BASE DRAIN IS NOT RECOMMENDED UNDER CURBED SECTIONS AND ADJACENT TO WIDENED PAVEMENT.
4. PLACE 2A AGGREGATE MATERIAL, IN A LIFT 75 (3") THICK, COMPACT TO 95% SPD.
5. FOR MAXIMUM AND MINIMUM ALLOWABLE FILL HEIGHTS, REFER TO PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 10, APPENDIX B (FILL HEIGHT TABLES FOR PIPES AND PIPE ARCHES).

LEGEND

▲ DEPTH BELOW SUBBASE EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 50 (2").

◑ WHEN STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN.

D= SUBBASE DEPTH.

IF SLOUGHING OF THE SUBBASE MATERIAL FROM UNDER THE PAVEMENT IS OBSERVED DURING TRENCH EXCAVATION, COMPACT BACKFILL HYDRAULICALLY, AS DIRECTED BY THE ENGINEER.

● WIDTH IS EQUAL TO 75-125 (3"-5") OF BACKFILL AGGREGATE PLUS 25 (1") FOR THE PREFABRICATED BASE DRAIN.

* VARY TO MAINTAIN THE NECESSARY SUBGRADE SLOPE. CONSIDER ADDITIONAL AGGREGATE INCIDENTAL TO THE SUBGRADE DRAIN PAY ITEM.

** REFER TO SHEET 4 FOR PIPE INSTALLATION PROCEDURES, INCLUDING PLACEMENT AND COMPACTION REQUIREMENTS.

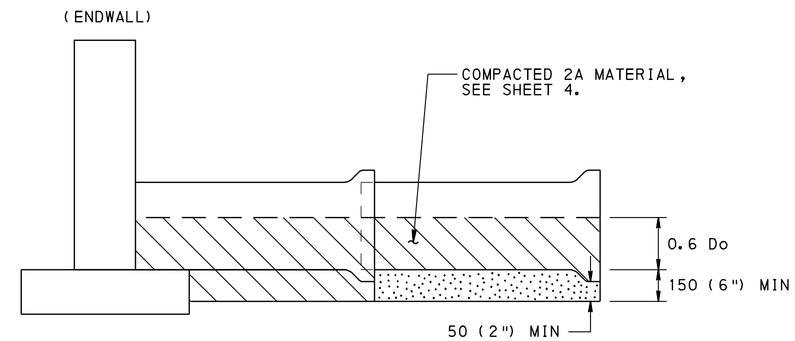
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS

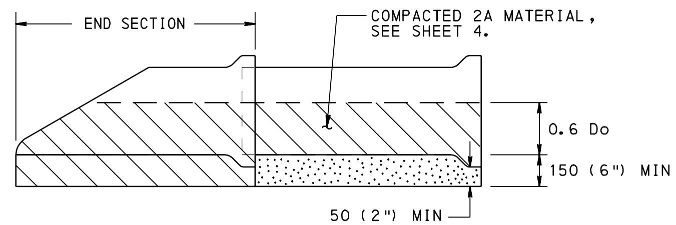
PIPE PLACEMENT

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 5
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-30M



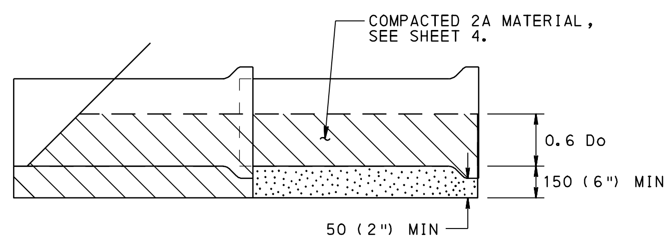
BACKFILL DETAIL AT ENDWALL

(FOR CONCRETE PIPE)



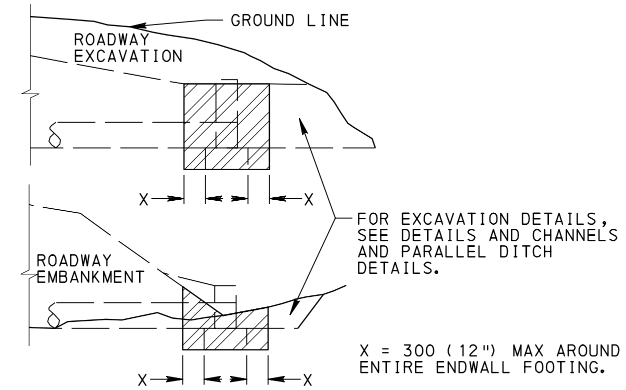
BACKFILL DETAIL AT END SECTION

(FOR CONCRETE PIPE)

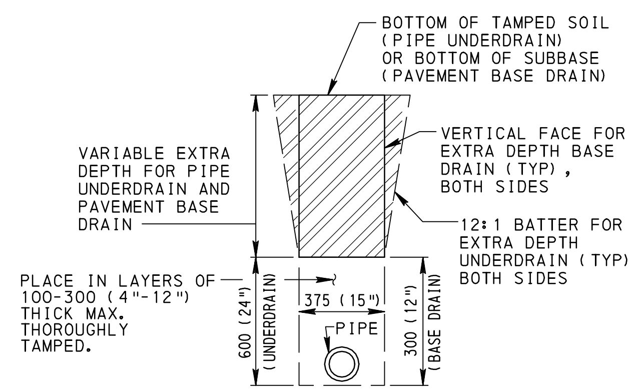


BACKFILL DETAIL AT LAST SECTION OF PIPE

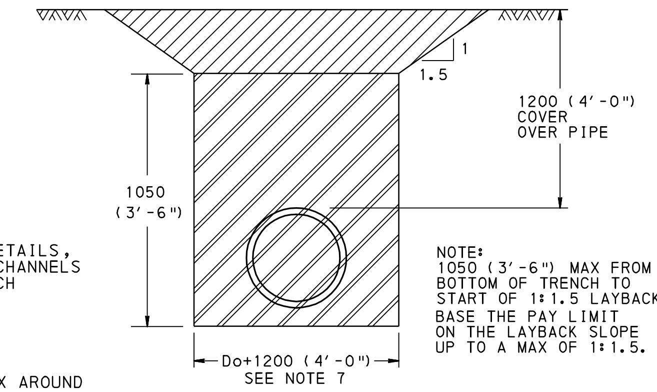
(FOR CONCRETE PIPE)



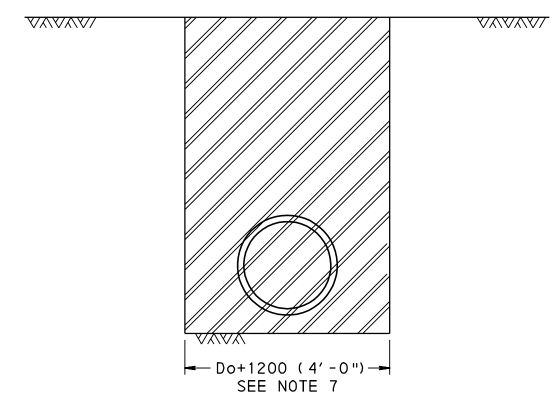
EXCAVATION FOR ENDWALLS



EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN



ABOVE DRAWING SHOWS EXCAVATION FOR PIPE IN CUT OR FILL WHERE SUBGRADE IS 1050 (3'-6") OR MORE ABOVE THE BOTTOM OF THE TRENCH.



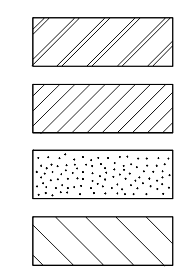
ABOVE DRAWING SHOWS EXCAVATION FOR PIPE IN CUT OR FILL WHERE SHORING OR A TRENCH BOX IS USED.

PAY LIMITS FOR PIPE EXCAVATION

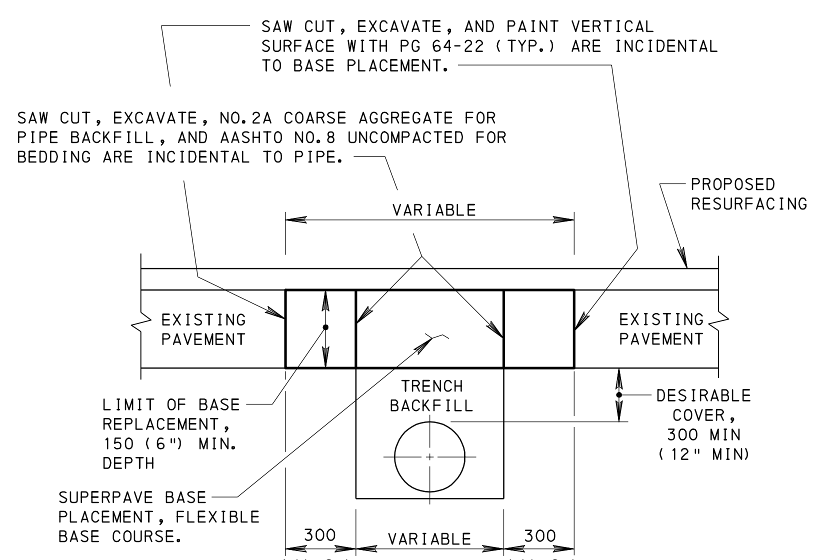
NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 601 FOR PIPE CULVERTS, SECTION 602 FOR CORRUGATED METAL PIPE-ARCH CULVERTS AND SECTION 603 FOR METAL PLATE CULVERTS.
2. SHORING OR TRENCH BOX INSTALLATION FOR FLEXIBLE PIPE IS NOT NORMALLY USED. IF SHORING OR TRENCH BOX INSTALLATION IS PERMITTED IN SPECIAL CIRCUMSTANCES, REFER TO PUBLICATION 408, SECTION 601.3(g).
3. IN ALL EXCAVATION AREAS FOLLOW OSHA SAFETY REQUIREMENTS.
4. DO NOT COMPACT NO. 8 MATERIAL USED FOR BEDDING UNDER CONCRETE PIPES.
5. ALLOW NO PAYMENT FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
6. PAYMENT FOR THE BACKFILL ENVELOPE, INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
7. FOR BOTTOM TRENCH WIDTHS ≥ 2.5 m (8'-0"), ALL EXCAVATION IS CLASS 1.
8. FOR INLET OR OUTLET PROTECTION SEE DETAIL A.
9. CONSTRUCT FLEXIBLE BASE REPLACEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 316.
10. PREPARE EXPOSED VERTICAL AND HORIZONTAL SURFACES AS PER PUBLICATION 408, SECTION 409.3(k).
11. FOR NON-OVERLAY APPLICATIONS, THE TOP 40 (1½") OF BASE REPLACEMENT WILL BE SUPERPAVE WEARING COURSE.
12. FOR RESTORATION OF RIGID PAVEMENT, REFER TO PUBLICATION 408, SECTION 516 AND RC-26M.
13. FOR SUPERPAVE BASE REPLACEMENT, SAW CUTTING, EXCAVATION, HAULING AND DISPOSAL, BITUMINOUS TACK COAT, BITUMINOUS MATERIAL, AND SEALING OF THE JOINTS ARE CONSIDERED AS INCIDENTAL.
14. PERFORM AND COMPLETE PIPE RESTORATION WORK PRIOR TO THE FLEXIBLE SUPERPAVE BASE REPLACEMENT.

LEGEND



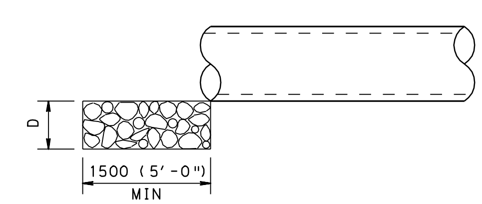
Do = OUTSIDE DIAMETER OF PIPE.



ELEVATION

RESTORATION OF PAVEMENT OVER PIPE

SEE NOTES 9, 10, 11, 12, 13 AND 14 THIS SHEET.



DETAIL A - PIPE INLET OR OUTLET PROTECTION

D = 450 (18"), R-4 ROCK, FOR PIPES LESS THAN 900 (36") INSIDE DIAMETER OR SPAN.
D = 600 (24"), R-5 ROCK, FOR PIPES 900 (36") AND GREATER INSIDE DIAMETER OR SPAN.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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SUBSURFACE DRAINS PIPE PLACEMENT EXCAVATION - BEDDING - BACKFILL

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 3 OF 5 RC-30M

PIPE INSTALLATION PROCEDURES

CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:

(A) PIPE LYING ON TOP OF THE NATURAL GROUND, ROCK OR COMPACTED (97% SPD) FILL.

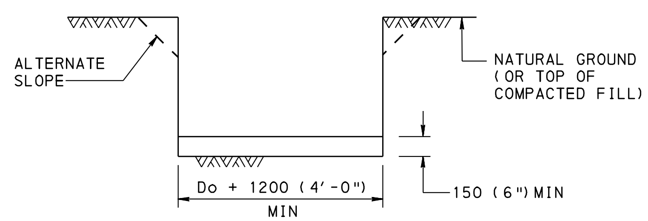
(B) THE EXISTING GROUND IS BETWEEN THE TOP AND THE BOTTOM OF THE PROPOSED PIPE AND THE PIPE IS TO BE COVERED WITH EARTH FILL.

(C) THE TOP OF PIPE IS BELOW THE LEVEL OF THE NATURAL GROUND OR COMPACTED FILL (TO MINIMUM 97% SPD) AND TO BE COVERED WITH EARTH FILL TO HEIGHTS ABOVE THE NATURAL GROUND.

STEP 1 : REMOVE TOPSOIL (COMPRESSIBLE LAYER OF ORGANIC MATERIAL) TO A WIDTH EQUAL TO 5 OUTSIDE DIAMETERS OF THE PIPE IN ALL FILL CONDITIONS ABOVE (A), (B) & (C). ALSO IF SPECIFIED ON THE CONTRACT DRAWING, UNDERCUT FOR THE DEPTH BELOW THE BEDDING AS SHOWN BY DESIGN (MAKE MIN WIDTH 5 DIAMETERS OF PIPE). PAY AS CLASS 1 EXCAVATION.

STEP 2 : CONSTRUCT THE EMBANKMENT TO 1200 (4'-0") ABOVE THE TOP OF PIPE OR TO THE SUBGRADE ELEVATION, WHICHEVER IS LESS. FOR PIPES 1800 (72") OR GREATER SEE NOTE 1.

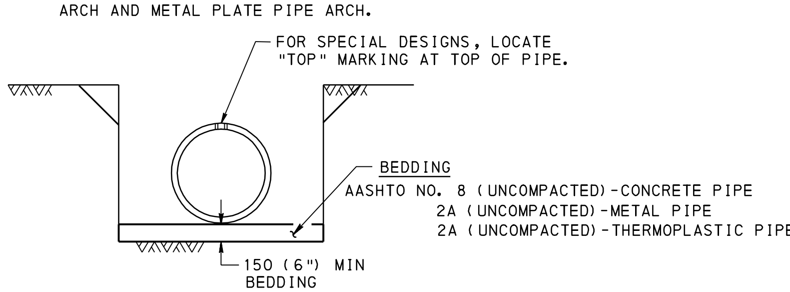
STEP 3 : EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE BARREL PLUS 1200 (4'-0") AND CREATE AN APPROPRIATE BEDDING 150 (6") DEEP.



STEP 4 : FOR CONCRETE PIPE, IF THIS EXCAVATION IS THROUGH ROCK, OR HARD SHALE, OR IN AREAS OF UNDERCUT, PROVIDE 150+40 mm/m (6"+½" INCH/FT) OF Do+1200 (4'-0"), BELOW THE INTENDED BOTTOM ELEVATION OF THE PIPE, 400 (16") MAX.

NOTE: IF UNSUITABLE MATERIAL IS FOUND, UNDERCUT AS DIRECTED AND BACKFILL WITH SUITABLE MATERIAL TO BOTTOM OF BEDDING ELEVATION. (UNLESS OTHERWISE SPECIFIED.)

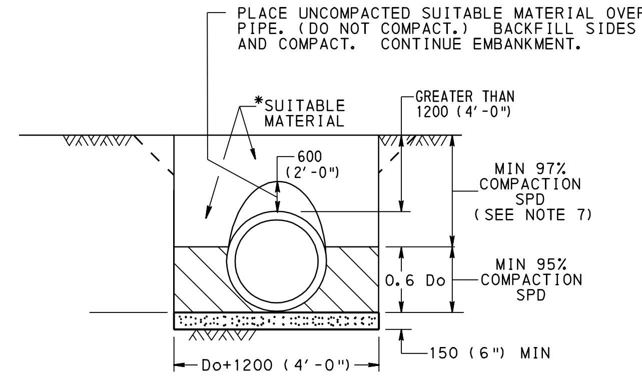
STEP 5 : LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.



STEP 6 : FOR CONCRETE PIPE, SEE STEP 6A.
: FOR METAL PIPE AND METAL PLATE PIPE, SEE STEP 6B.
: FOR THERMOPLASTIC PIPE, SEE STEP 6C.
: FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH, SEE STEP 6D.

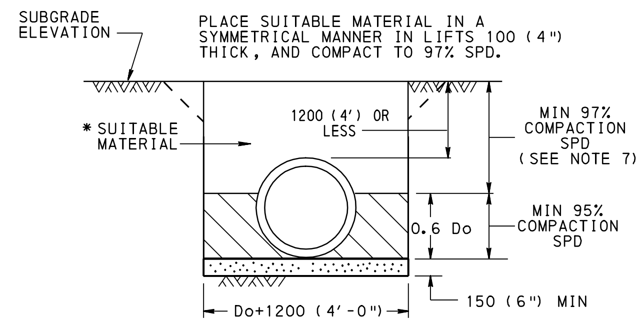
STEP 6A : CONCRETE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 0.6 Do. COMPACT TO 95% SPD. TEST THE SIDE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



GREATER THAN 1.2 m (4') TO 14.6 m (48')

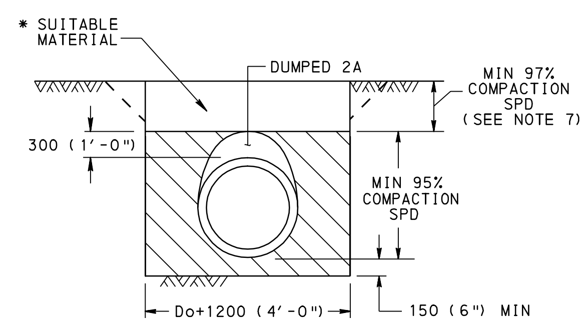
FOR FILLS OVER 14.6 m (48'), SEE NOTE 8.



SHALLOW FILLS 1200 (4'-0") AND LESS

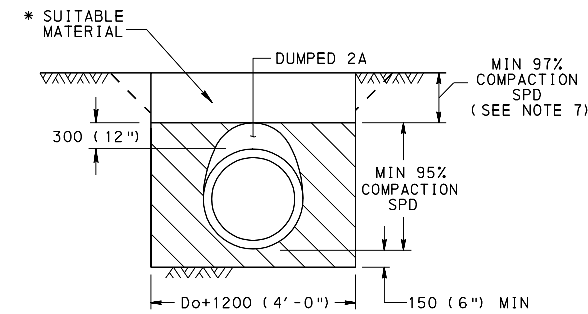
STEP 6B : METAL PIPE AND METAL PLATE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



STEP 6C: THERMOPLASTIC PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.

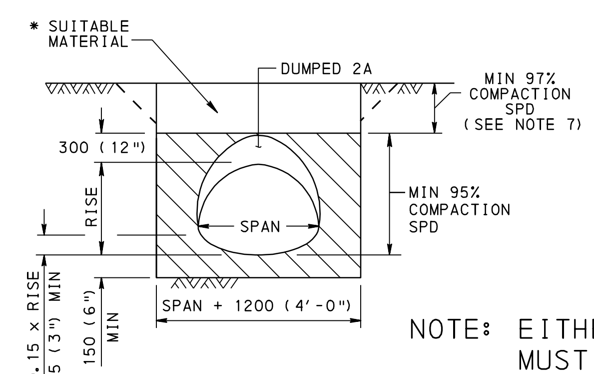


STEP 6D : METAL PIPE ARCH AND METAL PLATE PIPE ARCH

(1) PLACE 2A COARSE AGGREGATE MATERIAL (0.15 x RISE) ON TOP OF THE BEDDING AND FORM THE CRADLE.

(2) LAY THE PIPE ON THE PREPARED CRADLE.

(3) PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



NOTES

1. THE INSTALLATION OF PIPES 1800 (72") OR GREATER INSIDE DIAMETER OR SPAN IS PERMITTED WITHOUT PLACING EMBANKMENT FIRST. MAKE THE BACKFILL ENVELOPE AS SHOWN ON THIS DRAWING EXCEPT PROVIDE 2A MATERIAL ON EACH SIDE OF THE PIPE EQUAL TO ONE OUTSIDE DIAMETER OR SPAN OF THE PIPE. FOR CONCRETE PIPE, THE WIDTH OF UNCOMPACTED AGGREGATE FOR BEDDING (AASHTO NO. 8) REMAINS AT Do + 1200 (4'-0"). PAYMENT FOR THE 2A MATERIAL IS AS PER NOTE 3.
2. A HIGHER STRENGTH PIPE THAN SPECIFIED MAY BE SUPPLIED AT NO ADDITIONAL COST TO THE DEPARTMENT.
3. PAYMENT FOR THE BACKFILL ENVELOPE INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
4. TO PRECLUDE POINT LOADING ON RELATIVELY RIGID CONCRETE PIPE, DO NOT COMPACT AASHTO NO. 8 BEDDING MATERIAL.
5. FOR TRENCH BOX/SHORING INSTALLATION REQUIREMENTS REFER TO PUBLICATION 408, SECTION 601.
6. PERMIT PLACEMENT OF BACKFILL MATERIAL IN LAYERS, LIFTS, 200 (8") THICK WHEN USING VIBRATORY COMPACTION EQUIPMENT.
7. COMPACT TOP 1000 (3'-0") OF SUBGRADE TO 100% IN ACCORDANCE WITH PUBLICATION 408, SECTION 206.3.
8. FOR REINFORCED CONCRETE PIPES INSTALLED WITH GREATER THAN 14.6 m (48') OF FILL, PROVIDE 300 (12") BEDDING MINIMUM AND 400 (16") WHEN ROCK IS PRESENT.

LEGEND

AGGREGATE FOR BEDDING (AASHTO NO. 8), UNCOMPACTED

COARSE AGGREGATE (2A)

Do = OUTSIDE DIAMETER OF PIPE, MILLIMETERS (INCHES)

SPD = STANDARD PROCTOR DENSITY

ID = INSIDE DIAMETER

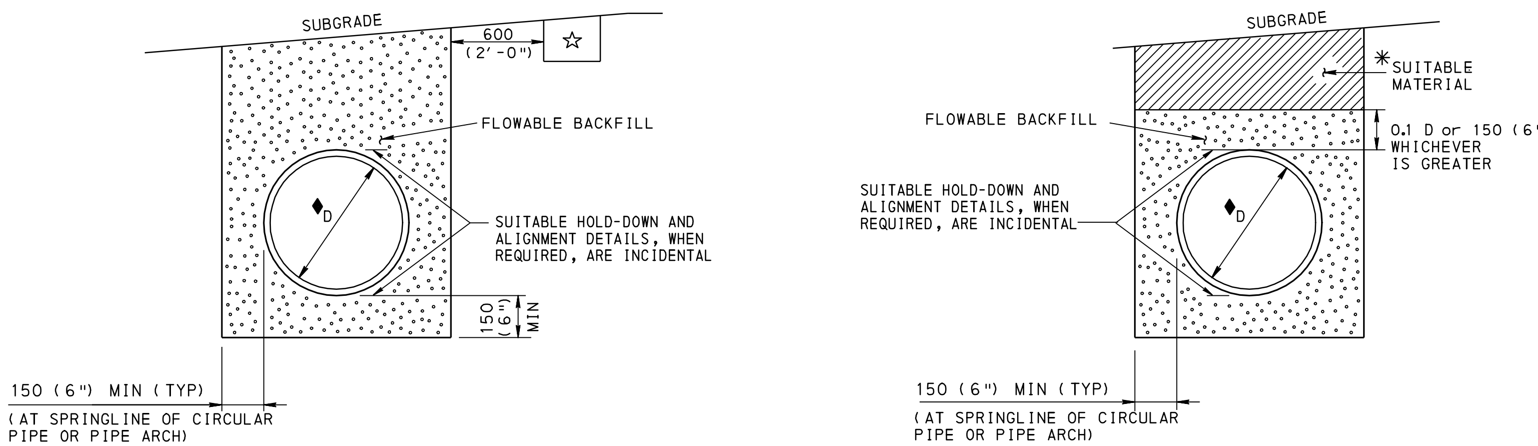
* SUITABLE MATERIAL = MATERIAL CONTAINING NO DEBRIS, ORGANIC MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN ONE-HALF THE THICKNESS OF THE COMPACTED LAYERS BEING PLACED.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS
PIPE PLACEMENT
EXCAVATION - BEDDING - BACKFILL

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 5
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-30M



♦D = NOMINAL DIAMETER OR RISE IN DESCRIPTION OF PIPE ITEM. 900 mm (3'-0") MAXIMUM DIAMETER OR RISE.

FLOWABLE BACKFILL DETAIL

(SEE NOTE 4)

NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 601 AND 220.
2. FLOWABLE BACKFILL WILL ENVELOP THE LAST SECTION OF PIPE OR END SECTION. CONSTRUCT DIKE OF FLOWABLE BACKFILL MATERIAL AS SPECIFIED IN SPECIAL PROVISION OR PROVIDE FORMWORK TO CONTAIN FLOWABLE BACKFILL.
3. PAYMENT FOR THE BACKFILL ENVELOPE (AGGREGATE, BEDDING AND BACKFILL OR FLOWABLE BACKFILL MATERIAL) AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
4. THE FLOWABLE BACKFILL DETAIL REPLACES STEPS 6A, 6B, 6C AND 6D ON SHEET 4 WHEN FLOWABLE BACKFILL IS SPECIFIED.

☆ IF DRAINAGE IS REQUIRED TO MAINTAIN POSITIVE FLOW OF WATER AWAY FROM THE TRENCH, IT MUST BE PROVIDED BY USE OF PROPERLY DESIGNED GRANULAR OR SYNTHETIC DRAINS.

* SUITABLE MATERIAL = MATERIAL CONTAINING NO DEBRIS, ORGANIC MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN ONE-HALF THE THICKNESS OF THE COMPACTED LAYERS BEING PLACED.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

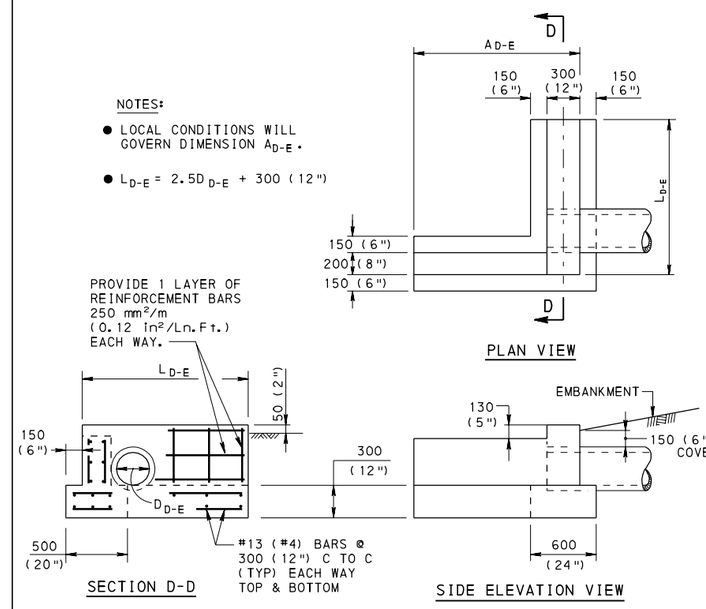
SUBSURFACE DRAINS

FLOWABLE BACKFILL

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 5 OF 5 RC-30M

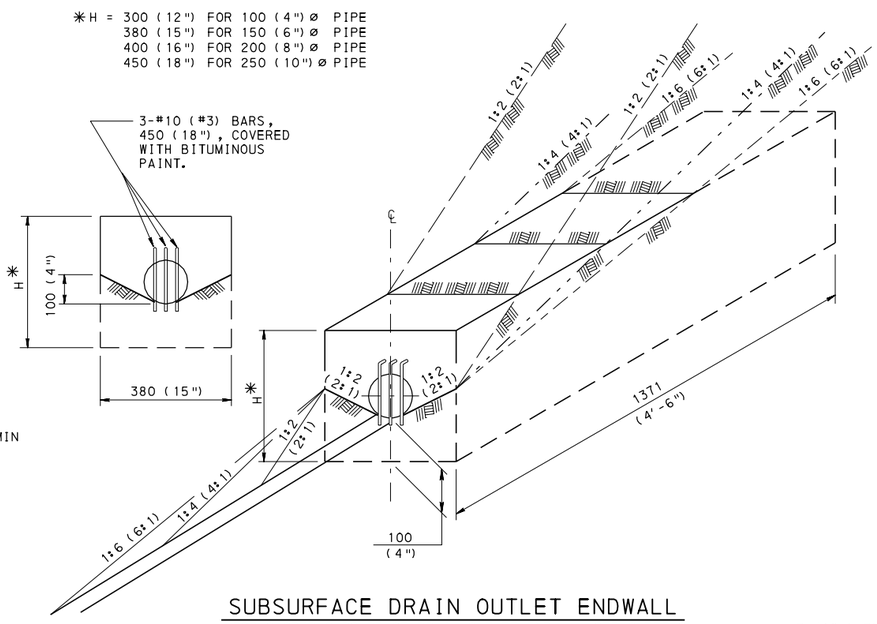
NOTES:

- LOCAL CONDITIONS WILL GOVERN DIMENSION A_{D-E}.
- $L_{D-E} = 2.5D_{D-E} + 300\ (12")$



TYPE D-E ENDWALL

*H = 300 (12") FOR 100 (4") Ø PIPE
380 (15") FOR 150 (6") Ø PIPE
400 (16") FOR 200 (8") Ø PIPE
450 (18") FOR 250 (10") Ø PIPE

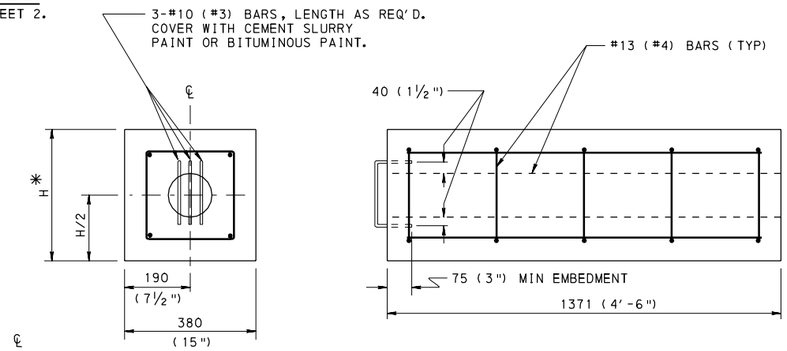


SUBSURFACE DRAIN OUTLET ENDWALL

FOR SLOPED SUBSURFACE DRAIN OUTLET ENDWALL SEE SHEET 2.

NOTES

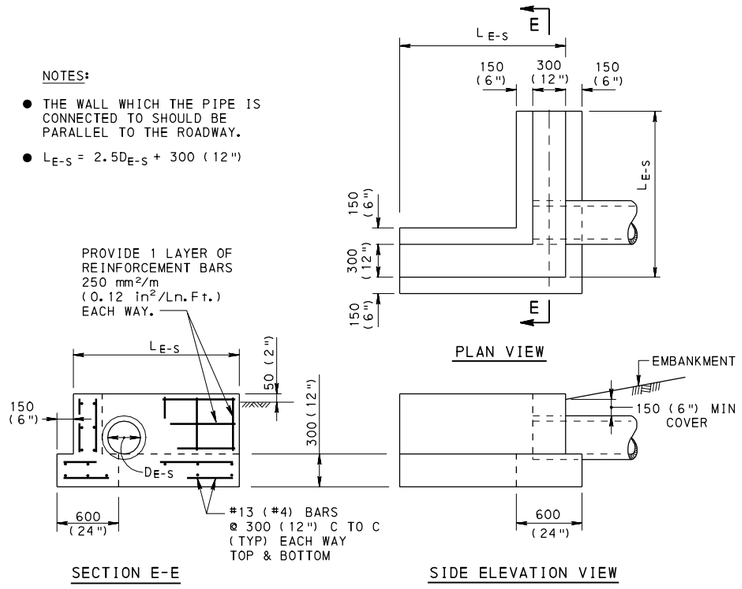
1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND SECTION 714.
2. THIS STANDARD DEPICTS THE SHAPE AND DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. PERMIT ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS TO THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
3. USE CLASS A CONCRETE OR BETTER & CHAMFER EXPOSED EDGES AT 25 (1").
4. PROVIDE PIPE OPENING SIZE IN PRECAST UNITS AT LEAST 50 (2") BUT NOT MORE THAN 100 (4") LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE. FOR TYPE D-E AND E-S ENDWALLS PROVIDE MIN. 200 (8") WALL HEIGHT OVER THE PIPE.
5. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING AND INSTALLATION OF PRECAST ENDWALLS. GALVANIZE METAL DEVICES AS SPECIFIED IN PUB 408, SECTION 1105.
6. PROVIDE NON-SHRINK EPOXY GROUT THROUGHOUT THE CONTACT SURFACE WHEN CONNECTING WING AND HEADWALL SECTION TO BASE SECTION. PROVIDE JOINT SEALANT MATERIAL ALONG INTERFACE BETWEEN WING AND HEADWALL SECTION AND BASE SECTION.
7. PROVIDE MORTAR BED OF 25 (1") PLACED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES, WHEN REQUIRED.
8. PROVIDE REINFORCEMENT, 250 mm²/m, (0.12 in²/Ln.Ft.) IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.
9. THE SLOPED SUBSURFACE DRAIN OUTLET ENDWALL IS DESIGNATED FOR INSTALLATION ALONG INTERSTATES AND EXPRESSWAYS WHERE THE SUBSURFACE DRAIN WILL OUTLET ON MEDIAN AND/OR OUTSIDE SLOPES THAT ARE SUBJECT TO MOWING.
10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.



(PRECAST) SUBSURFACE DRAIN OUTLET ENDWALL

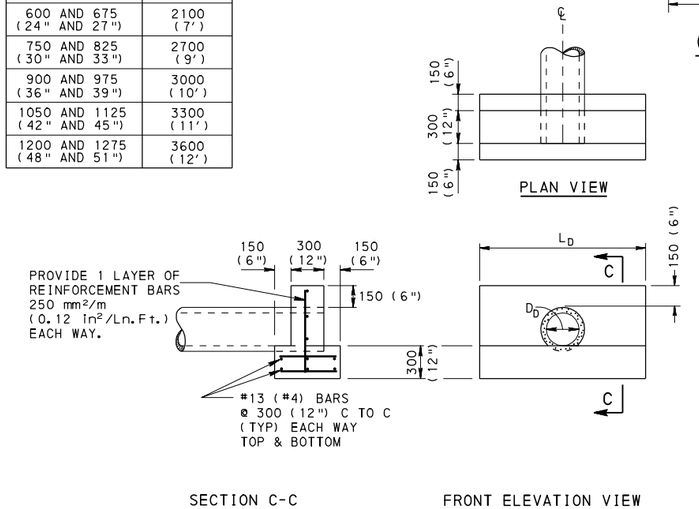
NOTES:

- THE WALL WHICH THE PIPE IS CONNECTED TO SHOULD BE PARALLEL TO THE ROADWAY.
- $L_{E-S} = 2.5D_{E-S} + 300\ (12")$



TYPE E-S ENDWALL

PIPE DIAMETER	L_D
450 AND 525 (18" AND 21")	1500 (5')
600 AND 675 (24" AND 27")	2100 (7')
750 AND 825 (30" AND 33")	2700 (9')
900 AND 975 (36" AND 39")	3000 (10')
1050 AND 1125 (42" AND 45")	3300 (11')
1200 AND 1275 (48" AND 51")	3600 (12')



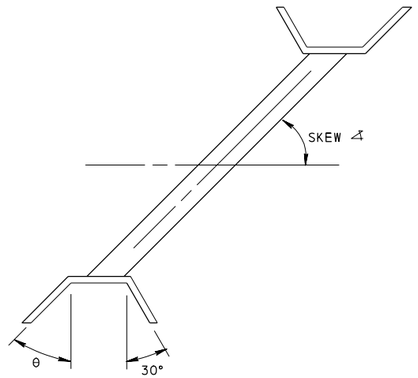
TYPE D ENDWALL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

ENDWALLS
CAST-IN-PLACE & PRECAST

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 2
R. Wood Willey	Bruce E. Thomas	RC-31M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



METRIC EQUATION

$**SD = \frac{D_{D-W}}{COS\ \theta} = \frac{D_{D-W}}{SIN\ SKEW\ \angle}$

L_{D-W} = SD + 0.70 m

$W_1 = \frac{2D_{D-W} - 0.60\ m}{COS\ \theta}$ FOR 1:2 SLOPE

$W_1 = \frac{X}{COS\ \theta}(D_{D-W} - 0.5 - \frac{1.0}{X})$ (FOR VARIABLE SLOPE WHEN X EQUALS HORIZONTAL DIMENSION OF THE SLOPE DESIGNATION.)

ENGLISH EQUATION

$**SD = \frac{D_{D-W}}{COS\ \theta} = \frac{D_{D-W}}{SIN\ SKEW\ \angle}$

L_{D-W} = SD + 2.3′

$W_1 = \frac{2D_{D-W} - 2.0'}{COS\ \theta}$ FOR 2:1 SLOPE

$W_1 = \frac{X}{COS\ \theta}(D_{D-W} - 0.5 - \frac{1.0}{X})$ (FOR VARIABLE SLOPE WHEN X EQUALS HORIZONTAL DIMENSION OF THE SLOPE DESIGNATION.)

TABLE A (METRIC)

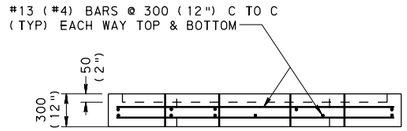
1 : 2 EMBANKMENT SLOPES

PIPE DIAMETER	SKEW ∠ = 90° TO 60° θ = 30°			SKEW ∠ = 55° θ = 35°			SKEW ∠ = 50° θ = 40°			SKEW ∠ = 45° θ = 45°			SKEW ∠ = 40° θ = 50°			SKEW ∠ = 30° θ = 60°			SKEW ∠ = 20° θ = 70°			SKEW ∠ = 10° θ = 80°				
D_{D-W}	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	W_2	A_{D-W}
(mm)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(mm)
900	1.74	0	1.39	1.80	0.10	1.46	1.87	0.15	1.57	1.97	0.20	1.70	2.10	0.23	1.87	2.50	0.41	2.40	3.33	0.53	3.51	5.88	1.52	6.91	1.39	300
1050	1.91	0	1.73	1.98	0.10	1.83	2.07	0.15	1.96	2.18	0.20	2.12	2.33	0.23	2.33	2.80	0.41	3.00	3.77	0.53	4.39	6.75	1.52	8.64	1.73	300
1200	2.09	0	2.08	2.16	0.10	2.20	2.27	0.15	2.35	2.40	0.20	2.55	2.57	0.23	2.80	3.10	0.41	3.60	4.21	0.53	5.26	7.61	1.52	10.37	2.08	300
1350	2.26	0	2.42	2.35	0.10	2.56	2.46	0.15	2.74	2.61	0.20	2.97	2.80	0.23	3.27	3.40	0.41	4.20	4.65	0.53	6.14	8.47	1.52	12.09	2.42	300
1500	2.43	0	2.77	2.53	0.10	2.93	2.66	0.15	3.13	2.82	0.20	3.39	3.03	0.23	3.73	3.70	0.41	4.80	5.09	0.53	7.02	9.34	1.52	13.82	2.77	375
1800	2.78	0	3.46	2.90	0.10	3.66	3.05	0.15	3.92	3.25	0.20	4.24	3.50	0.23	4.67	4.30	0.41	6.00	5.96	0.53	8.77	11.07	1.52	17.28	3.46	375

TABLE A (ENGLISH)

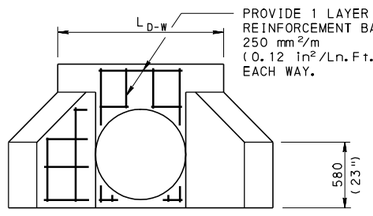
2 : 1 EMBANKMENT SLOPES

PIPE DIAMETER	SKEW ∠ = 90° TO 60° θ = 30°			SKEW ∠ = 55° θ = 35°			SKEW ∠ = 50° θ = 40°			SKEW ∠ = 45° θ = 45°			SKEW ∠ = 40° θ = 50°			SKEW ∠ = 30° θ = 60°			SKEW ∠ = 20° θ = 70°			SKEW ∠ = 10° θ = 80°				
D_{D-W}	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	W_2	A_{D-W}
(IN.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(IN.)
36	5.8	0	4.6	6.0	0.33	4.9	6.2	0.5	5.2	6.5	0.67	5.7	7.0	0.75	6.2	8.3	1.33	8.0	11.1	1.75	11.7	19.6	5.0	23.0	4.6	12
42	6.3	0	5.8	6.6	0.33	6.1	6.9	0.5	6.5	7.3	0.67	7.1	7.8	0.75	7.8	9.3	1.33	10.0	12.5	1.75	14.6	22.5	5.0	28.8	5.8	12
48	6.9	0	6.9	7.2	0.33	7.3	7.5	0.5	7.8	8.0	0.67	8.5	8.5	0.75	9.4	10.3	1.33	12.0	14.0	1.75	17.5	25.3	5.0	34.6	6.9	12
54	7.5	0	8.0	7.8	0.33	8.5	8.2	0.5	9.1	8.7	0.67	9.9	9.3	0.75	10.9	11.3	1.33	14.0	15.5	1.75	20.5	28.2	5.0	40.3	8.0	12
60	8.1	0	9.2	8.4	0.33	9.8	8.8	0.5	10.4	9.4	0.67	11.3	10.1	0.75	12.5	12.3	1.33	16.0	16.9	1.75	23.4	31.1	5.0	46.0	9.2	15
72	9.2	0	11.5	9.6	0.33	12.2	10.1	0.5	13.0	10.8	0.67	14.1	11.7	0.75	15.6	14.3	1.33	20.0	19.8	1.75	29.2	36.9	5.0	57.6	11.5	15



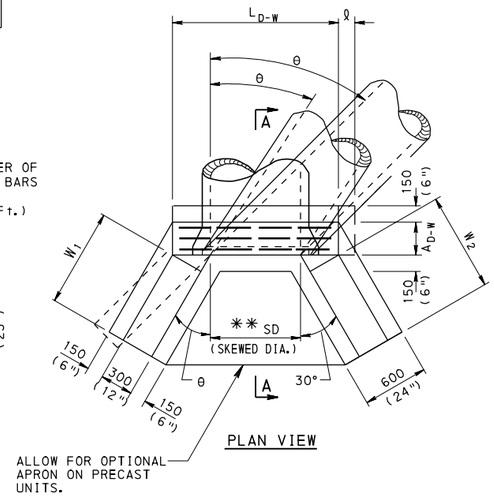
FRONT ELEVATION VIEW

BASE SECTION FOR TYPE D-W

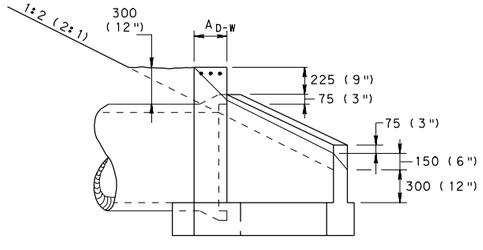


FRONT ELEVATION VIEW

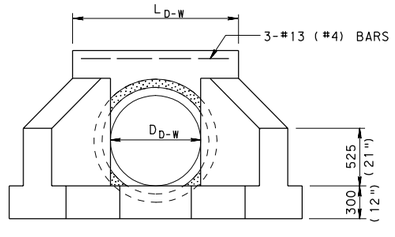
HEAD & WINGWALL SECTION FOR TYPE D-W



PLAN VIEW



SECTION A-A

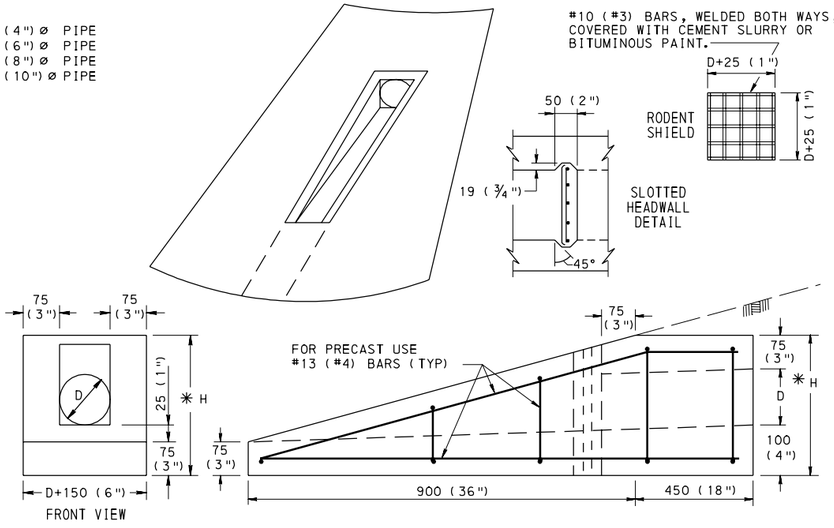


FRONT ELEVATION VIEW

TYPE D-W ENDWALL

(SEE TABLE A FOR DIMENSIONS NOT INDICATED.)

*H = 300 (12") FOR 100 (4") Ø PIPE
380 (15") FOR 150 (6") Ø PIPE
400 (16") FOR 200 (8") Ø PIPE
450 (18") FOR 250 (10") Ø PIPE



SUBSURFACE DRAIN OUTLET ENDWALL (SLOPED)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

ENDWALLS

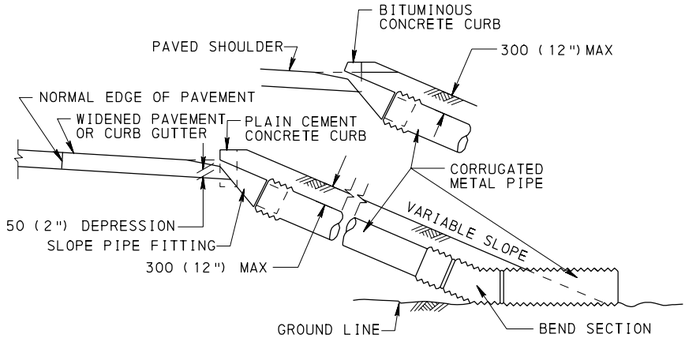
CAST-IN-PLACE & PRECAST

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

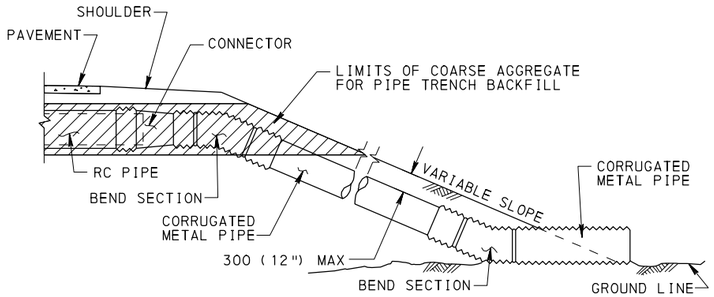
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2

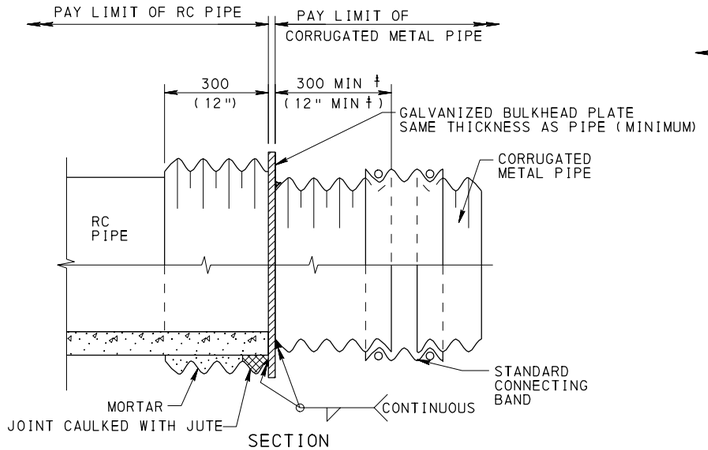
RC-31M



ADJACENT TO STRUCTURE AND/OR PAVED SHOULDER



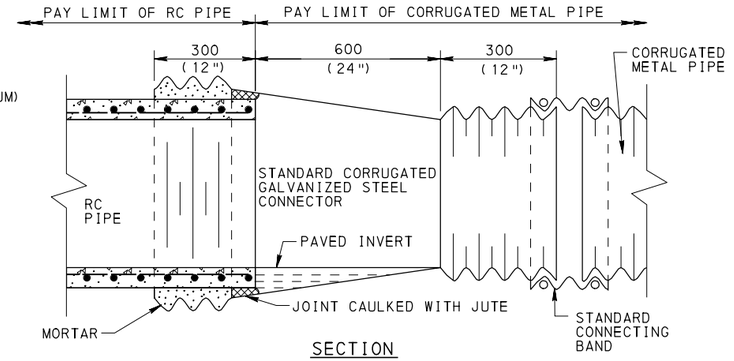
OUTLET PIPE THRU EMBANKMENT SLOPE



SECTION

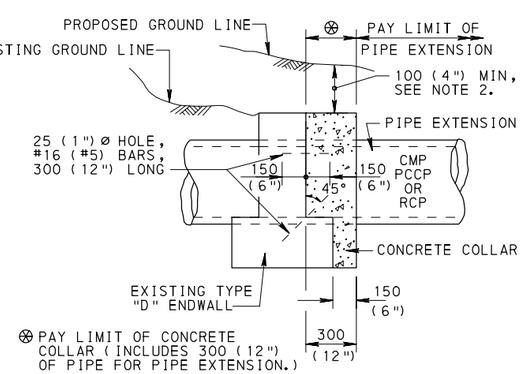
ALTERNATE PIPE CONNECTOR

‡ ADJUST LENGTH TO OBTAIN EVEN LENGTHS OF 600 (24 ") OF CONNECTING PIPE.



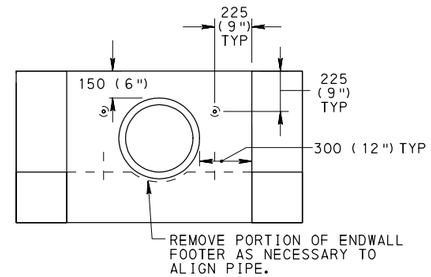
SECTION

PIPE CONNECTOR



⊛ PAY LIMIT OF CONCRETE COLLAR (INCLUDES 300 (12 ") OF PIPE FOR PIPE EXTENSION.)

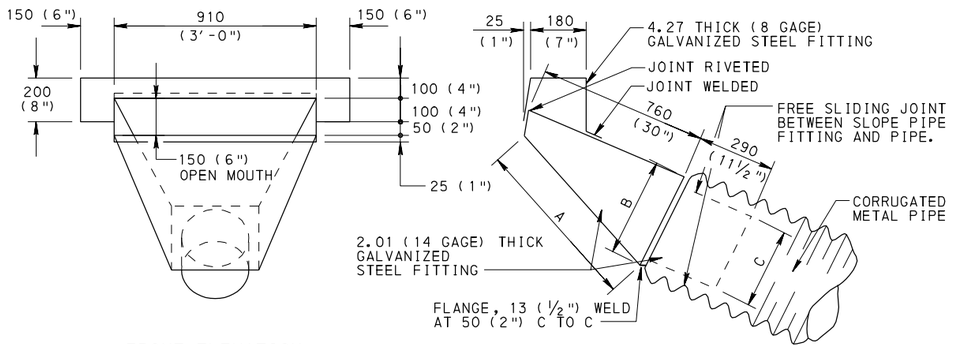
SIDE VIEW



END VIEW

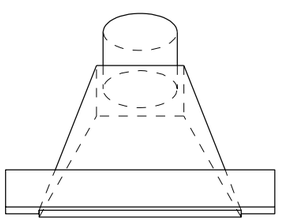
CONCRETE COLLAR FOR PIPE EXTENSION

FOR PIPES UP TO AND INCLUDING 825 (33 ") Ø, SEE NOTE 1.



FRONT ELEVATION

SIDE ELEVATION



PLAN

NOMINAL DIAMETER OF PIPE	DIMENSIONS FOR 1:2 (2:1) SLOPES		
	A	B	C
300 (12 ")	735 (28 15/16 ")	325 (13 ")	275 (11 ")
375 (15 ")	760 (29 13/16 ")	400 (16 ")	350 (14 ")
450 (18 ")	795 (31 5/16 ")	475 (19 ")	425 (17 ")

* RESTRICT SLOPE PIPES DRAINING ONLY SHOULDER AREAS IN EMBANKMENTS, OTHER THAN THOSE ADJACENT TO STRUCTURES, TO 300 (12 ") MINIMUM DIAMETER.

SLOPE PIPE FITTING

NOTES

1. FOR OTHER TYPES OF ENDWALLS AND FOR PIPES LARGER THAN 825 (33 ") Ø, A SPECIAL COLLAR DESIGN IS REQUIRED.
2. REMOVE PORTIONS OF EXISTING ENDWALL IF REQUIRED TO MAINTAIN 100 (4 ") GROUND COVER.
3. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 616 FOR SLOPE PIPE FITTINGS AND SECTION 618 FOR CONCRETE COLLAR FOR PIPE EXTENSION.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

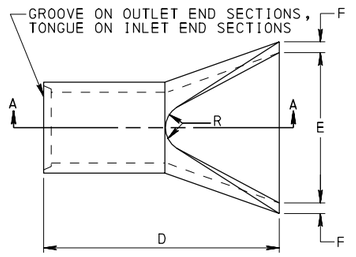
SLOPE PIPE FITTINGS, PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

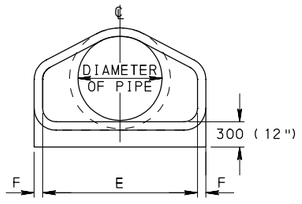
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 1

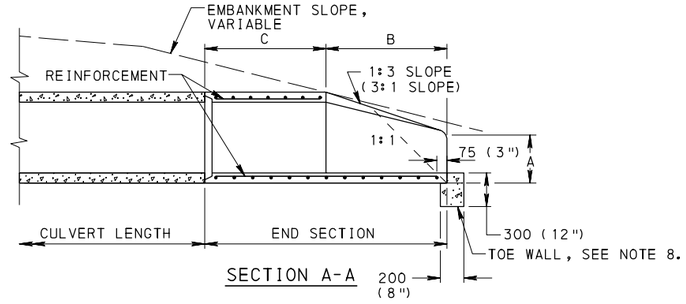
RC-32M



PLAN



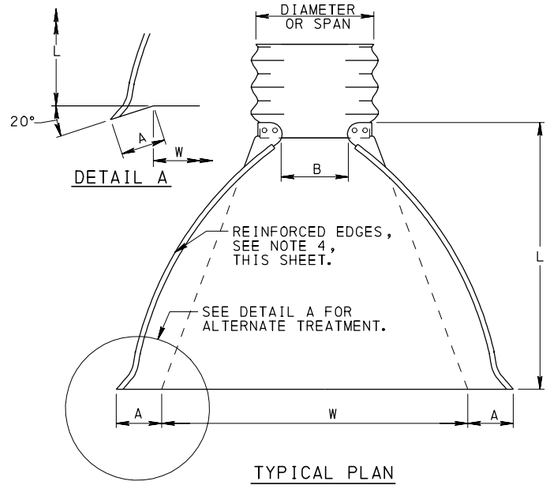
END VIEW



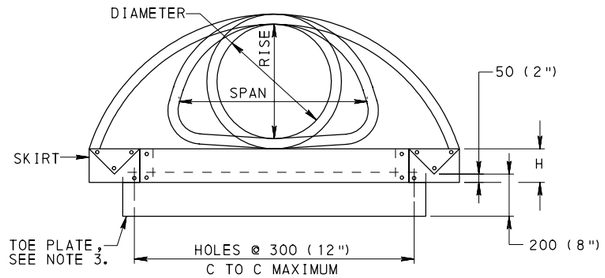
SECTION A-A

SLOPE DETAIL

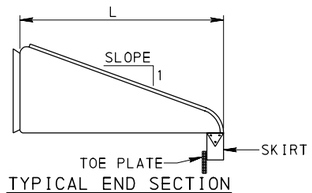
CONCRETE END SECTIONS



TYPICAL PLAN



TYPICAL ELEVATION



TYPICAL END SECTION

CORRUGATED METAL PIPE END SECTIONS

GENERAL NOTES

1. PROVIDE END SECTIONS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 616. PROVIDE GALVANIZED STEEL END SECTIONS WHEN SECTIONS ARE REQUIRED WITH ALUMINIZED STEEL PIPE OR PRECOATED GALVANIZED STEEL PIPE.

2. PROVIDE 2.77 THICK (12 GAGE) SIDES AND 3.50 THICK (10 GAGE) CENTER PANELS FOR 3 PIECE UNITS. PROVIDE CENTER PANEL WIDTH GREATER THAN 20% OF PIPE PERIPHERY. PROVIDE 50 (2") LAP JOINT TIGHTLY FASTENED BY 10 (3/8") ø GALVANIZED OR ALUMINIZED RIVETS OR BOLTS FOR STEEL UNITS AND ALUMINUM ALLOY RIVETS OR BOLTS FOR ALUMINUM UNITS, ON CENTERLINE, SPACED 150 (6") C TO C FOR MULTIPLE PANEL UNITS. CONSTRUCT SKIRTS OF THE SAME THICKNESS AND PIECES AS THE END SECTION.

3. PROVIDE TOE PLATES OF THE SAME MATERIAL AS THE END SECTION. LOCATE PUNCHED HOLES IN PLATE TO MATCH HOLES IN SKIRT. PROVIDE 10 (3/8") ø GALVANIZED OR ALUMINIZED BOLTS AND NUTS FOR STEEL UNITS AND ALUMINUM ALLOY BOLTS AND NUTS FOR ALUMINUM UNITS. PROVIDE TOE PLATE LENGTHS AS FOLLOWS:
   PIPE-ARCH CULVERT 1060 x 740, 1010 x 790 (42" x 29", 40" x 31") OR SMALLER-W+250 (+10")
   PIPE-ARCH CULVERT 1240 x 840, 1160 x 920 (49" x 33", 46" x 36") OR LARGER-W+500 (+20")
   PIPE 750 (30") DIAMETER OR SMALLER-W+250 (+10")
   PIPE 900 (36") DIAMETER OR LARGER-W+500 (+20")

4. SUPPLEMENT REINFORCED EDGES WITH GALVANIZED STEEL STIFFENER ANGLES WITH GALVANIZED OR ALUMINIZED BOLTS AND NUTS OR ALUMINUM ALLOY STIFFENER ANGLES WITH ALUMINUM ALLOY NUTS AND BOLTS OF THE FOLLOWING SIZES:
   - 50 (2") x 50 (2") x 6 (1/4") FOR, 1500 (60") TO 1800 (72") DIAMETER PIPE, 1950 x 1320, 1850 x 1400 (77" x 52", 73" x 55") AND 2100 x 1450, 2050 x 1500 (83" x 57", 81" x 59") PIPE-ARCH CULVERT.
   - 63 (2 1/2") x 63 (2 1/2") x 6 (1/4") FOR, 1950 TO 2100 (78" TO 84") DIAMETER PIPE.

   PLACE ANGLE REINFORCEMENT UNDER THE CENTER PANEL SEAMS FOR, 1950 x 1320, 1850 x 1400 (77" x 52", 73" x 55") AND 2100 x 1450, 2050 x 1500 (83" x 57", 81" x 59") PIPE-ARCH CULVERTS.

5. ANCHOR ALUMINUM OR STEEL END SECTIONS, THAT ARE USED ON THE INLET END OF PIPE LARGER THAN 1350 (54") DIAMETER, AS INDICATED ON THE PLAN.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
7. FOR DIMENSION TABLES SEE SHEET 2.
8. PROVIDE TOE WALL OF CLASS A CONCRETE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

END SECTIONS FOR PIPE CULVERTS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 2
R. Wyatt Dilley CHIEF, HWY. QA DIVISION	Gary L. Hoffman DIRECTOR, BUREAU OF DESIGN	RC-33M

TABLE A (METRIC)
DIMENSIONS FOR END SECTION FOR CONCRETE PIPE

DIA	A	B	C	D	E	F	R
450	230	685	1170	1855	900	65	190
525	230	915	940	1855	1050	70	205
600	240	1105	760	1865	1200	75	205
675	265	1220	650	1865	1350	85	230
750	305	1370	500	1875	1500	90	205
825	345	1485	955	2440	1650	95	230
900	380	1600	840	2440	1800	100	255
1050	535	1600	840	2440	1950	115	280
1200	610	1830	610	2440	2100	125	305

TABLE B (METRIC)
DIMENSIONS FOR END SECTIONS FOR CIRCULAR CORRUGATED METAL PIPE

DIA	THICKNESS	A (± 25)	B (MAX)	H (± 25)	L (± 40)	W (± 50)	BODY	SLOPE
450	1.63	205	255	150	785	900	1 PC	2.5
525	1.63	230	305	150	915	1050	1 PC	2.5
600	1.63	255	330	150	1040	1200	1 PC	2.5
750	2.01	305	405	205	1295	1500	1 PC	2.5
900	2.01	355	485	230	1525	1800	2 PC	2.5
1050	2.77	405	560	280	1755	2100	2 PC	2.5
1200	2.77	450	685	305	1980	2300	2 PC	2.25
1350	2.77	450	760	305	2135	2600	2 PC	2
1500	2.77	450	840	305	2210	2900	3 PC	1.75
1650	2.77	450	915	305	2210	3050	3 PC	1.5
1800	2.77	450	990	305	2210	3200	3 PC	1.33
1950	2.77	450	1070	305	2210	3350	3 PC	1.25
2100	2.77	450	1145	305	2210	3500	3 PC	1.17

TABLE C (METRIC)
DIMENSIONS FOR END SECTIONS FOR CORRUGATED METAL PIPE-ARCH

75x25 AND 125x25 CORRUGATIONS		68x13 CORRUGATIONS		THICKNESS	A (± 25)	B (MAX)	H (± 25)	L (± 40)	W (± 50)	M	BODY	SLOPE
SPAN	RISE	SPAN	RISE									
---	---	430	330	1.63	180 [115]	230	150	485	750	305	1 PC	2.5
---	---	530	380	1.63	180 [135]	255	150	585	900	305	1 PC	2.5
---	---	610	460	1.63	205 [160]	305 [290]	150	710	1050	305	1 PC	2.5
---	---	710	510	1.63	230 [180]	355	150	815	1200	305	1 PC	2.5
---	---	885	610	2.01	255 [220]	405	150	990	1500	305	1 PC	2.5
1010	790	1060	740	2.01	305	455	205	1170	1900	305	1 PC	2.5
1160	920	1240	840	2.77	330	535	230	1345	2150	305	2 PC	2.5
1340	1050	1440	970	2.77	450	660	305	1600	2300	305	2 PC	2.5
1520	1170	1620	1100	2.77	450	760	305	1780	2600	610	2 PC	2.25
1670	1300	1800	1200	2.77	450	840	305	1955	2900	610	3 PC	2.25
1850	1400	1950	1320	2.77	450	915	305	1955	3200	610	3 PC	2
2050	1500	2100	1450	2.77	450	990	305	1955	3500	610	3 PC	2

[] ACCEPTABLE ALTERNATE DIMENSIONS FOR PIPE-ARCH.

TABLE A (ENGLISH)
DIMENSIONS FOR END SECTION FOR CONCRETE PIPE

DIA	A	B	C	D	E	F	R
18"	9"	2' - 3"	3' -10"	6' - 1"	3' - 0"	2½"	7½"
21"	9"	3' - 0"	3' - 1"	6' - 1"	3' - 6"	2¾"	8"
24"	9½"	3' - 7½"	2' - 6"	6' - 1½"	4' - 0"	3"	8"
27"	10½"	4' - 0"	2' - 1½"	6' - 1½"	4' - 6"	3¼"	9"
30"	12"	4' - 6"	1' - 7¾"	6' - 1¾"	5' - 0"	3½"	8"
33"	13½"	4' -10½"	3' - 1½"	8' - 0"	5' - 6"	3¾"	9"
36"	15"	5' - 3"	2' - 9"	8' - 0"	6' - 0"	4"	10"
42"	21"	5' - 3"	2' - 9"	8' - 0"	6' - 6"	4½"	11"
48"	24"	6' - 0"	2' - 0"	8' - 0"	7' - 0"	5"	12"

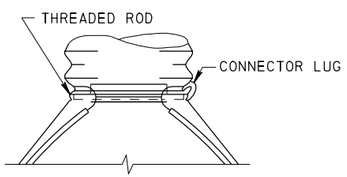
TABLE B (ENGLISH)
DIMENSIONS FOR END SECTIONS FOR CIRCULAR CORRUGATED METAL PIPE

DIA	GAGE	A (±1")	B (MAX.)	H (±1")	L (±1½")	W (±2")	BODY	SLOPE
18"	16	8"	10"	6"	31"	36"	1 PC.	2½
21"	16	9"	12"	6"	36"	42"	1 PC.	2½
24"	16	10"	13"	6"	41"	48"	1 PC.	2½
30"	14	12"	16"	8"	51"	60"	1 PC.	2½
36"	14	14"	19"	9"	60"	72"	2 PC.	2½
42"	12	16"	22"	11"	69"	84"	2 PC.	2½
48"	12	18"	27"	12"	78"	90"	2 PC.	2¼
54"	12	18"	30"	12"	84"	102"	2 PC.	2
60"	12	18"	33"	12"	87"	114"	3 PC.	1¾
66"	12	18"	36"	12"	87"	120"	3 PC.	1½
72"	12	18"	39"	12"	87"	126"	3 PC.	1 1/3
78"	12	18"	42"	12"	87"	132"	3 PC.	1 1/4
84"	12	18"	45"	12"	87"	138"	3 PC.	1 1/6

TABLE C (ENGLISH)
DIMENSIONS FOR END SECTIONS FOR CORRUGATED METAL PIPE-ARCH

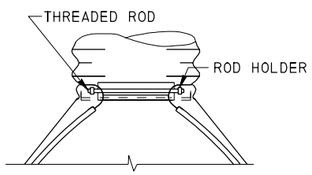
3"X1" AND 5"X1" CORRUGATIONS		2 2/3"X1/2" CORRUGATIONS		GAGE	A (±1")	B (MAX.)	H (±1")	L (±1½")	W (±2")	M	BODY	SLOPE
SPAN	RISE	SPAN	RISE									
---	---	17"	13"	16	7"[4.5"]	9"	6"	19"	30"	12"	1 PC.	2½
---	---	21"	15"	16	7"[5.25"]	10"	6"	23"	36"	12"	1 PC.	2½
---	---	24"	18"	16	8"[6.25"]	12"[11.5"]	6"	28"	42"	12"	1 PC.	2½
---	---	28"	20"	16	9"[7"]	14"	6"	32"[31.5"]	48"	12"	1 PC.	2½
---	---	35"	24"	14	10"[8.75"]	16"	6"	39"[38.5"]	60"	12"	1 PC.	2½
40"	31"	42"	29"	14	12"	18"	8"	46"	75"	12"	1 PC.	2½
46"	36"	49"	33"	12	13"	21"	9"	53"	85"	12"	2 PC.	2½
53"	41"	57"	38"	12	18"	26"	12"	63"	90"	12"	2 PC.	2½
60"	46"	64"	43"	12	18"	30"	12"	70"	102"	24"	2 PC.	2¼
66"	51"	71"	47"	12	18"	33"	12"	77"	114"	24"	3 PC.	2¼
73"	55"	77"	52"	12	18"	36"	12"	77"	126"	24"	3 PC.	2
81"	59"	83"	57"	12	18"	39"	12"	77"	138"	24"	3 PC.	2

[] ACCEPTABLE ALTERNATE DIMENSIONS FOR PIPE-ARCH.



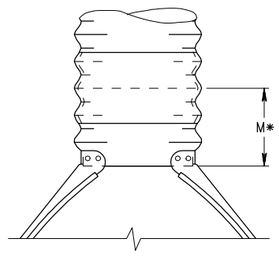
TYPE-1 CONNECTION

450ø TO 600ø
(18"ø x 24"ø)
CIRCULAR PIPE



TYPE-2 CONNECTION

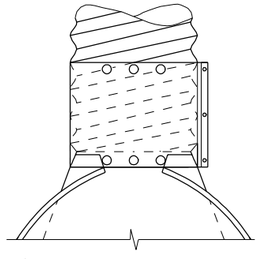
750ø TO 900ø (30"ø TO 36"ø)
CIRCULAR PIPE AND
1440 x 970, 1340 x 1050
(57" x 38", 53" x 41") OR
SMALLER PIPE-ARCH).



TYPE-3 CONNECTION

1050 (42") ø OR
LARGER CIRCULAR PIPE
AND 1620 x 1100, 1520 x 1170
(64" x 43", 60" x 46")
OR LARGER PIPE-ARCH.

* USE 300 (12") FOR CIRCULAR PIPE AND TABLE C DIMENSIONS FOR PIPE-ARCH.



‡ TYPE-D CONNECTION

450ø TO 900ø (18"ø TO 36"ø)
CIRCULAR PIPE AND
1440 x 970, 1340 x 1050
(57" x 38", 53" x 41") OR
SMALLER PIPE-ARCH.

‡ FOR CONNECTING END SECTIONS TO PIPE OR PIPE-ARCH HAVING OTHER THAN ANNULAR CORRUGATIONS. ACCEPT ALTERNATE DESIGNS PROVIDED NO LEAKAGE RESULTS.

ALTERNATE TYPE CONNECTIONS FOR CORRUGATED METAL PIPE END SECTIONS

NOTE:
FOR GENERAL NOTES SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

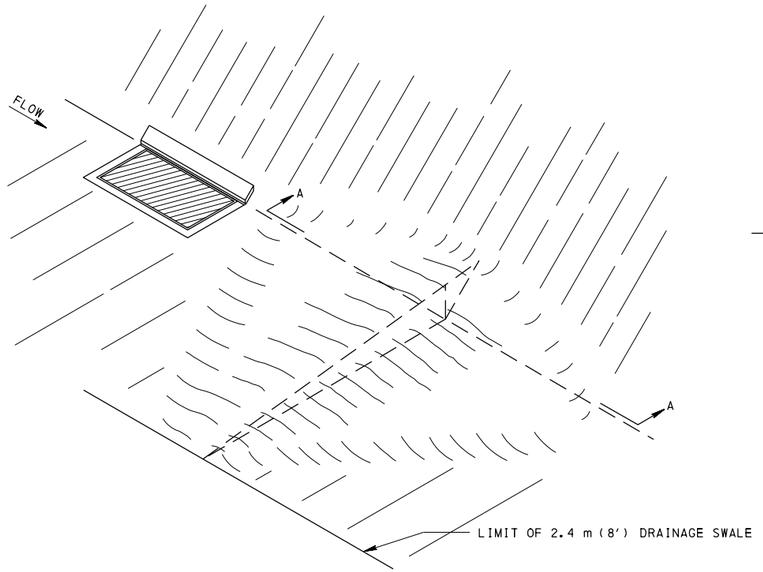
END SECTIONS FOR PIPE CULVERTS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

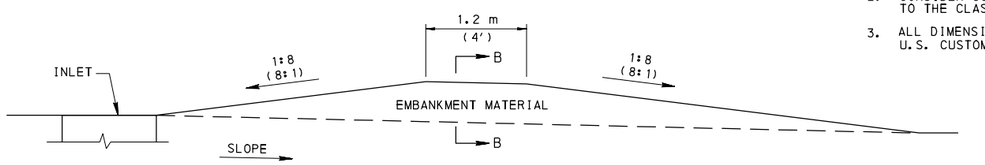
SHT 2 OF 2

RC-33M

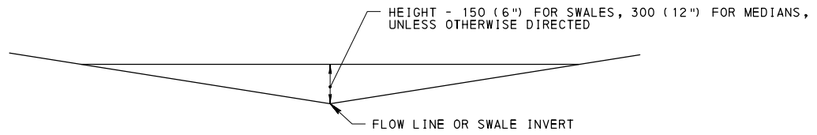


SWALE INSTALLATION

DRAINAGE DIKE



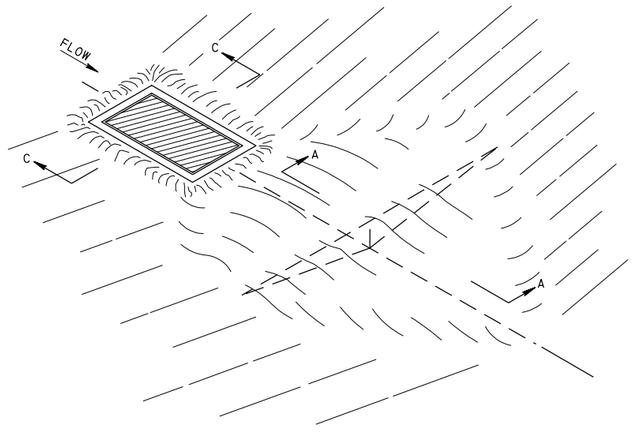
SECTION A-A



SECTION B-B

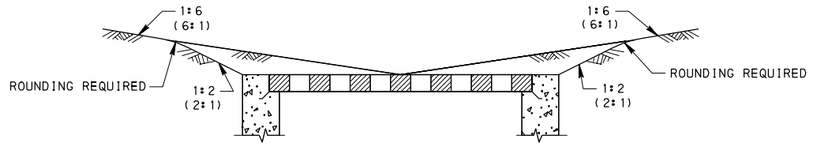
NOTES

1. DO NOT CONSTRUCT DRAINAGE DIKE TO A HEIGHT WHICH CAUSES FLOODING OF THE SUBBASE.
2. CONSIDER CONSTRUCTION OF THE DRAINAGE DIKE INCIDENTAL TO THE CLASS 1 EXCAVATION.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.



MEDIAN INSTALLATION

DRAINAGE DIKE



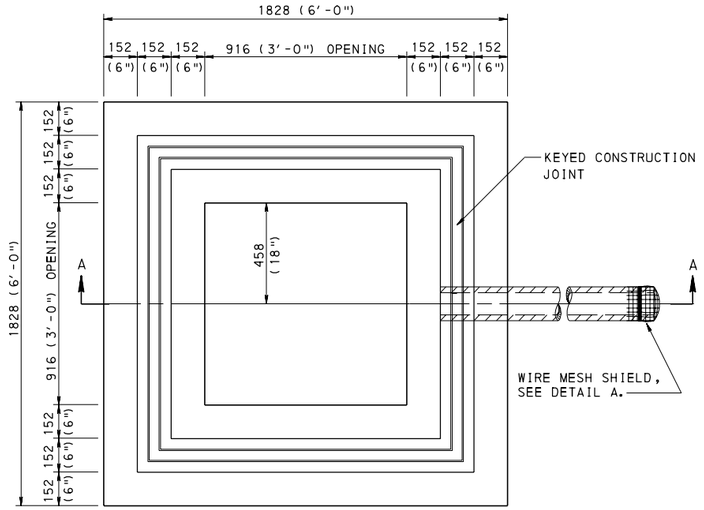
SECTION C-C

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

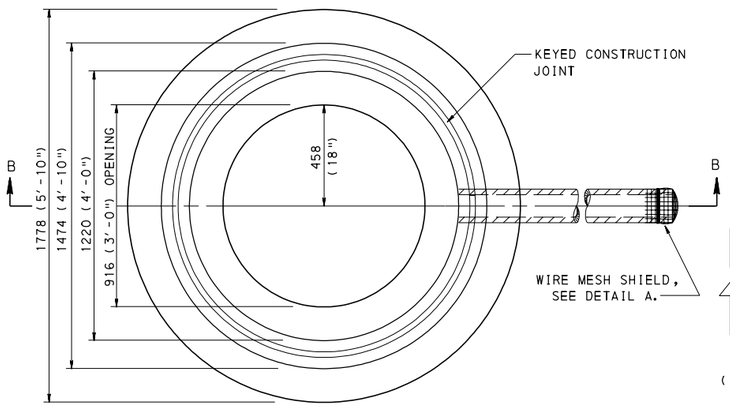
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

DRAINAGE DIKE

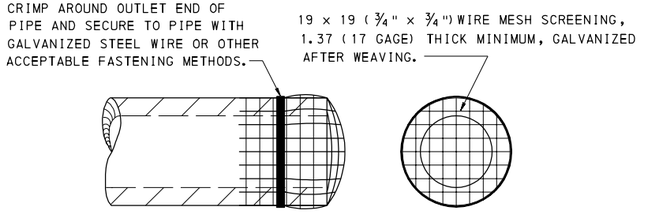
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
R. Wyatt Dilley	Bruce E. Thomas	RC-35M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



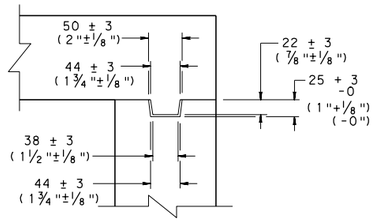
PLAN VIEW
(WITHOUT COVER)



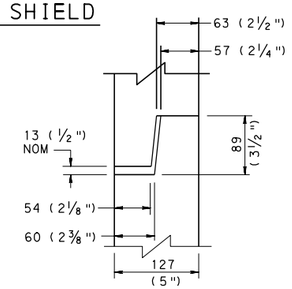
PLAN VIEW
(WITHOUT COVER)



DETAIL A
WIRE MESH SHIELD

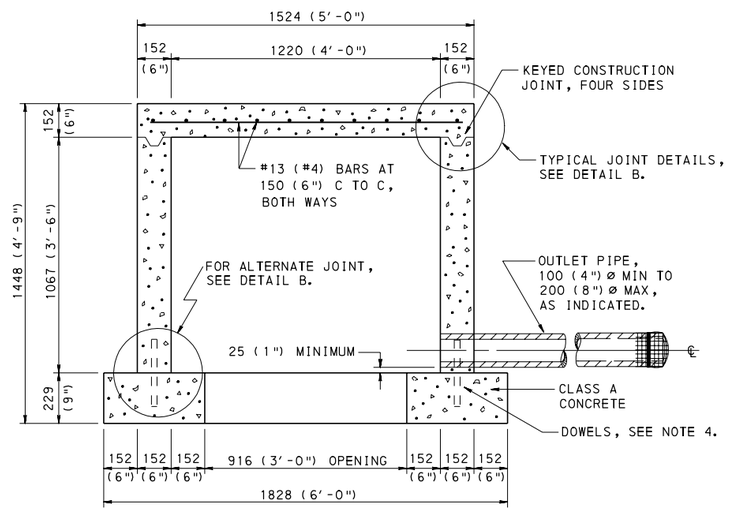


DETAIL B



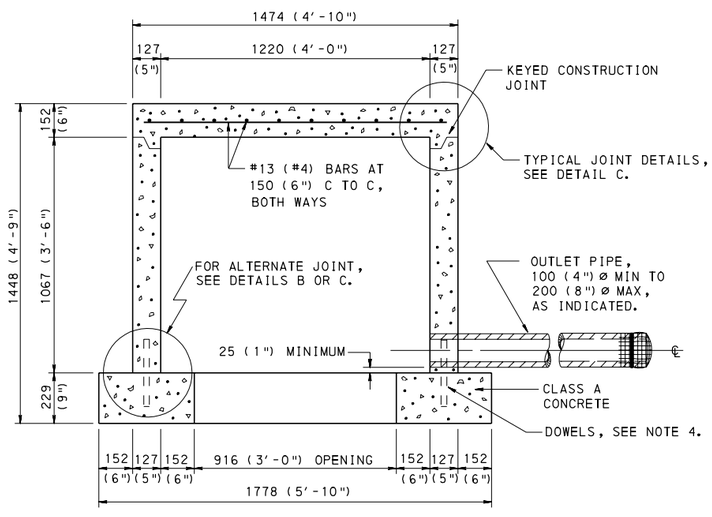
DETAIL C

TYPICAL JOINT DETAILS



SECTION A-A

SQUARE SPRING BOX
TYPE A



SECTION B-B

CIRCULAR SPRING BOX
TYPE B

NOTES

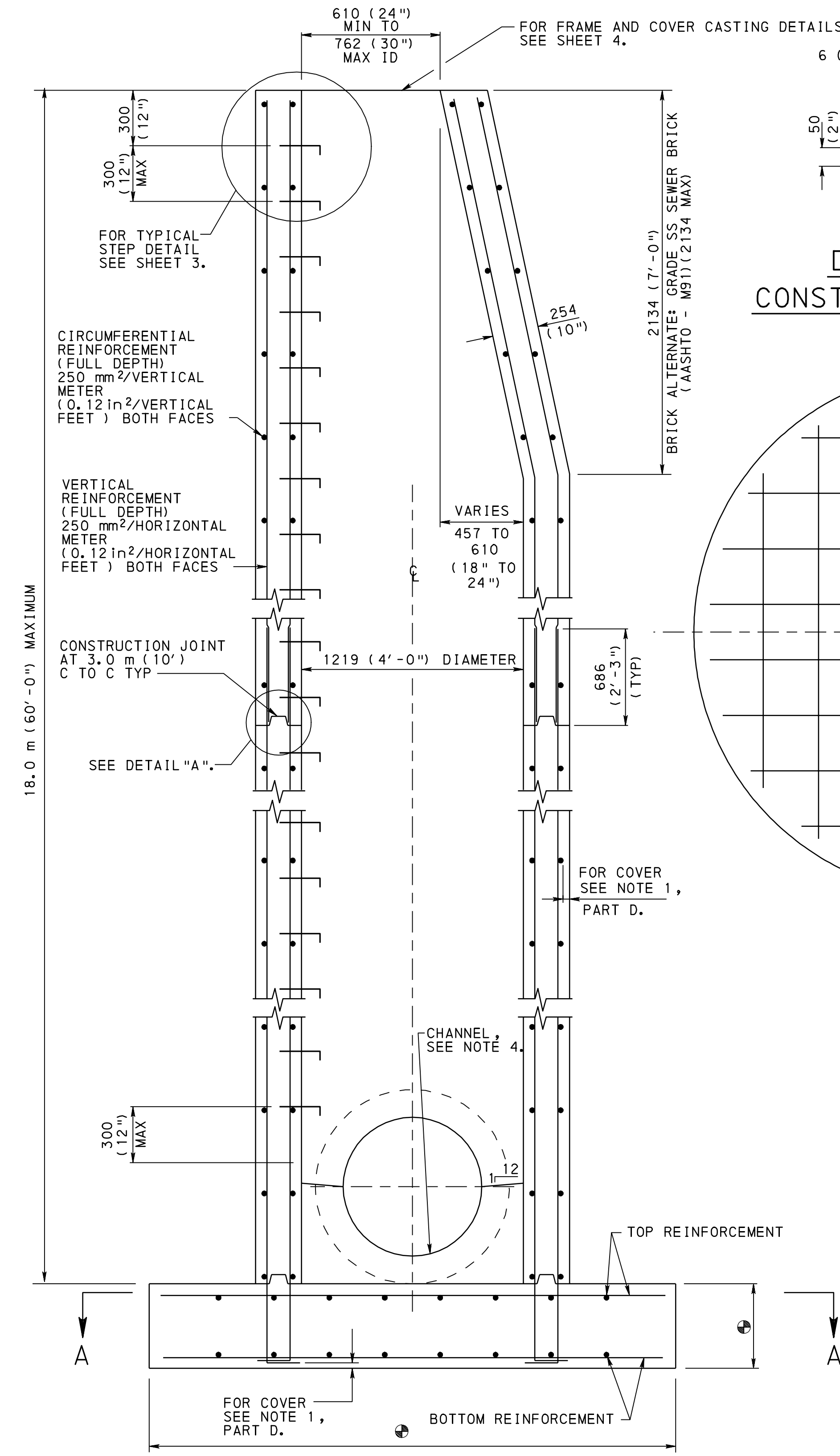
1. PROVIDE SPRING BOXES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PRECAST SPRING BOXES MAY BE USED IN LIEU OF CAST-IN-PLACE SPRING BOXES. PERMIT ONLY PRECAST BOXES SUPPLIED BY AN APPROVED MANUFACTURER LISTED IN BULLETIN 15.
3. LOCATE OUTLET PIPE AS REQUIRED TO SUIT FIELD CONDITIONS.
4. PLACE #13 (#4) REINFORCEMENT BARS, MINIMUM 305 (12") LONG, SPACED AT 300 (12") C TO C, AS DOWELS BETWEEN THE FOUNDATION AND WALLS WHEN THE CONSTRUCTION, EXCLUDING COVER, IS NOT MONOLITHIC. THE DOWELS MAY BE ELIMINATED IF THE ALTERNATE JOINTS SHOWN IN DETAILS B OR C ARE CONSTRUCTED.
5. PROVIDE REINFORCEMENT FOR WALLS AND FOUNDATIONS OF PRECAST BOXES MEETING THE REQUIREMENTS OF AASHTO-M199M.
6. WHEN FILL HEIGHT OVER TOP OF BOX EXCEEDS 3.0 m (10'), REQUIRE A SPECIAL DESIGN.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SPRING BOXES

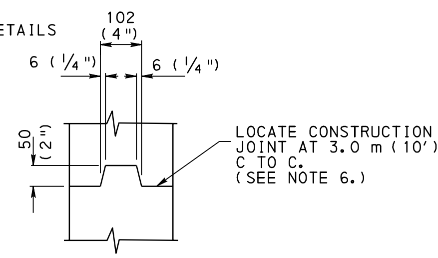
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
R. Wyatt Willy	Bruce E. Thomas	RC-36M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



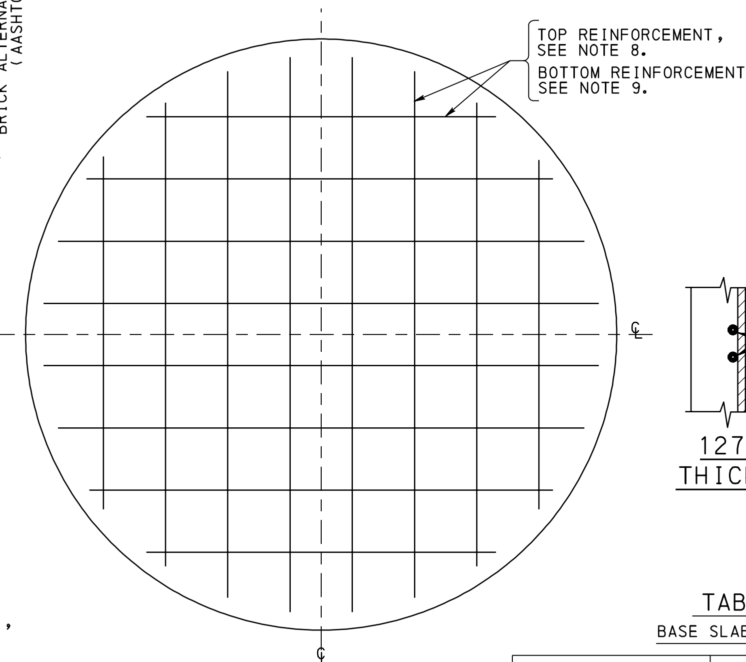
CAST-IN-PLACE MANHOLE

FOR PIPES WITH 750 (30") INSIDE DIAMETER AND LESS

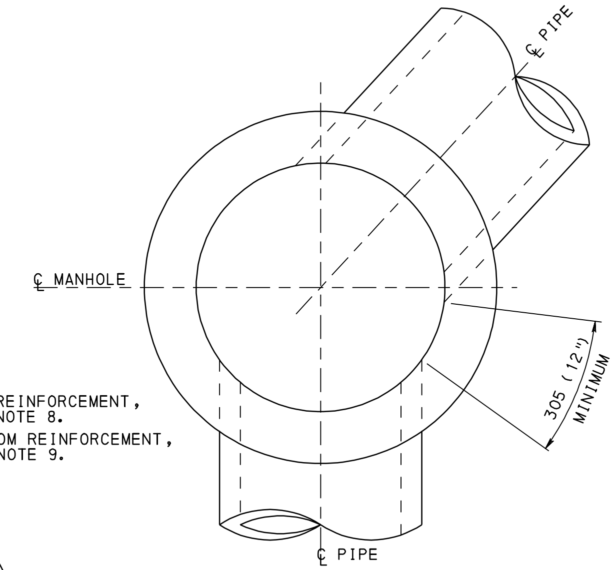
⊕ FOR BASE SLAB DIMENSIONS SEE TABLE A.



DETAIL "A" CONSTRUCTION JOINT

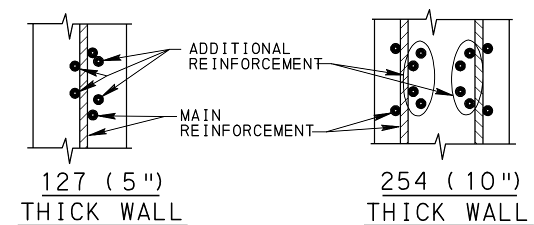


SECTION A-A



PLAN VIEW

SEE NOTE 3.

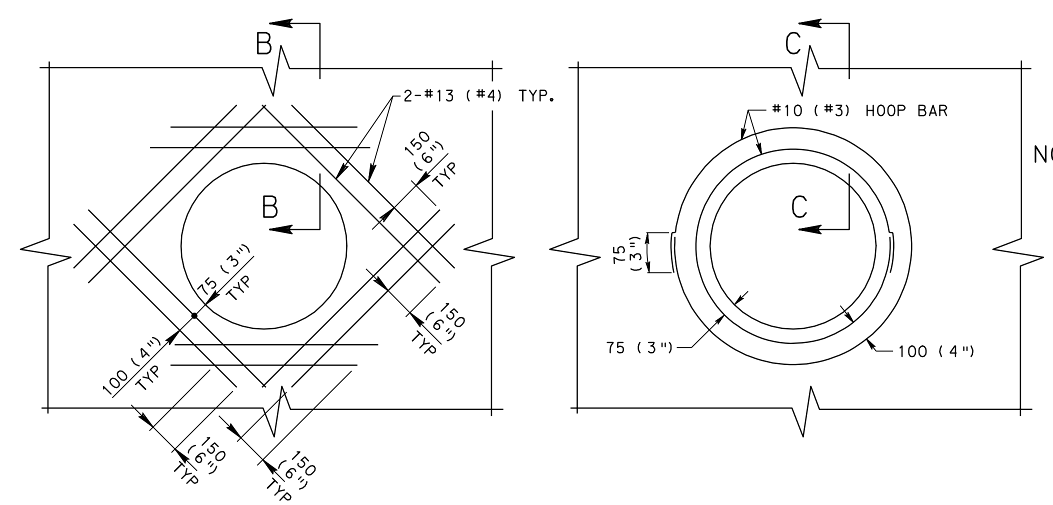


SECTION B-B OR C-C

TABLE A

BASE SLAB DIMENSIONS

MAX DEPTH FROM TOP OF MANHOLE TO TOP OF FOOTING	AS DESIGNED (SEE NOTE 7) FOOTING DIAMETER	FOOTING THICKNESS
3.0 m (10')	2060 (6'-9")	300 (1'-0")
6.0 m (20')	2060 (6'-9")	300 (1'-0")
9.0 m (30')	2060 (6'-9")	380 (1'-3")
12.0 m (40')	2210 (7'-3")	380 (1'-3")
15.0 m (50')	2440 (8'-0")	380 (1'-3")
18.0 m (60')	2590 (8'-6")	380 (1'-3")



REINFORCEMENT DETAILS AT OPENINGS

NOTE: FOR WALL THICKNESSES 254 (10") OR GREATER PLACE ADDITIONAL REINFORCEMENT AS SHOWN ABOVE AT EACH FACE OF THE WALL INSIDE MAIN REINFORCEMENT.
FOR WALLS 127 (5") THICK KEEP MAIN REINFORCEMENT CENTERED IN WALL. PROVIDE ADDITIONAL REINFORCEMENT AS SHOWN ABOVE, MAINTAINING REQUIRED COVER.

NOTES

1. CONSTRUCTION REQUIREMENTS:
   A. CONSTRUCT IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 605, 606 AND 714; AND ASTM C-478M-90, STANDARD SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS, AS MODIFIED HEREIN.
   B. MINIMUM CONCRETE CLASS:
      CAST-IN-PLACE CLASS A
      PRECAST CLASS AA
   C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM A185, STEEL WELDED WIRE FABRIC ASTM A663/A663M & A675/A675M, PLAIN BILLET STEEL BARS OR ASTM A615/A615M, DEFORMED BILLET STEEL BARS. PROVIDE MINIMUM YIELD STRENGTH OF 400 MPa (60,000 PSI).
   D. CLEAR COVER FOR STEEL:
      WALLS: CAST-IN-PLACE 50 (2")
      PRECAST 40 (1½")
      FOOTINGS: CAST-IN-PLACE 60 (2½") TOP BARS
      80 (3") BOTTOM BARS
      50 (2") SIDE COVER
      PRECAST 50 (2") TOP BARS
      40 (1½") BOTTOM BARS
      40 (1½") SIDE COVER
      SLABS: CAST-IN-PLACE 50 (2") TOP & BOTTOM BARS
2. FOR PIPES WITH INSIDE DIAMETERS GREATER THAN 750 (30") SEE MODIFIED CAST-IN-PLACE MANHOLES, SHEET 2.
3. PROVIDE 300 (12") MINIMUM HORIZONTAL CLEARANCE BETWEEN OPENINGS LOCATED AT THE SAME DEPTH. LOCATE PIPES NOT AT THE SAME DEPTH VERTICALLY AT LEAST ONE HALF THE MAXIMUM OPENING DIAMETER APART.
4. FORM A CONCRETE CHANNEL AT THE BOTTOM OF THE MANHOLE CONFORMING TO THE SHAPE OF THE LOWER HALF OF THE INCOMING AND/OR OUTGOING PIPES. PROVIDE A FULL DEPTH U-SHAPED CHANNEL WHEN NECESSARY TO REDUCE ENERGY LOSSES.
5. USE 127 (5") THICK WALLS WITH ONE (1) ROW OF REINFORCING, OR USE 254 (10") THICK OR GREATER WALLS WITH TWO (2) ROWS OF REINFORCING.
6. CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT CONCRETE SEGMENT.
7. A SAFE BEARING CAPACITY OF 0.15 MPa (1.5 TONS/SF) UNDER THE ENTIRE BASE SLAB IS ASSUMED TO DETERMINE THE BASE SIZE. WHEN THE SUBSOIL IS EXTREMELY POOR, PROCEED WITH CONSTRUCTION ONLY AFTER THE ENGINEER SPECIFIES AN ADEQUATE BASE DESIGN.
8. FOR FOOTING TOP REINFORCEMENT, BOTH DIRECTIONS, USE #19 (#6) BARS AT 300 (12") FOR DEPTHS TO 18.0 m (60') OR 635 mm²/m (0.30 in²/FT) WWF FOR DEPTHS TO 9.0 m (30') AND 680 mm²/m (0.32 in²/FT) WWF FOR DEPTHS GREATER THAN 9.0 m (30'), 152 (6") MAXIMUM SPACING FOR WWF.
9. FOR FOOTING BOTTOM REINFORCEMENT, BOTH DIRECTIONS, USE #13 (#4) BARS AT 480 (18") FOR DEPTHS TO 18.0 m (60') OR 320 mm²/m (0.15 in²/FT) WWF FOR DEPTHS TO 9.0 m (30') AND 340 mm²/m (0.16 in²/FT) WWF FOR DEPTHS GREATER THAN 9.0 m (30'), 152 (6") MAXIMUM SPACING FOR WWF.
10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

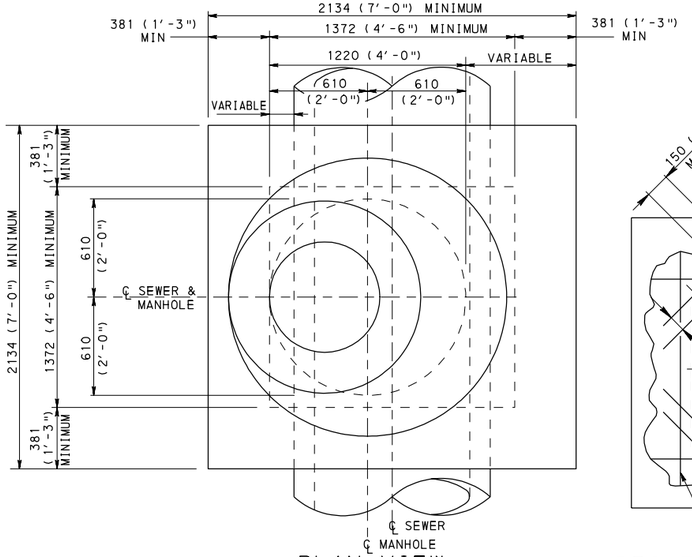
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

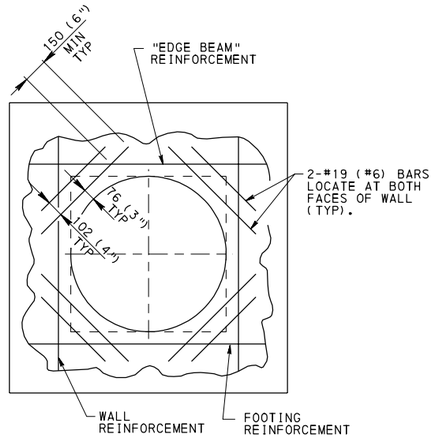
STANDARD MANHOLES
CAST-IN-PLACE MANHOLES

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 6
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-39M

14-JUN-2010



PLAN VIEW



REINFORCEMENT DETAILS AT VERTICAL OPENINGS

NOTE: ONLY BOX WITH MAIN REINFORCEMENT SHOWN FOR CLARITY.

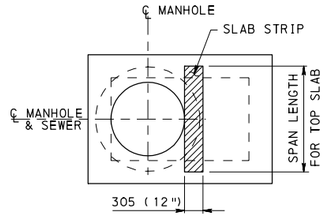


FIGURE 1

PLAN-TOP OF SLAB

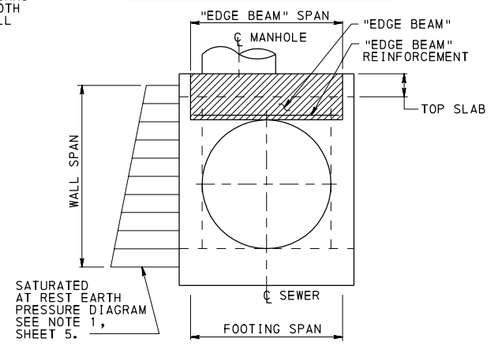


FIGURE 2

ELEVATION-OPENING

NOTES

1. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1.
   FOR DESIGN REQUIREMENTS SEE NOTE 1, SHEET 6.
2. INCREASE BOX SIZE WHEN REQUIRED TO KEEP WALLS OF MANHOLE BOX SECTION FLUSH WITH THE OPENING FOR PIPES LARGER THAN 1050 (42") ID. INDICATE THE BOX SIZE ON THE CONSTRUCTION PLANS OR SHOP DRAWINGS BASED ON THE DESIGN PROCEDURES PROVIDED BELOW.
3. DESIGN PROCEDURE FOR MANHOLE BOX SECTION:

   DESIGN ALL MEMBERS FOR MOMENT, CRACK CONTROL & SHEAR AT DISTANCE d (EFFECTIVE DEPTH OF MEMBER) FROM FACE OF SUPPORT. CALCULATE ALL SPAN LENGTHS FROM THE CENTER OF THE SUPPORTS.

3A. TOP SLAB
- DESIGN A 305 (12") WIDE SLAB STRIP FOR ONE-WAY ACTION TO CARRY DEAD LOAD, LIVE LOAD, AND WEIGHT OF EARTH. SPAN THE STRIP, SIMPLY SUPPORTED, ACROSS THE WIDTH OF THE BOX OR IN THE SHORT DIRECTION. SEE FIGURE 1 FOR DETAILS.
- PLACE ADDITIONAL BARS IN THE SLAB AT 45° AROUND THE MANHOLE OPENING. SEE SECTION A-A FOR DETAILS.

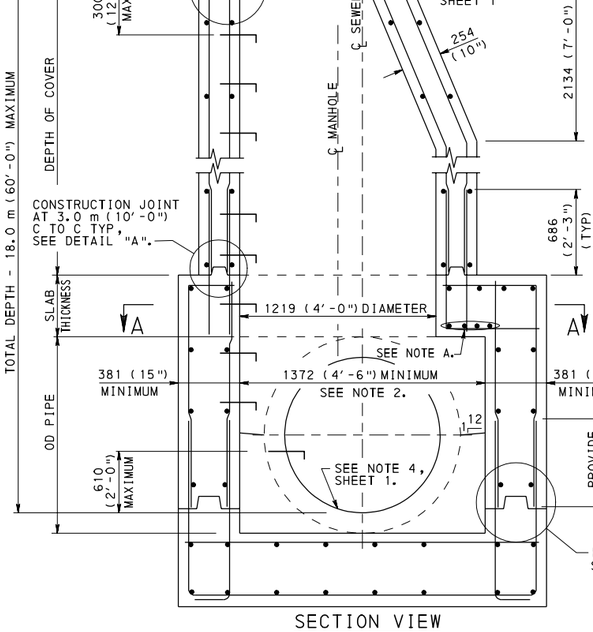
3B. "EDGE BEAM"

VIEWS SHOWING THE CONFIGURATION OF MANHOLE BOX SECTION ILLUSTRATE "EDGE BEAMS" TO BE THE SAME DEPTH AS THE TOP SLAB. TO ACHIEVE REQUIRED CAPACITY WHERE NECESSARY, INCREASE DEPTH OF "EDGE BEAM" BY PROVIDING ADDITIONAL CLEARANCE BETWEEN THE SLAB AND TOP OF OPENING. LOCATE HORIZONTAL STEEL FOR BEAM ABOVE THE SOFFIT OF THE OPENING. SEE FIGURE 2 FOR DETAILS.

- DESIGN THE "EDGE BEAMS", SPANNING THE LENGTH OF THE BOX, TO CARRY A UNIFORMLY DISTRIBUTED LOAD EQUAL TO THE REACTION FROM THE SLAB.

3C. WALLS
- DESIGN THE WALLS TO CARRY THE AXIAL LOAD, DUE TO EARTH LOAD, LIVE LOAD, AND DEAD LOAD APPLIED DIRECTLY TO THE WALL, IN ADDITION TO REACTIONS FROM THE "EDGE BEAMS", AND THE VERTICAL MOMENT CAUSED BY SATURATED AT REST EARTH PRESSURE. SEE FIGURE 2 FOR PRESSURE DIAGRAM. CONSIDER THE WALL SIMPLY SUPPORTED BETWEEN TOP SLAB AND FOOTING. PROVIDE THE SAME REINFORCEMENT ON THE OUTSIDE FACE.

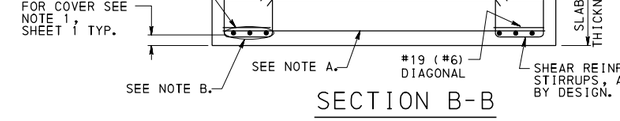
3D. FOOTING
- DESIGN SPAN NORMAL TO PIPE TO CARRY POSITIVE MOMENT OF $1/10\ WL^2$ AND NEGATIVE MOMENT OF $1/12\ WL^2$ WHERE W IS THE UNIFORM BEARING PRESSURE. DO NOT TAKE INTO ACCOUNT THE CONCRETE IN THE CHANNEL WHEN CALCULATING CAPACITY OF THE FOOTING.
- AS A MINIMUM, PROVIDE #13 (#4) BARS AT 300 (12") CENTERS, TOP AND BOTTOM OF SLAB IN THE OPPOSITE DIRECTION.



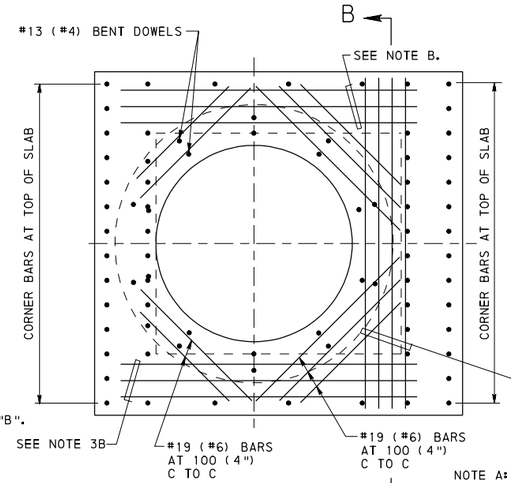
SECTION VIEW

MODIFIED MANHOLE

FOR PIPES GREATER THAN 750 (30") TO 2100 (84") INSIDE DIAMETER



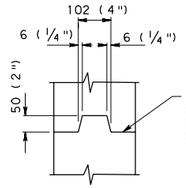
SECTION B-B



SECTION A-A

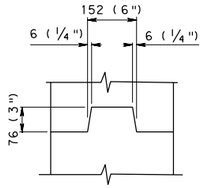
NOTE A: BARS REQUIRED TO SPAN FROM WALL TO WALL.

NOTE B: PROVIDE ADDITIONAL BARS AS REQUIRED BY DESIGN WHEN OPENING IN WALL IS PRESENT (TYP).



DETAIL "A" CONSTRUCTION JOINT

SEE NOTE 6, SHEET 1



DETAIL "B" KEYWAY

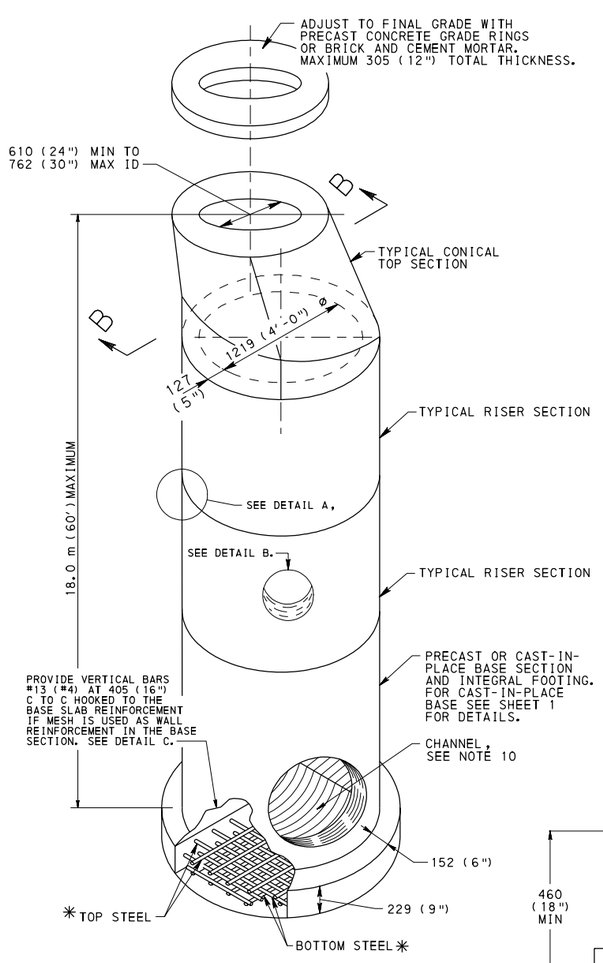
SEE NOTE 6, SHEET 1

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES MODIFIED CAST-IN-PLACE MANHOLES

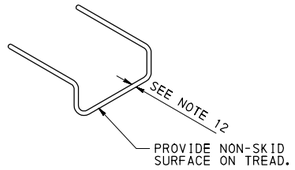
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 6
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-39M



PRECAST MANHOLE

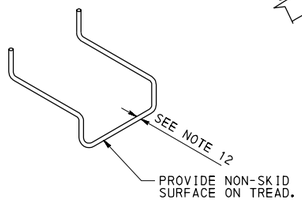
FOR PIPES 750 (30") INSIDE DIAMETER AND LESS

✳SEE TABLE B FOR BASE SLAB STEEL REQUIREMENTS. PROVIDE WALL REINFORCEMENT DETAILS AT BASE SLAB TYPICAL OF CAST-IN-PLACE MANHOLE. SEE SHEET 1.

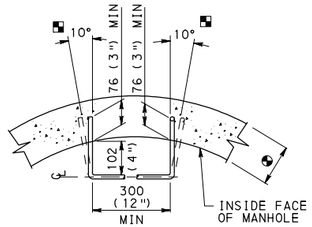


STEP WITHOUT HOOKS

SEE NOTE 13



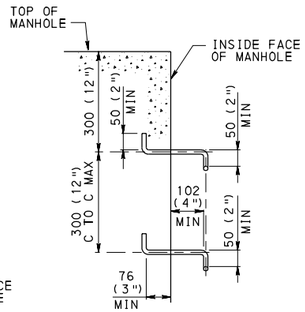
STEP WITH HOOKS



PLAN VIEW

■ ALTERNATE ACCEPTABLE CONFIGURATION

◔ 254 (10") FOR CAST-IN-PLACE
127 (5") FOR PRECAST

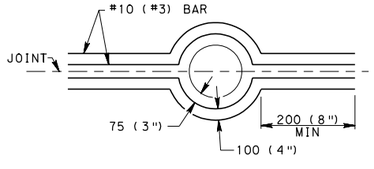


SIDE VIEW

TYPICAL STEP CONFIGURATION

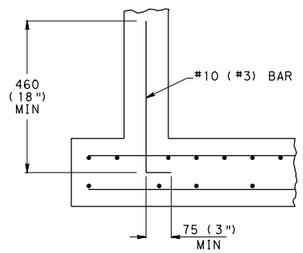
MANHOLE STEPS

SEE NOTE 11

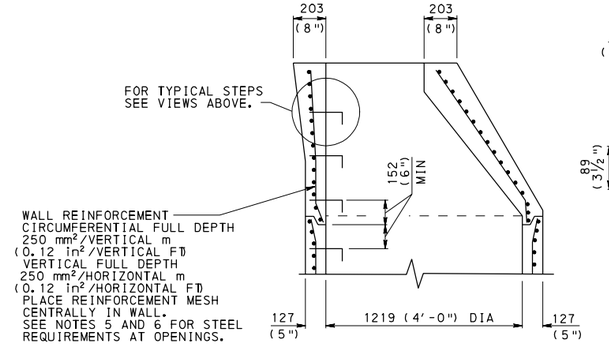


ALTERNATE DETAIL AT OPENINGS

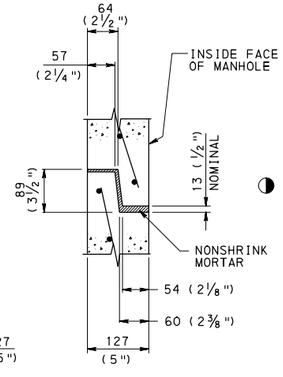
SEE NOTE 14



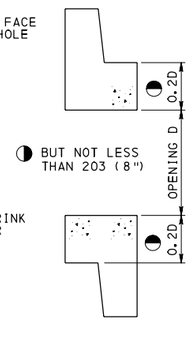
DETAIL C



SECTION B-B



DETAIL A



DETAIL B

NOTES

1. PRECAST MANHOLES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 714, MAY BE SUBSTITUTED FOR THE STANDARD CAST-IN-PLACE MANHOLE. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
2. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1. FOR DESIGN REQUIREMENTS SEE NOTE 1, SHEET 5.
3. FOR PERMISSIBLE LOCATION OF PIPES SEE PLAN VIEW AND NOTE 3, SHEET 1.
4. FOR RISERS OR BASE SECTIONS WITH OPENINGS, PROVIDE A MINIMUM HEIGHT OF SECTION SO AS TO PROVIDE AN UNCUT WALL EQUAL TO 20% OF THE OPENING, BUT NO LESS THAN 203 (8"), BETWEEN THE OPENING AND THE CLOSEST JOINT BETWEEN RISERS - SEE DETAIL B.
5. FOR PRECAST RISER OR BASE SECTIONS WITH ONE OPENING LOCATED AT DEPTHS TO 18.0 m (60'), PROVIDE CIRCUMFERENTIAL REINFORCEMENT IN ACCORDANCE WITH SECTION B-B. FOR SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT DEPTH OF 3.0 m (10') AND LESS, PROVIDE CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 340 mm²/VERTICAL m (0.16 in²/VERTICAL FT) FOR THE HEIGHT OF RISER OR BASE SECTION.
6. FOR RISERS OR BASE SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT A DEPTH GREATER THAN 3.0 m (10'), BUT LESS THAN OR EQUAL TO 7.6 m (25'), PROVIDE CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 930 mm²/VERTICAL m (0.44 in²/VERTICAL FT) FOR THE HEIGHT OF THE RISER OR BASE SECTION.
7. FOR RISERS OR BASE SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT DEPTHS GREATER THAN 7.6 m (25'), USE A 254 (10") THICK WALL RISER OR BASE SECTION WITH CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 470 mm²/VERTICAL m (0.22 in²/VERTICAL FT) EACH FACE.
8. MARK RISERS OR BASE SECTIONS WITH HOLES CLEARLY WITH MAXIMUM ALLOWABLE DEPTH.
9. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND OPENINGS AS SHOWN ON REINFORCEMENT DETAILS AT OPENINGS SHEET 1.
10. FOR CHANNEL DETAILS IN PRECAST MANHOLE SEE CAST-IN-PLACE MANHOLE SHEET 1.
11. PROVIDE MANHOLE STEPS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(c). ALTERNATE CONFIGURATIONS AND DIMENSIONS, AS APPROVED BY THE ENGINEER, MAY BE USED.
12. PROVIDE MINIMUM 25 (1") SECTION DIMENSION FOR METAL STEPS. PROVIDE MINIMUM 19 (¾") SECTION DIMENSION FOR NON-DETERIORATING MATERIAL STEPS.
13. MECHANICAL ANCHOR REQUIRED FOR INSTALLATION OF STEPS WITHOUT HOOKS.
14. THE ALTERNATE OPENING REINFORCEMENT DETAIL IS NOT DESIRABLE BY DESIGN. USE IT TO MEET EXISTING PIPE ELEVATIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

TABLE B

PRECAST MANHOLE HEIGHT	TOP STEEL REQUIREMENTS	BOTTOM STEEL REQUIREMENTS
0.0 m TO 9.0 m (0'-0" TO 30'-0")	#13 BARS AT 150 C TO C OR 700 mm²/m WWF 152 MAXIMUM SPACING (#4 BARS AT 6" C TO C OR 0.33 in²/FT WWF 6" MAXIMUM SPACING)	#13 BARS AT 300 C TO C OR 340 mm²/m WWF 152 MAXIMUM SPACING (#4 BARS AT 12" C TO C OR 0.16 in²/FT WWF 6" MAXIMUM SPACING)
> 9.0 m TO 18.0 m (> 30'-0" TO 60'-0")	#16 BARS AT 150 C TO C OR 1190 mm²/m WWF 152 MAXIMUM SPACING (#5 BARS AT 6" C TO C OR 0.56 in²/FT WWF 6" MAXIMUM SPACING)	#13 BARS AT 150 C TO C OR 575 mm²/m WWF 152 MAXIMUM SPACING (#4 BARS AT 6" C TO C OR 0.27 in²/FT WWF 6" MAXIMUM SPACING)

SEE NOTE 7, SHEET 1

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

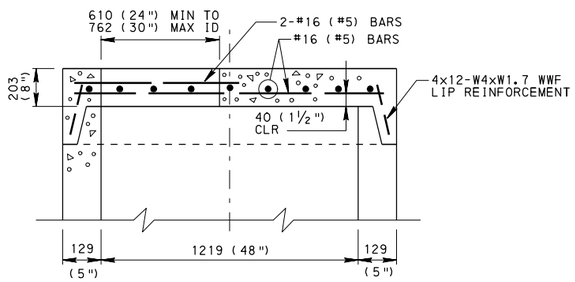
STANDARD MANHOLES PRECAST MANHOLES & MANHOLE STEPS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

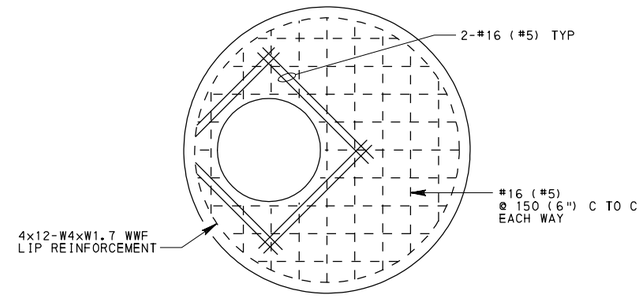
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 3 OF 6

RC-39M

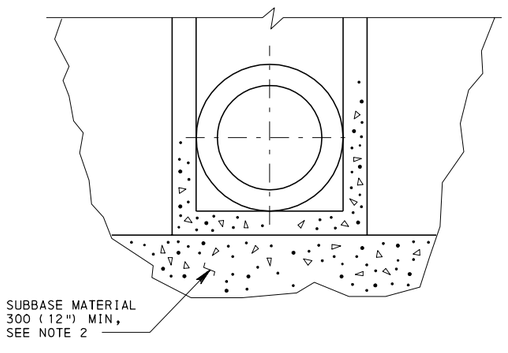


SECTION B-B

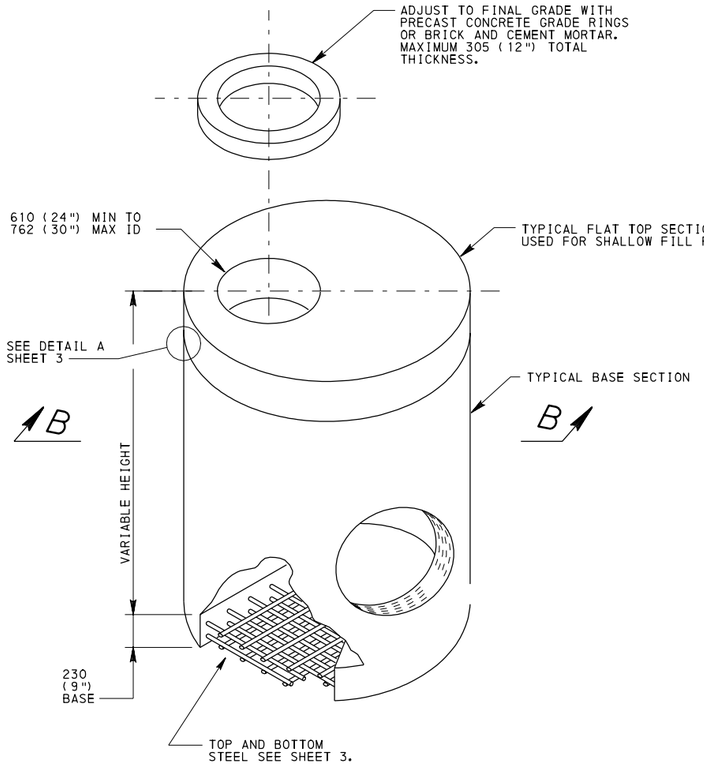


NOTES

1. PRECAST MANHOLES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 714, MAY BE SUBSTITUTED FOR THE STANDARD CAST-IN-PLACE MANHOLE. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
2. PLACE SUBBASE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350.2, IN LAYERS 100 (4") THICK, COMPACTED TO A DENSITY SATISFACTORY TO THE ENGINEER AND INCIDENTAL TO THE MANHOLE PAY ITEM.
3. FOR ALL OTHER DESIGN REQUIREMENTS AND APPLICABLE NOTES, SEE SHEET 3.



PRECAST MANHOLE
BASE PREPARATION



PRECAST MANHOLE
WITH FLAT TOP

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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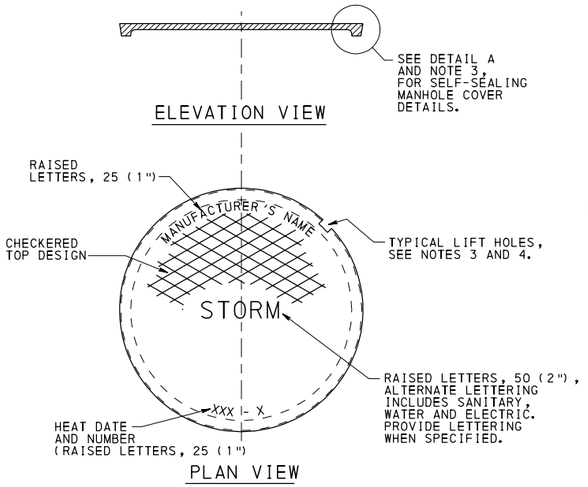
STANDARD MANHOLES COVERS, FRAMES AND ADJUSTMENT RISERS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 6
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-39M

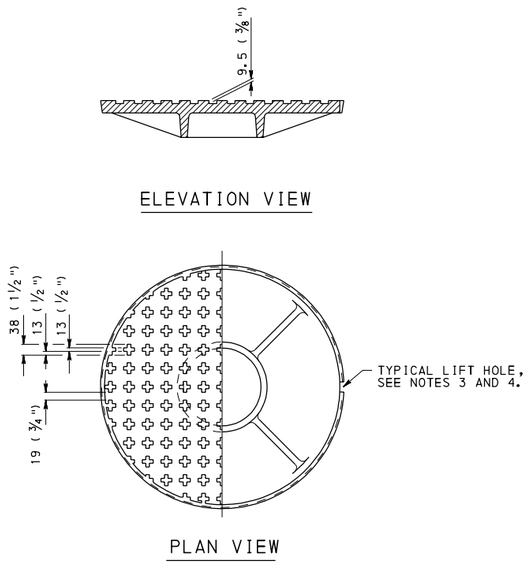


ELEVATION VIEW

PLAN VIEW

CAST IRON MANHOLE COVER

(PLATEN COVER)



ELEVATION VIEW

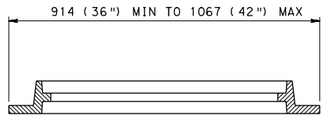
PLAN VIEW

CAST IRON MANHOLE COVER

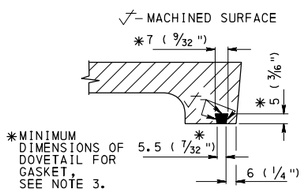
(STANDARD COVER)

NOTES

1. PROVIDE MANHOLE FRAMES AND COVERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(b). DESIGN MANHOLE FRAME, COVER AND GRADE ADJUSTMENT RINGS FOR PHL 93 (HS25) LIVE LOAD. IF MANHOLES ARE NOT IN OR ADJACENT TO ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT.
2. PROVIDE MANHOLE FRAMES, COVERS AND GRADE ADJUSTMENT RISERS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR DEVIATION OR MODIFICATION TO THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
3. PROVIDE A GASKET SEALING SYSTEM, DOVETAIL GROOVE AND CONTINUOUS GASKET, AS INDICATED IN DETAIL A, TO PREVENT INFLOW THROUGH THE BEARING SURFACES, OF SURFACE RUNOFF WATER INTO THE MANHOLE SYSTEM, WHEN SPECIFIED. PROVIDE 6 (1/4") DIA ONE PIECE SELF-SEAL POLYISOPRENE ROUND GASKET, 40 DUROMETER GLUED IN PLACE. PROVIDE TWO (2) LIFT HOLES AT 180° TO FACILITATE COVER REMOVAL FOR SELF-SEALING MANHOLE COVER.
4. PROVIDE ONE LIFT HOLE TO FACILITATE COVER REMOVAL FOR NON-SEALING MANHOLE COVER.
5. FRAME AND GRADE ADJUSTMENT RISER TO HAVE A MINIMUM BEARING SEAT OF 25 (1") FOR COVER.
6. LOCATE TOP OF FRAME OR ADJUSTMENT RISER 3 (1/8") BELOW THE TOP OF ROADWAY SURFACE.
7. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 606, AND AS MODIFIED HEREIN:
   - A. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASUREMENTS PROVIDED WITH EACH ORDER.
   - B. MANUFACTURE BAR STOCK AND RETAINER CLIP FROM U.S. MADE CARBON STEEL MEETING OR EXCEEDING THE MINIMUM REQUIREMENTS OF ASTM A-36M.
   - C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) FOR PROPER SEATING OF MANHOLE LID AND MAKE THE OUTER WELD A FILLET WELD.
   - D. MAKE THE MINIMUM WIDTH OF BOTTOM AND TOP BAR STOCK 25 (1") AND 10 (3/8"), RESPECTIVELY.
   - E. TAP THE BOTTOM BAR STOCK FOR MULTI-PIECE ADJUSTMENT RISER FOR M14 ADJUSTMENT BOLT.
   - F. REINFORCE THE ADJUSTMENT RISER ADEQUATELY TO PREVENT BENDING.
   - G. PROVIDE AN ADJUSTMENT RISER WHICH IS FLUSH WITH COVER AND DOES NOT ALLOW EXCESSIVE MOVEMENT. PROVIDE AN ADJUSTMENT RISER WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME.
8. ATTACH FRAME AND/OR PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 (1/2") THREADED STUDS WITH HEX HEAD NUTS AND WASHERS, INSERTED THROUGH AT 16 (5/8") DIA HOLES THROUGH FRAME AND/OR RINGS. SPACE HOLES AT 120° AND 50 (2") FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 102 (4") MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE.
9. SET THE BASE OF THE FRAME AND/OR PRECAST CONCRETE GRADE RINGS IN A BED OF CEMENT MORTAR.

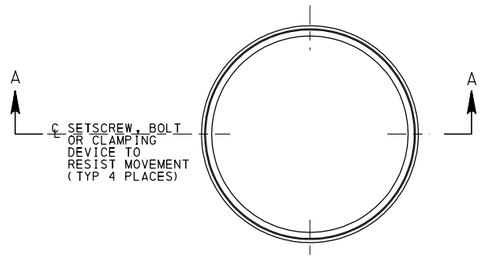


ELEVATION VIEW OF MANHOLE FRAME



DETAIL A

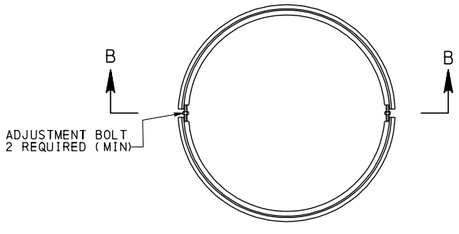
GASKET SEALING SYSTEM



PLAN VIEW

ONE PIECE ADJUSTMENT RISER

SECTION A-A



PLAN VIEW

MULTI-PIECE ADJUSTMENT RISER

SECTION B-B

ADJUSTMENT RISERS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES COVERS, FRAMES AND ADJUSTMENT RISERS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 5 OF 6
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-39M

1. DESIGN REQUIREMENTS:

A. DESIGN SPECIFICATIONS: 1998 AASHTO LRFD BRIDGE DESIGN SPECIFICATION, DESIGN MANUAL PART 4 AND ASTM C 478M-90, STANDARD SPECIFICATIONS FOR PRECAST CONCRETE MANHOLE SECTIONS.

B. CALCULATE FOUNDATION BEARING PRESSURES BY SERVICE LOAD METHODS. DESIGN ALL OTHER PORTIONS OF THE MANHOLES BY LOAD FACTOR METHODS.

C. THE SAFE BEARING PRESSURE IS NOT TO EXCEED THE EXISTING STATE OF STRESS OR 0.15 MPa (1.5 TONS/SF), WHICHEVER IS GREATER.

D. DESIGN THE MANHOLE FOR A LIVE LOAD OF PHL 93 (HS25) AND WITH 30% IMPACT, EXCEPT DO NOT USE IMPACT IN THE DESIGN OF THE FOOTING. IF MANHOLES ARE NOT IN OR ADJACENT TO A ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT.

E. DESIGN THE MANHOLE FOR:

ACCELERATION DUE TO GRAVITY, $g = 9.81\ m/s^2$ ($32.2\ ft/s^2$)

DENSITY OF EARTH, $\gamma_E = 1920\ kg/m^3$ ($120\ lb/ft^3$)

$\emptyset$ = ANGLE OF INTERNAL FRICTION = 33°

DRY AT REST EARTH PRESSURE = $K_0\gamma_E = 0.001(1-\sin\emptyset)\gamma_{Eg}$
$= 0.001 \times 0.46 \times 1920 \times 9.81 = 8.7\ kN/m^3$

SATURATED AT REST EARTH PRESSURE = $K_0[0.001\gamma_{Eg} - \gamma_W] + \gamma_W$
$= 0.46\ [(0.001)(1920)(9.81) - 9.81] + 9.81$
$= 14.0\ kN/m^3$

(DRY AT REST EARTH PRESSURE = $K_0\gamma_E = 0.001(1-\sin\emptyset)\gamma_{Eg}$
$= 0.46 \times 120 = 55\ lb/ft^3$

SATURATED AT REST EARTH PRESSURE = $K_0(\gamma_E - \gamma_W) + \gamma_W$
$= 0.46 \times (120 - 62.4) + 62.4$
$= 89\ lb/ft^3$)

F. PROVIDE AT LEAST MINIMUM REINFORCEMENT FOR SHRINKAGE AND TEMPERATURE AT ALL CONCRETE FACES WHERE REINFORCEMENT IS NOT REQUIRED BY DESIGN.

G. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1.

2. VERTICAL STEEL:

A. THIS PROCEDURE IS REQUIRED ONLY WHEN A SIGNIFICANT LOADING EXISTS ON ONE SIDE OF THE MANHOLE AND LIMITED SUPPORT IS PROVIDED ON THE OTHER.

B. DETERMINE MINIMUM AND MAXIMUM VERTICAL LOAD APPLIED TO MANHOLE AT DEPTH "H".

C. DETERMINE OVERTURNING MOMENT FROM UNBALANCED EARTH PRESSURE.

D. DETERMINE DIMENSIONS OF DESIGN SECTION TO CARRY MOMENT AS SHOWN IN FIGURE 1.

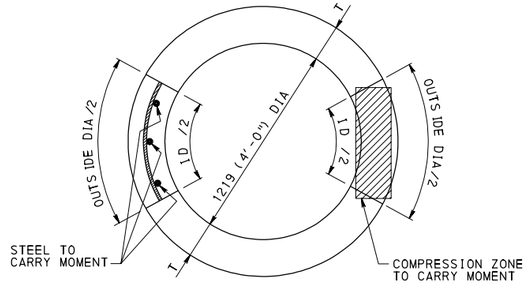
EQUIVALENT RECTANGULAR COMPRESSION ZONE DIMENSIONS TO CARRY MOMENT:
T MILLIMETERS (INCHES) BY 1/4 INSIDE DIA + OUTSIDE DIA) (MILLIMETERS (INCHES))
CENTROID OF RECTANGULAR SECTION IS AT CENTROID OF ARC SECTION.

E. DESIGN REINFORCEMENT IN "COLUMN" TO CARRY AXIAL LOAD AND MOMENT. (USE TOTAL CROSS-SECTION TO CARRY AXIAL LOAD.)

F. CHECK CRACK CONTROL UNDER SERVICE LOAD CONDITIONS.

$$Z = F_s \sqrt[3]{\frac{dc \times 2dst \times b}{NO.\ OF\ BARS}} < 17.2\ N/m \quad (98\ kips/ft)$$

DM4-8-16-8-4



DESIGN SECTION TO CARRY MOMENT
FIGURE 1

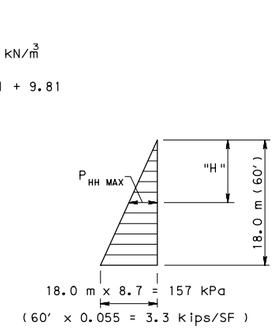
3. HOOP STEEL:

A. DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS USING FIGURE 2 AND FIGURE 3. $P_{HH\ MIN}$ NOT TO BE GREATER THAN ONE-HALF OF $P_{HH\ MAX}$.

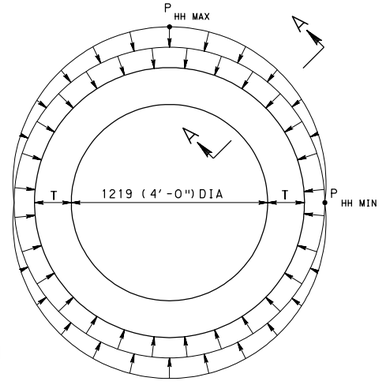
B. DESIGN HOOP REINFORCEMENT SHOWN IN SECTION A-A, TO CARRY THE MOMENT AND AXIAL THRUST.

C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

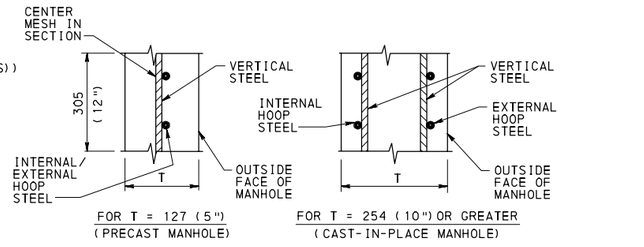
$$Z = F_s \sqrt[3]{\frac{dc \times 2dst \times b}{NO.\ OF\ BARS}} < 17.2\ N/m \quad (98\ kips/ft)$$



AT REST PRESSURE DIAGRAM
TO DETERMINE $P_{HH\ MAX}$
FIGURE 2



DIFFERENTIAL PRESSURE LOADING
TO DETERMINE HOOP MOMENTS
FIGURE 3



USE WALLS AT 127 (5") THICK WITH ONE (1) ROW OF REINFORCING, OR USE WALLS AT 254 (10") OR GREATER WITH TWO (2) ROWS OF REINFORCING.

SECTION A-A - DESIGN SECTION

4. FOOTING DESIGN:

A. DETERMINE FOOTING SIZE (USE AN EQUIVALENT CIRCULAR FOOTING FOR DESIGN)

$\frac{P}{A} + \frac{M}{S}$ < 290 kPa (3.0 kips/SF) OR MAXIMUM ALLOWABLE BEARING PRESSURE

P = DL + LL + EP

DL = DEAD LOAD OF MANHOLE

LL = PHL 93 (HS25) WHEEL LOAD (NO IMPACT)

EP = EARTH LOAD ON OVERHANG

A = BEARING AREA OF FOOTING

M = MOMENT DUE TO DIFFERENTIAL LOADING (WHEN APPLICABLE)

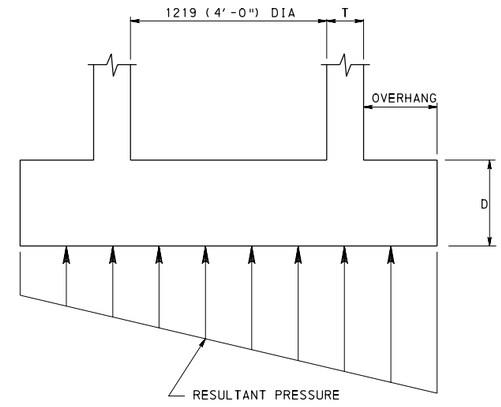
S = SECTION MODULUS OF FOOTING

SEPARATION BETWEEN THE FOOTING AND SOIL IS NOT PERMISSIBLE.

B. DESIGN FOOTING TO CARRY MOMENT (BOTH MAXIMUM NEGATIVE AND POSITIVE) AND SHEAR DUE TO RESULTANT PRESSURE AS SHOWN IN FIGURE 4 AND APPLIED LOADS.

C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

$$Z = F_s \sqrt[3]{\frac{dc \times 2dst \times b}{NO.\ OF\ BARS}} < 17.2\ N/m \quad (98\ kips/ft)$$



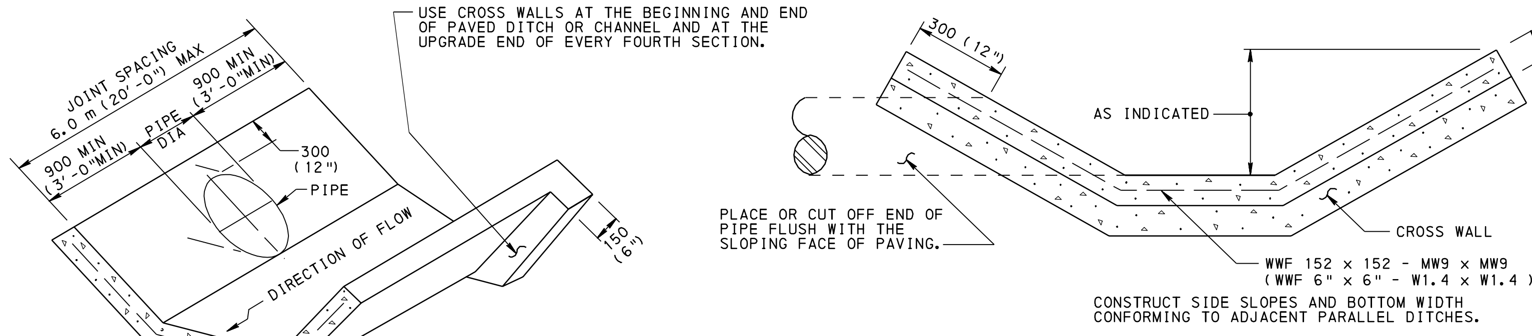
DIAMETRICAL SECTION THROUGH FOOTING
FIGURE 4

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

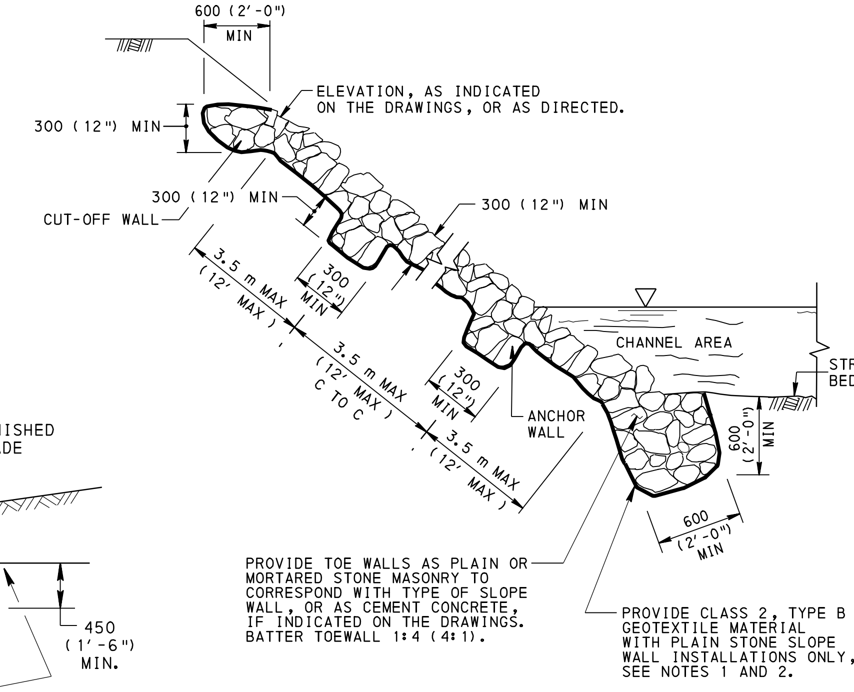
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES DESIGN PROCEDURE

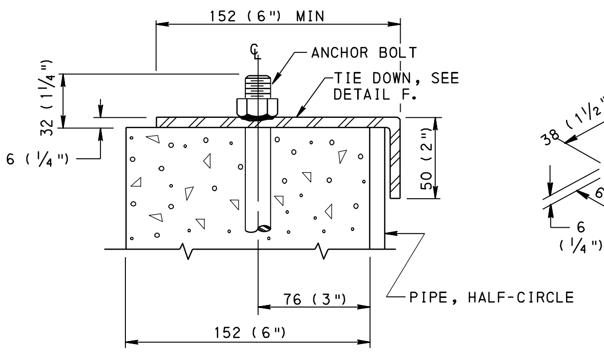
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 6 OF 6
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-39M



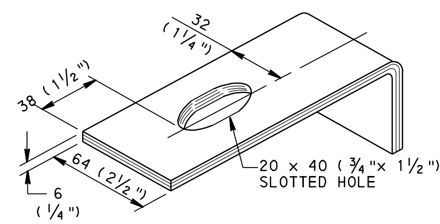
CONCRETE PAVING FOR STREAM BEDS



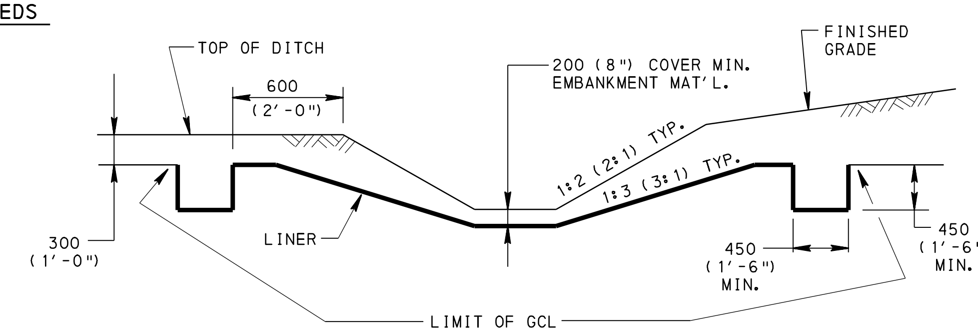
PLAIN AND MORTARED STONE SLOPE WALL



DETAIL E



DETAIL F

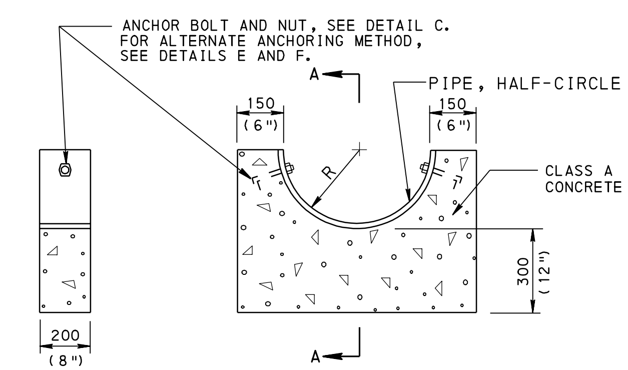


GEOSYNTHETIC CLAY LINER

SEE NOTE 5

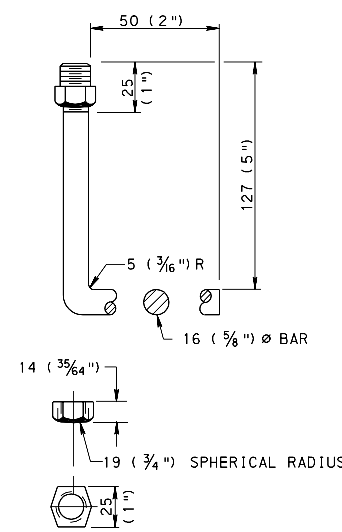
NOTES

1. PROVIDE GEOTEXTILE MATERIAL MEETING THE CONSTRUCTION REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND MATERIAL REQUIREMENTS OF SECTION 735.
2. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
3. PLACE CONCRETE PIPE ANCHORS AT THE ENDS OF PIPE, UNDER ALL JOINTS AND AT INTERMEDIATE LOCATIONS AS REQUIRED. PROVIDE 3.0 m (10-0") MAXIMUM SPACING BETWEEN ANCHORS.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
5. DO NOT LINE ANY DITCHES OR SWALES WHERE GCL HAS BEEN INSTALLED WITH LIMESTONE OR CARBONATE ROCK RIPROCK USED FOR EROSION CONTROL.

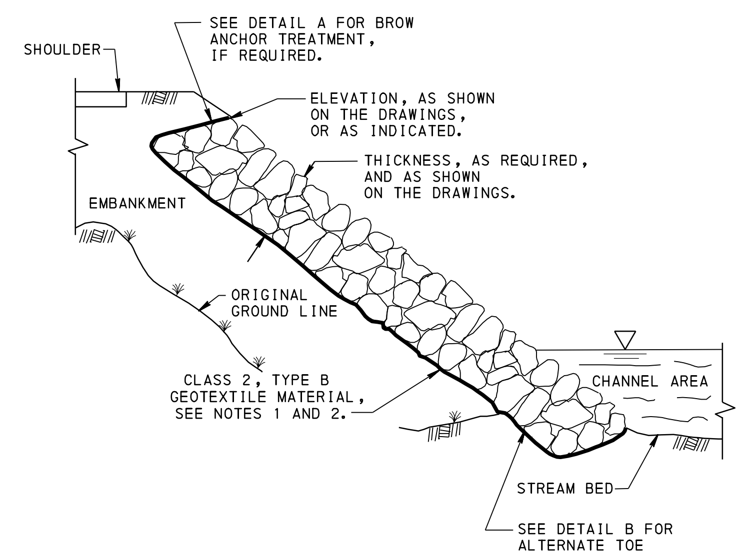


SECTION A-A

CEMENT CONCRETE PIPE ANCHOR
DETAIL D

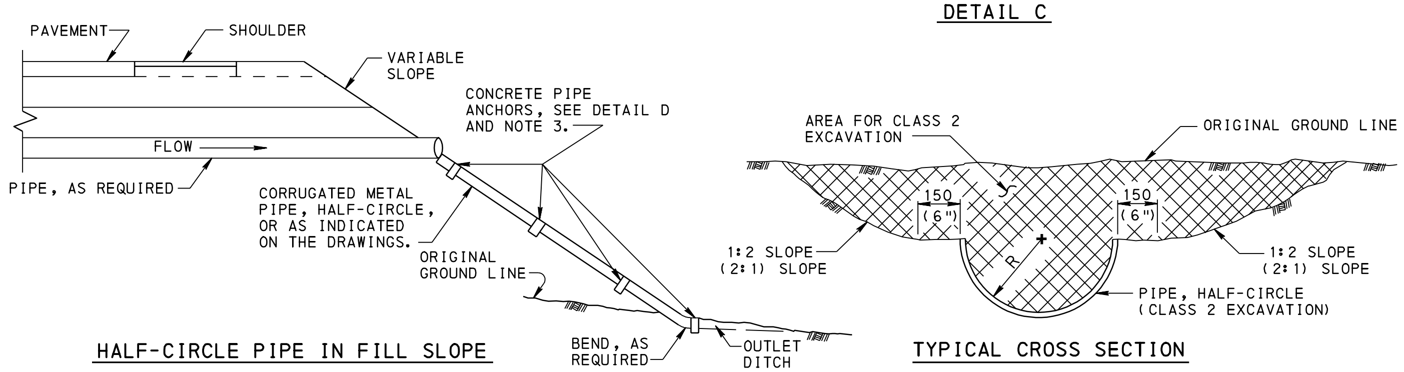


ANCHOR BOLT AND NUT
DETAIL C



ROCK EMBANKMENT

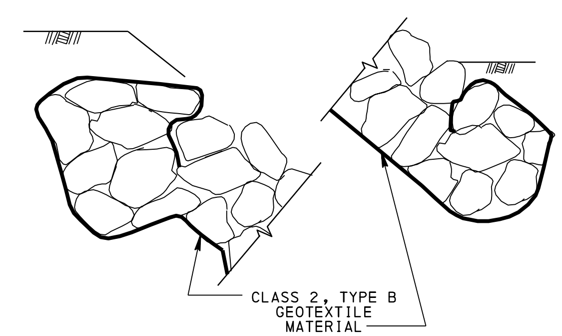
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



HALF-CIRCLE PIPE IN FILL SLOPE

TYPICAL CROSS SECTION

INSTALLATION DETAILS FOR HALF-CIRCLE PIPE



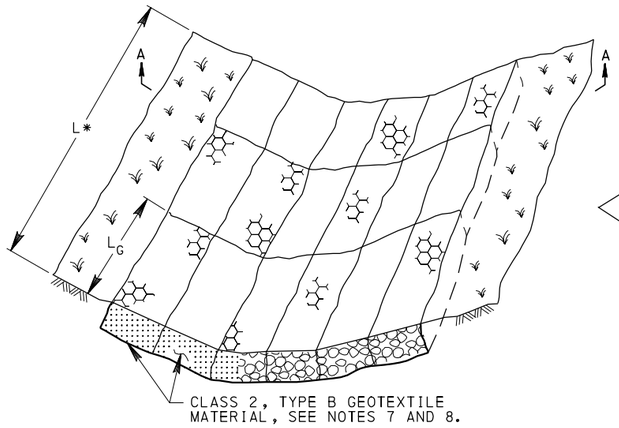
DETAIL A

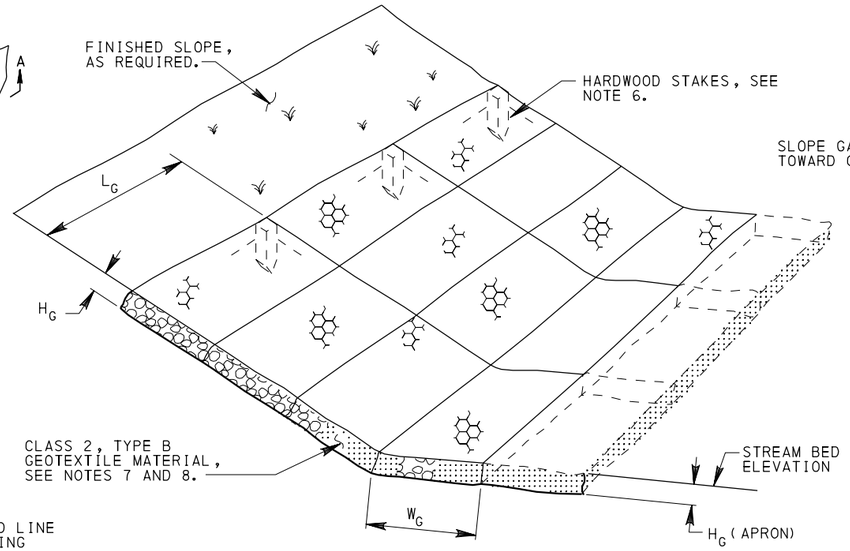
DETAIL B

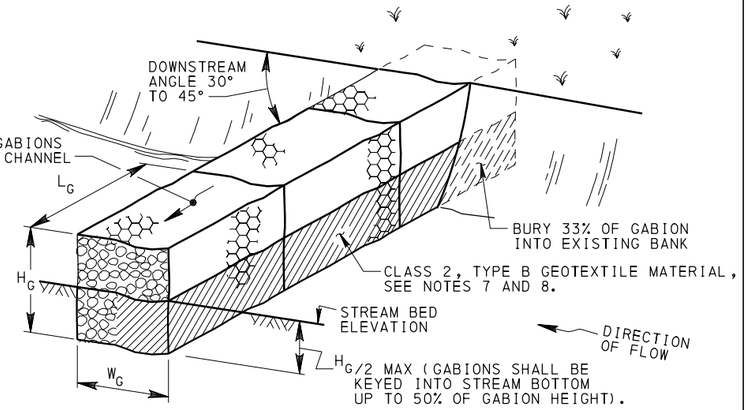
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SLOPE PROTECTION

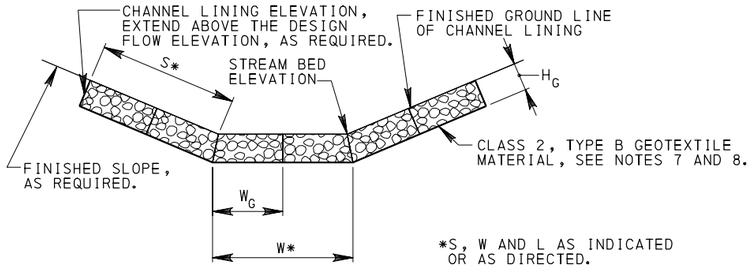
RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 1 RC-40M







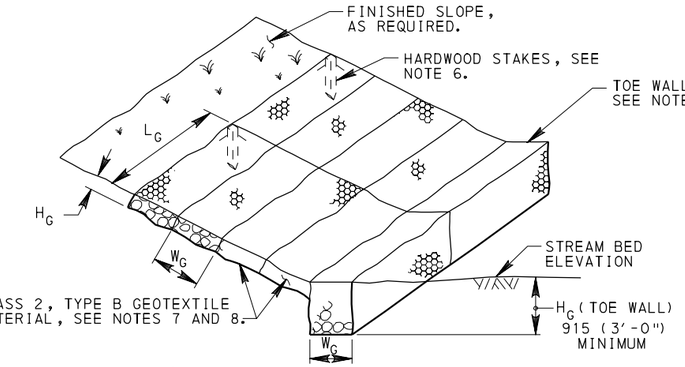
CHANNEL DEFLECTOR



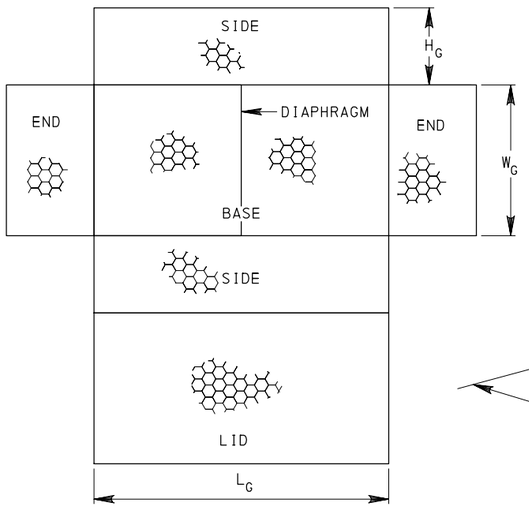
*S, W AND L AS INDICATED OR AS DIRECTED.

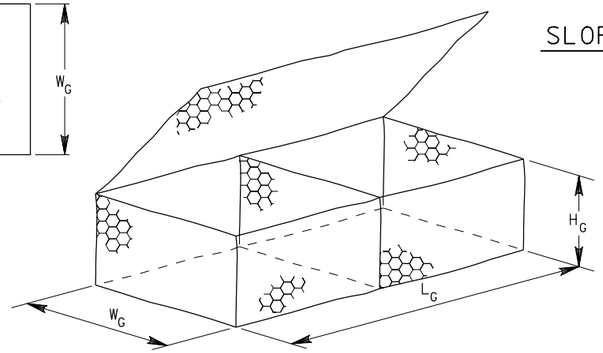
SECTION A-A

CHANNEL LINING



SLOPE WALLS





WIRE MESH BASKETS

GABIONS SIZES

MATTRESS TYPE		
W_G	L_G	H_G
1829 (6'-0")	2743 (9'-0")	229 (0'-9")
1829 (6'-0")	3658 (12'-0")	229 (0'-9")

STANDARD		
W_G	L_G	H_G
914 (3'-0")	1829 (6'-0")	305 (1'-0")
914 (3'-0")	3658 (12'-0")	305 (1'-0")
914 (3'-0")	2743 (9'-0")	457 (1'-6")
914 (3'-0")	1829 (6'-0")	914 (3'-0")
914 (3'-0")	2743 (9'-0")	914 (3'-0")
914 (3'-0")	3658 (12'-0")	914 (3'-0")

ADDITIONAL SIZES MAY BE AVAILABLE ON A SPECIAL ORDER BASIS.

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 626.
2. SPECIFY TYPE A GABIONS OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OF COARSE AGGREGATE, AT LEAST ALONG THE EXPOSED FACES, FOR A UNIFORM APPEARANCE.
3. SPECIFY TYPE B GABIONS OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OR SMALL POWER EQUIPMENT PLACEMENT OF COARSE AGGREGATE.
4. MAKE CORROSION RESISTANT TYPE A AND TYPE B GABIONS THE SAME AS TYPE A AND TYPE B GABIONS EXCEPT SHEATH THE WIRE-MESH IN POLYVINYL CHLORIDE PLASTIC.
5. THE APRON OR TOE WALL IS REQUIRED WHERE THE SLOPE WALL IS INSTALLED ADJACENT TO WATER. MAKE THE APRON APPROXIMATELY TWO TIMES AS WIDE AS THE ANTICIPATED DEPTH OF SCOUR AND THE TOE WALL HEIGHT AT LEAST EQUAL TO THE ANTICIPATED DEPTH OF SCOUR.
6. WHEN GABIONS ARE PLACED ON A 1:1.5 (1.5 :1) SIDE SLOPE OR STEEPER, DRIVE HARDWOOD STAKES THROUGH THE GABIONS, ALONG THE TOP EDGE, TO ANCHOR THE INSTALLATION. EMBED STAKES 450 (18") MINIMUM BELOW GABION BOTTOM.
7. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND SECTION 735.
8. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
9. ON ANY GIVEN LEVEL, BASKETS WITH EXPOSED FACES MUST BE FILLED PRIOR TO FILLING BASKETS WITH NO EXPOSED FACE.
10. BASE OF GABION TO BE CONSTRUCTED BELOW SCOUR DEPTH NEXT TO STREAMS OR BELOW FROST DEPTH, WHICHEVER IS GREATER.
11. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GABIONS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

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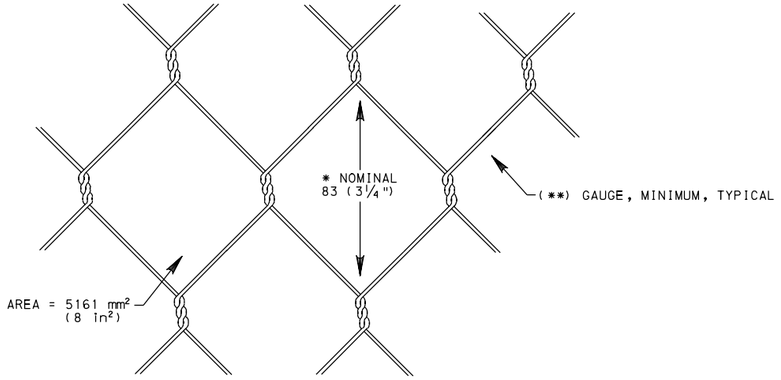
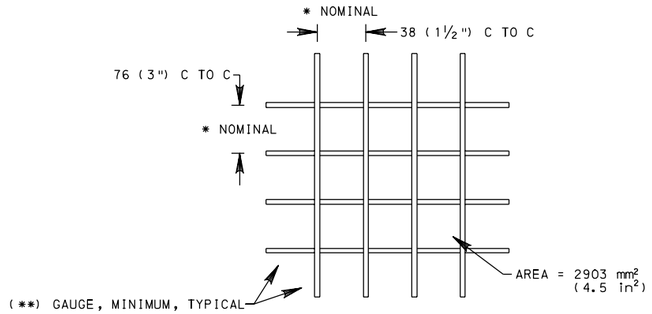


WOVEN WIRE MESH



WELDED WIRE MESH

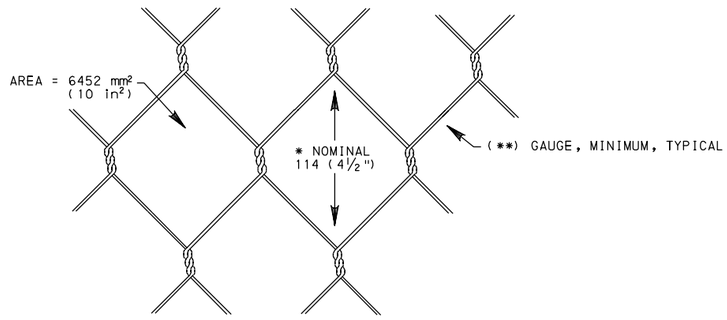
WIRE MESH FOR GABION BASKETS LESS THAN 300 (12 ") IN HEIGHT

* SUBJECT TO A TOLERANCE LIMIT OF 3% OF MANUFACTURERS' SIZES.

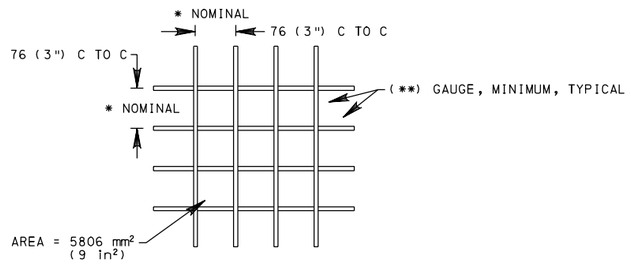
** FOR MINIMUM WIRE SIZES, REFER TO PUBLICATION 408, SECTION 626.

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.



WOVEN WIRE MESH



WELDED WIRE MESH

WIRE MESH FOR GABION BASKETS 300 (12 ") IN HEIGHT OR OVER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GABIONS

RECOMMENDED JUN. 1, 2010
R. Wyatt Willy
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
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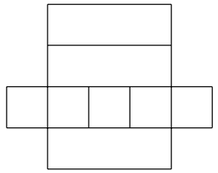
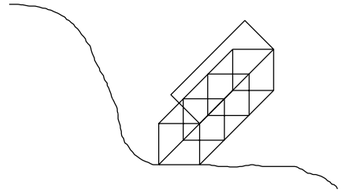
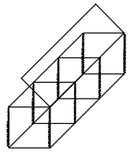


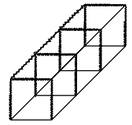
BASKET PRIOR TO ASSEMBLY



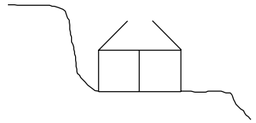
BASKET WITH HINGE AWAY FROM SLOPE FACE



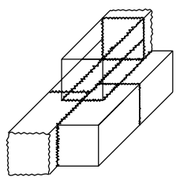
BASKET AFTER ASSEMBLY



BASKET AFTER LID CLOSURE

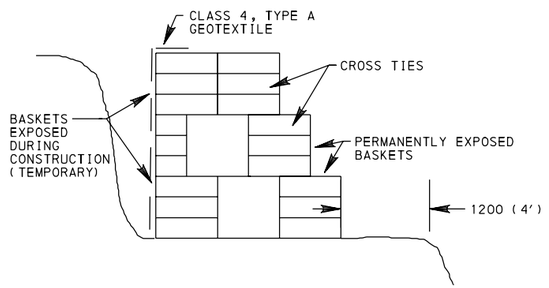


ADJACENT BASKETS WITH HINGES ON OPPOSITE SIDES



BASKET STAGGERING

GEOTEXTILE PLACEMENT



CROSS TIES IN EXPOSED (EXTERIOR) BASKETS

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.

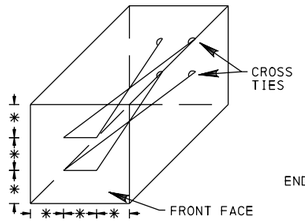
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

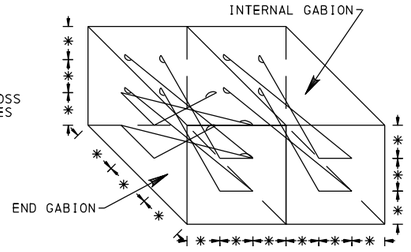
GABIONS

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 3 OF 5 RC-43M

PREFABRICATED
CROSS TIES



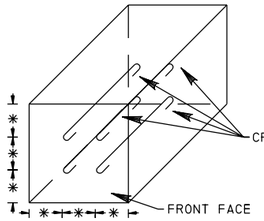
CROSS TIE
LOCATION DETAIL



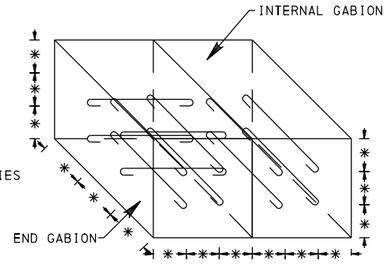
CROSS TIE
LOCATION DETAIL

CROSS TIE DETAIL (PREFABRICATED WOVEN WIRE GABIONS)

PREFABRICATED
CROSS TIES

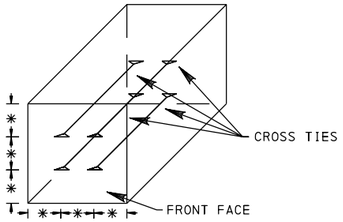


CROSS TIE
LOCATION DETAIL

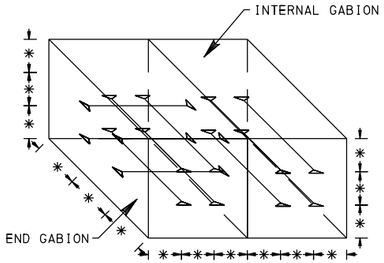


CROSS TIE
LOCATION DETAIL

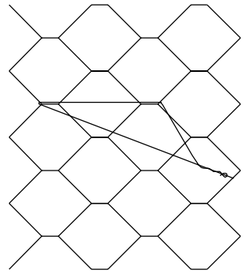
CROSS TIE DETAIL (PREFABRICATED WELDED WIRE GABIONS)



CROSS TIE
LOCATION DETAIL

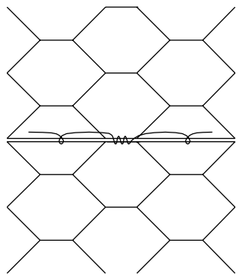


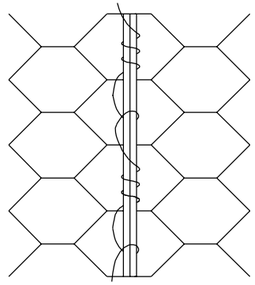
CROSS TIE
LOCATION DETAIL

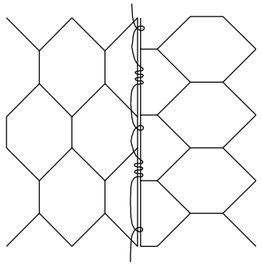


CROSS TIE
LOCATION DETAIL

CROSS TIE DETAIL (LACING)

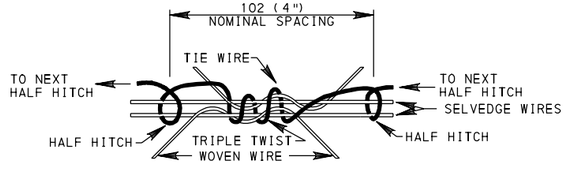






WOVEN WIRE MESH PLACEMENT
AND TIE WIRE LACING PATTERNS

SEE NOTE 5



TIE WIRE LACING DETAIL

* 305 (12")

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. SEE PUBLICATION 408, SECTION 626 FOR PREFABRICATED CROSS TIE REQUIREMENTS.
3. CROSS TIE MAY BE FABRICATED IN FIELD USING TIE WIRE.
4. DO NOT MIX STRAIGHT AND CROSSED CROSS TIES IN SAME GABION INSTALLATION.
5. TIE WIRE LACING AS SHOWN IS FOR CLARITY OF LACING PATTERN. ACTUAL FIELD APPLICATION SHOULD HAVE TIE WIRE LACING SNUG WITH SELVEDGE WIRE OF WOVEN WIRE MESH.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GABIONS

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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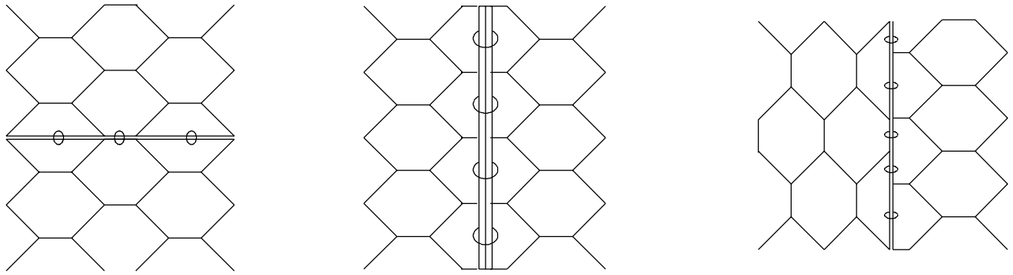
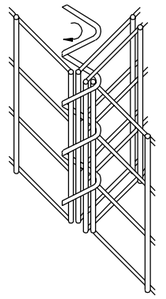
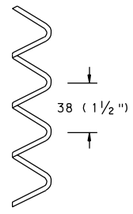


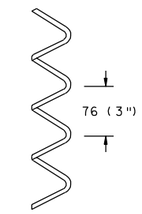
PLACEMENT AND FREQUENCY OF PREFABRICATED FASTENERS



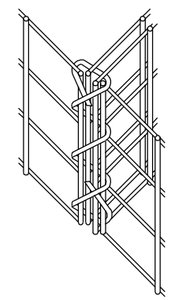
SPIRAL INSTALLATION



LESS THAN 300 (12 ")
BASKET HEIGHT



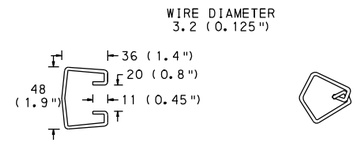
300 (12 ") OR OVER
BASKET HEIGHT



SPIRAL CLOSURE

SPIRAL FASTENERS

SEE NOTES 2 & 3

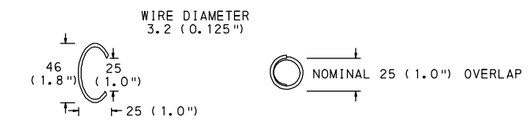


BEFORE CLOSURE AFTER CLOSURE

NOTE: ALL DIMENSIONS ARE NOMINAL

INTERLOCKING FASTENER

SEE NOTES 4, 5 & 6



BEFORE CLOSURE AFTER CLOSURE

NOTE: ALL DIMENSIONS ARE NOMINAL

NON-INTERLOCKING FASTENER

SEE NOTES 7, 8 & 9

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. USE SPIRAL FASTENERS WITH WELDED WIRE MESH ONLY.
3. ENSURE A MINIMUM OF ONE LOOP OF SPIRAL PASSES THROUGH EACH OPENING OF WIRE MESH.
4. USE INTERLOCKING FASTENER FOR BASKET CONNECTIONS.
5. USE ONE FASTENER PER WIRE MESH OPENING.
6. USE INTERLOCKING FASTENER WITH A MINIMUM FASTENING STRENGTH OF 4.00 kN (900 lb) WHILE REMAINING IN A LOCKED, CLOSED CONDITION.
7. USE NON-INTERLOCKING FASTENER FOR ASSEMBLY OF GABION BASKETS.
8. USE ONE FASTENER PER WIRE MESH OPENING EXCEPT USE TWO PER WIRE MESH OPENING ON EXPOSED ENDS OF GABION BASKETS AT BEGINNING OR END OF ROW.
9. USE NON-INTERLOCKING FASTENER WITH A MINIMUM FASTENING STRENGTH OF 2.22 kN (500 lb) WHILE REMAINING IN A WRAPPED, CLOSED CONDITION.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GABIONS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

2. METRIC UNITS INDICATED ARE SOFT CONVERTED FROM U.S. CUSTOMARY UNITS.

3. DESIGN SPECIFICATIONS:
   - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
   - DESIGN IS IN ACCORDANCE WITH THE LOAD AND RESISTANCE FACTOR DESIGN METHOD (LRFD).

4. CONSTRUCTION SPECIFICATIONS:
   - PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH THE CURRENT VERSION OF THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.

5. SHOP DRAWINGS FOR INLET TOPS, GRATES, FRAMES, AND GRADE ADJUSTMENT RINGS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/FABRICATED IN ACCORDANCE WITH THIS STANDARD.

6. IF A REQUIRED DETAIL IS NOT FOUND IN THIS STANDARD OR ON THE CONTRACT DRAWINGS A SPECIAL SUBMISSION REQUESTING ACCEPTANCE FOR SPECIFIC DETAILS MUST BE MADE TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF.

7. FOR INLET BOX DETAILS REFER TO RC-46M.

PLACEMENT NOTES:

1. EACH TYPE OF CONCRETE TOP UNIT OR FRAME IS SUITED FOR A PARTICULAR SITUATION AS FOLLOWS:
   - TYPE C CONCRETE TOP UNIT AND TYPE C ALTERNATE CONCRETE TOP UNIT WITH A TYPE C FRAME ARE DESIGNATED FOR INSTALLATION WITH NON-MOUNTABLE CURBS.
   - TYPE M CONCRETE TOP UNIT AND TYPE M FRAMES ARE DESIGNATED FOR INSTALLATION IN AREAS ADJACENT TO MEDIANS AND MOUNTABLE CURBS.
   - TYPE S CONCRETE TOP UNIT IS DESIGNATED FOR INSTALLATION IN SHOULDER SWALE AREAS.
   - TYPE D-H CONCRETE TOP UNIT IS DESIGNATED FOR INSTALLATION IN SHOULDER SWALE AREAS WITH A TYPE D-H INLET BOX.
   - TYPE D-H LEVEL CONCRETE TOP UNIT IS DESIGNATED FOR INSTALLATION IN AREAS ADJACENT TO MEDIANS WITH A TYPE D-H INLET BOX.

2. PLACEMENT OF CONCRETE TOP UNITS:
   - TYPE C AND TYPE C ALTERNATE:
     - DOWEL THE TOP UNIT INTO THE ADJACENT CURB SECTIONS WITH 2-#25 X 300 mm (2-#8 x 1'-0") DOWEL BARS. PLACE 20 mm (3/4") WIDE PREMOLDED EXPANSION JOINT FILLER BETWEEN THE TOP UNIT AND ADJACENT CURB.
   - TYPE M:
     - PLACE THE TOP UNIT OR FRAME ADJACENT TO THE BACK EDGE OF THE CURB, FLUSH WITH THE PAVEMENT SURFACE, WHEN REQUIRED WITHIN A CONCRETE MOUNTABLE CURB SECTION.
   - TYPE S:
     - THE PLACEMENT OF THE TOP UNIT IS DEPENDENT ON THE GUTTER ELEVATION AND THE RATE OF THE BACK SLOPE.
       - FOR BACK SLOPES GREATER THAN 1:2 (2:1), LOCATE THE INLET TOP WHERE THE BACK SLOPE LINE INTERSECTS THE BACK, TOP, OUTSIDE CORNER OF THE INLET TOP.
       - FOR BACK SLOPES LESS THAN 1:2 (2:1), LOCATE THE INLET WHERE THE BACK SLOPE LINE INTERSECTS THE EDGE OF THE INLET GRATE.
   - TYPE D-H:
     - PLACE THE TOP UNIT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

3. THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED INLET ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.

4. SET THE PRECAST CONCRETE TOP UNITS ON A NON-SHRINK GROUT PAD TO PROVIDE FULL BEARING ON THE SUPPORTING SURFACE. NON-SHRINK GROUT IS ALSO PERMITTED FOR CROSS SLOPE AND LONGITUDINAL GRADE ADJUSTMENTS.
   - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
   - MINIMUM GROUT DEPTH = 13 mm (1/2")
   - MAXIMUM GROUT DEPTH = 25 mm (1")

   FOR ALTERNATE GRADE ADJUSTMENT SYSTEMS, WHICH DO NOT REQUIRE NON-SHRINK GROUT, REFER TO NOTE 5 UNDER THE GRADE ADJUSTMENT RING GENERAL NOTES ON SHEET 12.

5. BRICK OR BRICK AND MORTAR ARE NOT ALLOWED FOR GRADE ADJUSTMENTS FOR NEW OR REHABILITATION PROJECTS.

GENERAL GRATE NOTES:

1. THE FOLLOWING TWO DIFFERENT GRATE DEPTHS ARE SPECIFIED ON THIS STANDARD:
   - STRUCTURAL STEEL GRATES = 89 mm (3 1/2") DEPTH WITH 64 mm (2 1/2") PERIMETER DEPTH
   - CAST IRON GRATES = 64 mm (2 1/2") DEPTH (MINIMUM)

2. THE SELECTION OF THE TYPE OF GRATE MATERIAL IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.

CONCRETE TOP UNIT NOTES:

1. SHEETS 2 THRU 6 AND 18 THRU 20 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.

2. PROVIDE PRECAST CONCRETE TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

3. PROVIDE WELDED INLET ANGLE ASSEMBLIES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

4. CAST-IN-PLACE TOP UNITS MAY BE MONOLITHIC WITH THE INLET BOX.

5. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, SECTIONS 605 AND 714, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.

6. THE SIZE OF THE INLET TOP UNITS IS BASED ON THE MINIMUM DIMENSIONS INDICATED FOR THE STANDARD INLET BOX AS SHOWN ON RC-46M.

7. PROVIDE A TOP SLAB TO SUPPORT THE INLET TOP UNITS IF A STANDARD INLET BOX IS NOT SPECIFIED. REFER TO RC-46M FOR ADDITIONAL INFORMATION.

8. FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.

9. LIFTING DEVICES (IF REQUIRED):
   - PROVIDE GALVANIZED STEEL OR PLASTIC LIFTING DEVICES FOR HANDLING AND INSTALLATION.
   - LIFTING HOLES, WITH A MAXIMUM OUTSIDE DIAMETER EQUAL TO 41 mm (1 5/8"), ARE PERMITTED IN THE SIDEWALLS. LOCATE LIFTING HOLES BASED ON THE CENTER OF GRAVITY OF THE FABRICATED INLET TOP.
   - FILL LIFTING DEVICES WITH NON-SHRINK GROUT AFTER INSTALLATION IF THE LIFTING DEVICE IS LOCATED ON THE TOP SURFACE. HOLES IN THE SIDEWALLS ARE NOT REQUIRED TO BE FILLED WITH NON-SHRINK GROUT.
   - PROVIDE LIFTING DEVICES WITH A MINIMUM CAPACITY OF AT LEAST FOUR TIMES THE CALCULATED LOAD ON THE DEVICE.

10. PROVIDE THE FOLLOWING CONCRETE CLASS:
    - CAST-IN-PLACE: CLASS A CEMENT CONCRETE [DESIGN COMPRESSIVE STRENGTH, f'c = 21 MPa (3,000 PSI)]
    - PRECAST: CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH, f'c = 28 MPa (4,000 PSI)]

11. A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH OF CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGN TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.

12. PROVIDE GRADE 420 (GRADE 60) DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615M (A615) OR ASTM A706M (A706). DO NOT WELD REINFORCEMENT BARS WITHOUT A PENNDOT APPROVED WELDING PROCEDURE.

13. CLEAR COVER FOR STEEL:
    - PRECAST: 38 mm (1 1/2")
    - CAST-IN-PLACE: 50 mm (2")

14. PROVIDE STRUCTURAL STEEL (ANGLES AND PLATES) CONFORMING TO AASHTO M270M (M270) GRADE 250 (36) [ASTM A709M (A709), GRADE 250 (36)].

15. ANCHORING OF ANGLES AND PLATES: PROVIDE EITHER STUDS OR BENT BAR ANCHORS IN ACCORDANCE WITH THE INDICATED DETAILS.
    STUDS: PROVIDE STUDS CONFORMING TO AASHTO M169 (ASTM A108).
    WELD STUDS TO ANGLES OR PLATES.
    BENT BAR ANCHORS: PROVIDE GRADE 420 (GRADE 60) DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615M (A615) OR ASTM A706M (A706). WELD BARS TO ANGLES OR PLATES USING A PENNDOT APPROVED WELDING PROCEDURE.

16. GALVANIZE PLATES, ANGLES AND STUDS OR BENT BAR ANCHORS (AFTER FABRICATION AND BEFORE INSTALLATION IN FORMS) IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).

17. CHAMFER EXPOSED CONCRETE EDGES 12 mm x 12 mm (1/2" x 1/2"), EXCEPT AS NOTED. (CHAMFERS ARE NOT SHOWN ON THE DETAILS)

18. PRECAST TOP UNITS: TAPERS MAY BE PROVIDED ON THE INSIDE AND/OR OUTSIDE VERTICAL FACES OF THE INLET TOPS TO FACILITATE FORM STRIPPING. TAPERS MAY RESULT IN BOTTOM DIMENSIONS THAT VARY TO A MAXIMUM 50 mm (2").

19. REHABILITATION PROJECTS:
    - PROVIDE CONCRETE TOP UNITS IN ACCORDANCE WITH THE DETAILS SHOWN ON SHEETS 18 THRU 20 IF THE AVAILABLE DEPTH IS LESS THAN THE DEPTHS DETAILED ON SHEETS 2 THRU 4.
    - PROVIDE CONCRETE TOP UNITS IN ACCORDANCE WITH THE DETAILS SHOWN ON SHEETS 2 THRU 4 IF THE AVAILABLE DEPTH IS GREATER THAN THE DEPTHS DETAILED ON SHEETS 2 THRU 4.
    - CONTRACTOR TO REMOVE THE EXISTING TOP UNIT AND ANY GRADE ADJUSTMENT DEVICES, INCLUDING BRICK AND MORTAR AND GRADE ADJUSTMENT RINGS, DOWN TO THE TOP OF THE EXISTING INLET BOX. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE REQUIRED DEPTH OF THE NEW CONCRETE TOP UNIT BASED ON THE AVAILABLE DEPTH. COST OF THIS WORK IS INCIDENTAL TO THE COST OF THE CONCRETE TOP UNIT.
    - THE DEPTH OF THE CONCRETE TOP UNIT MUST ALWAYS BE MAXIMIZED.
    - FOR A PRECAST CONCRETE TOP UNIT THE CONTRACTOR MUST PROVIDE THE AVAILABLE DEPTH TO THE FABRICATOR FOR FABRICATION IN ACCORDANCE WITH THIS STANDARD.
    - FOR A CAST-IN-PLACE CONCRETE TOP UNIT THE CONTRACTOR IS TO CONSTRUCT THE NEW TOP IN ACCORDANCE WITH THIS STANDARD.

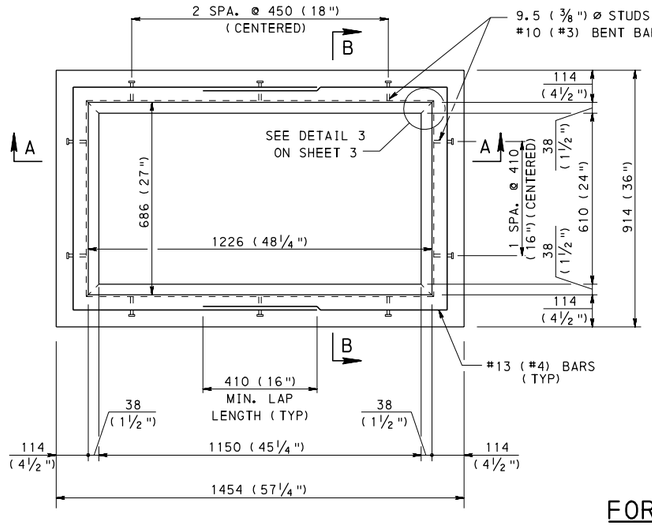
INDEX OF SHEETS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

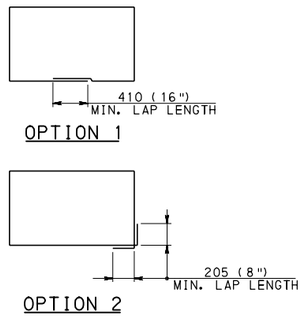
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES GENERAL NOTES

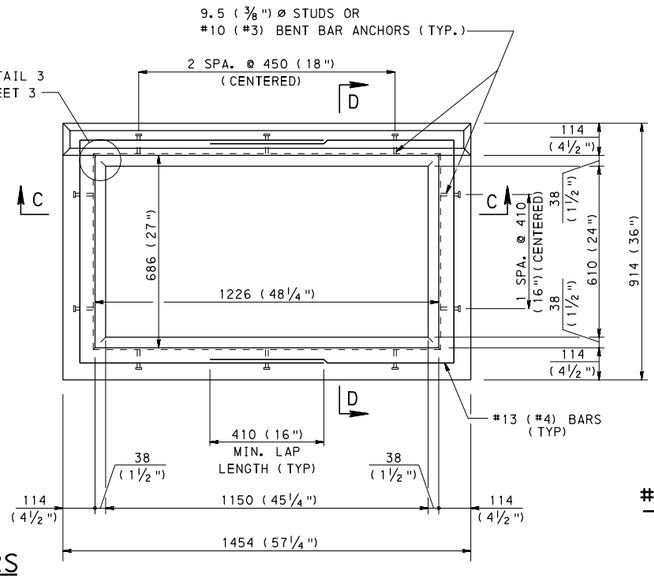
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



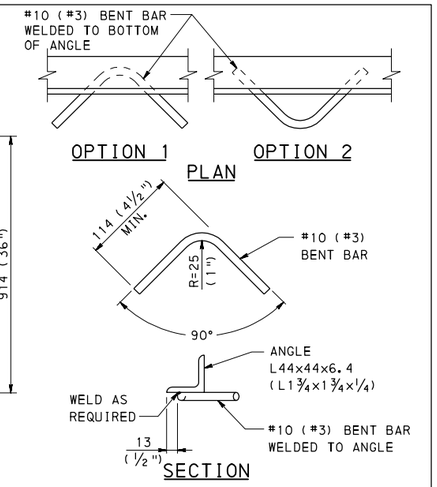
PLAN VIEW - TYPE M



ALTERNATE ONE BAR OPTIONS FOR # 13 (#4) HORIZONTAL U-BARS

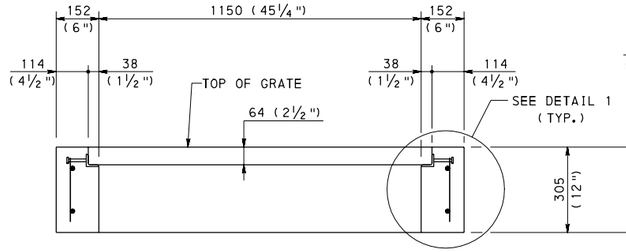


PLAN VIEW - TYPE S

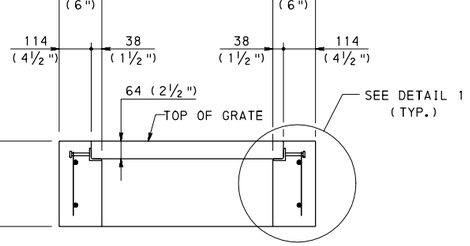


#10 (#3) BENT BAR ANCHOR DETAIL ATTACHED TO ANGLE

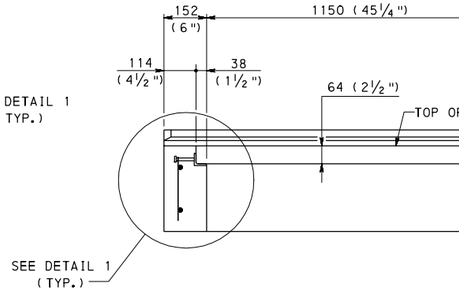
ALTERNATE DETAIL IN PLACE OF PROVIDING 9.5 (3/8) Ø STUDS



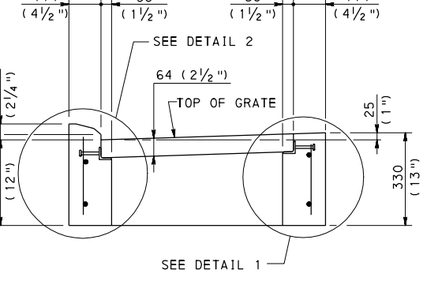
SECTION A-A



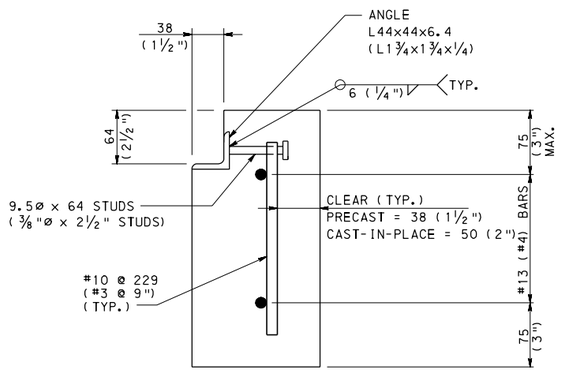
SECTION B-B



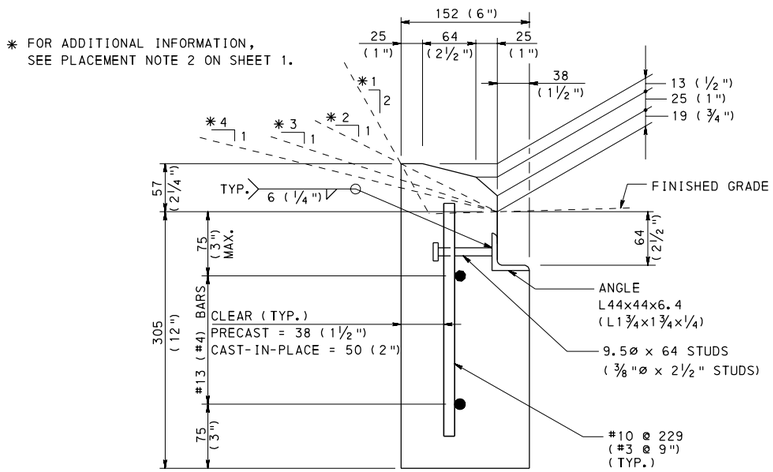
SECTION C-C



SECTION D-D



DETAIL 1



DETAIL 2

NOTES

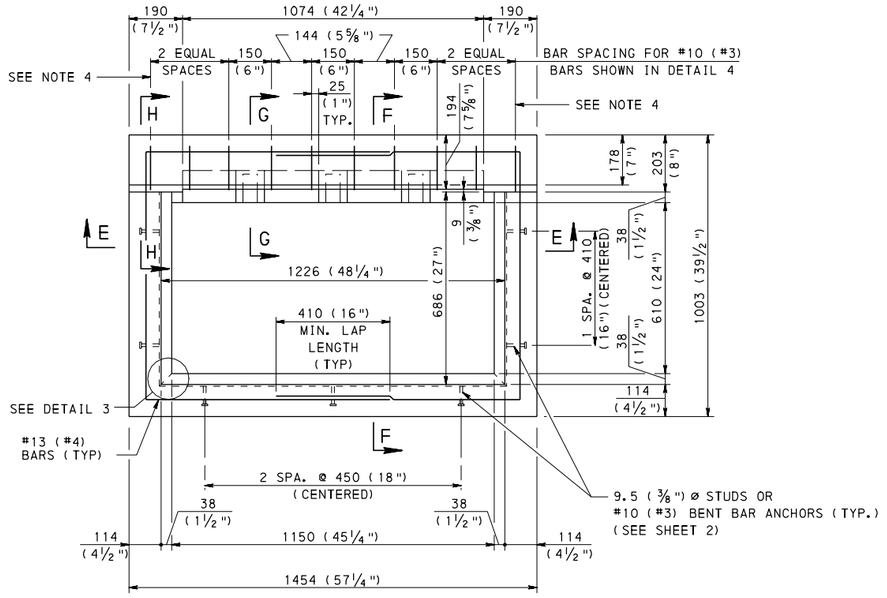
1. FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

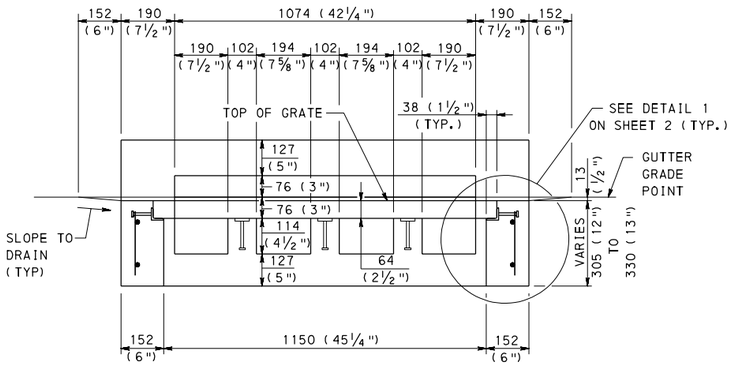
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES CONCRETE TOP UNITS TYPE M AND TYPE S

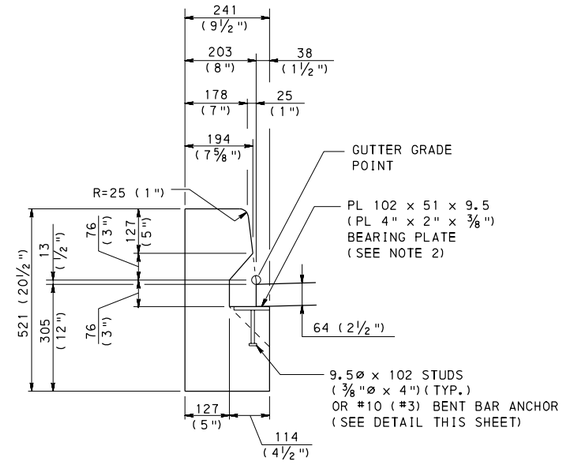
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



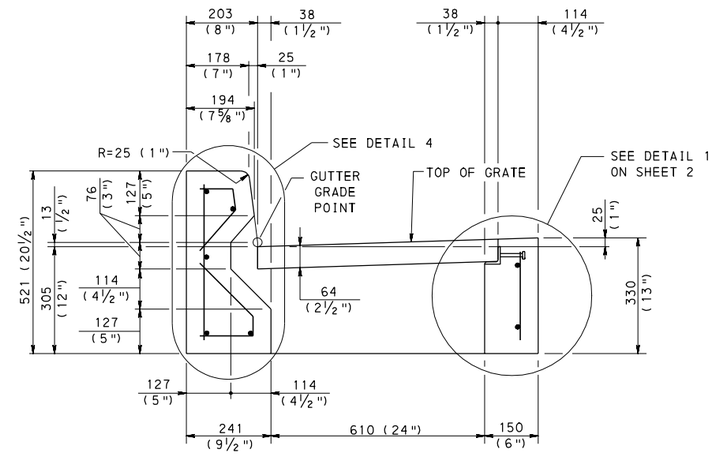
PLAN VIEW - TYPE C



SECTION E-E



SECTION G-G



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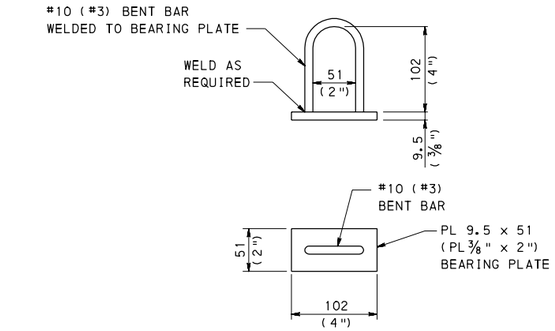
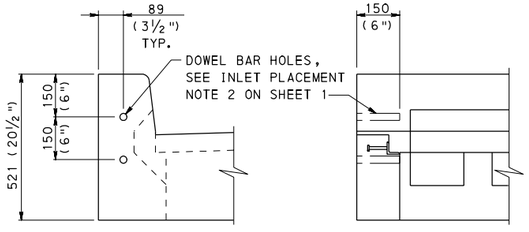


#10 (#3) BENT BAR ANCHOR DETAIL ATTACHED TO BEARING PLATE

ALTERNATE DETAIL IN PLACE OF PROVIDING 9.5 (⅜) ø STUD



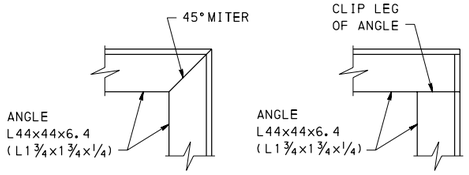
SECTION H-H

FRONT ELEVATION

NOTES

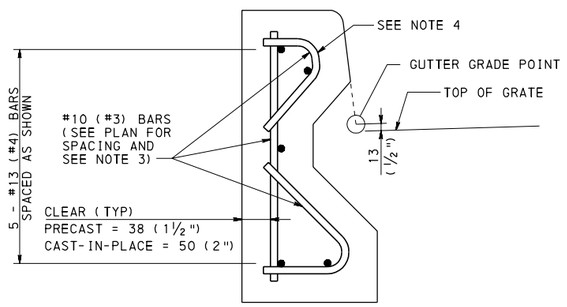
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. A MAXIMUM OF TWO HOLES ARE PERMITTED IN THE PLATE TO POSITION AND HOLD THE PLATE IN PLACE DURING FABRICATION. HOLES ARE NOT PERMITTED TO BE GREATER THAN 6 mm (¼") DIAMETER.
3. FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MATCH SHAPE INDICATED. PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
4. BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS AND STILL MAINTAIN CLEARANCE REQUIREMENTS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



OPTION 1 (MITERED) OPTION 2 (CLIPPED LEG)

DETAIL 3

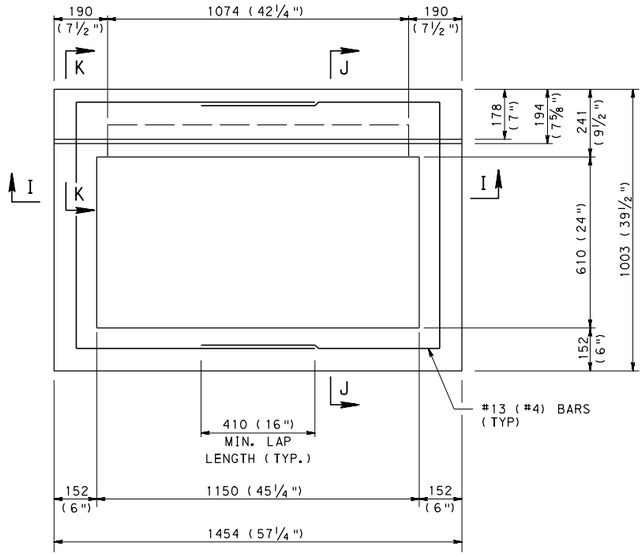


DETAIL 4

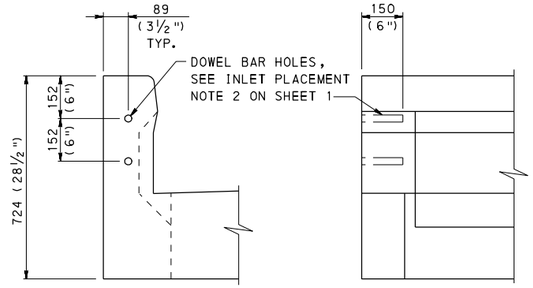
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES CONCRETE TOP UNITS TYPE C

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M

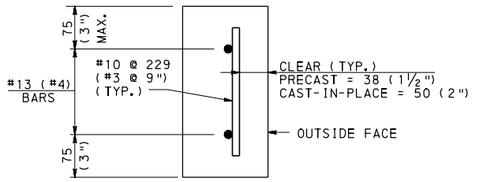


PLAN VIEW - TYPE C ALTERNATE

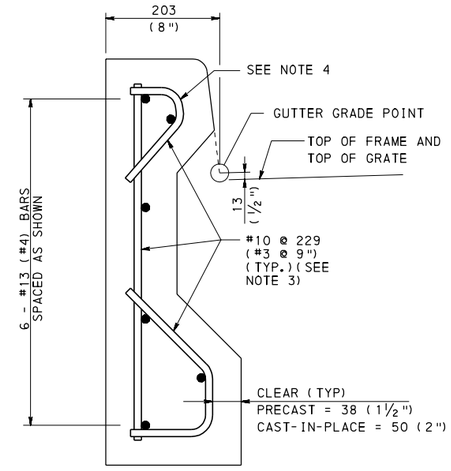


SECTION K-K

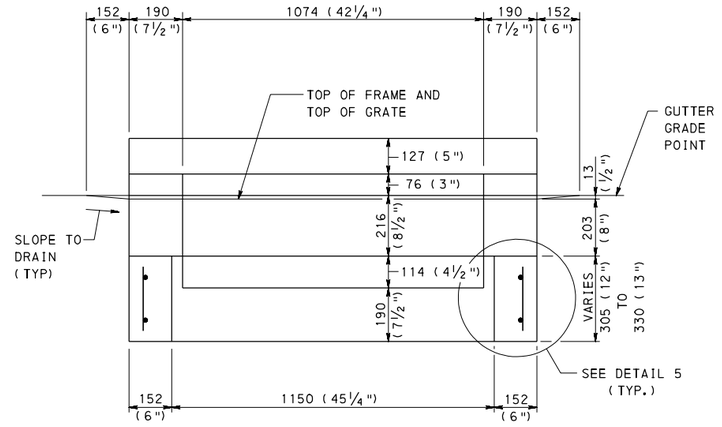
FRONT ELEVATION



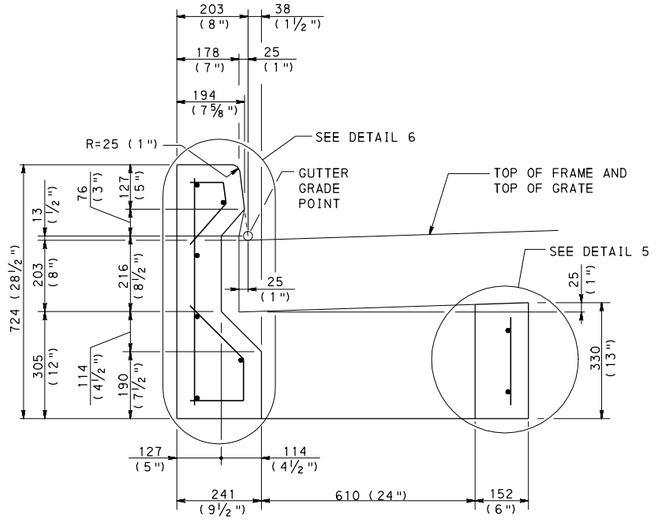
DETAIL 5



DETAIL 6



SECTION I-I



SECTION J-J

NOTES

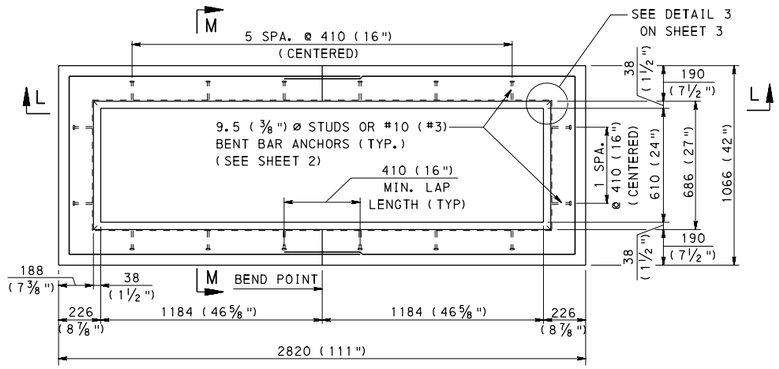
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR TYPE C FRAME, SEE SHEET 14.
3. FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MATCH SHAPE INDICATED. PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
4. BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS AND STILL MAINTAIN CLEARANCE REQUIREMENTS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

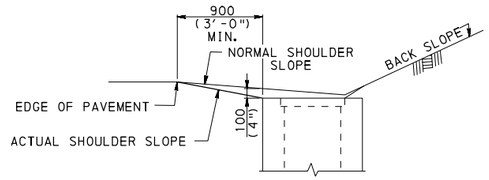
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES CONCRETE TOP UNITS TYPE C ALTERNATE

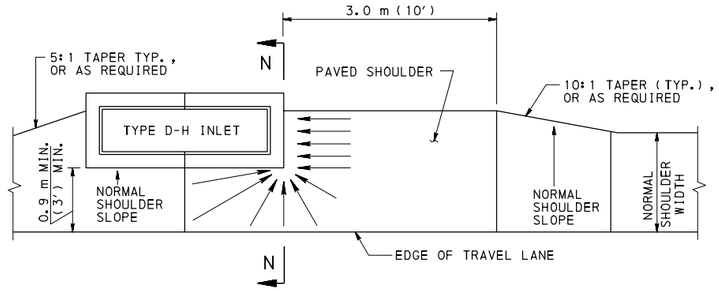
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



PLAN VIEW - TYPE D-H

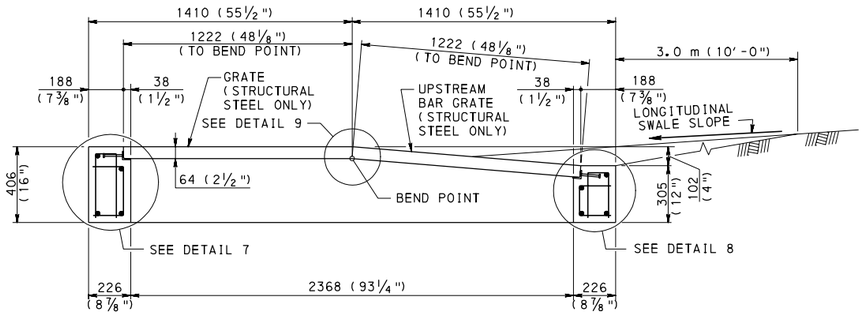


SECTION N-N

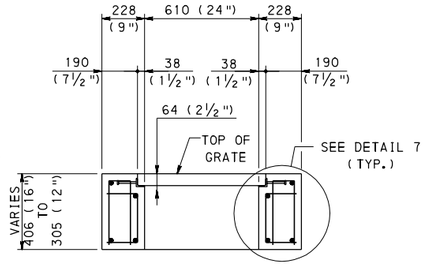


PLAN VIEW

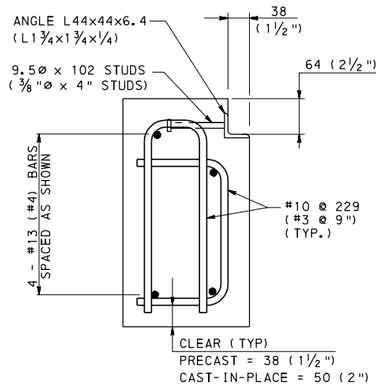
TYPICAL TYPE D-H INLET LOCATION



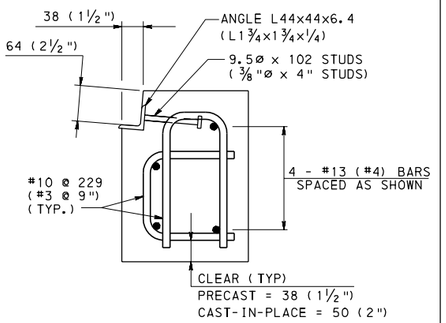
SECTION L-L



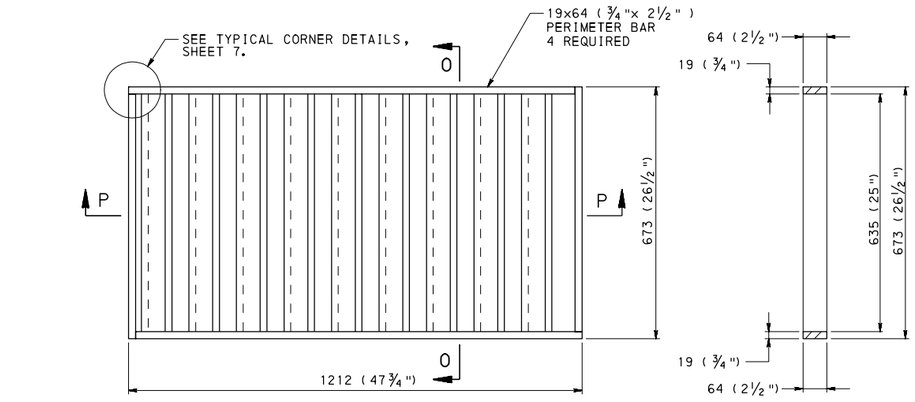
SECTION M-M



DETAIL 7

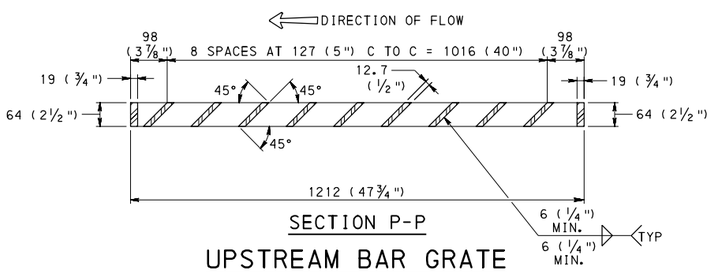


DETAIL 8



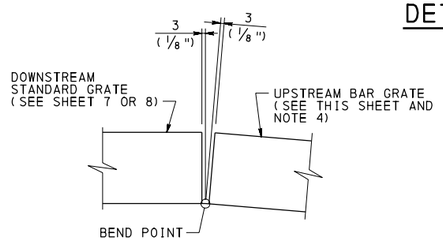
PLAN VIEW

SECTION O-O



SECTION P-P

UPSTREAM BAR GRATE



DETAIL 9

TYPE AND LOCATION OF GRATES

NOTES

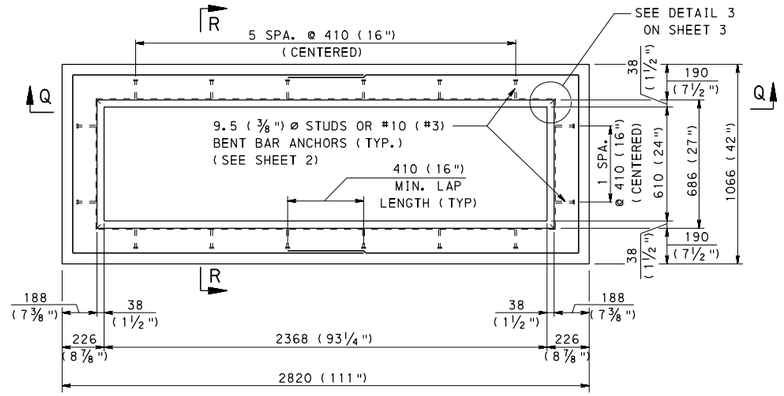
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR STRUCTURAL STEEL GRATE DETAILS AND NOTES, SEE SHEET 7.
3. FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 12.
4. UPSTREAM BAR GRATE IS NOT DESIGNED FOR PHL-93 OR HS-25 LOADING.
5. DO NOT PLACE TYPE D-H INLETS IN A LOCATION WHERE FREQUENT IMPACTS FROM TRAFFIC IS LIKELY.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

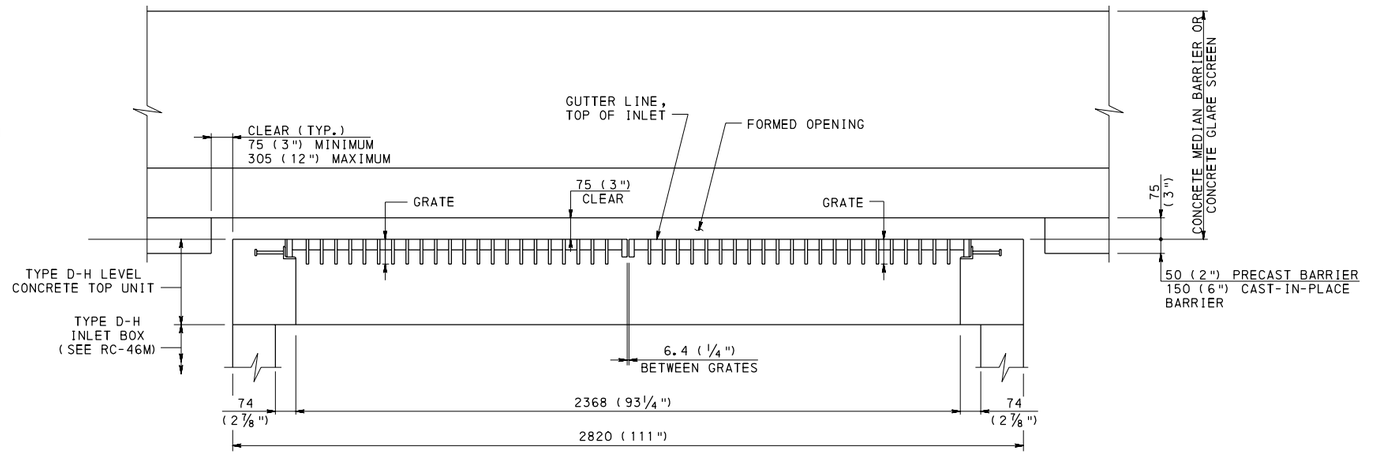
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES CONCRETE TOP UNITS TYPE D-H

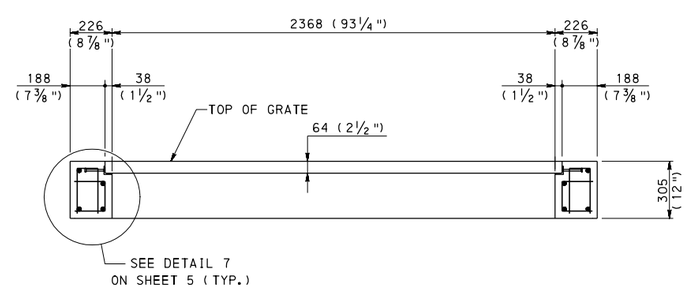
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 5 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



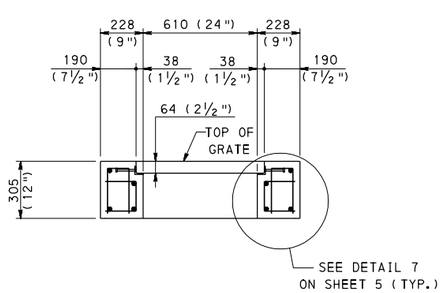
PLAN VIEW - TYPE D-H LEVEL



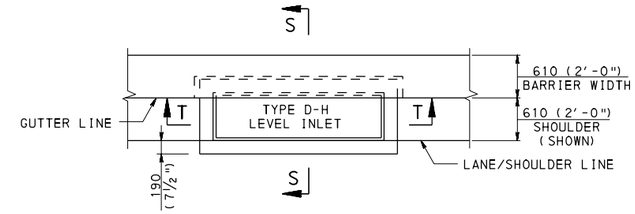
SECTION T-T



SECTION Q-Q



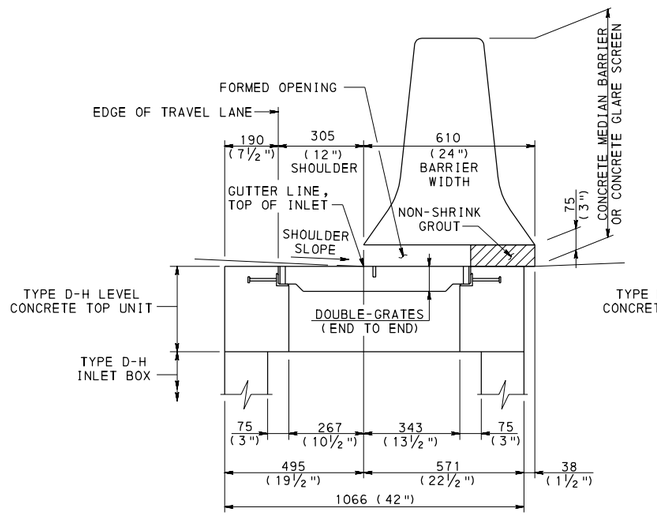
SECTION R-R



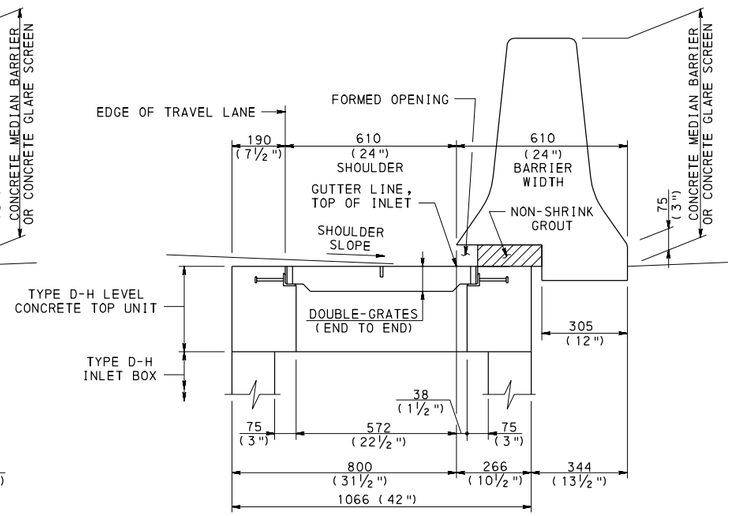
PLAN VIEW

TYPICAL TYPE D-H LEVEL INLET LOCATION AT CONCRETE MEDIAN BARRIER

(FOR INFORMATION ONLY, REFER TO CONTRACT DRAWINGS FOR ADDITIONAL DETAILS.



PLACED ALONG 305 (1'-0") WIDE SHOULDER



PLACED ALONG 610 (2'-0") WIDE SHOULDER

SECTION S-S

NOTES

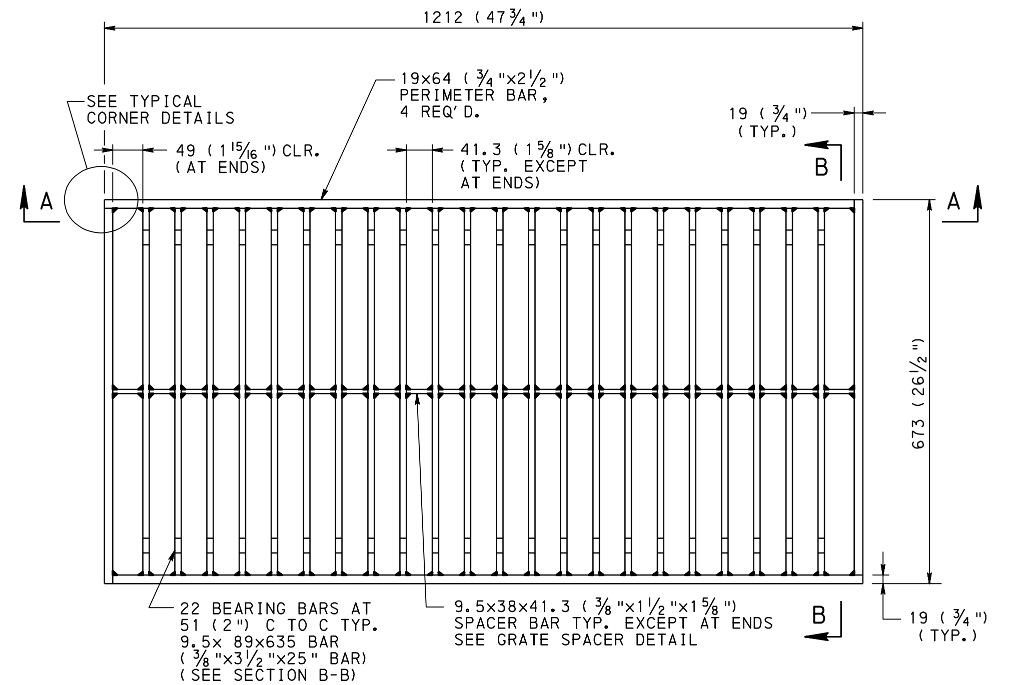
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR PRECAST CONCRETE GRADE ADJUSTMENT RING, SEE SHEET 12.
3. FOR CONCRETE BARRIER DETAILS, REFER TO RC-57M, RC-59M AND THE CONTRACT DRAWINGS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

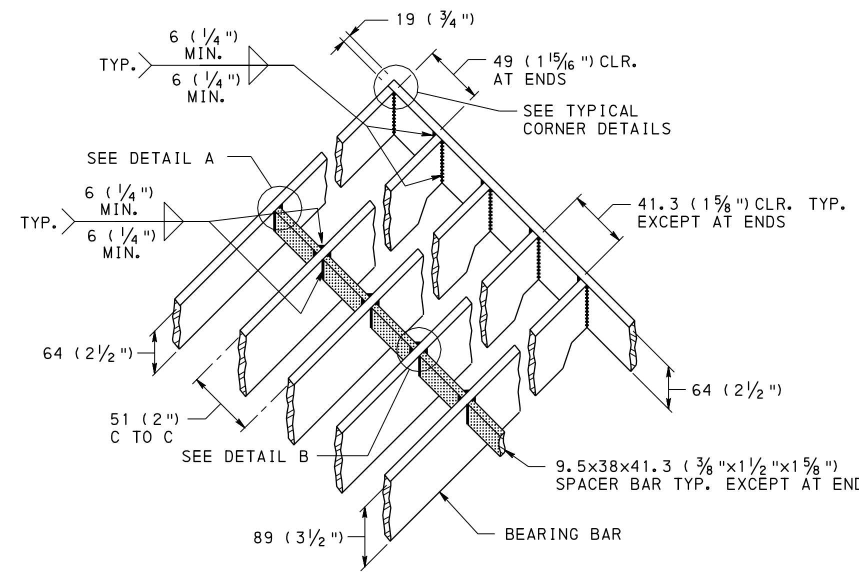
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES CONCRETE TOP UNITS TYPE D-H LEVEL

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 6 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



STRUCTURAL STEEL GRATE

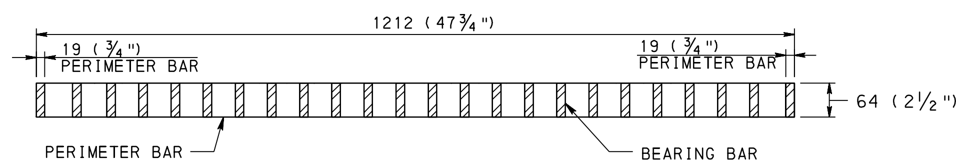


GRATE SPACER DETAIL

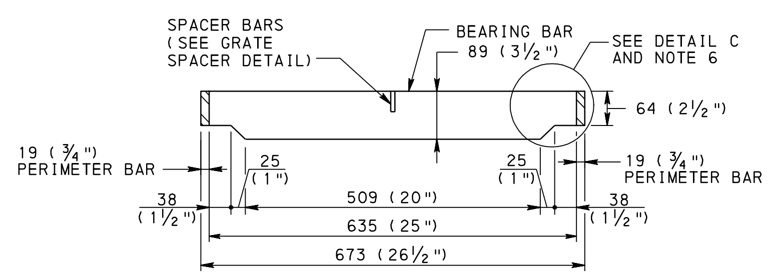
NOTE: PLACE SPACER BARS AT LONGITUDINAL ℄ OF GRATE.

STRUCTURAL STEEL GRATE NOTES:

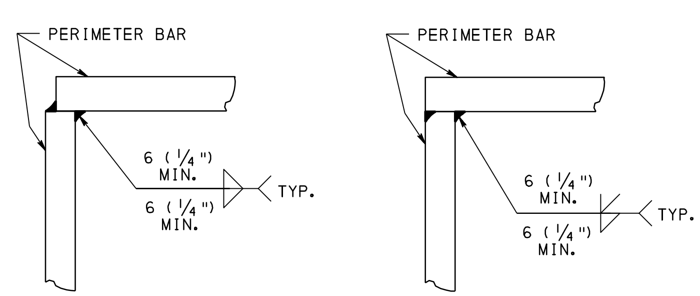
1. SHEETS 7 AND 8 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE STRUCTURAL STEEL GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.
4. PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270M (M270) GRADE 345 (50) [ASTM A709M (A709), GRADE 345 (50)].
5. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. WELDING SHOPS ARE NOT REQUIRED TO BE AISC CERTIFIED.
6. FABRICATE BEARING BARS FROM 89 (3½") DEEP BARS. FABRICATE BY BURNING, SHEARING OR PUNCHING. PROVIDE EITHER CHAMFERED OR 12.7 (½") RADIUS CORNERS (SEE DETAIL C).
7. LOCATE SPACER BARS FLUSH WITH THE TOP SURFACE OF THE GRATE.
8. PROVIDE BICYCLE SAFE GRATES WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS OR ROADWAYS SPECIFICALLY ESTABLISHED AND SIGNED AS BIKEWAYS OR HAVING BIKE LANES. ALTERNATE BICYCLE SAFE GRATE DESIGNS REQUIRE A SHOP DRAWING, AS SPECIFIED IN NOTE 1, AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT TOP UNITS.
9. FABRICATE SLOTS BY BURNING, DRILLING, SHEARING OR PUNCHING. HAVE THE BOTTOM OF ALL BURNED OR DRILLED SLOTS CONFORM TO THE SHAPE OF THE ROD.
10. COAT GRATES WITH AN APPROVED BITUMINOUS PAINT, IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO BITUMINOUS PAINT, GALVANIZE GRATES IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).



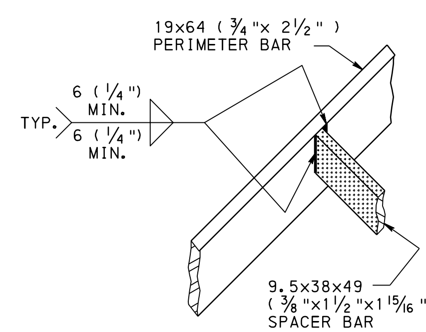
SECTION A-A



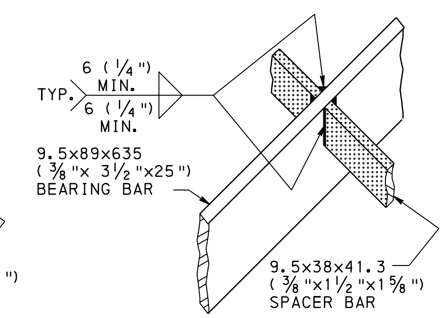
SECTION B-B



TYPICAL CORNER DETAILS



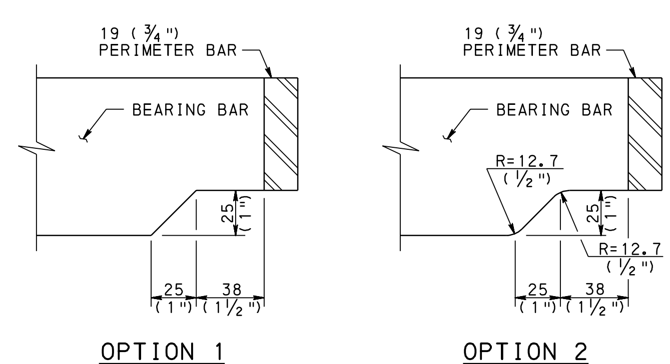
DETAIL A



DETAIL B

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.



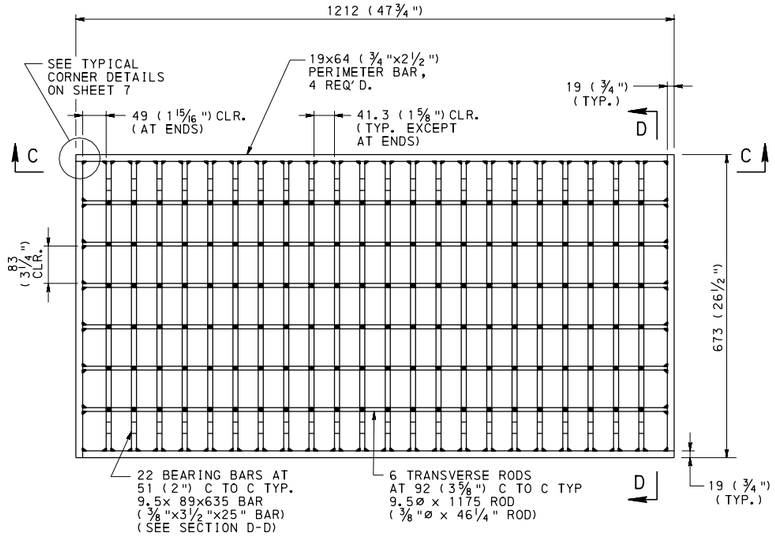
DETAIL C

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

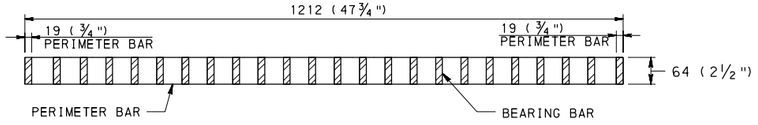
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES
STRUCTURAL STEEL GRATE

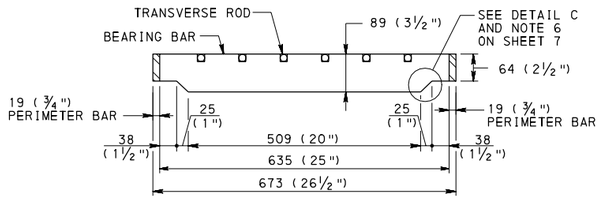
RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 7 OF 20 RC-45M



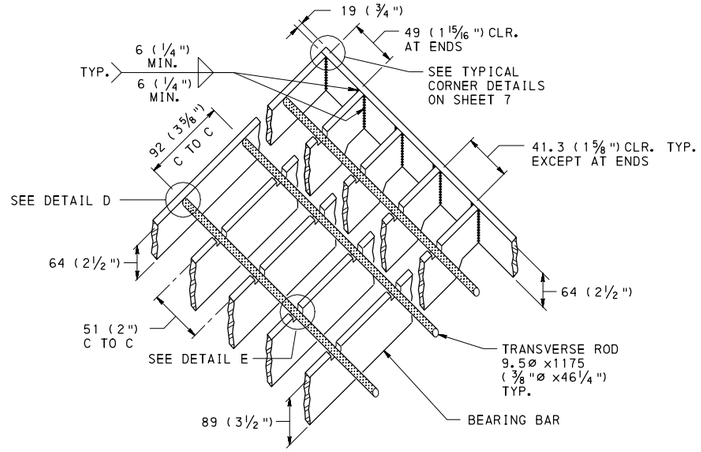
STRUCTURAL STEEL GRATE BICYCLE SAFE



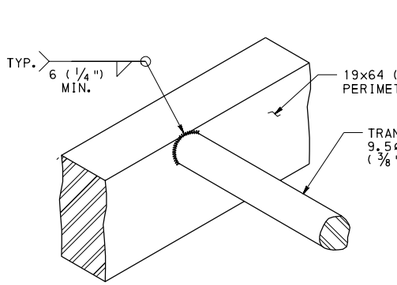
SECTION C-C



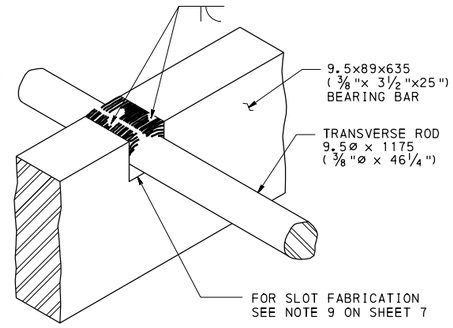
SECTION D-D



BAR AND ROD SPACER DETAIL



DETAIL D



DETAIL E

NOTES

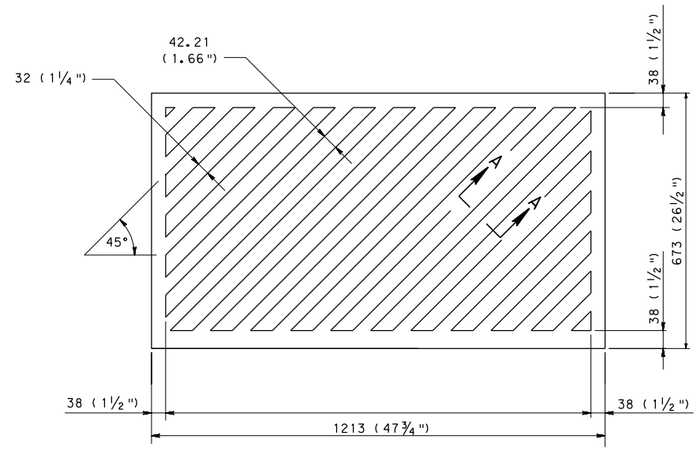
1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR STRUCTURAL STEEL GRATE NOTES, SEE SHEET 7.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

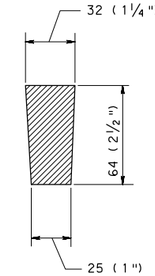
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES STRUCTURAL STEEL GRATE BICYCLE SAFE

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 8 OF 20
R. Wyatt Dilly CHIEF, HWY. QA DIVISION	Bruce E. Hyson DIRECTOR, BUREAU OF DESIGN	RC-45M



PLAN

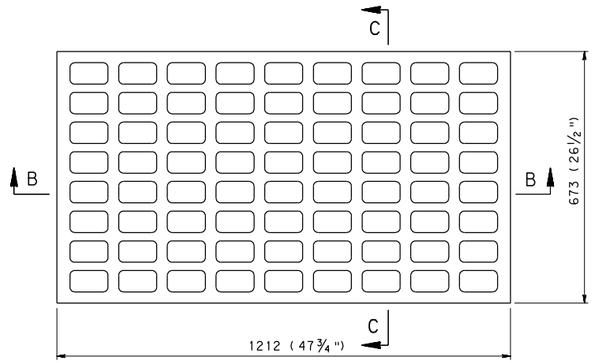


SECTION A-A

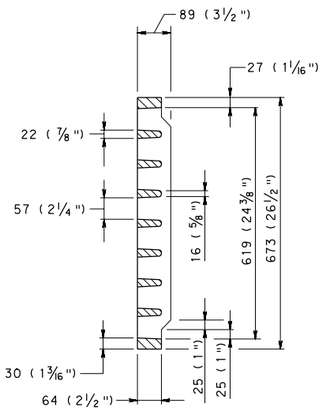
CAST IRON GRATE NOTES:

1. SHEETS 9 AND 10 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE CAST IRON GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408 AND THE CONTRACT SPECIAL PROVISIONS.
4. PROVIDE GRAY CAST IRON CONFORMING TO AASHTO M105 (ASTM A48/A48M), CLASS 225B (35B) AND AASHTO M306.
5. PROVIDE BICYCLE SAFE GRATES WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS OR ROADWAYS SPECIFICALLY ESTABLISHED AND SIGNED AS BIKEWAYS OR HAVING BIKE LANES. ALTERNATE BICYCLE SAFE GRATE DESIGNS REQUIRE A SHOP DRAWING, AS SPECIFIED IN NOTE 1, AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT TOP UNITS.
6. PROVIDE ADA COMPLIANT GRATES WHERE PEDESTRIAN TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS ADJACENT TO SIDEWALKS. ALTERNATE ADA COMPLIANT GRADE DESIGNS REQUIRE A SHOP DRAWING, AS SPECIFIED IN NOTE 1 AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT TOP UNITS.
7. CAST IRON GRATES ARE PERMITTED TO BE USED AS AN ALTERNATE TO THE STRUCTURAL STEEL GRATES PROVIDED THEY ARE SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 AND ARE APPROVED FOR PHL-93 OR HS-25 LOADING. CAST IRON GRATES NOT APPROVED FOR PHL-93 OR HS-25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANES: AT THE EDGE OF OUTSIDE SHOULDERS, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.
8. REFER TO SHEET 10 FOR TWO PIECE CAST IRON GRATES.

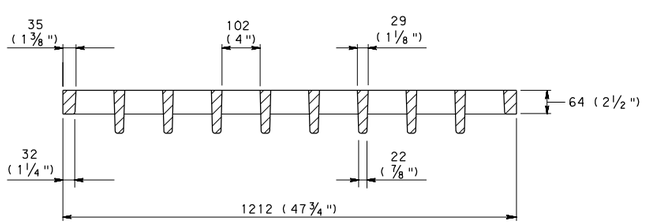
ONE PIECE CAST IRON GRATE



PLAN VIEW



SECTION C-C



SECTION B-B

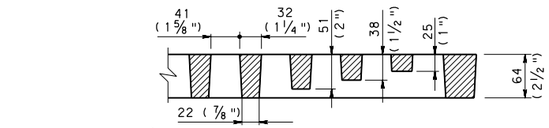
ONE PIECE CAST IRON GRATE - BICYCLE SAFE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

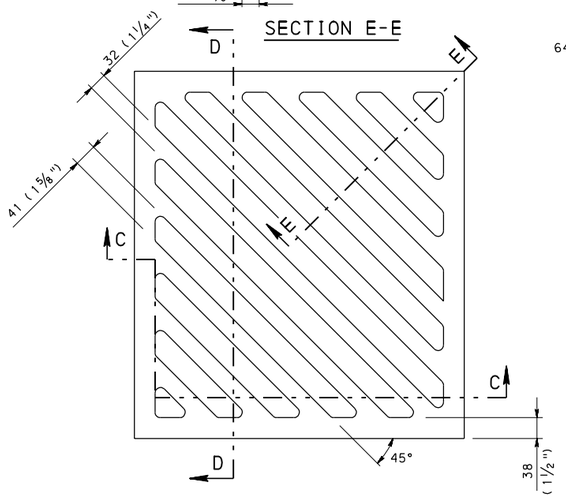
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES
CAST IRON GRATES - 1

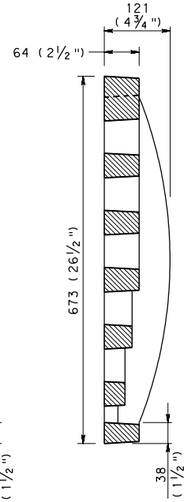
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 9 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



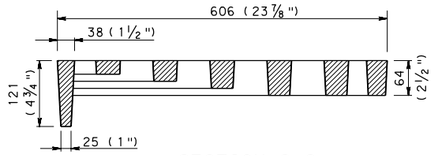
SECTION E-E



PLAN

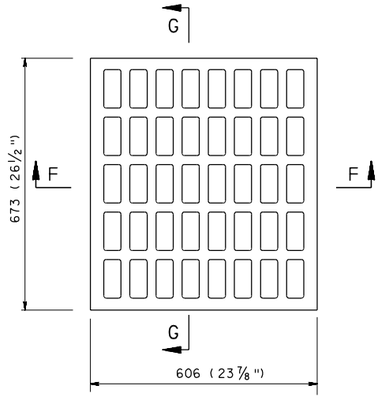


SECTION D-D

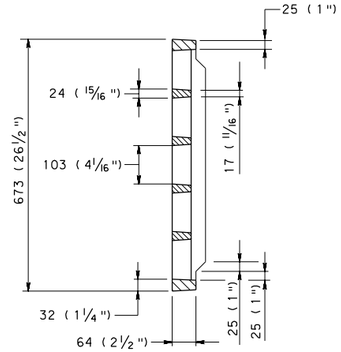


SECTION C-C

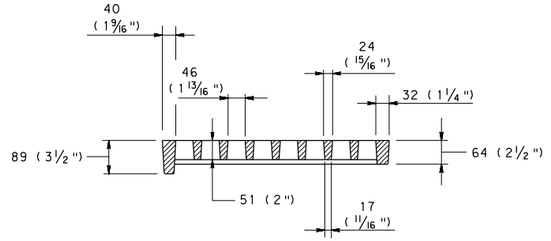
GRATE



PLAN

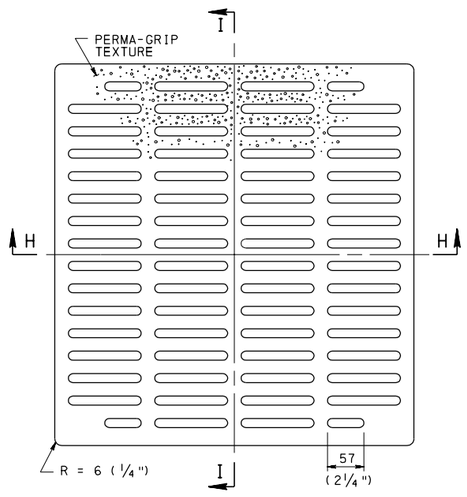


SECTION G-G

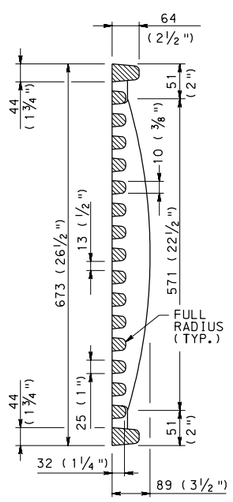


SECTION F-F

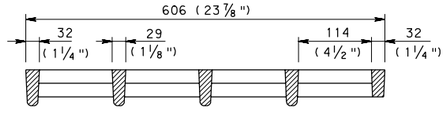
BICYCLE SAFE GRATE



PLAN



SECTION I-I



SECTION H-H

ADA COMPLIANT GRATE

TWO PIECE CAST IRON GRATES

NOTES

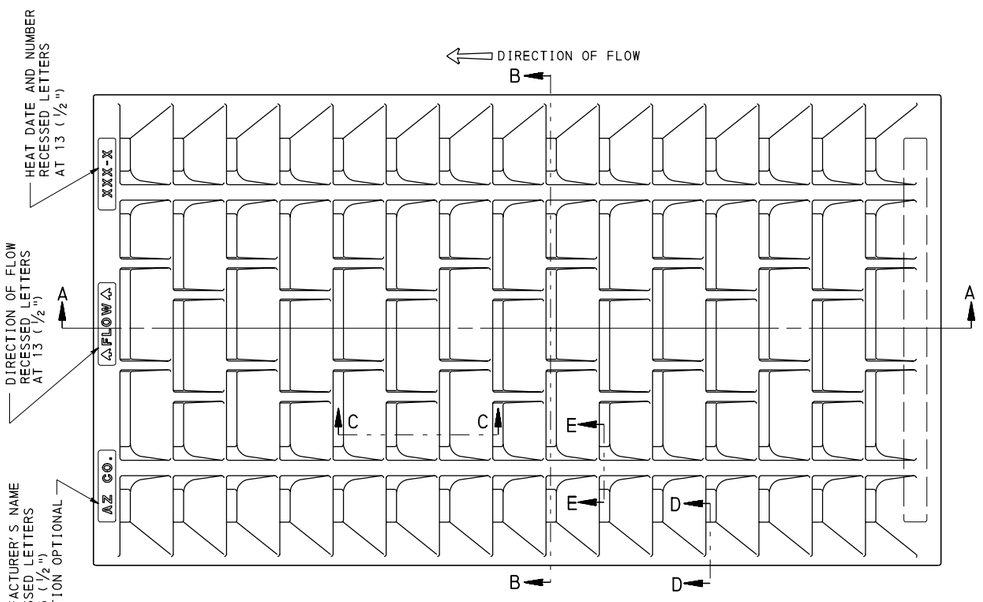
1. FOR CAST IRON GRATE NOTES, SEE SHEET 9.
2. FOR ONE PIECE CAST IRON GRATE DETAILS, SEE SHEET 9.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

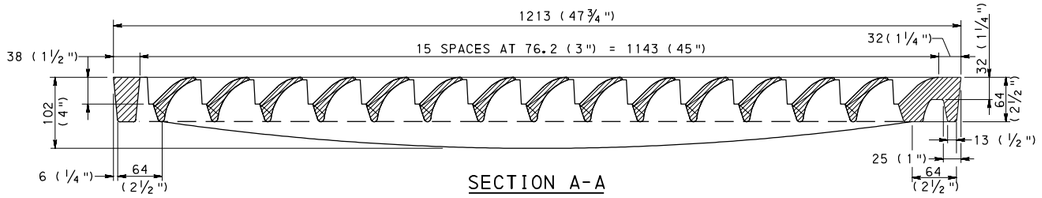
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES
CAST IRON GRATES - 2

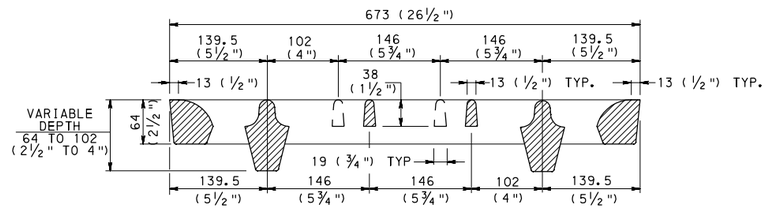
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 10 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



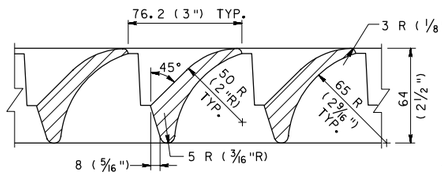
PLAN VIEW



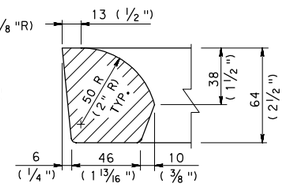
SECTION A-A



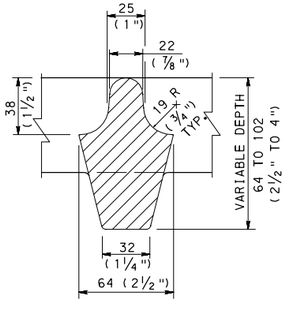
SECTION B-B



SECTION C-C

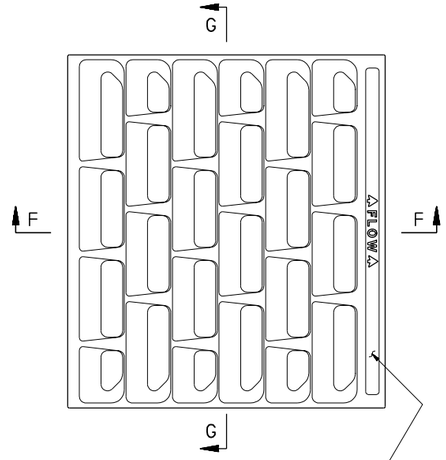


SECTION D-D

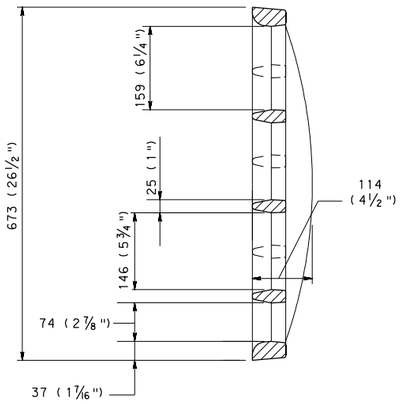


SECTION E-E

ONE PIECE CAST IRON VANE GRATE

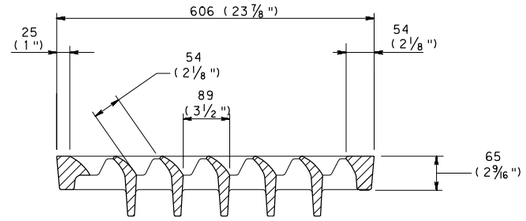


PLAN



SECTION G-G

REFER TO ONE PIECE VANE GRATE FOR ADDITIONAL INFORMATION.



SECTION F-F

TWO PIECE CAST IRON VANE GRATE

CAST IRON VANE GRATE NOTES:

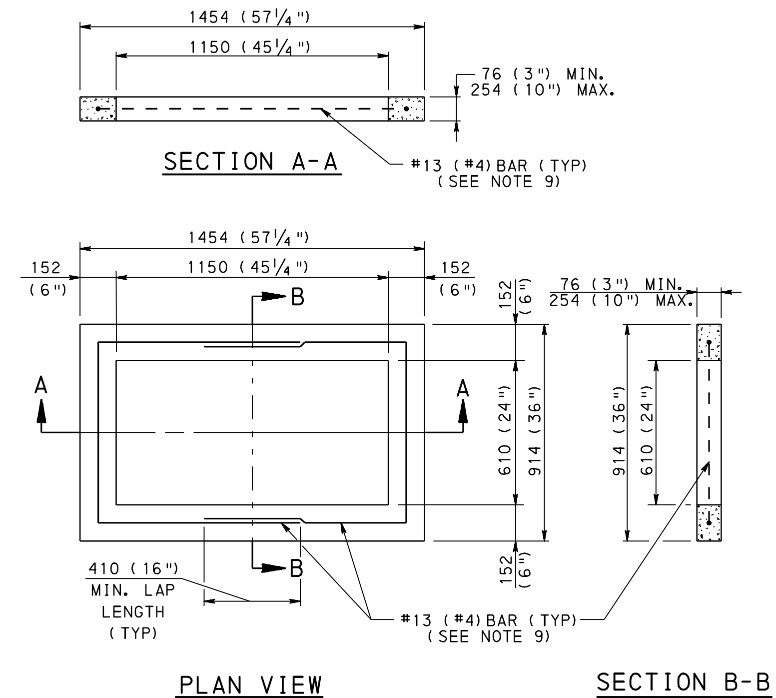
1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE CAST IRON VANE GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408 AND THE CONTRACT SPECIAL PROVISIONS.
4. PROVIDE EITHER GRAY IRON CASTINGS CONFORMING TO AASHTO M105 (ASTM A48/A48M), CLASS 225B (35B) AND AASHTO M306, MALLEABLE IRON CASTINGS CONFORMING TO ASTM A47/A47M, GRADE 22010 (32510), OR DUCTILE IRON CASTINGS CONFORMING TO ASTM A536, GRADE 60-40-18.
5. INSTALL VANE GRATES WITH CURVED VANES FACING THE DIRECTION OF FLOW.
6. PROVIDE RADIUS OF 3 mm (1/8") TYPICAL FOR ALL FILLETS AND ROUNDS, UNLESS NOTED.
7. CAST IRON VANE GRATES ARE PERMITTED TO BE USED AS AN ALTERNATE TO THE STRUCTURAL STEEL GRATES PROVIDED THEY ARE SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 AND ARE APPROVED FOR PHL-93 OR HS-25 LOADING. CAST IRON VANE GRATES NOT APPROVED FOR PHL-93 OR HS-25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANES; AT THE EDGE OF OUTSIDE SHOULDERS, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

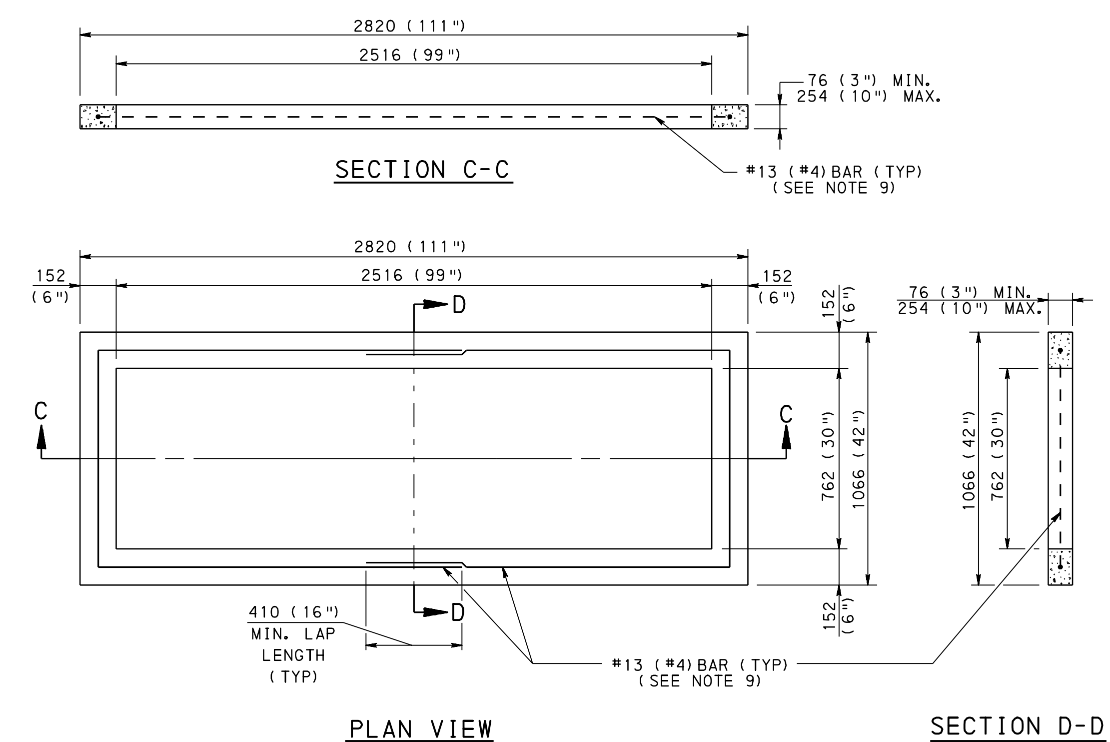
INLET TOPS, GRATES, AND FRAMES
CAST IRON VANE GRATE

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 11 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



PRECAST CONCRETE GRADE ADJUSTMENT RING

(FOR TYPE C, C ALTERNATE, M, AND S CONCRETE TOP UNITS)



PRECAST CONCRETE GRADE ADJUSTMENT RING

(FOR TYPE D-H AND TYPE D-H LEVEL CONCRETE TOP UNITS)

GRADE ADJUSTMENT RING GENERAL NOTES:

1. SHEETS 12 AND 13 DEPICT THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE GRADE ADJUSTMENT RINGS/RISERS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE D1.5 AND/OR D1.1 OR D1.3, AS APPROPRIATE AND THE CONTRACT SPECIAL PROVISIONS.
4. BRICK OR BRICK AND MORTAR ARE NOT ALLOWED FOR GRADE ADJUSTMENTS FOR NEW OR REHABILITATION PROJECTS.
5. ALTERNATE ADJUSTMENT RINGS:
   - HDPE OR RUBBER GRADE ADJUSTMENT RINGS ARE PERMITTED FOR GRADE ADJUSTMENTS IF REQUESTED BY THE CONTRACTOR AND ACCEPTED BY PENNDOT PRIOR TO INSTALLATION. PROVIDE HDPE OR RUBBER GRADE ADJUSTMENT RINGS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

PRECAST CONCRETE GRADE ADJUSTMENT RING NOTES:

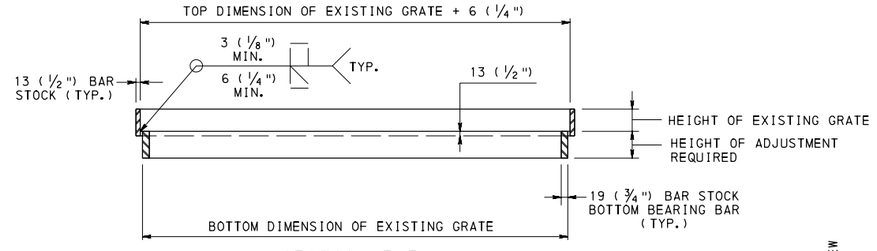
1. PRECAST CONCRETE GRADE ADJUSTMENT RINGS ARE PERMITTED FOR TYPE C, C ALTERNATE, M, S AND D-H CONCRETE INLET TOPS. DO NOT USE PRECAST CONCRETE ADJUSTMENT RINGS TO RAISE TYPE C FRAMES.
2. ONLY ONE GRADE ADJUSTMENT RING IS PERMITTED FOR NEW CONSTRUCTION PROJECTS. GRADE ADJUSTMENT RINGS ARE INCIDENTAL TO THE COST OF THE TOP UNITS OR FRAMES.
3. PROVIDE ADJUSTMENT RING WHICH IS FLUSH WITH THE INLET TOP AND DOES NOT ALLOW EXCESSIVE MOVEMENT.
4. GRADE ADJUSTMENT RINGS ARE PERMITTED TO BE FABRICATED IN DIFFERENT SHAPES TO FORM A RECTANGLE TO MATCH THE REQUIRED DIMENSIONS. SECTIONS ARE NOT PERMITTED TO BE LESS THAN 457 mm (1'-6") IN LENGTH.
   - PROVIDE 38 mm (1½") CONCRETE COVER FOR REINFORCEMENT AT EACH END.
   - MAXIMUM GAP BETWEEN PIECES = 13 mm (½")
5. FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.
6. PROVIDE CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH = f'c = 28 MPa (4,000 PSI)] IN THE PRECAST CONCRETE ADJUSTMENT RINGS.
7. A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGNS TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.
8. PROVIDE GRADE 420 (GRADE 60) DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615M (A615) OR ASTM A706M (A706).
9. REINFORCEMENT REQUIREMENTS:
   - DEPTHS LESS THAN OR EQUAL TO 152 (6"): PROVIDE ONE #13 (#4) BAR PLACED AT CENTER OF THICKNESS.
   - DEPTHS GREATER THAN 152 (6") AND LESS THAN OR EQUAL TO 254 (10"): PROVIDE ONE #13 (#4) BAR PLACED 38 (1½") CLEAR FROM THE TOP AND BOTTOM SURFACES FOR A TOTAL OF TWO BARS.
10. SET PRECAST CONCRETE GRADE ADJUSTMENT RINGS ON A NON-SHRINK GROUT PAD TO PROVIDE FULL BEARING ON THE SUPPORTING SURFACE.
    - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).
    - MAXIMUM GROUT DEPTH = 13 mm (½")
11. TAPERED PRECAST CONCRETE ADJUSTMENT RINGS ARE PERMITTED AS LONG AS THE MINIMUM AND MAXIMUM DIMENSIONS REQUIRED ARE BETWEEN 76 mm (3") AND 254 mm (10").

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

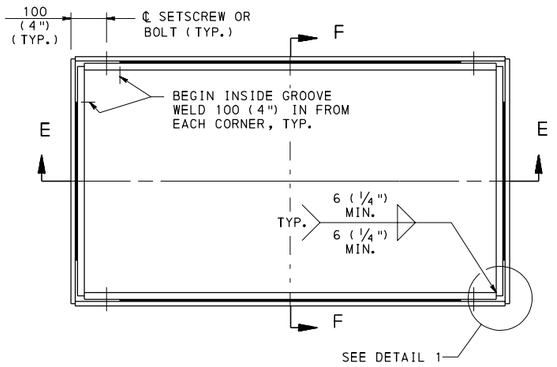
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES
GRADE ADJUSTMENT RINGS - 1

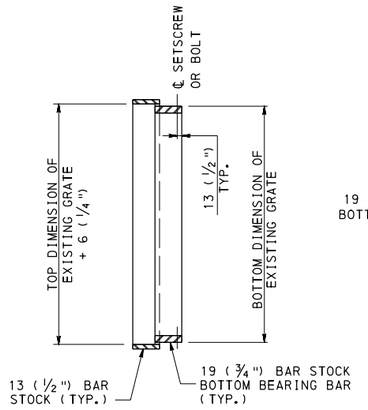
RECOMMENDED JUN. 1, 2010 — CHIEF, HWY. QA DIVISION
RECOMMENDED JUN. 1, 2010 — DIRECTOR, BUREAU OF DESIGN
SHT 12 OF 20
RC-45M



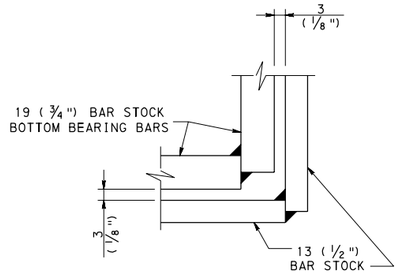
SECTION E-E



PLAN VIEW



SECTION F-F

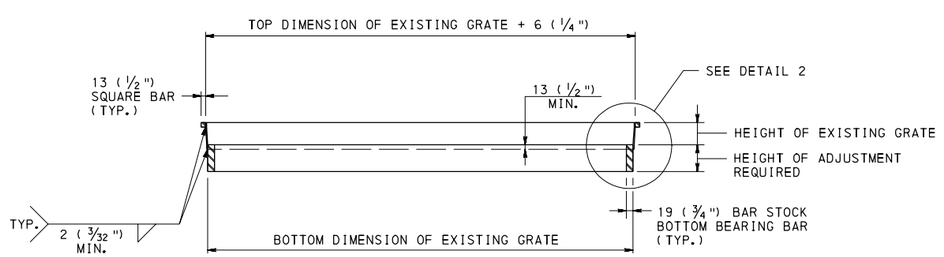


DETAIL 1

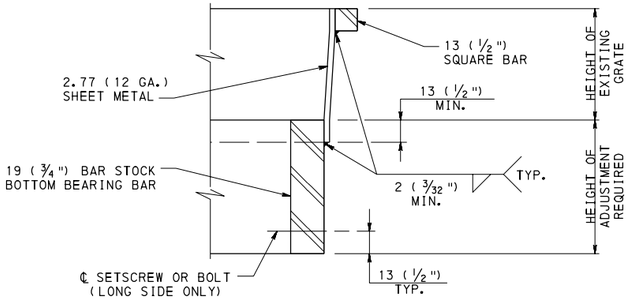
STRUCTURAL STEEL GRADE ADJUSTMENT RISER NOTES:

1. STRUCTURAL STEEL ADJUSTMENT RISERS ARE PERMITTED FOR TYPE C AND M FRAMES AND TYPE C, C ALTERNATE, M, AND S CONCRETE INLET TOPS.
2. ADJUSTMENT RISER TYPES:
   - TYPE 1:
     - MINIMUM HEIGHT ADJUSTMENT = EXISTING GRATE THICKNESS + 13 (1/2")
     - MAXIMUM HEIGHT ADJUSTMENT = 150 (6")
   - TYPE 2:
     - MINIMUM HEIGHT ADJUSTMENT = 25 (1")
     - MAXIMUM HEIGHT ADJUSTMENT = EXISTING GRATE THICKNESS + 13 (1/2")
3. PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270M (M270) GRADE 250 (36) [ASTM A709M (A709), GRADE 250 (36)].
4. WELD STRUCTURAL STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. WELDING SHOPS ARE NOT REQUIRED TO BE AISC CERTIFIED. ALL WELDS ARE CONTINUOUS UNLESS NOTED OTHERWISE.
5. PROVIDE ADJUSTMENT RISERS WHICH CONFORM TO THE SHAPE OF THE ORIGINAL FRAME AND DOES NOT ALLOW FOR EXCESSIVE MOVEMENT.
6. CUSTOM FABRICATE EACH ADJUSTMENT RISER TO FIT THE EXISTING DIMENSIONS OF EACH INLET. CAREFULLY MEASURE LENGTH, WIDTH, AND HEIGHT OF EACH EXISTING INLET FRAME AND GRATE AND PROVIDE THIS INFORMATION TO THE FABRICATOR. CLEARLY MARK EACH ADJUSTMENT RISER FOR PLACEMENT LOCATION. UPON DELIVERY OF ADJUSTMENT RISERS, VERIFY ALL DIMENSIONS AND LOCATIONS BEFORE INSTALLATION BEGINS.
7. FABRICATION TOLERANCES:
   - BOTTOM OUTSIDE DIMENSION: +/- 3 (1/8")
   - TOP INSIDE DIMENSION: +/- 3 (1/8")
8. CHECK FOR FULL BEARING OF LOWER ADJUSTMENT RISER SECTION ON EXISTING FRAMES DURING INSTALLATION.
9. ATTACH THE STEEL ADJUSTMENT RISERS SECURELY TO THE EXISTING FRAME USING SET SCREWS OR BOLTS. PROVIDE TWO SET SCREWS OR BOLTS PER LONG SIDE. PLACE SET SCREWS OR BOLTS 100 mm (4") FROM CORNER. NO SCREWS OR BOLTS ARE REQUIRED ON THE SHORT SIDE. OMIT SET SCREWS OR BOLTS ALONG GUTTER LINE FOR TYPE C CONCRETE INLET TOP.
10. COAT ADJUSTMENT RISERS WITH AN APPROVED BITUMINOUS PAINT, IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO BITUMINOUS PAINT, GALVANIZE ADJUSTMENT RISERS IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
11. FOR ADDITIONAL NOTES, REFER TO THE GRADE ADJUSTMENT RING GENERAL NOTES ON SHEET 12 AND GENERAL NOTES ON SHEET 1.

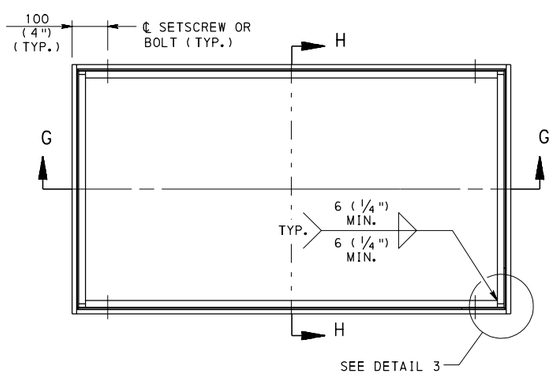
STRUCTURAL STEEL GRADE ADJUSTMENT RISERS - TYPE 1



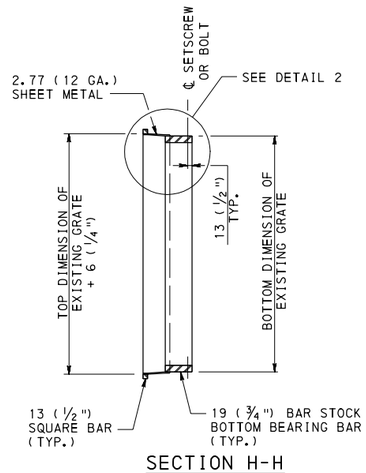
SECTION G-G



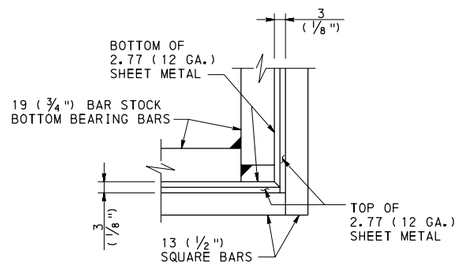
DETAIL 2



PLAN VIEW



SECTION H-H



DETAIL 3

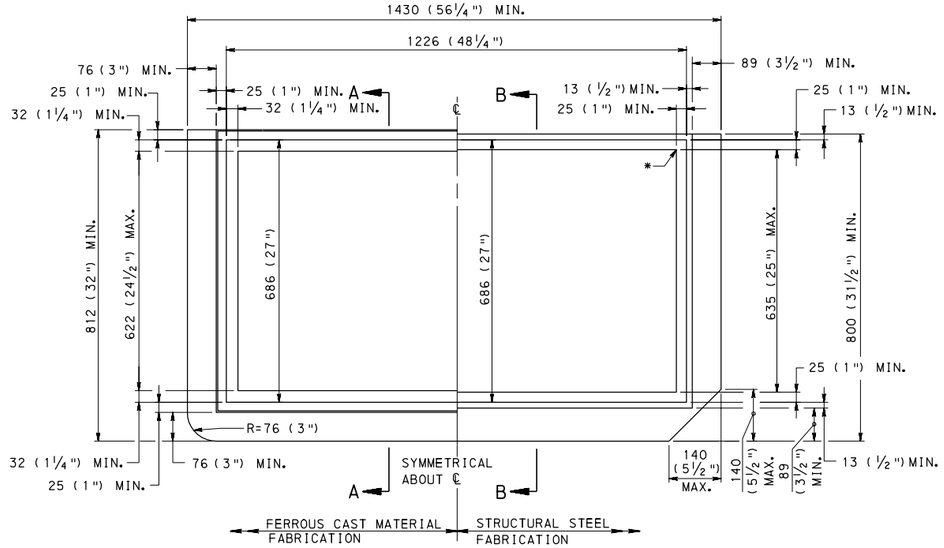
STRUCTURAL STEEL GRADE ADJUSTMENT RISERS - TYPE 2

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES GRADE ADJUSTMENT RINGS - 2

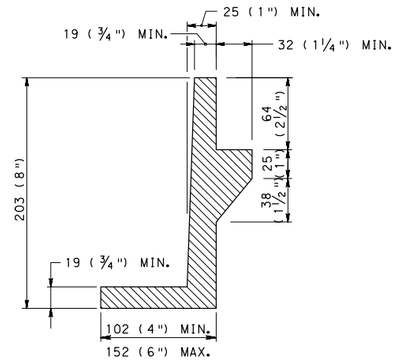
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 13 OF 20
R. Wyatt Dilley	Bruce E. Hyson	
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



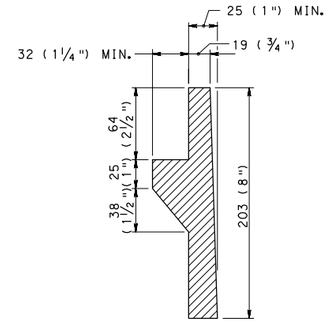
TYPE C FRAME

(USED WITH TYPE C ALTERNATE CONCRETE TOP UNIT)

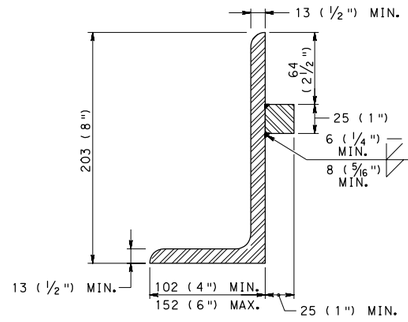
*CORNER CONFIGURATION DETAILS ARE THE FABRICATOR'S RESPONSIBILITY AND ARE APPROVED BY THE INSPECTOR.



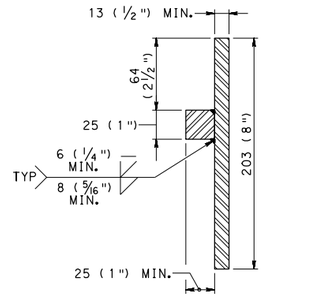
DETAIL 1



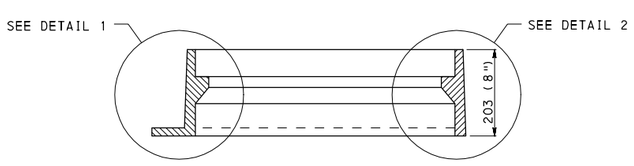
DETAIL 2



DETAIL 3

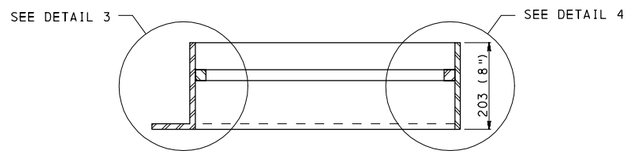


DETAIL 4



SECTION A-A

(FERROUS CAST MATERIAL)



SECTION B-B

(STRUCTURAL STEEL)

NOTES

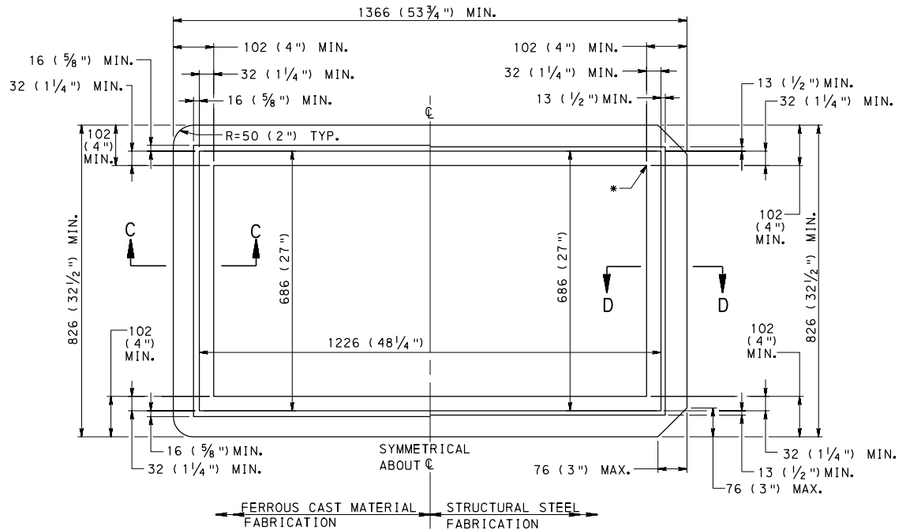
1. FOR INLET FRAME NOTES, SEE SHEET 15.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

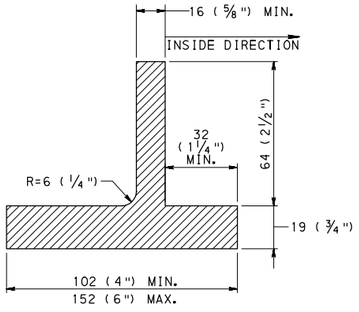
INLET TOPS, GRATES, AND FRAMES
TYPE C FRAME

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 14 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M

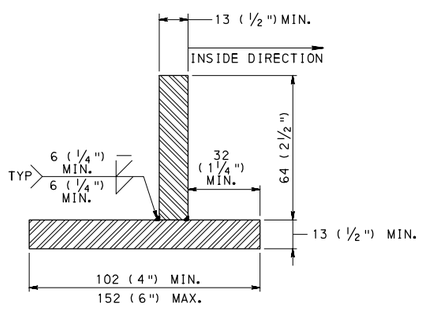


TYPE M FRAME

*CORNER CONFIGURATION DETAILS ARE THE FABRICATOR'S RESPONSIBILITY AND ARE APPROVED BY THE INSPECTOR.



SECTION C-C
(FERROUS CAST MATERIAL)



SECTION D-D
(STRUCTURAL STEEL)

INLET FRAME NOTES:

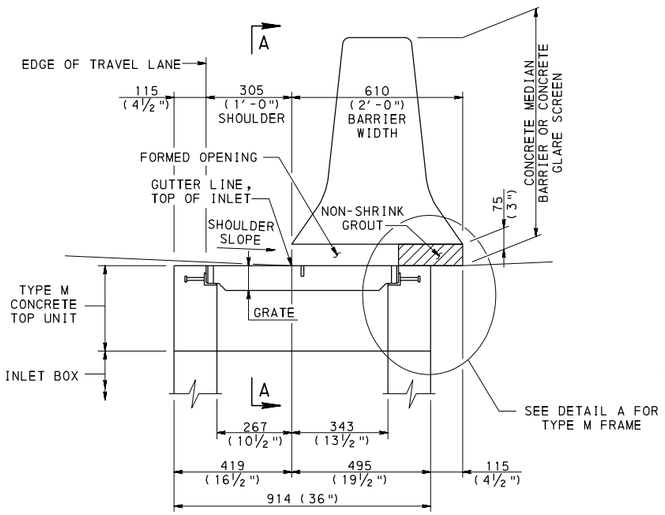
1. SHEETS 14 AND 15 DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.
2. PROVIDE EITHER STRUCTURAL STEEL FRAMES OR CAST IRON FRAMES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE PUBLICATION 408, AASHTO/AWS BRIDGE WELDING CODE AND THE CONTRACT SPECIAL PROVISIONS.
4. PROVIDE TYPE C FRAME WITH A TYPE C ALTERNATE CONCRETE TOP UNIT.
5. PROVIDE TYPE M FRAME IN PLACE OF THE TYPE M CONCRETE TOP UNIT.
6. STRUCTURAL STEEL FRAMES:
   - TYPE C FRAMES: PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270M (M270) GRADE 345 (50) [ASTM A709M (A709), GRADE 345 (50)].
   - TYPE M FRAMES: PROVIDE STRUCTURAL STEEL CONFORMING TO AASHTO M270M (M270) GRADE 250 (36) [ASTM A709M (A709), GRADE 250 (36)].
   - WELD STRUCTURAL STEEL FRAMES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. WELDING SHOPS ARE NOT REQUIRED TO BE AISC CERTIFIED.
   - COAT FRAMES WITH AN APPROVED BITUMINOUS PAINT, IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(f). AS AN ALTERNATE TO BITUMINOUS PAINT, GALVANIZE FRAMES IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
7. CAST IRON FRAMES:
   - PROVIDE EITHER GRAY IRON CASTINGS CONFORMING TO AASHTO M105 (ASTM A48/A48M), CLASS 225B (35B) AND AASHTO M306, MALLEABLE IRON CASTINGS CONFORMING TO ASTM A47/A47M, GRADE 22010 (32510), OR DUCTILE IRON CASTINGS CONFORMING TO ASTM A536, GRADE 60-40-18.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

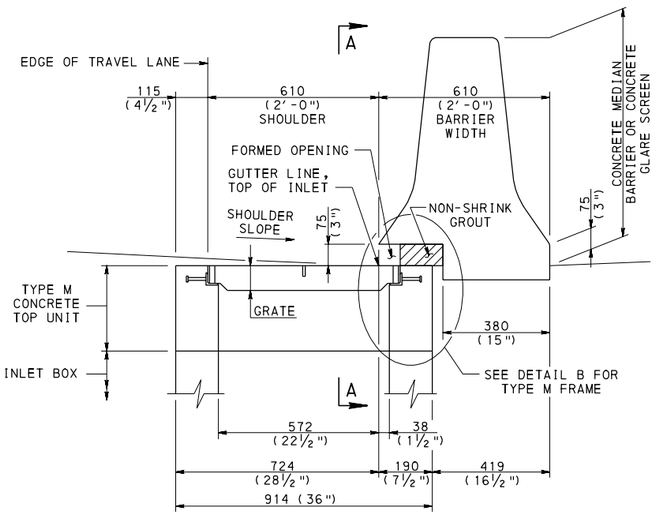
INLET TOPS, GRATES, AND FRAMES
TYPE M FRAME

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 15 OF 20
R. Wyatt Dilly CHIEF, HWY. QA DIVISION	Bruce E. Hyson DIRECTOR, BUREAU OF DESIGN	RC-45M



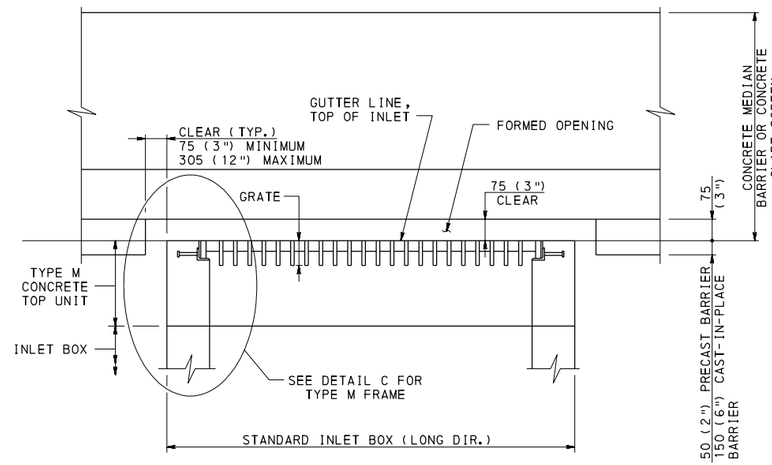
TYPE M CONCRETE TOP UNIT PLACED ALONG 305 (1'-0") WIDE SHOULDER

(STANDARD INLET BOX SHOWN / TOP SLAB REQUIRED FOR OTHER INLET TYPES)

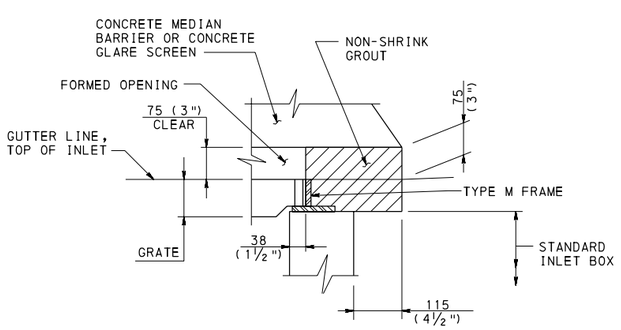


TYPE M CONCRETE TOP UNIT PLACED ALONG 610 (2'-0") WIDE SHOULDER

(STANDARD INLET BOX SHOWN / TOP SLAB REQUIRED FOR OTHER INLET TYPES)

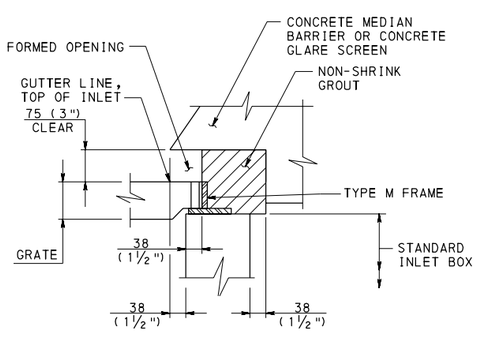


SECTION A-A



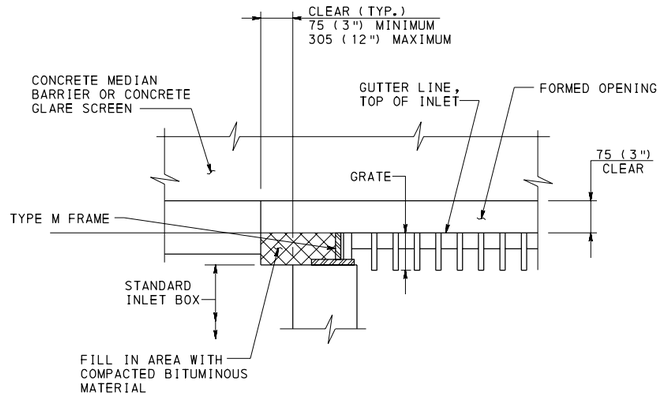
DETAIL A

TYPE M FRAME



DETAIL B

TYPE M FRAME



DETAIL C

TYPE M FRAME

INLET PLACEMENT NOTES:

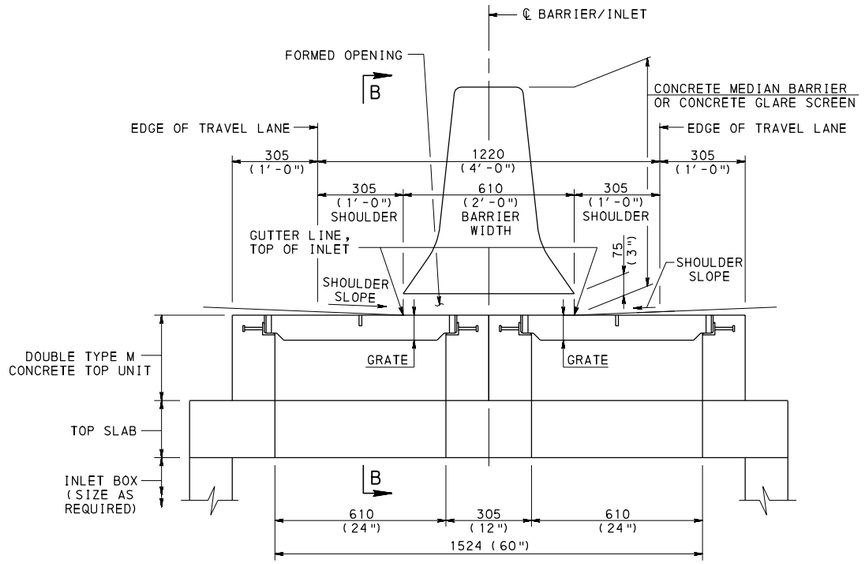
1. DETAILS SHOWN ON SHEETS 16 AND 17 ARE FOR INFORMATION ONLY. FOR ACTUAL PLACEMENT AND BARRIER DETAILS REFER TO THE CONTRACT DRAWINGS.
2. DESIGNER TO DETAIL BARRIER AND INLET PLACEMENT ON THE CONTRACT DRAWINGS.
3. FOR CONCRETE BARRIER DETAILS REFER TO RC-57M, RC-59M, AND THE CONTRACT DRAWINGS.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

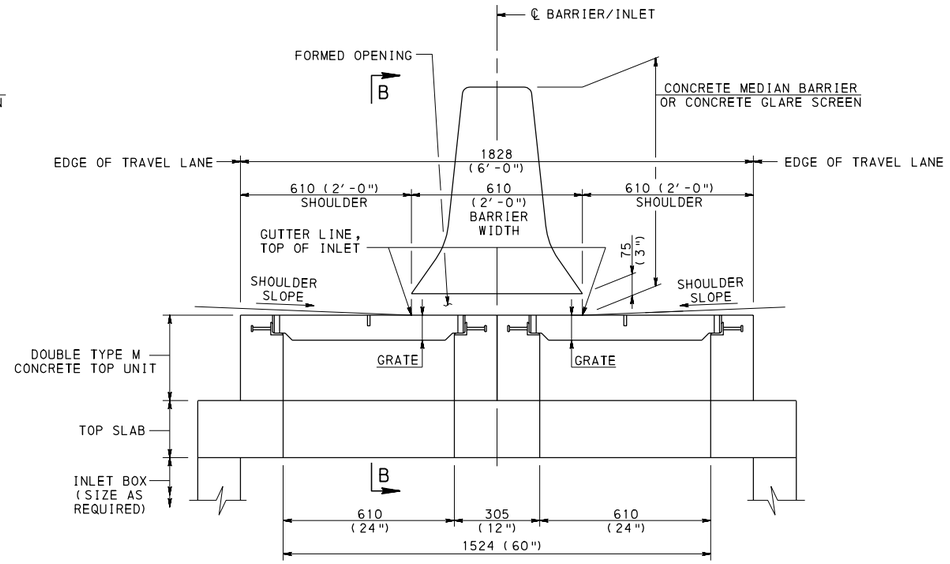
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES TYPE M PLACEMENT AT MEDIAN - 1

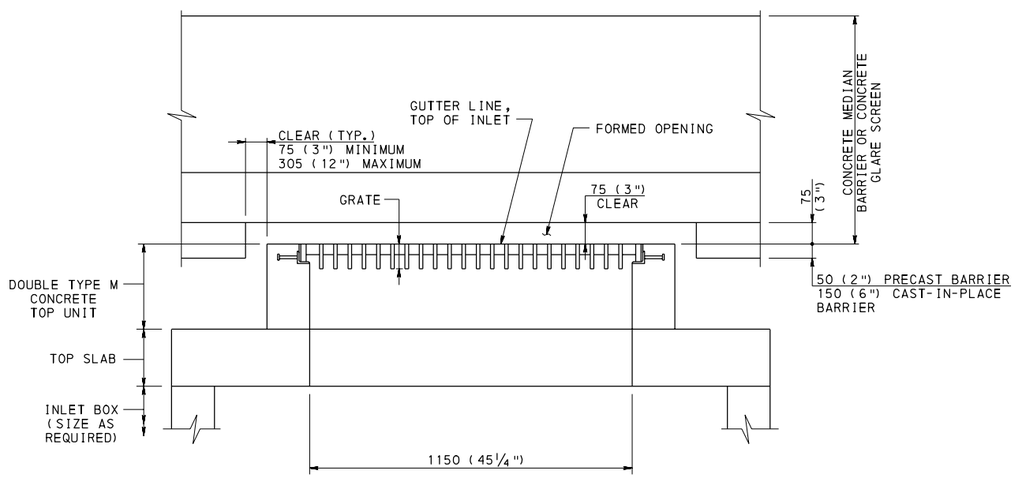
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 16 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



INLET BOX WITH TOP SLAB AND DOUBLE TYPE M CONCRETE TOP UNIT PLACED ALONG 305 (1'-0") WIDE SHOULDERS



INLET BOX WITH TOP SLAB AND DOUBLE TYPE M CONCRETE TOP UNIT PLACED ALONG 610 (2'-0") WIDE SHOULDERS



SECTION B-B

NOTES

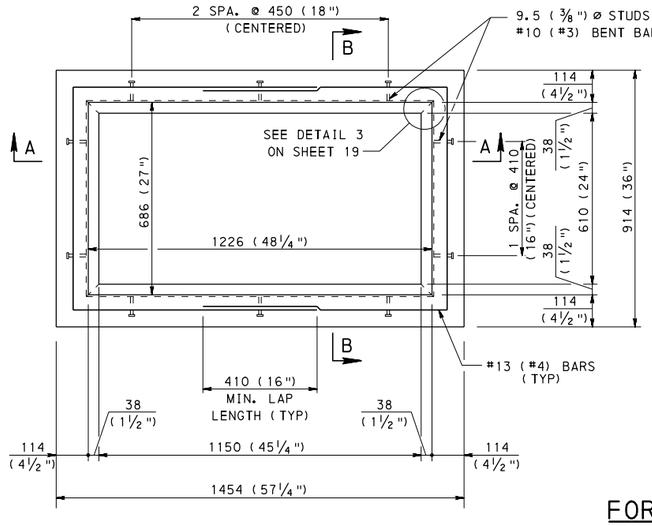
1. FOR INLET PLACEMENT NOTES, SEE SHEET 16.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

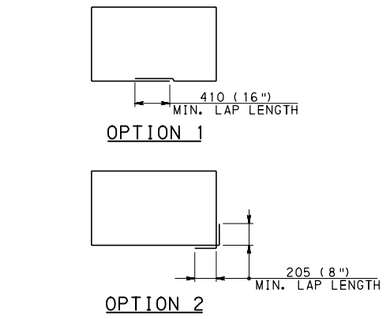
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES TYPE M PLACEMENT AT MEDIAN - 2

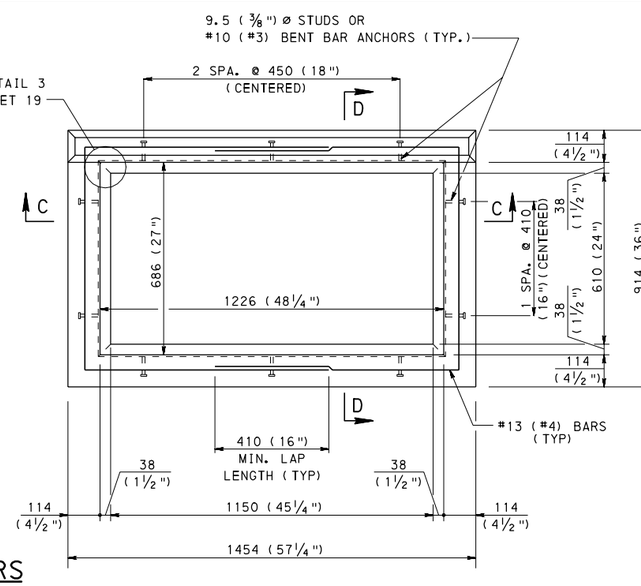
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 17 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



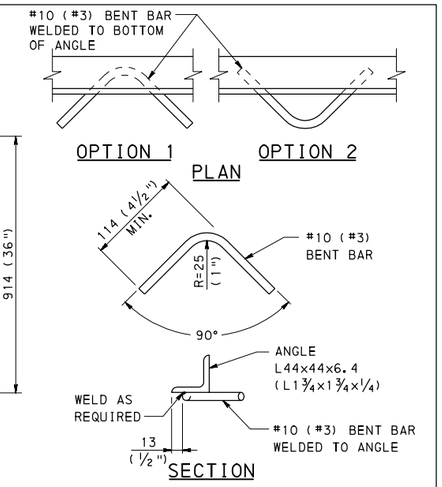
PLAN VIEW - TYPE M



ALTERNATE ONE BAR OPTIONS FOR # 13 (#4) HORIZONTAL U-BARS

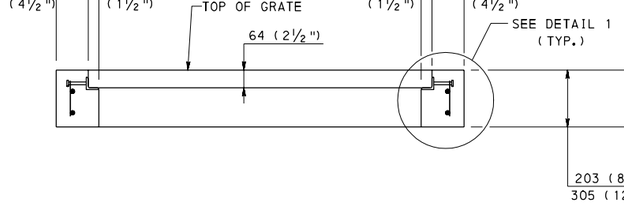


PLAN VIEW - TYPE S

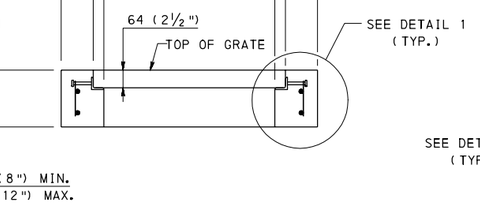


#10 (#3) BENT BAR ANCHOR DETAIL ATTACHED TO ANGLE

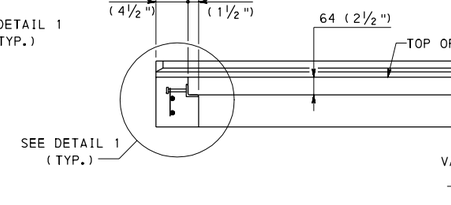
ALTERNATE DETAIL IN PLACE OF PROVIDING 9.5 (3/8) Ø STUDS



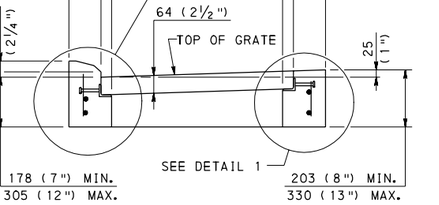
SECTION A-A



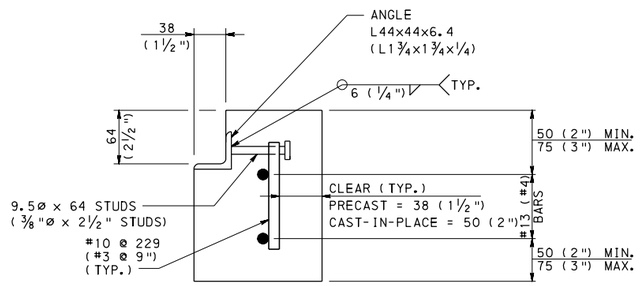
SECTION B-B



SECTION C-C

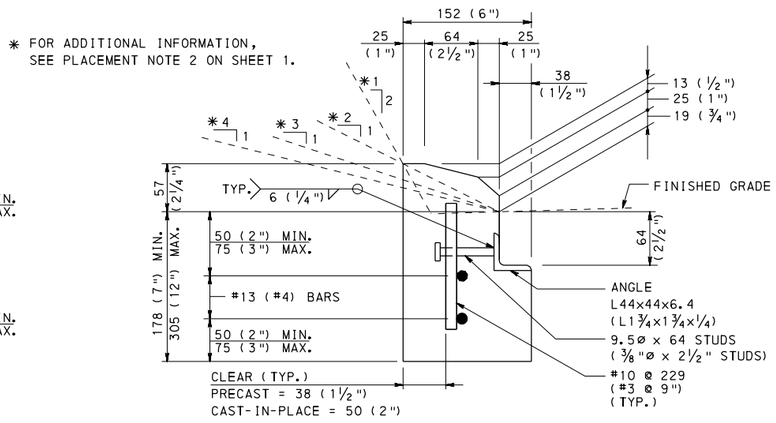


SECTION D-D



DETAIL 1

* FOR ADDITIONAL INFORMATION, SEE PLACEMENT NOTE 2 ON SHEET 1.



DETAIL 2

NOTES

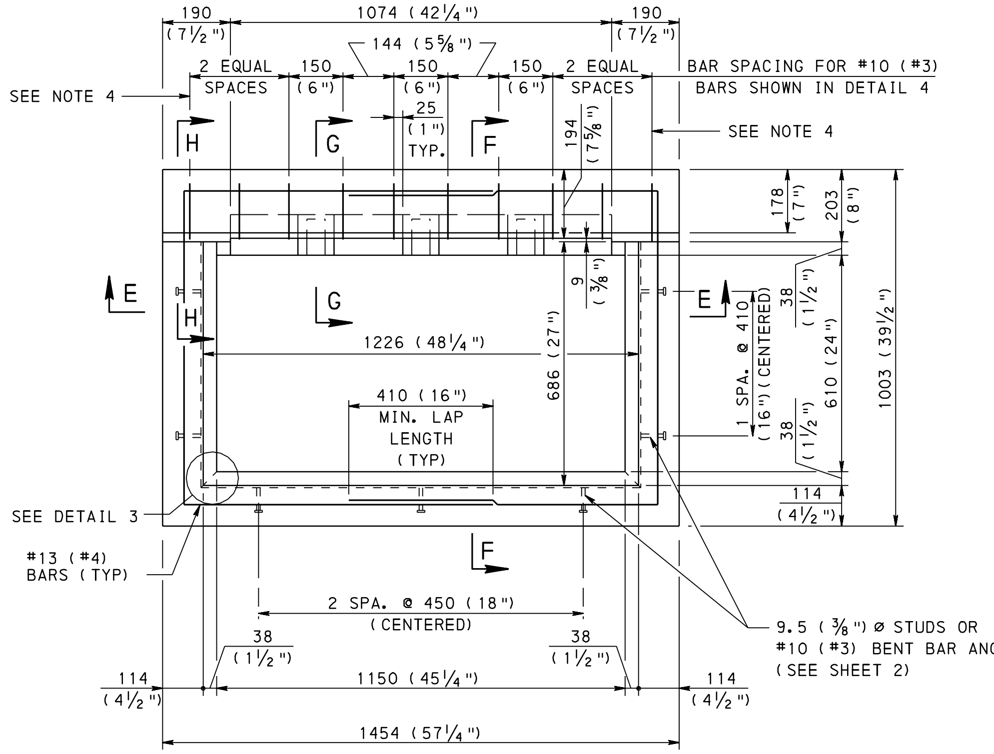
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 AND 20.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

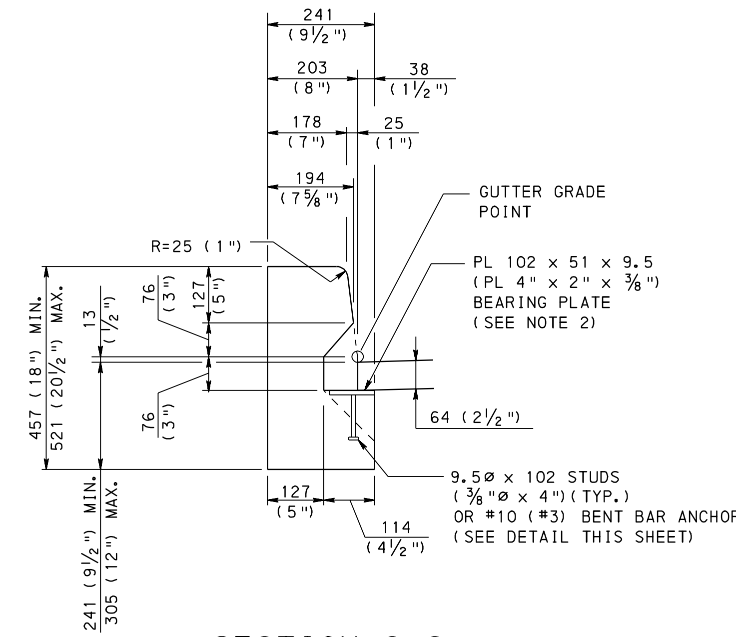
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES CONCRETE TOP UNITS TYPE M AND TYPE S FOR REHABILITATION PROJECTS

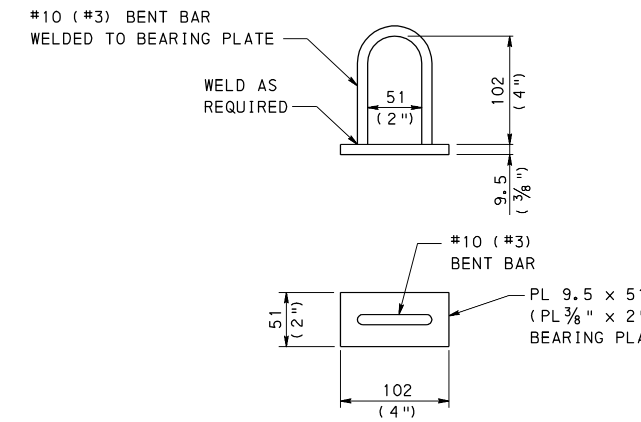
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 18 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



PLAN VIEW - TYPE C

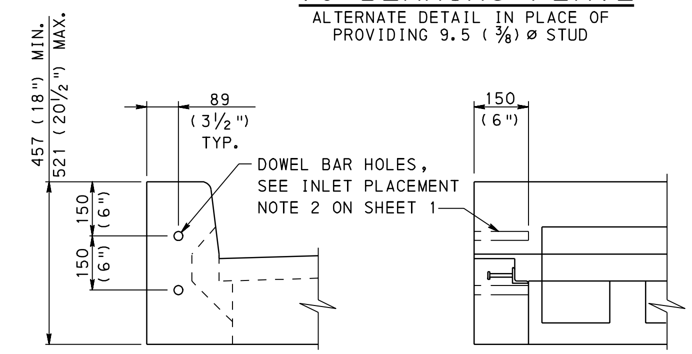


SECTION G-G



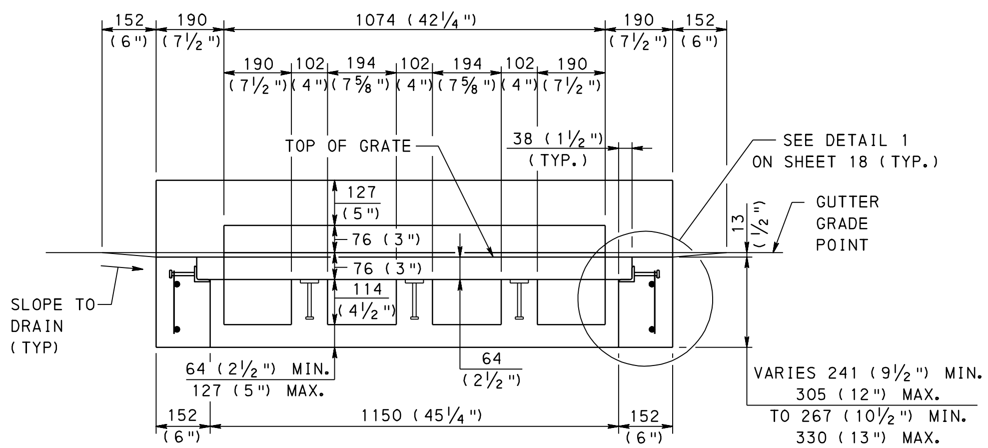
#10 (#3) BENT BAR ANCHOR DETAIL ATTACHED TO BEARING PLATE

ALTERNATE DETAIL IN PLACE OF PROVIDING 9.5 (⅜) ⌀ STUD

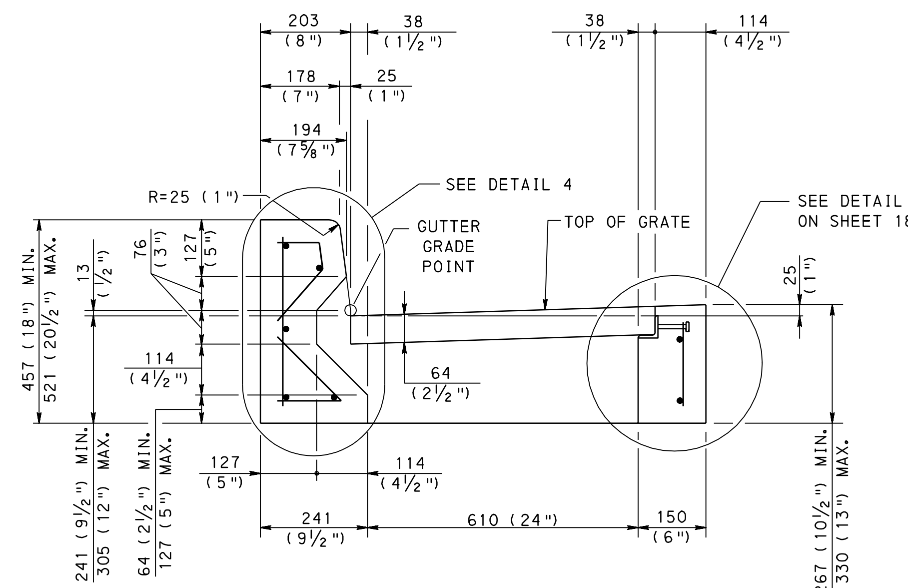


SECTION H-H

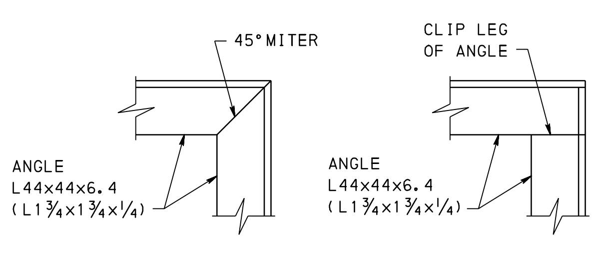
FRONT ELEVATION



SECTION E-E



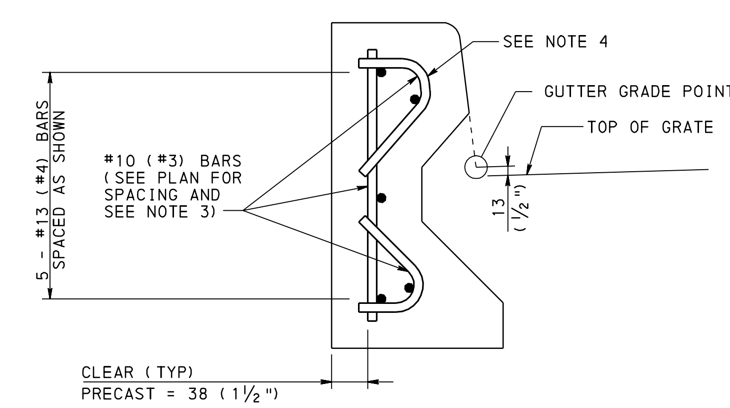
SECTION F-F



OPTION 1 (MITERED)

OPTION 2 (CLIPPED LEG)

DETAIL 3



DETAIL 4

NOTES

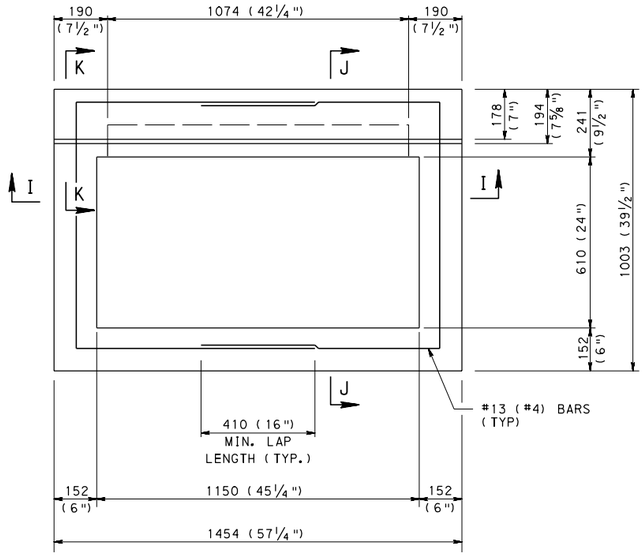
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 AND 20.
2. A MAXIMUM OF TWO HOLES ARE PERMITTED IN THE PLATE TO POSITION AND HOLD THE PLATE IN PLACE DURING FABRICATION. HOLES ARE NOT PERMITTED TO BE GREATER THAN 6 mm (¼") DIAMETER.
3. FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MATCH SHAPE INDICATED. PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
4. BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS AND STILL MAINTAIN CLEARANCE REQUIREMENTS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

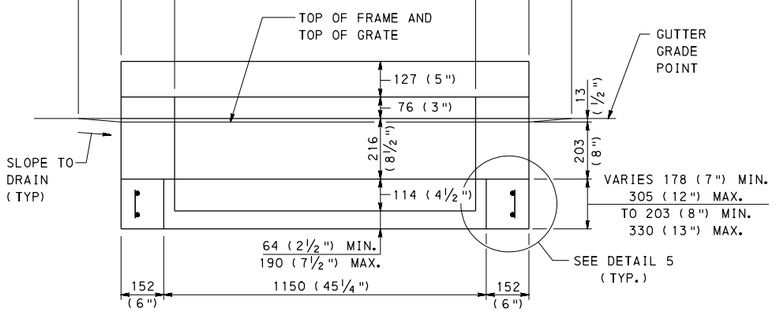
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES
CONCRETE TOP UNITS
TYPE C
FOR REHABILITATION PROJECTS

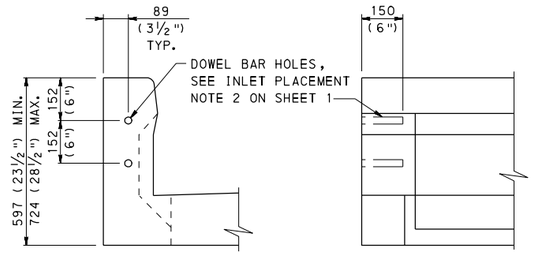
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 19 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M



PLAN VIEW - TYPE C ALTERNATE

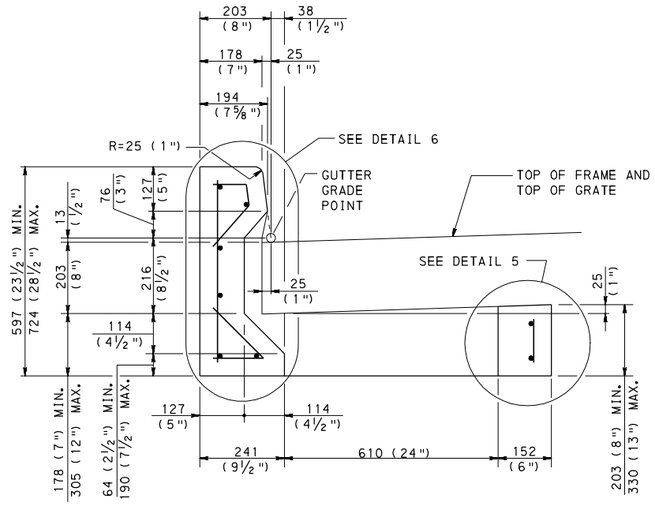


SECTION I-I



SECTION K-K

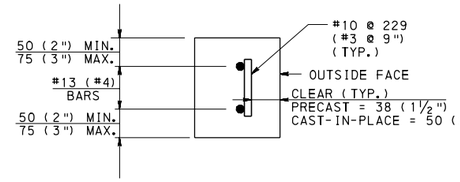
FRONT ELEVATION



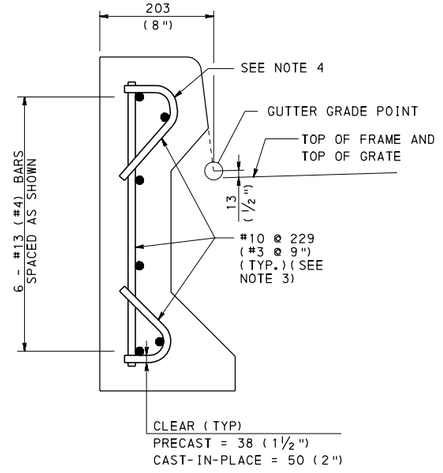
SECTION J-J

CONCRETE TOP UNIT NOTES FOR REHABILITATION PROJECTS:

1. SHEETS 18 THRU 20 DEPICTS DETAILS FOR REHABILITATION PROJECTS ONLY. IF FEASIBLE, UTILIZE CONCRETE TOP UNITS DETAILED ON SHEETS 2 THRU 4.
2. USE OF BRICK OR BRICK AND MORTAR FOR REPAIRS OR GRADE ADJUSTMENTS IS NOT PERMITTED. USE GRADE ADJUSTMENT DEVICES AS DETAILED IN THIS STANDARD.
3. IF FINAL GRADE ELEVATIONS CANNOT BE MADE WITH GRADE ADJUSTMENT DEVICES, THE TOP OF THE INLET BOX MUST BE REBUILT OR THE INLET BOX REPLACED.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.



DETAIL 5



DETAIL 6

NOTES

1. FOR ADDITIONAL NOTES, SEE SHEET 1.
2. FOR TYPE C FRAME, SEE SHEET 14.
3. FABRICATOR TO DETERMINE NUMBER OF BARS REQUIRED TO MATCH SHAPE INDICATED. PROVIDE ONE, TWO, OR THREE BARS AS REQUIRED.
4. BEND OUTSIDE STIRRUP TO ACCOMMODATE DOWEL BARS AND STILL MAINTAIN CLEARANCE REQUIREMENTS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET TOPS, GRATES, AND FRAMES CONCRETE TOP UNITS TYPE C ALTERNATE FOR REHABILITATION PROJECTS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 20 OF 20
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-45M

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

2. METRIC UNITS INDICATED ARE SOFT CONVERTED FROM U.S. CUSTOMARY UNITS.

3. DESIGN SPECIFICATIONS AND REQUIREMENTS:
   - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, STRUCTURES.
   - DESIGN IS IN ACCORDANCE WITH THE LOAD AND RESISTANCE FACTOR DESIGN METHOD (LRFD).
   - INLET BOXES ARE DESIGNED FOR AN ALLOWABLE FOUNDATION PRESSURE EQUAL TO 0.190 MPa (2.0 TONS/SQ. FT.) AT THE SERVICE LIMIT STATE.

4. CONSTRUCTION SPECIFICATIONS:
   - PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH THE CURRENT VERSION OF THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION PUBLICATION 408 AND THE CONTRACT SPECIAL PROVISIONS.

5. SHOP DRAWINGS FOR INLET BOXES, TOP SLABS, AND TRANSITION SLABS ARE NOT REQUIRED IF THE ITEM IS CONSTRUCTED/FABRICATED IN ACCORDANCE WITH THIS STANDARD.

6. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF FOR REVIEW AND ACCEPTANCE.

7. THE DESIGNER IS RESPONSIBLE FOR DETERMINING THE TYPE OF INLET BOX REQUIRED BASED ON THE REQUIRED PIPE SIZE(S) AND PIPE OPENING(S). REFER TO TABLES A AND B ON SHEET 45 FOR ADDITIONAL INFORMATION. THE DESIGNER IS ALSO RESPONSIBLE TO DETERMINE THE REQUIRED PAY ITEM FOR AN INSTALLATION BASED ON THE OVERALL INSTALLATION HEIGHT.

8. THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED INLET ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY, UNLESS OTHERWISE INDICATED ON THE CONTRACT DOCUMENTS.

9. THE SIZE OF THE INLET TOP UNITS, PER RC-45M, ARE BASED ON THE MINIMUM DIMENSIONS INDICATED FOR THE STANDARD INLET BOX.

10. MINIMUM PIPE DIAMETERS [INSIDE]:
    - FILL HEIGHT LESS THAN OR EQUAL TO 7600 mm (25'): 450 mm (18") FOR CIRCULAR PIPE (OR EQUIVALENT SIZE PIPE ARCH)
    - FILL HEIGHTS GREATER THAN 7600 mm (25'): 600 mm (24")

11. INSIDE INLET BOX DIMENSIONS ARE BASED ON PROVIDING A PIPE OPENING TO ACCOMMODATE A MINIMUM 450 mm (18") PIPE TO A MAXIMUM 2438 mm (96") PIPE. IF A LARGER PIPE SIZE IS REQUIRED, THE DESIGNER IS RESPONSIBLE FOR PROVIDING DESIGN AND DETAILS IN ACCORDANCE WITH PENNDOT REQUIREMENTS.

12. INLETS THAT EXCEED THE MAXIMUM HEIGHT INDICATED REQUIRE SPECIAL DESIGN AND DETAILS. DESIGNER IS RESPONSIBLE FOR PROVIDING DESIGN AND DETAILS IN ACCORDANCE WITH PENNDOT REQUIREMENTS.

13. SHOW ORIENTATION OF INLET BOXES ON THE CONTRACT DRAWINGS.

14. THE TOP SLAB IS NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT BOX SECTION.

15. PROVIDE 50 mm (2") DIAMETER WEEPHOLES IN THE WALLS WHEN THE DEPTH BETWEEN THE FINISHED GRADE ELEVATION AND THE TOP OF BOTTOM SLAB ELEVATION IS GREATER THAN 3048 mm (10'-0").
    - VERTICAL PLACEMENT: 1500 mm (5'-0") MAXIMUM SPACING
    - HORIZONTAL PLACEMENT: PLACE WEEPHOLES IN THE SIDE WALLS THAT ARE PERPENDICULAR TO TRAFFIC.
    - LOCATE WEEPHOLES A MINIMUM OF 150 mm (6") FROM PIPE OPENINGS OR JOINTS.
    - LOCATE WEEPHOLES A MINIMUM OF 305 mm (1'-0") ABOVE OUTLET PIPE INVERT.

16. PROVIDE MANHOLE STEPS WHEN THE DEPTH BETWEEN THE FINISHED GRADE ELEVATION AND THE TOP OF BOTTOM SLAB ELEVATION IS GREATER THAN 1500 mm (5'-0"). SHALLOW RECESSES, ON THE INSIDE FACE OF THE INLET, NOT GREATER THAN 10 mm (3/8") IN DEPTH, FORMED BY MAGNETIC STEP FORMERS ARE ACCEPTABLE AND DO NOT REQUIRE PATCHING. FOR DETAILS, REFER TO RC-39M.

17. IF A REQUIRED DETAIL IS NOT FOUND IN THIS STANDARD OR ON THE CONTRACT DRAWINGS A SPECIAL SUBMISSION REQUESTING ACCEPTANCE FOR SPECIFIC DETAILS MUST BE MADE TO THE BUREAU OF DESIGN HIGHWAY QUALITY ASSURANCE DIVISION CHIEF.

18. FOR INLET TOPS, GRATES, GRADE ADJUSTMENT RINGS AND FRAMES, REFER TO RC-45M.

MATERIAL NOTES:

1. PROVIDE THE FOLLOWING CONCRETE CLASS:
   - CAST-IN-PLACE: CLASS A CEMENT CONCRETE [DESIGN COMPRESSIVE STRENGTH, f'c = 21 MPa (3,000 PSI)]
   - PRECAST: CLASS AA CEMENT CONCRETE, MODIFIED [DESIGN COMPRESSIVE STRENGTH , f'c = 28 MPa (4,000 PSI)]

2. A HIGHER STRENGTH OF CONCRETE MAY BE SUBSTITUTED FOR A LOWER STRENGTH OF CONCRETE AT NO ADDITIONAL COST TO THE DEPARTMENT. SUBMIT MIX DESIGN TO THE DEPARTMENT FOR REVIEW AND ACCEPTANCE.

3. REINFORCEMENT STEEL:
   - PROVIDE GRADE 420 (GRADE 60) DEFORMED REINFORCEMENT BARS THAT MEET THE REQUIREMENTS OF ASTM A615M (A615) OR ASTM A706M (A706). DO NOT WELD REINFORCEMENT BARS WITHOUT A PENNDOT APPROVED WELDING PROCEDURE.
   - ALL REINFORCEMENT BARS SHOWN ARE SOFT CONVERTED METRIC SIZES.
   - PROVIDE MINIMUM LAP AND EMBEDMENT LENGTH FOR REINFORCING BARS OF 30 DIAMETERS OR IN ACCORDANCE WITH THE CURRENT AASHTO SPECIFICATIONS AS MODIFIED BY THE DESIGN MANUAL PART 4, WHICHEVER IS GREATER. (REFER TO TABLE ON SHEET 3)
   - BAR SPACING:
     - MINIMUM SPACING = 102 mm (4")
     - MAXIMUM SPACING = 305 mm (1'-0") OR 1.5 MEMBER THICKNESS
   - PERMITTED BAR SIZES:
     - INLET BOXES: #10 (#3), #13 (#4), #16 (#5), #19 (#6)
     - LARGER BAR SIZES ARE PERMITTED IN THE TOP SLABS AND TRANSITION SLABS.
   - MINIMUM AREA OF STEEL REQUIREMENTS FOR REINFORCEMENT BARS:
     - WALLS = 318 mm^2/m (0.15 in^2/ft) EACH WAY
     - BOTTOM SLAB:
       - TOP MAT = 424 mm^2/m (0.20 in^2/ft) EACH WAY
       - BOTTOM MAT = 424 mm^2/m (0.20 in^2/ft) EACH WAY

4. WELDED WIRE FABRIC (WWF):
   - PROVIDE GRADE 450 (GRADE 65) PLAIN WELDED WIRE FABRIC THAT MEET THE REQUIREMENTS OF ASTM A185 OR GRADE 480 (GRADE 70) DEFORMED WELDED WIRE FABRIC THAT MEET THE REQUIREMENTS OF ASTM A497.
   - ALL WELDED WIRE FABRIC SHOWN IS SOFT CONVERTED METRIC SIZES.
   - PROVIDE MINIMUM LAP SPLICES FOR WELDED WIRE FABRIC EQUAL TO THE LARGER OF TWO GRID SPACINGS OR 305 mm (12").
   - WIRE SPACING:
     - MINIMUM SPACING = 51 mm (2")
     - MAXIMUM SPACING = 305 mm (1'-0") OR 1.5 MEMBER THICKNESS
   - PERMITTED WIRE SIZES:
     - MINIMUM WIRE SIZE = MW26 (W4) [MD26 (D4)]
     - MAXIMUM WIRE SIZE = MW129 (W20) [MD129 (D20)]
     - WWF IS NOT PERMITTED IN THE CAST-IN-PLACE INLET BOXES.
     - WWF IS NOT PERMITTED IN THE TOP SLABS AND TRANSITION SLABS.
   - MINIMUM AREA OF STEEL REQUIREMENTS FOR WWF:
     - WALLS = 259 mm^2/m (0.12 in^2/ft) EACH WAY
     - BOTTOM SLAB:
       - TOP MAT = 424 mm^2/m (0.20 in^2/ft) EACH WAY
       - BOTTOM MAT = 424 mm^2/m (0.20 in^2/ft) EACH WAY

5. NON-SHRINK GROUT:
   - PROVIDE NON-SHRINK GROUT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1001.2(d).

6. EPOXY BONDING COMPOUND:
   - PROVIDE EPOXY BONDING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, SECTION 706.1.

7. MORTAR:
   - PROVIDE MORTAR IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.7(b).

8. CAULKING COMPOUND:
   - PROVIDE CAULKING COMPOUND IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.8(a).

9. GASKETS:
   - PROVIDE GASKETS IN ACCORDANCE WITH PUBLICATION 408, SECTION 705.5(b).

10. MANHOLE STEPS:
    - PROVIDE MANHOLE STEPS IN ACCORDANCE WITH PUBLICATION 408, SECTION 605.2(c).

11. SUBBASE MATERIAL AND PREPARATION:
    - PROVIDE NO. 2A COARSE AGGREGATE IN ACCORDANCE WITH PUBLICATION 408, SECTION 703.2 AND COMPACT IN ACCORDANCE WITH PUBLICATION 408, SECTION 350.3(e).
    - PLACE AND COMPACT IN 100 (4") MAXIMUM LAYERS.
    - PROVIDE A 300 mm (1'-0") MINIMUM DEPTH.

FIELD CONSTRUCTION NOTES:

1. CONSTRUCT OR PLACE INLET BOXES LEVEL, UNLESS OTHERWISE INDICATED OR DIRECTED.

2. CONSTRUCT OR PLACE INLET BOXES ON A SUBBASE CONSTRUCTED OF COMPACTED NO. 2A COARSE AGGREGATE. PLACE AND COMPACT IN 100 mm (4") LAYERS TO PROVIDE A 300 mm (1'-0") MINIMUM DEPTH.

3. LOCATE PIPE OR PIPES AS INDICATED OR DIRECTED.

4. CONNECT PIPES TO INLET BOXES WITH MORTAR OR WATERTIGHT RUBBER FLEXIBLE CONNECTORS.

5. FORM BOTTOM OF INLET, USING CLASS A CEMENT CONCRETE, TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE. PROVIDE #13 (#4) REINFORCEMENT BARS SPACED AT 300 mm (12") CENTER TO CENTER MAXIMUM WHEN THE THICKNESS EXCEEDS 75 mm (3").

6. BACKFILL EXCAVATED SPACES AROUND THE STRUCTURE WITH ACCEPTABLE EMBANKMENT MATERIAL.

7. THE FOLLOWING ITEMS ARE INCIDENTAL TO THE COST OF THE INLET BOX PAY ITEM: EXCAVATION, COMPACTED NO. 2A COARSE AGGREGATE, INLET BOX, CLASS A CEMENT CONCRETE TO CHANNEL FLOW, TRANSITION SLAB, TOP SLAB, BACKFILL AND ANY OTHER MISCELLANEOUS ITEMS REQUIRED FOR THE CONSTRUCTION OF THE INLET BOX.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

INDEX OF SHEETS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
GENERAL NOTES - 1

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 45 RC-46M

PIPE LOCATION AND PIPE OPENING NOTES:

1. LOCATE THE TOP OF PIPE AT LEAST 150 mm (6") BELOW THE ROADWAY SUBGRADE ELEVATION. FOR ADDITIONAL INFORMATION REFER TO RC-30M. (SUBGRADE IS DEFINED AS THE BOTTOM OF THE PAVEMENT STRUCTURE.)

2. PROVIDE A MINIMUM DROP OF AT LEAST 50 mm (2") BETWEEN THE INLET PIPE INVERT ELEVATION AND THE OUTLET PIPE INVERT ELEVATION, WHENEVER POSSIBLE.

3. PROVIDE PIPE OPENING(S) OF AT LEAST 50 mm (2") BUT NOT MORE THAN 100 mm (4") LARGER THAN THE OUTSIDE DIAMETER OF THE SPECIFIED PIPE.

4. LOCATE PIPE OPENINGS, EXCEPT CORNER PENETRATIONS, TO PROVIDE A MINIMUM 102 mm (4") OF CONCRETE BETWEEN THE TOP OF THE INLET BOX AND THE TOP OF THE PIPE OPENING.

5. WHEN PROJECT CONDITIONS REQUIRE THE PIPE OPENINGS TO BE LOCATED WITHIN 102 mm (4") FROM THE TOP OR BOTTOM OF A BOX SECTION (NOT APPLICABLE TO CORNER PENETRATIONS), PROVIDE AN ADDITIONAL #10 (#3) HORIZONTAL BAR ALONG THE FULL WIDTH OF THE INLET BOX. PROVIDE 305 mm (12") HOOKS ON BARS AT CORNERS. LOCATE BARS 38 mm (1½") CLEAR FROM THE TOP OR BOTTOM OF THE SECTION. CUT BARS IN THE FIELD PRIOR TO INSTALLING PIPE.

6. LOCATE PIPE OPENINGS TO PROVIDE A MINIMUM OF 305 mm (12") OF CONCRETE BETWEEN THE BOTTOM OF A TRANSITION SLAB AND THE TOP OF THE PIPE OPENING.

7. IF MULTIPLE PIPE OPENINGS ARE REQUIRED IN A SINGLE WALL AND THE PIPE OPENINGS ARE GREATER THAN 305mm (12"), LOCATE THE PIPE OPENINGS A MINIMUM OF 305 mm (12") APART.

8. IF REINFORCED CONCRETE PIPE IS USED, THE PIPE OPENING MAY BE FORMED "FLUSH" WITH THE TOP OF THE INLET BOTTOM [BASE] SLAB.

9. LOCATE PIPE OPENINGS PER THE CONTRACT DRAWINGS OR AS DIRECTED.

10. LOCATE PIPE OPENINGS WITHIN THE INLET BOX. DO NOT CUT THE TOP SLAB, TRANSITION SLAB, OR TOP UNIT TO ACCOMMODATE PIPES.

11. PIPE OPENINGS ARE PERMITTED TO BE IN EACH WALL WHEN CORNER PENETRATIONS ARE NOT REQUIRED.

12. CORNER PENETRATIONS:
    - PIPE OPENINGS ARE PERMITTED IN ONE (1) CORNER AND IN THE TWO (2) OTHER WALLS NOT AFFECTED BY THE CORNER PENETRATION.
    - LOCATE CORNER PENETRATION PIPE OPENINGS TO PROVIDE A MINIMUM OF 204 mm (8") OF CONCRETE BETWEEN THE TOP OF THE INLET BOX AND THE TOP OF THE PIPE OPENING.
    - DESIGNER IS RESPONSIBLE TO SIZE THE INLET BOX TO ACCOMMODATE THE CORNER PIPE AND ANY OTHER PIPES. DESIGNER MUST CONSIDER THE PIPE OUTSIDE DIAMETER AND PIPE OPENINGS WHEN DETERMINING THE REQUIRED INLET BOX SIZE. FOR ADDITIONAL DETAILS, REFER TO SHEET 45.

13. SKEWED PIPES:
    - DESIGNER IS RESPONSIBLE TO SIZE THE INLET BOX TO ACCOMMODATE SKEWED PIPES. DESIGNER MUST CONSIDER THE SKEW ANGLE, PIPE OUTSIDE DIAMETER, AND PIPE OPENING WHEN DETERMINING THE REQUIRED INLET BOX SIZE. FOR ADDITIONAL DETAILS, REFER TO SHEET 45.

14. PIPE OPENINGS ARE PERMITTED TO REMOVE UP TO 25 mm (1") OF EACH WALL THICKNESS IN THE STANDARD BOX ONLY. THE PIPE OPENINGS, IN ALL OTHER BOXES, ARE NOT PERMITTED TO REDUCE THE WALL THICKNESS.

15. TAPERED PIPE OPENINGS ARE PERMITTED.
    - TAPERED PIPE OPENINGS THAT REDUCE THE WALL THICKNESS ARE ONLY PERMITTED IN THE STANDARD BOX.
    - TAPERED PIPE OPENINGS, IN ALL OTHER BOXES, ARE NOT PERMITTED TO REDUCE THE WALL THICKNESS.

16. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND PIPE OPENINGS AS INDICATED (SEE SHEETS 15 AND 25), OR AS REQUIRED. ADDITIONAL REINFORCEMENT IS NOT REQUIRED IF THE PIPE OPENING IS LESS THAN 305 mm (12"). ADDITIONAL STEEL IS PERMITTED TO BE ADDED AROUND THE PIPE OPENING TO KEEP THE "HOLE FORM" IN PLACE DURING CONSTRUCTION OR FABRICATION.

PIPE OPENINGS IN BOTTOM SLAB NOTES:

1. PIPE OPENINGS ARE PERMITTED IN THE BOTTOM SLAB, IF REQUIRED. A MAXIMUM OF ONE OPENING IS PERMITTED.

2. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND THE PIPE OPENING IN ACCORDANCE WITH THE DETAIL SHOWN ON SHEET 45.

3. THE BOTTOM SLAB THICKNESS IS PERMITTED TO BE INCREASED, AS REQUIRED, TO MAINTAIN ALL CLEARANCE REQUIREMENTS.

CAST-IN-PLACE CONCRETE INLET BOX NOTES:

1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.

2. PROVIDE A TOP SLAB TO SUPPORT THE INLET TOP UNITS M, S, C AND C ALTERNATE WHEN A STANDARD INLET BOX IS NOT SPECIFIED. PROVIDE OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS. PROVIDE A TOP SLAB WITH A ROUND OPENING FOR MANHOLE COVER WHEN SPECIFIED ON THE CONTRACT DRAWINGS.

3. PROVIDE A TRANSITION SLAB BETWEEN TWO SEPARATE INLET BOX SIZES, WHEN TWO SEPARATE INLET BOX SIZES ARE USED. (SEE TRANSITION SLAB NOTES.)

4. CLEAR COVER FOR STEEL:
    - WALLS: 50 mm (2")
    - FOOTINGS [BOTTOM SLAB]:
        - TOP COVER: 60 mm (2½")
        - BOTTOM COVER: 75 mm (3")
        - SIDE COVER: 50 mm (2")
    - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 50 mm (2")

5. MINIMUM SLAB AND WALL THICKNESS:
    - MINIMUM TOP SLAB THICKNESS: 203 mm (8")
    - MINIMUM WALL THICKNESS: 152 mm (6")
    - MINIMUM BOTTOM SLAB THICKNESS: 229 mm (9")

6. THICKNESS OF WALL MUST BE MAINTAINED FOR THE ENTIRE HEIGHT OF THE INLET BOX.

7. WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE INLET BOXES.

8. WHEN THE BOTTOM SLAB IS CONSTRUCTED MONOLITHICALLY WITH THE WALLS, PROVIDE 75 mm (3") MINIMUM BETWEEN THE PIPE OPENING AND TOP OF THE BOTTOM SLAB.

9. KEYED CONSTRUCTION JOINTS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT CONCRETE SEGMENT.

10. PROVIDE A KEYED JOINT BETWEEN BOTTOM OF THE TOP SLAB AND THE TOP OF THE BOX.

11. PROVIDE A KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.

12. PROVIDE KEYED CONSTRUCTION JOINTS BETWEEN CONCRETE POURS.

13. SEGMENT HEIGHTS:
    - MINIMUM HEIGHT:
        - RISER SECTIONS = 305 mm (1'-0")
        - BASE SECTIONS = 610 mm (2'-0")
    - MAXIMUM HEIGHT = 2744 mm (9'-0")

14. USE EPOXY BONDING COMPOUND BETWEEN CONCRETE POURS.

TRANSITION SLAB NOTES

1. USE TRANSITION SLABS TO TRANSITION A LARGER INLET BOX SIZE (LOWER SECTION) TO A SMALLER BOX SIZE (UPPER SECTION).

2. THE DESIGNER IS NOT RESPONSIBLE TO SPECIFY A TRANSITION SLAB. THE DESIGNER IS ONLY RESPONSIBLE FOR DETERMINING THE MAXIMUM INLET BOX SIZE REQUIRED WITHIN AN INLET ASSEMBLY BASED ON THE OVERALL INSTALLATION HEIGHT.

3. THE CONTRACTOR/FABRICATOR IS RESPONSIBLE TO DETERMINE WHEN A TRANSITION SLAB WILL BE USED BASED ON THE REQUIREMENTS OF THIS STANDARD AND THE CONTRACT DRAWINGS.

4. ONLY ONE TRANSITION SLAB IS PERMITTED WITHIN AN INLET ASSEMBLY.

5. THE TRANSITION SLAB IS NOT PERMITTED TO BE POURED MONOLITHICALLY WITH THE ADJACENT UPPER OR LOWER BOX SECTIONS.

6. TRANSITION SLAB IS NOT PERMITTED ON A TYPE D-H INLET.

PRECAST CONCRETE INLET BOX NOTES:

1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 714.

2. PROVIDE PRECAST CONCRETE INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

3. PROVIDE A TOP SLAB TO SUPPORT THE INLET TOP UNITS M, S, C AND C ALTERNATE WHEN A STANDARD INLET BOX IS NOT SPECIFIED. PROVIDE OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS. PROVIDE A TOP SLAB WITH A ROUND OPENING FOR MANHOLE COVER WHEN SPECIFIED ON THE CONTRACT DRAWINGS.

4. PROVIDE A TRANSITION SLAB BETWEEN TWO SEPARATE INLET BOX SIZES, WHEN TWO SEPARATE INLET BOX SIZES ARE USED. (SEE TRANSITION SLAB NOTES.)

5. CLEAR COVER FOR STEEL:
    - WALLS: 38 mm (1½")
    - FOOTINGS [BOTTOM SLAB]:
        - TOP COVER: 50 mm (2")
        - BOTTOM COVER: 38 mm (1½")
        - SIDE COVER: 38 mm (1½")
    - TOP AND TRANSITION SLABS [TOP AND BOTTOM]: 38 mm (1½")

6. MINIMUM SLAB AND WALL THICKNESS:
    - MINIMUM TOP SLAB THICKNESS: 203 mm (8")
    - MINIMUM WALL THICKNESS: 152 mm (6")
    - MINIMUM BOTTOM SLAB THICKNESS: 178 mm (7")

7. THICKNESS OF WALL IS PERMITTED TO VARY FROM SECTION TO SECTION. INSIDE FACE OF WALLS MUST ALIGN BETWEEN SECTIONS.

8. FABRICATOR IS RESPONSIBLE FOR LIFTING, HANDLING AND TRANSPORTATION STRESSES.

9. LIFTING DEVICES:
    - PROVIDE GALVANIZED STEEL OR PLASTIC LIFTING DEVICES FOR HANDLING AND INSTALLATION.
    - FILL LIFTING DEVICES WITH NON-SHRINK GROUT AFTER INSTALLATION.
    - PROVIDE LIFTING DEVICES WITH A MINIMUM CAPACITY OF AT LEAST FOUR TIMES THE CALCULATED LOAD ON THE DEVICE.

10. TAPERS MAY BE PROVIDED ON THE INSIDE AND/OR OUTSIDE VERTICAL FACES OF THE INLET BOXES TO FACILITATE FORM STRIPPING. TAPERS MAY RESULT IN INTERNAL BOTTOM DIMENSIONS THAT VARY 20 mm/m (¼"/FOOT) PER SIDE TO A MAXIMUM OF 25 mm (1") PER SIDE.

11. KEYED JOINTS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT SEGMENT. PLACE MORTAR OR CAULKING COMPOUND BETWEEN JOINTS IN ACCORDANCE WITH THIS STANDARD.

12. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN THE BOTTOM OF THE TOP SLAB AND THE TOP OF THE BOX.

13. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN THE TRANSITION SLAB AND THE ADJACENT TOP AND BOTTOM SECTIONS.

14. PROVIDE EITHER A SHIPLAP OR KEYED JOINT BETWEEN PRECAST SECTIONS.

15. SEGMENT HEIGHTS:
    - MINIMUM HEIGHT:
        - RISER SECTIONS = 305 mm (1'-0")
        - BASE SECTIONS = 610 mm (2'-0")
    - MAXIMUM HEIGHT = 2438 mm (8'-0")

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
GENERAL NOTES - 2

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M

DESIGN TABLE GENERAL NOTES:

1. SEPARATE DESIGN TABLES ARE PROVIDED FOR CAST-IN-PLACE CONCRETE AND PRECAST CONCRETE INLET BOXES.
2. SEPARATE DESIGN TABLES ARE PROVIDED USING REINFORCEMENT BARS AND WELDED WIRE FABRIC FOR THE PRECAST CONCRETE INLET BOXES.
3. THE RISER (UPPER) AND BASE (BOTTOM) BOX SECTIONS WERE DESIGNED AS SQUARE BOXES, EXCEPT FOR THE STANDARD AND TYPE D-H BOXES.
4. ALWAYS TRY TO MAXIMIZE THE HEIGHT OF THE RISER AND BASE SECTIONS.
5. ALWAYS TRY TO PROVIDE THE MINIMUM NUMBER OF SECTIONS BY USING THE MAXIMUM POSSIBLE SECTION HEIGHTS.

CUSTOMIZED RECTANGULAR BOX NOTES:

1. CUSTOMIZED RECTANGULAR INLET BOXES MAY BE USED PROVIDED THE DESIGN REQUIREMENTS ARE BASED ON THE LARGER INSIDE DIMENSION OF THE INLET BOX LENGTH OR WIDTH.
2. THE CONTRACTOR/FABRICATOR WILL BE RESPONSIBLE TO DETERMINE THE MINIMUM INSIDE BOX DIMENSIONS BASED ON THE REQUIRED PIPE SIZE, PIPE WALL THICKNESS, PIPE OPENING, PIPE SKEW AND ANY REQUIRED CLEARANCES. AT A MINIMUM, TRY AND ROUND DIMENSIONS UP TO THE NEXT 75 mm (3").
3. AFTER THE CONTRACTOR/FABRICATOR DETERMINES THE MINIMUM INSIDE BOX DIMENSIONS THEY THEN MUST DETERMINE WHICH BOX TYPE (DESIGN TABLE) WILL BE USED TO DETERMINE THE DESIGN REQUIREMENTS OF THE INLET BOX.

   - EXAMPLE 1:
     MINIMUM REQUIRED INSIDE BOX DIMENSIONS:
     L_I = 1959 mm (77") (6'-5")
     W_I = 610 mm (24") (2'-0")
     FABRICATED INSIDE BOX DIMENSIONS:
     L_I = 1981 mm (78") (6'-6")
     W_I = 610 mm (24") (2'-0")
     DESIGN REQUIREMENTS WOULD THAN BE BASED ON A TYPE 7 [2134 mm x 2134 mm (7'-0" x 7'-0")] INLET BOX

   - EXAMPLE 2:
     MINIMUM REQUIRED INSIDE BOX DIMENSIONS:
     L_I = 1626 mm (64") (5'-4")
     W_I = 915 mm (36") (3'-0")
     FABRICATED INSIDE BOX DIMENSIONS:
     L_I = 1676 mm (66") (5'-6")
     W_I = 991 mm (39") (3'-3")
     DESIGN REQUIREMENTS WOULD THAN BE BASED ON A TYPE 6 [1828 mm x 1828 mm (6'-0" x 6'-0")] INLET BOX

CAST-IN-PLACE CONCRETE INLET BOX DESIGN TABLE NOTES:

1. RISER AND BASE SECTIONS WERE DESIGNED BASED ON A 2744 mm (9'-0") MAXIMUM HEIGHT.
2. AVOID USING RISER SECTIONS WHEN THE HEIGHT OF THE INLET BOX IS LESS THAN 2744 mm (9'-0").
3. WHEN RISER SECTIONS ARE REQUIRED, ALWAYS MAXIMIZE THE HEIGHT OF THE BASE SECTION.
4. THE WALL THICKNESS FOR THE RISER SECTION MUST ALWAYS MATCH THE WALL THICKNESS REQUIRED FOR THE BASE SECTION, UNLESS A TRANSITION SLAB IS USED.
5. WELDED WIRE FABRIC IS NOT PERMITTED IN CAST-IN-PLACE CONCRETE INLET BOXES.
6. HOW TO DETERMINE THE RISER AND BASE BOX DESIGN REQUIREMENTS:
   - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
   - GO TO THE APPROPRIATE TABLE AND SELECT THE DESIGN INFORMATION FOR BOTH THE RISER AND BASE SECTIONS BASED ON THE ROUNDED HEIGHT.
   - IF MULTIPLE RISER SECTIONS ARE REQUIRED, USE THE RISER DESIGN REQUIREMENTS SHOWN FOR ALL RISER SECTIONS. DO NOT USE THE DESIGN REQUIREMENTS FOR A LESSER HEIGHT.
7. HOW TO DETERMINE THE RISER BOX DESIGN REQUIREMENTS WHEN USING A TRANSITION SLAB:
   - DETERMINE THE TOP OF TRANSITION SLAB ELEVATION AND CALCULATE THE HEIGHT, H (FINISHED GRADE ELEVATION - TOP OF TRANSITION SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
   - GO TO THE APPROPRIATE TABLE AND SELECT THE DESIGN INFORMATION FOR THE RISER SECTION BASED ON THE REQUIRED HEIGHT.

PRECAST CONCRETE INLET BOX DESIGN TABLE NOTES:

1. RISER AND BASE SECTIONS WERE DESIGNED BASED ON A 2438 mm (8'-0") MAXIMUM HEIGHT.
2. WELDED WIRE FABRIC SIZE AND SPACING SHOWN IN THE DESIGN TABLES IS ONLY SUGGESTED. FABRICATOR IS PERMITTED TO USE ANY WIRE SIZE AND SPACING THAT MEETS THE STEEL AREA REQUIREMENTS, CLEARANCE REQUIREMENTS, CLEARANCE REQUIREMENTS BETWEEN TWO REINFORCEMENT MATS AND THE REQUIREMENTS SHOWN IN MATERIAL NOTE 4 ON SHEET 1.
3. THE WALL THICKNESS FOR THE RISER SECTIONS DOES NOT NEED TO MATCH THE WALL THICKNESS FOR THE BASE SECTION, ALTHOUGH THE INSIDE FACES MUST ALIGN.
4. HOW TO DETERMINE THE BASE DESIGN REQUIREMENTS:
   - DETERMINE THE OVERALL STRUCTURE HEIGHT, H (FINISHED GRADE ELEVATION - BOTTOM SLAB ELEVATION), AND ROUND THE HEIGHT UP TO THE NEXT HIGHER HEIGHT INCREMENT SHOWN IN THE TABLE.
   - GO TO THE APPROPRIATE BASE SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED HEIGHT.
5. HOW TO DETERMINE THE RISER BOX DESIGN REQUIREMENTS:
   - DETERMINE THE JOINT ELEVATION AND CALCULATE THE JOINT DEPTH, JD (FINISHED GRADE ELEVATION - JOINT ELEVATION), AND ROUND THE DEPTH UP TO THE NEXT HIGHER DEPTH INCREMENT SHOWN IN THE TABLE.
   - GO TO THE APPROPRIATE RISER SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED DEPTH.
   - IF MULTIPLE RISER SECTIONS ARE REQUIRED, SELECT ADDITIONAL RISER SECTIONS DESIGN REQUIREMENTS BASED ON THE JOINT ELEVATION.
6. HOW TO DETERMINE THE RISER BOX DESIGN REQUIREMENTS WHEN USING A TRANSITION SLAB:
   - DETERMINE THE TOP OF TRANSITION SLAB ELEVATION AND CALCULATE THE JOINT DEPTH, JD (FINISHED GRADE ELEVATION - TOP OF TRANSITION SLAB ELEVATION), AND ROUND THE DEPTH UP TO THE NEXT HIGHER DEPTH INCREMENT SHOWN IN THE TABLE.
   - GO TO THE APPROPRIATE RISER SECTION TABLE AND SELECT THE DESIGN INFORMATION BASED ON THE ROUNDED DEPTH.
   - IF MULTIPLE RISER SECTIONS ARE REQUIRED, SELECT ADDITIONAL RISER SECTIONS DESIGN REQUIREMENTS BASED ON THE JOINT ELEVATION.
7. FABRICATOR IS PERMITTED TO FABRICATE PRECAST CONCRETE INLET BOXES USING A COMBINATION OF REINFORCEMENT BARS AND WELDED WIRE FABRIC (WWF) IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:
   - THE MEMBER THICKNESS AND THE REQUIRED AREA OF STEEL MUST MEET THE REQUIREMENTS OF THE REINFORCEMENT BAR DESIGN TABLES SHOWN ON SHEETS 29-34.
   - BAR SIZE AND BAR SPACING MUST MEET THE REQUIREMENTS SHOWN IN MATERIAL NOTE 3 ON SHEET 1.
   - WIRE SIZE AND WIRE SPACING MUST MEET THE REQUIREMENTS SHOWN IN MATERIAL NOTE 4 ON SHEET 1.
   - CLEARANCE REQUIREMENTS AND CLEARANCE REQUIREMENTS BETWEEN TWO REINFORCEMENT MATS MUST BE MET.
   - FOR DETAILS, SEE SHEET 28.
8. PROVIDE MARKINGS ON EACH SECTION TO CLEARLY IDENTIFY THE MAXIMUM ALLOWABLE DEPTH.

REINFORCEMENT BAR AREAS U.S. CUSTOMARY UNITS	
BAR SIZE AND SPACING	STEEL AREA ($IN.^2/FT.$)
#3 @ 4"	0.33
#3 @ 6"	0.22
#3 @ 9"	0.15
#4 @ 4"	0.60
#4 @ 6"	0.40
#4 @ 9"	0.27
#4 @ 12"	0.20
#5 @ 4"	0.93
#5 @ 6"	0.62
#5 @ 9"	0.41
#5 @ 12"	0.31
#6 @ 4"	1.32
#6 @ 6"	0.88
#6 @ 9"	0.59
#6 @ 12"	0.44

REINFORCEMENT BAR AREAS METRIC UNITS	
BAR SIZE AND SPACING	STEEL AREA (mm^2/m)
#10 @ 102 mm	699
#10 @ 152 mm	466
#10 @ 229 mm	318
#13 @ 102 mm	1270
#13 @ 152 mm	847
#13 @ 229 mm	572
#13 @ 305 mm	424
#16 @ 102 mm	1969
#16 @ 152 mm	1312
#16 @ 229 mm	868
#16 @ 305 mm	656
#19 @ 102 mm	2794
#19 @ 152 mm	1863
#19 @ 229 mm	1249
#19 @ 305 mm	931

WELDED WIRE FABRIC WIRE SIZES PLAIN [DEFORMED]	
U.S. CUSTOMARY SIZES	METRIC SIZES
W4 [D4]	MW26 [MD26]
W5 [D5]	MW32 [MD32]
W6 [D6]	MW39 [MD39]
W7 [D7]	MW45 [MD45]
W8 [D8]	MW52 [MD52]
W9 [D9]	MW58 [MD58]
W10 [D10]	MW65 [MD65]
W12 [D12]	MW77 [MD77]
W14 [D14]	MW90 [MD90]
W16 [D16]	MW103 [MD103]
W20 [D20]	MW129 [MD129]

W AND MW = PLAIN WIRES
D AND MD = DEFORMED WIRES

REINFORCEMENT BAR SPLICE LENGTHS		
BAR SIZE	CAST-IN-PLACE CONCRETE (CLASS A) f'c = 21 MPa (3000 psi)	PRECAST CONCRETE (CLASS AA, MODIFIED) f'c = 28 MPa (4000 psi)
#10 (#3)	410 mm (1'-4")	410 mm (1'-4")
#13 (#4)	550 mm (1'-9")	550 mm (1'-9")
#16 (#5)	675 mm (2'-2")	675 mm (2'-2")
#19 (#6)	850 mm (2'-9")	800 mm (2'-7")
#22 (#7)	1150 mm (3'-9")	1000 mm (3'-3")
#25 (#8)	1500 mm (4'-11")	1300 mm (4'-3")
#29 (#9)	1900 mm (6'-3")	1650 mm (5'-5")
#32 (#10)	2425 mm (7'-11")	2100 mm (6'-10")
#36 (#11)	2950 mm (9'-9")	2575 mm (8'-5")

NOTES:

1. SPLICE LENGTHS BASED ON UNCOATED DEFORMED BARS.
2. SPLICE LENGTHS BASED ON CLASS C SPLICE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
GENERAL NOTES - 3

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 3 OF 45

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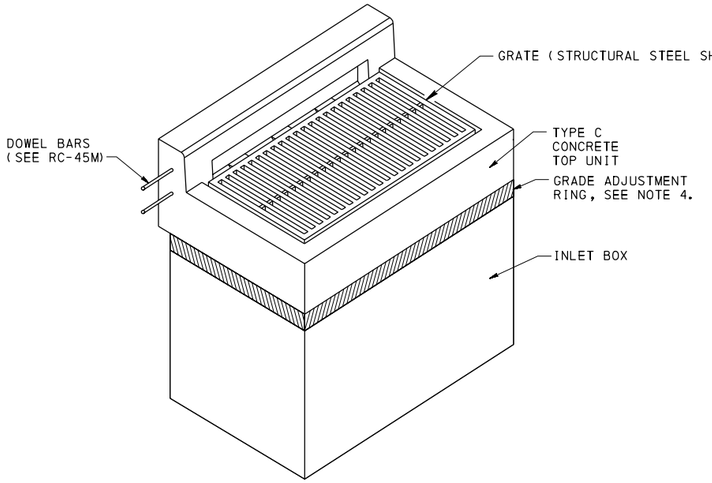
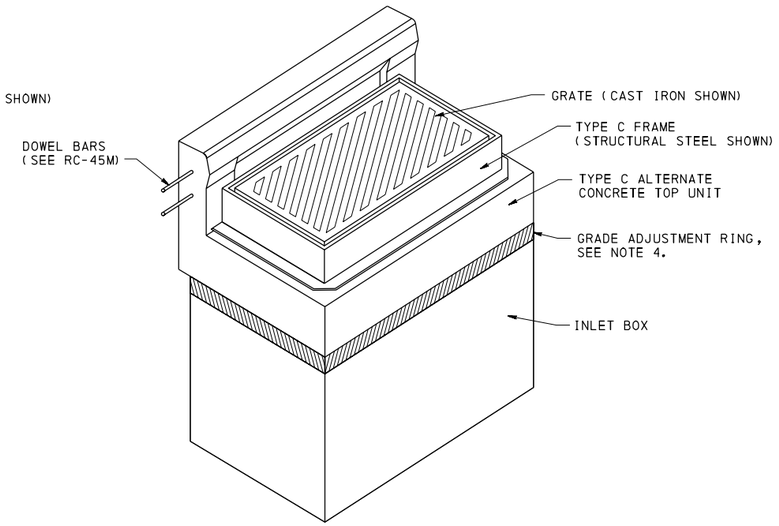


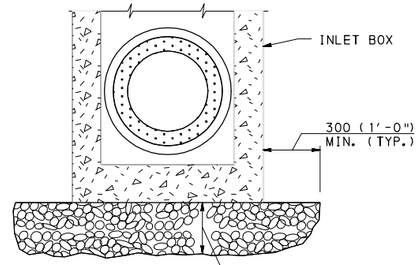
CONCRETE TOP UNIT - TYPE C



CONCRETE TOP UNIT - TYPE C ALTERNATE WITH TYPE C FRAME

NOTES:

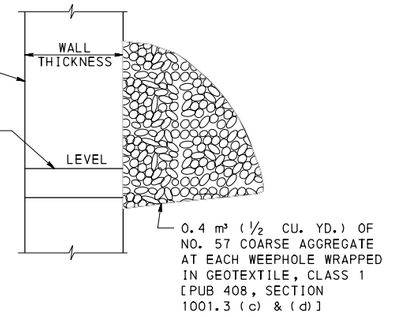
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. STANDARD INLET BOXES SHOWN, PROVIDE TOP SLABS FOR OTHER INLET BOX TYPES.
3. SEE RC-45M FOR DETAILS FOR THE CONCRETE TOP UNITS, FRAMES, AND GRATES.
4. PROVIDE GRADE ADJUSTMENT RINGS WHEN REQUIRED. SEE RC-45M FOR DETAILS.



NOTE:
COST OF NO. 2A COARSE AGGREGATE IS INCIDENTAL TO THE INLET BOX.

INLET BOX SUBBASE PREPARATION DETAIL

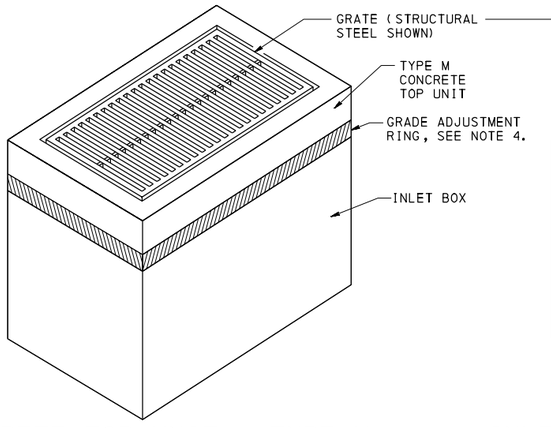
(SEE FIELD CONSTRUCTION NOTES ON SHEET 1)



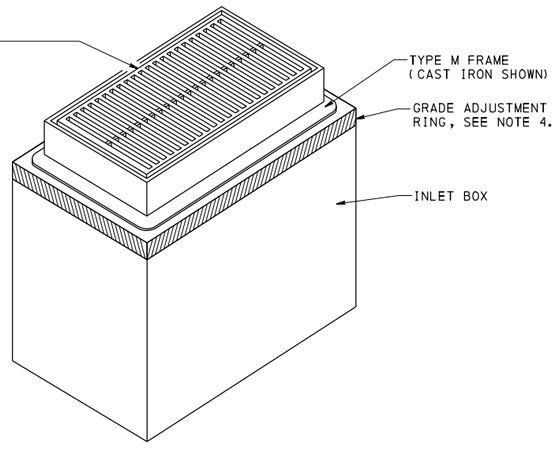
NOTE:
COST OF NO. 57 COARSE AGGREGATE AND GEOTEXTILE IS INCIDENTAL TO THE INLET BOX.

WEEPHOLE DETAIL

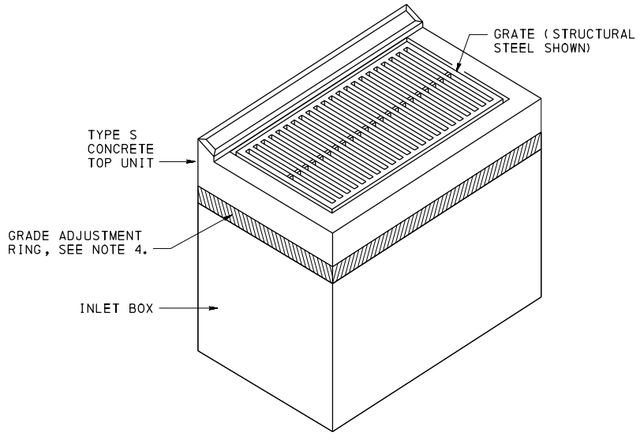
(SEE GENERAL NOTE 15 ON SHEET 1)



CONCRETE TOP UNIT - TYPE M



INLET BOX WITH TYPE M FRAME



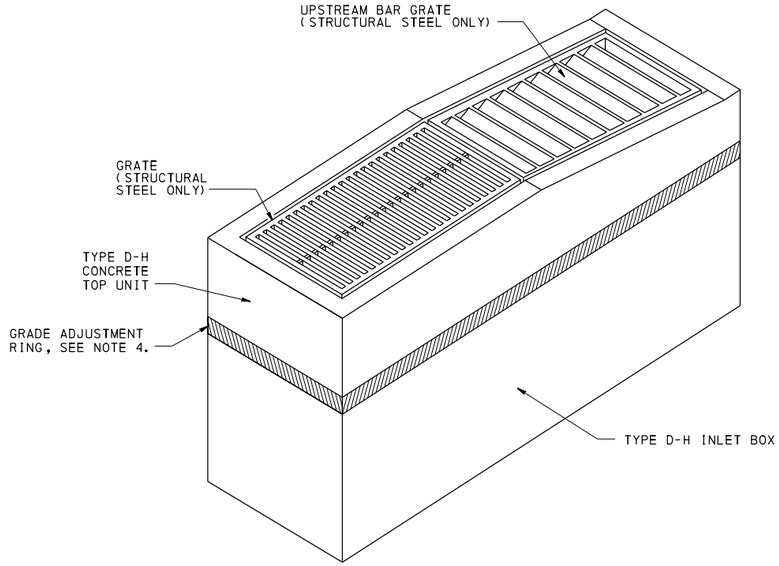
CONCRETE TOP UNIT - TYPE S

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

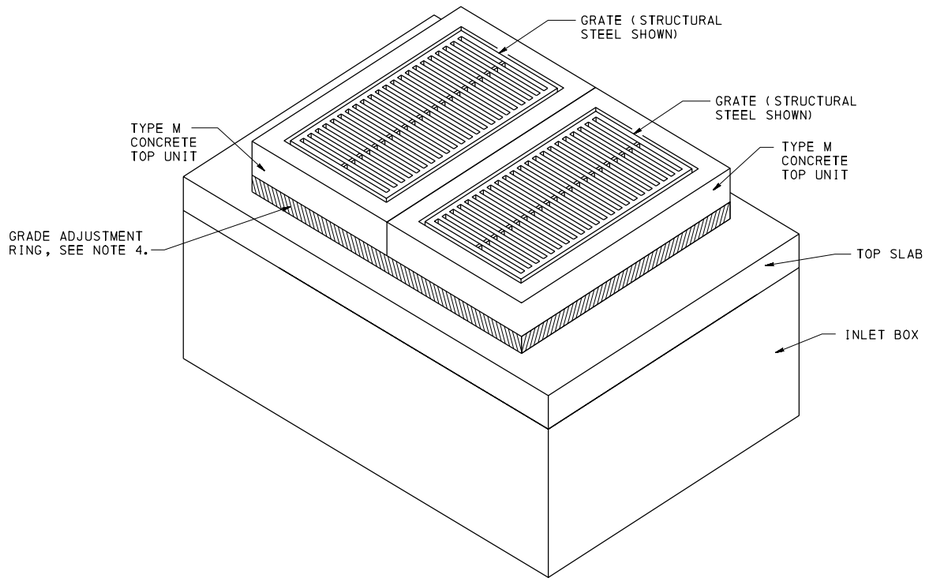
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
INLET ASSEMBLIES - 1

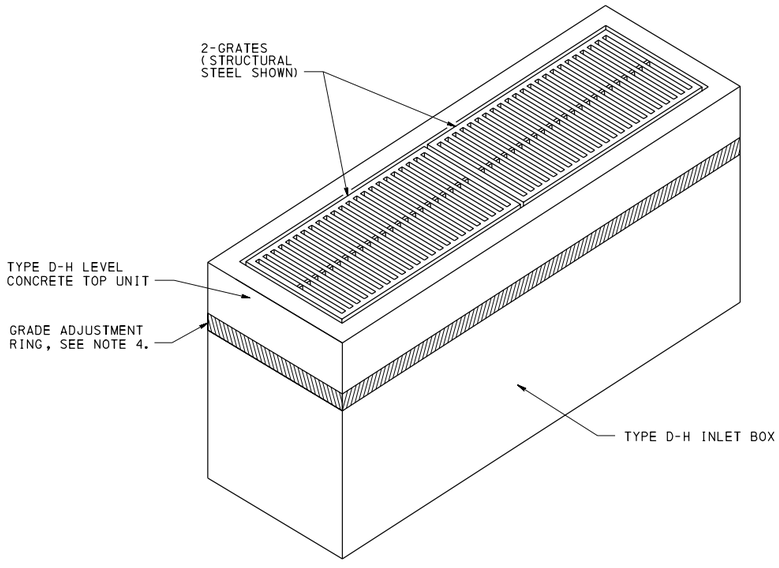
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



CONCRETE TOP UNIT - TYPE D-H



CONCRETE TOP UNIT - DOUBLE TYPE M



CONCRETE TOP UNIT - TYPE D-H LEVEL

NOTES:

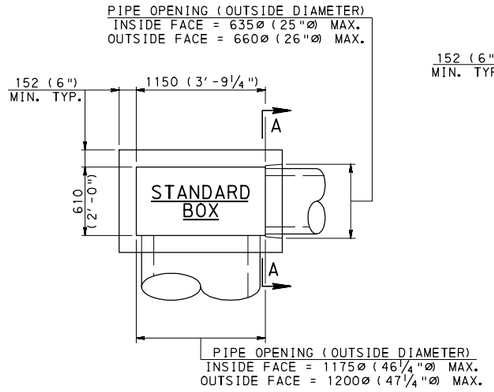
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. TOP SLAB NOT PERMITTED ON TYPE D-H INLET BOX.
3. SEE RC-45M FOR DETAILS FOR THE CONCRETE TOP UNITS, FRAMES, AND GRATES.
4. PROVIDE GRADE ADJUSTMENT RINGS WHEN REQUIRED. SEE RC-45M FOR DETAILS.

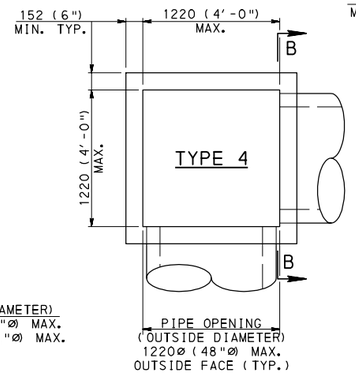
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

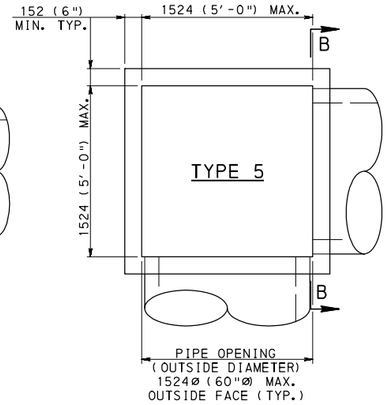
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

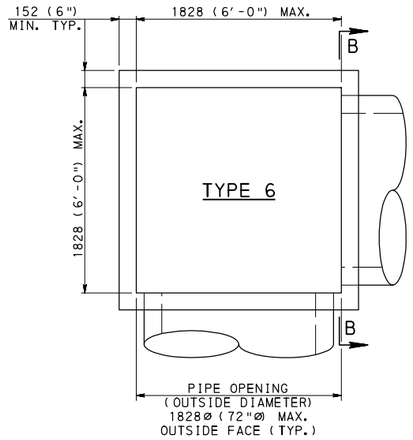
INLET BOXES
INLET ASSEMBLIES - 2

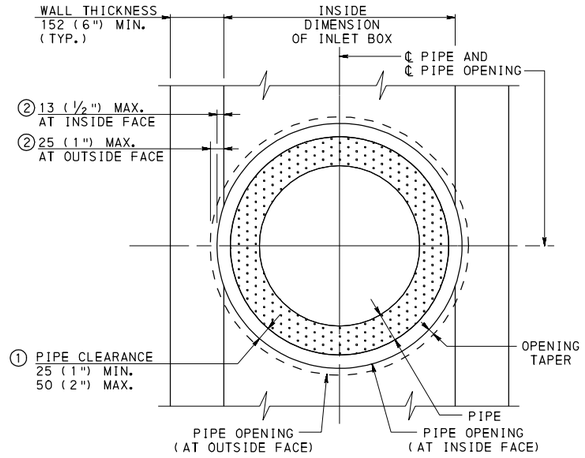
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 5 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



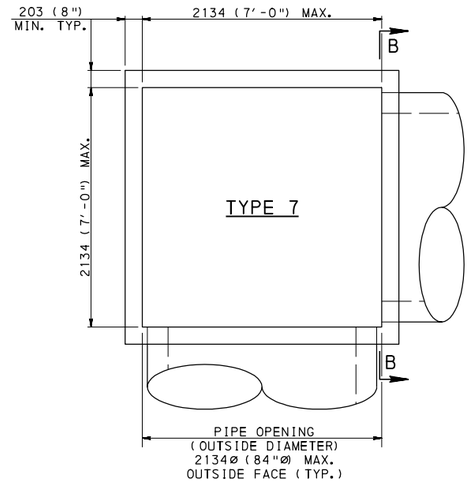


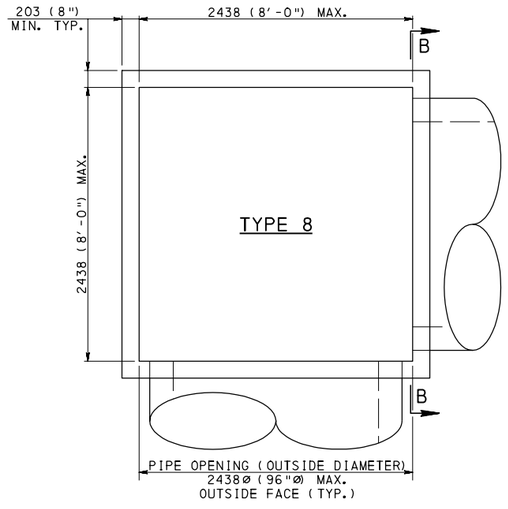


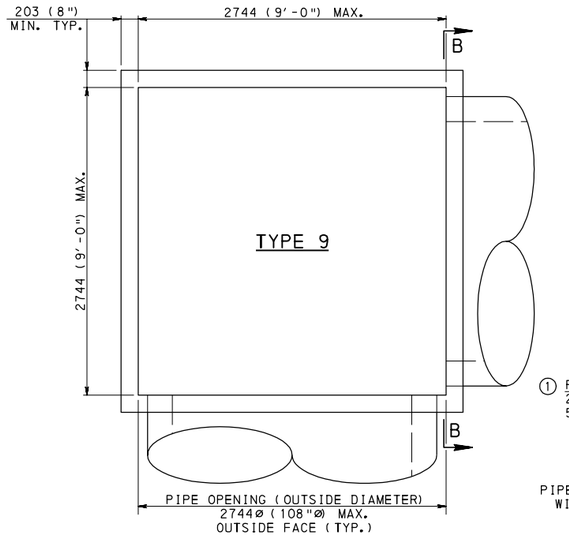


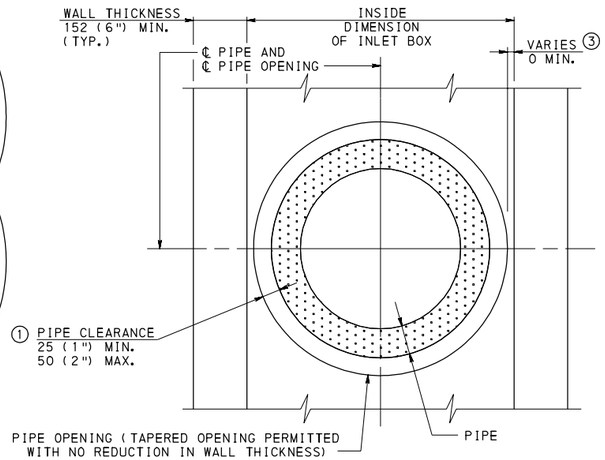


SECTION A-A
(STANDARD INLET BOX ONLY)

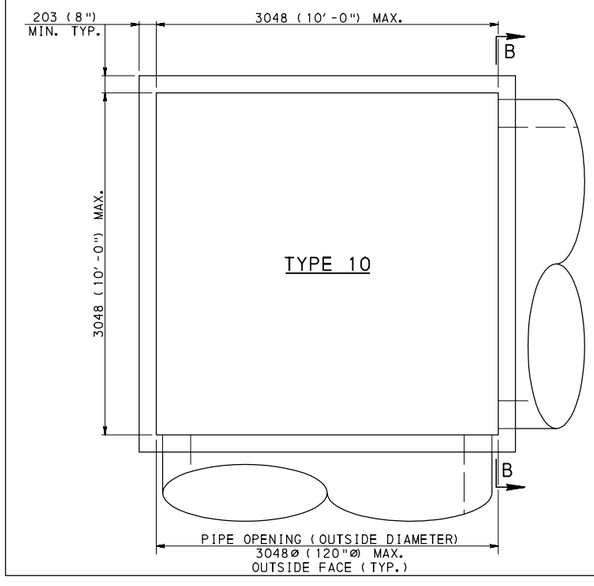


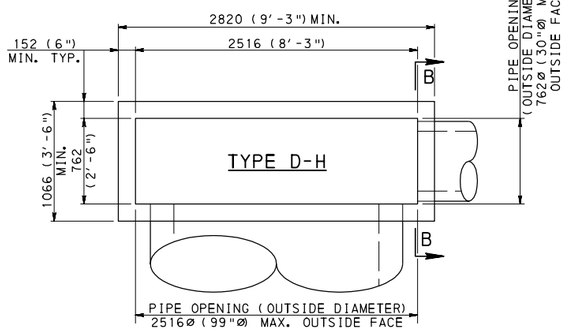






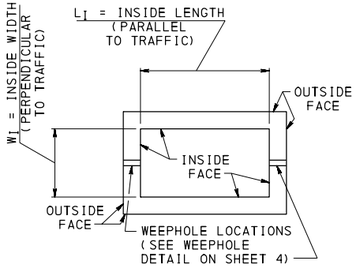
SECTION B-B
(TYPICAL ALL TYPES EXCEPT STANDARD)





PLAN - INLET BOXES

NOTES
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.



INLET BOX SCHEMATIC

LEGEND
OUTSIDE FACE - OUTSIDE FACE OF INLET BOX WALL
INSIDE FACE - INSIDE FACE OF INLET BOX WALL

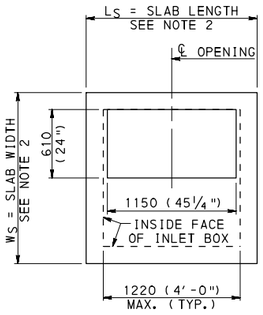
LEGEND
① OUTSIDE DIAMETER OF PIPE TO PIPE OPENING
② REDUCTION IN WALL THICKNESS DIMENSION
③ INSIDE FACE OF BOX WALL TO OUTSIDE DIAMETER OF PIPE OPENING

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

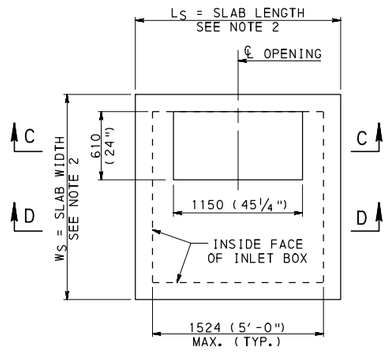
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
INLET BOX TYPES

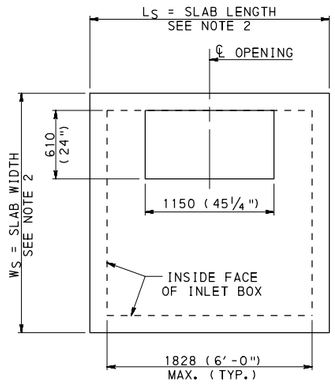
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 6 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



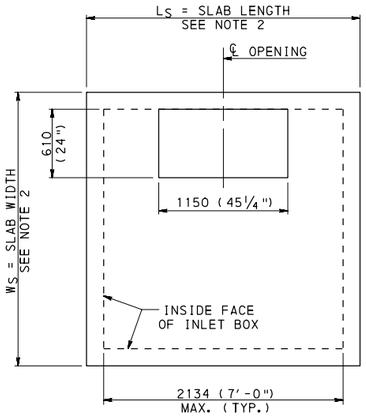
FOR TYPE 4 INLET BOX



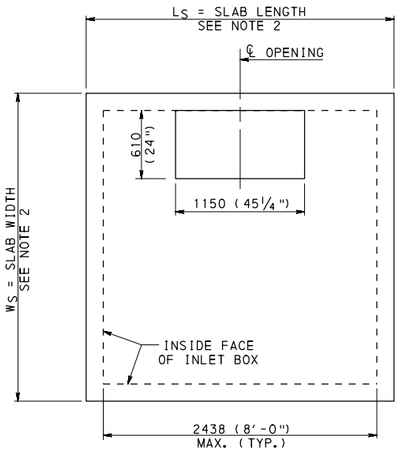
FOR TYPE 5 INLET BOX



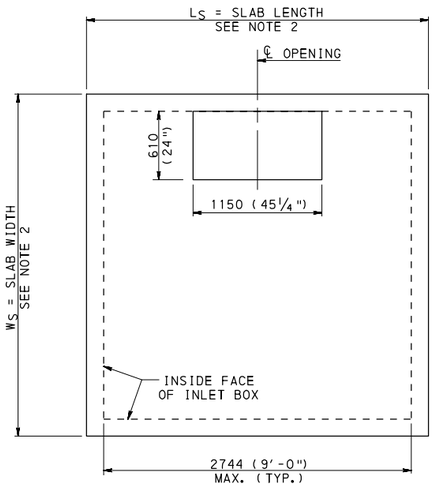
FOR TYPE 6 INLET BOX



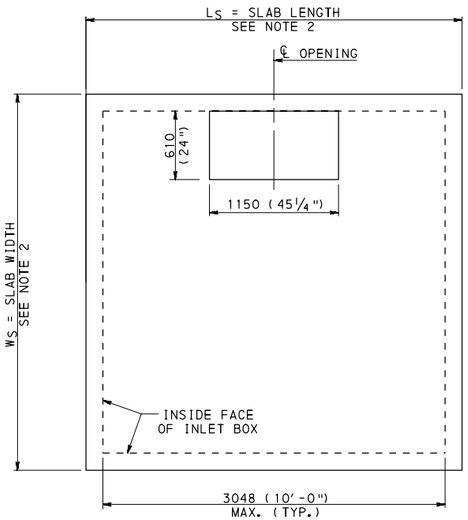
FOR TYPE 7 INLET BOX



FOR TYPE 8 INLET BOX



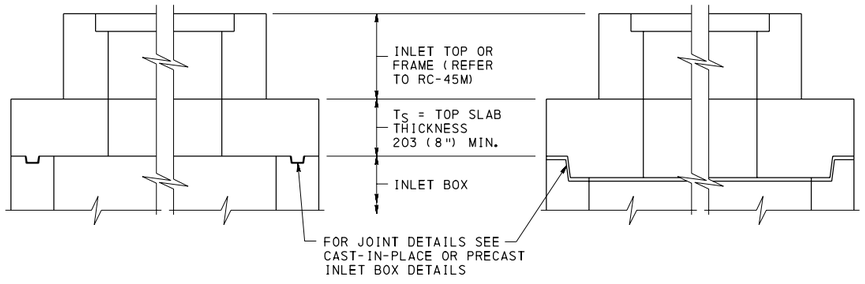
FOR TYPE 9 INLET BOX



FOR TYPE 10 INLET BOX

PLAN - TOP SLABS

(WITH STANDARD OPENING)



TOP SLAB WITH KEYED JOINT

TOP SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

SECTION C-C

(TYPICAL)

NOTE: GRADE ADJUSTMENT RINGS NOT SHOWN

NOTES:

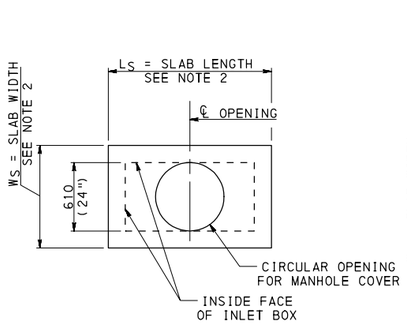
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.
3. SET EDGE OF OPENING AT INSIDE FACE OF INLET BOX FOR ACCESS, IF POSSIBLE.
4. FOR SECTION D-D AND REINFORCEMENT REQUIREMENTS, SEE SHEET 8.
5. FOR ADDITIONAL REINFORCEMENT AROUND OPENINGS, SEE SHEETS 9 & 10.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

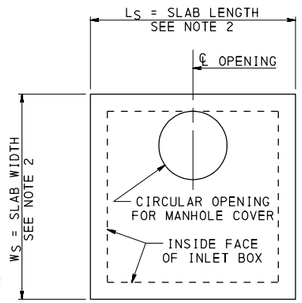
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
TOP SLABS - 1

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 7 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



STANDARD INLET BOX



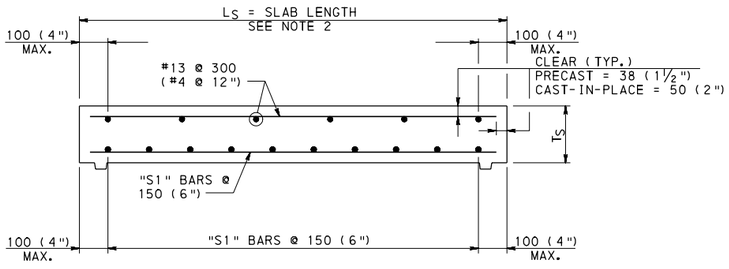
OTHER INLET BOXES

PLAN - TOP SLAB WITH OPTIONAL ROUND OPENING FOR MANHOLE COVER

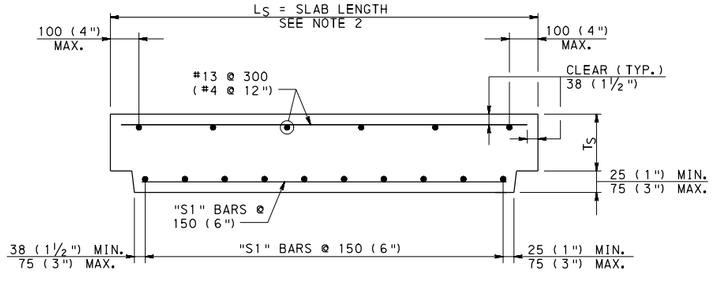
CIRCULAR OPENINGS:

1. THE FOLLOWING CIRCULAR OPENINGS ARE PERMITTED:
   610 mm (24") ø
   686 mm (27") ø
   762 mm (30") ø

2. FOR A STANDARD BOX, ONLY A 610 mm (24") ø OPENING IS PERMITTED.



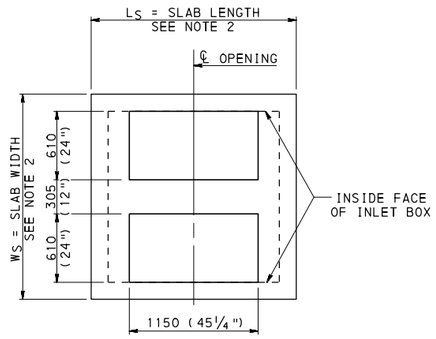
TOP SLAB WITH KEYED JOINT



TOP SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

SECTION D-D

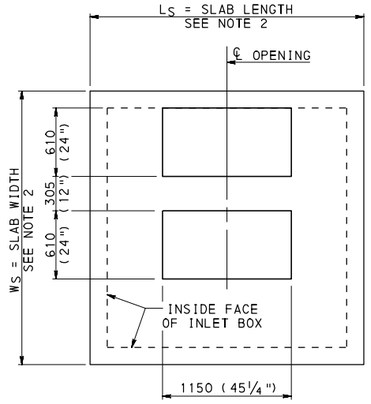
(ADDITIONAL REINFORCEMENT NOT SHOWN)



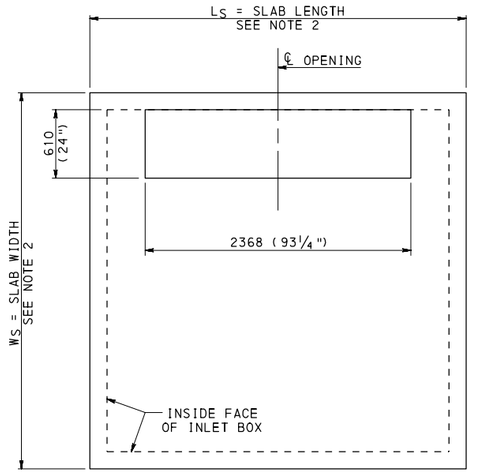
TYPE 5 INLET BOX

PLAN - TOP SLAB FOR DOUBLE TYPE M CONCRETE TOP UNIT

NOT APPLICABLE FOR STANDARD OR TYPE 4 INLET BOXES



OTHER INLET BOXES
(TYPE 6, 7, 8, 9 AND 10)



PLAN - TOP SLAB FOR TYPE D-H CONCRETE TOP UNITS

FOR TYPES 8, 9 OR 10 INLET BOXES ONLY

TOP SLAB CAST-IN-PLACE CONCRETE U.S. CUSTOMARY UNITS		
INLET BOX TYPE	Ts (IN.)	S1 (BAR SIZE)
STANDARD	8	#6
TYPE 4	12	#7
TYPE 5	14	#8
TYPE 6	14	#8
TYPE 7	14	#9
TYPE 8	14	#9
TYPE 9	14	#9
TYPE 10	14	#9

TOP SLAB CAST-IN-PLACE CONCRETE METRIC UNITS		
INLET BOX TYPE	Ts (mm)	S1 (BAR SIZE)
STANDARD	203	#19
TYPE 4	305	#22
TYPE 5	356	#25
TYPE 6	356	#25
TYPE 7	356	#29
TYPE 8	356	#29
TYPE 9	356	#29
TYPE 10	356	#29

TOP SLAB PRECAST CONCRETE U.S. CUSTOMARY UNITS		
INLET BOX TYPE	Ts (IN.)	S1 (BAR SIZE)
STANDARD	8	#6
TYPE 4	10	#8
TYPE 5	12	#9
TYPE 6	12	#9
TYPE 7	14	#9
TYPE 8	14	#9
TYPE 9	14	#9
TYPE 10	14	#9

TOP SLAB PRECAST CONCRETE METRIC UNITS		
INLET BOX TYPE	Ts (mm)	S1 (BAR SIZE)
STANDARD	203	#19
TYPE 4	254	#25
TYPE 5	305	#29
TYPE 6	305	#29
TYPE 7	356	#29
TYPE 8	356	#29
TYPE 9	356	#29
TYPE 10	356	#29

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.
3. SET EDGE OF OPENING AT INSIDE FACE OF INLET BOX FOR ACCESS, IF POSSIBLE.
4. FOR ADDITIONAL REINFORCEMENT AROUND OPENINGS, SEE SHEETS 9 & 10.
5. FOR JOINT DETAILS, SEE SHEETS 13 OR 23.
6. ANY REINFORCEMENT BARS LESS THAN 152 mm (6") IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

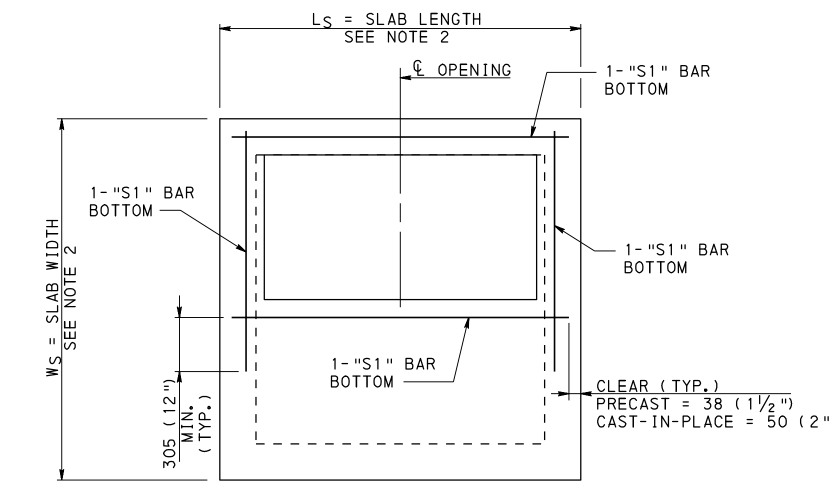
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
TOP SLABS - 2

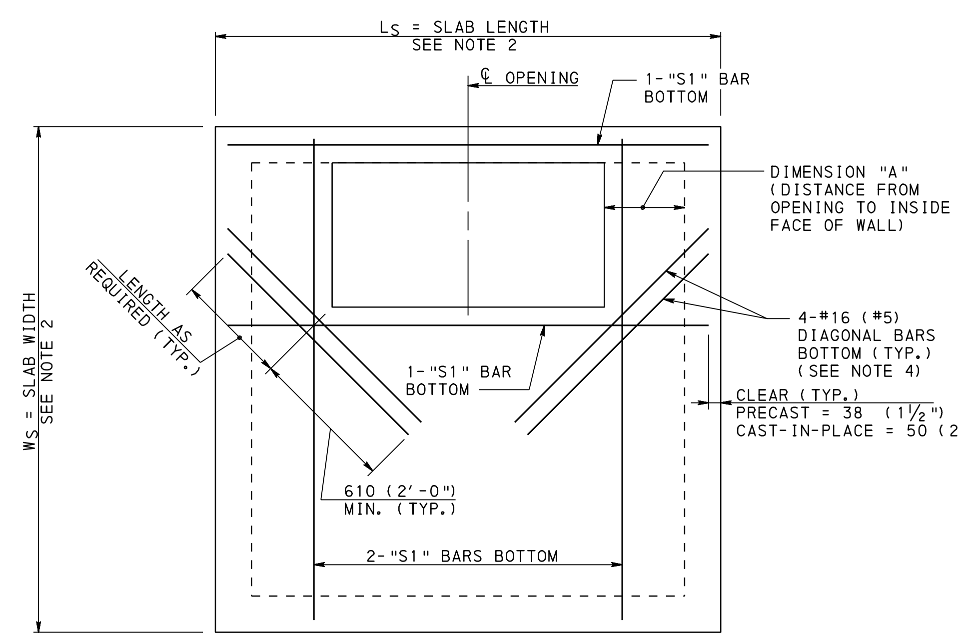
RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

RC-46M



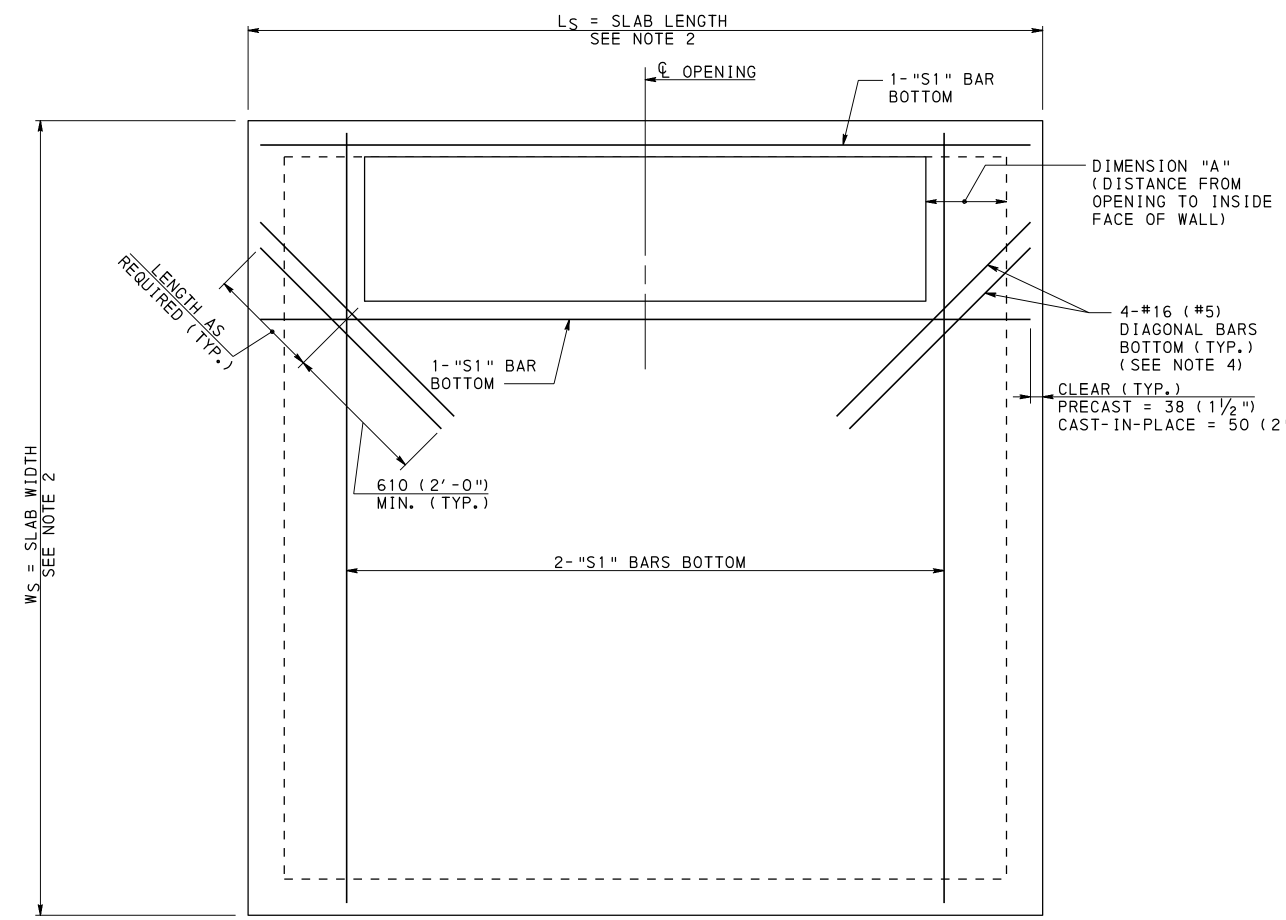
FOR TYPE 4 AND 5 INLET BOXES



FOR TYPE 6, 7, 8, 9
AND 10 INLET BOXES

ADDITIONAL REINFORCING AT RECTANGULAR OPENINGS IN TOP SLAB

(FOR ADDITIONAL INFORMATION SEE SHEET 8)



ADDITIONAL REINFORCING AT RECTANGULAR OPENING IN TOP SLAB FOR TYPE D-H CONCRETE TOP UNITS

(FOR ADDITIONAL INFORMATION SEE SHEET 8)

NOTES:

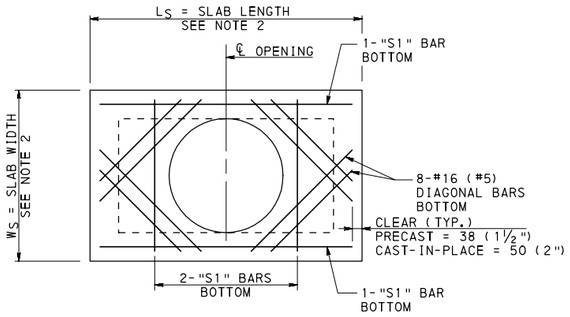
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.
3. FOR REINFORCEMENT REQUIREMENTS, SEE SHEET 8.
4. DIAGONAL BARS NOT REQUIRED WHEN DIMENSION "A" IS LESS THAN 150 mm (6").

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

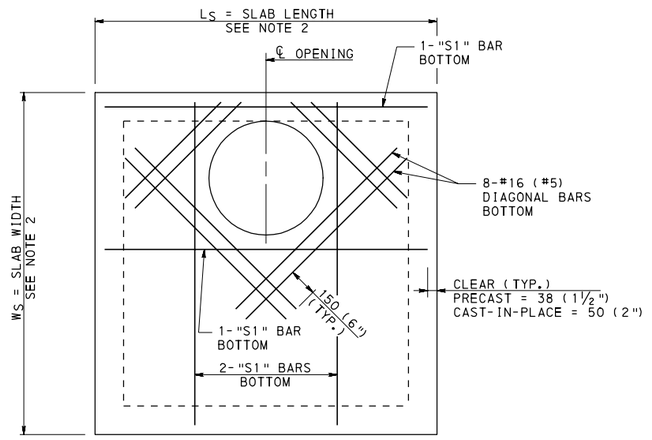
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
TOP SLABS - 3

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 9 OF 45 RC-46M



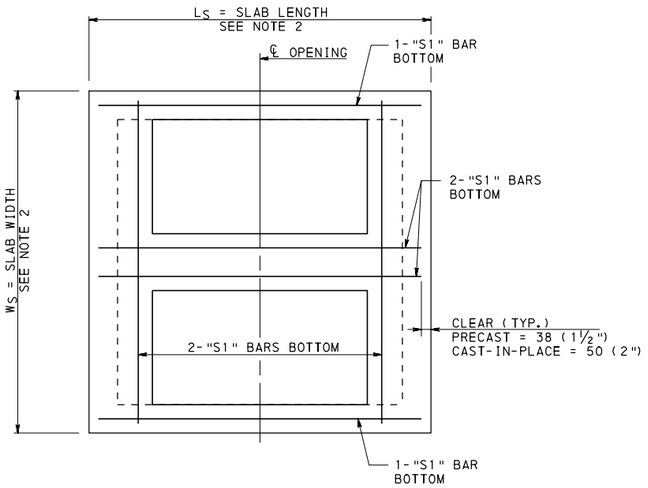
FOR STANDARD INLET BOX



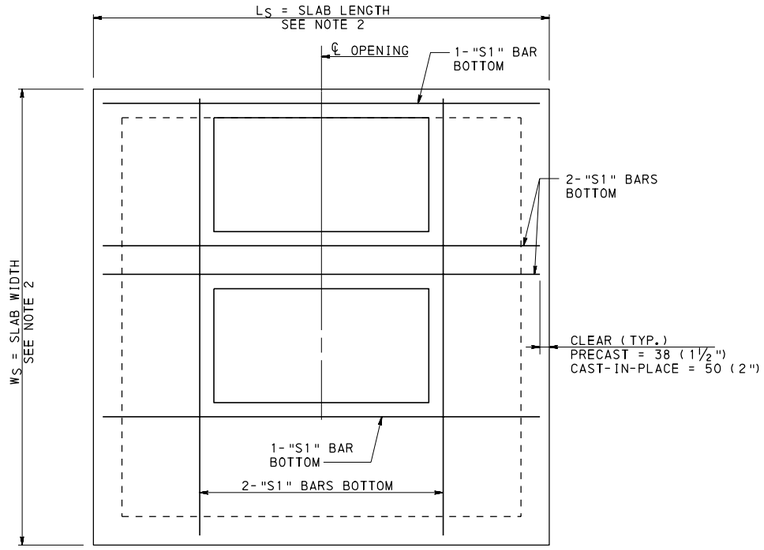
FOR OTHER INLET BOXES

ADDITIONAL REINFORCING AT ROUND OPENING IN TOP SLAB

(FOR ADDITIONAL INFORMATION SEE SHEET 8)



FOR TYPE 5 INLET BOX



FOR OTHER INLET BOXES
(TYPE 6, 7, 8, 9 AND 10)

ADDITIONAL REINFORCING AT RECTANGULAR OPENINGS IN TOP SLAB FOR DOUBLE TYPE M CONCRETE TOP UNIT

(FOR ADDITIONAL INFORMATION SEE SHEET 8)

NOTES:

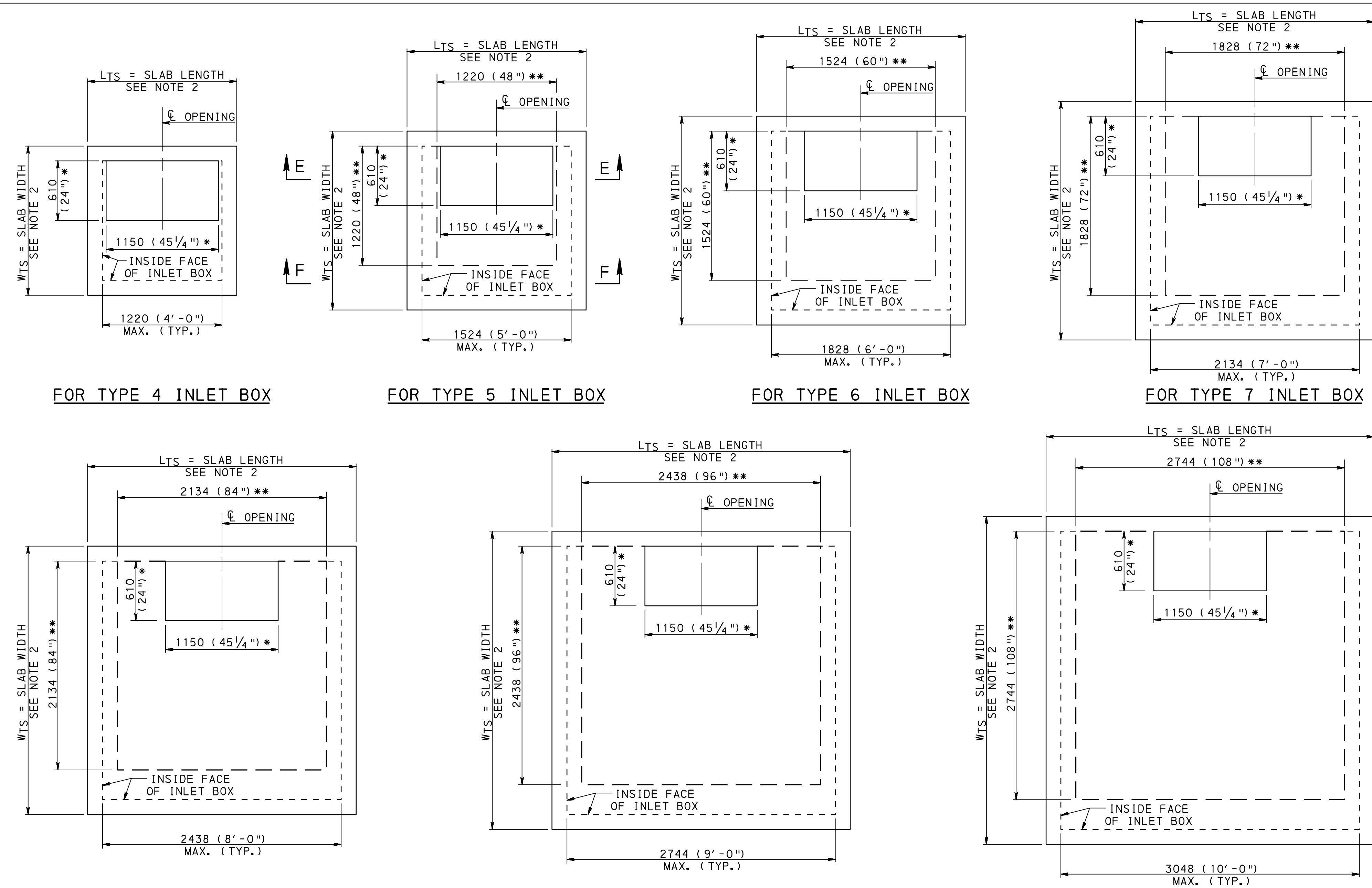
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TOP SLABS TO MATCH SIZE OF INLET BOX.
3. FOR REINFORCEMENT REQUIREMENTS, SEE SHEET 8.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
TOP SLABS - 4

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 10 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



FOR TYPE 4 INLET BOX

FOR TYPE 5 INLET BOX

FOR TYPE 6 INLET BOX

FOR TYPE 7 INLET BOX

FOR TYPE 8 INLET BOX

FOR TYPE 9 INLET BOX

FOR TYPE 10 INLET BOX

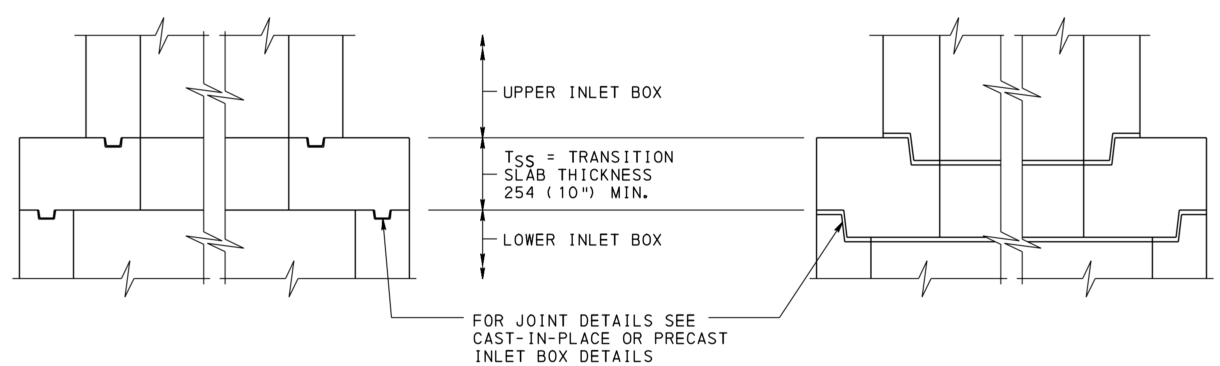
PLAN - TRANSITION SLABS

* MIN. OPENING - SIZED FOR STANDARD INLET BOX

** MAX. OPENING - SIZED FOR NEXT SMALLER INLET BOX

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TRANSITION SLAB TO MATCH SIZE OF LOWER INLET BOX.
3. SET EDGE OF OPENING AT INSIDE FACE OF INLET BOX FOR ACCESS, IF POSSIBLE.
4. FOR SECTION F-F AND REINFORCEMENT REQUIREMENTS, SEE SHEET 12.
5. FOR ADDITIONAL REINFORCEMENT AROUND OPENINGS, SEE SHEET 12.



TRANSITION SLAB WITH KEYED JOINT

TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

SECTION E-E

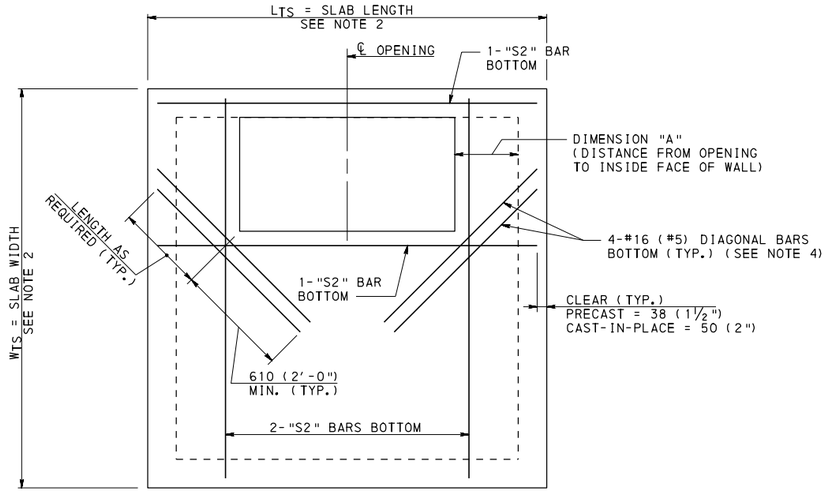
(TYPICAL)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
TRANSITION SLABS - 1

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 11 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



ADDITIONAL REINFORCING AT OPENINGS IN TRANSITION SLAB

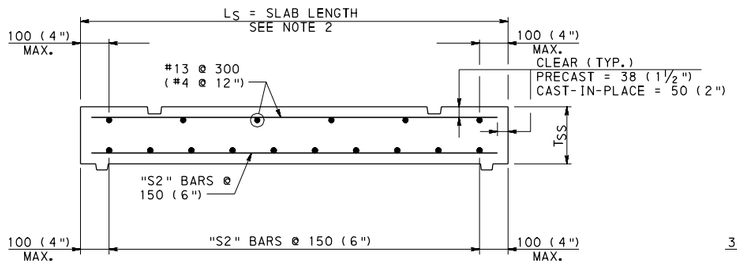
TRANSITION SLAB CAST-IN-PLACE CONCRETE U.S. CUSTOMARY UNITS			
BOTTOM BOX TYPE	T_{SS} (IN.)	S2 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.)*
TYPE 4	12	#6	25.0
TYPE 5	12	#8	24.0
TYPE 6	15	#8	23.0
TYPE 7	18	#10	22.0
TYPE 8	21	#10	21.0
TYPE 9	21	#11	20.0
TYPE 10	24	#11	19.0

TRANSITION SLAB CAST-IN-PLACE CONCRETE METRIC UNITS			
BOTTOM BOX TYPE	T_{SS} (mm)	S2 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (mm)*
TYPE 4	305	#19	7620
TYPE 5	305	#25	7315
TYPE 6	381	#25	7010
TYPE 7	457	#32	6706
TYPE 8	533	#32	6400
TYPE 9	533	#36	6096
TYPE 10	610	#36	5791

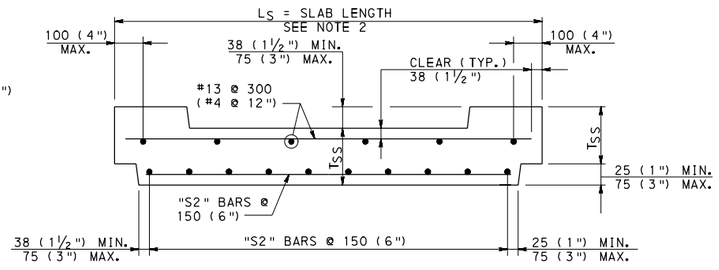
TRANSITION SLAB PRECAST CONCRETE U.S. CUSTOMARY UNITS			
BOTTOM BOX TYPE	T_{SS} (IN.)	S2 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (FT.)*
TYPE 4	10	#7	25.0
TYPE 5	12	#8	24.0
TYPE 6	14	#9	23.0
TYPE 7	16	#11	22.0
TYPE 8	18	#11	21.0
TYPE 9	22	#11	20.0
TYPE 10	24	#11	19.0

TRANSITION SLAB PRECAST CONCRETE METRIC UNITS			
BOTTOM BOX TYPE	T_{SS} (mm)	S2 (BAR SIZE)	MAXIMUM INSTALLATION DEPTH (mm)*
TYPE 4	254	#22	7620
TYPE 5	305	#25	7315
TYPE 6	356	#29	7010
TYPE 7	406	#36	6706
TYPE 8	457	#36	6400
TYPE 9	559	#36	6096
TYPE 10	610	#36	5791

* MAXIMUM INSTALLATION DEPTH = FINISHED GRADE ELEVATION - BOTTOM OF TRANSITION SLAB ELEVATION.



TRANSITION SLAB WITH KEYED JOINT



TRANSITION SLAB WITH SHIPLAP JOINT (PRECAST ONLY)

SECTION F-F

(ADDITIONAL REINFORCEMENT NOT SHOWN)

NOTES:

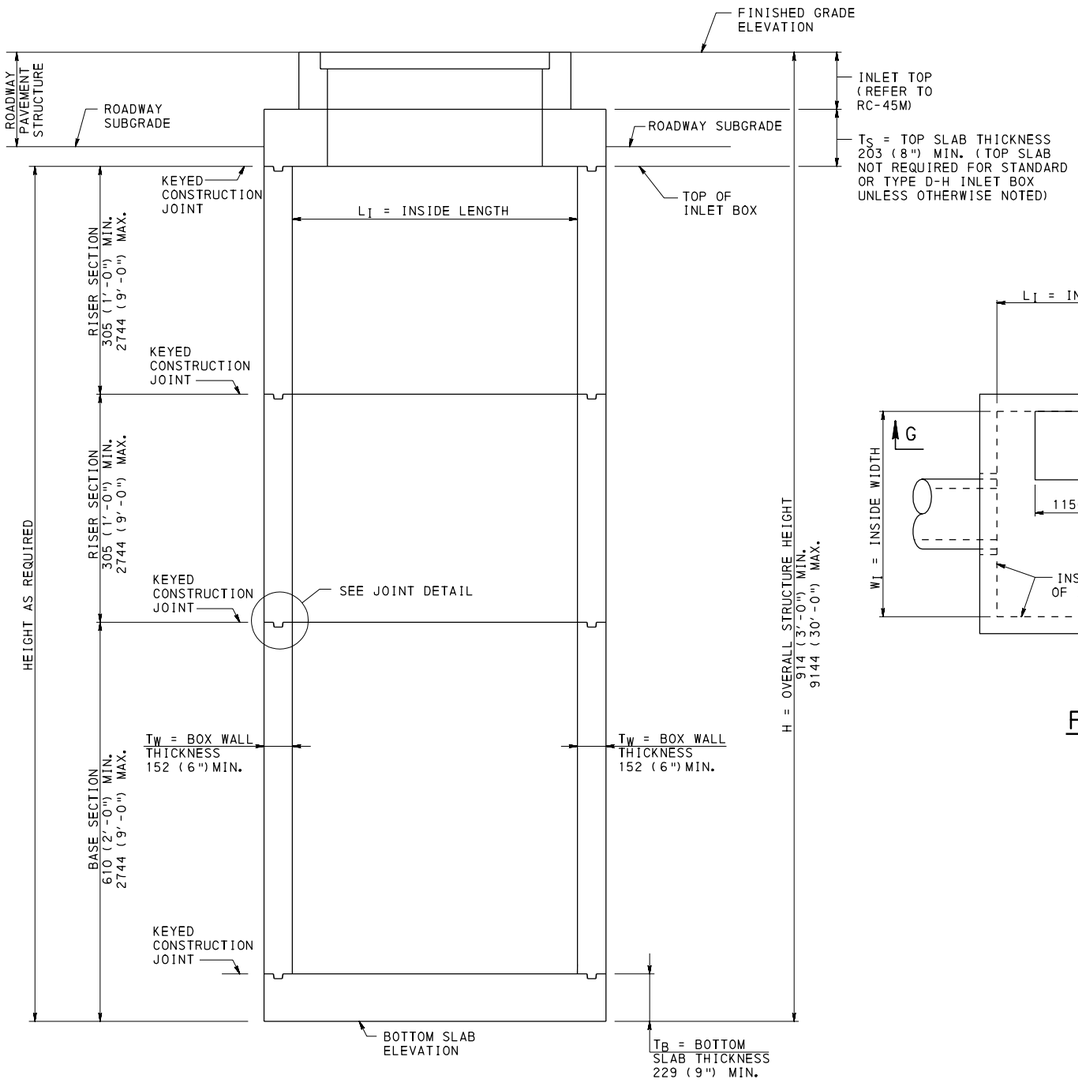
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. OUT TO OUT DIMENSIONS OF TRANSITION SLAB TO MATCH SIZE OF LOWER INLET BOX.
3. ANY REINFORCEMENT BARS LESS THAN 152 mm (6") IN LENGTH, DUE TO THE LOCATION OF THE OPENING, ARE NOT REQUIRED.
4. DIAGONAL BARS NOT REQUIRED WHEN DIMENSION "A" IS LESS THAN 150 mm (6").

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

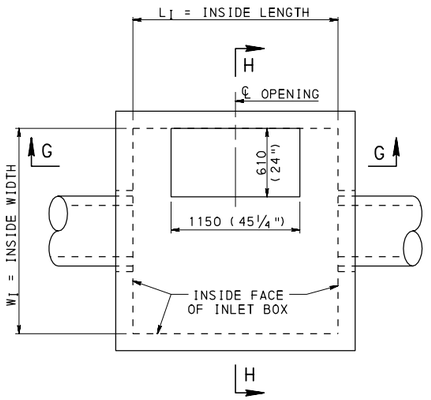
INLET BOXES
TRANSITION SLABS - 2

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 12 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M

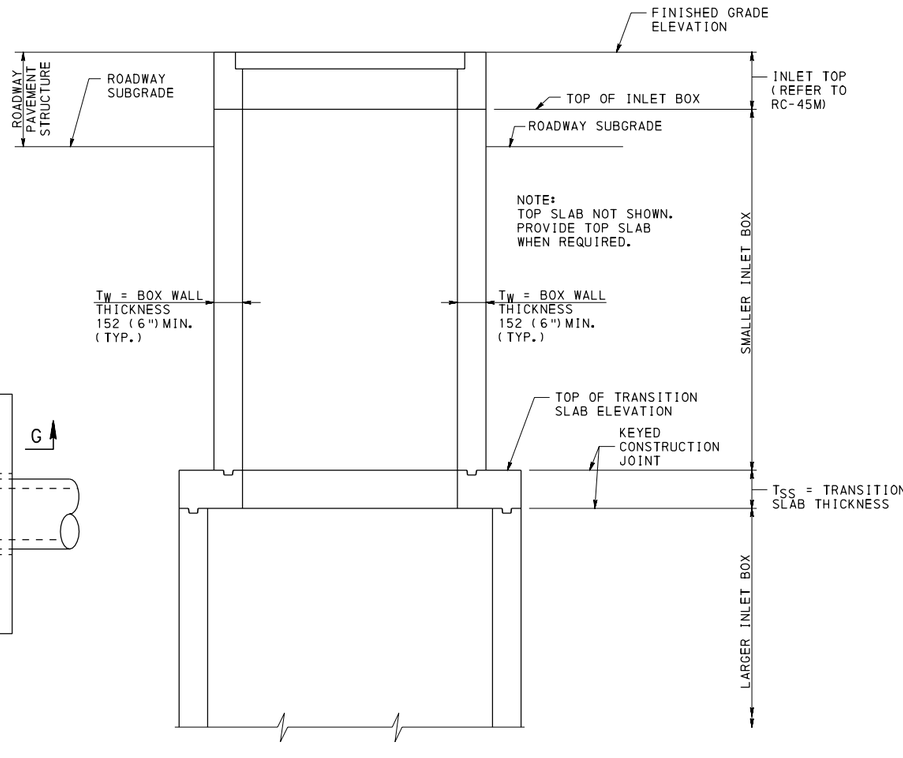


SECTION G-G

SAME SIZE INLET BOX FULL HEIGHT
WITH TOP SLAB AND INLET TOP

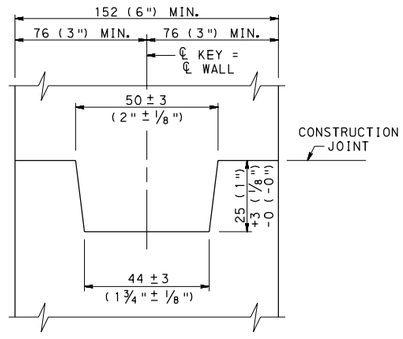


PLAN



SECTION G-G

LARGER INLET BOX TO SMALLER INLET BOX
WITH TRANSITION SLAB AND INLET TOP



JOINT DETAIL (CAST-IN-PLACE)

(KEYED CONSTRUCTION JOINT)

NOTES:

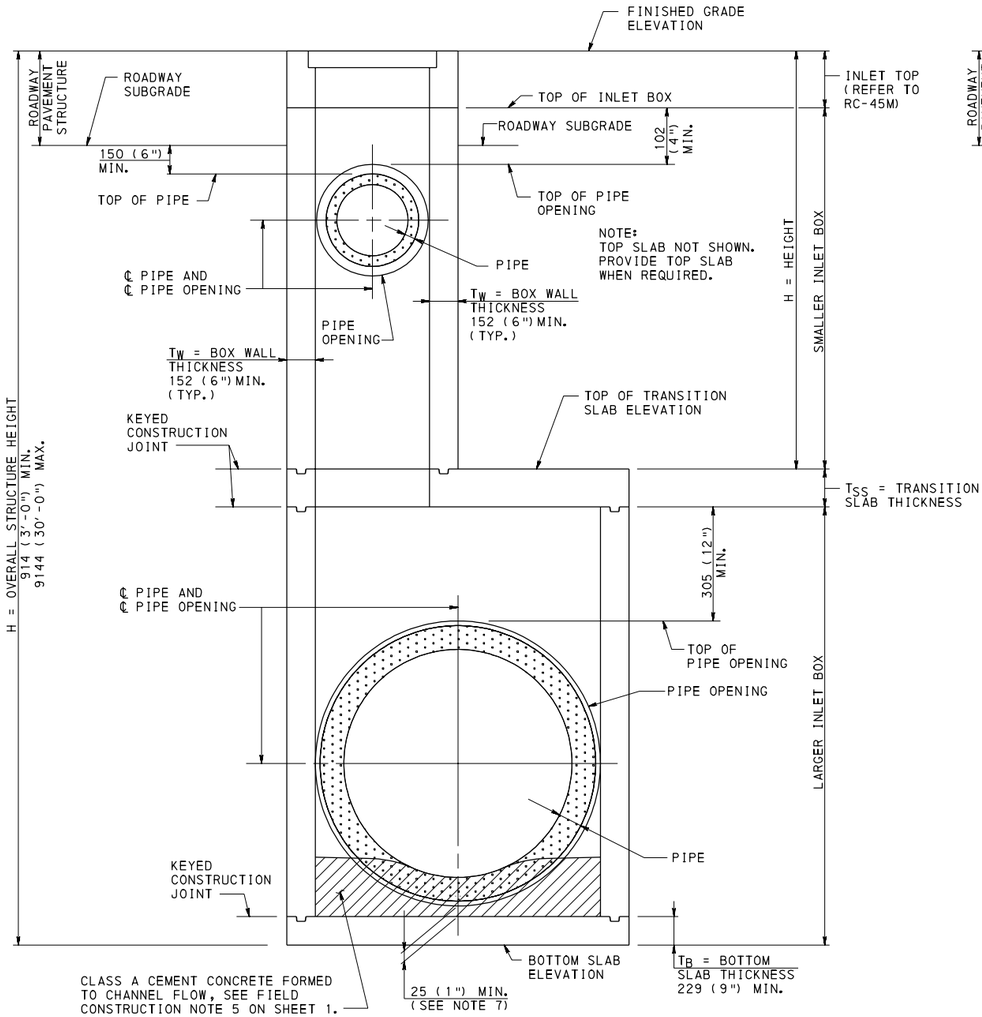
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR TOP SLAB DETAILS, SEE SHEETS 7 - 10.
4. FOR TRANSITION SLAB DETAILS, SEE SHEETS 11 & 12.
5. FOR SECTION H-H, SEE SHEET 14.
6. FOR REINFORCEMENT DETAILS, SEE SHEETS 15 & 16.
7. FOR DESIGN TABLES, SEE SHEETS 17 - 22.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

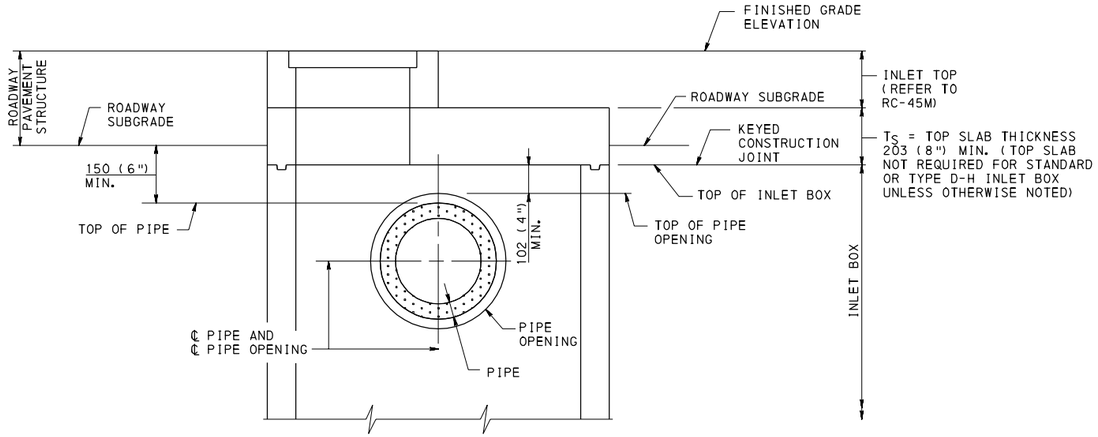
INLET BOXES
CAST-IN-PLACE INLET BOXES - 1

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 13 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



SECTION H-H

LARGER INLET BOX TO SMALLER INLET BOX WITH TRANSITION SLAB AND INLET TOP



SECTION H-H

INLET BOX WITH TOP SLAB AND INLET TOP

NOTES:

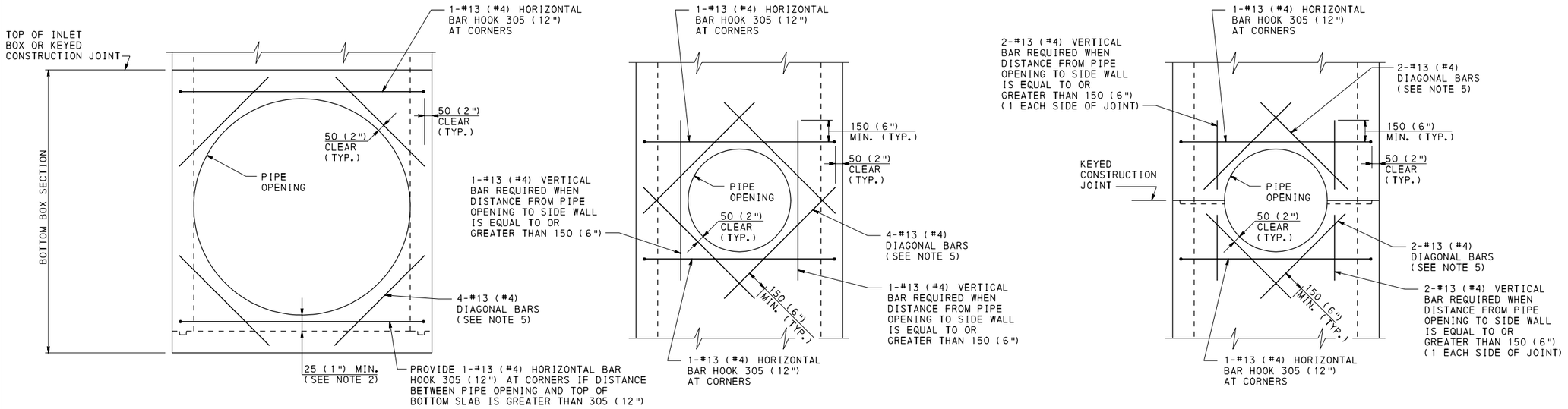
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR TOP SLAB DETAILS, SEE SHEETS 7 - 10.
4. FOR TRANSITION SLAB DETAILS, SEE SHEETS 11 & 12.
5. FOR REINFORCEMENT DETAILS, SEE SHEETS 15 & 16.
6. FOR DESIGN TABLES, SEE SHEETS 17 - 22.
7. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
CAST-IN-PLACE INLET BOXES - 2

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 14 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



AT BASE SECTION

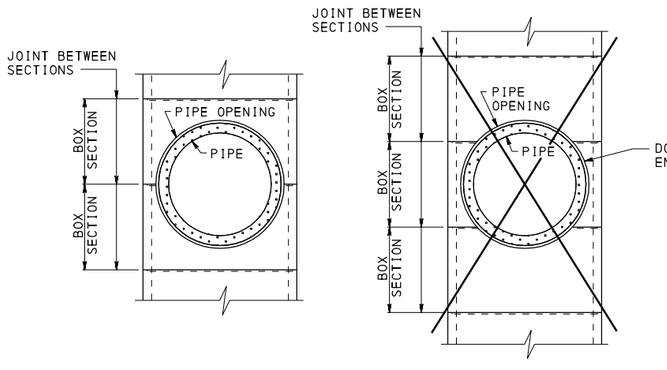
DETAIL SHOWN WHEN THE DISTANCE FROM PIPE OPENING TO SIDE WALL IS LESS THAN 150 (6"). PROVIDE A VERTICAL BAR WHEN THE DISTANCE FROM THE PIPE OPENING TO SIDE WALL IS EQUAL TO OR GREATER THAN 150 (6").

WITHIN BOX SECTION

AT CONSTRUCTION JOINT

ADDITIONAL REINFORCING ADJACENT TO PIPE OPENINGS IN WALL

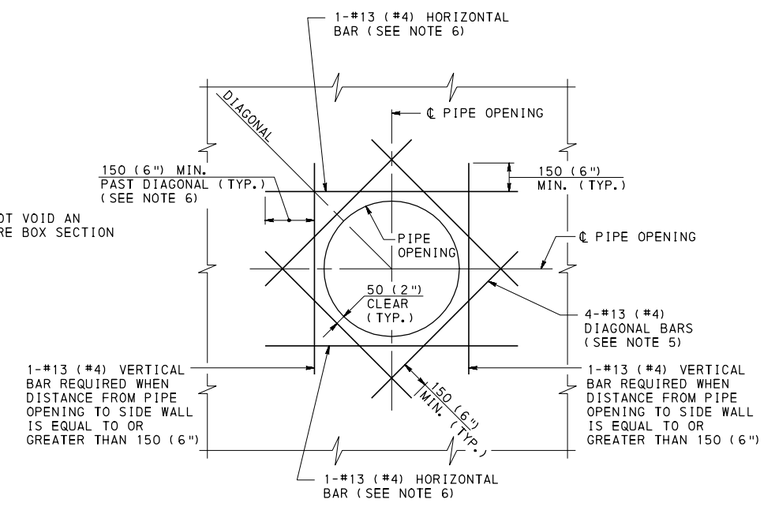
PIPE OPENING LOCATION AND SIZE AS REQUIRED



CORRECT LOCATION

WRONG LOCATION

LOCATION OF PIPE OPENING



WITHIN BOX SECTION
ALTERNATE DETAIL

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
3. TIE ADDITIONAL REINFORCEMENT TO THE OUTSIDE FACE REINFORCEMENT.
4. FOR REINFORCEMENT DETAILS, SEE SHEET 16.
5. PROVIDE DIAGONAL BARS WHEN PIPE OPENING IS GREATER THAN 914 mm (3'-0").
6. PROVIDE 305 mm (12") HOOK WHEN HORIZONTAL BAR EXTENDS INTO SIDE WALL.

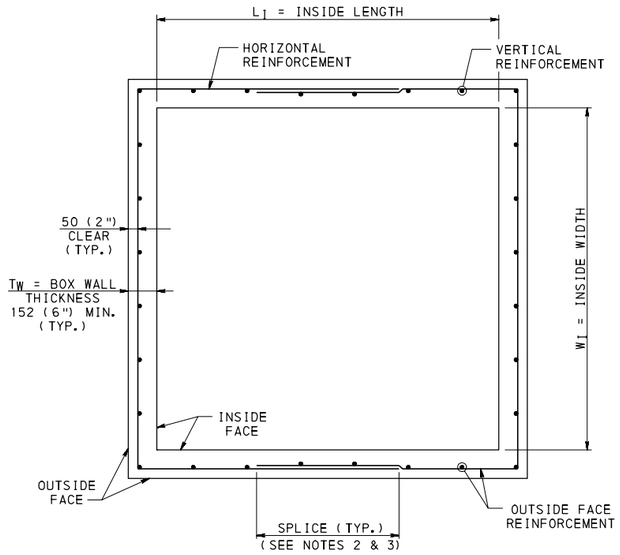
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

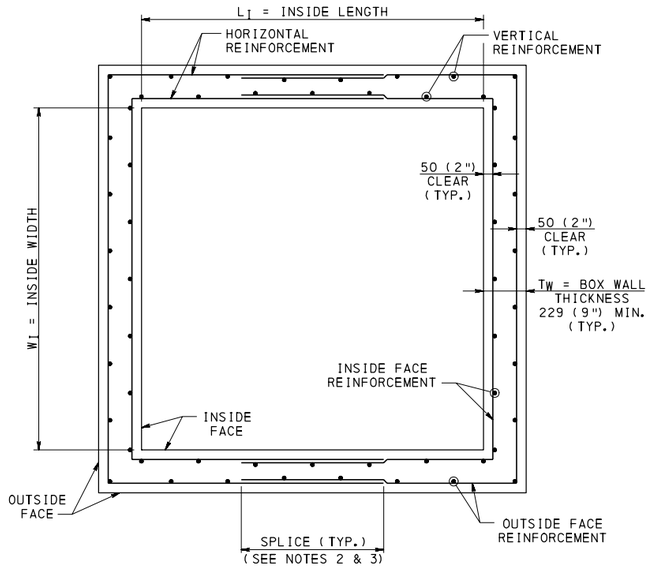
INLET BOXES

CAST-IN-PLACE INLET BOXES - 3

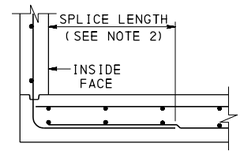
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 15 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



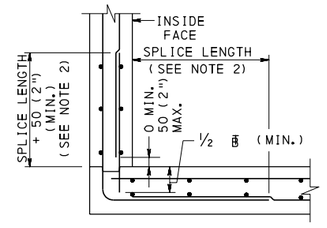
HORIZONTAL SECTION
WITH OUTSIDE FACE REINFORCEMENT
(RISER SECTIONS AND BASE SECTIONS)



HORIZONTAL SECTION
WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT
(RISER SECTIONS AND BASE SECTIONS)

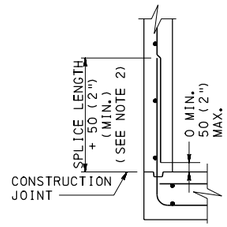


WITH OUTSIDE FACE
REINFORCEMENT

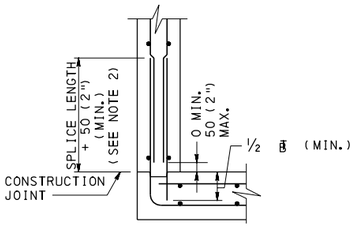


WITH OUTSIDE FACE AND
INSIDE FACE REINFORCEMENT

SPLICE IN BOTTOM SLAB



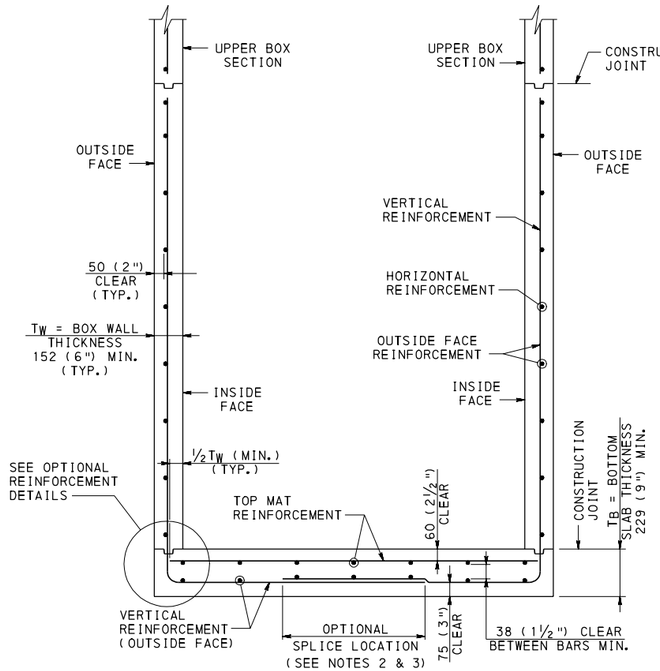
WITH OUTSIDE FACE
REINFORCEMENT



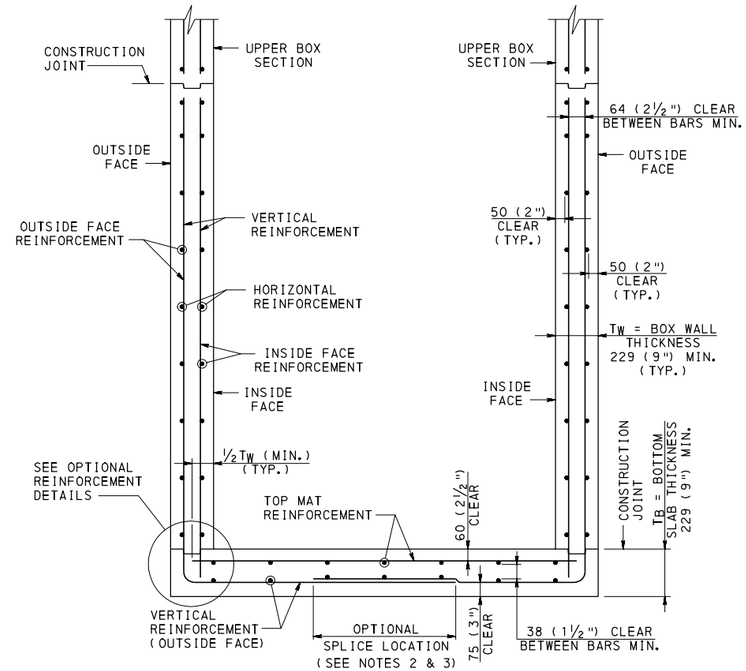
WITH OUTSIDE FACE AND
INSIDE FACE REINFORCEMENT

SPLICE IN WALLS

OPTIONAL REINFORCEMENT DETAILS



VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE REINFORCEMENT



VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT

TYPICAL SECTIONS
CAST-IN-PLACE INLET BOXES
WITH REINFORCEMENT BARS

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
3. SPLICE LOCATION TO BE DETERMINED BY CONTRACTOR.
4. FOR DESIGN TABLES, SEE SHEETS 17 - 22.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
CAST-IN-PLACE INLET BOXES - 4
(REINFORCEMENT BAR DETAILS)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 16 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - STANDARD
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
9.0	45¼	24	6	#3	9	#3	9	---	---	---	---	6	9	#3	9	#3	6	---	---	---	---	#4	12
14.0	45¼	24	6	#3	9	#3	9	---	---	---	---	6	9	#3	6	#3	6	---	---	---	---	#4	12
17.0	45¼	24	6	#3	9	#3	9	---	---	---	---	6	9	#4	9	#3	6	---	---	---	---	#4	12
21.0	45¼	24	9	#4	12	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
25.0	45¼	24	9	#4	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
28.0	45¼	24	9	#5	12	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
30.0	45¼	24	9	#5	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#4	12	#3	9	#4	12

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
6.0	48	48	6	#3	9	#3	9	---	---	---	---	6	9	#3	9	#3	6	---	---	---	---	#4	12
10.0	48	48	6	#3	9	#3	9	---	---	---	---	6	9	#3	6	#3	6	---	---	---	---	#4	12
14.0	48	48	6	#3	9	#3	9	---	---	---	---	6	9	#4	9	#3	6	---	---	---	---	#4	12
18.0	48	48	9	#4	12	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
22.0	48	48	9	#4	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
24.0	48	48	9	#5	12	#3	9	---	---	---	---	9	9	#4	12	#3	6	#4	12	#3	9	#4	12
27.0	48	48	9	#4	6	#3	9	---	---	---	---	9	9	#4	12	#3	6	#4	12	#3	9	#4	12
30.0	48	48	9	#3	9	#3	9	#3	9	#3	9	9	9	#3	4	#3	6	#3	4	#3	9	#4	12

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
8.0	60	60	6	#3	9	#3	9	---	---	---	---	6	9	#4	9	#3	6	---	---	---	---	#4	12
11.0	60	60	9	#3	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
14.0	60	60	9	#3	6	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
16.0	60	60	9	#4	9	#3	9	---	---	---	---	9	9	#4	12	#3	6	#3	9	#3	9	#4	12
19.0	60	60	9	#3	4	#3	9	---	---	---	---	9	9	#4	12	#3	6	#4	12	#3	9	#4	12
21.0	60	60	9	#3	9	#3	9	#3	9	#3	9	9	9	#3	4	#3	6	#3	4	#3	9	#4	12
25.0	60	60	9	#3	9	#3	9	#3	9	#3	9	9	9	#4	4	#4	9	#4	4	#3	9	#4	12
28.0	60	60	9	#4	12	#3	9	#4	12	#3	9	9	9	#4	4	#4	9	#4	4	#3	9	#4	12
30.0	60	60	9	#3	4	#3	9	#3	4	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 13 - 16.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

CAST-IN-PLACE INLET BOXES
DESIGN TABLES - 1
U.S. CUSTOMARY UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 17 OF 45

RC-46M

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
9.0	72	72	9	#3	9	#3	9	---	---	---	---	9	9	#3	9	#4	6	#3	9	#3	9	#4	12
11.0	72	72	9	#3	9	#3	9	---	---	---	---	9	9	#3	9	#4	6	#3	9	#3	9	#4	12
13.0	72	72	9	#4	9	#3	9	---	---	---	---	9	10	#4	12	#4	6	#4	12	#3	9	#4	12
15.0	72	72	9	#3	9	#3	9	#3	9	#3	9	9	10	#3	4	#4	6	#3	4	#3	9	#4	12
19.0	72	72	9	#3	9	#3	9	#3	9	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
23.0	72	72	9	#4	12	#3	9	#4	12	#3	9	9	11	#4	4	#4	4	#4	4	#3	9	#4	12
25.0	72	72	9	#3	4	#3	9	#3	4	#3	9	9	11	#4	4	#4	4	#4	4	#3	9	#4	12
28.0	72	72	12	#4	12	#3	9	#4	12	#4	12	12	11	#4	4	#4	4	#4	4	#4	12	#4	12
30.0	72	72	12	#4	12	#3	9	#4	12	#4	12	12	12	#4	4	#4	4	#4	4	#4	12	#4	12

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
10.0	84	84	9	#3	9	#3	9	---	---	---	---	9	9	#3	4	#3	4	#3	4	#3	9	#4	12
11.0	84	84	9	#3	9	#3	9	---	---	---	---	9	9	#3	4	#4	4	#3	4	#3	9	#4	12
13.0	84	84	9	#4	6	#3	9	---	---	---	---	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
16.0	84	84	9	#3	9	#3	9	#3	9	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
19.0	84	84	9	#4	12	#3	9	#4	12	#3	9	9	11	#4	4	#4	4	#4	4	#3	9	#4	12
21.0	84	84	9	#3	4	#3	9	#3	4	#3	9	9	11	#5	4	#4	4	#5	4	#3	9	#4	12
23.0	84	84	12	#3	6	#3	9	#4	12	#4	12	12	11	#4	4	#4	4	#4	4	#4	12	#4	12
25.0	84	84	12	#3	6	#3	9	#4	12	#4	12	12	12	#4	4	#4	4	#4	4	#4	12	#4	12
27.0	84	84	12	#4	4	#3	9	#3	6	#4	12	12	12	#4	4	#4	4	#4	4	#4	12	#4	12
30.0	84	84	12	#4	4	#3	9	#4	4	#4	12	12	13	#5	4	#4	4	#5	4	#4	12	#4	12

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
11.0	96	96	9	#3	9	#3	9	#3	9	#3	9	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
13.0	96	96	9	#3	9	#3	9	#3	9	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
16.0	96	96	9	#4	12	#3	9	#4	12	#3	9	9	10	#4	4	#4	4	#4	4	#3	9	#4	12
18.0	96	96	9	#3	4	#3	9	#3	4	#3	9	9	11	#5	4	#4	4	#5	4	#3	9	#4	12
20.0	96	96	12	#4	12	#3	9	#4	12	#4	12	12	11	#4	4	#4	4	#4	4	#4	12	#4	12
22.0	96	96	12	#3	6	#3	9	#4	12	#4	12	12	12	#4	4	#4	4	#4	4	#4	12	#4	12
26.0	96	96	12	#4	4	#3	9	#4	4	#4	12	12	12	#5	4	#4	4	#5	4	#4	12	#4	12
29.0	96	96	15	#4	9	#3	9	#4	9	#4	9	15	13	#5	4	#5	4	#5	4	#4	9	#3	6
30.0	96	96	15	#4	4	#3	9	#4	4	#4	9	15	13	#5	4	#5	4	#5	4	#4	9	#3	6

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 13 - 16.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

CAST-IN-PLACE INLET BOXES
DESIGN TABLES - 2
U.S. CUSTOMARY UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
11.0	108	108	9	#4	12	#3	9	#4	12	#3	9	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
13.0	108	108	9	#4	12	#3	9	#4	12	#3	9	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
15.0	108	108	9	#3	4	#3	9	#3	4	#3	9	9	10	#5	4	#4	4	#5	4	#3	9	#4	12
17.0	108	108	9	#4	4	#3	9	#4	4	#3	9	9	10	#5	4	#4	4	#5	4	#3	9	#4	12
20.0	108	108	12	#4	9	#3	9	#4	9	#4	12	12	10	#5	4	#4	4	#5	4	#4	12	#4	12
23.0	108	108	12	#4	4	#3	9	#4	4	#4	12	12	11	#5	4	#4	4	#5	4	#4	12	#4	12
25.0	108	108	15	#4	9	#3	9	#4	9	#4	9	15	12	#5	4	#5	4	#5	4	#4	9	#4	9
27.0	108	108	15	#4	4	#3	9	#4	4	#4	9	15	12	#5	4	#5	4	#5	4	#4	9	#4	9
30.0	108	108	15	#4	4	#3	9	#4	4	#4	9	15	13	#5	4	#5	4	#5	4	#4	9	#4	9

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
13.0	120	120	9	#4	6	#3	9	#4	6	#3	9	9	9	#5	4	#4	4	#5	4	#3	9	#4	12
15.0	120	120	9	#4	4	#3	9	#4	4	#3	9	9	10	#5	4	#5	4	#5	4	#3	9	#4	12
18.0	120	120	12	#4	9	#3	9	#4	9	#4	12	12	10	#5	4	#4	4	#5	4	#4	12	#4	12
20.0	120	120	12	#4	4	#3	9	#4	4	#4	12	12	11	#5	4	#4	4	#5	4	#4	12	#4	12
23.0	120	120	15	#4	9	#3	9	#4	9	#4	9	15	12	#5	4	#5	4	#5	4	#4	9	#4	9
25.0	120	120	15	#4	4	#3	9	#4	4	#4	9	15	12	#5	4	#5	4	#5	4	#4	9	#4	9
27.0	120	120	15	#4	4	#3	9	#4	4	#4	9	15	13	#5	4	#5	4	#5	4	#4	9	#4	9
30.0	120	120	18	#4	4	#3	9	#4	4	#4	6	18	14	#5	4	#5	4	#5	4	#4	6	#4	9

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
U.S. CUSTOMARY UNITS

H (FT.)	LI (IN.)	WI (IN.)	RISER SECTIONS									BASE SECTIONS										
			TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)			BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0	99	30	9	#3	9	#3	9	---	---	---	---	9	9	#3	9	#3	6	#3	9	#3	9	#4	12
9.0	99	30	9	#3	9	#3	9	---	---	---	---	9	9	#4	12	#3	6	#4	12	#3	9	#4	12
12.0	99	30	9	#5	12	#3	9	---	---	---	---	9	9	#4	6	#3	6	#4	6	#3	9	#4	12
14.0	99	30	9	#4	6	#3	9	---	---	---	---	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
17.0	99	30	9	#3	9	#3	9	#3	9	#3	9	9	9	#4	4	#4	4	#4	4	#3	9	#4	12
19.0	99	30	12	#4	12	#3	9	#4	12	#4	12	12	9	#4	4	#4	9	#4	4	#4	12	#4	12
24.0	99	30	12	#4	12	#3	9	#4	12	#4	12	12	9	#4	4	#4	4	#4	4	#4	12	#4	12
26.0	99	30	12	#3	6	#3	9	#3	6	#4	12	12	9	#4	4	#4	4	#4	4	#4	12	#4	12
28.0	99	30	15	#4	9	#3	9	#4	9	#4	9	15	9	#4	4	#4	6	#4	4	#4	9	#4	12
30.0	99	30	15	#4	9	#3	9	#4	9	#4	9	15	9	#4	4	#4	4	#4	4	#4	9	#4	12

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 13 - 16.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

CAST-IN-PLACE INLET BOXES
DESIGN TABLES - 3
U.S. CUSTOMARY UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 19 OF 45
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CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - STANDARD
METRIC

H (mm)	LI (mm)	WI (mm)	RISER SECTIONS									BASE SECTIONS										TOP MAT REINFORCEMENT	
			TW (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (mm)	TB (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT					
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
2743	1150	610	152	#10	229	#10	229	---	---	---	---	152	229	#10	229	#10	152	---	---	---	---	#13	305
4267	1150	610	152	#10	229	#10	229	---	---	---	---	152	229	#10	152	#10	152	---	---	---	---	#13	305
5182	1150	610	152	#10	229	#10	229	---	---	---	---	152	229	#13	229	#10	152	---	---	---	---	#13	305
6401	1150	610	229	#13	305	#10	229	---	---	---	---	229	229	#10	229	#10	152	#10	229	#10	229	#13	305
7620	1150	610	229	#13	229	#10	229	---	---	---	---	229	229	#10	229	#10	152	#10	229	#10	229	#13	305
8534	1150	610	229	#16	305	#10	229	---	---	---	---	229	229	#10	229	#10	152	#10	229	#10	229	#13	305
9144	1150	610	229	#16	229	#10	229	---	---	---	---	229	229	#10	229	#10	152	#13	305	#10	229	#13	305

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
METRIC

H (mm)	LI (mm)	WI (mm)	RISER SECTIONS									BASE SECTIONS										TOP MAT REINFORCEMENT	
			TW (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (mm)	TB (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT					
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
1829	1220	1220	152	#10	229	#10	229	---	---	---	---	152	229	#10	229	#10	152	---	---	---	---	#13	305
3048	1220	1220	152	#10	229	#10	229	---	---	---	---	152	229	#10	152	#10	152	---	---	---	---	#13	305
4267	1220	1220	152	#10	229	#10	229	---	---	---	---	152	229	#13	229	#10	152	---	---	---	---	#13	305
5486	1220	1220	229	#13	305	#10	229	---	---	---	---	229	229	#10	229	#10	152	#10	229	#10	229	#13	305
6706	1220	1220	229	#13	229	#10	229	---	---	---	---	229	229	#10	229	#10	152	#10	229	#10	229	#13	305
7315	1220	1220	229	#16	305	#10	229	---	---	---	---	229	229	#13	305	#10	152	#13	305	#10	229	#13	305
8230	1220	1220	229	#13	152	#10	229	---	---	---	---	229	229	#13	305	#10	152	#13	305	#10	229	#13	305
9144	1220	1220	229	#10	229	#10	229	#10	229	#10	229	229	229	#10	102	#10	152	#10	102	#10	229	#13	305

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
METRIC

H (mm)	LI (mm)	WI (mm)	RISER SECTIONS									BASE SECTIONS										TOP MAT REINFORCEMENT	
			TW (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TW (mm)	TB (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT					
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
2438	1524	1524	152	#10	229	#10	229	---	---	---	---	152	229	#13	229	#10	152	---	---	---	---	#13	305
3353	1524	1524	229	#10	229	#10	229	---	---	---	---	229	229	#10	229	#10	152	#10	229	#10	229	#13	305
4267	1524	1524	229	#10	152	#10	229	---	---	---	---	229	229	#10	229	#10	152	#10	229	#10	229	#13	305
4877	1524	1524	229	#13	229	#10	229	---	---	---	---	229	229	#13	305	#10	152	#10	229	#10	229	#13	305
5791	1524	1524	229	#10	102	#10	229	---	---	---	---	229	229	#13	305	#10	152	#13	305	#10	229	#13	305
6401	1524	1524	229	#10	229	#10	229	#10	229	#10	229	229	229	#10	102	#10	152	#10	102	#10	229	#13	305
7620	1524	1524	229	#10	229	#10	229	#10	229	#10	229	229	229	#13	102	#13	229	#13	102	#10	229	#13	305
8534	1524	1524	229	#13	305	#10	229	#13	305	#10	229	229	229	#13	102	#13	229	#13	102	#10	229	#13	305
9144	1524	1524	229	#10	102	#10	229	#10	102	#10	229	229	254	#13	102	#13	102	#13	102	#10	229	#13	305

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 13 - 16.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

CAST-IN-PLACE INLET BOXES
DESIGN TABLES - 1
METRIC UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
METRIC

H (mm)	L_I (mm)	W_I (mm)	RISER SECTIONS									BASE SECTIONS										TOP MAT REINFORCEMENT	
			T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT					
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
2743	1828	1828	229	#10	229	#10	229	---	---	---	---	229	229	#10	229	#13	152	#10	229	#10	229	#13	305
3353	1828	1828	229	#10	229	#10	229	---	---	---	---	229	229	#10	229	#13	152	#10	229	#10	229	#13	305
3962	1828	1828	229	#13	229	#10	229	---	---	---	---	229	254	#13	305	#13	152	#13	305	#10	229	#13	305
4572	1828	1828	229	#10	229	#10	229	#10	229	#10	229	229	254	#10	102	#13	152	#10	102	#10	229	#13	305
5791	1828	1828	229	#10	229	#10	229	#10	229	#10	229	229	254	#13	102	#13	102	#13	102	#10	229	#13	305
7010	1828	1828	229	#13	305	#10	229	#13	305	#10	229	229	279	#13	102	#13	102	#13	102	#10	229	#13	305
7620	1828	1828	229	#10	102	#10	229	#10	102	#10	229	229	279	#13	102	#13	102	#13	102	#10	229	#13	305
8534	1828	1828	305	#13	305	#10	229	#13	305	#13	305	305	279	#13	102	#13	102	#13	102	#13	305	#13	305
9144	1828	1828	305	#13	305	#10	229	#13	305	#13	305	305	305	#13	102	#13	102	#13	102	#13	305	#13	305

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
METRIC

H (mm)	L_I (mm)	W_I (mm)	RISER SECTIONS									BASE SECTIONS										TOP MAT REINFORCEMENT	
			T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT					
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
3048	2134	2134	229	#10	229	#10	229	---	---	---	---	229	229	#10	102	#10	102	#10	102	#10	229	#13	305
3353	2134	2134	229	#10	229	#10	229	---	---	---	---	229	229	#10	102	#13	102	#10	102	#10	229	#13	305
3962	2134	2134	229	#13	152	#10	229	---	---	---	---	229	254	#13	102	#13	102	#13	102	#10	229	#13	305
4877	2134	2134	229	#10	229	#10	229	#10	229	#10	229	229	254	#13	102	#13	102	#13	102	#10	229	#13	305
5791	2134	2134	229	#13	305	#10	229	#13	305	#10	229	229	279	#13	102	#13	102	#13	102	#10	229	#13	305
6401	2134	2134	229	#10	102	#10	229	#10	102	#10	229	229	279	#16	102	#13	102	#16	102	#10	229	#13	305
7010	2134	2134	305	#10	152	#10	229	#13	305	#13	305	305	279	#13	102	#13	102	#13	102	#13	305	#13	305
7620	2134	2134	305	#10	152	#10	229	#13	305	#13	305	305	305	#13	102	#13	102	#13	102	#13	305	#13	305
8230	2134	2134	305	#10	152	#10	229	#10	152	#13	305	305	305	#13	102	#13	102	#13	102	#13	305	#13	305
9144	2134	2134	305	#13	102	#10	229	#13	102	#13	305	305	330	#16	102	#13	102	#16	102	#13	305	#13	305

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
METRIC

H (mm)	L_I (mm)	W_I (mm)	RISER SECTIONS									BASE SECTIONS										TOP MAT REINFORCEMENT	
			T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT					
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
3353	2438	2438	229	#10	229	#10	229	#10	229	#10	229	229	229	#13	102	#13	102	#13	102	#10	229	#13	305
3962	2438	2438	229	#10	229	#10	229	#10	229	#10	229	229	254	#13	102	#13	102	#13	102	#10	229	#13	305
4877	2438	2438	229	#13	305	#10	229	#13	305	#10	229	229	254	#13	102	#13	102	#13	102	#10	229	#13	305
5486	2438	2438	229	#10	102	#10	229	#10	102	#10	229	229	279	#16	102	#13	102	#16	102	#10	229	#13	305
6096	2438	2438	305	#13	305	#10	229	#13	305	#13	305	305	279	#13	102	#13	102	#13	102	#13	305	#13	305
6706	2438	2438	305	#10	152	#10	229	#13	305	#13	305	305	305	#13	102	#13	102	#13	102	#13	305	#13	305
7925	2438	2438	305	#13	102	#10	229	#13	102	#13	305	305	305	#16	102	#13	102	#16	102	#13	305	#13	305
8839	2438	2438	381	#13	229	#10	229	#13	229	#13	229	381	330	#16	102	#16	102	#16	102	#13	229	#13	152
9144	2438	2438	381	#13	102	#10	229	#13	102	#13	229	381	330	#16	102	#16	102	#16	102	#13	229	#13	152

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 13 - 16.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

CAST-IN-PLACE INLET BOXES
DESIGN TABLES - 2
METRIC UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
METRIC

H (mm)	L_I (mm)	W_I (mm)	RISER SECTIONS									BASE SECTIONS											
			T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
3353	2744	2744	229	#13	305	#10	229	#13	305	#10	229	229	229	#13	102	#13	102	#13	102	#10	229	#13	305
3962	2744	2744	229	#13	305	#10	229	#13	305	#10	229	229	229	#13	102	#13	102	#16	102	#10	229	#13	305
4572	2744	2744	229	#10	102	#10	229	#10	102	#10	229	229	254	#16	102	#13	102	#16	102	#10	229	#13	305
5182	2744	2744	229	#13	102	#10	229	#13	102	#10	229	229	254	#16	102	#13	102	#16	102	#10	229	#13	305
6096	2744	2744	305	#13	229	#10	229	#13	229	#13	305	305	254	#16	102	#13	102	#16	102	#13	305	#13	305
7010	2744	2744	305	#13	102	#10	229	#13	102	#13	305	305	279	#16	102	#13	102	#16	102	#13	305	#13	305
7620	2744	2744	381	#13	229	#10	229	#13	229	#13	229	381	305	#16	102	#16	102	#16	102	#13	229	#13	229
8230	2744	2744	381	#13	102	#10	229	#13	102	#13	229	381	305	#16	102	#16	102	#16	102	#13	229	#13	229
9144	2744	2744	381	#13	102	#10	229	#13	102	#13	229	381	330	#16	102	#16	102	#16	102	#13	229	#13	229

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
METRIC

H (mm)	L_I (mm)	W_I (mm)	RISER SECTIONS									BASE SECTIONS											
			T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
3962	3048	3048	229	#13	152	#10	229	#13	152	#10	229	229	229	#16	102	#13	102	#16	102	#10	229	#13	305
4572	3048	3048	229	#13	102	#10	229	#13	102	#10	229	229	254	#16	102	#16	102	#16	102	#10	229	#13	305
5486	3048	3048	305	#13	229	#10	229	#13	229	#13	305	305	254	#16	102	#13	102	#16	102	#13	305	#13	305
6096	3048	3048	305	#13	102	#10	229	#13	102	#13	305	305	279	#16	102	#13	102	#16	102	#13	305	#13	305
7010	3048	3048	381	#13	229	#10	229	#13	229	#13	229	381	305	#16	102	#16	102	#16	102	#13	229	#13	229
7620	3048	3048	381	#13	102	#10	229	#13	102	#13	229	381	305	#16	102	#16	102	#16	102	#13	229	#13	229
8230	3048	3048	381	#13	102	#10	229	#13	102	#13	229	381	330	#16	102	#16	102	#16	102	#13	229	#13	229
9144	3048	3048	457	#13	102	#10	229	#13	102	#13	152	457	356	#16	102	#16	102	#16	102	#13	152	#13	229

CAST-IN-PLACE CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
METRIC

H (mm)	L_I (mm)	W_I (mm)	RISER SECTIONS									BASE SECTIONS											
			T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)			BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
2134	2516	762	229	#10	229	#10	229	---	---	---	---	229	229	#10	229	#10	152	#10	229	#10	229	#13	305
2743	2516	762	229	#10	229	#10	229	---	---	---	---	229	229	#13	305	#10	152	#13	305	#10	229	#13	305
3658	2516	762	229	#16	305	#10	229	---	---	---	---	229	229	#13	152	#10	152	#13	152	#10	229	#13	305
4267	2516	762	229	#13	152	#10	229	---	---	---	---	229	229	#13	102	#13	102	#13	102	#10	229	#13	305
5182	2516	762	229	#10	229	#10	229	#10	229	#10	229	229	229	#13	102	#13	102	#13	102	#10	229	#13	305
5791	2516	762	305	#13	305	#10	229	#13	305	#13	305	305	229	#13	102	#13	229	#13	102	#13	305	#13	305
7315	2516	762	305	#13	305	#10	229	#13	305	#13	305	305	229	#13	102	#13	102	#13	102	#13	305	#13	305
7925	2516	762	305	#10	152	#10	229	#10	152	#13	305	305	229	#13	102	#13	102	#13	102	#13	305	#13	305
8534	2516	762	381	#13	229	#10	229	#13	229	#13	229	381	229	#13	102	#13	152	#13	102	#13	229	#13	305
9144	2516	762	381	#13	229	#10	229	#13	229	#13	229	381	229	#13	102	#13	102	#13	102	#13	229	#13	305

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.

2. FOR INLET BOX TYPES, SEE SHEET 6.

3. FOR DETAILS, SEE SHEETS 13 - 16.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

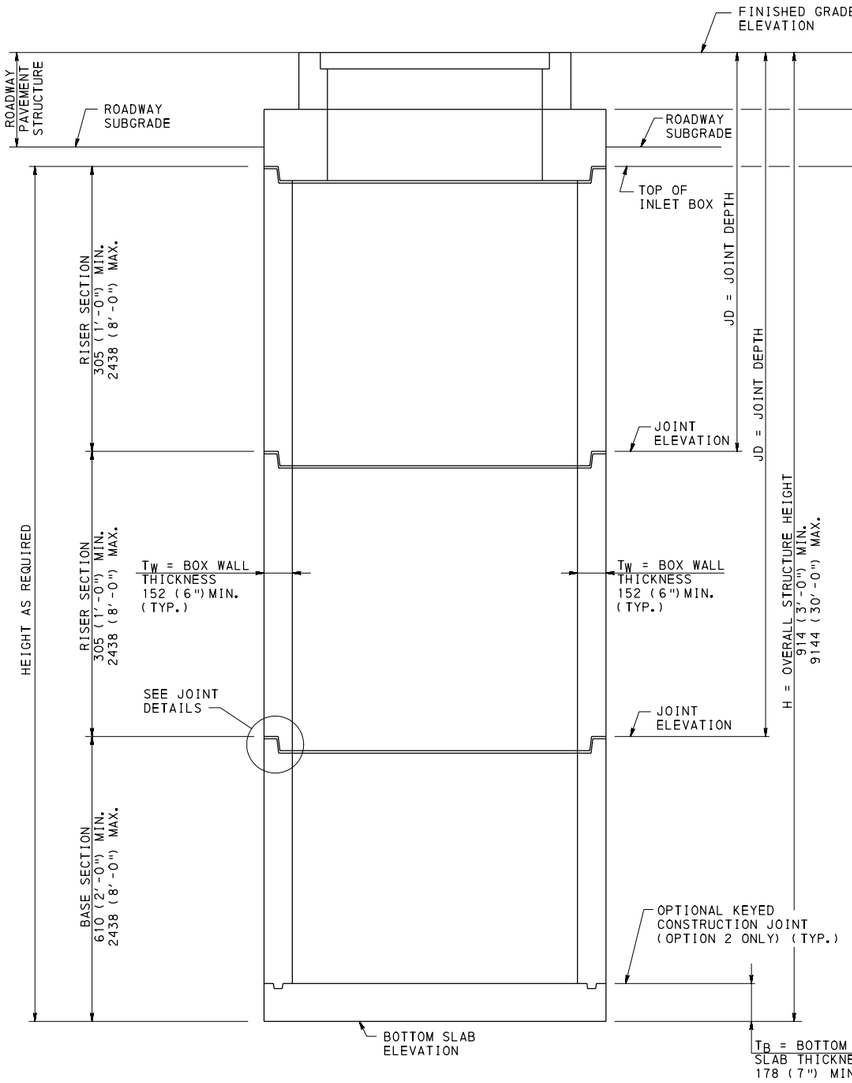
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

CAST-IN-PLACE INLET BOXES
DESIGN TABLES - 3
METRIC UNITS
(REINFORCEMENT BARS)

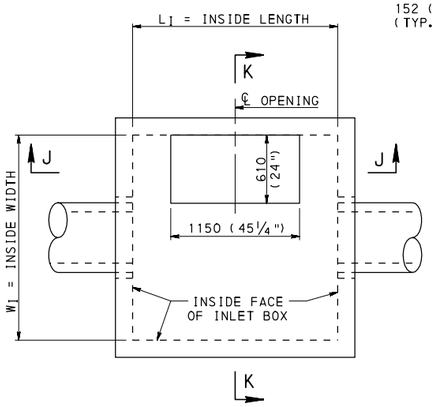
RECOMMENDED JUN. 1, 2010 — CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010 — DIRECTOR, BUREAU OF DESIGN

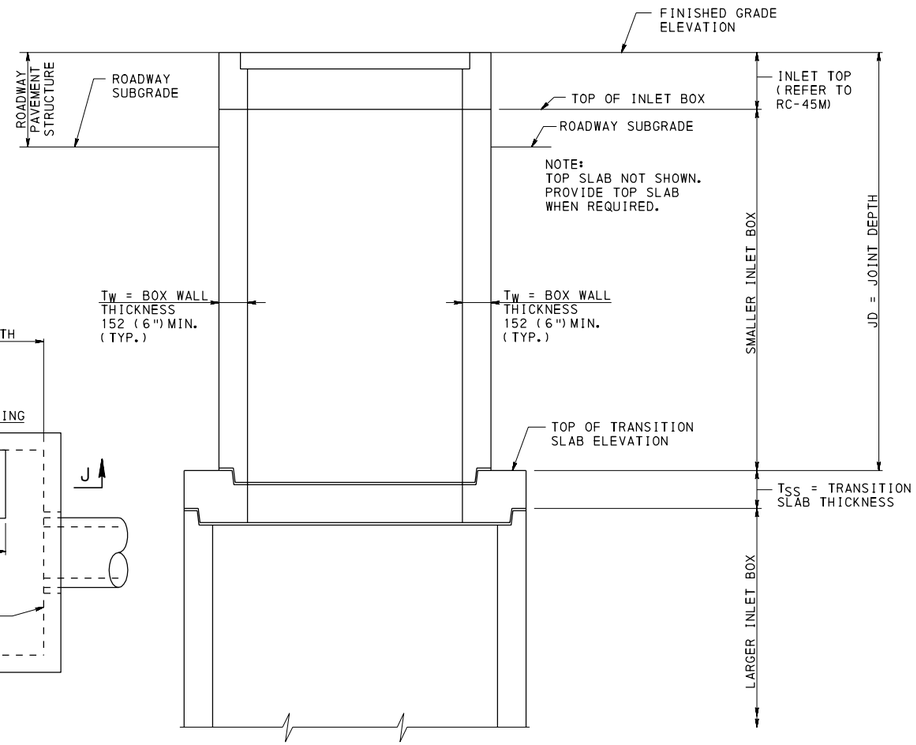


SECTION J-J

SAME SIZE INLET BOX FULL HEIGHT WITH TOP SLAB AND INLET TOP

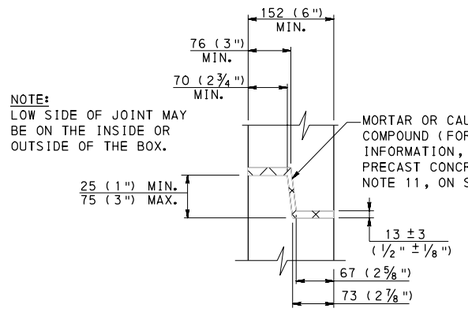


PLAN

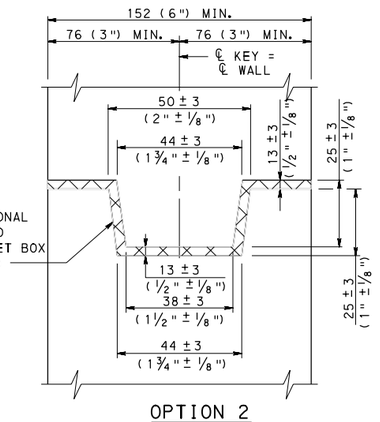


SECTION J-J

LARGER INLET BOX TO SMALLER INLET BOX WITH TRANSITION SLAB AND INLET TOP



OPTION 1
(SHIPLAP JOINT)



OPTION 2
(KEYED JOINT)

JOINT DETAILS (PRECAST)

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR TOP SLAB DETAILS, SEE SHEETS 7 - 10.
4. FOR TRANSITION SLAB DETAILS, SEE SHEETS 11 & 12.
5. FOR SECTION K-K, SEE SHEET 24.
6. FOR REINFORCEMENT DETAILS, SEE SHEETS 25 - 28.
7. FOR DESIGN TABLES, SEE SHEETS 29 - 44.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

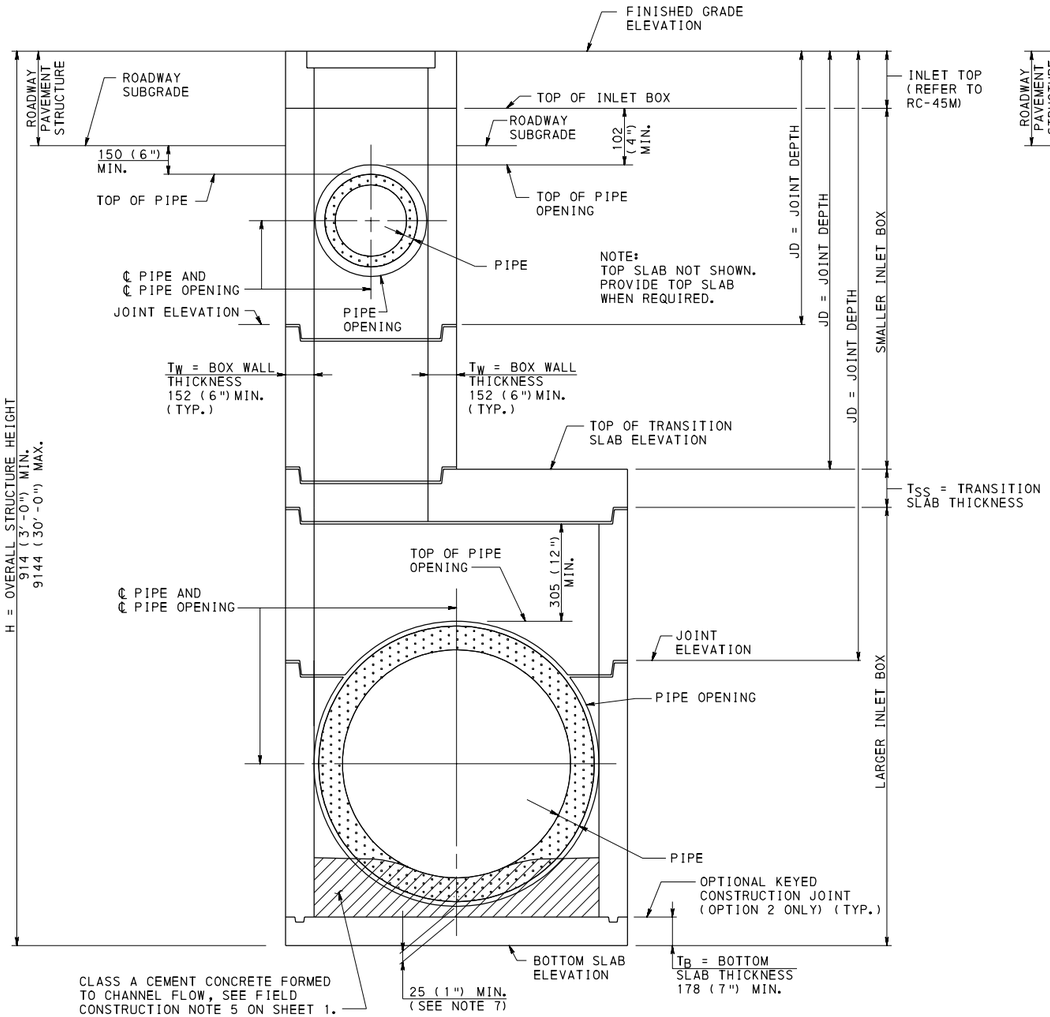
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
PRECAST INLET BOXES - 1

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

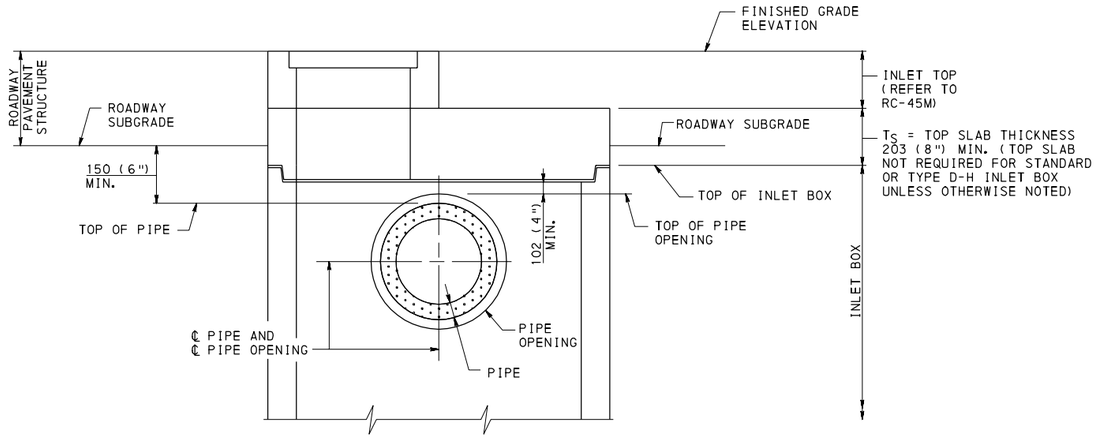
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

RC-46M



SECTION K-K

LARGER INLET BOX TO SMALLER INLET BOX WITH TRANSITION SLAB AND INLET TOP



SECTION K-K

INLET BOX WITH TOP SLAB AND INLET TOP

NOTES:

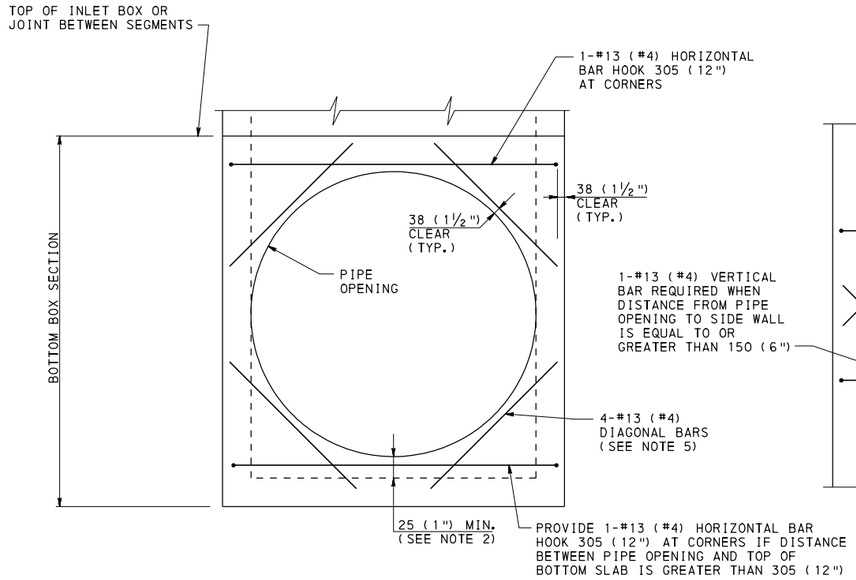
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR TOP SLAB DETAILS, SEE SHEETS 7 - 10.
4. FOR TRANSITION SLAB DETAILS, SEE SHEETS 11 & 12.
5. FOR REINFORCEMENT DETAILS, SEE SHEETS 25 - 28.
6. FOR DESIGN TABLES, SEE SHEETS 29 - 44.
7. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

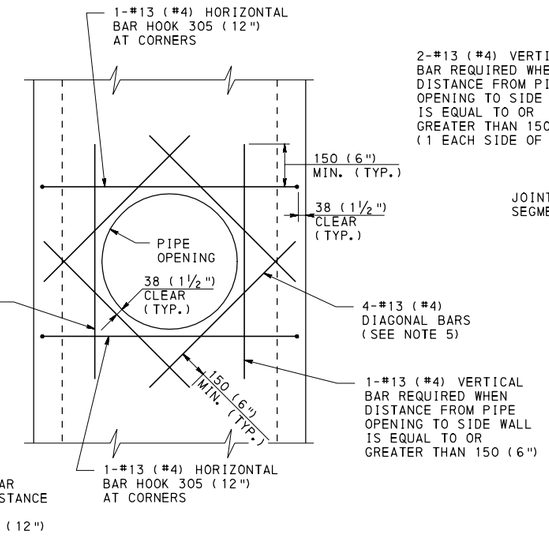
INLET BOXES
PRECAST INLET BOXES - 2

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 24 OF 45
R. Wyatt Dilley CHIEF, HWY. QA DIVISION	Bruce E. Thomas DIRECTOR, BUREAU OF DESIGN	RC-46M

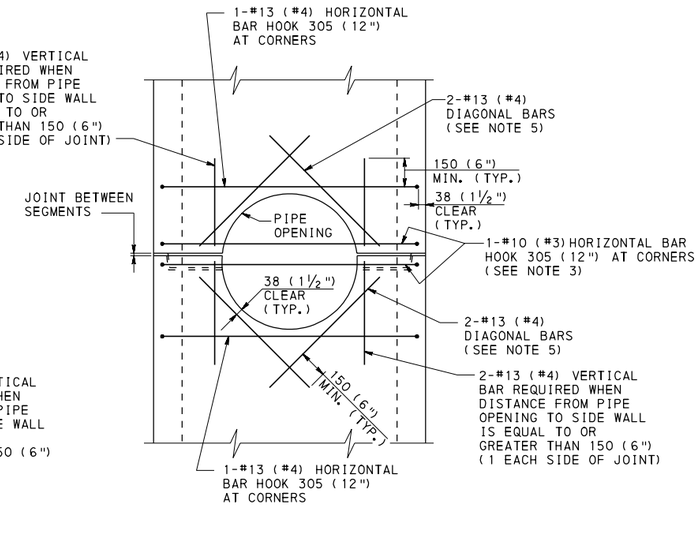


AT BASE SECTION

DETAIL SHOWN WHEN THE DISTANCE FROM PIPE OPENING TO SIDE WALL IS LESS THAN 150 (6"). PROVIDE A VERTICAL BAR WHEN THE DISTANCE FROM THE PIPE OPENING TO SIDE WALL IS EQUAL TO OR GREATER THAN 150 (6").



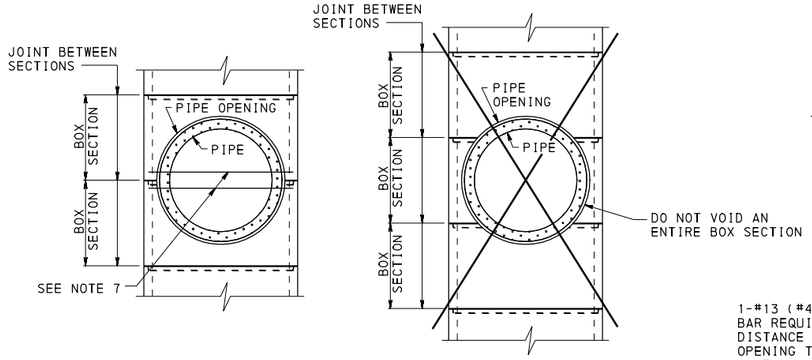
WITHIN BOX SECTION



BETWEEN BOX SECTIONS

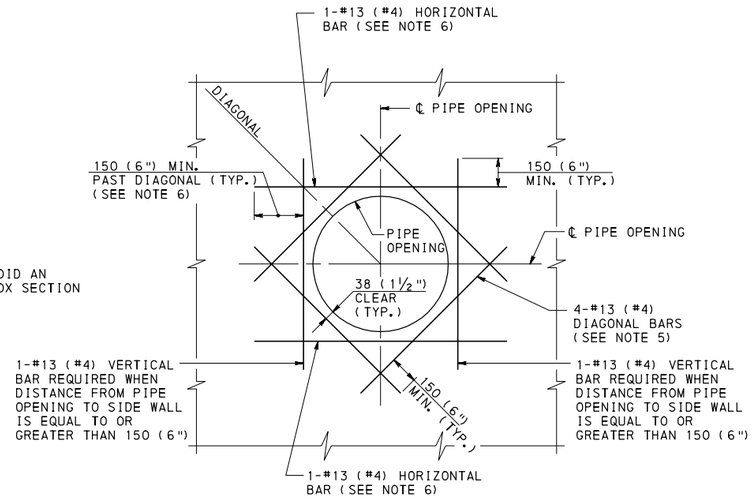
ADDITIONAL REINFORCING ADJACENT TO PIPE OPENINGS IN WALL

PIPE OPENING LOCATION AND SIZE AS REQUIRED



CORRECT LOCATION WRONG LOCATION

LOCATION OF PIPE OPENING



WITHIN BOX SECTION
ALTERNATE DETAIL

NOTES:

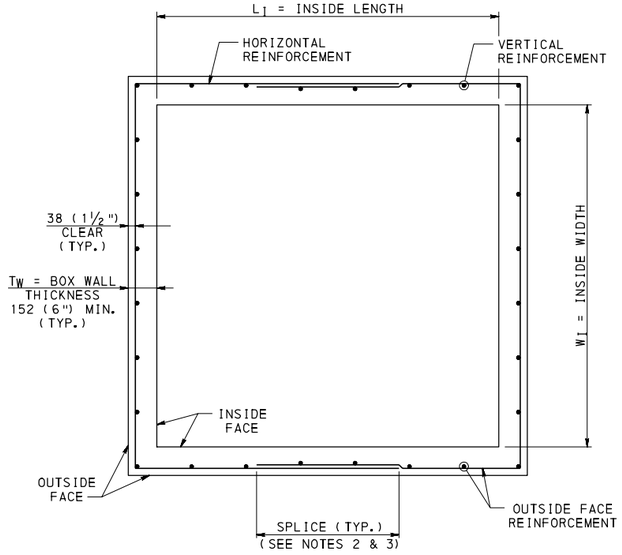
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR PIPE LOCATION AND PIPE OPENING NOTES, SEE SHEET 2.
3. TIE ADDITIONAL REINFORCEMENT TO THE OUTSIDE FACE REINFORCEMENT.
4. FOR REINFORCEMENT DETAILS, SEE SHEET 26 - 28.
5. PROVIDE DIAGONAL BARS WHEN PIPE OPENING IS GREATER THAN 914 mm (3'-0").
6. PROVIDE 305 mm (12") HOOK WHEN HORIZONTAL BAR EXTENDS INTO SIDE WALL.
7. PROVIDE #10 (#3) BARS TO SUPPORT THE PIPE OPENING DURING FABRICATION. LOCATE BARS 38 mm (1½") CLEAR FROM TOP OR BOTTOM OF THE SECTION. CUT BARS IN FIELD PRIOR TO INSTALLING PIPE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

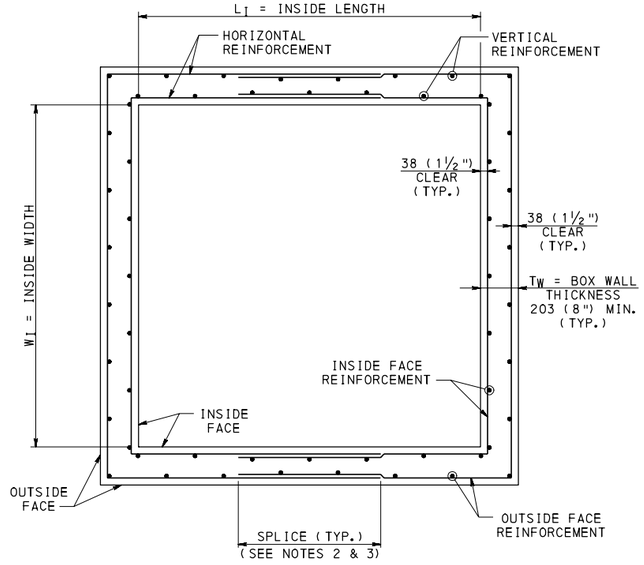
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
PRECAST INLET BOXES - 3

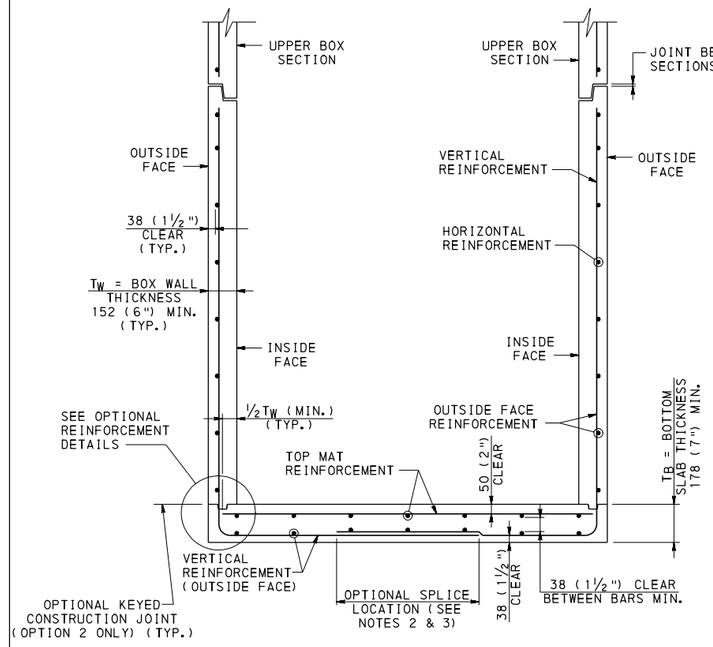
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 25 OF 45
R. Wyatt Dilley CHIEF, HWY. QA DIVISION	Bruce E. Hyson DIRECTOR, BUREAU OF DESIGN	RC-46M



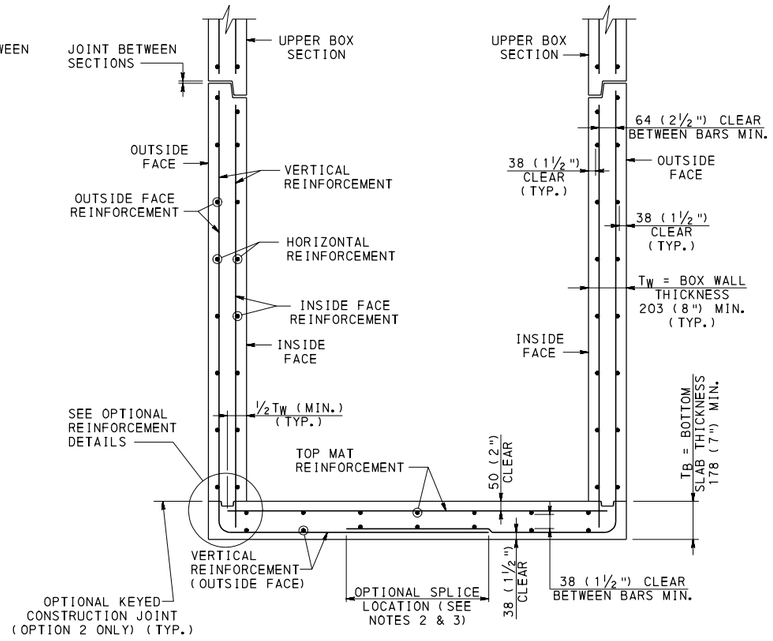
HORIZONTAL SECTION
WITH OUTSIDE FACE REINFORCEMENT
(RISER SECTIONS AND BASE SECTIONS)



HORIZONTAL SECTION
WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT
(RISER SECTIONS AND BASE SECTIONS)

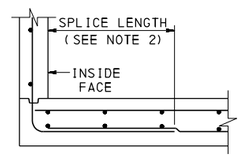


VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE REINFORCEMENT

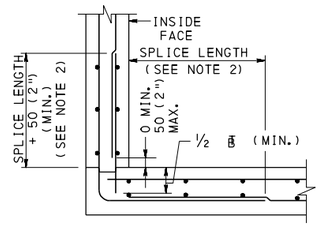


VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT

TYPICAL SECTIONS PRECAST INLET BOXES WITH REINFORCEMENT BARS

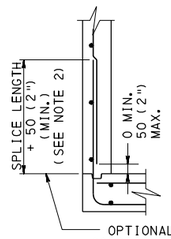


WITH OUTSIDE FACE REINFORCEMENT

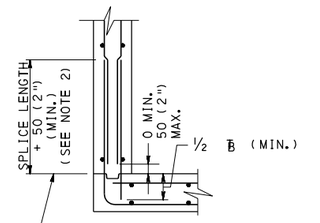


WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT

SPLICE IN BOTTOM SLAB



WITH OUTSIDE FACE REINFORCEMENT



WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT

SPLICE IN WALLS

OPTIONAL REINFORCEMENT DETAILS

NOTES:

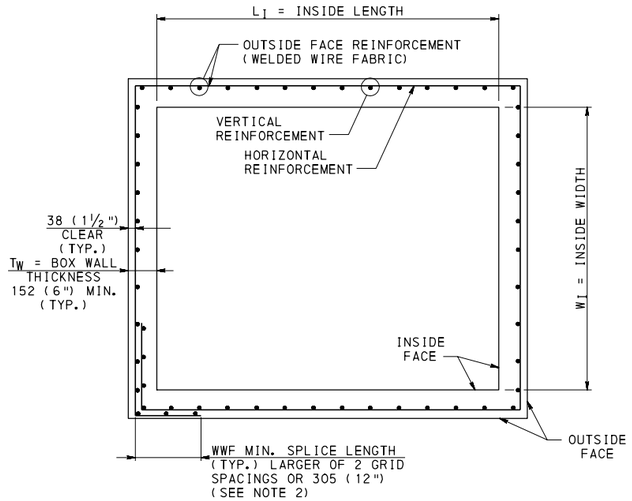
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.
3. SPLICE LOCATION TO BE DETERMINED BY FABRICATOR.
4. FOR REINFORCEMENT BAR DESIGN TABLES, SEE SHEETS 29 - 34.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

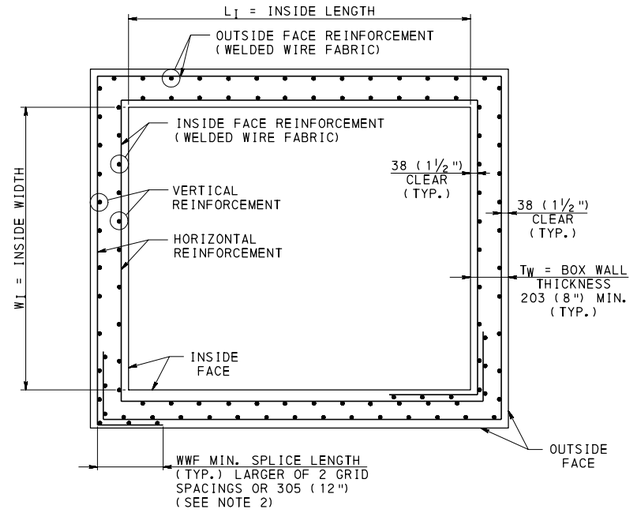
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
PRECAST INLET BOXES - 4
(REINFORCEMENT BAR DETAILS)

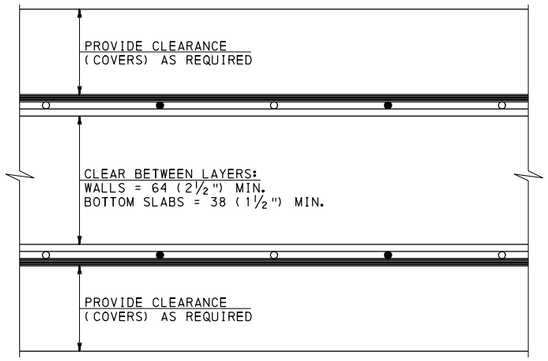
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 26 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



HORIZONTAL SECTION
WITH OUTSIDE FACE WELDED WIRE FABRIC
(RISER SECTIONS AND BASE SECTIONS)



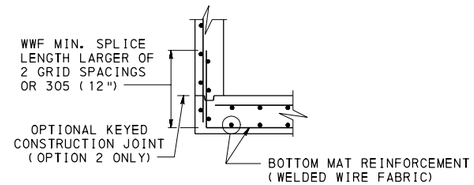
HORIZONTAL SECTION
WITH OUTSIDE FACE AND INSIDE WELDED WIRE FABRIC
(RISER SECTIONS AND BASE SECTIONS)



NESTED WWF DETAIL

NESTED WWF NOTES:

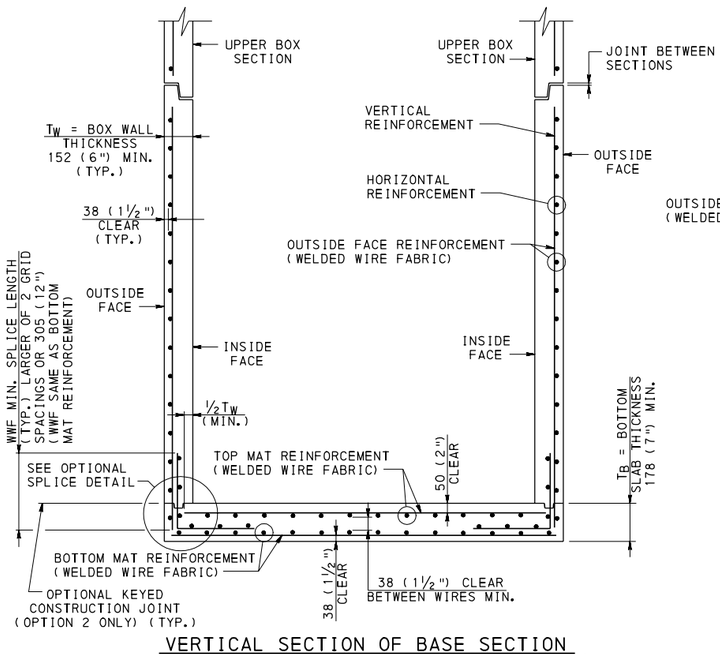
1. FABRICATOR IS PERMITTED TO FABRICATE THE PRECAST CONCRETE INLET BOXES USING NESTED WWF IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS:
   - THE MEMBER THICKNESS AND THE REQUIRED AREA OF STEEL MUST MEET THE REQUIREMENTS OF THE WELDED WIRE FABRIC DESIGN TABLES SHOWN ON SHEETS 35 - 44.
   - THE CLEAR DISTANCE BETWEEN PARALLEL WIRES IS NOT PERMITTED TO BE LESS THAN 38 (1½").
   - ALL OTHER COVER AND CLEARANCE REQUIREMENTS ARE MET.
2. A MAXIMUM OF TWO LAYERS OF WWF IS PERMITTED TO BE NESTED PER MAT.



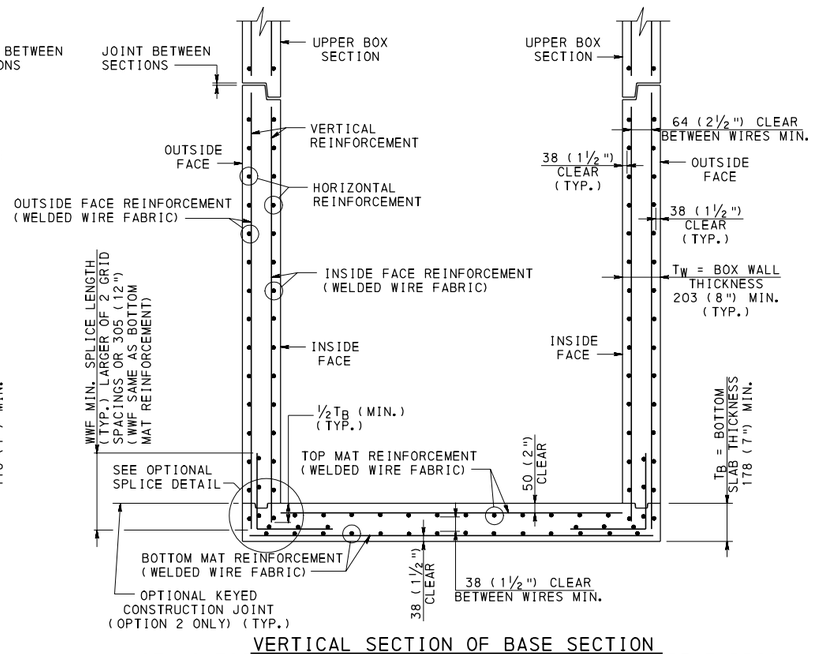
OPTIONAL SPLICE DETAIL

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. SPLICE LOCATION TO BE DETERMINED BY FABRICATOR.
3. FOR WWF DESIGN TABLES, SEE SHEETS 35 - 44.



VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE WELDED WIRE FABRIC



VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE AND INSIDE FACE WELDED WIRE FABRIC

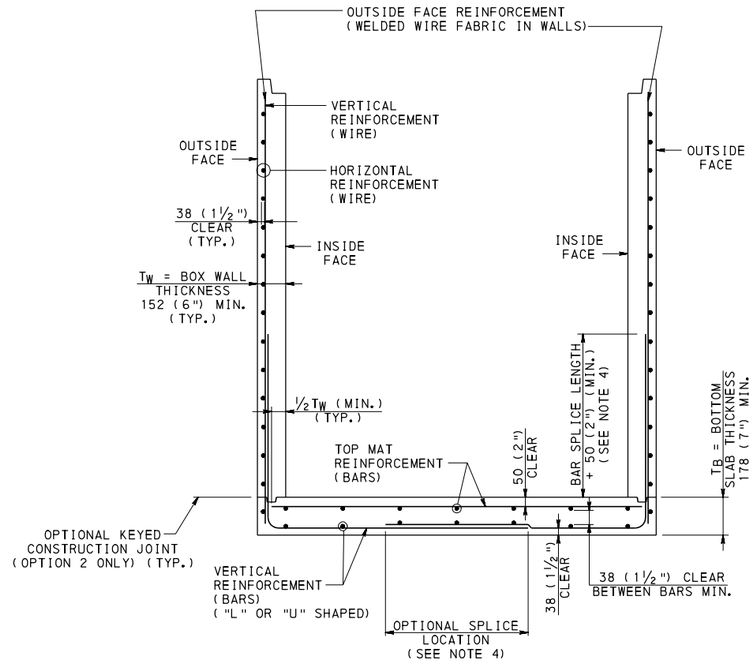
TYPICAL SECTIONS
PRECAST INLET BOXES
WITH WELDED WIRE FABRIC

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

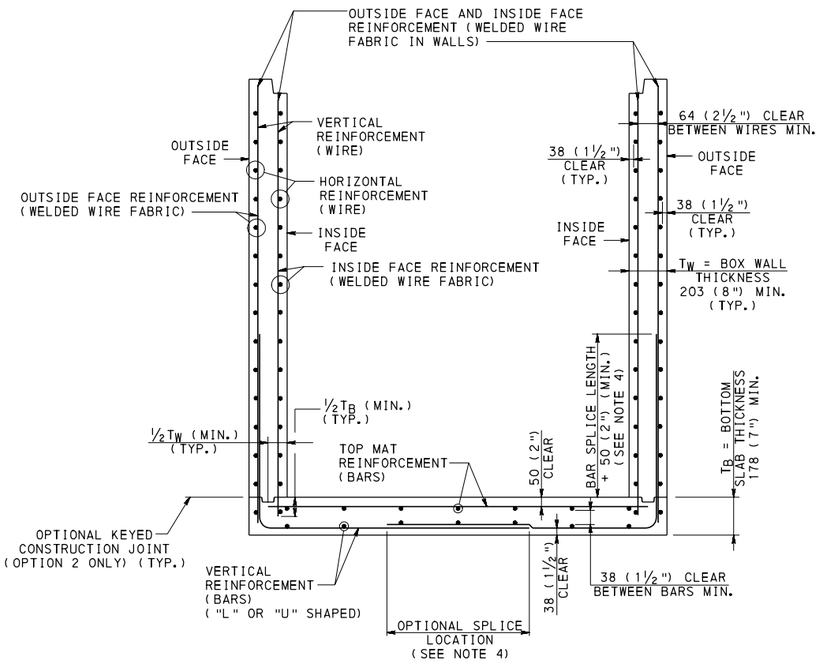
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
PRECAST INLET BOXES - 5
(WELDED WIRE FABRIC DETAILS)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 27 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE REINFORCEMENT



VERTICAL SECTION OF BASE SECTION
WITH OUTSIDE FACE AND INSIDE FACE REINFORCEMENT

TYPICAL SECTIONS
PRECAST INLET BOXES
WITH REINFORCEMENT BARS IN BOTTOM SLAB AND WELDED WIRE FABRIC IN WALLS

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR ADDITIONAL INFORMATION, REFER TO NOTE 7 UNDER THE PRECAST CONCRETE INLET BOX DESIGN TABLE NOTES ON SHEET 3.
3. FOR ADDITIONAL DETAILS, SEE SHEETS 23 - 27.
4. FOR REINFORCEMENT BAR SPLICE LENGTHS, SEE SHEET 3.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
PRECAST INLET BOXES - 6
(COMBINATION DETAILS)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 28 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M

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

RISER SECTIONS

JOINT DEPTH (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.) SPACING (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0	45¼	24	6	#3	9	#3	9	---	---	---	---
11.0	45¼	24	6	#3	6	#3	9	---	---	---	---
14.0	45¼	24	6	#4	9	#3	9	---	---	---	---
16.0	45¼	24	6	#3	4	#3	9	---	---	---	---
20.0	45¼	24	6	#4	6	#3	9	---	---	---	---
28.0	45¼	24	8	#4	12	#3	9	#4	12	#3	9

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

BASE SECTIONS

H (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	T_B (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0	45¼	24	6	7	#3	9	#3	6	---	---	---	---	#3	6
11.0	45¼	24	6	7	#3	6	#3	6	---	---	---	---	#3	6
13.0	45¼	24	6	7	#4	9	#3	6	---	---	---	---	#3	6
16.0	45¼	24	6	7	#3	4	#3	6	---	---	---	---	#3	6
19.0	45¼	24	6	7	#4	6	#3	6	---	---	---	---	#3	6
30.0	45¼	24	8	7	#4	12	#3	6	#4	12	#4	12	#3	6

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
4.0	48	48	6	#3	9	#3	9	---	---	---	---
8.0	48	48	6	#3	6	#3	9	---	---	---	---
11.0	48	48	6	#4	9	#3	9	---	---	---	---
12.0	48	48	6	#3	4	#3	9	---	---	---	---
15.0	48	48	6	#4	6	#3	9	---	---	---	---
26.0	48	48	8	#4	12	#3	9	#4	12	#3	9
28.0	48	48	8	#3	4	#3	9	#3	4	#3	9

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	T_B (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
8.0	48	48	6	7	#3	6	#3	6	---	---	---	---	#3	6
10.0	48	48	6	7	#4	9	#3	6	---	---	---	---	#3	6
12.0	48	48	6	7	#3	4	#3	6	---	---	---	---	#3	6
15.0	48	48	6	7	#4	6	#3	6	---	---	---	---	#3	6
16.0	48	48	6	7	#5	9	#3	6	---	---	---	---	#3	6
25.0	48	48	8	7	#4	12	#3	6	#4	12	#3	9	#3	6
26.0	48	48	8	7	#3	4	#3	6	#4	12	#3	9	#3	6
29.0	48	48	8	7	#3	4	#3	6	#4	6	#3	9	#3	6
30.0	48	48	8	8	#3	4	#3	6	#4	6	#3	9	#3	6

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
5.0	60	60	6	#4	9	#3	9	---	---	---	---
7.0	60	60	6	#3	4	#3	9	---	---	---	---
10.0	60	60	6	#4	6	#3	9	---	---	---	---
17.0	60	60	8	#4	12	#3	9	#4	12	#3	9
24.0	60	60	8	#3	4	#3	9	#3	4	#3	9
28.0	60	60	8	#4	4	#3	9	#4	4	#3	9

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	T_B (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0	60	60	6	7	#3	4	#3	6	---	---	---	---	#3	6
10.0	60	60	6	7	#4	6	#3	6	---	---	---	---	#3	6
17.0	60	60	8	7	#4	12	#3	6	#4	12	#3	9	#3	6
19.0	60	60	8	7	#3	4	#3	6	#3	4	#3	9	#3	6
22.0	60	60	8	8	#3	4	#3	6	#3	4	#3	9	#3	6
24.0	60	60	8	8	#3	4	#3	4	#3	4	#3	9	#3	6
26.0	60	60	8	8	#4	4	#3	4	#4	4	#3	9	#3	6
30.0	60	60	8	8	#4	4	#4	4	#4	4	#3	9	#3	6

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 26.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 1
U.S. CUSTOMARY UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 29 OF 45
R. Hyde Wilby		
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
6.0	72	72	6	#4	6	#3	9	---	---	---	---
13.0	72	72	8	#4	12	#3	9	#4	12	#3	9
17.0	72	72	8	#3	4	#3	9	#3	4	#3	9
26.0	72	72	8	#4	4	#3	9	#4	4	#3	9
28.0	72	72	10	#4	4	#3	9	#4	4	#4	12

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	T_B (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
10.0	72	72	8	8	#4	12	#3	4	#4	12	#3	9	#3	6
12.0	72	72	8	8	#4	12	#4	4	#4	12	#3	9	#3	6
17.0	72	72	8	9	#3	4	#4	4	#3	4	#3	9	#3	6
20.0	72	72	8	9	#4	4	#4	4	#4	4	#3	9	#3	6
26.0	72	72	8	10	#4	4	#4	4	#4	4	#3	9	#3	6
30.0	72	72	10	10	#4	4	#4	4	#4	4	#4	12	#4	9

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
9.0	84	84	8	#4	12	#3	9	#4	12	#3	9
13.0	84	84	8	#3	4	#3	9	#3	4	#3	9
22.0	84	84	8	#4	4	#3	9	#4	4	#3	9
28.0	84	84	10	#4	4	#4	12	#4	4	#4	12

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	T_B (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
9.0	84	84	8	8	#3	4	#4	4	#4	12	#4	12	#3	6
11.0	84	84	8	8	#3	4	#4	4	#4	6	#4	12	#3	6
13.0	84	84	8	9	#3	4	#4	4	#4	6	#4	12	#3	6
18.0	84	84	8	9	#4	4	#4	4	#4	4	#4	12	#3	6
22.0	84	84	8	10	#4	4	#4	4	#4	4	#4	12	#3	6
24.0	84	84	10	10	#4	4	#4	4	#4	4	#4	12	#4	9
26.0	84	84	10	10	#4	4	#5	4	#4	4	#4	12	#3	4
29.0	84	84	10	11	#5	4	#5	4	#4	4	#4	12	#3	4
30.0	84	84	12	11	#5	6	#5	4	#4	4	#4	9	#3	4

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
10.0	96	96	8	#4	6	#3	9	#4	6	#3	9
18.0	96	96	8	#4	4	#3	9	#4	4	#3	9
23.0	96	96	10	#4	4	#3	9	#4	4	#4	12
25.0	96	96	10	#5	4	#3	9	#5	4	#4	12
27.0	96	96	12	#4	4	#3	9	#4	4	#4	9
28.0	96	96	12	#5	4	#3	9	#5	4	#4	9

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	L_I (IN.)	W_I (IN.)	T_W (IN.)	T_B (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
11.0	96	96	8	8	#4	4	#4	4	#4	4	#4	12	#3	6
17.0	96	96	8	9	#4	4	#4	4	#4	4	#4	12	#3	6
19.0	96	96	8	10	#5	4	#4	4	#5	4	#4	12	#3	6
22.0	96	96	10	10	#5	4	#5	4	#5	4	#4	12	#3	4
24.0	96	96	10	10	#5	4	#4	4	#5	4	#4	12	#3	6
28.0	96	96	12	11	#5	4	#5	4	#5	4	#4	9	#4	9
30.0	96	96	12	12	#5	4	#5	4	#5	4	#4	9	#4	4

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 26.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 2
U.S. CUSTOMARY UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
14.0	108	108	8	#4	4	#3	9	#4	4	#3	9
16.0	108	108	8	#5	4	#3	9	#5	4	#3	9
18.0	108	108	10	#4	4	#3	9	#4	4	#4	12
23.0	108	108	10	#5	4	#3	9	#5	4	#4	12
28.0	108	108	12	#5	4	#3	9	#5	4	#4	9

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
14.0	108	108	8	8	#4	4	#4	4	#4	4	#4	12	#3	6
18.0	108	108	10	9	#5	4	#5	4	#5	4	#4	12	#3	4
21.0	108	108	10	9	#5	4	#5	4	#5	4	#4	12	#4	9
24.0	108	108	12	10	#5	4	#5	4	#5	4	#4	9	#4	9
26.0	108	108	12	10	#5	4	#5	4	#5	4	#4	9	#4	4
28.0	108	108	12	11	#5	4	#5	4	#5	4	#4	9	#4	4
30.0	108	108	14	11	#5	4	#5	4	#5	4	#4	6	#4	4

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
12.0	120	120	8	#4	4	#3	9	#4	4	#3	9
15.0	120	120	8	#5	4	#3	9	#5	4	#4	12
20.0	120	120	10	#5	4	#3	9	#5	4	#4	12
26.0	120	120	12	#5	4	#3	9	#5	4	#4	9
28.0	120	120	14	#5	4	#3	9	#5	4	#3	4

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
13.0	120	120	8	8	#5	4	#4	4	#5	4	#4	12	#4	9
15.0	120	120	8	8	#5	4	#5	4	#5	4	#4	12	#4	9
18.0	120	120	10	9	#5	4	#4	4	#5	4	#4	12	#3	6
20.0	120	120	10	9	#5	4	#5	4	#5	4	#4	12	#4	9
24.0	120	120	12	10	#5	4	#5	4	#5	4	#4	9	#4	4
28.0	120	120	14	11	#5	4	#5	4	#5	4	#4	6	#4	4
30.0	120	120	14	12	#5	4	#5	4	#5	4	#4	6	#4	4

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
3.0	99	30	6	#4	6	#3	9	---	---	---	---
9.0	99	30	8	#4	12	#3	9	#4	12	#3	9
13.0	99	30	8	#3	4	#3	9	#3	4	#3	9
19.0	99	30	8	#4	4	#3	9	#4	4	#3	9
26.0	99	30	10	#4	4	#3	9	#4	4	#4	12
28.0	99	30	12	#4	4	#3	9	#4	4	#4	9

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
4.0	99	30	6	7	#5	9	#3	6	---	---	---	---	#3	6
9.0	99	30	8	7	#4	12	#3	6	#4	12	#3	9	#3	6
12.0	99	30	8	7	#3	4	#3	4	#3	4	#3	9	#3	6
19.0	99	30	8	7	#4	4	#4	4	#4	4	#3	9	#3	6
25.0	99	30	10	7	#4	4	#4	4	#4	4	#4	12	#3	6
30.0	99	30	12	7	#4	4	#4	4	#4	4	#4	9	#3	6

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 26.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 3
U.S. CUSTOMARY UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - STANDARD
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
2134	1150	610	152	#10	229	#10	229	---	---	---	---
3353	1150	610	152	#10	152	#10	229	---	---	---	---
4267	1150	610	152	#13	229	#10	229	---	---	---	---
4877	1150	610	152	#10	102	#10	229	---	---	---	---
6096	1150	610	152	#13	152	#10	229	---	---	---	---
8534	1150	610	203	#13	305	#10	229	#13	305	#10	229

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - STANDARD
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
2134	1150	610	152	178	#10	229	#10	152	---	---	---	---	#10	152
3353	1150	610	152	178	#10	152	#10	152	---	---	---	---	#10	152
3962	1150	610	152	178	#13	229	#10	152	---	---	---	---	#10	152
4877	1150	610	152	178	#10	102	#10	152	---	---	---	---	#10	152
5791	1150	610	152	178	#13	152	#10	152	---	---	---	---	#10	152
9144	1150	610	203	178	#13	305	#10	152	#13	305	#13	305	#10	152

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
1219	1220	1220	152	#10	229	#10	229	---	---	---	---
2438	1220	1220	152	#10	152	#10	229	---	---	---	---
3353	1220	1220	152	#13	229	#10	229	---	---	---	---
3658	1220	1220	152	#10	102	#10	229	---	---	---	---
4572	1220	1220	152	#13	152	#10	229	---	---	---	---
7925	1220	1220	203	#13	305	#10	229	#13	305	#10	229
8534	1220	1220	203	#10	102	#10	229	#10	102	#10	229

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
2438	1220	1220	152	178	#10	152	#10	152	---	---	---	---	#10	152
3048	1220	1220	152	178	#13	229	#10	152	---	---	---	---	#10	152
3658	1220	1220	152	178	#10	102	#10	152	---	---	---	---	#10	152
4572	1220	1220	152	178	#13	152	#10	152	---	---	---	---	#10	152
4877	1220	1220	152	178	#16	229	#10	152	---	---	---	---	#10	152
7620	1220	1220	203	178	#13	305	#10	152	#13	305	#10	229	#10	152
7925	1220	1220	203	178	#10	102	#10	152	#13	305	#10	229	#10	152
8839	1220	1220	203	178	#10	102	#10	152	#13	152	#10	229	#10	152
9144	1220	1220	203	203	#10	102	#10	152	#13	152	#10	229	#10	152

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
1524	1524	1524	152	#13	229	#10	229	---	---	---	---
2134	1524	1524	152	#10	102	#10	229	---	---	---	---
3048	1524	1524	152	#13	152	#10	229	---	---	---	---
5182	1524	1524	203	#13	305	#10	229	#13	305	#10	229
7315	1524	1524	203	#10	102	#10	229	#10	102	#10	229
8534	1524	1524	203	#13	102	#10	229	#13	102	#10	229

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
2134	1524	1524	152	178	#10	102	#10	152	---	---	---	---	#10	152
3048	1524	1524	152	178	#13	152	#10	152	---	---	---	---	#10	152
5182	1524	1524	203	178	#13	305	#10	152	#13	305	#10	229	#10	152
5791	1524	1524	203	178	#10	102	#10	152	#10	102	#10	229	#10	152
6706	1524	1524	203	203	#10	102	#10	152	#10	102	#10	229	#10	152
7315	1524	1524	203	203	#10	102	#10	102	#10	102	#10	229	#10	152
7925	1524	1524	203	203	#13	102	#10	102	#13	102	#10	229	#10	152
9144	1524	1524	203	203	#13	102	#13	102	#13	102	#10	229	#10	152

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 26.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 1
METRIC UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	OUTSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	OUTSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	OUTSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	INSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	INSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	INSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	INSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)
1829	1828	1828	152	#13	152	#10	229	---	---	---	---
3962	1828	1828	203	#13	305	#10	229	#13	305	#10	229
5182	1828	1828	203	#10	102	#10	229	#10	102	#10	229
7925	1828	1828	203	#13	102	#10	229	#13	102	#10	229
8534	1828	1828	254	#13	102	#10	229	#13	102	#13	305

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	OUTSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	OUTSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	OUTSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	INSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	INSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	INSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	INSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	TOP MAT REINFORCEMENT BAR SIZE	TOP MAT REINFORCEMENT SPACING (mm)
3048	1828	1828	203	203	#13	305	#10	102	#13	305	#10	229	#10	152
3658	1828	1828	203	203	#13	305	#13	102	#13	305	#10	229	#10	152
5182	1828	1828	203	229	#10	102	#13	102	#10	102	#10	229	#10	152
6096	1828	1828	203	229	#13	102	#13	102	#13	102	#10	229	#10	152
7925	1828	1828	203	254	#13	102	#13	102	#13	102	#10	229	#10	152
9144	1828	1828	254	254	#13	102	#13	102	#13	102	#13	305	#13	229

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	OUTSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	OUTSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	OUTSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	INSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	INSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	INSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	INSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)
2743	2134	2134	203	#13	305	#10	229	#13	305	#10	229
3962	2134	2134	203	#10	102	#10	229	#10	102	#10	229
6706	2134	2134	203	#13	102	#10	229	#13	102	#10	229
8534	2134	2134	254	#13	102	#13	305	#13	102	#13	305

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	OUTSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	OUTSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	OUTSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	INSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	INSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	INSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	INSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	TOP MAT REINFORCEMENT BAR SIZE	TOP MAT REINFORCEMENT SPACING (mm)
2743	2134	2134	203	203	#10	102	#13	102	#13	305	#13	305	#10	152
3353	2134	2134	203	203	#10	102	#13	102	#13	152	#13	305	#10	152
3962	2134	2134	203	229	#10	102	#13	102	#13	152	#13	305	#10	152
5486	2134	2134	203	229	#13	102	#13	102	#13	102	#13	305	#10	152
6706	2134	2134	203	254	#13	102	#13	102	#13	102	#13	305	#10	152
7315	2134	2134	254	254	#13	102	#13	102	#13	102	#13	305	#13	229
7925	2134	2134	254	254	#13	102	#16	102	#13	102	#13	305	#10	102
8839	2134	2134	254	279	#16	102	#16	102	#13	102	#13	305	#10	102
9144	2134	2134	305	279	#16	152	#16	102	#13	102	#13	229	#10	102

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	OUTSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	OUTSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	OUTSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	INSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	INSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	INSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	INSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)
3048	2438	2438	203	#13	152	#10	229	#13	152	#10	229
5486	2438	2438	203	#13	102	#10	229	#13	102	#10	229
7010	2438	2438	254	#13	102	#10	229	#13	102	#13	305
7620	2438	2438	254	#16	102	#10	229	#16	102	#13	305
8230	2438	2438	305	#13	102	#10	229	#13	102	#13	229
8534	2438	2438	305	#16	102	#10	229	#16	102	#13	229

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	OUTSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	OUTSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	OUTSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	INSIDE FACE REINFORCEMENT HORIZONTAL BAR SIZE	INSIDE FACE REINFORCEMENT HORIZONTAL SPACING (mm)	INSIDE FACE REINFORCEMENT VERTICAL BAR SIZE	INSIDE FACE REINFORCEMENT VERTICAL SPACING (mm)	TOP MAT REINFORCEMENT BAR SIZE	TOP MAT REINFORCEMENT SPACING (mm)
3353	2438	2438	203	203	#13	102	#13	102	#13	102	#13	305	#10	152
5182	2438	2438	203	229	#13	102	#13	102	#13	102	#13	305	#10	152
5791	2438	2438	203	254	#16	102	#13	102	#16	102	#13	305	#10	152
6706	2438	2438	254	254	#16	102	#16	102	#16	102	#13	305	#10	102
7315	2438	2438	254	254	#16	102	#13	102	#16	102	#13	305	#10	152
8534	2438	2438	305	279	#16	102	#16	102	#16	102	#13	229	#13	229
9144	2438	2438	305	305	#16	102	#16	102	#16	102	#13	229	#13	102

NOTES:

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 2
METRIC UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010 — CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010 — DIRECTOR, BUREAU OF DESIGN

SHT 33 OF 45

RC-46M

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
4267	2744	2744	203	#13	102	#10	229	#13	102	#10	229
4877	2744	2744	203	#16	102	#10	229	#16	102	#10	229
5486	2744	2744	254	#13	102	#10	229	#13	102	#13	305
7010	2744	2744	254	#16	102	#10	229	#16	102	#13	305
8534	2744	2744	305	#16	102	#10	229	#16	102	#13	229

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
4267	2744	2744	203	203	#13	102	#13	102	#13	102	#13	305	#10	152
5486	2744	2744	254	229	#16	102	#16	102	#16	102	#13	305	#10	102
6401	2744	2744	254	229	#16	102	#13	102	#16	102	#13	305	#13	229
7315	2744	2744	305	254	#16	102	#16	102	#16	102	#13	229	#13	229
7925	2744	2744	305	254	#16	102	#16	102	#16	102	#13	229	#13	102
8534	2744	2744	305	279	#16	102	#16	102	#16	102	#13	229	#13	102
9144	2744	2744	356	279	#16	102	#16	102	#16	102	#13	152	#13	102

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
3658	3048	3048	203	#13	102	#10	229	#13	102	#10	229
4572	3048	3048	203	#16	102	#10	229	#16	102	#13	305
6096	3048	3048	254	#16	102	#10	229	#16	102	#13	305
7925	3048	3048	305	#16	102	#10	229	#16	102	#13	229
8534	3048	3048	356	#16	102	#10	229	#16	102	#10	102

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
3962	3048	3048	203	203	#16	102	#13	102	#16	102	#13	305	#13	229
4572	3048	3048	203	203	#16	102	#16	102	#16	102	#13	305	#13	229
5486	3048	3048	254	229	#16	102	#13	102	#16	102	#13	305	#10	152
6096	3048	3048	254	229	#16	102	#16	102	#16	102	#13	305	#13	229
7315	3048	3048	305	254	#16	102	#16	102	#16	102	#13	229	#13	102
8534	3048	3048	356	279	#16	102	#16	102	#16	102	#13	152	#13	102
9144	3048	3048	356	305	#16	102	#16	102	#16	102	#13	152	#13	102

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT			
				HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL	
				BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
914	2516	762	152	#13	152	#10	229	---	---	---	---
2743	2516	762	203	#13	305	#10	229	#13	305	#10	229
3962	2516	762	203	#10	102	#10	229	#10	102	#10	229
5791	2516	762	203	#13	102	#10	229	#13	102	#10	229
7925	2516	762	254	#13	102	#10	229	#13	102	#13	305
8534	2516	762	305	#13	102	#10	229	#13	102	#13	229

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT				INSIDE FACE REINFORCEMENT				TOP MAT REINFORCEMENT	
					HORIZONTAL		VERTICAL		HORIZONTAL		VERTICAL			
					BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)	BAR SIZE	SPACING (mm)
1219	2516	762	152	178	#16	229	#10	152	---	---	---	---	#10	152
2743	2516	762	203	178	#13	305	#10	152	#13	305	#10	229	#10	152
3658	2516	762	203	178	#10	102	#10	102	#10	102	#10	229	#10	152
5791	2516	762	203	178	#13	102	#13	102	#13	102	#10	229	#10	152
7620	2516	762	254	178	#13	102	#13	102	#13	102	#13	305	#10	152
9144	2516	762	305	178	#13	102	#13	102	#13	102	#13	229	#10	152

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 26.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 3
METRIC UNITS
(REINFORCEMENT BARS)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		EACH DIRECTION		EACH DIRECTION
4.0	45 1/4	24	6	7	WWF 4x4-W4xW4	0.12	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
7.0	45 1/4	24	6	7	WWF 3x4-W4xW4	0.16	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
9.0	45 1/4	24	6	7	WWF 3x4-W5xW4	0.20	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
11.0	45 1/4	24	6	7	WWF 3x4-W6xW4	0.24	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
13.0	45 1/4	24	6	7	WWF 3x4-W7xW4	0.28	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
15.0	45 1/4	24	6	7	WWF 3x4-W8xW4	0.32	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
17.0	45 1/4	24	6	7	WWF 3x4-W9xW4	0.36	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
19.0	45 1/4	24	6	7	WWF 6x6-W20xW10	0.40	0.20	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
30.0	45 1/4	24	8	7	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20

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

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
5.0	45 1/4	24	6	WWF 4x4-W4xW4	0.12	0.12	---	---	---
8.0	45 1/4	24	6	WWF 3x4-W4xW4	0.16	0.12	---	---	---
10.0	45 1/4	24	6	WWF 3x4-W5xW4	0.20	0.12	---	---	---
13.0	45 1/4	24	6	WWF 3x4-W7xW4	0.28	0.12	---	---	---
15.0	45 1/4	24	6	WWF 3x4-W8xW4	0.32	0.12	---	---	---
17.0	45 1/4	24	6	WWF 3x4-W9xW4	0.36	0.12	---	---	---
19.0	45 1/4	24	6	WWF 3x4-W10xW4	0.40	0.12	---	---	---
28.0	45 1/4	24	8	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD
A = SPACING OF HORIZONTAL WIRES (S_H), IN.
B = SPACING OF VERTICAL WIRES (S_V), IN.
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		EACH DIRECTION		EACH DIRECTION
6.0	48	48	6	7	WWF 3x4-W4xW4	0.20	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
8.0	48	48	6	7	WWF 3x4-W6xW4	0.24	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
10.0	48	48	6	7	WWF 3x4-W7xW4	0.28	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
13.0	48	48	6	7	WWF 3x4-W9xW4	0.36	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
24.0	48	48	8	7	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
26.0	48	48	8	7	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W5xW4	0.20	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
30.0	48	48	8	8	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
4.0	48	48	6	WWF 3x4-W4xW4	0.16	0.12	---	---	---
6.0	48	48	6	WWF 3x4-W5xW4	0.20	0.12	---	---	---
9.0	48	48	6	WWF 3x4-W6xW4	0.24	0.12	---	---	---
12.0	48	48	6	WWF 3x4-W8xW4	0.32	0.12	---	---	---
14.0	48	48	6	WWF 3x4-W10xW4	0.40	0.12	---	---	---
24.0	48	48	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
26.0	48	48	8	WWF 3x3-W5xW4	0.20	0.12	WWF 3x3-W5xW4	0.20	0.16
28.0	48	48	8	WWF 3x4-W7xW4	0.28	0.12	WWF 3x3-W7xW4	0.28	0.16

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 1
U.S. CUSTOMARY UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

RC-46M

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		EACH DIRECTION		EACH DIRECTION
8.0	60	60	6	7	WWF 3x4-W9xW4	0.36	0.12	---	---	---	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
16.0	60	60	8	7	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
18.0	60	60	8	7	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W6xW6	0.24
21.0	60	60	8	7	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W6xW6	0.24
23.0	60	60	8	8	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W6xW6	0.24
25.0	60	60	8	8	WWF 3x3-W9xW5	0.36	0.20	WWF 3x3-W9xW4	0.36	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W6xW6	0.24
27.0	60	60	8	8	WWF 3x3-W10xW7	0.40	0.28	WWF 3x3-W9xW4	0.36	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W7xW7	0.28
29.0	60	60	8	8	WWF 3x3-W10xW8	0.40	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W7xW7	0.28
30.0	60	60	8	8	WWF 3x3-W12xW8	0.48	0.32	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W7xW7	0.28

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
6.0	60	60	6	WWF 4x4-W10xW4	0.30	0.12	---	---	---
8.0	60	60	6	WWF 4x4-W12xW4	0.36	0.12	---	---	---
16.0	60	60	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
18.0	60	60	8	WWF 3x4-W6xW4	0.24	0.12	WWF 3x3-W5xW4	0.20	0.16
24.0	60	60	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16
28.0	60	60	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD
A = SPACING OF HORIZONTAL WIRES (SH), IN.
B = SPACING OF VERTICAL WIRES (SV), IN.
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		EACH DIRECTION		EACH DIRECTION
10.0	72	72	8	8	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W4xW4	0.16	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W7xW7	0.28
12.0	72	72	8	8	WWF 3x3-W5xW4	0.20	0.16	WWF 3x3-W5xW4	0.20	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W8xW8	0.32
15.0	72	72	8	9	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W8xW8	0.32
17.0	72	72	8	9	WWF 3x3-W8xW5	0.32	0.20	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W9xW9	0.36
19.0	72	72	8	9	WWF 3x3-W10xW8	0.40	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W9xW9	0.36
21.0	72	72	8	10	WWF 3x3-W10xW8	0.40	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
25.0	72	72	8	10	WWF 3x3-W12xW9	0.48	0.36	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
27.0	72	72	10	10	WWF 3x3-W12xW6	0.48	0.24	WWF 3x3-W12xW6	0.48	0.24	WWF 3x3-W6xW6	0.24	WWF 3x3-W12xW12	0.48
29.0	72	72	10	10	WWF 3x3-W12xW8	0.48	0.32	WWF 3x3-W12xW6	0.48	0.24	WWF 6x6-W12xW12	0.24	WWF 4x4-W20xW20	0.60
30.0	72	72	10	10	WWF 3x3-W12xW10	0.48	0.40	WWF 3x3-W12xW6	0.48	0.24	WWF 6x6-W12xW12	0.24	WWF 4x4-W20xW20	0.60

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
11.0	72	72	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
13.0	72	72	8	WWF 3x4-W5xW4	0.20	0.12	WWF 3x3-W5xW4	0.20	0.16
17.0	72	72	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16
21.0	72	72	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16
25.0	72	72	8	WWF 3x6-W12xW6	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16
28.0	72	72	10	WWF 3x12-W12xW12	0.48	0.12	WWF 3x3-W12xW5	0.48	0.20

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 2
U.S. CUSTOMARY UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) EACH DIRECTION
10.0	84	84	8	8	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W8xW8	0.32
12.0	84	84	8	9	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
14.0	84	84	8	9	WWF 3x3-W10xW6	0.40	0.24	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
16.0	84	84	8	9	WWF 3x3-W10xW8	0.40	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
18.0	84	84	8	9	WWF 3x3-W12xW10	0.48	0.40	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
21.0	84	84	8	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW8	0.60	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W12xW12	0.48
24.0	84	84	10	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 4x4-W8xW8	0.24	WWF 4x4-W20xW20	0.60
26.0	84	84	10	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 4x4-W8xW8	0.24	WWF 4x4-W20xW20	0.60
28.0	84	84	10	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 4x4-W8xW8	0.24	WWF 4x4-W20xW20	0.60
30.0	84	84	12	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x4-W20xW8	0.60	0.24	WWF 4x4-W8xW8	0.24	WWF 4x4-W20xW20	0.60

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL
8.0	84	84	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
10.0	84	84	8	WWF 3x4-W6xW4	0.24	0.12	WWF 3x3-W5xW4	0.20	0.16
13.0	84	84	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16
16.0	84	84	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16
19.0	84	84	8	WWF 3x12-W12xW12	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16
22.0	84	84	8	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW8	0.60	0.16
24.0	84	84	10	WWF 3x12-W12xW12	0.48	0.12	WWF 3x6-W12xW10	0.48	0.20
28.0	84	84	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD
A = SPACING OF HORIZONTAL WIRES (S_H), IN.
B = SPACING OF VERTICAL WIRES (S_V), IN.
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) EACH DIRECTION
11.0	96	96	8	8	WWF 3x3-W10xW5	0.40	0.20	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
13.0	96	96	8	9	WWF 3x3-W12xW8	0.48	0.32	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
15.0	96	96	8	9	WWF 3x3-W12xW10	0.48	0.40	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W10xW10	0.40
17.0	96	96	8	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW8	0.60	0.16	WWF 3x3-W6xW6	0.24	WWF 3x3-W12xW12	0.48
19.0	96	96	10	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W6xW6	0.24	WWF 3x3-W12xW12	0.48
22.0	96	96	10	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W8xW8	0.32	WWF 3x3-W14xW14	0.56
24.0	96	96	12	10	WWF 4x3-W20xW10	0.60	0.40	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
27.0	96	96	12	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x4-W20xW8	0.60	0.24	WWF 3x3-W6xW6	0.24	WWF 4x4-W20xW20	0.60
30.0	96	96	14	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W6xW6	0.24	WWF 4x4-W20xW20	0.60

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL
10.0	96	96	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16
13.0	96	96	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16
15.0	96	96	8	WWF 3x12-W12xW12	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16
18.0	96	96	8	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20
23.0	96	96	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20
27.0	96	96	12	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW12	0.60	0.24
28.0	96	96	14	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW8	0.60	0.32

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 3
U.S. CUSTOMARY UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) EACH DIRECTION
12.0	108	108	8	8	WWF 3x3-W12xW10	0.48	0.40	WWF 3x3-W12xW5	0.48	0.20	WWF 3x3-W5xW5	0.20	WWF 3x3-W12xW12	0.48
14.0	108	108	8	8	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W6xW6	0.24	WWF 3x3-W12xW12	0.48
16.0	108	108	10	8	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W6xW6	0.24	WWF 3x3-W14xW14	0.56
18.0	108	108	10	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x6-W20xW10	0.60	0.20	WWF 3x3-W8xW8	0.32	WWF 3x3-W14xW14	0.56
20.0	108	108	12	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 3x3-W14xW14	0.56
22.0	108	108	12	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 3x3-W14xW14	0.56
24.0	108	108	14	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
29.0	108	108	16	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW10	0.60	0.40	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
30.0	108	108	18	12	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW10	0.60	0.40	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL
10.0	108	108	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16
12.0	108	108	8	WWF 3x12-W12xW12	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16
14.0	108	108	8	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW8	0.60	0.16
18.0	108	108	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20
22.0	108	108	12	WWF 4x12-W20xW12	0.60	0.12	WWF 4x4-W20xW8	0.60	0.24
26.0	108	108	14	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW8	0.60	0.32
28.0	108	108	16	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW10	0.60	0.40

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD
A = SPACING OF HORIZONTAL WIRES (S_H), IN.
B = SPACING OF VERTICAL WIRES (S_V), IN.
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) EACH DIRECTION
13.0	120	120	10	8	WWF 3x3-W12xW10	0.48	0.40	WWF 3x3-W12xW8	0.48	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
15.0	120	120	10	8	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
17.0	120	120	12	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
19.0	120	120	14	9	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW8	0.60	0.32	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
22.0	120	120	16	10	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW10	0.60	0.40	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
24.0	120	120	18	11	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW10	0.60	0.40	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
26.0	120	120	20	13	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW12	0.60	0.48	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
29.0	120	120	20	14	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW12	0.60	0.48	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60
30.0	120	120	22	14	WWF 4x3-W20xW12	0.60	0.48	WWF 4x3-W20xW12	0.60	0.48	WWF 3x3-W8xW8	0.32	WWF 4x4-W20xW20	0.60

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.) HORIZONTAL	STEEL AREA (IN.^{2}/FT.) VERTICAL
12.0	120	120	8	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW8	0.60	0.16
15.0	120	120	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20
18.0	120	120	12	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW12	0.60	0.24
21.0	120	120	14	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW8	0.60	0.32
24.0	120	120	16	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW10	0.60	0.40
27.0	120	120	18	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW10	0.60	0.40
28.0	120	120	20	WWF 4x12-W20xW12	0.60	0.12	WWF 4x3-W20xW12	0.60	0.48

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 4
U.S. CUSTOMARY UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 38 OF 45

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
U.S. CUSTOMARY UNITS

BASE SECTIONS

H (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	TB (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)
						HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL		EACH DIRECTION		EACH DIRECTION
8.0	99	30	8	7	WWF 3x3-W4xW4	0.16	0.16	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
10.0	99	30	8	7	WWF 3x3-W7xW5	0.28	0.20	WWF 3x3-W6xW4	0.24	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
12.0	99	30	8	7	WWF 3x3-W8xW7	0.32	0.28	WWF 3x3-W8xW4	0.32	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
14.0	99	30	8	7	WWF 3x3-W9xW9	0.36	0.36	WWF 3x3-W9xW4	0.36	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
16.0	99	30	8	7	WWF 3x3-W12xW10	0.48	0.40	WWF 3x3-W10xW4	0.40	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
18.0	99	30	8	7	WWF 3x3-W12xW12	0.48	0.48	WWF 3x6-W12xW8	0.48	0.16	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
24.0	99	30	10	7	WWF 4x4-W20xW20	0.60	0.60	WWF 3x3-W12xW5	0.48	0.20	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
27.0	99	30	12	7	WWF 4x4-W20xW20	0.60	0.60	WWF 4x4-W20xW8	0.60	0.24	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20
30.0	99	30	12	8	WWF 4x4-W20xW20	0.60	0.60	WWF 4x4-W20xW8	0.60	0.24	WWF 3x3-W5xW5	0.20	WWF 3x3-W5xW5	0.20

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
U.S. CUSTOMARY UNITS

RISER SECTIONS

JOINT DEPTH (FT.)	LI (IN.)	WI (IN.)	TW (IN.)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)		WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (IN.^{2}/FT.)	
					HORIZONTAL	VERTICAL		HORIZONTAL	VERTICAL
3.0	99	30	6	WWF 3x4-W10xW4	0.40	0.12	---	---	---
8.0	99	30	8	WWF 3x4-W4xW4	0.16	0.12	WWF 3x3-W4xW4	0.16	0.16
10.0	99	30	8	WWF 3x4-W6xW4	0.24	0.12	WWF 3x3-W6xW4	0.24	0.16
13.0	99	30	8	WWF 3x4-W8xW4	0.32	0.12	WWF 3x3-W8xW4	0.32	0.16
15.0	99	30	8	WWF 3x4-W10xW4	0.40	0.12	WWF 3x3-W10xW4	0.40	0.16
18.0	99	30	8	WWF 3x6-W12xW6	0.48	0.12	WWF 3x6-W12xW8	0.48	0.16
24.0	99	30	10	WWF 4x12-W20xW12	0.60	0.12	WWF 3x3-W12xW5	0.48	0.20
26.0	99	30	10	WWF 4x12-W20xW12	0.60	0.12	WWF 4x6-W20xW10	0.60	0.20
28.0	99	30	12	WWF 4x12-W20xW12	0.60	0.12	WWF 4x4-W20xW8	0.60	0.24

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-WCxWD
A = SPACING OF HORIZONTAL WIRES (SH), IN.
B = SPACING OF VERTICAL WIRES (SV), IN.
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 5
U.S. CUSTOMARY UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 39 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - STANDARD
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
1219	1150	610	152	178	WWF 102x102-MW26xMW26	254	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
2134	1150	610	152	178	WWF 76x102-MW26xMW26	339	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
2743	1150	610	152	178	WWF 76x102-MW32xMW26	423	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
3353	1150	610	152	178	WWF 76x102-MW39xMW26	508	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
3962	1150	610	152	178	WWF 76x102-MW45xMW26	593	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
4572	1150	610	152	178	WWF 76x102-MW52xMW26	677	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
5182	1150	610	152	178	WWF 76x102-MW58xMW26	762	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
5791	1150	610	152	178	WWF 152x152-MW129xMW65	847	423	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
9144	1150	610	203	178	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - STANDARD
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
1524	1150	610	152	WWF 102x102-MW26xMW26	254	254	---	---	---
2438	1150	610	152	WWF 76x102-MW26xMW26	339	254	---	---	---
3048	1150	610	152	WWF 76x102-MW32xMW26	423	254	---	---	---
3962	1150	610	152	WWF 76x102-MW45xMW26	593	254	---	---	---
4572	1150	610	152	WWF 76x102-MW52xMW26	677	254	---	---	---
5182	1150	610	152	WWF 76x102-MW58xMW26	762	254	---	---	---
5791	1150	610	152	WWF 76x102-MW65xMW26	847	254	---	---	---
8534	1150	610	203	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW26xMW26	339	339

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-MWCxMWD
A = SPACING OF HORIZONTAL WIRES (S_H), mm
B = SPACING OF VERTICAL WIRES (S_V), mm
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
1829	1220	1220	152	178	WWF 76x102-MW32xMW26	423	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
2438	1220	1220	152	178	WWF 76x102-MW39xMW26	508	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
3048	1220	1220	152	178	WWF 76x102-MW45xMW26	593	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
3962	1220	1220	152	178	WWF 76x102-MW58xMW26	762	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
7315	1220	1220	203	178	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
7925	1220	1220	203	178	WWF 76x76-MW39xMW26	508	339	WWF 76x76-MW32xMW26	423	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
9144	1220	1220	203	203	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 4
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
1219	1220	1220	152	WWF 76x102-MW26xMW26	339	254	---	---	---
1829	1220	1220	152	WWF 76x102-MW32xMW26	423	254	---	---	---
2743	1220	1220	152	WWF 76x102-MW39xMW26	508	254	---	---	---
3658	1220	1220	152	WWF 76x102-MW52xMW26	677	254	---	---	---
4267	1220	1220	152	WWF 76x102-MW65xMW26	847	254	---	---	---
7315	1220	1220	203	WWF 76x102-MW26xMW26	339	254	WWF 76x76-MW26xMW26	339	339
7925	1220	1220	203	WWF 76x102-MW32xMW26	423	254	WWF 76x76-MW32xMW26	423	339
8534	1220	1220	203	WWF 76x102-MW45xMW26	593	254	WWF 76x76-MW45xMW26	593	339

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 1
METRIC UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
2438	1524	1524	152	178	WWF 76x102-MW58xMW26	762	254	---	---	---	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
4877	1524	1524	203	178	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
5486	1524	1524	203	178	WWF 76x76-MW39xMW26	508	339	WWF 76x76-MW39xMW26	508	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW39xMW39	508
6401	1524	1524	203	178	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW39xMW39	508
7010	1524	1524	203	203	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW39xMW39	508
7620	1524	1524	203	203	WWF 76x76-MW58xMW32	762	423	WWF 76x76-MW58xMW26	762	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW39xMW39	508
8230	1524	1524	203	203	WWF 76x76-MW65xMW45	847	593	WWF 76x76-MW58xMW26	762	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW45xMW45	593
8839	1524	1524	203	203	WWF 76x76-MW65xMW52	847	677	WWF 76x76-MW65xMW26	847	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW45xMW45	593
9144	1524	1524	203	203	WWF 76x76-MW77xMW52	1016	677	WWF 76x152-MW77xMW52	1016	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW45xMW45	593

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 5
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
1829	1524	1524	152	WWF 102x102-MW65xMW26	635	254	---	---	---
2438	1524	1524	152	WWF 102x102-MW77xMW26	762	254	---	---	---
4877	1524	1524	203	WWF 76x102-MW26xMW26	339	254	WWF 76x76-MW26xMW26	339	339
5486	1524	1524	203	WWF 76x102-MW39xMW26	508	254	WWF 76x76-MW32xMW26	423	339
7315	1524	1524	203	WWF 76x102-MW52xMW26	677	254	WWF 76x76-MW52xMW26	677	339
8534	1524	1524	203	WWF 76x102-MW65xMW26	847	254	WWF 76x76-MW65xMW26	847	339

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-MWCxMWD
A = SPACING OF HORIZONTAL WIRES (SH), mm
B = SPACING OF VERTICAL WIRES (Sv), mm
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
3048	1828	1828	203	203	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW26xMW26	339	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW45xMW45	593
3658	1828	1828	203	203	WWF 76x76-MW32xMW26	423	339	WWF 76x76-MW32xMW26	423	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW52xMW52	677
4572	1828	1828	203	229	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW52xMW52	677
5182	1828	1828	203	229	WWF 76x76-MW52xMW32	677	423	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW58xMW58	762
5791	1828	1828	203	229	WWF 76x76-MW65xMW52	847	677	WWF 76x76-MW65xMW26	847	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW58xMW58	762
6401	1828	1828	203	254	WWF 76x76-MW65xMW52	847	677	WWF 76x76-MW65xMW26	847	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
7620	1828	1828	203	254	WWF 76x76-MW77xMW58	1016	762	WWF 76x152-MW77xMW52	1016	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
8230	1828	1828	254	254	WWF 76x76-MW77xMW39	1016	508	WWF 76x76-MW77xMW39	1016	508	WWF 76x76-MW39xMW39	508	WWF 76x76-MW77xMW77	1016
8839	1828	1828	254	254	WWF 76x76-MW77xMW52	1016	677	WWF 76x76-MW77xMW39	1016	508	WWF 152x152-MW77xMW77	508	WWF 102x102-MW129xMW129	1270
9144	1828	1828	254	254	WWF 76x76-MW77xMW65	1016	847	WWF 76x76-MW77xMW39	1016	508	WWF 152x152-MW77xMW77	508	WWF 102x102-MW129xMW129	1270

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 6
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
3353	1828	1828	203	WWF 76x102-MW26xMW26	339	254	WWF 76x76-MW26xMW26	339	339
3962	1828	1828	203	WWF 76x102-MW32xMW26	423	254	WWF 76x76-MW32xMW26	423	339
5182	1828	1828	203	WWF 76x102-MW52xMW26	677	254	WWF 76x76-MW52xMW26	677	339
6401	1828	1828	203	WWF 76x102-MW65xMW26	847	254	WWF 76x76-MW65xMW26	847	339
7620	1828	1828	203	WWF 76x152-MW77xMW39	1016	254	WWF 76x152-MW77xMW52	1016	339
8534	1828	1828	254	WWF 76x305-MW77xMW77	1016	254	WWF 76x76-MW77xMW32	1016	423

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 2
METRIC UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
3048	2134	2134	203	203	WWF 76x76-MW39xMW26	508	339	WWF 76x76-MW39xMW26	508	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW52xMW52	677
3658	2134	2134	203	229	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
4267	2134	2134	203	229	WWF 76x76-MW65xMW39	847	508	WWF 76x76-MW65xMW26	847	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
4877	2134	2134	203	229	WWF 76x76-MW65xMW52	847	677	WWF 76x76-MW65xMW26	847	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
5486	2134	2134	203	229	WWF 76x76-MW77xMW65	1016	847	WWF 76x152-MW77xMW52	1016	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
6401	2134	2134	203	254	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW52	1270	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW77xMW77	1016
7315	2134	2134	254	254	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW65	1270	423	WWF 102x102-MW52xMW52	508	WWF 102x102-MW129xMW129	1270
7925	2134	2134	254	254	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW65	1270	423	WWF 102x102-MW52xMW52	508	WWF 102x102-MW129xMW129	1270
8534	2134	2134	254	279	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW65	1270	423	WWF 102x102-MW52xMW52	508	WWF 102x102-MW129xMW129	1270
9144	2134	2134	305	279	WWF 102x76-MW129xMW77	1270	1016	WWF 102x102-MW129xMW52	1270	508	WWF 102x102-MW52xMW52	508	WWF 102x102-MW129xMW129	1270

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 7
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
2438	2134	2134	203	WWF 76x102-MW26xMW26	339	254	WWF 76x76-MW26xMW26	339	339
3048	2134	2134	203	WWF 76x102-MW39xMW26	508	254	WWF 76x76-MW32xMW26	423	339
3962	2134	2134	203	WWF 76x102-MW52xMW26	677	254	WWF 76x76-MW52xMW26	677	339
4877	2134	2134	203	WWF 76x102-MW65xMW26	847	254	WWF 76x76-MW65xMW26	847	339
5791	2134	2134	203	WWF 76x305-MW77xMW77	1016	254	WWF 76x152-MW77xMW52	1016	339
6706	2134	2134	203	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW52	1270	339
7315	2134	2134	254	WWF 76x305-MW77xMW77	1016	254	WWF 76x152-MW77xMW65	1016	423
8534	2134	2134	254	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW65	1270	423

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-MWCxMWD
A = SPACING OF HORIZONTAL WIRES (S_H), mm
B = SPACING OF VERTICAL WIRES (S_V), mm
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
3353	2438	2438	203	203	WWF 76x76-MW65xMW32	847	423	WWF 76x76-MW65xMW26	847	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
3962	2438	2438	203	229	WWF 76x76-MW77xMW52	1016	677	WWF 76x76-MW65xMW26	847	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
4572	2438	2438	203	229	WWF 76x76-MW77xMW65	1016	847	WWF 76x152-MW77xMW52	1016	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW65xMW65	847
5182	2438	2438	203	229	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW52	1270	339	WWF 76x76-MW39xMW39	508	WWF 76x76-MW77xMW77	1016
5791	2438	2438	254	254	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW65	1270	423	WWF 76x76-MW39xMW39	508	WWF 76x76-MW77xMW77	1016
6706	2438	2438	254	254	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW65	1270	423	WWF 76x76-MW52xMW52	677	WWF 76x76-MW90xMW90	1185
7315	2438	2438	305	254	WWF 102x76-MW129xMW65	1270	847	WWF 102x76-MW129xMW52	1270	677	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
8230	2438	2438	305	279	WWF 102x76-MW129xMW77	1270	1016	WWF 102x102-MW129xMW52	1270	508	WWF 76x76-MW39xMW39	508	WWF 102x102-MW129xMW129	1270
9144	2438	2438	356	279	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW52	1270	677	WWF 76x76-MW39xMW39	508	WWF 102x102-MW129xMW129	1270

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 8
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
3048	2438	2438	203	WWF 76x102-MW52xMW26	677	254	WWF 76x76-MW52xMW26	677	339
3962	2438	2438	203	WWF 76x102-MW65xMW26	847	254	WWF 76x76-MW65xMW26	847	339
4572	2438	2438	203	WWF 76x305-MW77xMW77	1016	254	WWF 76x152-MW77xMW52	1016	339
5486	2438	2438	203	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW65	1270	423
7010	2438	2438	254	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW65	1270	423
8230	2438	2438	305	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW77	1270	508
8534	2438	2438	356	WWF 102x305-MW129xMW77	1270	254	WWF 102x76-MW129xMW52	1270	677

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 3
METRIC UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
3658	2744	2744	203	203	WWF 76x76-MW77xMW65	1016	847	WWF 76x76-MW77xMW32	1016	423	WWF 76x76-MW32xMW32	423	WWF 76x76-MW77xMW77	1016
4267	2744	2744	203	203	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW65	1270	423	WWF 76x76-MW39xMW39	508	WWF 76x76-MW77xMW77	1016
4877	2744	2744	254	203	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW65	1270	423	WWF 76x76-MW39xMW39	508	WWF 76x76-MW90xMW90	1185
5486	2744	2744	254	229	WWF 102x76-MW129xMW77	1270	1016	WWF 102x152-MW129xMW65	1270	423	WWF 76x76-MW52xMW52	677	WWF 76x76-MW90xMW90	1185
6096	2744	2744	305	229	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW52	1270	677	WWF 76x76-MW52xMW52	677	WWF 76x76-MW90xMW90	1185
6706	2744	2744	305	254	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW52	1270	677	WWF 76x76-MW52xMW52	677	WWF 76x76-MW90xMW90	1185
7315	2744	2744	356	254	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW52	1270	677	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
8839	2744	2744	406	279	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW65	1270	847	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
9144	2744	2744	457	305	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW65	1270	847	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 9
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
3048	2744	2744	203	WWF 76x102-MW65xMW26	847	254	WWF 76x76-MW65xMW26	847	339
3658	2744	2744	203	WWF 76x305-MW77xMW77	1016	254	WWF 76x152-MW77xMW52	1016	339
4267	2744	2744	203	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW52	1270	339
5486	2744	2744	254	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW65	1270	423
6706	2744	2744	305	WWF 102x305-MW129xMW77	1270	254	WWF 102x102-MW129xMW52	1270	508
7925	2744	2744	356	WWF 102x305-MW129xMW77	1270	254	WWF 102x76-MW129xMW52	1270	677
8534	2744	2744	406	WWF 102x305-MW129xMW77	1270	254	WWF 102x76-MW129xMW65	1270	847

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-MWCxMWD
A = SPACING OF HORIZONTAL WIRES (S_H), mm
B = SPACING OF VERTICAL WIRES (S_V), mm
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
3962	3048	3048	254	203	WWF 76x76-MW77xMW65	1016	847	WWF 76x76-MW77xMW52	1016	677	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
4572	3048	3048	254	203	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW52	1270	677	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
5182	3048	3048	305	229	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW52	1270	677	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
5791	3048	3048	356	229	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW52	1270	677	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
6706	3048	3048	406	254	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW65	1270	847	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
7315	3048	3048	457	279	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW65	1270	847	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
7925	3048	3048	508	330	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW77	1270	1016	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
8839	3048	3048	508	356	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW77	1270	1016	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270
9144	3048	3048	559	356	WWF 102x76-MW129xMW77	1270	1016	WWF 102x76-MW129xMW77	1270	1016	WWF 76x76-MW52xMW52	677	WWF 102x102-MW129xMW129	1270

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - 10
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
3658	3048	3048	203	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW52	1270	339
4572	3048	3048	254	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW65	1270	423
5486	3048	3048	305	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW77	1270	508
6401	3048	3048	356	WWF 102x305-MW129xMW77	1270	254	WWF 102x76-MW129xMW52	1270	677
7315	3048	3048	406	WWF 102x305-MW129xMW77	1270	254	WWF 102x76-MW129xMW65	1270	847
8230	3048	3048	457	WWF 102x305-MW129xMW77	1270	254	WWF 102x76-MW129xMW65	1270	847
8534	3048	3048	508	WWF 102x305-MW129xMW77	1270	254	WWF 102x76-MW129xMW77	1270	1016

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 4
METRIC UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
METRIC UNITS

BASE SECTIONS

H (mm)	L_I (mm)	W_I (mm)	T_W (mm)	T_B (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT			TOP MAT REINFORCEMENT		BOTTOM MAT REINFORCEMENT	
					WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION	WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) EACH DIRECTION
2438	2516	762	203	178	WWF 76x76-MW26xMW26	339	339	WWF 76x102-MW26xMW26	339	254	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
3048	2516	762	203	178	WWF 76x76-MW45xMW32	593	423	WWF 76x76-MW39xMW26	508	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
3658	2516	762	203	178	WWF 76x76-MW52xMW45	677	593	WWF 76x76-MW52xMW26	677	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
4267	2516	762	203	178	WWF 76x76-MW58xMW58	762	762	WWF 76x76-MW58xMW26	762	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
4877	2516	762	203	178	WWF 76x76-MW77xMW65	1016	847	WWF 76x76-MW65xMW26	847	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
5486	2516	762	203	178	WWF 76x76-MW77xMW77	1016	1016	WWF 76x152-MW77xMW52	1016	339	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
7315	2516	762	254	178	WWF 102x102-MW129xMW129	1270	1270	WWF 76x76-MW77xMW32	1016	423	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
8230	2516	762	305	178	WWF 102x102-MW129xMW129	1270	1270	WWF 102x102-MW129xMW52	1270	508	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423
9144	2516	762	305	203	WWF 102x102-MW129xMW129	1270	1270	WWF 102x102-MW129xMW52	1270	508	WWF 76x76-MW32xMW32	423	WWF 76x76-MW32xMW32	423

PRECAST CONCRETE INLET BOX SUMMARY TABLE
BOX TYPE - D-H
METRIC UNITS

RISER SECTIONS

JOINT DEPTH (mm)	L_I (mm)	W_I (mm)	T_W (mm)	OUTSIDE FACE REINFORCEMENT			INSIDE FACE REINFORCEMENT		
				WELDED WIRE FABRIC *WWF AxB-MWCxMWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL	WELDED WIRE FABRIC *WWF AxB-WCxWD	STEEL AREA (mm^2/m) HORIZONTAL	STEEL AREA (mm^2/m) VERTICAL
914	2516	762	152	WWF 76x102-MW65xMW26	847	254	---	---	---
2438	2516	762	203	WWF 76x102-MW26xMW26	339	254	WWF 76x76-MW26xMW26	339	339
3048	2516	762	203	WWF 76x102-MW39xMW26	508	254	WWF 76x76-MW39xMW26	508	339
3962	2516	762	203	WWF 76x102-MW52xMW26	677	254	WWF 76x76-MW52xMW26	677	339
4572	2516	762	203	WWF 76x102-MW65xMW26	847	254	WWF 76x76-MW65xMW26	847	339
5486	2516	762	203	WWF 76x152-MW77xMW39	1016	254	WWF 76x152-MW77xMW52	1016	339
7315	2516	762	254	WWF 102x305-MW129xMW77	1270	254	WWF 76x76-MW77xMW32	1016	423
7925	2516	762	254	WWF 102x305-MW129xMW77	1270	254	WWF 102x152-MW129xMW65	1270	423
8534	2516	762	305	WWF 102x305-MW129xMW77	1270	254	WWF 102x102-MW129xMW52	1270	508

* SUGGESTED SIZE OF WELDED WIRE FABRIC

WWF AxB-MWCxMWD
A = SPACING OF HORIZONTAL WIRES (SH), mm
B = SPACING OF VERTICAL WIRES (SV), mm
C = HORIZONTAL WIRE SIZE
D = VERTICAL WIRE SIZE

NOTES:

1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.
2. FOR INLET BOX TYPES, SEE SHEET 6.
3. FOR DETAILS, SEE SHEETS 23 - 25 AND 27.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

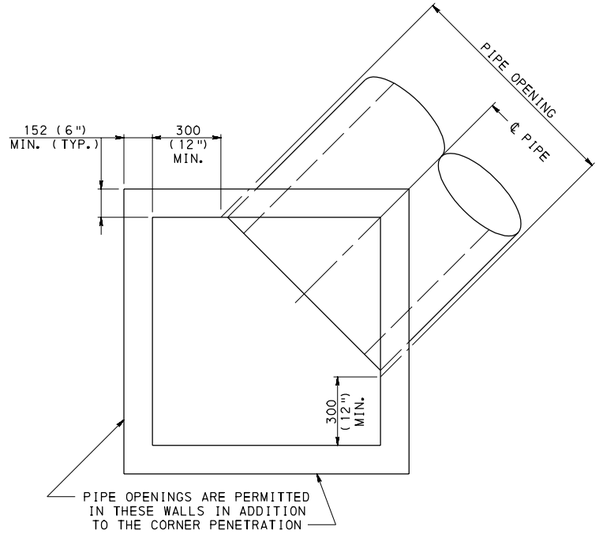
INLET BOXES

PRECAST INLET BOXES
DESIGN TABLES - 5
METRIC UNITS
(WELDED WIRE FABRIC)

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

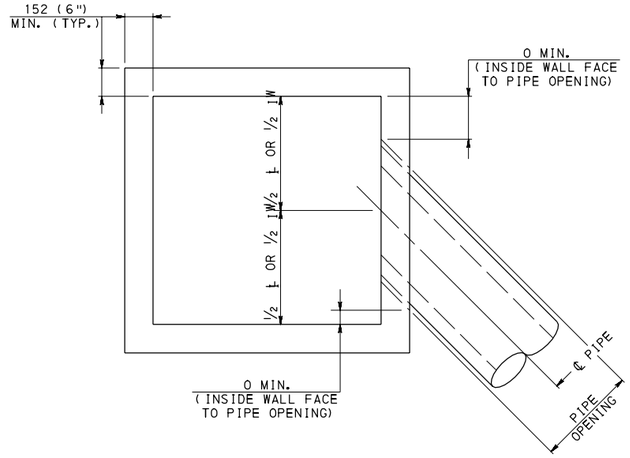
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

RC-46M



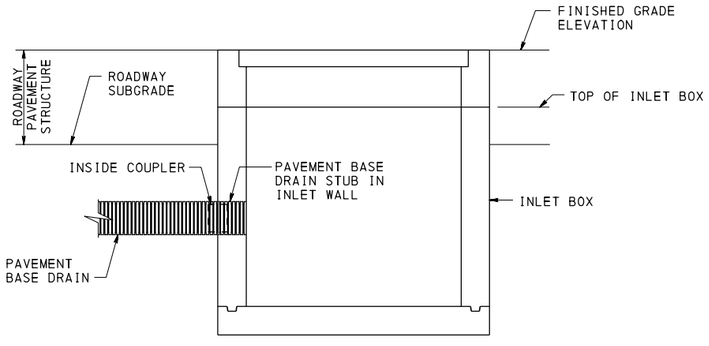
DETAIL FOR CORNER PIPE

(SEE PIPE LOCATION AND PIPE OPENING NOTES ON SHEET 2)

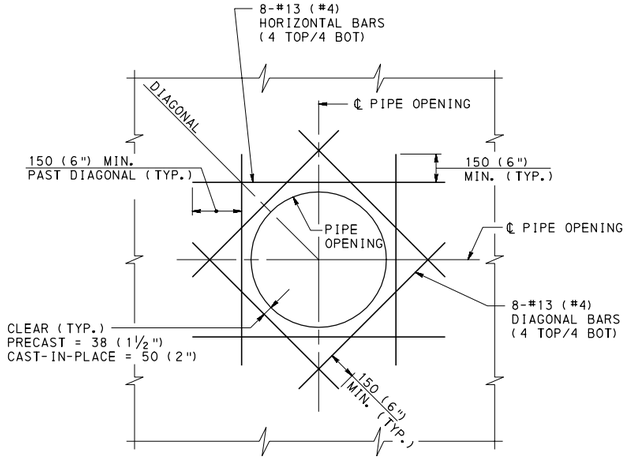


DETAIL FOR SKEWED PIPE

(SEE PIPE LOCATION AND PIPE OPENING NOTES ON SHEET 2)



OPTIONAL CONNECTION DETAIL FOR PAVEMENT BASE DRAIN



ADDITIONAL REINFORCEMENT ADJACENT TO PIPE OPENING IN BOTTOM SLAB

TABLE A
BOX TYPE BASED ON REINFORCED CONCRETE PIPE SIZES
U.S. CUSTOMARY UNITS

INLET TYPE	MAXIMUM INSIDE WIDTH (IN.)	MAXIMUM INSIDE LENGTH (IN.)	MAXIMUM PERMITTED PIPE DIAMETER ALONG WIDTH (IN.)	MAXIMUM PERMITTED PIPE DIAMETER ALONG LENGTH (IN.)
STANDARD	24	45¼	18	36
4	48	48	36	36
5	60	60	42	42
6	72	72	54	54
7	84	84	66	66
8	96	96	72	72
9	108	108	84	84
10	120	120	96	96
D-H	30	99	18	72

TABLE B
BOX TYPE BASED ON REINFORCED CONCRETE PIPE SIZES
METRIC UNITS

INLET TYPE	MAXIMUM INSIDE WIDTH (mm)	MAXIMUM INSIDE LENGTH (mm)	MAXIMUM PERMITTED PIPE DIAMETER ALONG WIDTH (mm)	MAXIMUM PERMITTED PIPE DIAMETER ALONG LENGTH (mm)
STANDARD	610	1150	450	900
4	1220	1220	900	900
5	1524	1524	1050	1050
6	1828	1828	1350	1350
7	2134	2134	1650	1650
8	2438	2438	1800	1800
9	2744	2744	2100	2100
10	3048	3048	2400	2400
D-H	762	2516	450	1800

NOTES:

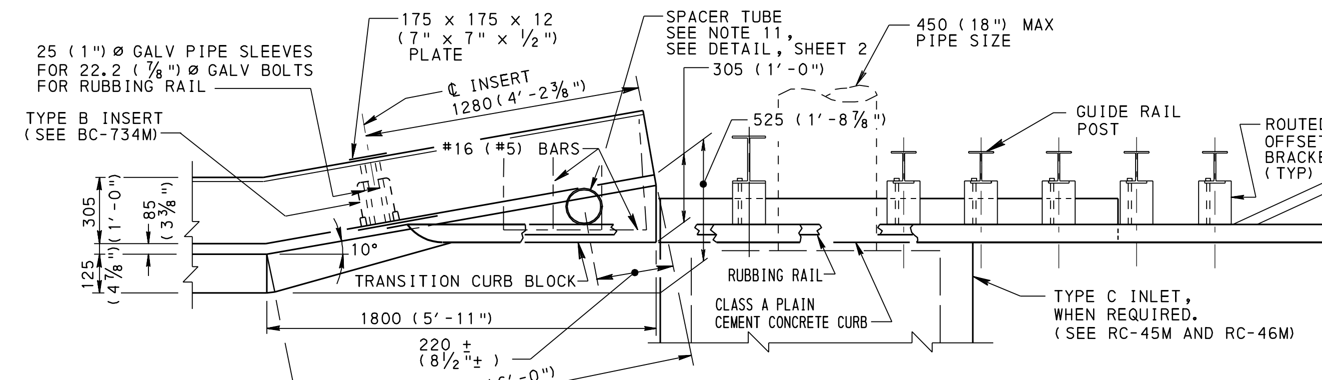
1. FOR ADDITIONAL NOTES, SEE SHEETS 1 - 3.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

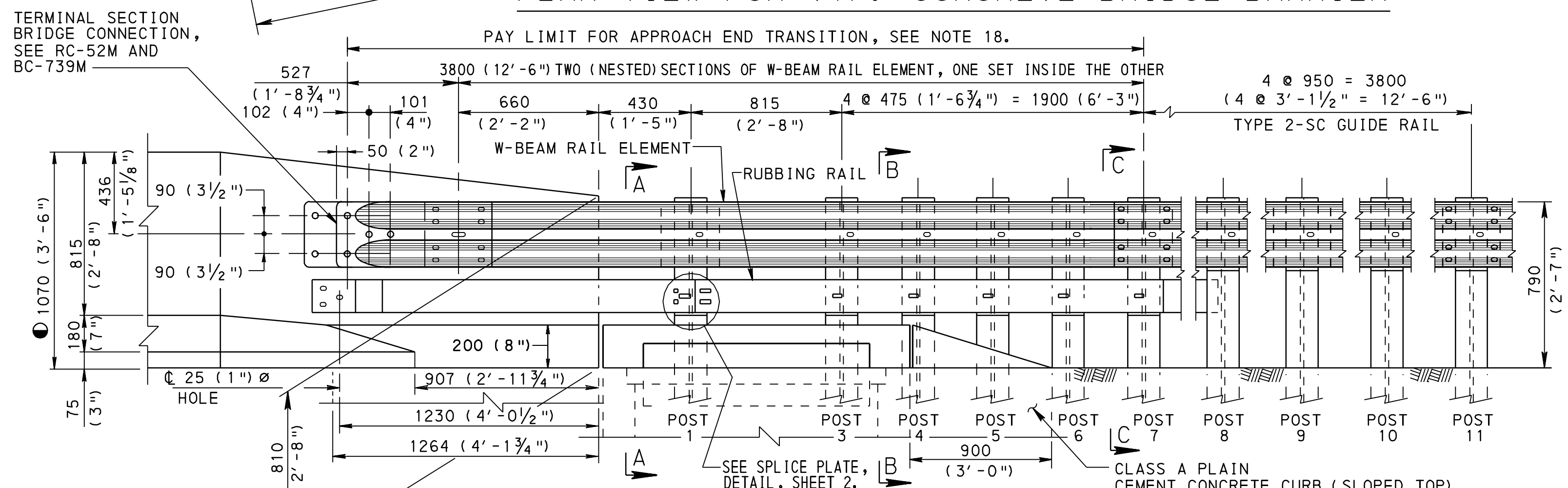
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET BOXES
MISCELLANEOUS DETAILS

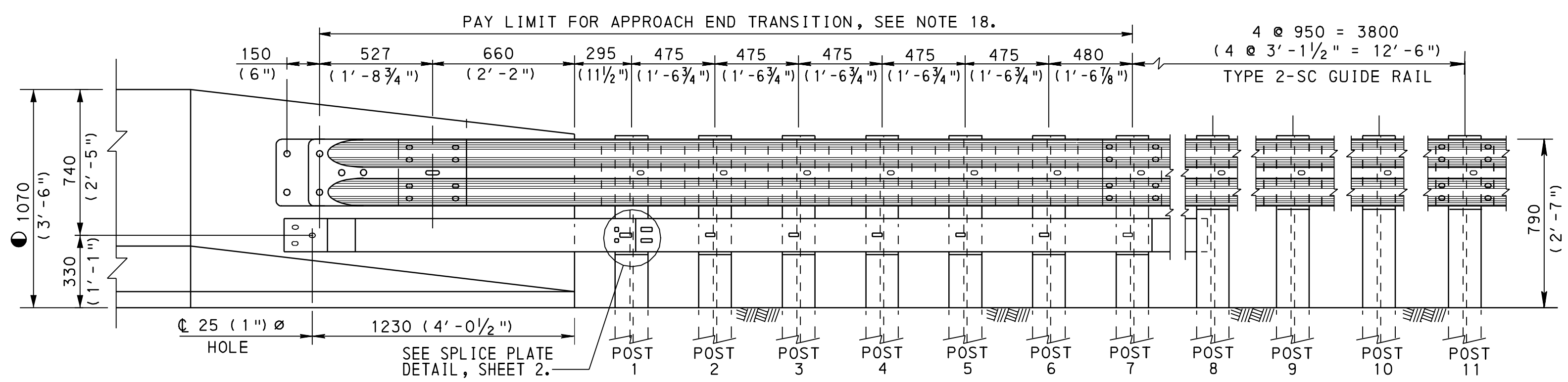
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 45 OF 45
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-46M



PLAN VIEW FOR TYP. CONCRETE BRIDGE BARRIER



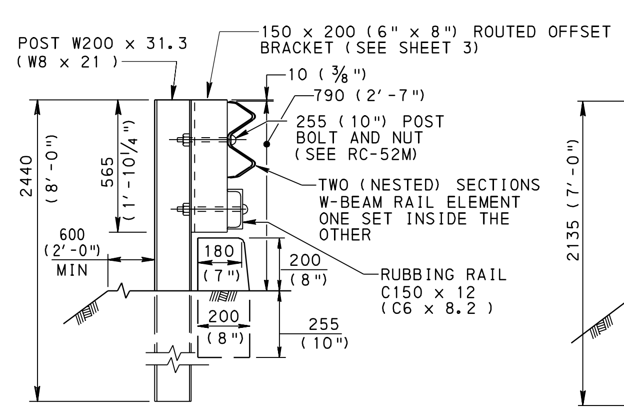
ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER



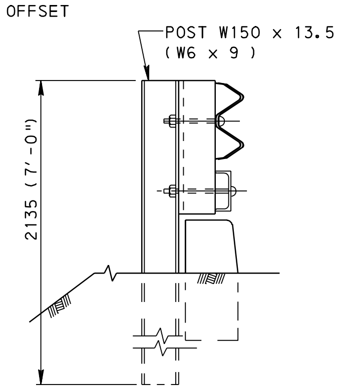
ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER

(WITHOUT INLET PLACEMENT)

NOTE:
TYPICAL TO ELEVATION VIEW WITH INLET PLACEMENT EXCEPT AS NOTED.

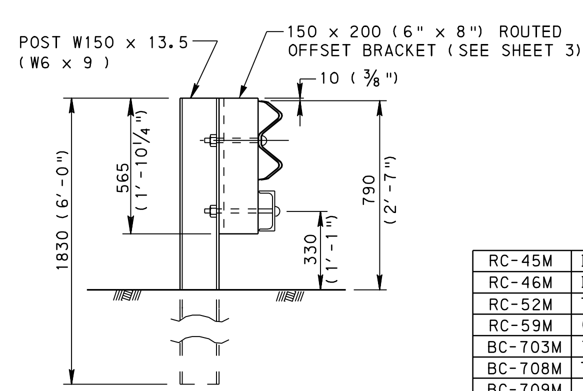


SECTION A-A



SECTION B-B

(SECTION B-B IS TYPICAL TO SECTION A-A EXCEPT AS SHOWN OTHERWISE)



SECTION C-C

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
2. ALL REINFORCEMENT STEEL BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A 615/A 615M, A 996/A 996M OR A 706/A 706M.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUBLICATION 408.
4. W-BEAM RAIL ELEMENT IS BOLTED TO ALL POSTS.
5. USE PLAN DIMENSIONS WHEN DIFFERENT FROM THOSE SHOWN ON THIS STANDARD.
6. REINFORCED CONCRETE BARRIER AND EMBEDDED INSERTS ARE BRIDGE ITEMS.
7. WHEN CONNECTING TO TYPE 2-S GUIDE RAIL (705 (2'-3 3/4")) OR TYPE 2-W GUIDE RAIL (815 (2'-8")), TRANSITION UP OR DOWN 25 (1") PER 7620 (25'-0").
8. BOLT RUBBING RAIL TO POST WITHOUT WASHER.
9. POSTS WITH RUBBING RAIL ATTACHMENT REQUIRE AN ADDITIONAL HOLE.
10. TERMINAL SECTION AND RUBBING RAIL END MUST BE ATTACHED FLUSH WITH BRIDGE BARRIER. INSTALLATION CAN BE GREATLY SIMPLIFIED BY FABRICATING OR SHOP TWISTING TO BE CONSISTENT WITH THE SLOPE OF THE BARRIER.
11. STEEL SPACER TUBE, SCHEDULE 40 GALVANIZED PIPE, 152 (6") ID x 305 (12"). CONNECT TO THE W-BEAM RAIL ELEMENTS USING SPLICE BOLT.
12. GALVANIZE ALL HARDWARE, W-BEAM RAIL ELEMENTS, THRIE-BEAM RAIL ELEMENTS, RUBBING RAIL, W-BEAM TO THRIE-BEAM TRANSITION SECTION, TERMINAL SECTION BRIDGE CONNECTIONS, ANGLES, PLATES, BOLTS AND ANY OTHER FABRICATED STEEL COMPONENTS.
13. REINFORCEMENT BAR SIZES ARE SHOWN FOR CLARITY ONLY. USE ACTUAL BAR DESIGNATION INDICATED IN THE CONTRACT DRAWINGS.
14. SEE BC-739M AND RC-52M FOR DETAILS AND HARDWARE NOT SHOWN.
15. PROVIDE 50 (2") CLEARANCE ON ALL REINFORCEMENT EXCEPT AS NOTED.
16. PROVIDE APPROACH END GUIDE RAIL TREATMENT AT BOTH THE APPROACH AND TRAILING ENDS OF STRUCTURE BARRIERS ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC. ON FOUR-LANE DIVIDED HIGHWAYS, GUIDE RAIL TRANSITION IS NOT REQUIRED ON TRAILING ENDS OF BARRIERS UNLESS WARRANTED BY OTHER OBSTRUCTIONS.
17. PROVIDE STEEL POST SIZE AND LENGTH AS SHOWN IN TABLES A, B, C, AND D AS APPROPRIATE.
18. PAYMENT FOR THE APPROACH END TRANSITION, EITHER WITH OR WITHOUT INLET PLACEMENT, INCLUDES TWO 3810 (12'-6") SECTIONS OF EITHER W-BEAM OR THRIE-BEAM RAIL ELEMENTS, W-BEAM TO THRIE-BEAM TRANSITION SECTION FABRICATED STEEL ITEMS, TERMINAL SECTION BRIDGE CONNECTION, RUBBING RAIL, RUBBING RAIL CONNECTIONS, BOLTS, POSTS, OFFSET BRACKETS, STEEL SPACER TUBE AND ASSOCIATED HARDWARE. END TRANSITIONS ARE ROADWAY ITEMS.
19. FOR THE PA BRIDGE BARRIER TRANSITION CONNECTION, CONNECTION PLATES SHALL MEET THE REQUIREMENTS OF ASTM A 709/A 709M GRADE 250 MPa (GRADE 36 KSI) STEEL. BOLTS, NUTS, AND WASHERS SHALL MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02(c).
20. REFER TO SHEET 3 FOR PHOTOS OF: GUIDE RAIL TO TYPICAL CONCRETE BRIDGE BARRIER TRANSITION (WITHOUT INLET PLACEMENT); ELEVATION VIEW FOR TYPICAL CONCRETE BRIDGE BARRIER TRANSITION (WITHOUT INLET PLACEMENT); AND TYPICAL STEEL SPACER TUBE INSTALLATION.

TABLE A

POST	LENGTH	SIZE
1 THRU 3	2440 (8'-0")	W200x31.3 (W8x21)
4 THRU 6	2135 (7'-0")	W150x13.5 (W6x9)
7 THRU 11	1830 (6'-0")	W150x13.5 (W6x9)

LEGEND

◐ SEE BC-739M, SHEET 1 FOR BRIDGE BARRIER HEIGHT.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

RC-45M	INLET TOPS, GRATES, AND FRAMES
RC-46M	INLET BOXES
RC-52M	TYPE 2 STRONG POST GUIDE RAIL
RC-59M	CONCRETE GLARE SCREEN
BC-703M	THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTION
BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER
BC-712M	THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION CONNECTION
BC-713M	PA BRIDGE BARRIER
BC-734M	STANDARD ANCHOR SYSTEMS
BC-739M	TYPE F-BRIDGE BARRIER TO GUIDE RAIL TRANSITION

REFERENCE DRAWINGS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

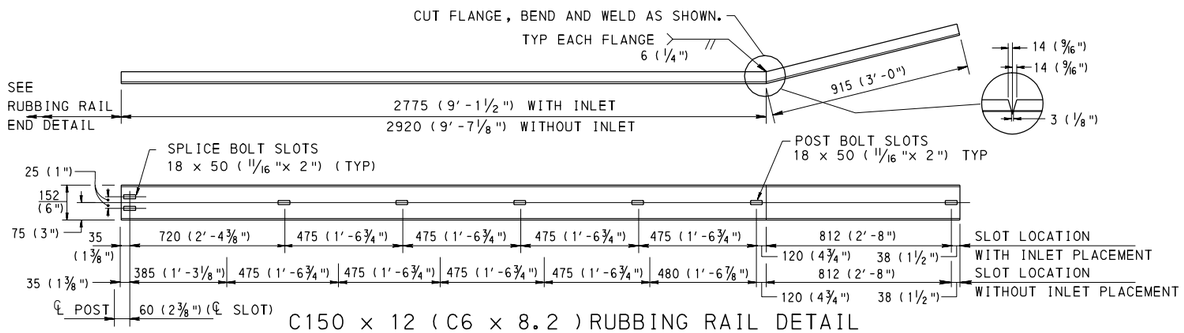
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

TYPICAL CONCRETE BRIDGE BARRIER

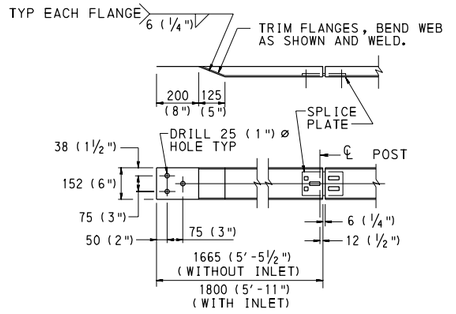
RECOMMENDED JUN. 1, 2010 — CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010 — DIRECTOR, BUREAU OF DESIGN

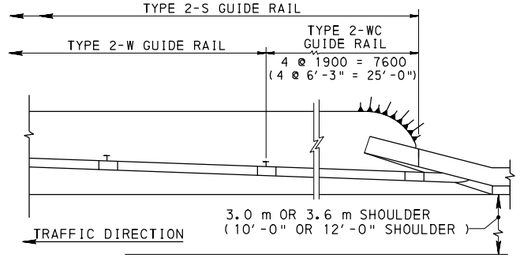
RC-50M



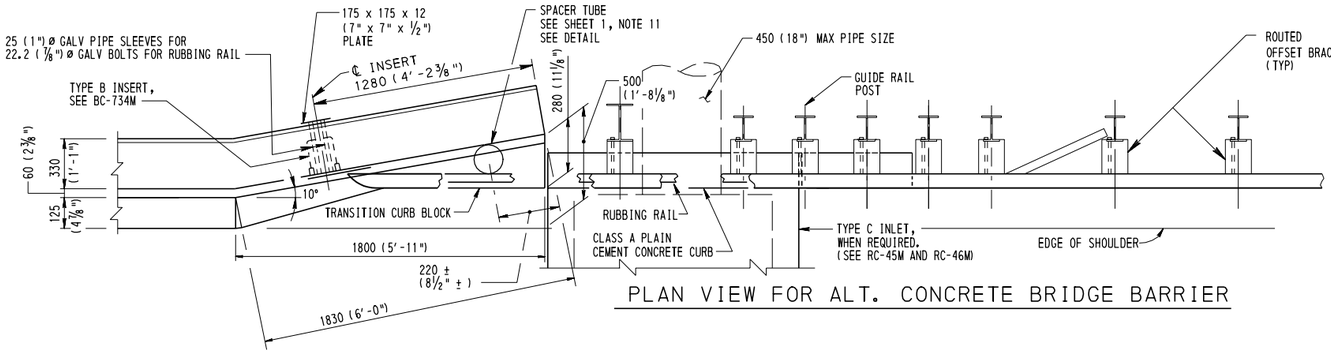
C150 x 12 (C6 x 8.2) RUBBING RAIL DETAIL



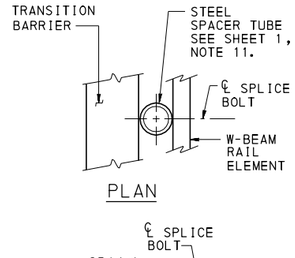
C150 x 12 (C6 x 8.2) RUBBING RAIL END DETAIL



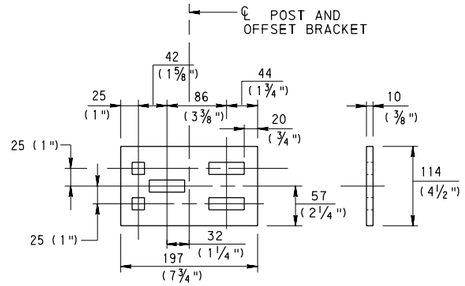
TRAILING END GUIDE RAIL AT STRUCTURE BARRIER
(FOUR-LANE DIVIDED HIGHWAY)



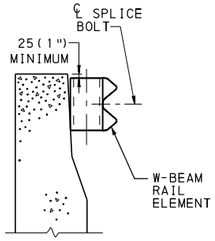
PLAN VIEW FOR ALT. CONCRETE BRIDGE BARRIER



PLAN

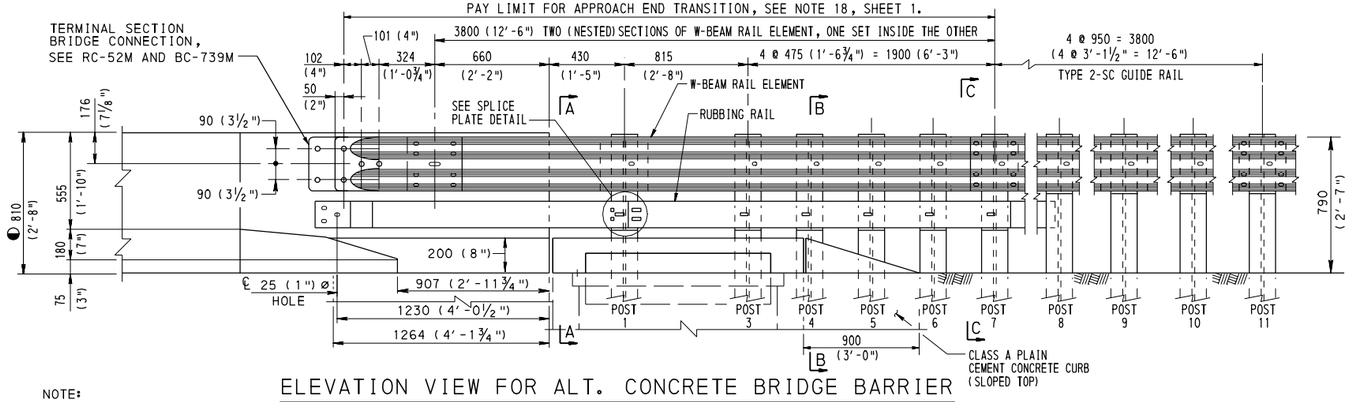


SPLICE PLATE DETAIL



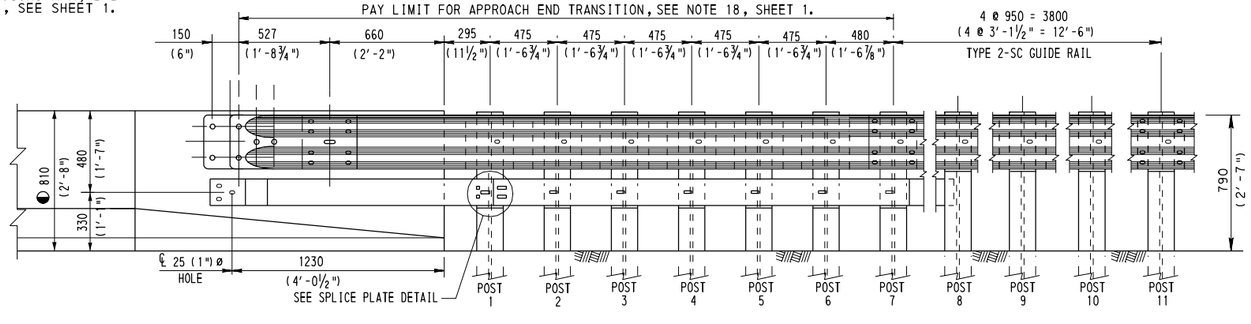
SECTION

STEEL SPACER TUBE DETAIL



ELEVATION VIEW FOR ALT. CONCRETE BRIDGE BARRIER

NOTE:
FOR SECTIONS A-A, B-B AND C-C, SEE SHEET 1.



ELEVATION VIEW FOR ALT. CONCRETE BRIDGE BARRIER
(WITHOUT INLET PLACEMENT)

NOTE:
TYPICAL TO ELEVATION VIEW WITH INLET PLACEMENT EXCEPT AS NOTED.

NOTES

1. THE GUIDE RAIL TRANSITION DETAILS ON THIS SHEET ARE ALSO TO BE USED FOR TRANSITIONS TO THE PA HT BRIDGE BARRIERS.
2. FOR APPROACH TRANSITION POST SIZE AND LENGTH, SEE TABLE A, SHEET 1.
3. FOR ADDITIONAL NOTES AND LEGEND, SEE SHEET 1.
4. FOR PHOTO OF TYPICAL STEEL SPACER TUBE INSTALLATION, SEE SHEET 3.

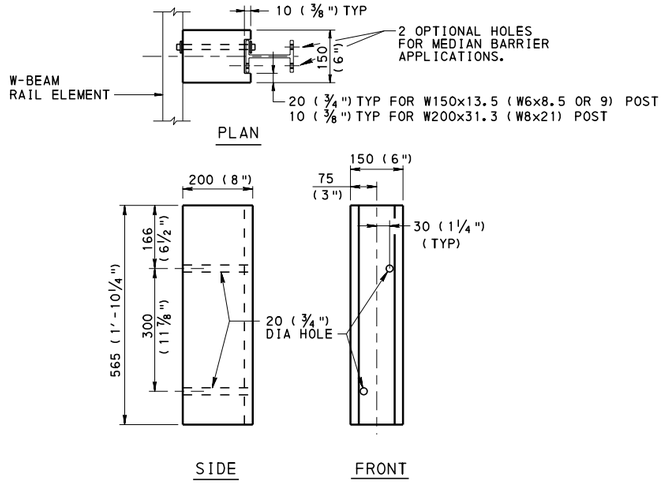
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

ALTERNATE CONCRETE BRIDGE BARRIER

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 16
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-50M



ROUTED OFFSET BRACKET

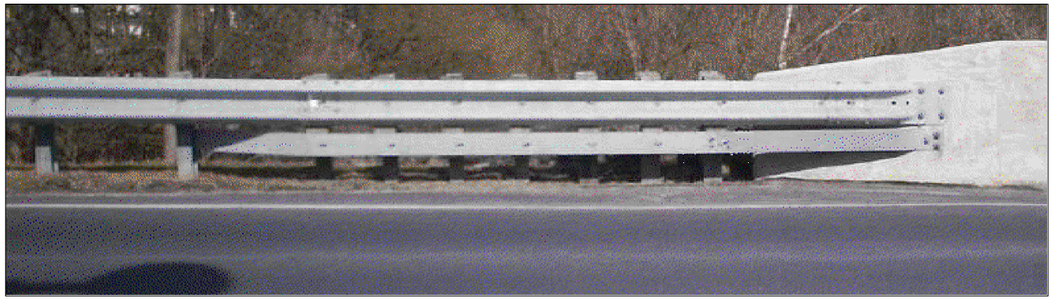
TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER TRANSITION POSTS 1 THRU 7, SEE SHEETS 1 AND 2.

GUIDE RAIL TO TYPICAL CONCRETE BRIDGE BARRIER TRANSITION
(WITHOUT INLET PLACEMENT)

FOR DETAILS, SEE SHEET 1

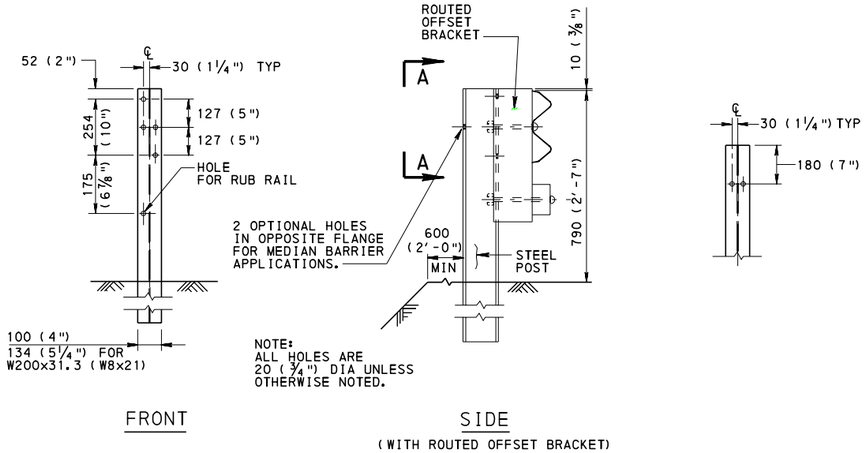
TYPICAL STEEL SPACER TUBE INSTALLATION

FOR DETAILS, SEE SHEETS 1 AND 2



ELEVATION VIEW FOR TYPICAL CONCRETE BRIDGE BARRIER TRANSITION
(WITHOUT INLET PLACEMENT)

FOR DETAILS, SEE SHEET 1



W150 x 13.5 (W6 x 8.5 or 9) POST DETAILS

TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER TRANSITION POSTS 4 THRU 7.

NOTE: W200x31.3 (W8x21) POSTS 1 THRU 3 SIMILAR, SEE DETAILS ON SHEETS 1 AND 2.

NOTES

1. FOR APPROACH TRANSITION POST HEIGHTS, SEE SHEETS 1 AND 2.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. FOR APPROACH TRANSITION POST SIZE AND LENGTH, SEE TABLE A, ON SHEET 1.

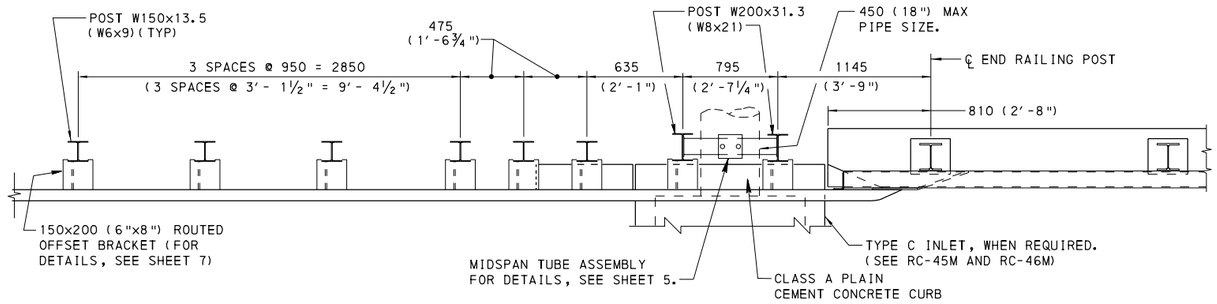
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

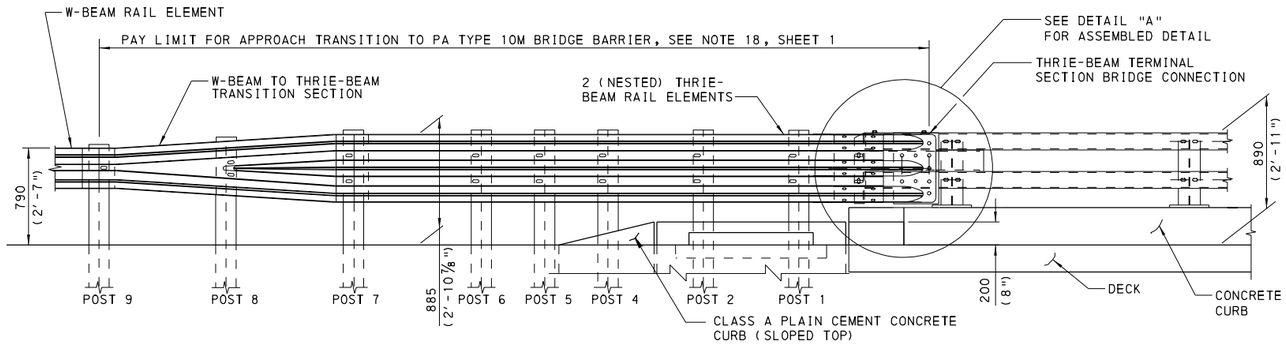
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS

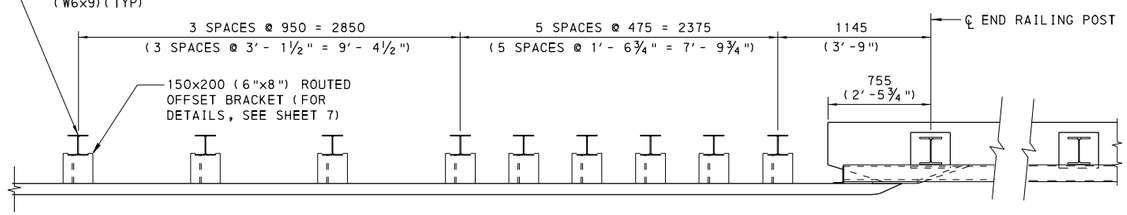
RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 3 OF 16 RC-50M



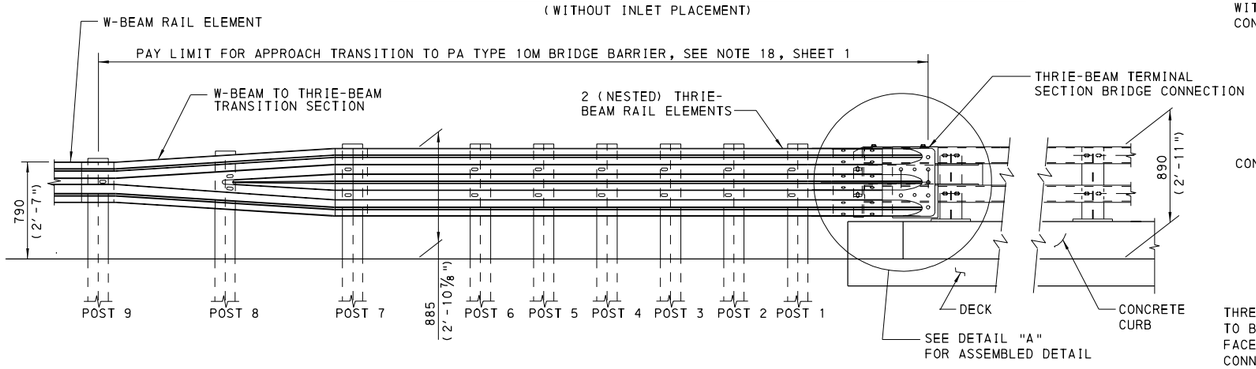
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



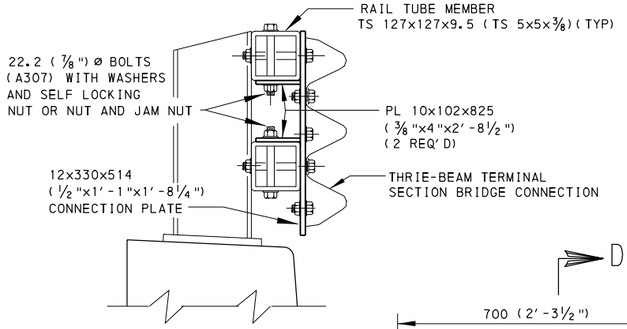
ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



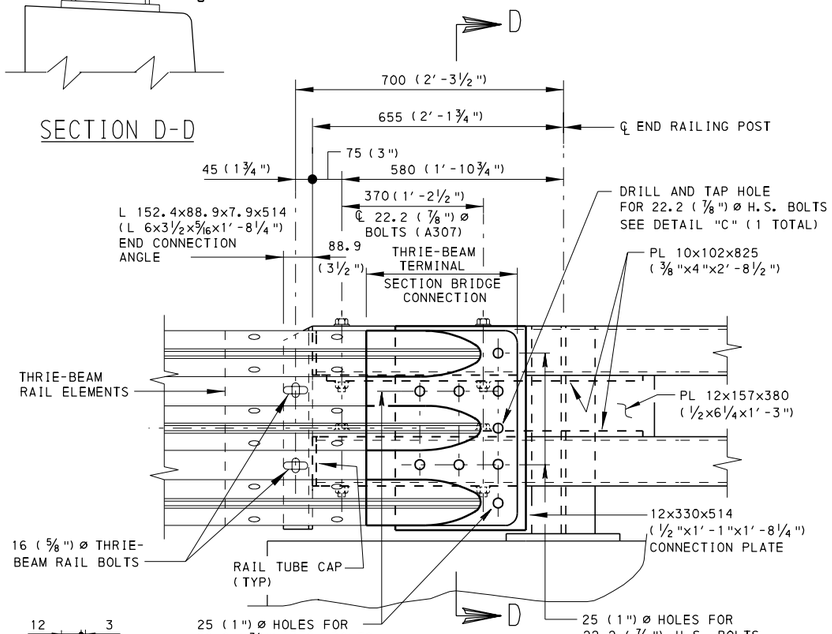
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
(WITHOUT INLET PLACEMENT)



ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
(WITHOUT INLET PLACEMENT)

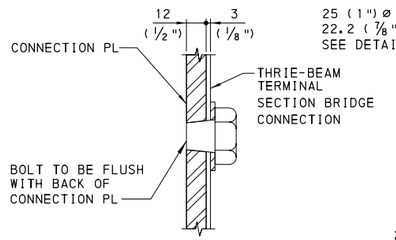


SECTION D-D

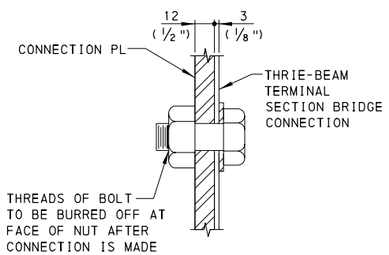


DETAIL A

(FOR UNASSEMBLED DETAILS, SEE SHEET 6)



DETAIL "C"



DETAIL "D"

NOTES

1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 7.
3. FOR LOCATION WITH INLET PLACEMENT, POST 3 IS OMITTED.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER

REFERENCE DRAWINGS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

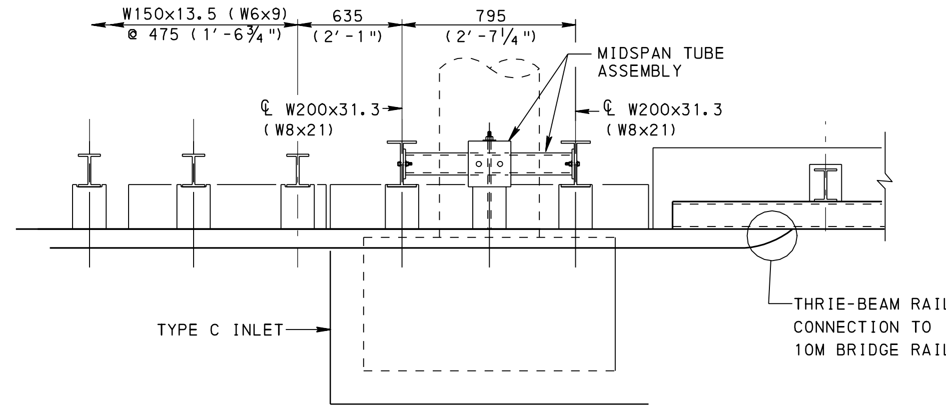
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

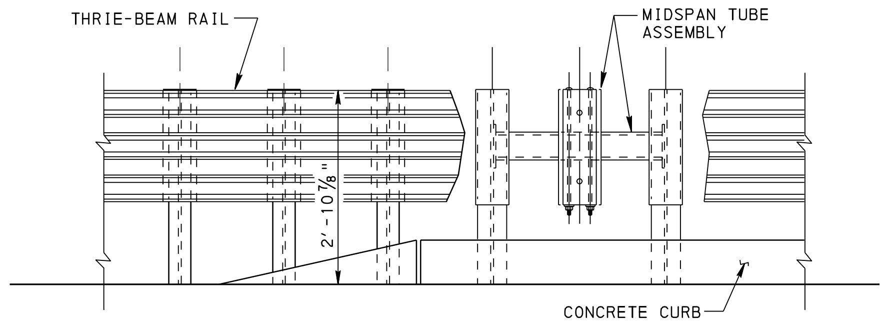
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 4 OF 16

RC-50M

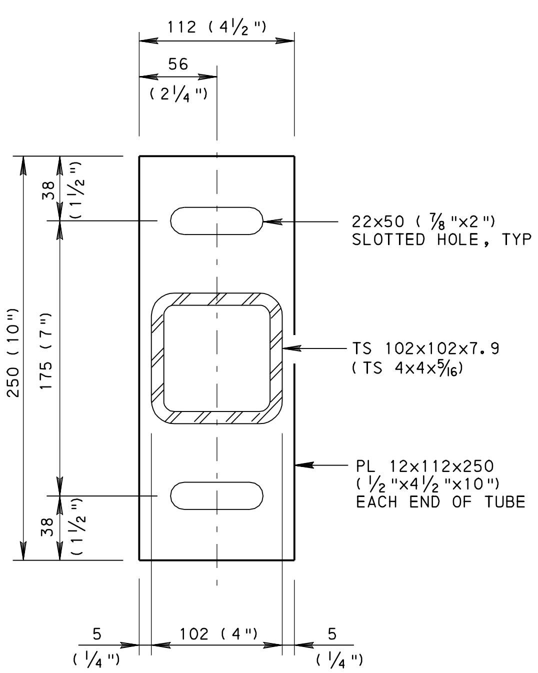


PLAN

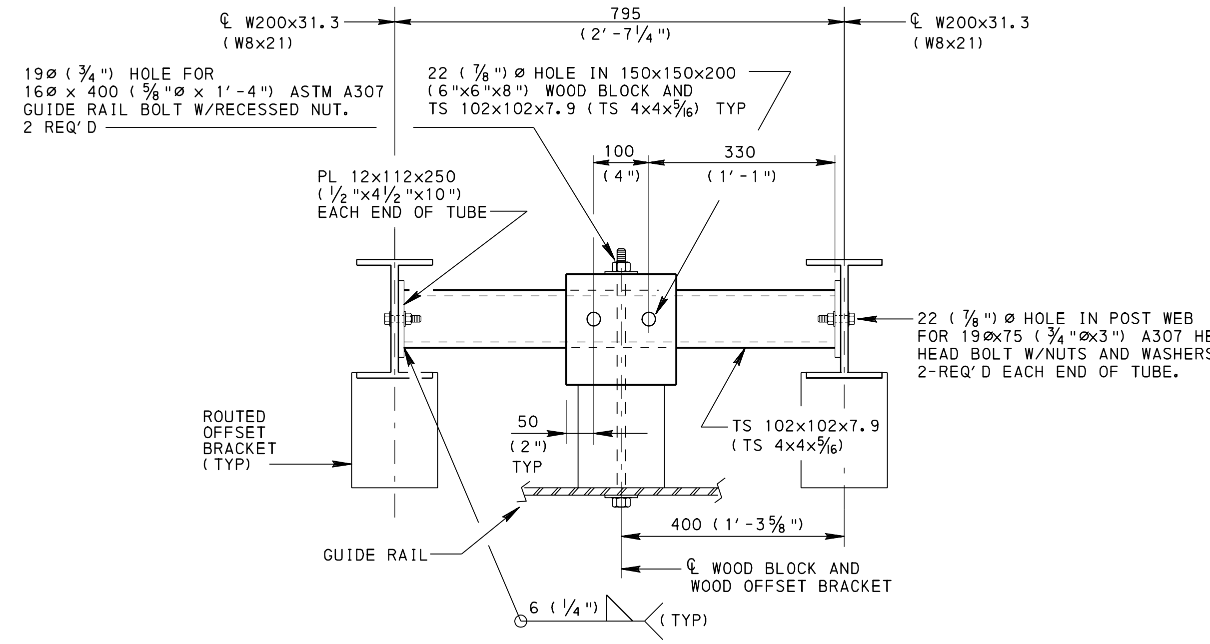


ELEVATION

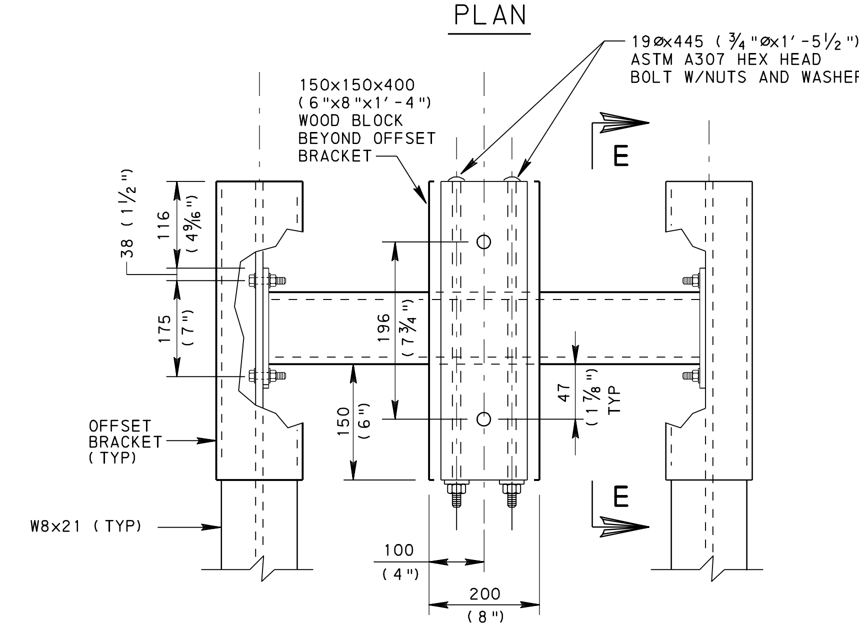
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER CONNECTION DETAILS



SECTION E-E



PLAN



ELEVATION

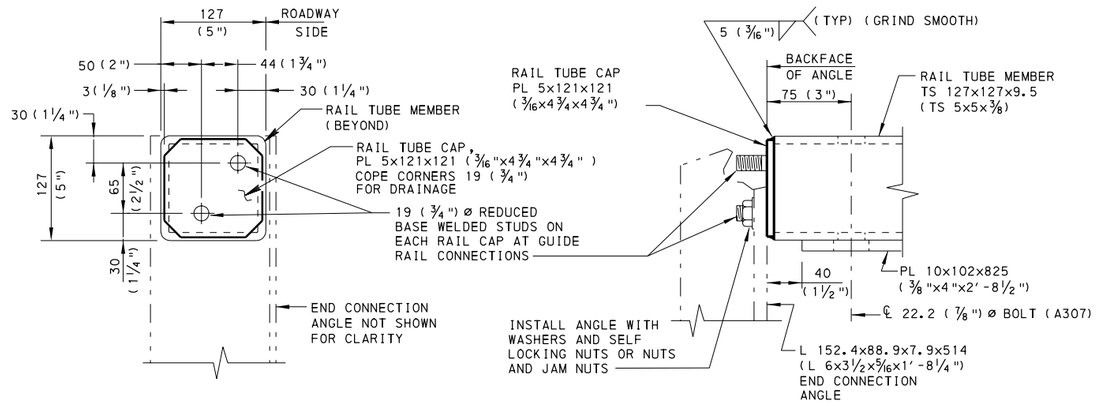
MIDSPAN TUBE ASSEMBLY DETAILS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 5 OF 16
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-50M



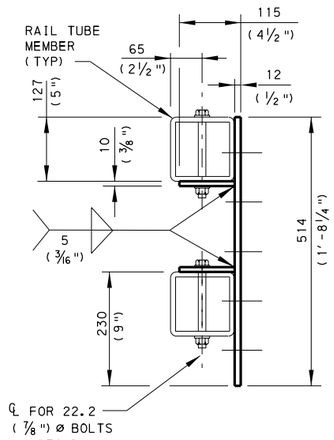
END VIEW

ELEVATION VIEW

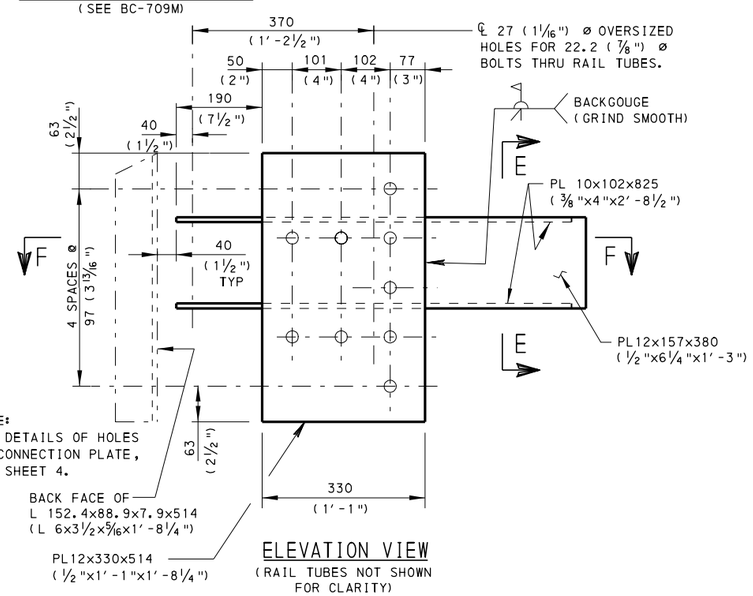
TOP RAIL TUBE MEMBER SHOWN, BOTH TUBES (TYP)

RAIL TUBE CAP DETAIL

(SEE BC-709M)



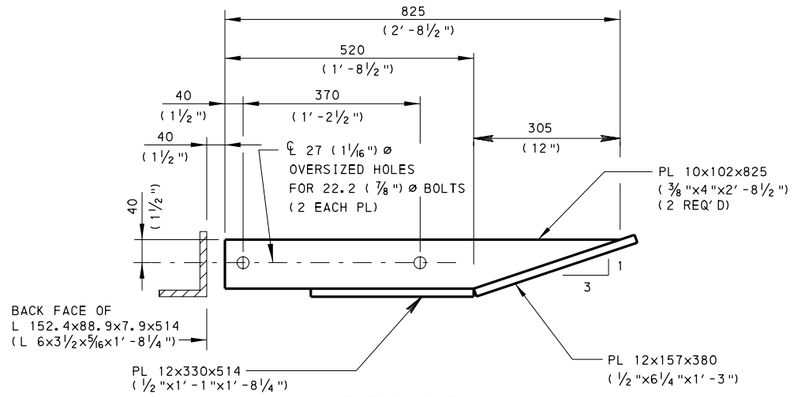
END VIEW



ELEVATION VIEW

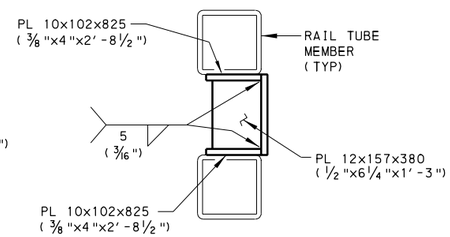
(RAIL TUBES NOT SHOWN FOR CLARITY)

CONNECTION PLATE ASSEMBLY DETAILS

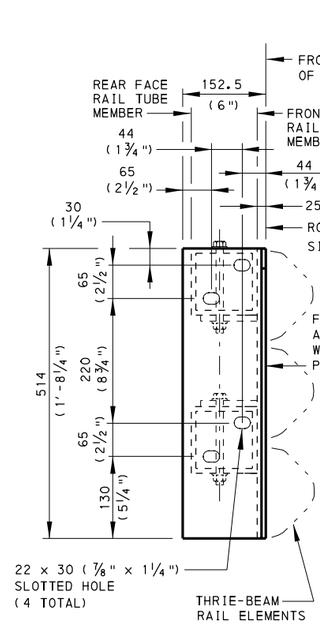


SECTION F-F

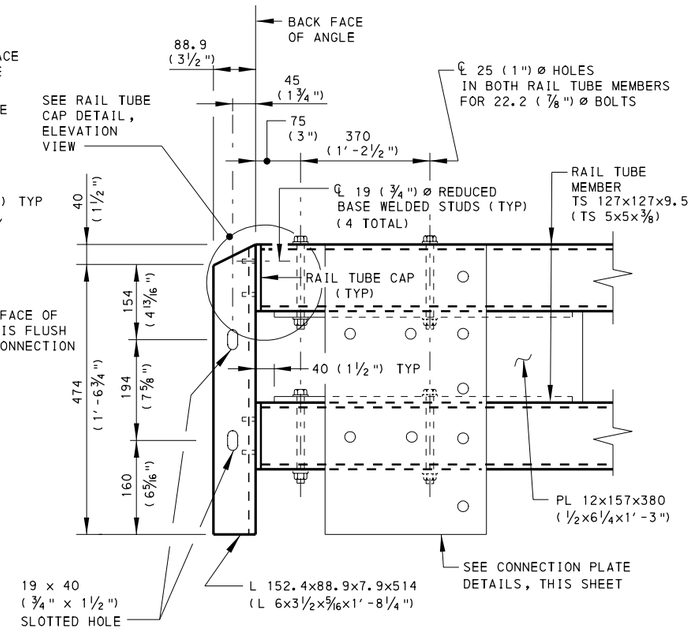
(RAIL TUBES NOT SHOWN FOR CLARITY)



SECTION E-E



END VIEW



ELEVATION VIEW

THRIE-BEAM RAIL ELEMENTS NOT SHOWN FOR CLARITY.

END CONNECTION ANGLE DETAILS

NOTES

1. USE THIS SHEET WITH SHEET 4.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 AND SHEET 4.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

REFERENCE DRAWINGS	
BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER CONNECTION PLATE DETAILS

RECOMMENDED JUN. 1, 2010
R. Wood Willey
CHIEF, HWY. QA DIVISION

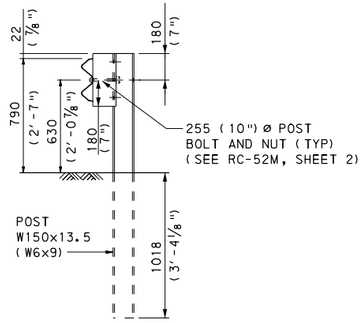
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 6 OF 16

RC-50M

TABLE B

WITHOUT INLET PLACEMENT		
POSTS	LENGTH	SIZE
1 THRU 9	2135 (7'-0")	W150x13.5 (W6x9)
BEYOND 9	1830 (6'-0")	W150x13.5 (W6x9)
WITH INLET PLACEMENT		
POSTS	LENGTH	SIZE
1 THRU 2	2440 (8'-0")	W200x31.3 (W8x21)
4 THRU 9	2135 (7'-0")	W150x13.5 (W6x9)
BEYOND 9	1830 (6'-0")	W150x13.5 (W6x9)

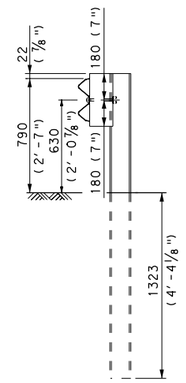


BEYOND POST 9

(AT W-BEAM RAIL ELEMENT)

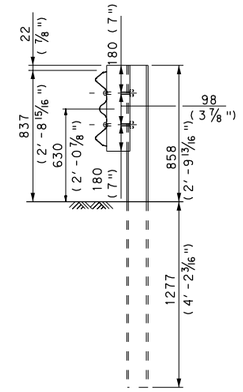
SEE NOTE 7, SHEET 1.

FOR POST DETAILS SEE RC-52M, SHEET 1.



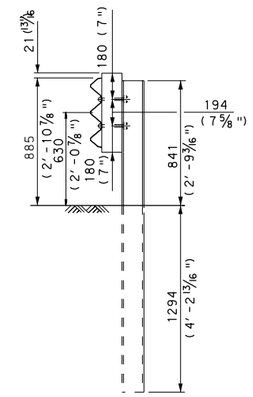
W150x13.5 (W6x9) STEEL POST
2135 (7'-0") LONG w/150x200x360
(6"x8"x1'-2") ROUTED OFFSET BRACKET

POST 9



W150x13.5 (W6x9) STEEL POST
2135 (7'-0") LONG w/ 150x200x458
(6"x8"x1'-5 7/8") ROUTED OFFSET BRACKET

POST 8



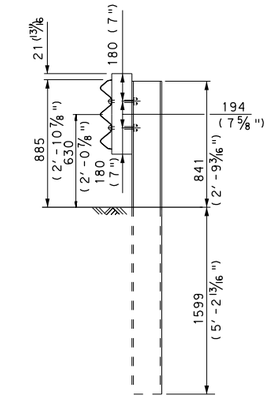
W150x13.5 (W6x9) STEEL POST
2135 (7'-0") LONG w/ROUTED OFFSET
BRACKET (SEE DETAIL)

POSTS 1 THRU 7

(WITHOUT INLET PLACEMENT)

POSTS 4 THRU 7 ✳

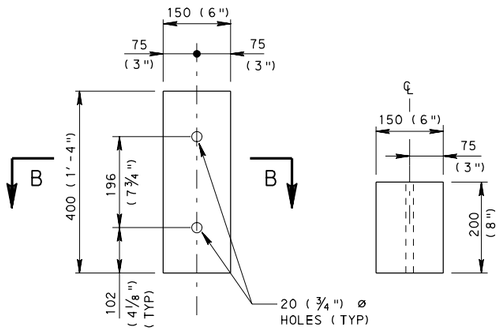
(WITH INLET PLACEMENT)



W200x31.3 (W8x21) STEEL POSTS
2440 (8'-0") LONG w/ROUTED OFFSET
BRACKET (SEE DETAIL)

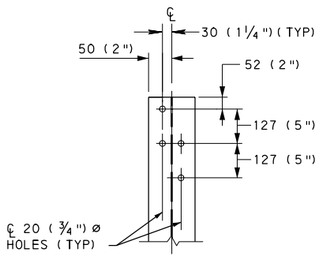
POSTS 1 AND 2

(WITH INLET PLACEMENT)

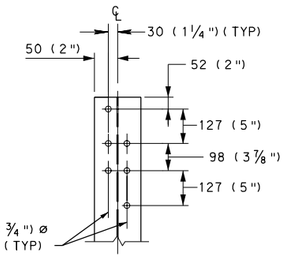


ELEVATION SECTION B-B

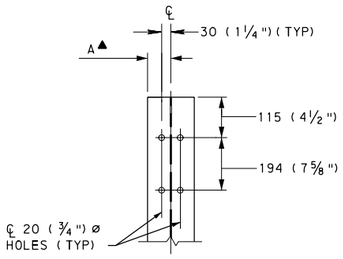
MIDSPAN TUBE
WOOD OFFSET BRACKET



POST 9



POST 8



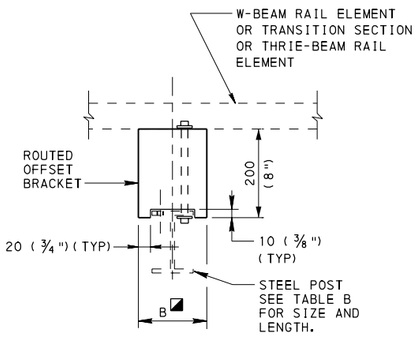
POSTS 1 THRU 7 ✳

✳ AT LOCATIONS WITH INLET PLACEMENT POST 3 IS OMITTED AND POSTS 1 AND 2 ARE W200x31.3 (W8x21)(SEE TABLE B).

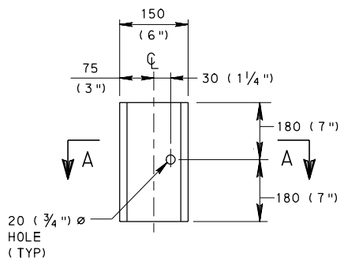
▲ A= 50 (2") FOR W150x13.5 (W6x9)
A= 67 (2 5/8") FOR W200x31.3 (W8x21)

◪ B= 150 (6") FOR W150x13.5 (W6x9)
B= 180 (7 1/4") FOR W200x31.3 (W8x21)

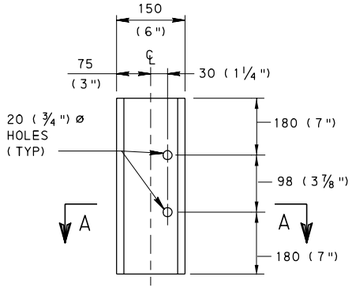
POST DETAILS



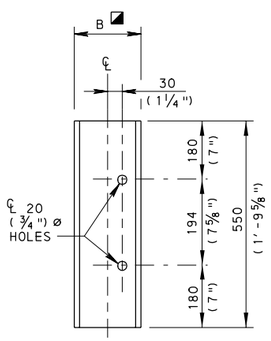
SECTION A-A



POST 9



POST 8



POSTS 1 THRU 7 ✳

ROUTED OFFSET BRACKET DETAILS

NOTES

1. FOR LOCATION OF POSTS, SEE SHEET 4.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

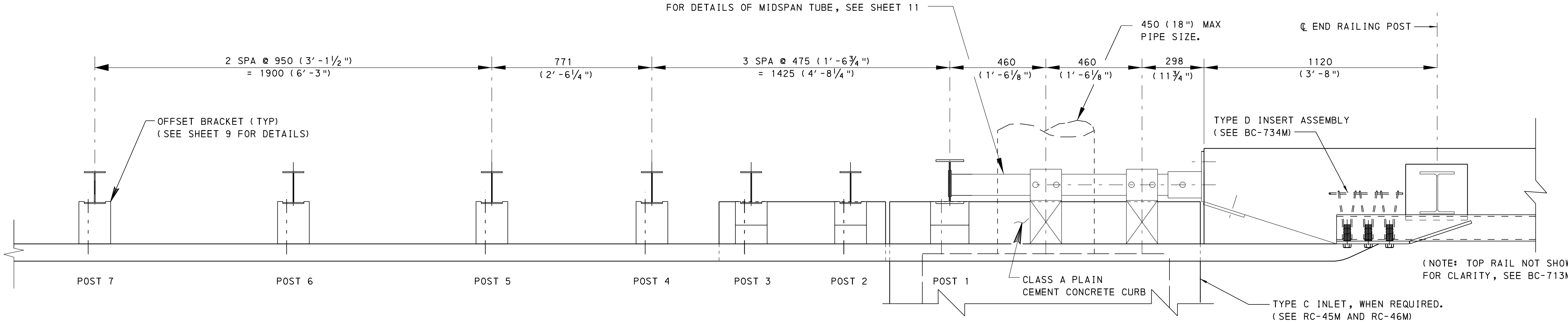
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

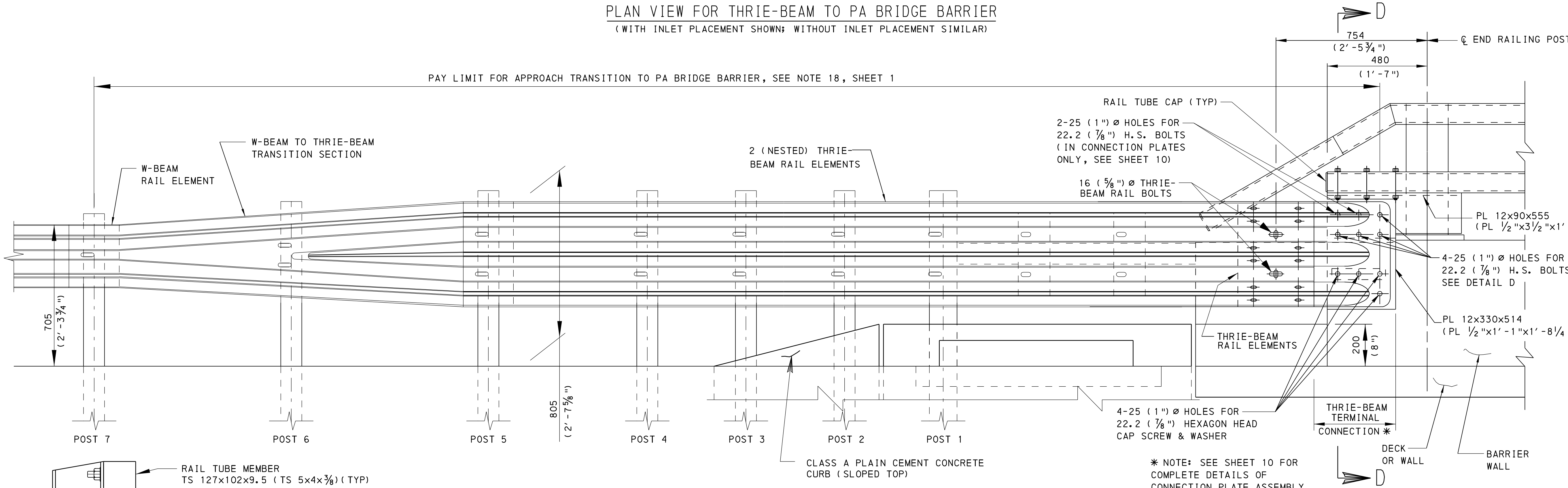
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 7 OF 16
R. Wood Willey CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-50M



PLAN VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER

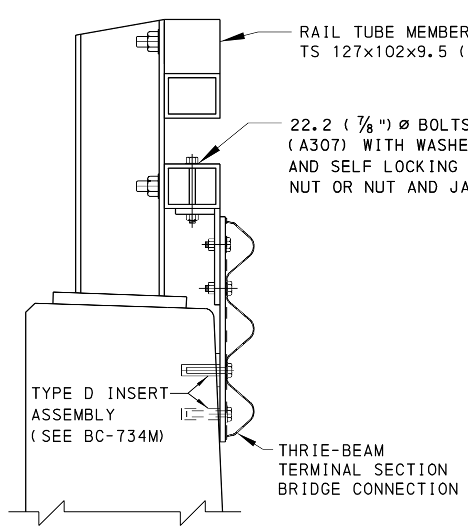
(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



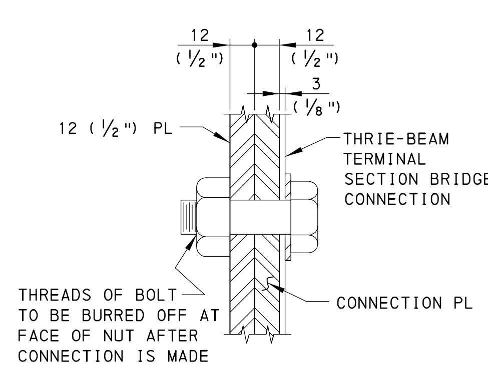
ELEVATION VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER

(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



SECTION D-D



DETAIL "D"

NOTES

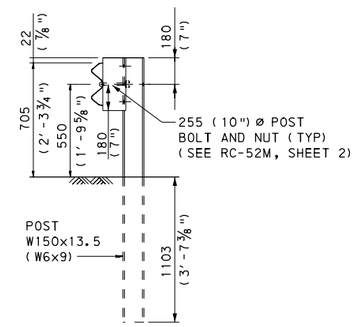
1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
3. FOR ADDITIONAL PA BRIDGE BARRIER NOTES, SEE SHEET 1.
4. SEE BC-712M AND BC-713M FOR PA BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 8 OF 16 RC-50M

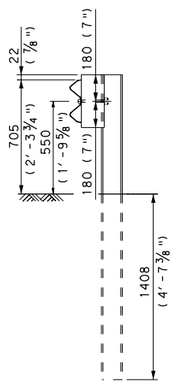


BEYOND POST 7

(AT W-BEAM RAIL ELEMENT)

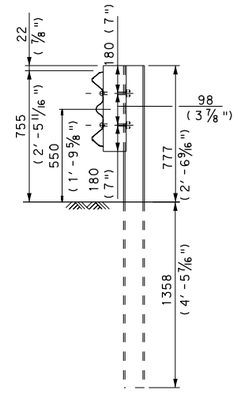
SEE NOTE 7, SHEET 1.

FOR POST DETAILS SEE RC-52M, SHEET 1.



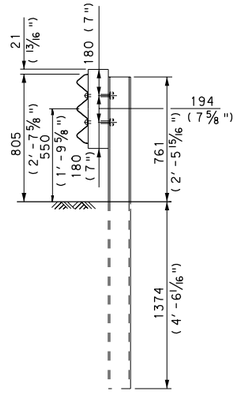
W150x13.5 (W6x9) STEEL POST
2135 (7' -0") LONG w/150x200x360
(6"x8"x1' -2") ROUTED OFFSET BRACKET

POST 7



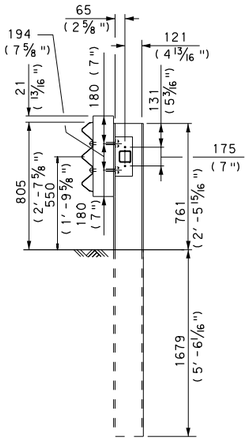
W150x13.5 (W6x9) STEEL POST
2135 (7' -0") LONG w/ 150x200x458
(6"x8"x1' -5 7/8 ") ROUTED OFFSET BRACKET

POST 6



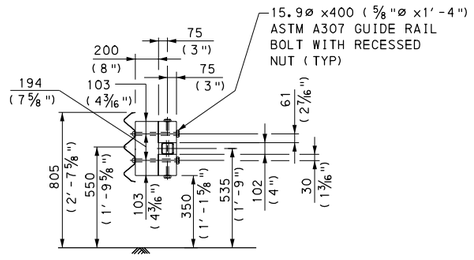
W150x13.5 (W6x9) STEEL POST
2135 (7' -0") LONG w/ROUTED OFFSET
BRACKET (SEE DETAIL)

POSTS 2 THRU 5



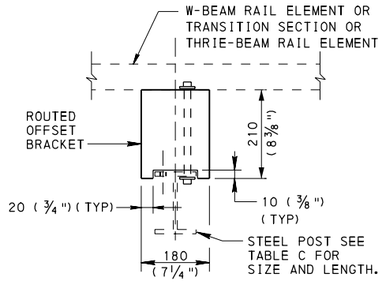
W200x31.3 (W8x21) STEEL POSTS
2440 (8' -0") LONG w/ROUTED OFFSET
BRACKET (SEE DETAIL)

POST 1

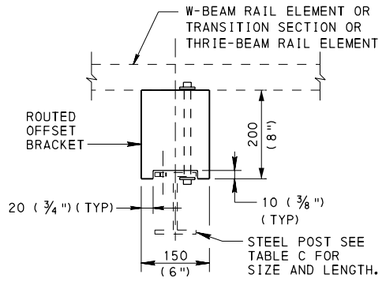


MIDSPAN TUBE SUPPORT

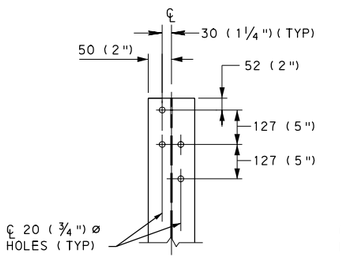
TWO 150x150x200 (6"x6"x8") WOOD BLOCKS
ATTACHED TO 100x100x8 (4"x4"x5/16") SQUARE TUBE
W/150x200x400 (6"x8"x1' -4") WOOD BRACKET



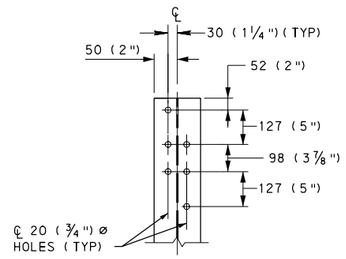
SECTION A-A



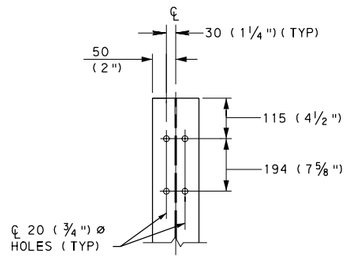
SECTION B-B



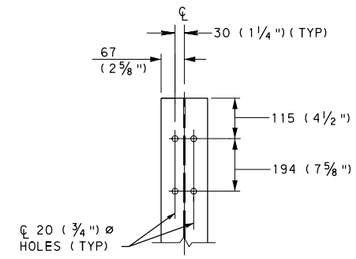
POST 7



POST 6



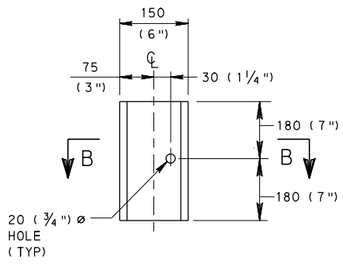
POSTS 2 THRU 5



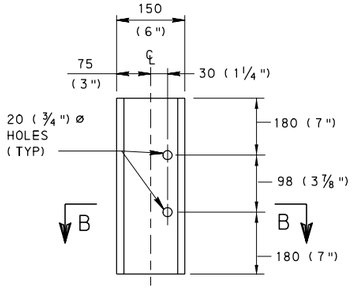
POST 1

POST DETAILS

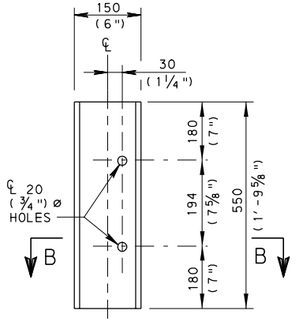
TABLE C		
POSTS	LENGTH	SIZE
1	2440 (8' -0")	W200x31.3 (W8x21)
2 THRU 7	2135 (7' -0")	W150x13.5 (W6x9)
BEYOND 7	1830 (6' -0")	W150x13.5 (W6x9)



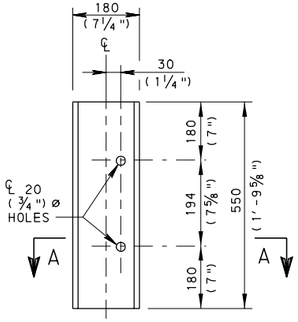
POST 7



POST 6



POSTS 2 THRU 5



POST 1

ROUTED OFFSET BRACKET DETAILS

NOTES

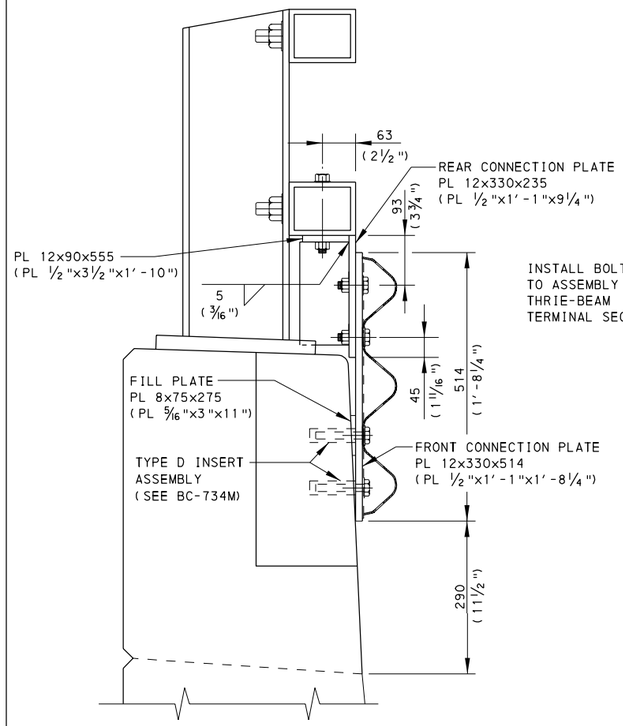
1. FOR LOCATION OF POSTS, SEE SHEET 8.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

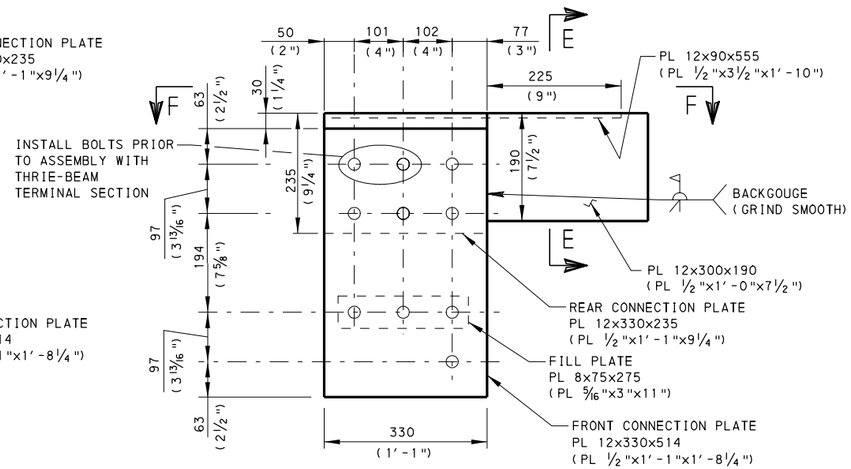
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
THRIE-BEAM TO PA BRIDGE BARRIER
POST AND OFFSET BRACKET DETAILS

RECOMMENDED JUN. 1, 2010 R. Wood Willey CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 Bruce E. Rhoades DIRECTOR, BUREAU OF DESIGN	SHT 9 OF 16 RC-50M



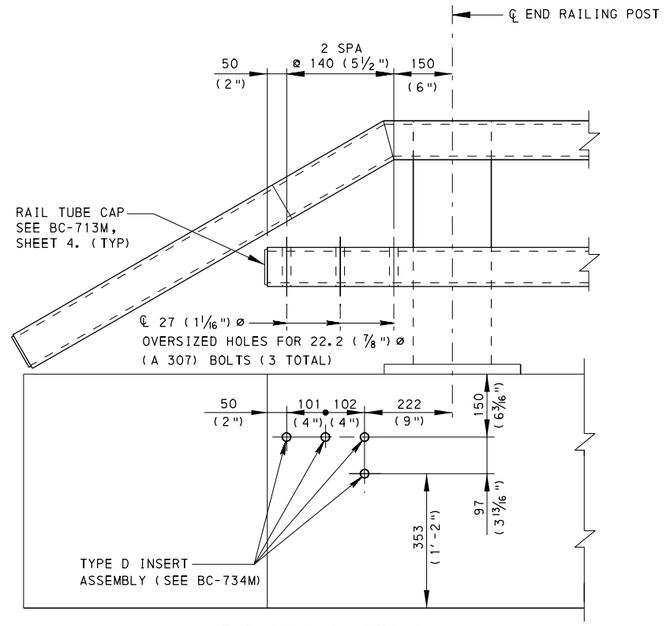
END VIEW

(DELINEATOR NOT SHOWN FOR CLARITY)



ELEVATION VIEW

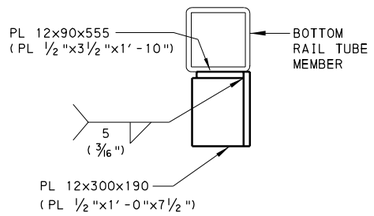
(RAIL TUBES NOT SHOWN
FOR CLARITY)



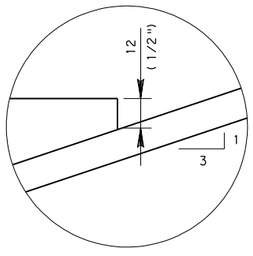
END OF RAIL DETAIL

(CONNECTION PLATES NOT SHOWN)

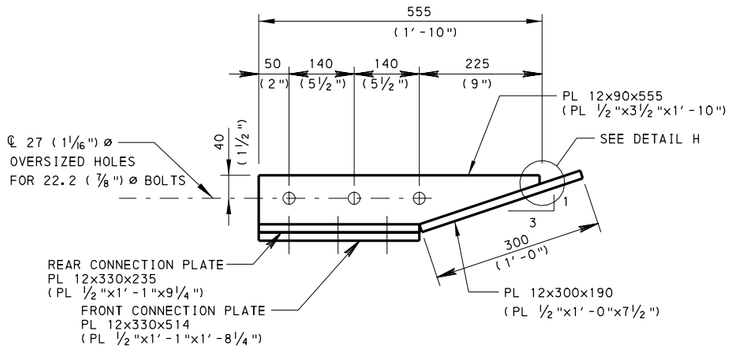
CONNECTION PLATE ASSEMBLY DETAILS



SECTION E-E

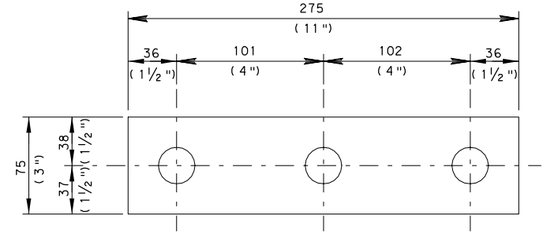


DETAIL H



SECTION F-F

(RAIL TUBES NOT SHOWN FOR CLARITY)



FILL PLATE DETAIL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

NOTES

1. USE THIS SHEET WITH SHEET 8.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 AND SHEET 8.
3. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE BC-712M AND BC-713M.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

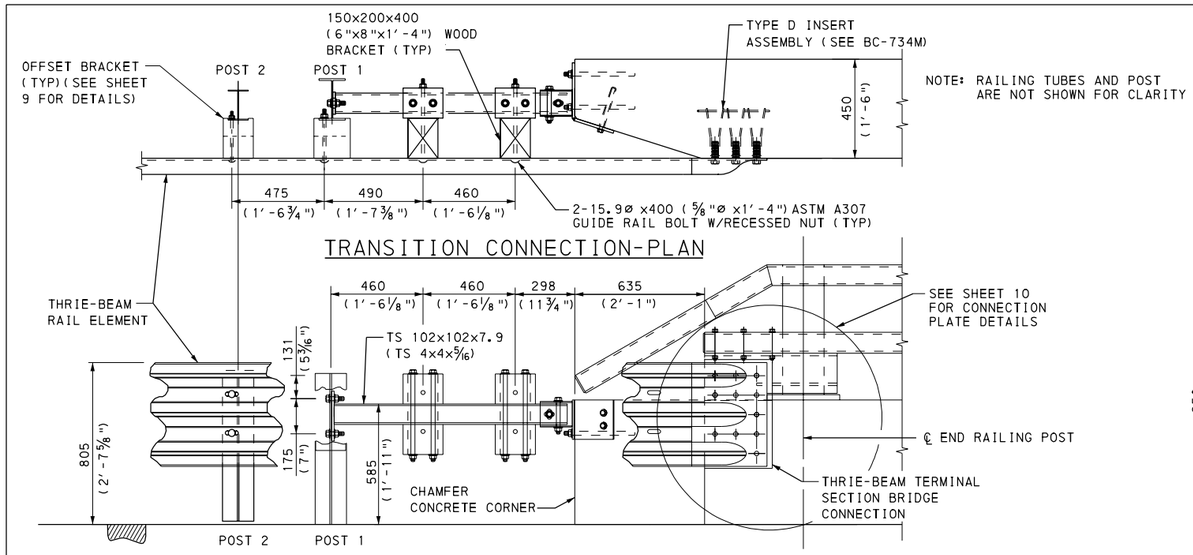
THRIE-BEAM TO PA BRIDGE BARRIER CONNECTION PLATE DETAILS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

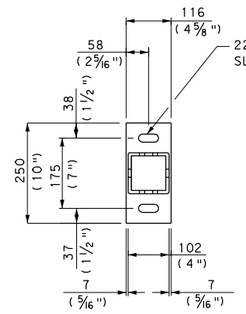
SHT 10 OF 16

RC-50M

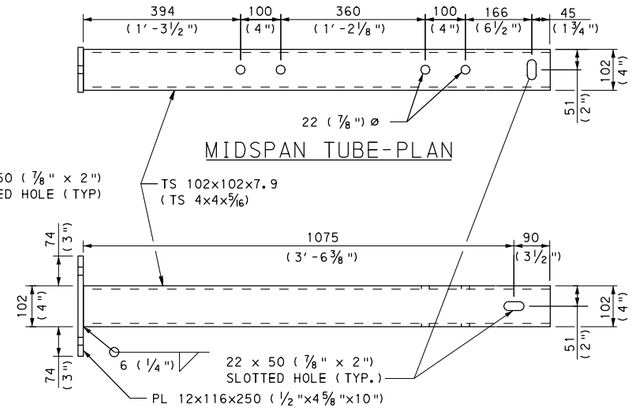


TRANSITION CONNECTION-ELEVATION

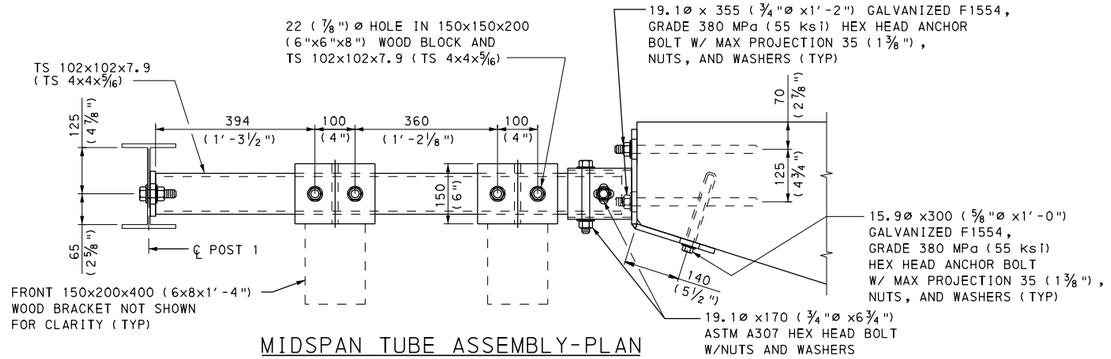
(WITHOUT INLET SHOWN, WITH INLET SIMILAR)



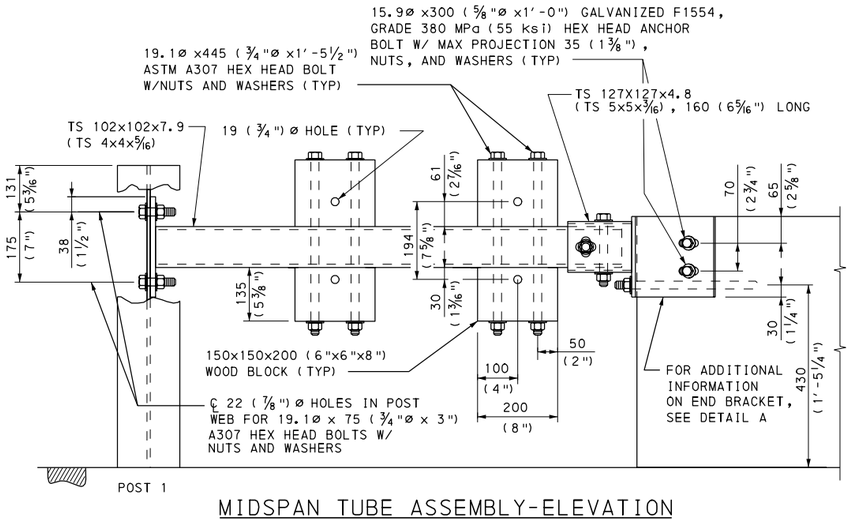
SIDE VIEW



MIDSPAN TUBE-ELEVATION

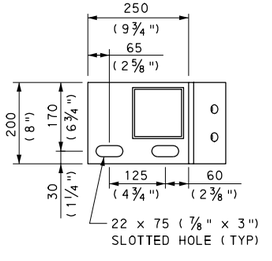


MIDSPAN TUBE ASSEMBLY-PLAN

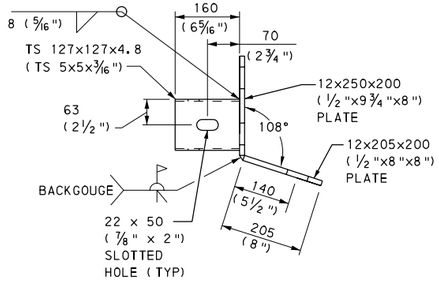


MIDSPAN TUBE ASSEMBLY-ELEVATION

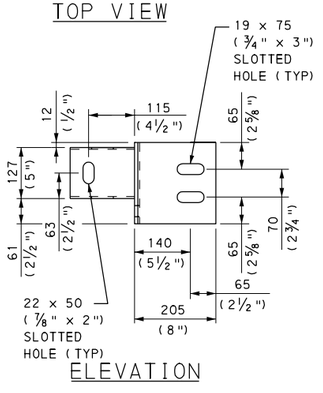
(FRONT 150x150x400 (6"x8"x1'-4") WOOD BRACKET NOT SHOWN FOR CLARITY)



SIDE VIEW



TOP VIEW



ELEVATION

DETAIL A - END BRACKET

NOTES

1. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
2. FOR APPROACH TRANSITION POST LOCATIONS, SEE SHEET 8.
3. SEE BC-734M FOR ANCHOR ASSEMBLIES.
4. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE BC-712M, BC-713M, AND THE STRUCTURE PLANS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

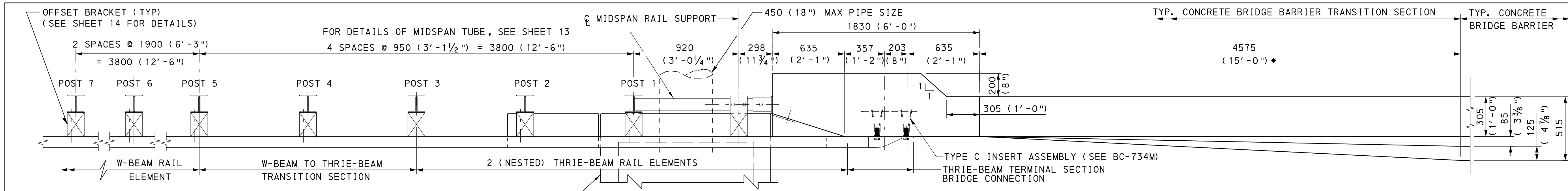
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

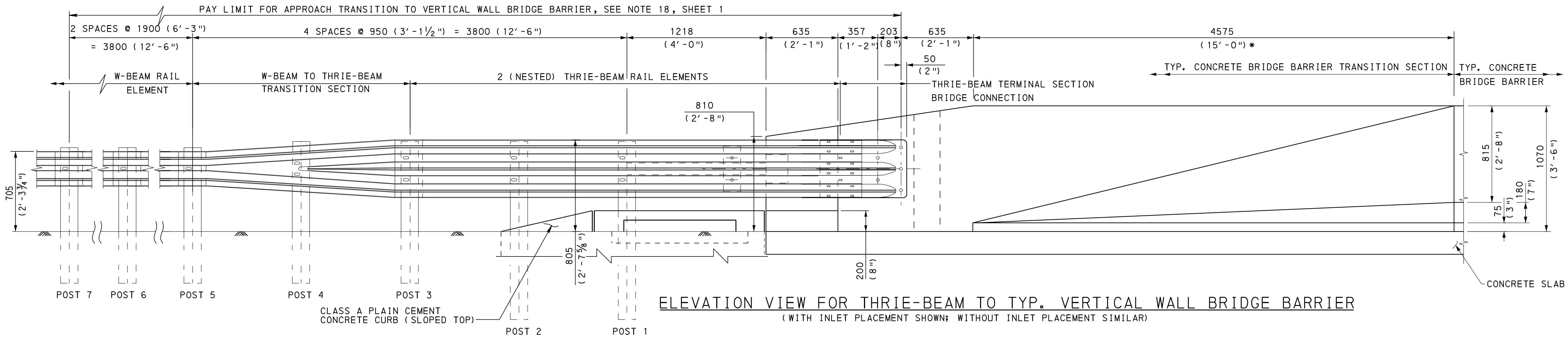
THRIE-BEAM TO PA BRIDGE BARRIER MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 11 OF 16
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-50M



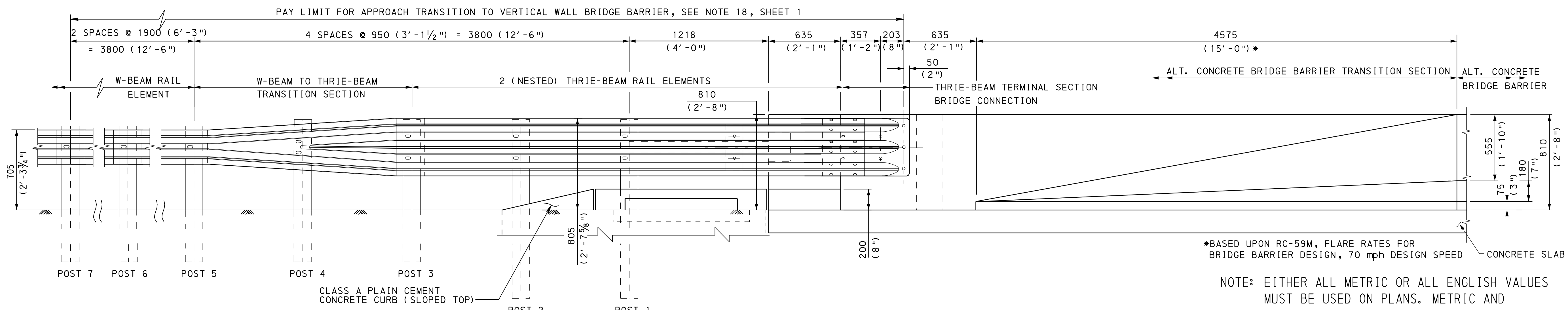
PLAN VIEW FOR THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER

(PLAN VIEW FOR TYP. CONCRETE BRIDGE BARRIER SHOWN; PLAN VIEW FOR ALT. CONCRETE BRIDGE BARRIER SIMILAR)
(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



ELEVATION VIEW FOR THRIE-BEAM TO TYP. VERTICAL WALL BRIDGE BARRIER

(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



*BASED UPON RC-59M, FLARE RATES FOR BRIDGE BARRIER DESIGN, 70 mph DESIGN SPEED

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

ELEVATION VIEW FOR THRIE-BEAM TO ALT. VERTICAL WALL BRIDGE BARRIER

(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)

NOTES

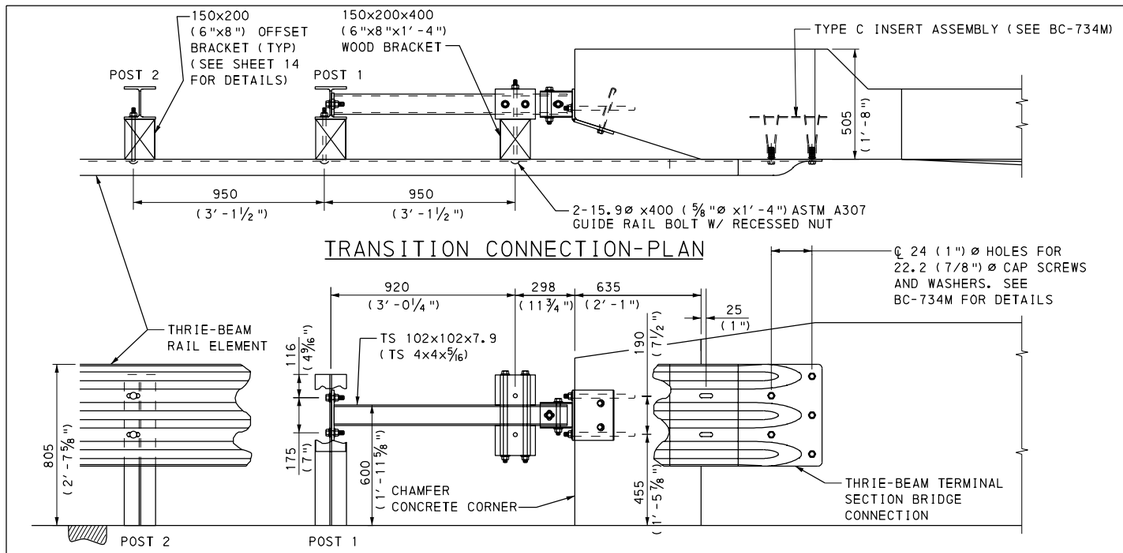
1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
3. SEE BC-703M FOR BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.
4. SEE STRUCTURE DRAWINGS FOR OTHER BRIDGE BARRIER DETAILS AND DIMENSIONS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

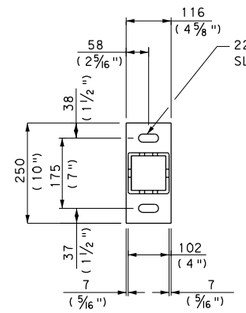
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

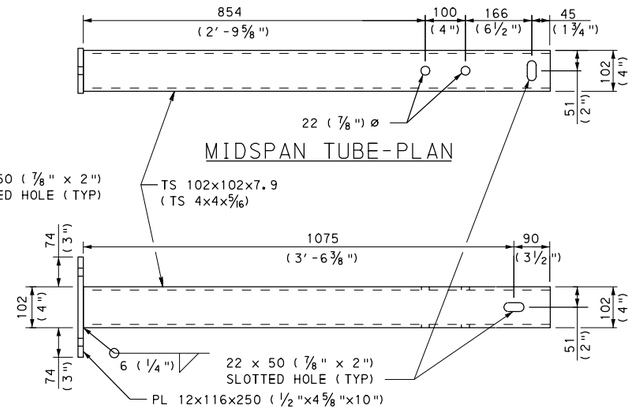
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

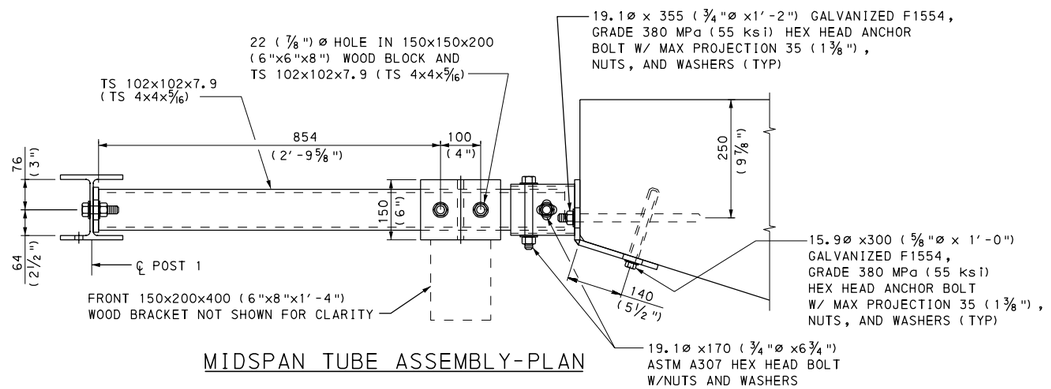
THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER

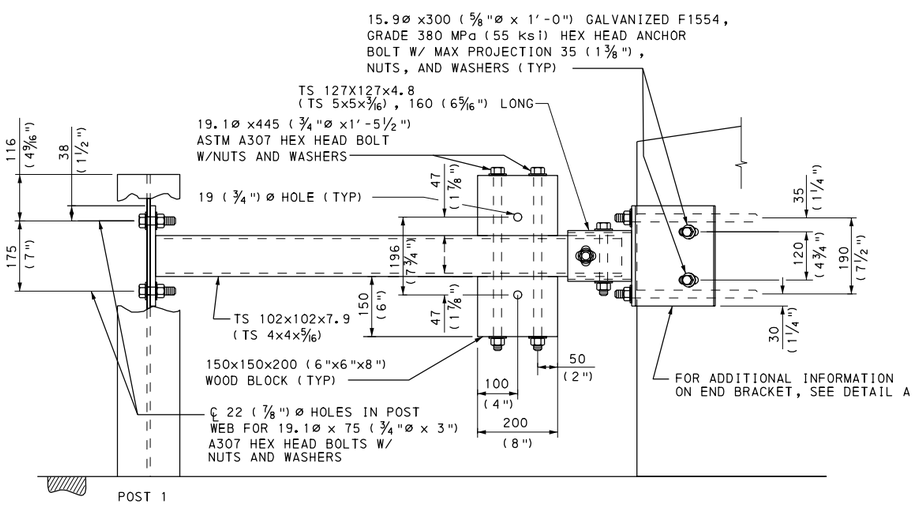
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 12 OF 16
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-50M



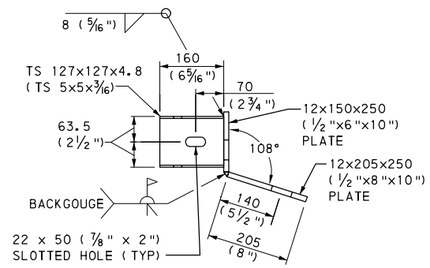


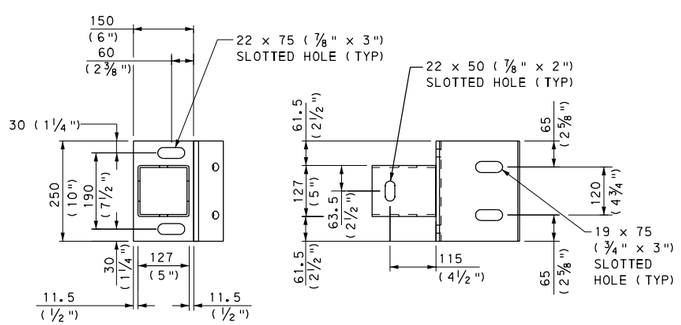






(FRONT 150x150x400 (6"x8"x1'-4") WOOD BRACKET NOT SHOWN FOR CLARITY)





NOTES

1. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
2. FOR APPROACH TRANSITION POST LOCATIONS, SEE SHEET 12.
3. SEE BC-734M FOR ANCHOR ASSEMBLIES.
4. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE STRUCTURE PLANS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

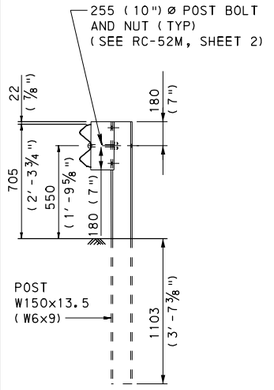
THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 13 OF 16

RC-50M

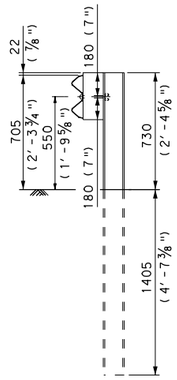


BEYOND POST 6

(AT W-BEAM RAIL ELEMENT)

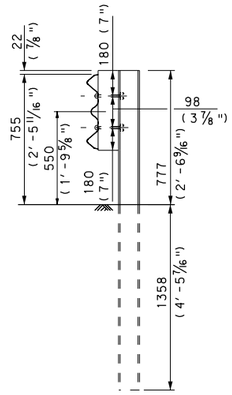
SEE NOTE 7, SHEET 1

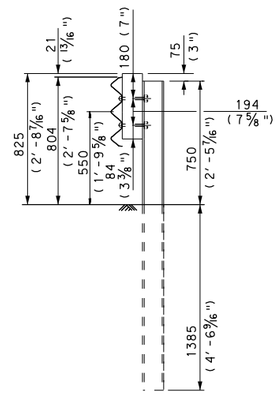
(FOR POST DETAILS, SEE RC-52M, SHEET 1)



POSTS 5 AND 6

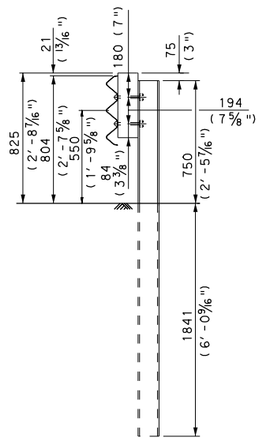
W150x22 (W6x15) STEEL POSTS 2135 (7'-0") LONG
w/ 150x200x336 (6"x8"x1'-2") OFFSET BRACKET





POST 4

W150x22 (W6x15) STEEL POST 2135 (7'-0") LONG
w/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET

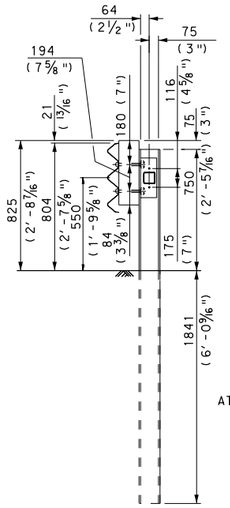


POST 3

W150x22 (W6x15) STEEL POST 2135 (7'-0") LONG
w/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET

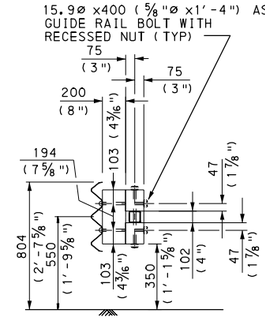
POST 2

W150x37 (W6x25) STEEL POST 2591 (8'-6") LONG
w/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET



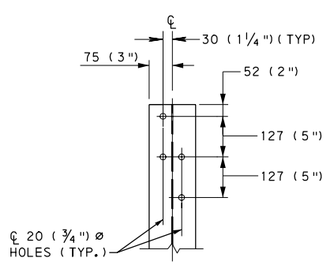
POST 1

W150x37 (W6x25) STEEL POST 2591 (8'-6") LONG
w/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET

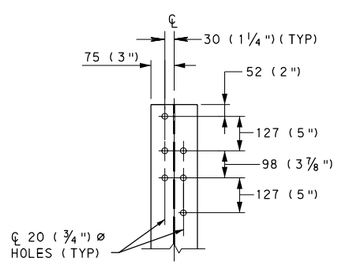


MIDSPAN TUBE SUPPORT

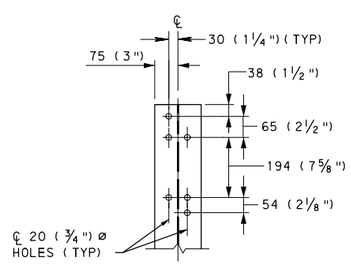
TWO 150x150x200 (6"x6"x8") WOOD BLOCKS
ATTACHED TO 100x100x8 (4"x4"x5/16") SQUARE TUBE
W/150x200x400 (6"x8"x1'-4") WOOD BRACKET



POSTS 5 AND 6



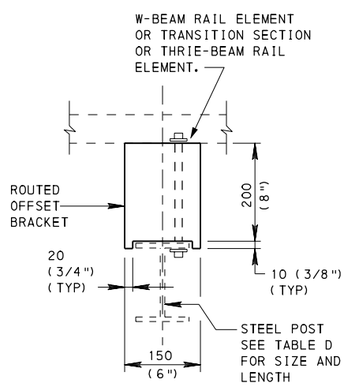
POST 4



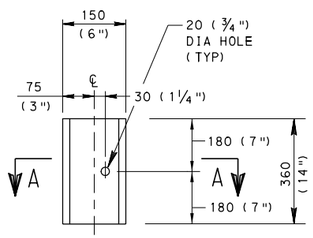
POSTS 1 THRU 3

POST DETAILS

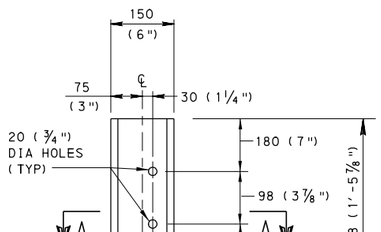
TABLE D		
POST	LENGTH	SIZE
1 THRU 2	2591 (8'-6")	W150x37 (W6x25)
3 THRU 6	2135 (7'-0")	W150x22 (W6x15)
BEYOND 6	1830 (6'-0")	W150x13.5 (W6x9)



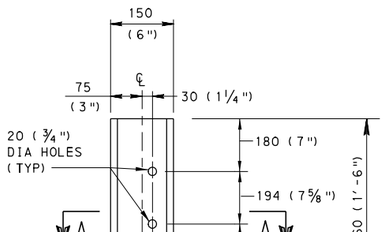
SECTION A-A



POSTS 5 AND 6



POST 4



POSTS 1 THRU 3

OFFSET BRACKET DETAILS

NOTES

1. FOR LOCATION OF POSTS, SEE SHEET 12.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

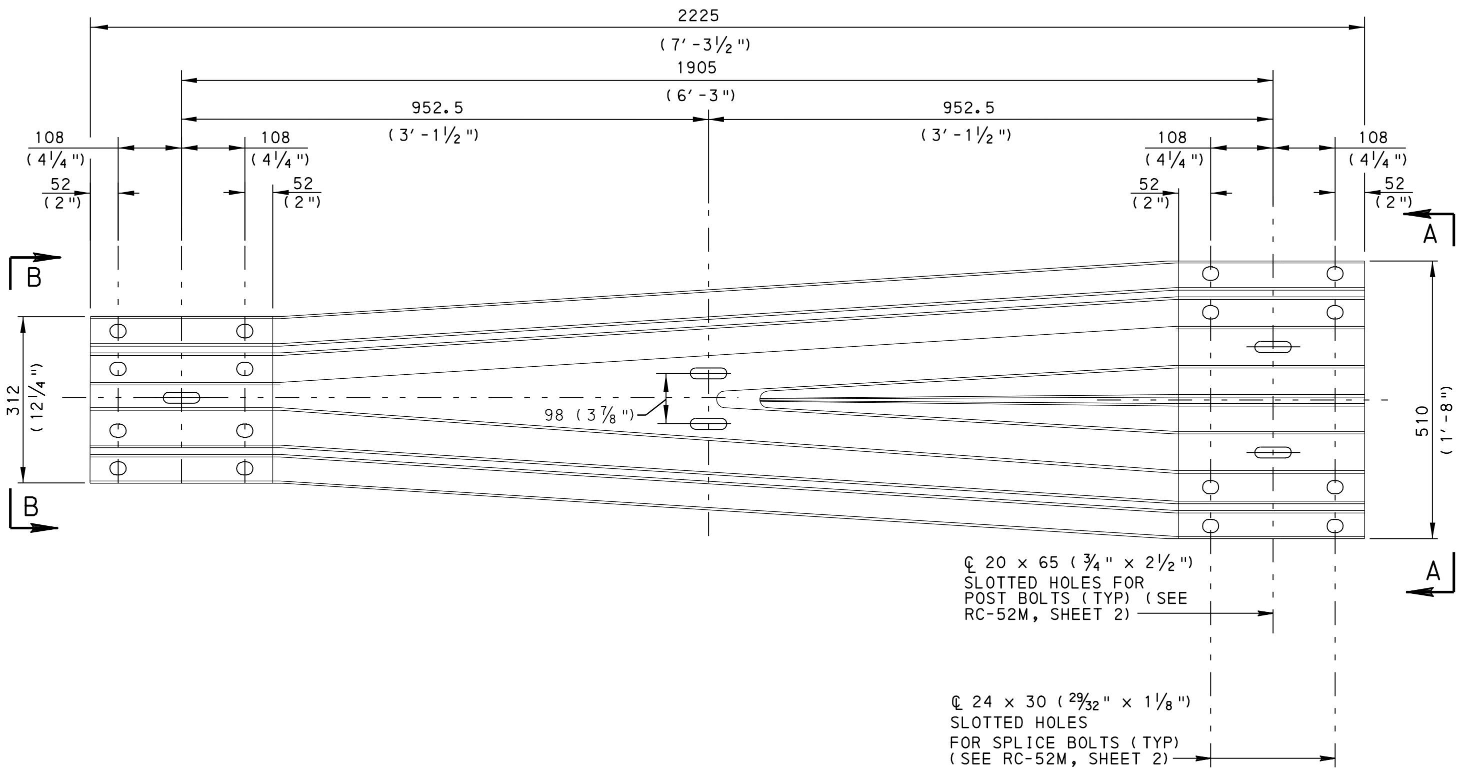
THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS

RECOMMENDED JUN. 1, 2010
R. Wood Willey
CHIEF, HWY. QA DIVISION

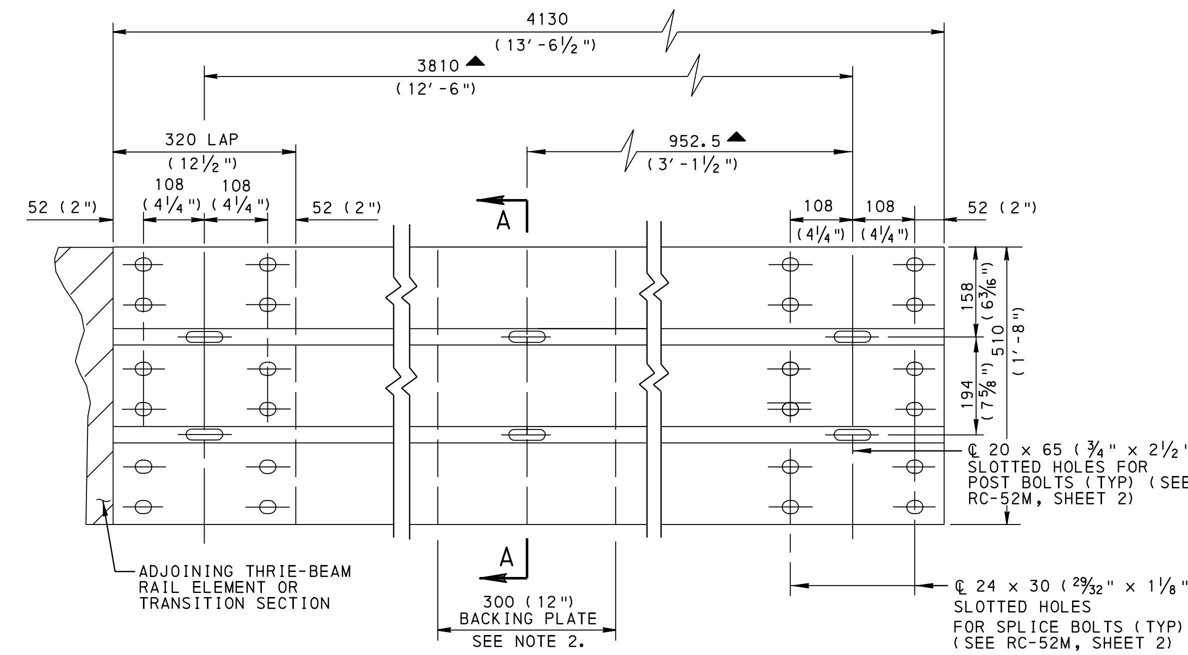
RECOMMENDED JUN. 1, 2010
Bruce E. Rhoades
DIRECTOR, BUREAU OF DESIGN

SHT 14 OF 16

RC-50M



TRANSITION SECTION

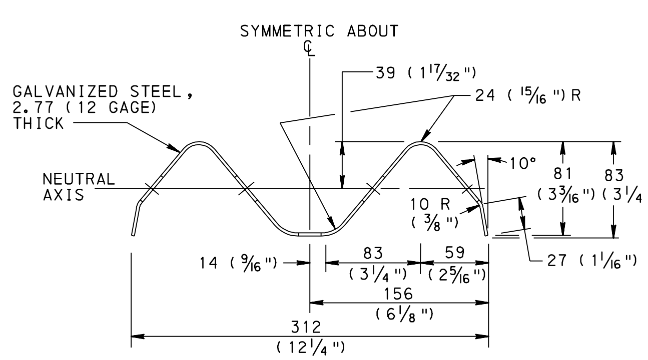


THRIE-BEAM RAIL ELEMENT

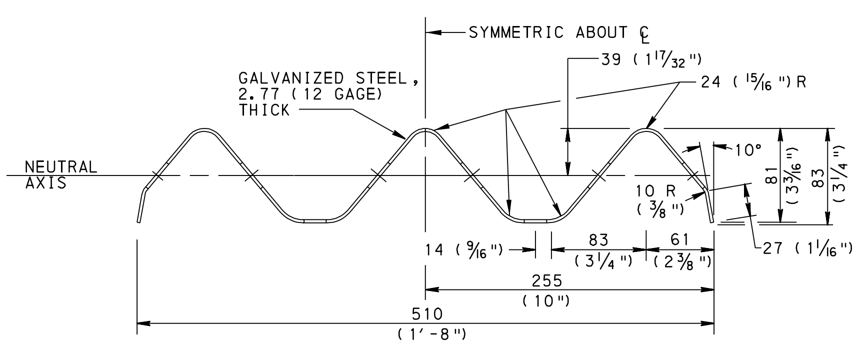
▲ AT TYPICAL THRIE-BEAM RAIL ELEMENT SHOWN; AT THRIE-BEAM TO VERTICAL WALL TRANSITION, SEE BC-703M, AT THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER TRANSITION, SEE BC-708M, AT THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION, SEE BC-712M.

NOTES

1. THE THRIE-BEAM RAIL ELEMENTS AND TRANSITION SECTIONS ARE ONLY USED IN THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER, THRIE-BEAM TO PA BRIDGE BARRIER, AND THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTIONS.
2. USE 300 (12") BACKING PLATE FOR THE THRIE-BEAM RAIL ELEMENTS AT ALL INTERMEDIATE POSTS WITH THE SAME SECTION AS ON THE THRIE-BEAM RAIL ELEMENT.
3. FOR ADDITIONAL NOTES, SEE SHEET 1.



RAIL ELEMENT
SECTION B-B



THRIE-BEAM RAIL ELEMENT
SECTION A-A
(BACKING PLATE NOT SHOWN FOR CLARITY)

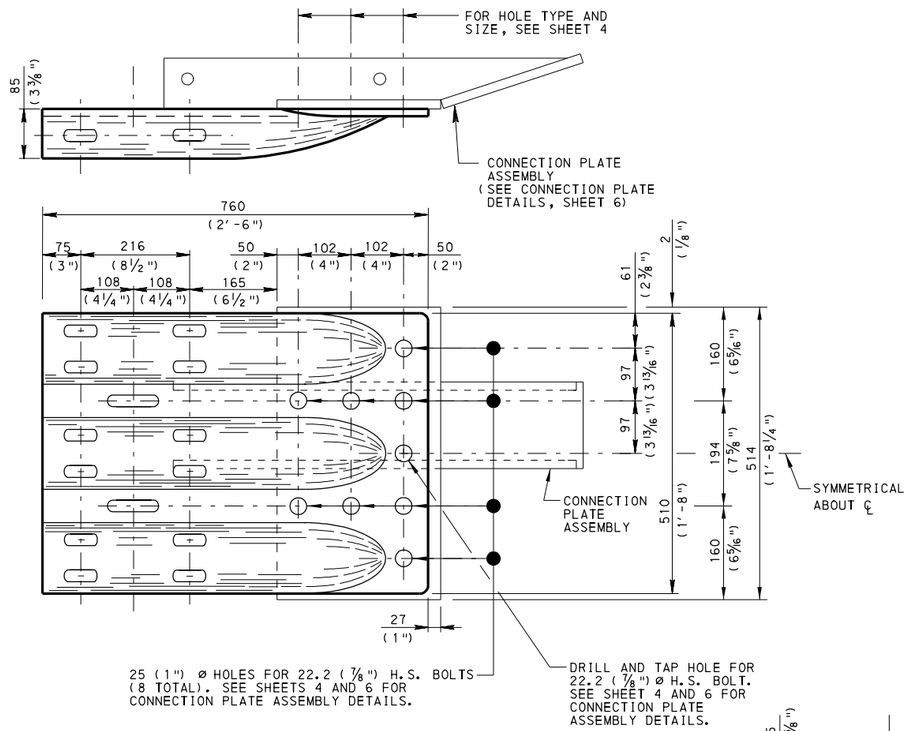
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

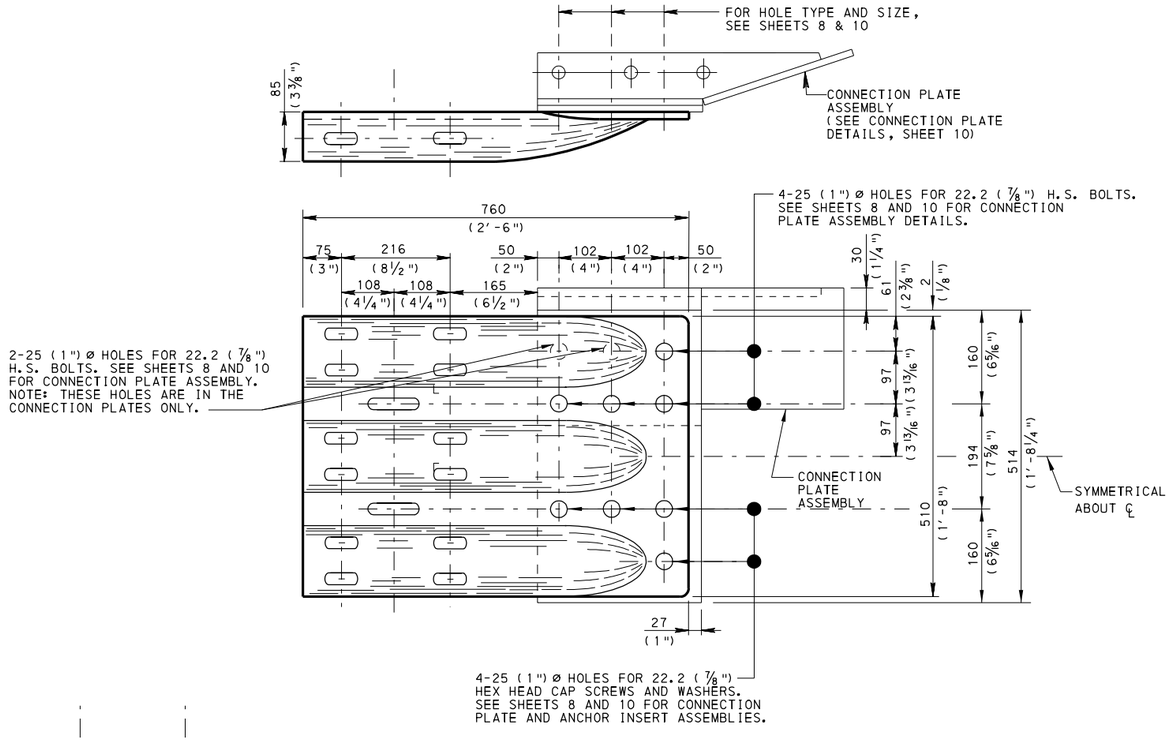
THRIE-BEAM TRANSITION SECTION AND RAIL ELEMENT DETAILS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 15 OF 16
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-50M



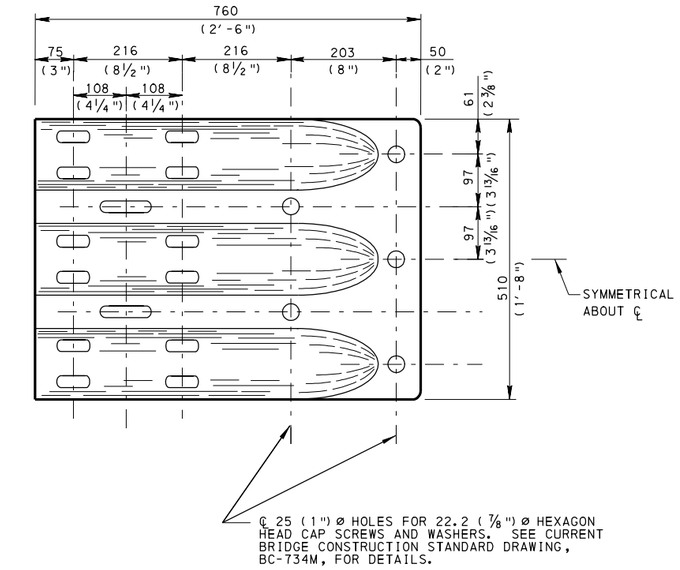
THRIE-BEAM TERMINAL SECTION AT PA TYPE 10M BRIDGE BARRIER

SHOWN WITH CONNECTION PLATE ASSEMBLY



THRIE-BEAM TERMINAL SECTION AT PA BRIDGE BARRIER

SHOWN WITH CONNECTION PLATE ASSEMBLY



THRIE-BEAM TERMINAL SECTION AT VERTICAL WALL BRIDGE BARRIER

NOTES

1. USE THIS SHEET WITH SHEETS 4-15.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

** PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES.

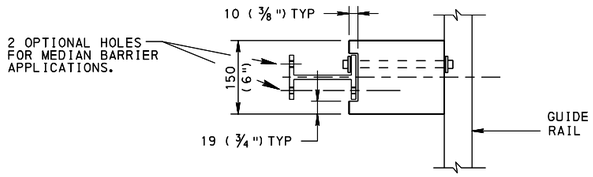
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

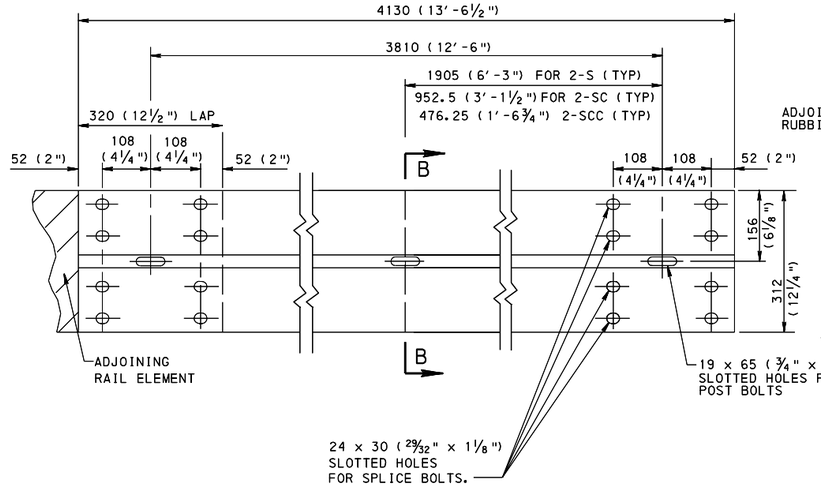
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TERMINAL SECTION BRIDGE CONNECTION DETAILS

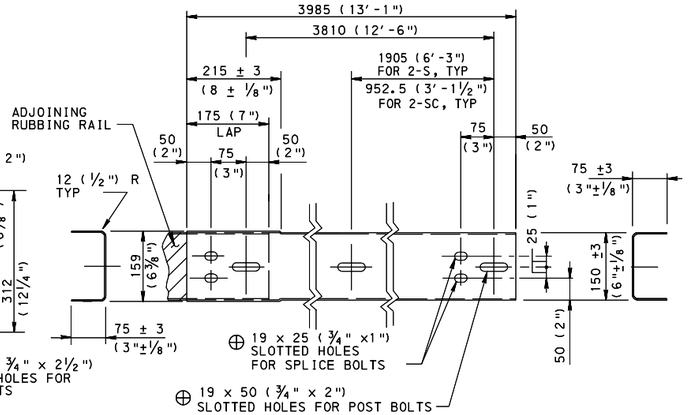
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 16 OF 16
R. Wyatt Dilley, CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-50M



PLAN

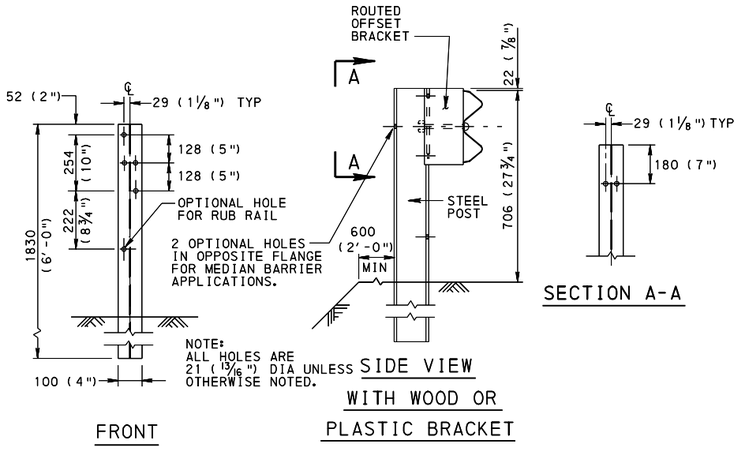


W-BEAM RAIL ELEMENT



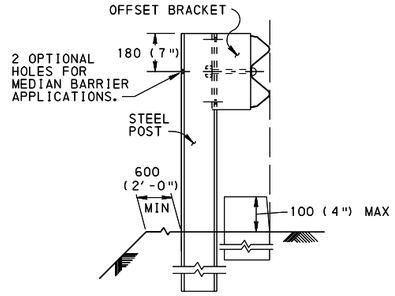
150 x 75 x 3.53 (6" x 3" x 10 GAGE)
THICK COLD FORMED CHANNEL OR
C150 x 12 (C6" x 8.2) RUBBING RAIL
(SEE NOTE 4)

⊕ FOR SPLICE BOLT AND POST BOLT DETAILS, SEE SHEET 2.

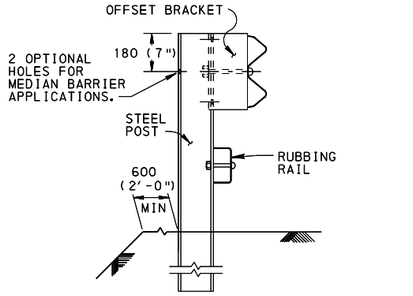


FRONT

SECTION A-A



GUIDE RAIL
WITH CURB

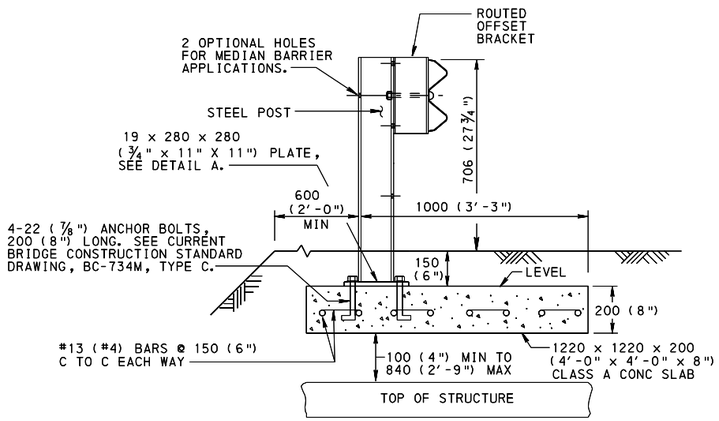


GUIDE RAIL
WITH RUBBING RAIL
(SEE NOTE 4)

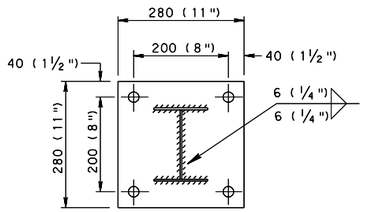
NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
2. PROVIDE STEEL I-BEAM W150 x 13.5 (W6" x 8.5) POSTS WITH ROUTED WOOD, PLASTIC OR COMPOSITE OFFSET BRACKETS LISTED IN BULLETIN 15.
3. FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES, THE CONCRETE, REINFORCEMENT BARS AND HARDWARE ARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.
4. PROVIDE RUBBING RAIL WHEN THE HEIGHT OF STRONG POST GUIDE RAIL IS OVER 710 (28") IN TRANSITION AREAS TO EXISTING GUIDE RAIL.
5. ATTACH W-BEAM RAIL ELEMENTS TO EACH POST. SPLICE RAIL ELEMENTS ONLY AT POSTS AND LAP IN THE DIRECTION OF TRAFFIC.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
7. INSTALL GUIDE RAIL DELINEATORS IN ACCORDANCE WITH TC-8604.
8. FOR STRONG POST MEDIAN BARRIER APPLICATIONS, THE INSTALLATION IS A MIRROR IMAGE ON EACH SIDE OF THE POST.
9. BURNING OF POSTS OR RAIL ELEMENT FOR HOLES IS NOT PERMITTED.
10. WHEN THE 600 (2'-0") MINIMUM CLEARANCE FROM THE REAR FACE OF THE GUIDE RAIL POST TO THE FILL SLOPE BREAK CANNOT BE MAINTAINED, PROVIDE STRONG POSTS THAT ARE A MINIMUM OF 300 (1'-0") LONGER.

W150 x 13.5 (W6 x 8.5 or 9.0) POST DETAILS

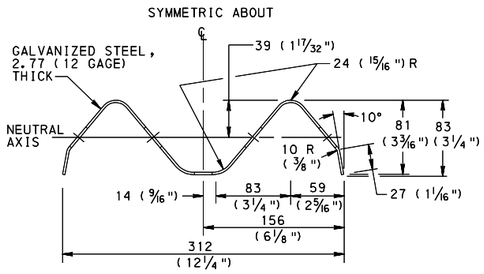


STEEL POSTS
OVER UNDERGROUND STRUCTURES
(SEE NOTE 3)



DETAIL A

THICKNESS IS 19 (3/4 ")
ALL HOLES 25 (1 ") ø UNLESS OTHERWISE NOTED.



RAIL ELEMENT
SECTION B-B

RC-50M	GUIDE RAIL TRANSITION AT END OF STRUCTURE
BC-734M	STANDARD ANCHOR SYSTEMS
BC-739M	BRIDGE BARRIER TO GUIDE RAIL TRANSITION

REFERENCE DRAWINGS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

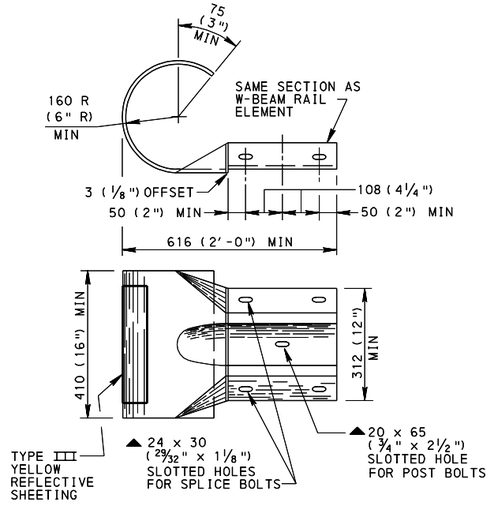
TYPE 2 STRONG POST GUIDE RAIL

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

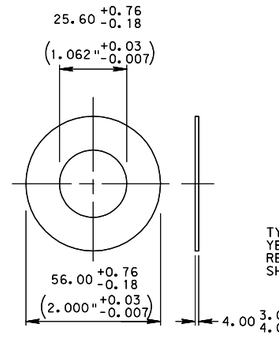
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 7

RC-52M

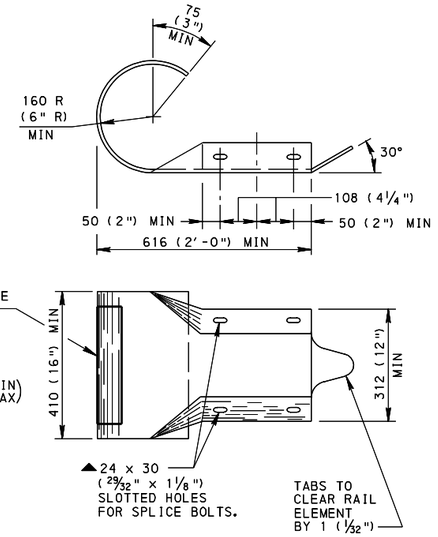


TERMINAL TO BE PLACED ON BACK OF RAIL ELEMENT

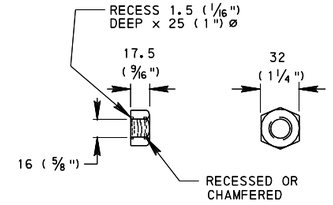


DETAIL B
TYPE A PLAIN WASHER

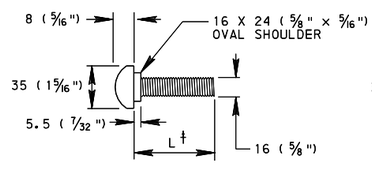
▲ FOR SPLICE AND POST BOLTS, SEE DETAILS. FOR ALL SPLICE BOLT CONNECTIONS, PROVIDE A TYPE A PLAIN WASHER BETWEEN BOLT HEAD AND TERMINAL SECTION. FOR WASHER, SEE DETAIL B.



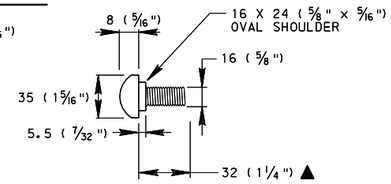
TERMINAL TO BE PLACED ON FACE OF RAIL ELEMENT



NUT



POST BOLT

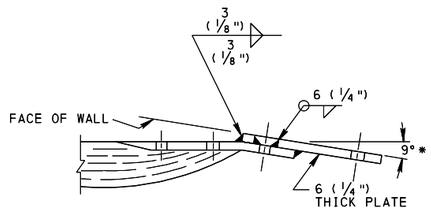


SPLICE BOLT

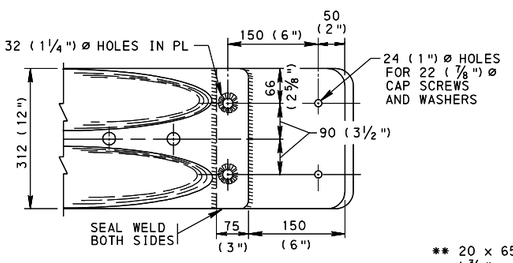
† USE L = 115 (4 1/2") FOR ALL RUBBING RAIL TO GUIDE RAIL POST CONNECTIONS AND USE L = 255 (10") FOR ALL W-BEAM RAIL ELEMENT TO GUIDE RAIL POST AND ROUTED OFFSET BRACKET CONNECTIONS.

▲ FOR FOUR (4) PANEL NESTED RAIL ELEMENT USE 54 (2 1/8") SPLICE BOLT.

ALTERNATE TERMINAL SECTIONS

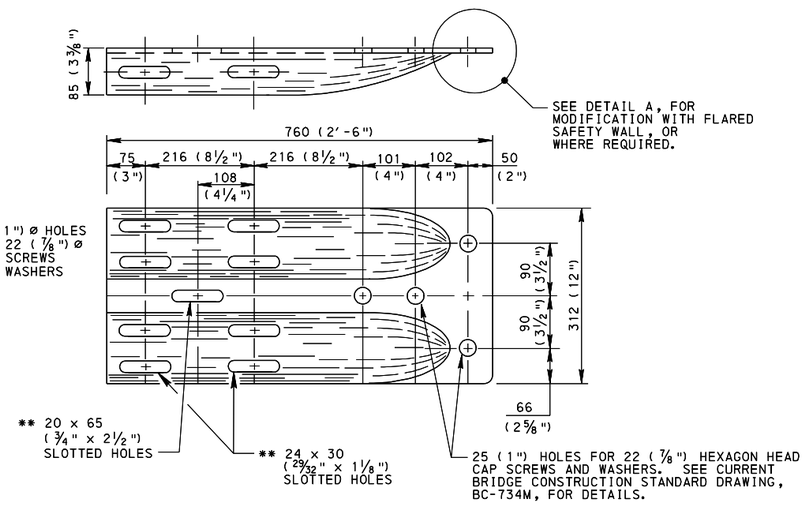


* OR TO BE DETERMINED BY ENGINEER.



(THE BRIDGE CONNECTION TERMINAL MODIFICATION MAY BE FABRICATED AS ONE PIECE TO ELIMINATE WELDING.)

DETAIL A



** PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES.

TERMINAL SECTION BRIDGE CONNECTION

NOTES

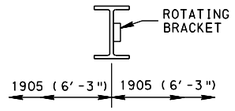
1. USE SPLICE BOLTS TO DEVELOP THE DESIGN STRENGTH OF THE RAIL ELEMENT.
2. PROVIDE TERMINAL SECTION BRIDGE CONNECTION, WITH WELDED PLATE FOR SAFETY, AS AN INCIDENTAL ITEM.
3. USE SLOTTED ROUND-HEADED BOLTS TO PROVIDE FOR WRENCH OR SCREWDRIVER.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 STRONG POST GUIDE RAIL

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 2 OF 7 RC-52M

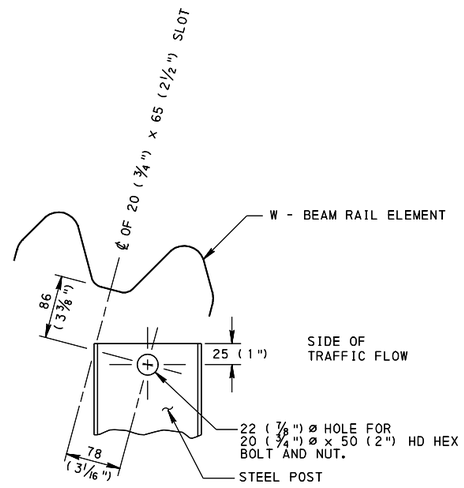


W150 X 13.5 (W6 x 9) POST

POSITIONING OF ROTATING BRACKET

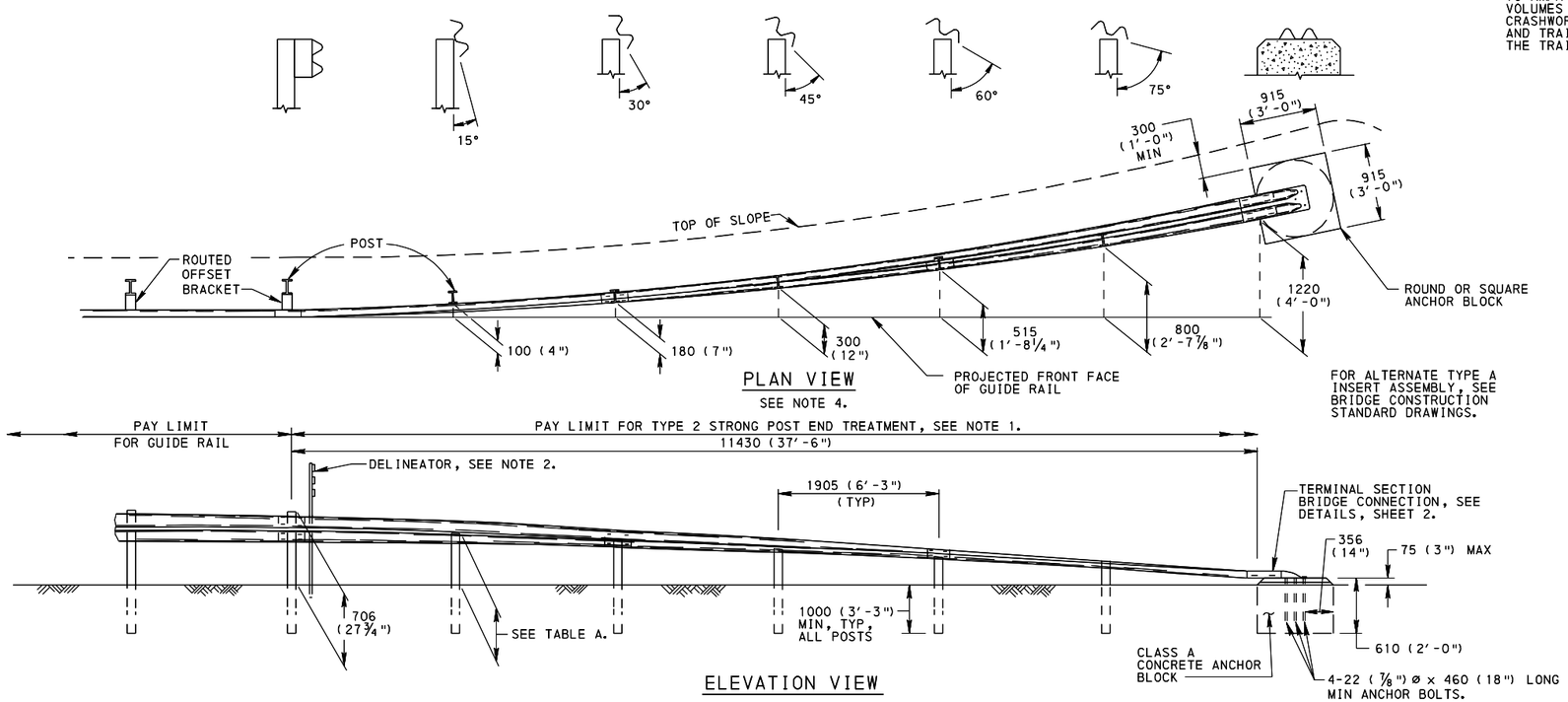
TABLE A

HEIGHT OF POST	430 (17")	370 (14½")	300 (11¾")	215 (8½")	115 (4½")
ROTATION ANGLES	15°	30°	45°	60°	75°



TYPICAL FOR
15° THRU 75° POSITIONS

ROTATING BRACKET



PLAN VIEW
SEE NOTE 4.

FOR ALTERNATE TYPE A
INSERT ASSEMBLY, SEE
BRIDGE CONSTRUCTION
STANDARD DRAWINGS.

ELEVATION VIEW

TYPE 2 STRONG POST END TREATMENT

SEE NOTE 5.

NOTES

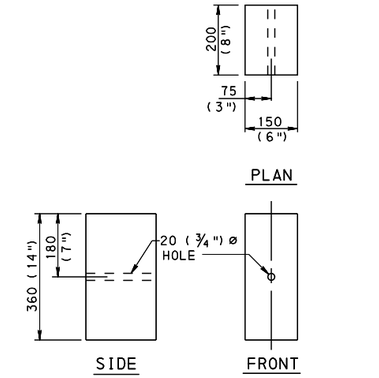
1. PAYMENT FOR TYPE 2 STRONG POST END TREATMENT INCLUDES 11430 (37′-6") OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.
2. INSTALL DELINEATOR ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT. FOR ADDITIONAL DETAILS, SEE TRAFFIC STANDARD TC-8604.
3. ONLY THE NECESSARY DIMENSIONS, FOR UNIFORMITY AND INTERCHANGEABILITY OF ROTATING BRACKETS, ARE INDICATED. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.
4. MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.
5. TYPE 2 STRONG POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF a) ANY GUIDE RAIL ON THE NHS, or b) ANY GUIDE RAIL ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROUTES. USE CRASHWORTHY END TREATMENTS ON ALL NHS ROUTES AND ON NON-NHS ROADWAYS WITH 70 km/h (45 mph) POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER DAY & ABOVE. ON 2-LANE ROADWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. TYPE 2 STRONG POST END TREATMENTS MAY BE USED ON THE TRAILING END OF GUIDE RAIL FOR HIGH SPEED NHS DIVIDED ROADWAYS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 STRONG POST GUIDE RAIL END TREATMENTS

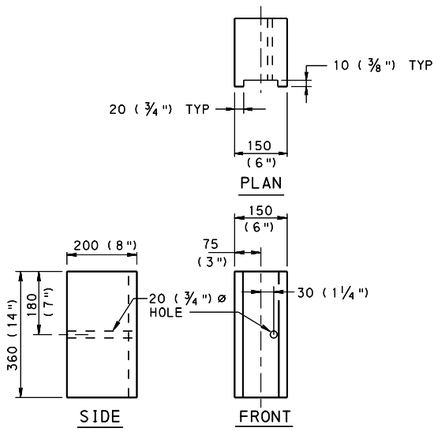
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 7
R. Wood Willey CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-52M



WOOD OR PLASTIC OFFSET BRACKET

TO BE USED WITH WOOD POSTS

(TOENAIL TO WOOD POST TO PREVENT ROTATION)

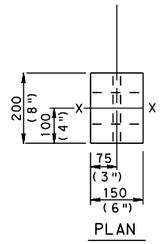


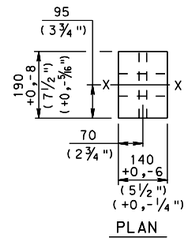
ROUTED OFFSET BRACKET

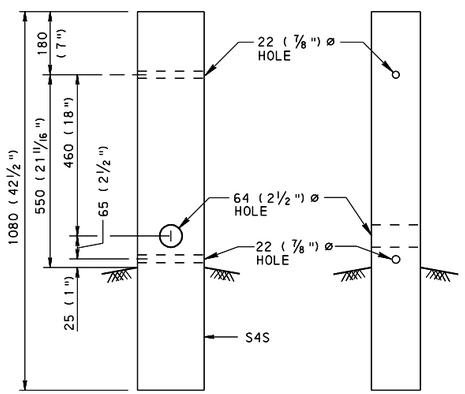
(WOOD, PLASTIC OR COMPOSITE) TO BE USED WITH STEEL POSTS

NOTES

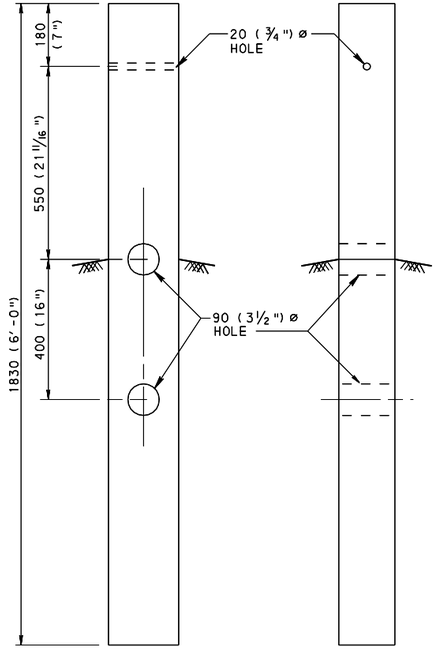
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. WOOD POSTS ARE TO BE USED FOR END TREATMENTS AND SPECIAL CONDITIONS ON A CASE BY CASE BASIS. THEY ARE NOT TO BE USED AS ALTERNATES TO STEEL POSTS FOR GUIDE RAIL.





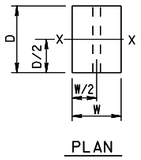


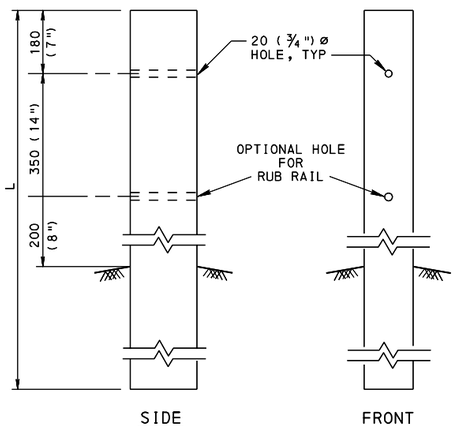
SHORT BREAKAWAY TIMBER POST



LONG BREAKAWAY TIMBER POST

L	W	D
1625 (5'-4")	150 (6")	200 (8")
1830 (6'-0")	150 (6")	200 (8")
1980 (6'-6")	150 (6")	200 (8")
2060 (6'-9")	150 (6")	200 (8")





TIMBER GUIDE RAIL POST

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

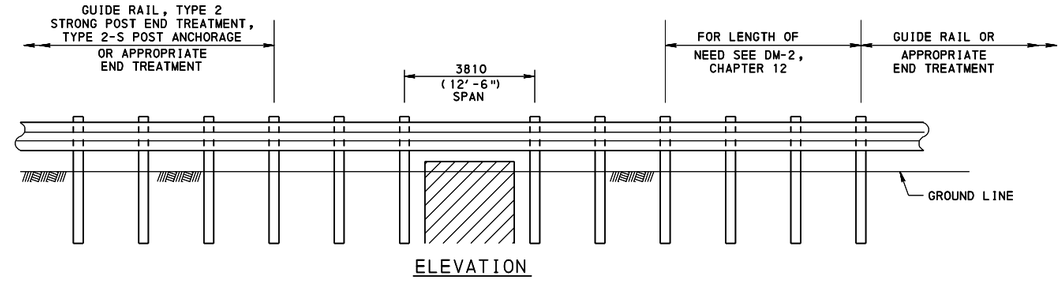
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 STRONG POST GUIDE RAIL POSTS AND OFFSET BRACKETS

RECOMMENDED JUN. 1, 2010
R. Wyatt Willey
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

RC-52M

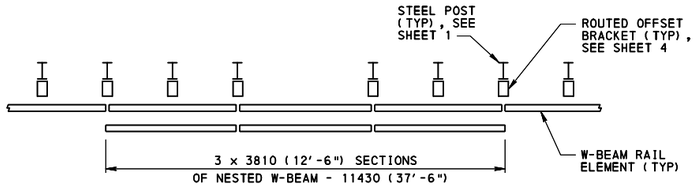


ELEVATION

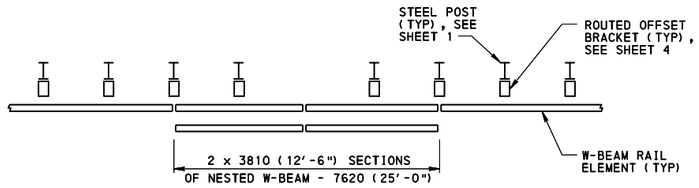
3810 (12'-6") SPAN NESTED W-BEAM (TYPE 2-S) GUIDE RAIL ACROSS LOW-FILL CULVERTS AND SMALL STRUCTURES

NOTES

1. PLACE TOP W-BEAM RAIL ELEMENT IN NESTED SECTION SO THAT SPLICE LOCATIONS ARE ALIGNED.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. FOR THE 3810 (12'-6") SPAN, A MINIMUM UNOBSTRUCTED DISTANCE OF 900 (3'-0") MUST BE PROVIDED BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.
4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 54 (2⅛") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHEET 2.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER METER (LINEAR FOOT) OF TYPE 2-S GUIDE RAIL.
6. PROVIDE A MINIMUM OF 60900 (200') OF STRONG POST GUIDE RAIL (1 SECTION OF W-BEAM RAIL ELEMENT) BETWEEN NESTED (2 SECTIONS OF W-BEAM RAIL ELEMENT) RUNS.



PLAN



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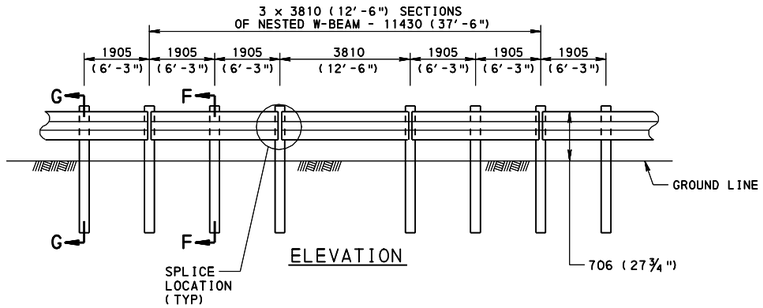
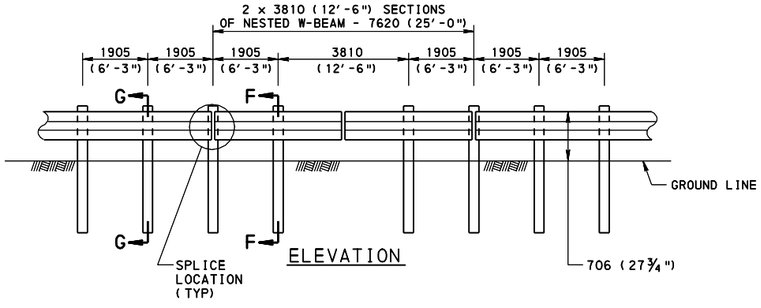


ELEVATION

CASE 1

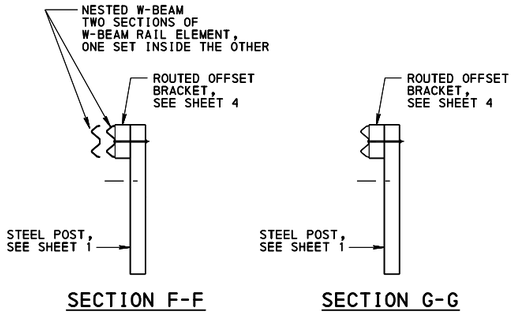
3 NESTED PANELS



ELEVATION

CASE 2

2 NESTED PANELS



SECTION F-F

SECTION G-G

TYPICAL NESTED PANEL

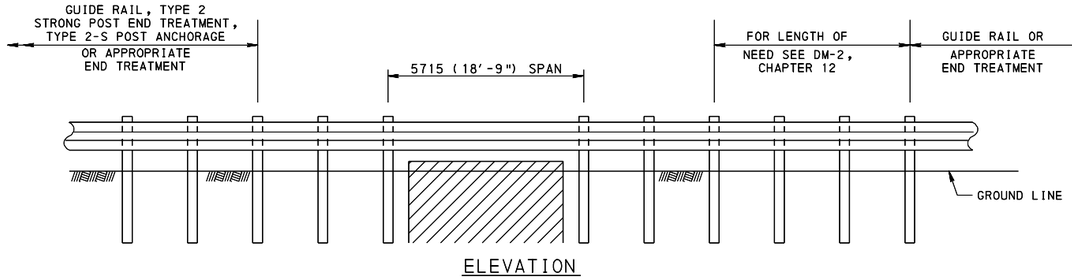
MID-SPAN SPLICE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 STRONG POST
GUIDE RAIL
ACROSS CULVERTS AND SMALL STRUCTURES
3810 (12'-6") SPAN

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 5 OF 7
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-52M

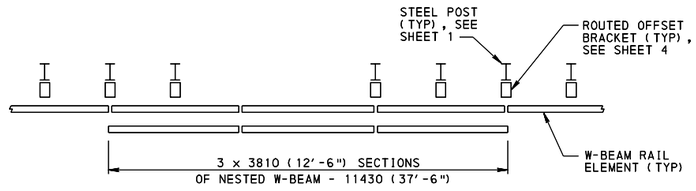


ELEVATION

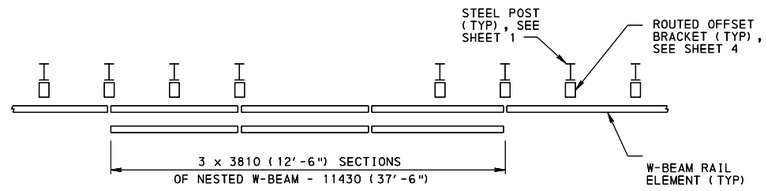
5715 (18'-9") SPAN NESTED W-BEAM (TYPE 2-S) GUIDE RAIL ACROSS LOW-FILL CULVERTS AND SMALL STRUCTURES

NOTES

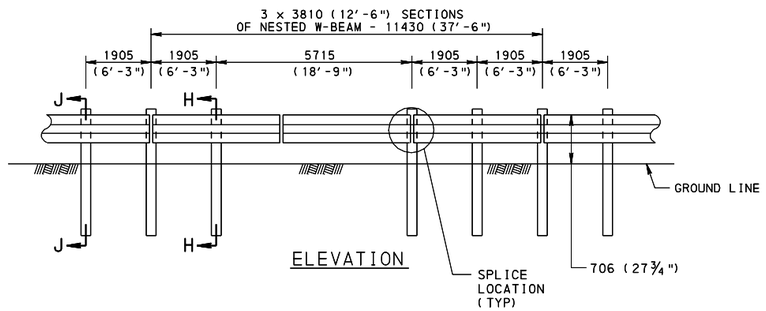
1. PLACE TOP W-BEAM RAIL ELEMENT IN NESTED SECTION SO THAT SPLICE LOCATIONS ARE ALIGNED.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. FOR THE 5715 (18'-9") SPAN, A MINIMUM UNOBSTRUCTED DISTANCE OF 1050 (3'-6") MUST BE PROVIDED BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.
4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 54 (2⅛") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHEET 2.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER METER (LINEAR FOOT) OF TYPE 2-S GUIDE RAIL.
6. PROVIDE A MINIMUM OF 60900 (200') OF STRONG POST GUIDE RAIL (1 SECTION OF W-BEAM RAIL ELEMENT) BETWEEN NESTED (2 SECTIONS OF W-BEAM RAIL ELEMENT) RUNS.



PLAN



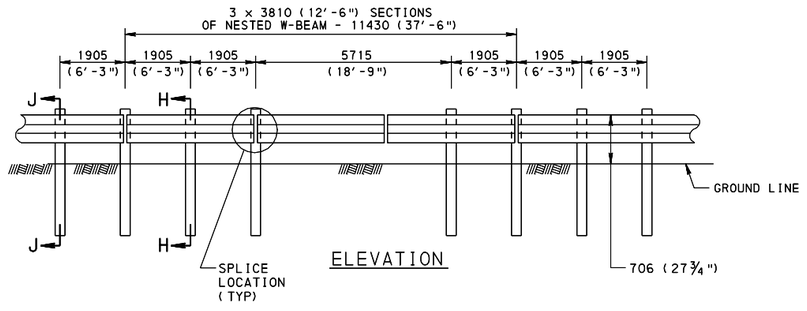
PLAN



ELEVATION

CASE 1

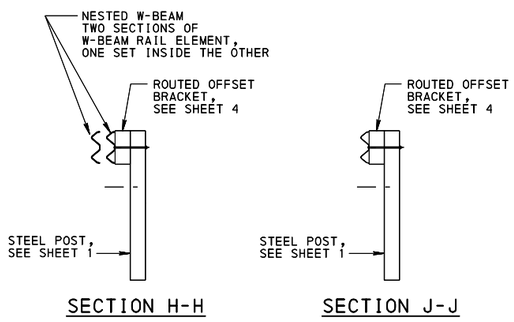
SPLICE LOCATIONS



ELEVATION

CASE 2

SPLICE LOCATIONS



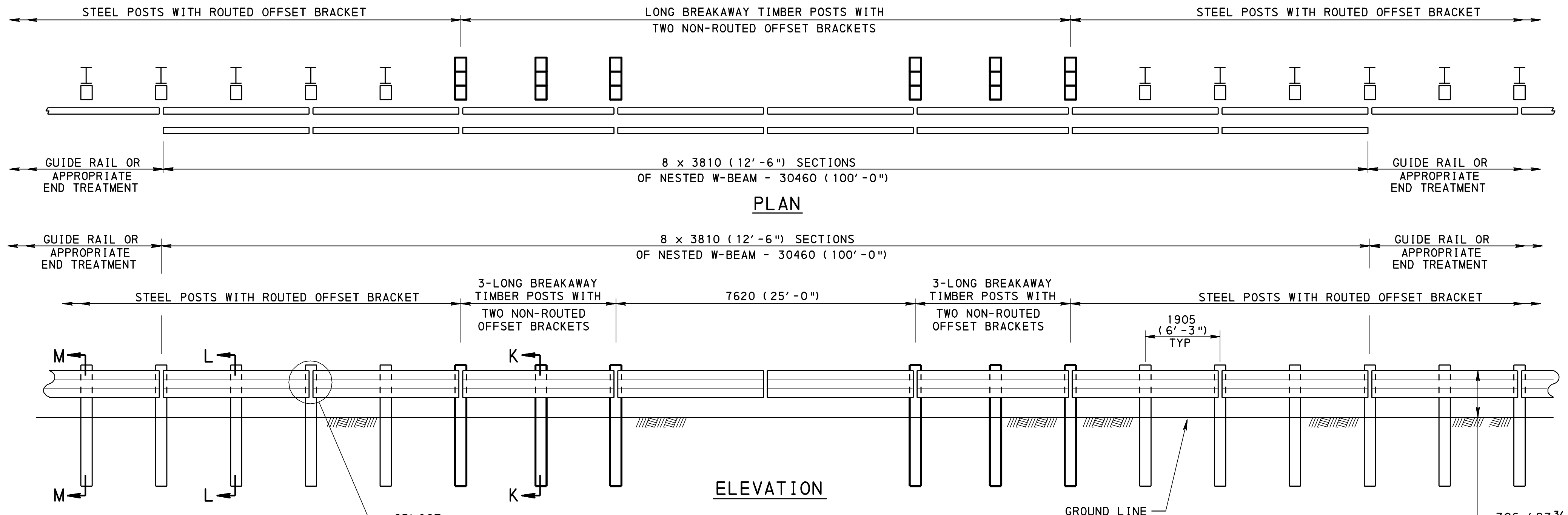
SECTION H-H SECTION J-J

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

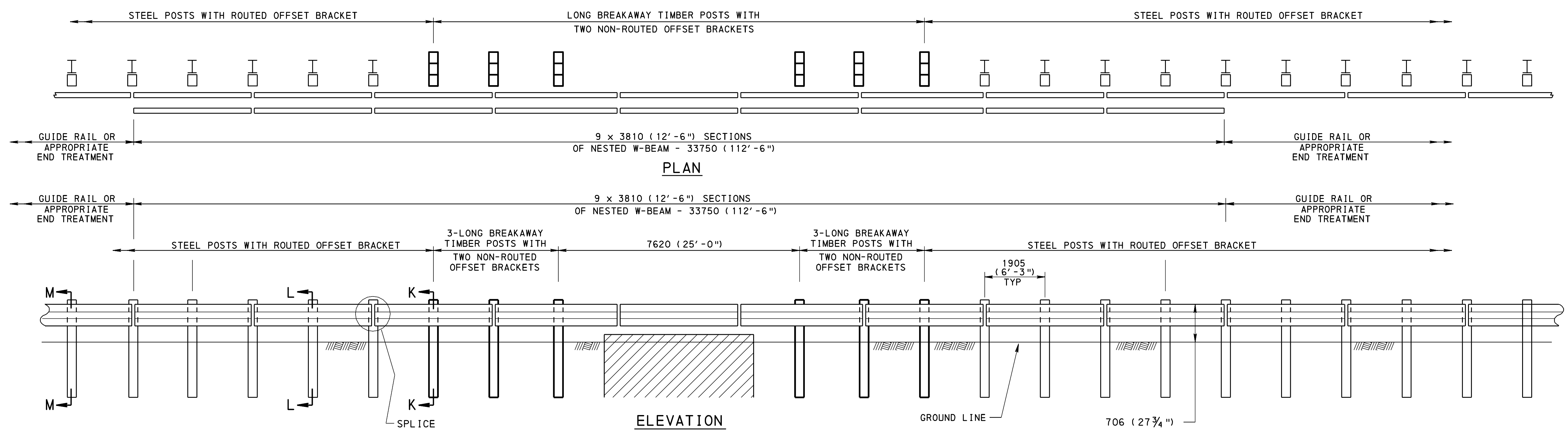
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 STRONG POST
GUIDE RAIL
ACROSS CULVERTS AND SMALL STRUCTURES
5715 (18'-9") SPAN

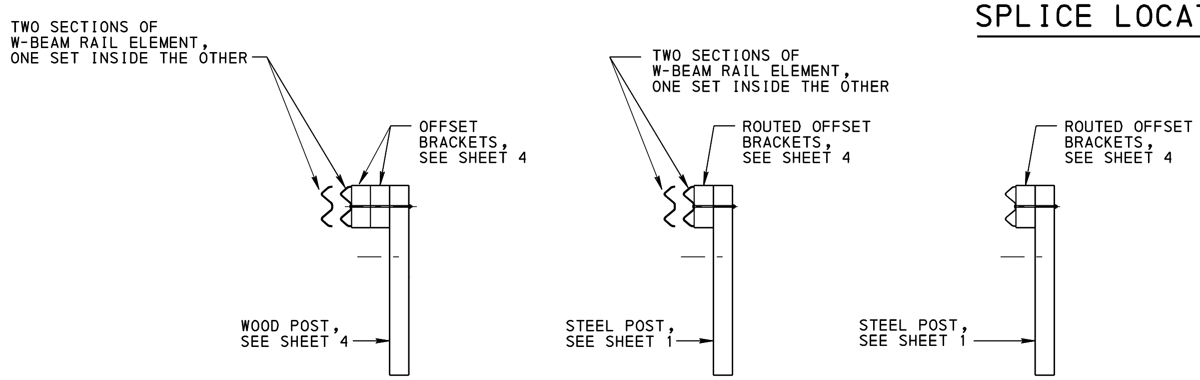
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 6 OF 7
R. Wood Willey	Bruce E. Ryan	RC-52M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



CASE 1
SPLICE LOCATIONS



CASE 2
SPLICE LOCATIONS



NOTES

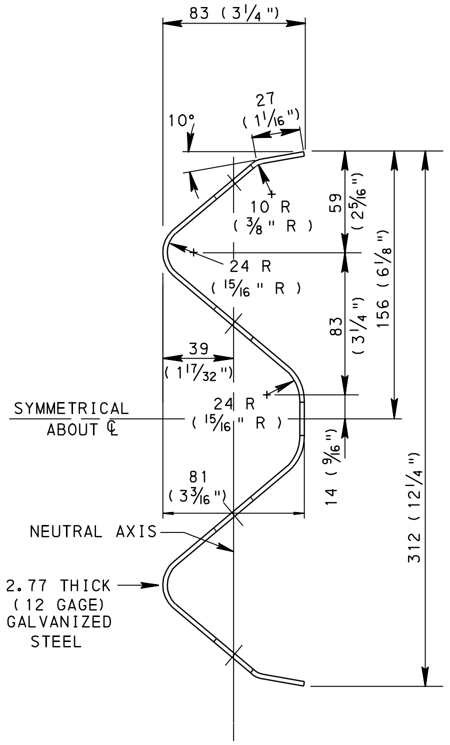
1. PLACE TOP W-BEAM RAIL ELEMENT IN NESTED SECTION SO THAT SPLICE LOCATIONS ARE ALIGNED.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. FOR THE 7620 (25'-0") SPAN, A MINIMUM UNOBSTRUCTED DISTANCE OF 1500 (5'-0") MUST BE PROVIDED BEHIND THE REAR FACE OF THE GUIDE RAIL POST TO THE FRONT FACE OF THE OBSTRUCTION.
4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 54 (2⅛") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHEET 2.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER METER (LINEAR FOOT) OF TYPE 2-S GUIDE RAIL.
6. PROVIDE A MINIMUM OF 60900 (200') OF STRONG POST GUIDE RAIL (1 SECTION OF W-BEAM RAIL ELEMENT) BETWEEN NESTED (2 SECTIONS OF W-BEAM RAIL ELEMENT) RUNS.
7. ONE 7620 (25'-0") W-BEAM PANEL SECTION IS AN EQUIVALENT FOR TWO 3810 (12'-6") W-BEAM PANEL SECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

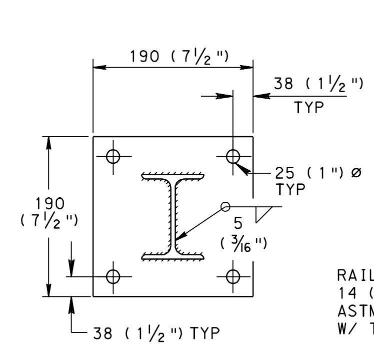
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 STRONG POST GUIDE RAIL ACROSS CULVERTS AND SMALL STRUCTURES 7620 (25'-0") SPAN

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 7 OF 7
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-52M



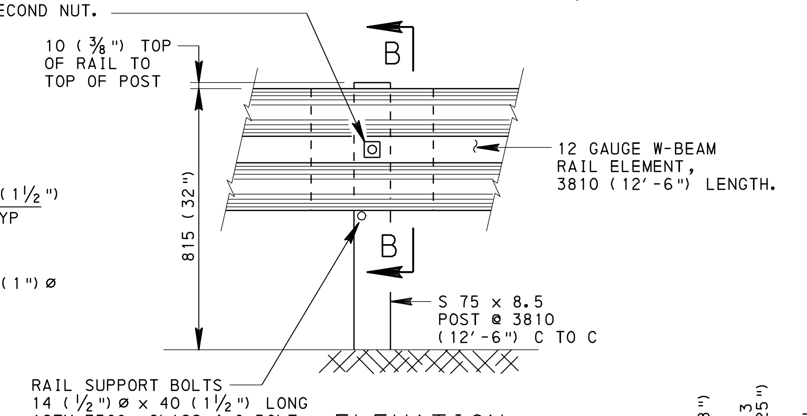
SECTION A-A



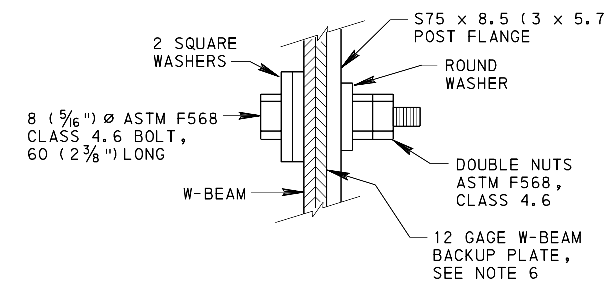
DETAIL C

BASE PLATE

USE BASE PLATE FOR
86 x 57 (3⅜" x 2¼")
COLD FORMED CHANNEL POST,
ALUMINUM ALLOY POST AND
S75 x 8.5 (3 x 5.7) POST.

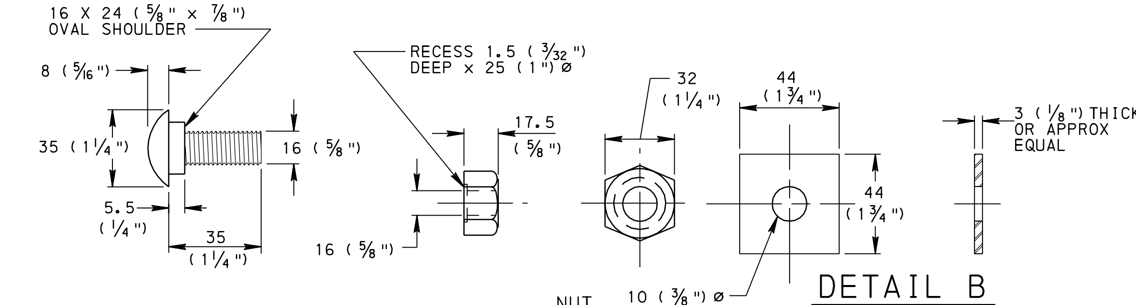


ELEVATION



SECTION B-B

TYPICAL INSTALLATION



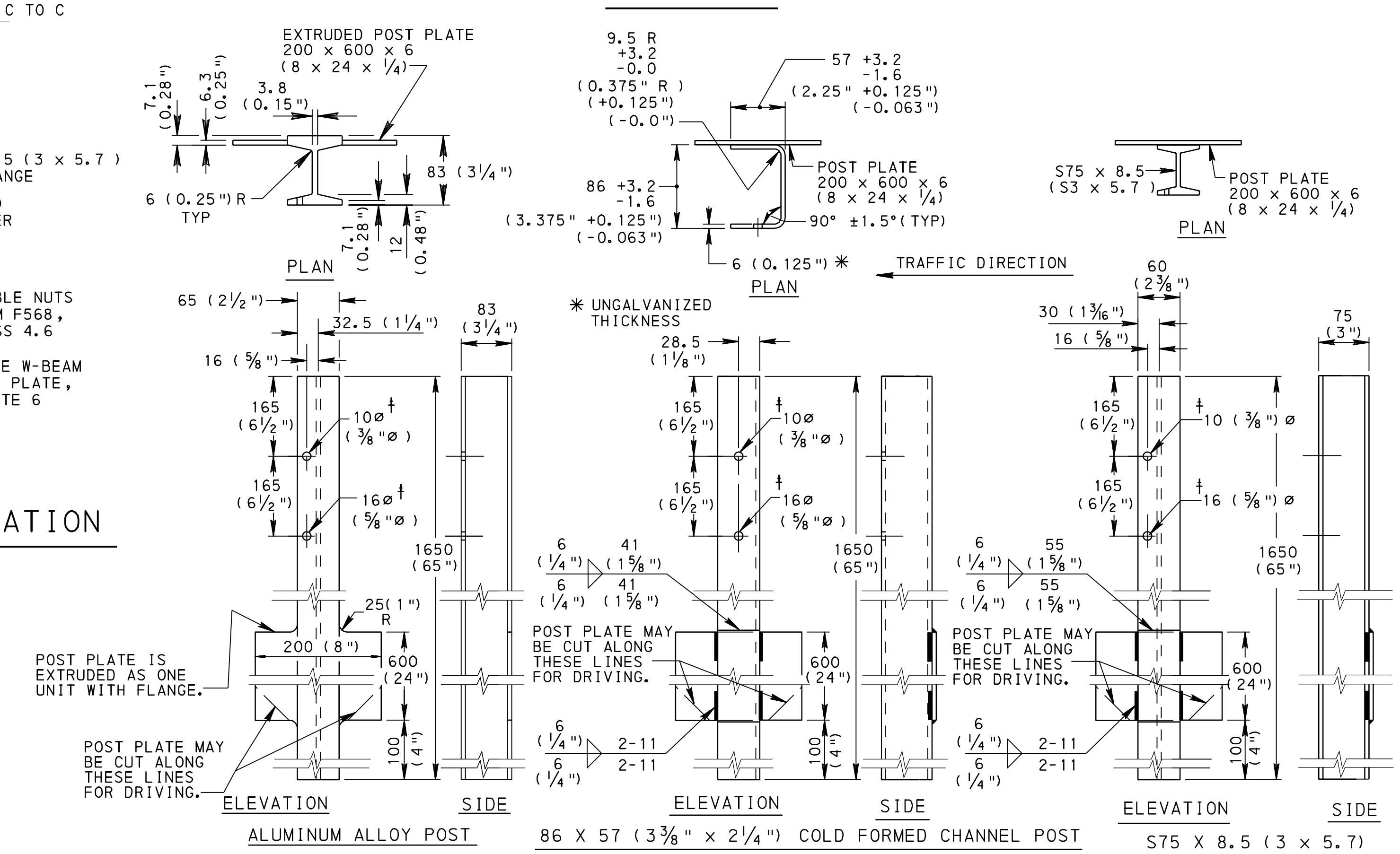
SPLICE BOLT

NUT

DETAIL A

DETAIL B

SQUARE WASHER



ALUMINUM ALLOY POST

86 X 57 (3⅜" x 2¼") COLD FORMED CHANNEL POST

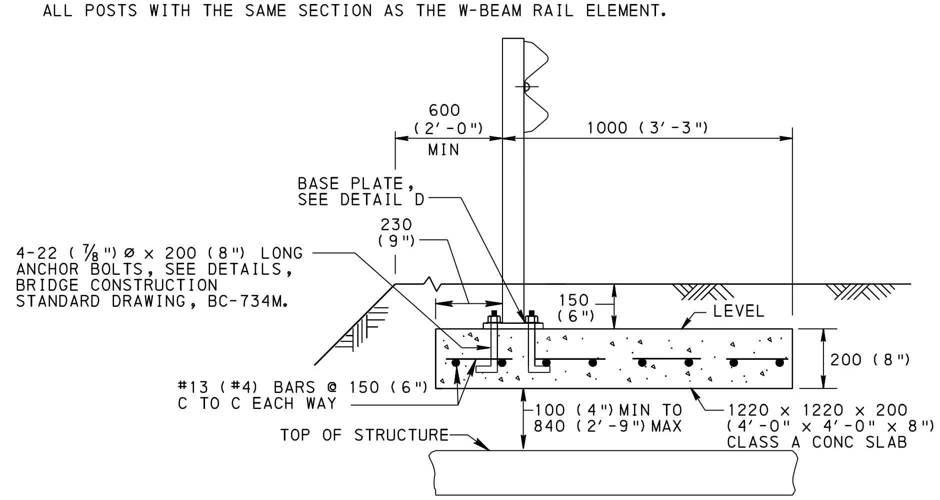
S75 X 8.5 (3 x 5.7)

TYPE 2-W GUIDE RAIL POSTS

ǂ CONFORM POST DETAILS FOR TYPE 2-WM MEDIAN BARRIER TO THE DETAILS AS SHOWN, EXCEPT LOCATE THE POST BOLT AND SUPPORT BOLT HOLES ON THE FRONT AND REAR FLANGES.

NOTES

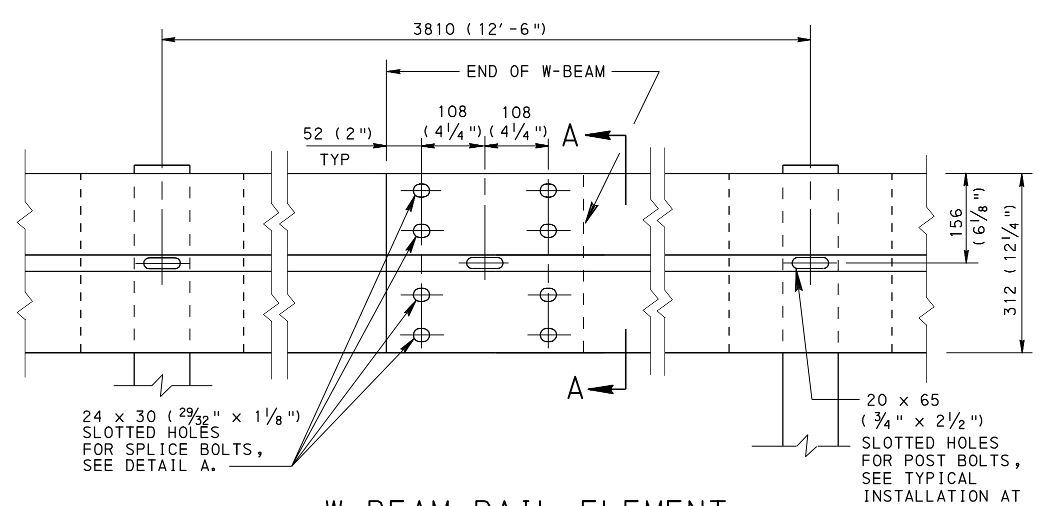
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
2. THE 86x57 (3⅜"x2¼") COLD FORMED CHANNEL POST, S75x8.5 (S3x5.7) POST AND ALUMINUM ALLOY POST MAY BE BID AS ALTERNATES FOR TYPE 2 WEAK POST GUIDE RAIL SYSTEM; HOWEVER, MIXING OF DIFFERENT POSTS IS NOT ACCEPTABLE WITHIN A PROJECT.
3. DURING ERECTION, USE SUPPORT BOLTS TO SUPPORT THE RAIL ELEMENT UNTIL THE 8 (5/16") ø POST BOLTS ARE PROPERLY TORQUED. LEAVE SUPPORT BOLTS IN PLACE AFTER CONSTRUCTION.
4. ATTACH W-BEAM RAIL ELEMENT TO EACH POST. SPLICE ONLY AT MID-SPAN AND LAP IN THE DIRECTION OF TRAFFIC. TO ACHIEVE A MID-SPAN SPLICE, THE PREFERRED METHOD IS TO OVERLAP HALF RAIL ELEMENT INSIDE THE OTHER AT THE BEGINNING OF A GUIDE RAIL RUN.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
6. USE 305 (12") BACKING PLATES FOR THE W-BEAM RAIL ELEMENTS AT ALL POSTS WITH THE SAME SECTION AS THE W-BEAM RAIL ELEMENT.



GUIDE RAIL

OVER UNDERGROUND STRUCTURES

MAKE NO SEPARATE PAYMENT FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES. CONSIDER CONCRETE, REINFORCEMENT BARS AND HARDWARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.



W-BEAM RAIL ELEMENT

AT MID-SPAN SPLICE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

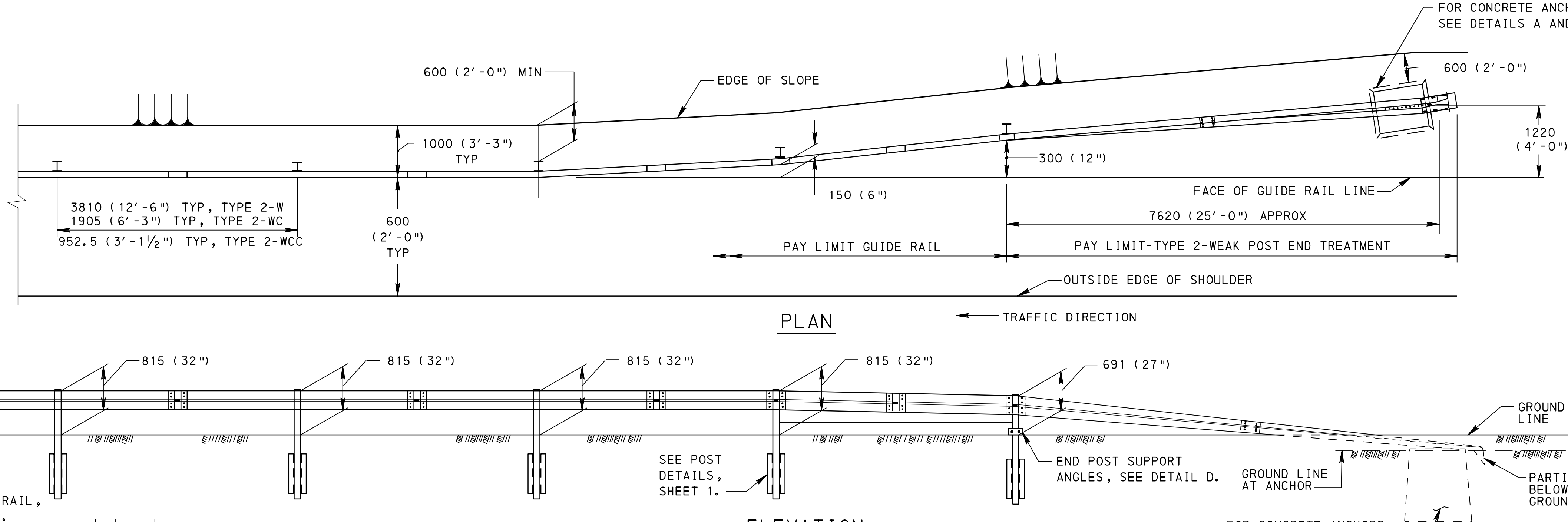
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 WEAK POST
GUIDE RAIL

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 2
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-53M

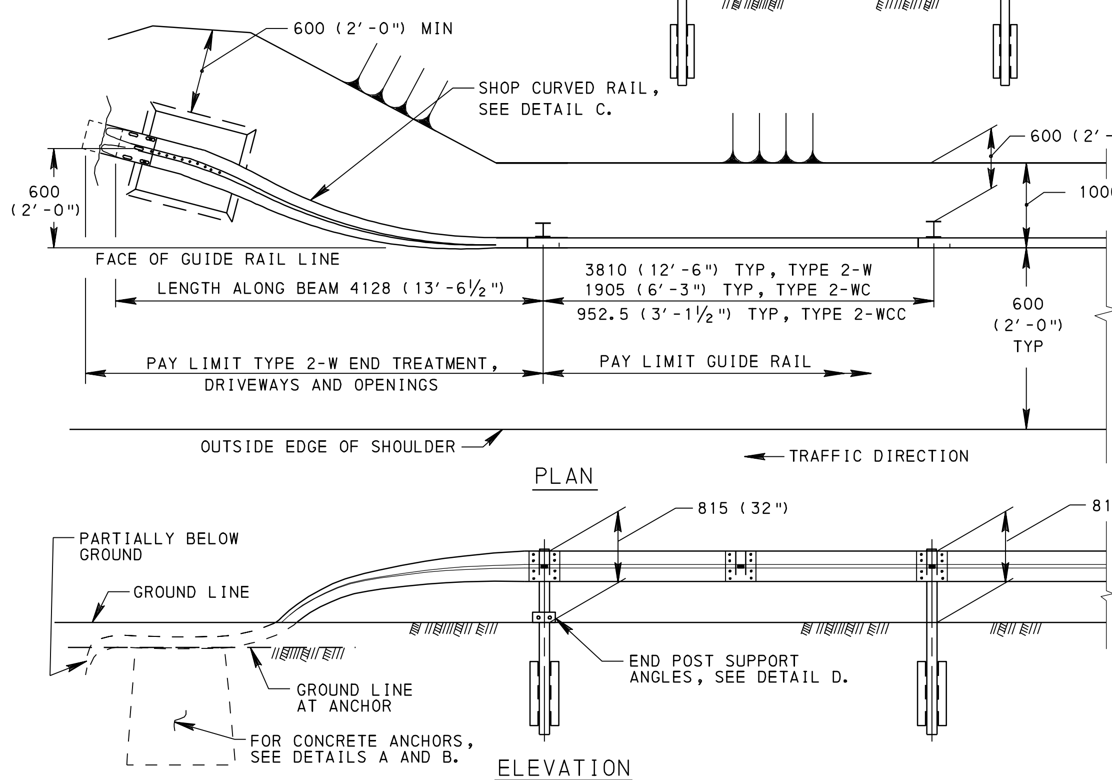
NOTE

1. TYPE 2 WEAK POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF a) ANY GUIDE RAIL ON THE NHS, or b) ANY GUIDE RAIL ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROUTES. USE CRASHWORTHY END TREATMENTS ON ALL NHS ROUTES AND ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROADWAYS WITH 70 km/h (45 mph) POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER DAY & ABOVE. ON 2-LANE ROADWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. IF CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST GUIDE RAIL MUST BE TRANSITIONED WITH A 15.2 m (50'-0") TYPE 2-S GUIDE RAIL SECTION TO ANCHOR THE TYPE 2-W GUIDE RAIL PRIOR TO THE ATTACHMENT OF A CRASHWORTHY END TREATMENT.



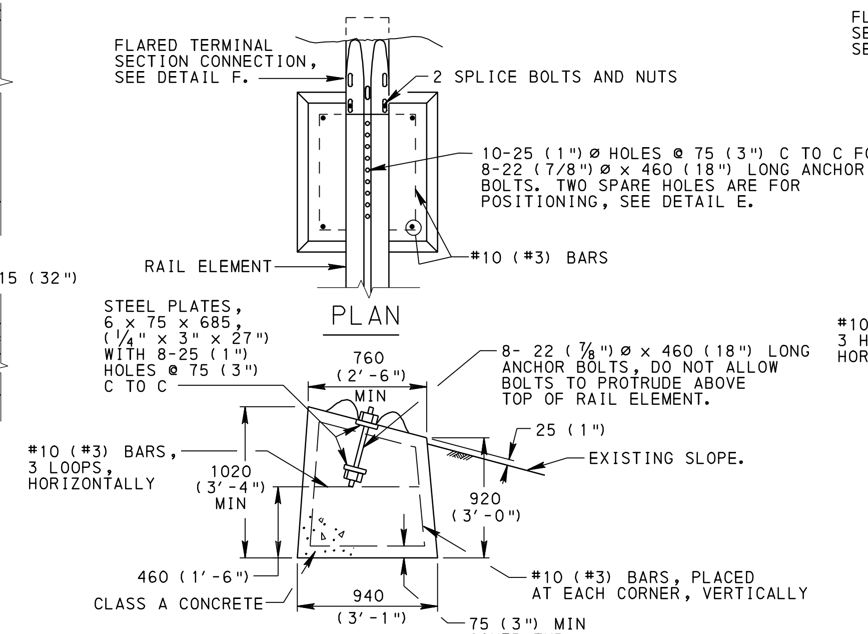
TYPE 2-WEAK POST END TREATMENT

(SEE NOTE 1)

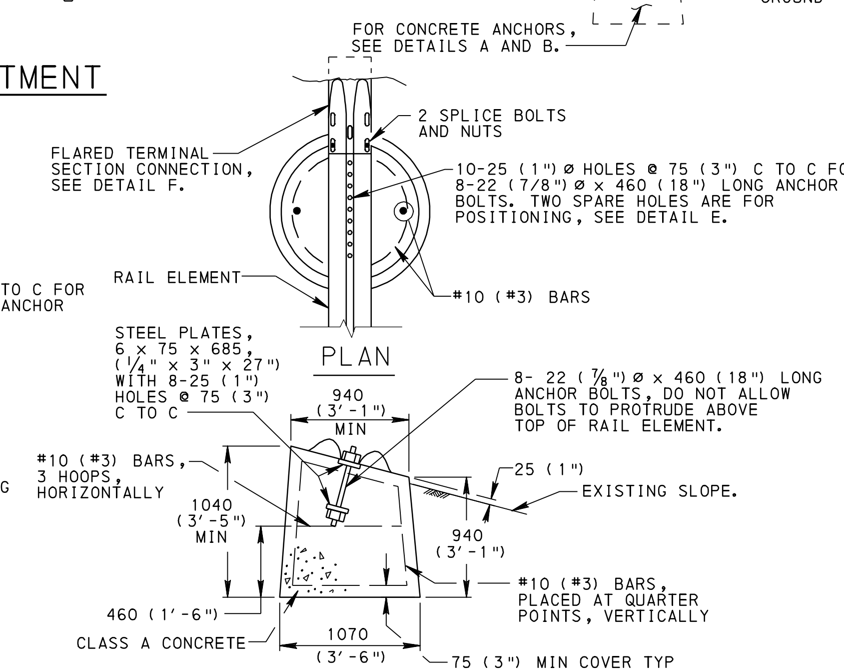


TYPE 2-W END TREATMENT, DRIVEWAYS & OPENINGS

(USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS)



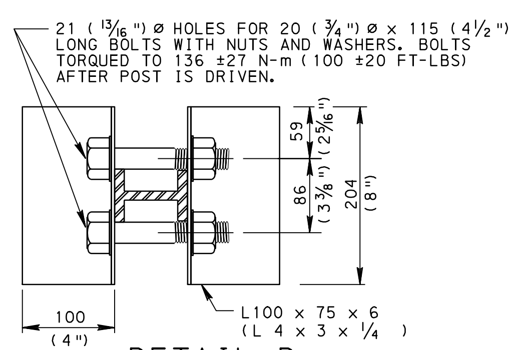
DETAIL A



DETAIL B (ALTERNATE)

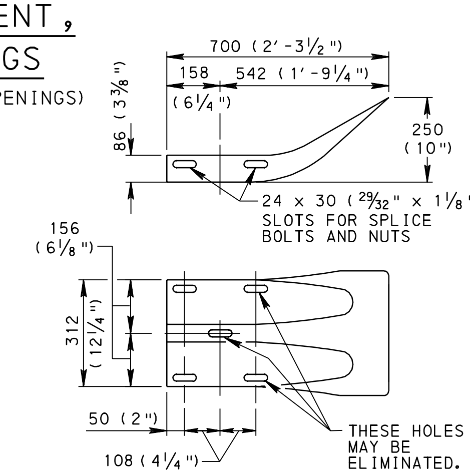
CONCRETE ANCHOR

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



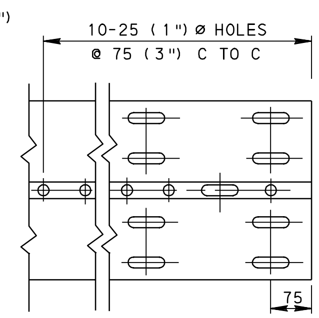
DETAIL D

END POST SUPPORT ANGLES

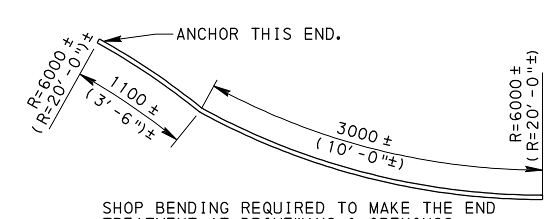


DETAIL F

FLARED TERMINAL SECTION



DETAIL E



DETAIL C

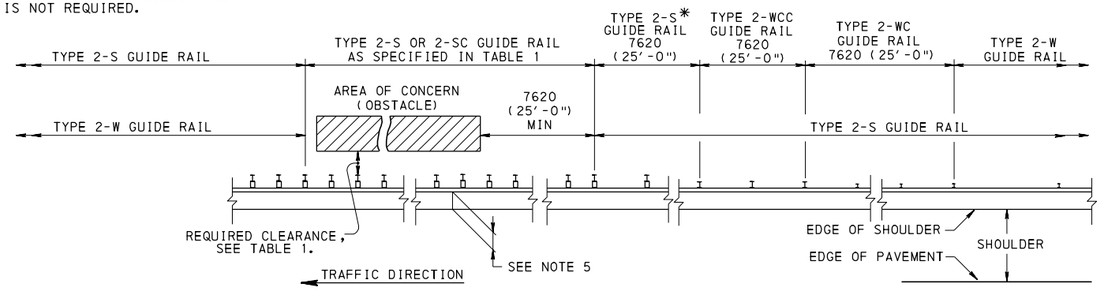
SHOP CURVED RAIL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 WEAK POST GUIDE RAIL END TREATMENTS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 2
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-53M

* IF TYPE 2-S GUIDE RAIL IS USED AT THE OBSTRUCTION, THIS SECTION OF GUIDE RAIL IS NOT REQUIRED.



TYPICAL GUIDE RAIL TREATMENT
WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE

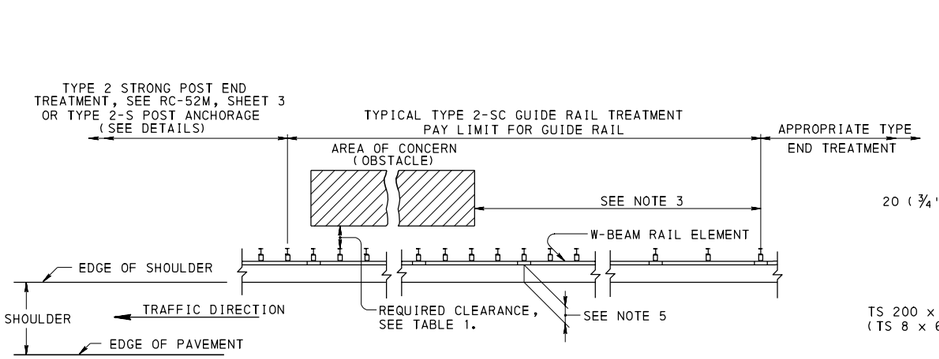
TABLE 1

TYPE OF GUIDE RAIL	REQUIRED † CLEARANCES
2-SCC	300 (1'-0")
2-SC	600 (2'-0")
2-S	900 (3'-0")
2-WCC	1200 (4'-0")
2-WC	1500 (5'-0")
2-W	2100 (7'-0")

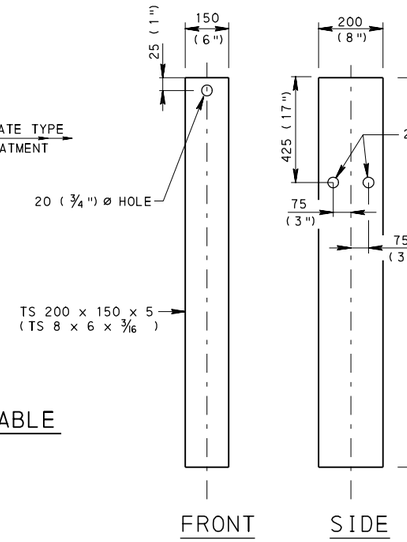
† THE MINIMUM UNOBSTRUCTED DISTANCE FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

NOTES

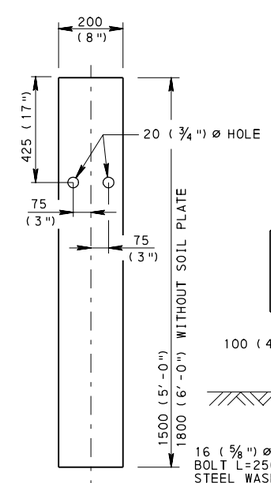
1. THE TREATMENTS SHOWN ARE FOR FOUR-LANE DIVIDED HIGHWAYS. USE THE APPROACH END TREATMENT AT BOTH SIDES OF THE OBSTRUCTION ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC.
2. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN PUBLICATION 13M, DM-2, CHAPTER 12.
3. THIS DISTANCE VARIES. DETERMINE THE REQUIRED LENGTH USING THE GUIDELINES FOUND IN PUBLICATION 13M, DM-2, CHAPTER 12, AND SHOW ON THE TABULATIONS. WHERE CALCULATIONS SHOW A DISTANCE LESS THAN 15000 (50'-0"), USE 15000 (50'-0") AS A MINIMUM DISTANCE.
4. WHEN THE MINIMUM UNOBSTRUCTED DISTANCE FROM BACK OF GUIDE RAIL POST TO FACE OF OBSTRUCTION IS LESS THAN 300 (1'-0"), USE TYPE 2-SCC DOUBLE NESTED RAIL.
5. THE TYPICAL DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT IS 600 (2'-0"). THIS MAY VARY; BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN REQUIRED CLEARANCES DETERMINED FROM TABLE 1.
6. 1800 (6'-0") STEEL TUBE MAY BE USED WITHOUT SOIL PLATE.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

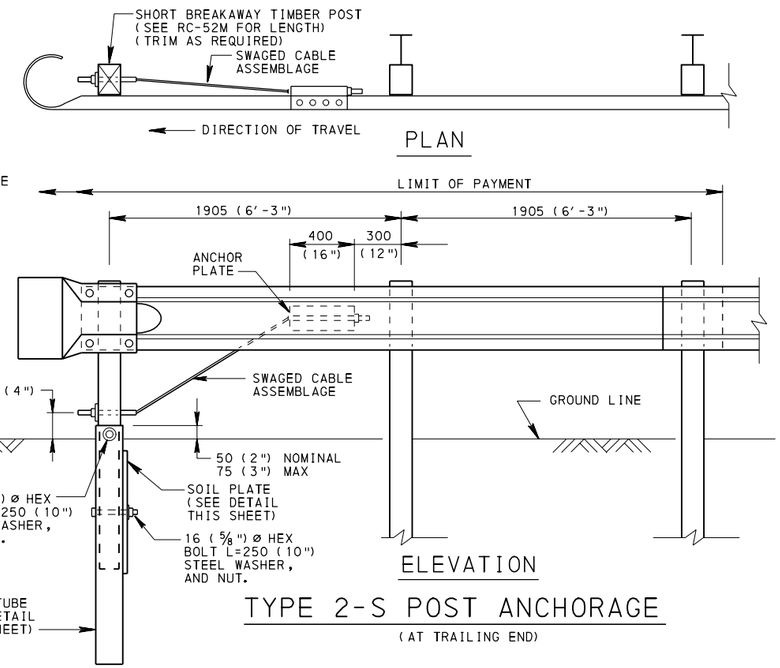


TYPICAL GUIDE RAIL TREATMENT
WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE

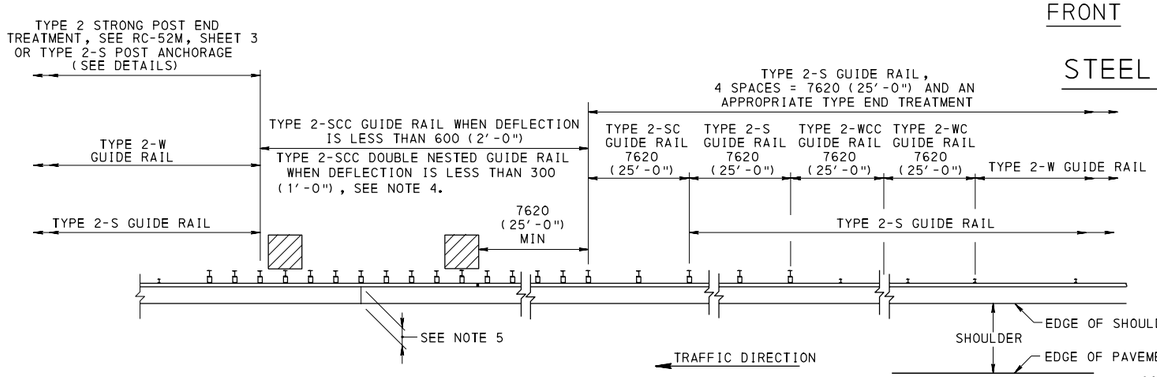


STEEL TUBE

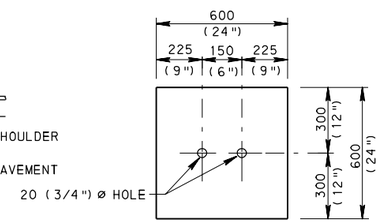




TYPE 2-S POST ANCHORAGE
(AT TRAILING END)



TYPICAL GUIDE RAIL TREATMENT WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS NOT AVAILABLE



SOIL PLATE
6 (¼") THICK

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

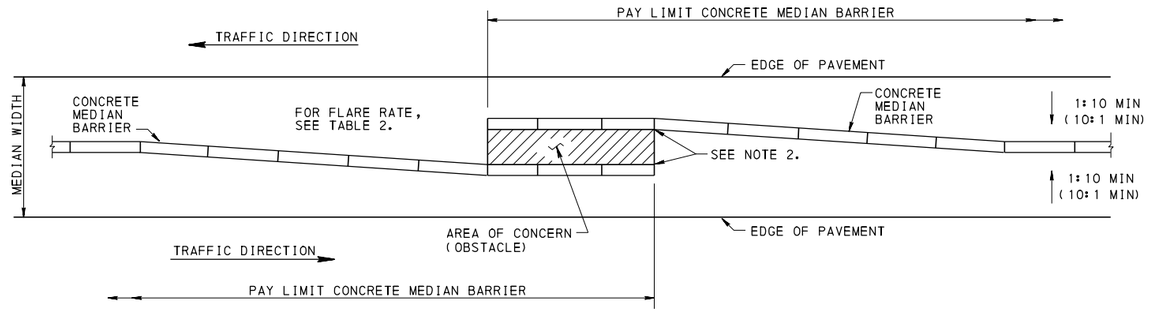
BARRIER PLACEMENT AT OBSTRUCTIONS

RECOMMENDED JUN. 1, 2010
R. Wentzel
CHIEF, HWY. QA DIVISION

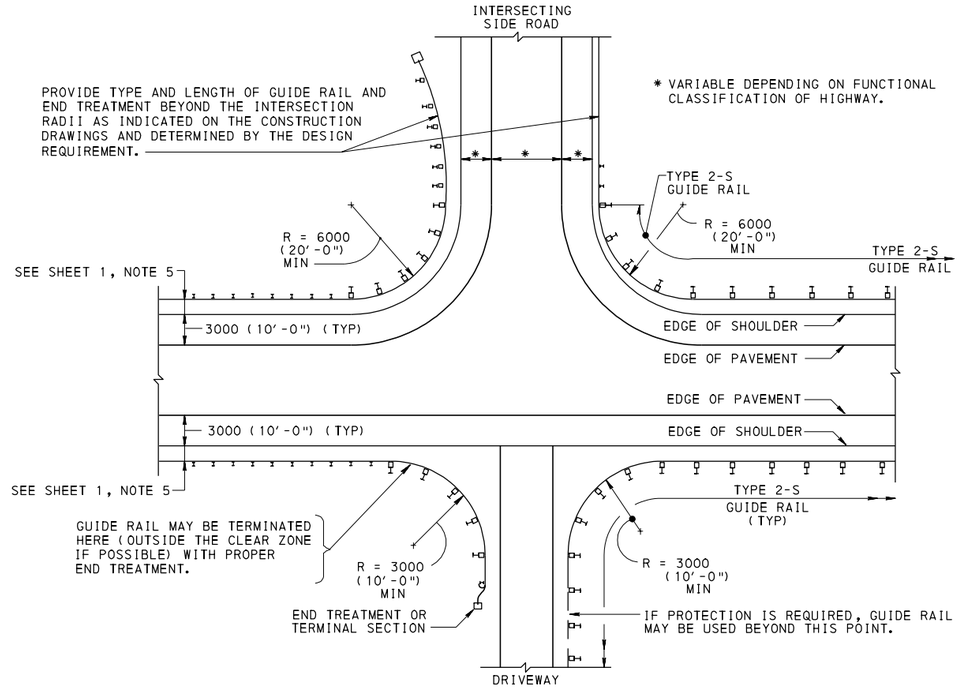
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 7

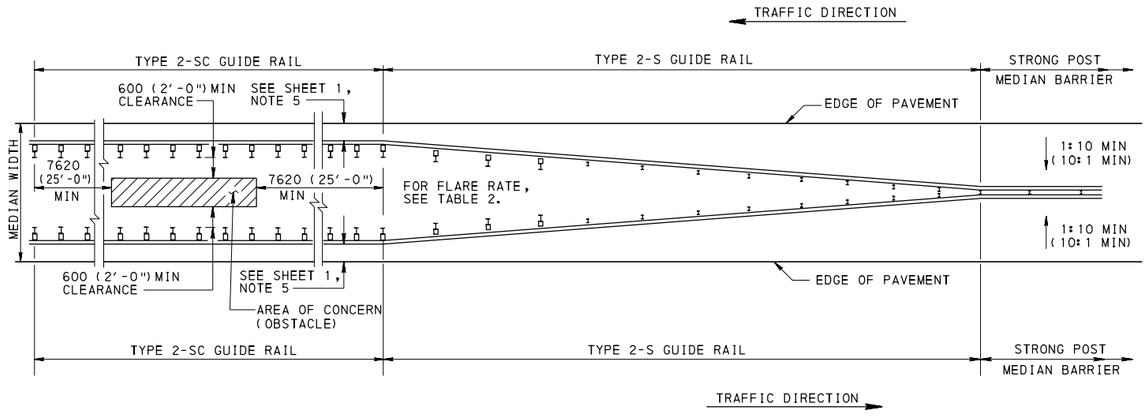
RC-54M



TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 6.0 m (20′) OR LESS WHERE CONTINUOUS BARRIER IS REQUIRED



TREATMENT AT INTERSECTIONS AND DRIVEWAYS



TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS OF 6.0 m (20′) TO 10.0 m (30′) WHERE CONTINUOUS BARRIER IS REQUIRED

NOTES

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW RECOMMENDED GUIDELINES IN DESIGN MANUAL, PART 2, CHAPTER 12.
2. PROVIDE SINGLE FACE CONCRETE BARRIER THROUGH THE AREA OF THE OBSTRUCTION. NO MINIMUM BARRIER-TO-OBSTRUCTION DISTANCE IS REQUIRED. FOR DETAILS, SEE RC-58M.

TABLE 2
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
110	70	20 : 1	15 : 1
105	65	19 : 1	15 : 1
100	60	18 : 1	14 : 1
90	55	16 : 1	12 : 1
80	50	14 : 1	11 : 1
70	45	12 : 1	10 : 1
65	40	11 : 1	9 : 1
60	35	10 : 1	8 : 1
50	30	8 : 1	7 : 1

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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BARRIER PLACEMENT AT OBSTRUCTIONS

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CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
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SHT 2 OF 7

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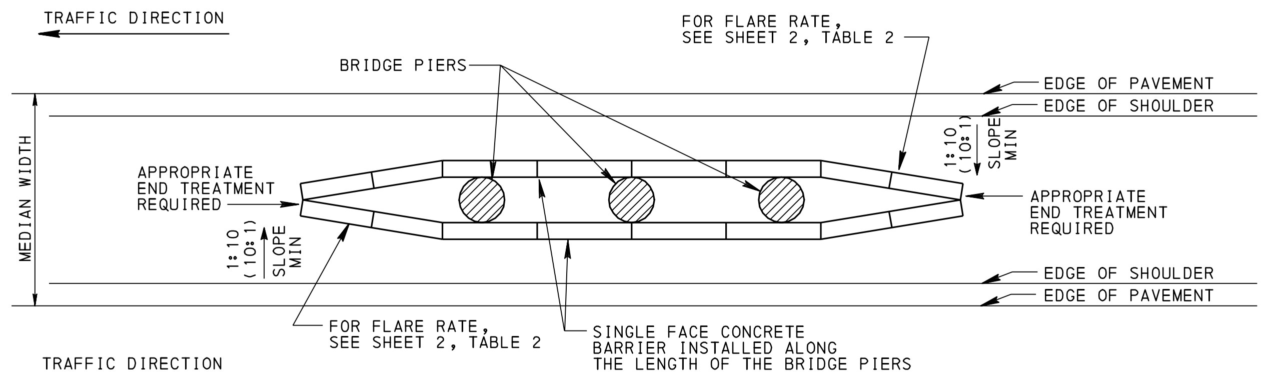
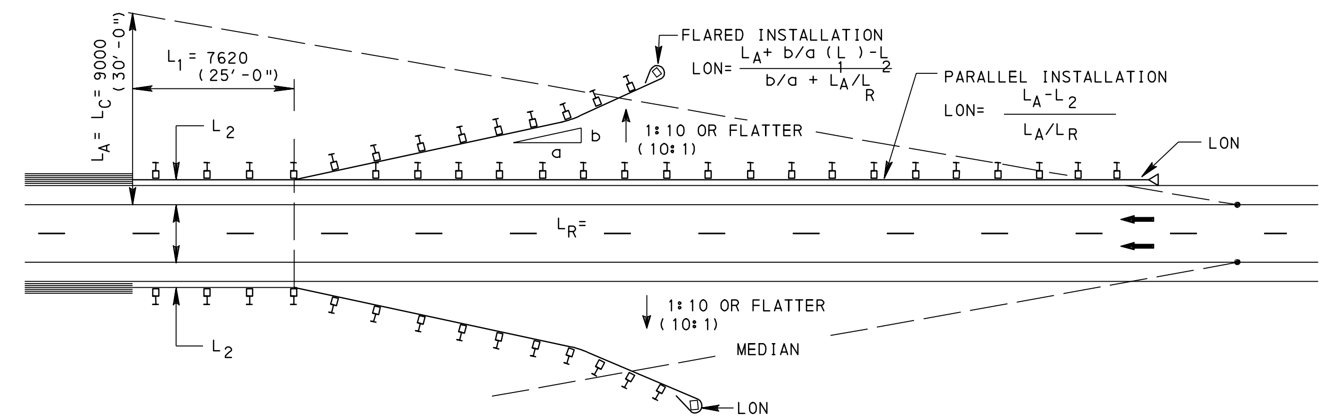
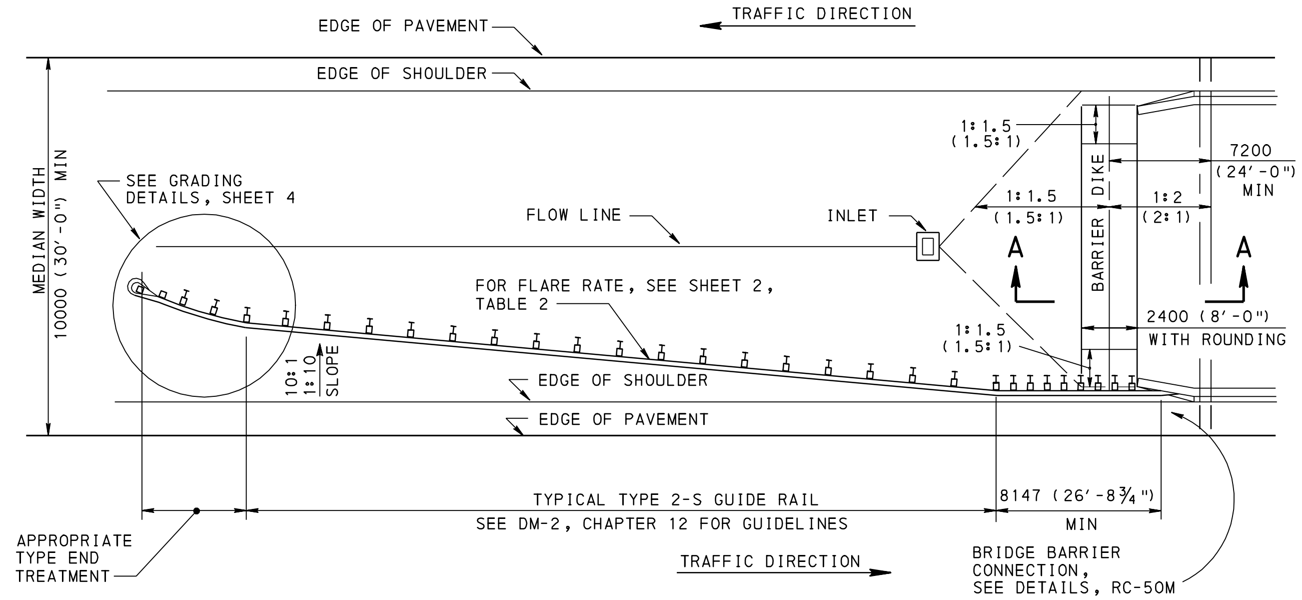


TREATMENT AT OBSTRUCTIONS FOR
MEDIAN WIDTHS GREATER THAN 6.0 m (20'-0")
WHERE CONTINUOUS BARRIER IS NOT REQUIRED

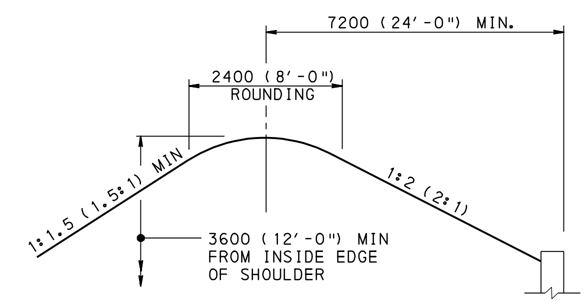


LENGTH OF BARRIER NEED (LON)

SEE PUBLICATION 13M, DM-2, CHAPTER 12 FOR GUIDELINES

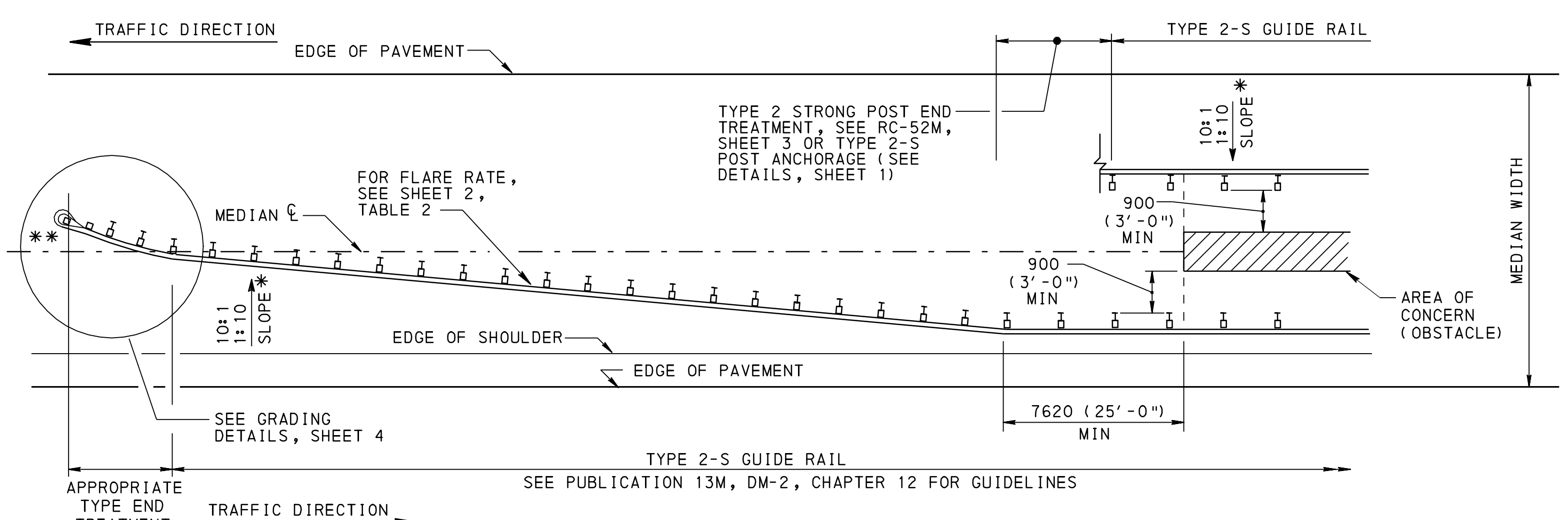


MEDIAN TREATMENT AT DUAL STRUCTURES



SECTION A-A

MEDIAN TREATMENT AT DUAL STRUCTURE



TREATMENT AT OBSTRUCTIONS FOR
MEDIAN WIDTHS GREATER THAN 10.0 m (30'-0")
WHERE CONTINUOUS BARRIER IS NOT REQUIRED

* A 1:10 (10:1) SLOPE MINIMUM IS REQUIRED IN FRONT OF THE BARRIER, IF ANY PORTION OF THE BARRIER IS LOCATED WITHIN 3.6 m (12'-0") FROM THE EDGE OF SHOULDER (HINGE POINT). BARRIER MUST NOT BE PLACED ON SLOPES STEEPER THAN 1:6 (6:1).

** DO NOT INSTALL END TREATMENT WITHIN 900 (3'-0") FROM MEDIAN ℄.

NOTE:
FOR FURTHER END TREATMENT DETAILS, SEE DM-2, CHAPTER 12 FOR GUIDELINES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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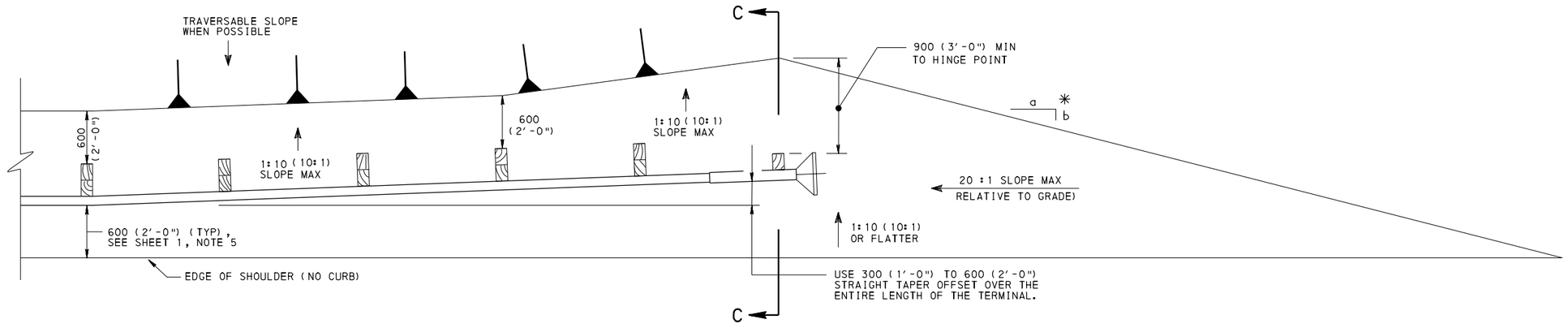
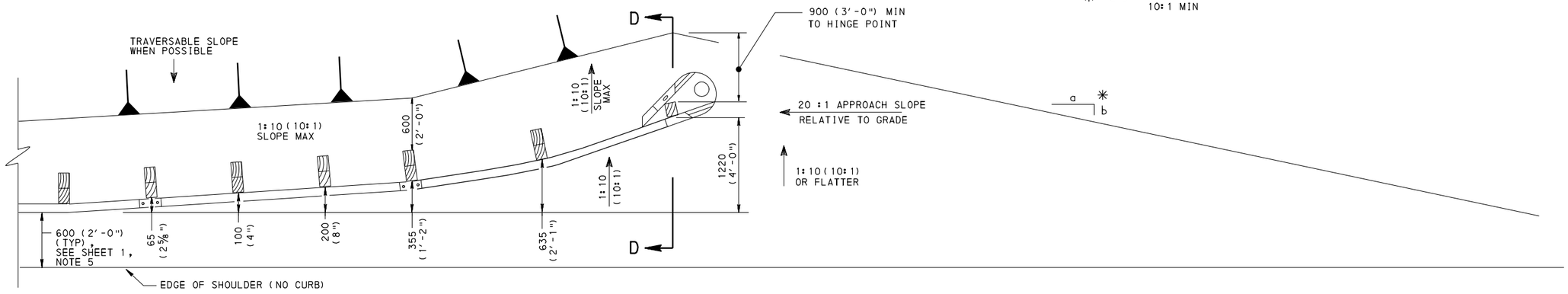
BARRIER PLACEMENT
AT OBSTRUCTIONS

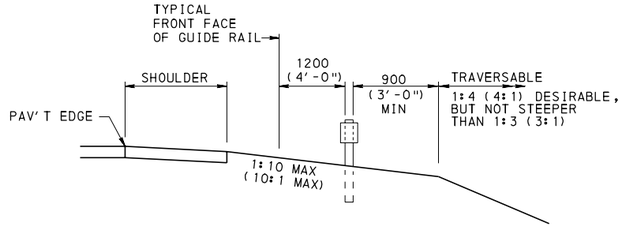
RECOMMENDED JUN. 1, 2010 [signature] CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 [signature] DIRECTOR, BUREAU OF DESIGN	SHT 3 OF 7
		RC-54M



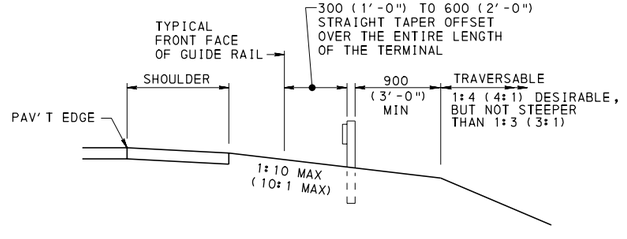
GRADING DETAIL FOR TANGENT TERMINALS



GRADING DETAIL FOR FLARED TERMINALS



SECTION D-D



SECTION C-C

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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BARRIER PLACEMENT AT OBSTRUCTIONS

GRADING DETAILS

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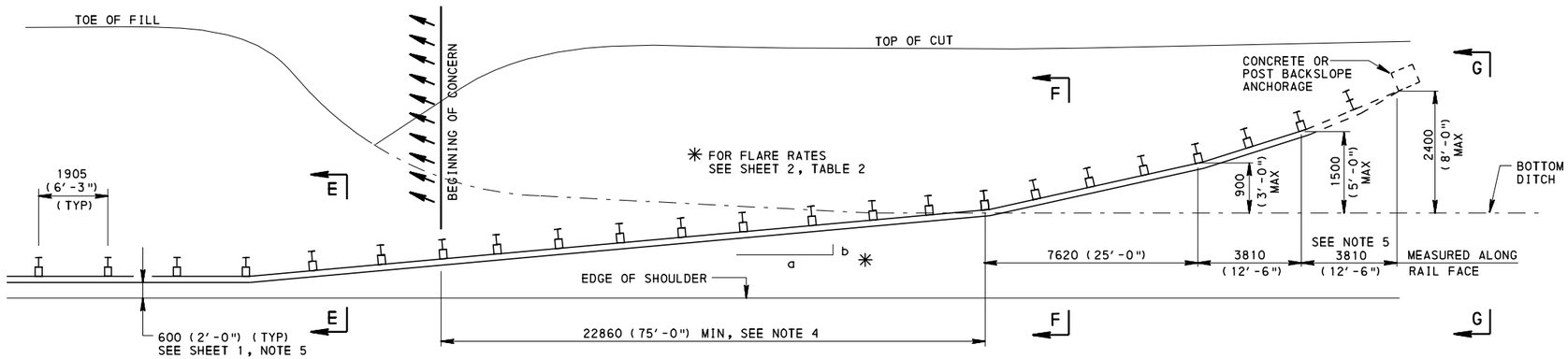
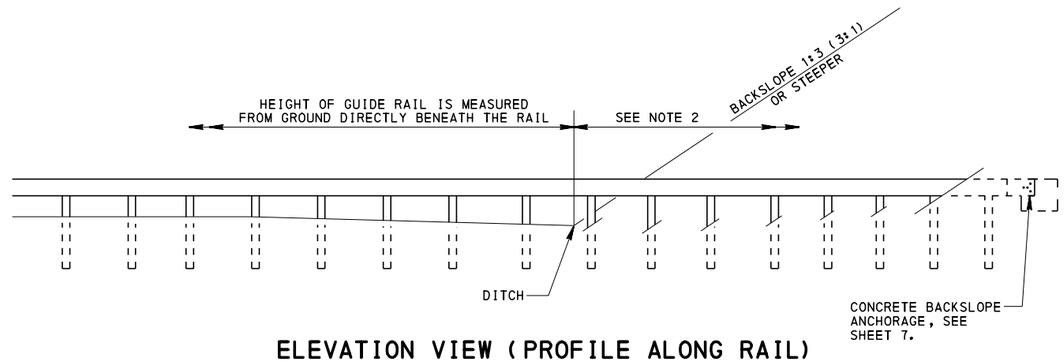


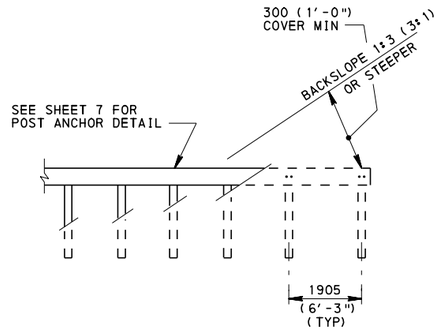
PLAN VIEW

NOTES

1. THE HEIGHT OF TOP OF THE W-BEAM RAIL IS HELD CONSTANT RELATIVE TO THE ROADWAY PROFILE GRADE.
2. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE 300 (1'-0") OF COVER OVER THE ANCHOR TERMINAL.
3. WHEN THE GUIDE RAIL LENGTH OF NEED FALLS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO ANCHOR THE GUIDE RAIL TO THE CUT SLOPE.
4. PROVIDE 22860 (75'-0") MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE SWALE LINE TO THE BEGINNING OF THE CONCERN.
5. BACKSLOPE ANCHOR TERMINAL PAY LIMIT INCLUDES THE CONCRETE OR POST ANCHORAGE, 3810 (12'-6") OF RAIL ELEMENT AND HARDWARE.

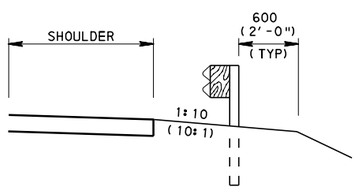


ELEVATION VIEW (PROFILE ALONG RAIL)

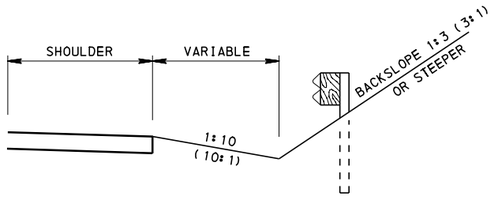


POST BACKSLOPE ANCHORAGE

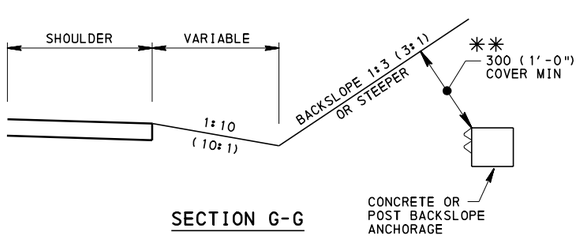
TYPICAL BACKSLOPE ANCHOR SINGLE RAIL



SECTION E-E



SECTION F-F



SECTION G-G

** ROCK ANCHORAGE DOES NOT REQUIRE THE 300 (1'-0") BURIAL.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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GUIDE RAIL TYPE 1 ANCHORED BACKSLOPE TERMINAL SINGLE RAIL 10:1 FRONT SLOPE

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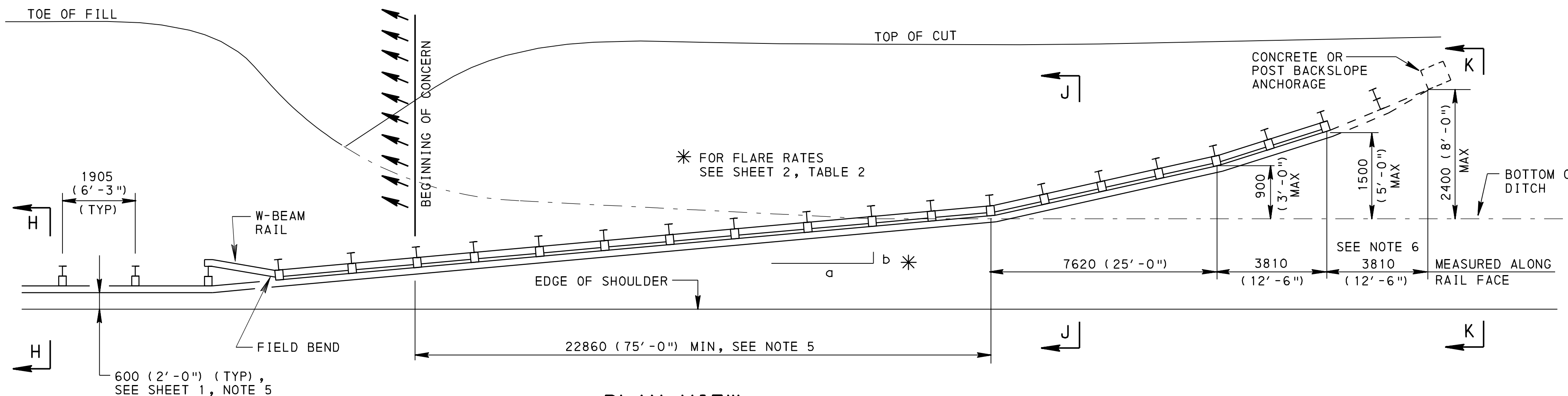
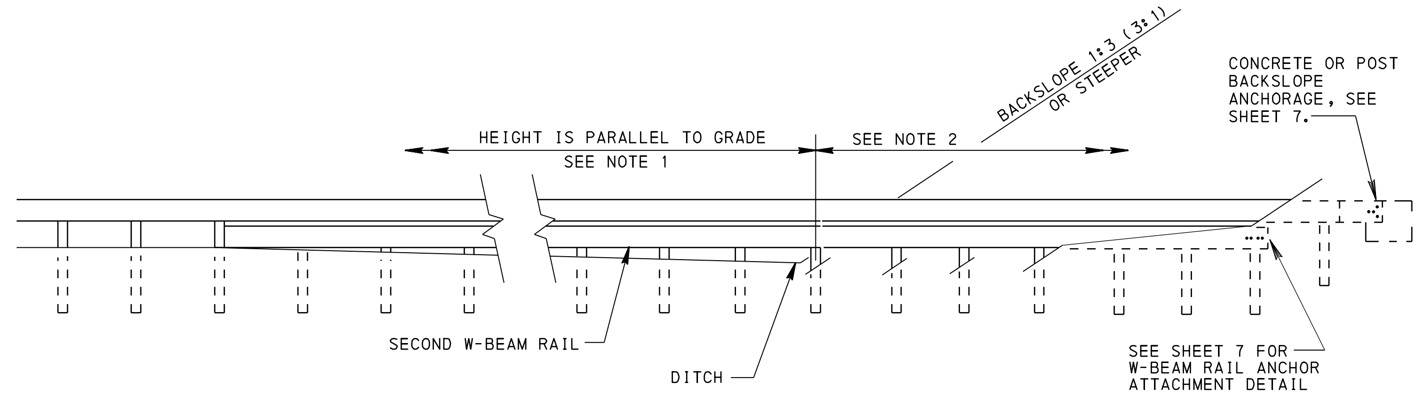
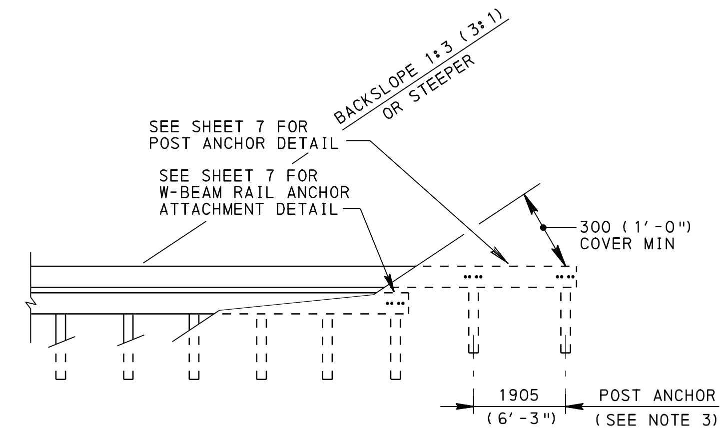


PLAN VIEW



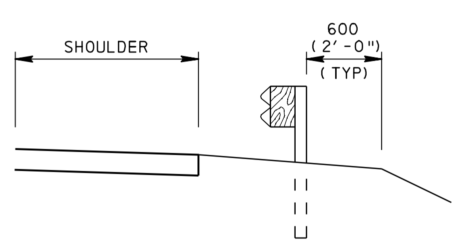
ELEVATION VIEW (PROFILE ALONG RAIL)



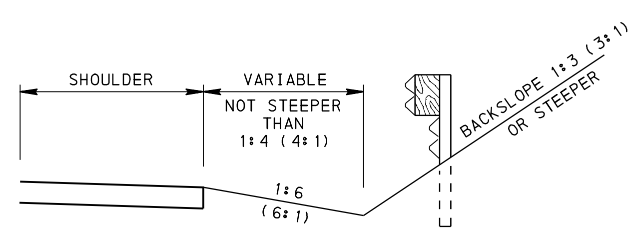
POST BACKSLOPE ANCHORAGE

NOTES

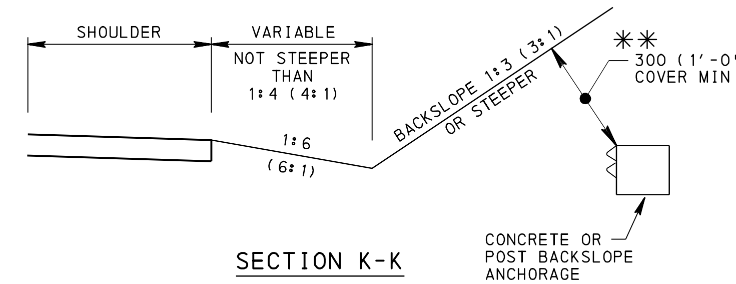
1. THE HEIGHT OF THE TOP OF THE W-BEAM RAIL IS HELD CONSTANT RELATIVE TO ROADWAY PROFILE GRADE. A SECOND W-BEAM RAIL IS REQUIRED WHERE THE DISTANCE BETWEEN THE GROUND AND BOTTOM OF THE TOP RAIL EXCEEDS 450 (18"). MAXIMUM HEIGHT OF DOUBLE RAIL SYSTEM IS 1140 (45"). IF NECESSARY, TAPER BOTH RAILS TO MAINTAIN MAXIMUM HEIGHT.
2. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE 300 (1'-0") OF COVER OVER THE ANCHOR TERMINAL.
3. USE 2400 (8'-0") LONG POSTS FOR ALL POST LOCATIONS WITH A DOUBLE RAIL. POSTS FOR THE POST ANCHOR ARE 1800 (6'-0") LONG. WHEN A DOUBLE RAIL INSTALLATION IS REQUIRED, INCLUDE A PAY ITEM IN THE CONTRACT FOR THE SECOND PANEL OF W-BEAM RAIL ELEMENT.
4. WHEN THE GUIDE RAIL LENGTH OF NEED FALLS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO ANCHOR THE GUIDE RAIL TO THE CUT SLOPE.
5. PROVIDE 22860 (75'-0") MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE SWALE LINE TO THE BEGINNING OF THE CONCERN.
6. BACKSLOPE ANCHOR TERMINAL PAY LIMIT INCLUDES THE CONCRETE OR POST ANCHORAGE, 3810 (12'-6") OF RAIL ELEMENT, POSTS AND HARDWARE.



SECTION H-H



SECTION J-J



SECTION K-K

** ROCK ANCHORAGE DOES NOT REQUIRE THE 300 (1'-0") BURIAL.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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GUIDE RAIL TYPE 1 ANCHORED BACKSLOPE TERMINAL DOUBLE RAIL 6:1 FRONT SLOPE

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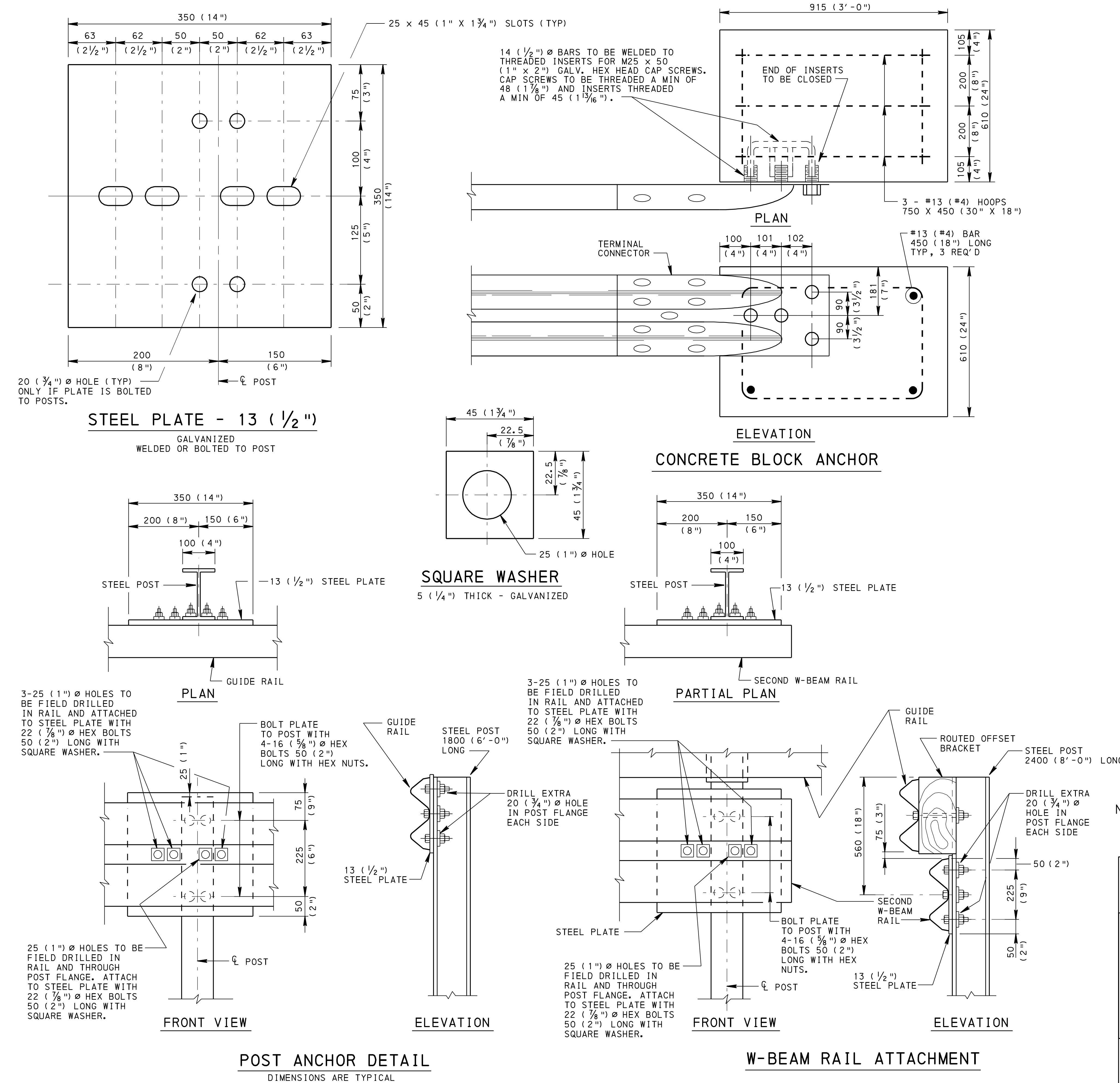

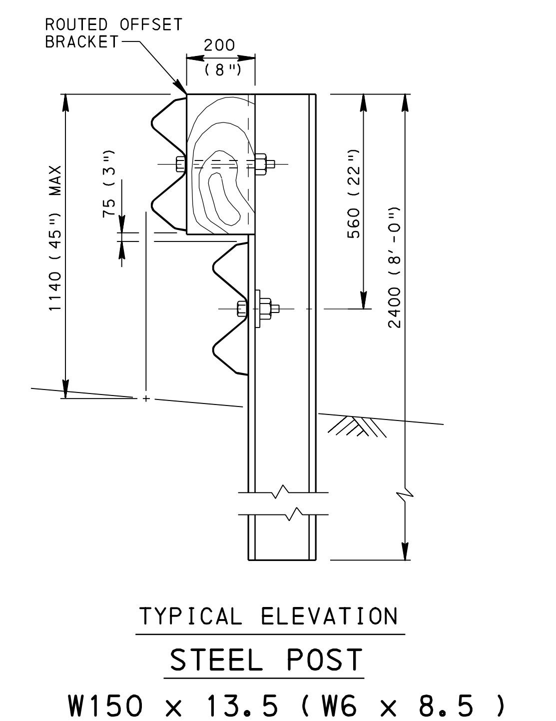

NOTE

1. FOR ROUTED OFFSET BRACKET DETAIL, SEE RC-52M.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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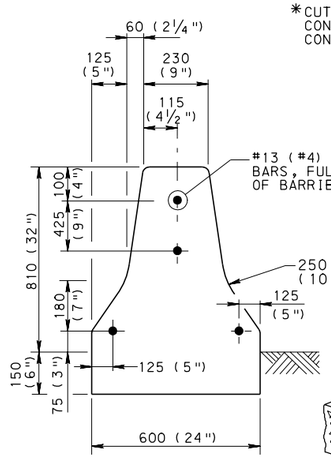
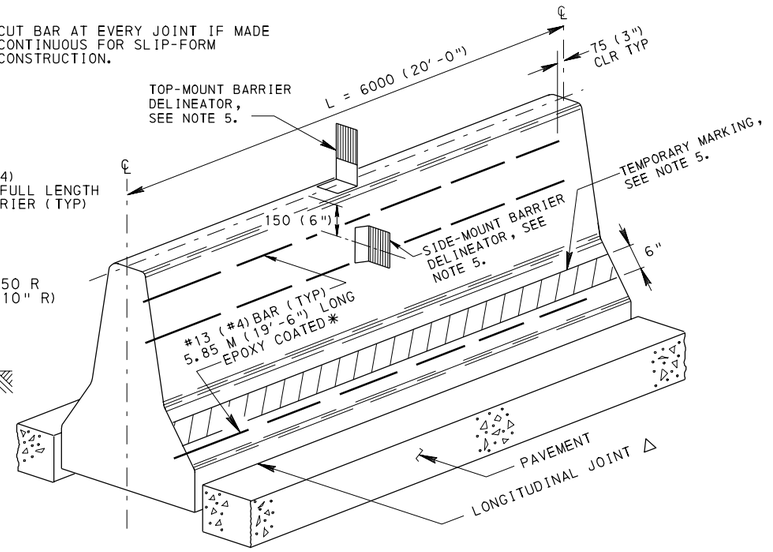
BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 7 OF 7
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-54M

NOTES

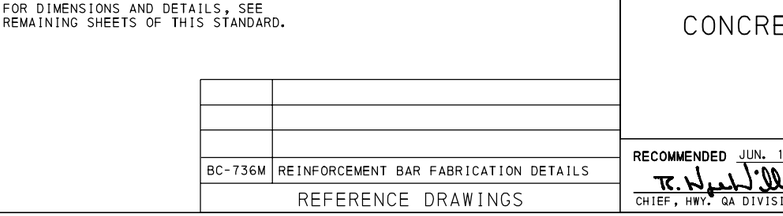
1. PROVIDE CONCRETE MEDIAN BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.
   A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
2. PROVIDE PRECAST CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL.
3. FOR CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION, USE PREMOLDED JOINT MATERIAL AT ALL CONSTRUCTION JOINTS.
4. CONCRETE MEDIAN BARRIER CONSTRUCTION ON EXISTING PAVEMENT REQUIRES SPECIAL DETAILS TO BE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. FOR DELINEATOR PLACEMENT, SEE TC-8604.
6. COMPACT NO. 2A OR NO. OGS MATERIAL IN ACCORDANCE WITH PUBLICATION 408, SECTION 350. A LAYER 25 (1") THICK OF NON-SHRINK MORTAR MAY BE USED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES. A RIGID BASE MAY BE USED INSTEAD OF SUBBASE.
7. PROVIDE PRECAST CONCRETE MEDIAN BARRIER FOR USE AS TEMPORARY (MPT) AND IN PERMANENT INSTALLATIONS. FOR TEMPORARY INSTALLATIONS, EMBEDMENT IS NOT REQUIRED.
8. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
9. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
10. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.
11. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
12. MINOR VARIATIONS IN TOP WIDTH DIMENSIONS OF PRECAST BARRIER SEGMENTS OF UP TO PLUS 10 (1/2"), BOTTOM WIDTH DIMENSIONS OF UP TO MINUS 10 (1/2"), AND SIDE TAPER DIMENSIONS OF PLUS OR MINUS 5 (1/4") ARE PERMITTED TO ACCOUNT FOR VARIATIONS IN FORMING EQUIPMENT PRODUCED WITH PREVIOUS STANDARD DRAWINGS FOR F-SHAPE BARRIER.
13. PLACE PRECAST BARRIER SEGMENTS FORMED USING THE SAME FORMS AND FORM TOGETHER IN CONTINUOUS STRINGS. MINIMIZE THE NUMBER OF LOCATIONS WHERE BARRIER SEGMENTS FROM DIFFERENT SOURCES OR FORMING EQUIPMENT ARE PLACED.
14. INSTALL CONCRETE MEDIAN BARRIER WITH THE VERTICAL CENTERLINE TO NOT BE OUT OF PLUMB BY MORE THAN 6 (1/4").



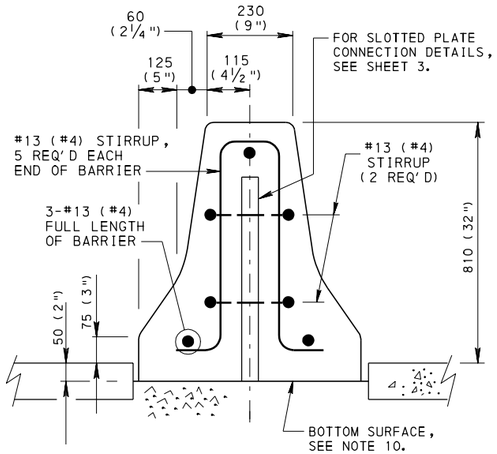


*CUT BAR AT EVERY JOINT IF MADE CONTINUOUS FOR SLIP-FORM CONSTRUCTION.

TYPICAL CAST-IN-PLACE BARRIER



△ SEAL JOINTS WITH AN APPROVED JOINT SEALER.



TYPICAL PRECAST BARRIER

FOR DIMENSIONS AND DETAILS, SEE REMAINING SHEETS OF THIS STANDARD.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS

REFERENCE DRAWINGS

COMMONWEALTH OF PENNSYLVANIA
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CONCRETE MEDIAN BARRIER F-SHAPE

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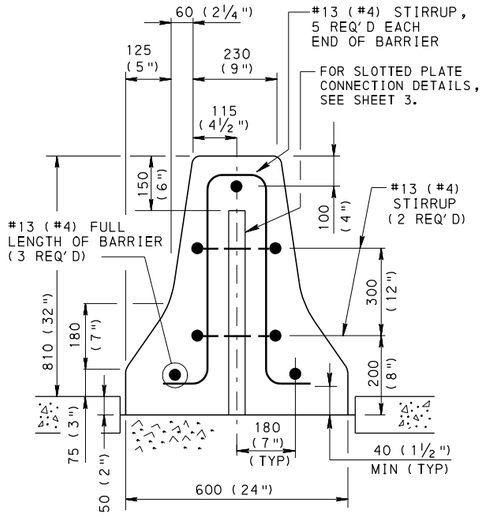
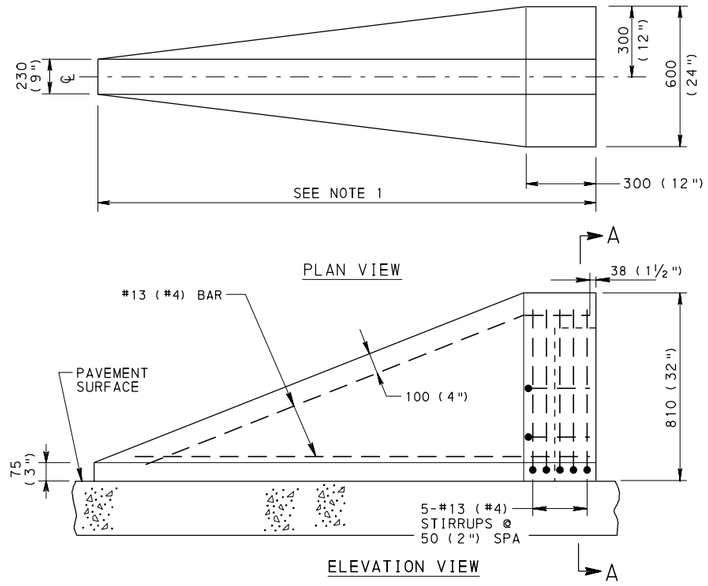
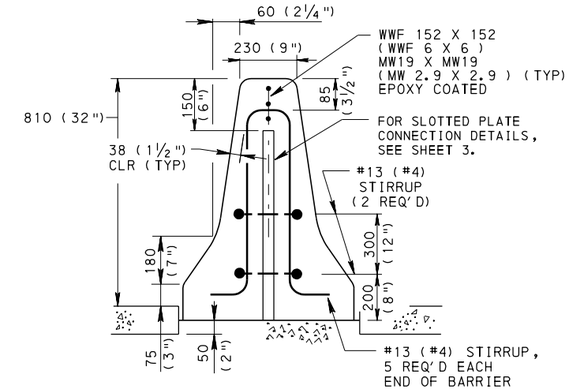
R. Wyatt Dilley		
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-57M



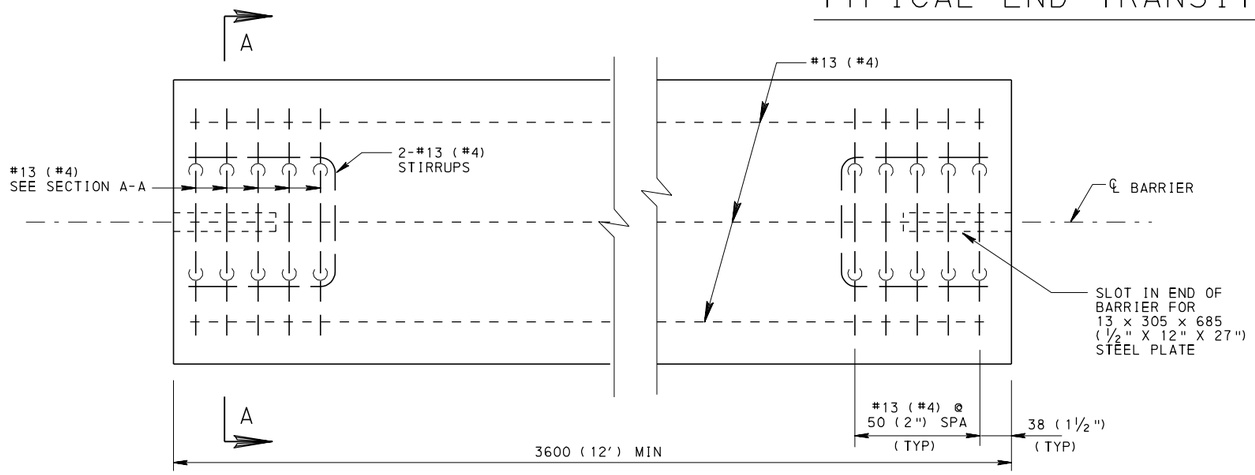
SECTION A-A



TYPICAL END TRANSITION

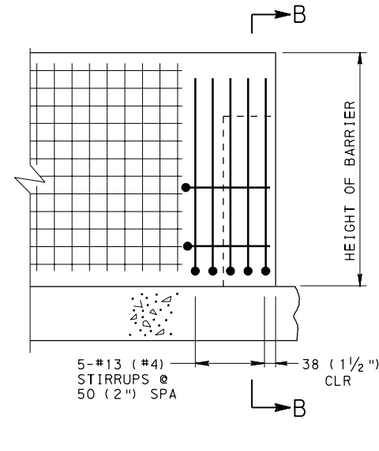


SECTION B-B

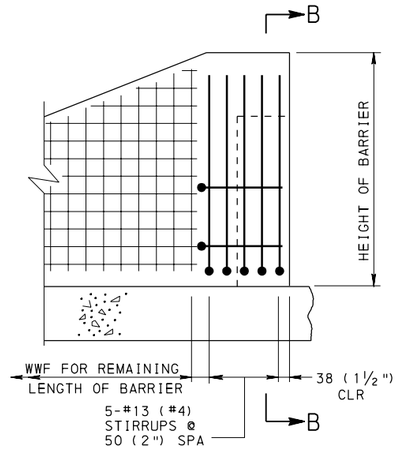


TYPICAL BARRIER PLAN

BOTH ENDS OF BARRIER ARE TYPICAL.



TYPICAL BARRIER ELEVATION



END TRANSITION ELEVATION

ALTERNATE WWF REINFORCEMENT DETAILS

WWF REPLACES THE #13 (#4) FULL LENGTH REBARS USED IN THE REBAR ALTERNATE. ALL OTHER DIMENSIONS ARE TYPICAL TO THE REBAR ALTERNATE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

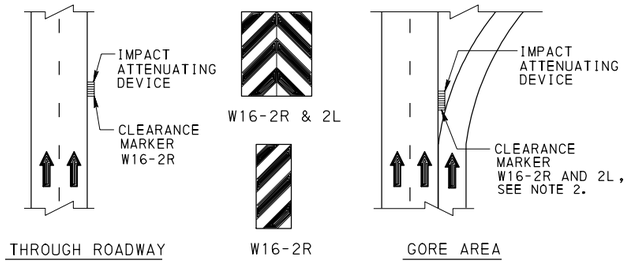
NOTES

1. REFER TO TABLE 1, SHEET 3, FOR FLARE RATE REQUIREMENTS.
2. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).
3. PROVIDE REINFORCEMENT STEEL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1½ ").
4. EPOXY COATED REINFORCEMENT IS NOT REQUIRED WHEN PRECAST CONCRETE MEDIAN BARRIER IS TO BE USED IN TEMPORARY INSTALLATION ONLY, IN ACCORDANCE WITH SECTION 627, AND IDENTIFIED AS SUCH, AS SPECIFIED IN SECTION 714.6(d).
5. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1 ") EXCEPT AS SHOWN.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

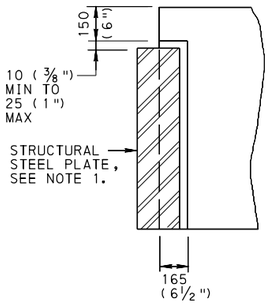
CONCRETE MEDIAN BARRIER F-SHAPE

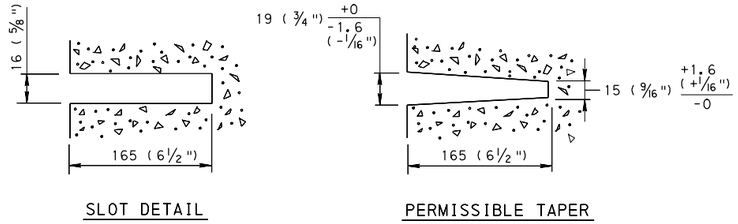
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 6
R. Wyatt Dilley CHIEF, HWY. QA DIVISION	Bruce E. Ryan DIRECTOR, BUREAU OF DESIGN	RC-57M



DETAIL A

DELINEATION OF IMPACT ATTENUATING DEVICES





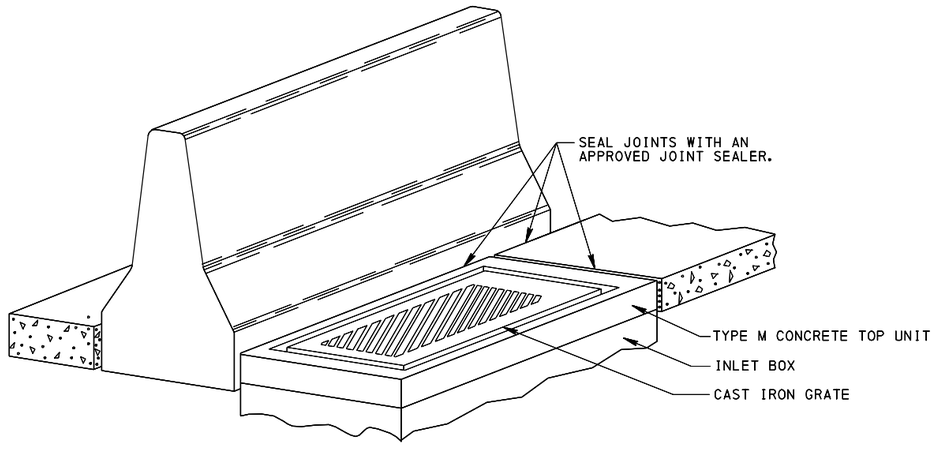
SLOTTED PLATE CONNECTION

NOTES

1. PROVIDE STRUCTURAL STEEL PLATES, 13 X 305 X 685 (1/2" X 12" X 27"), MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. FOR PERMANENT BARRIER, GALVANIZE THE STRUCTURAL STEEL PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s). FOR TEMPORARY BARRIER, DO NOT GALVANIZE THE STRUCTURAL STEEL PLATES.

2. PROVIDE VERTICAL RECTANGLE, STANDARD ALUMINUM, PRESSURE SENSITIVE CLEARANCE MARKERS, W16-2R AND/OR W16-2L, FABRICATED FROM CLASS II SHEETING MATERIAL, FOR DELINEATION OF IMPACT ATTENUATING DEVICES AS PRESENTED IN DETAIL A. ATTACH MARKERS DIRECTLY TO THE LEADING END OF IMPACT ATTENUATING DEVICES. ON INERTIAL BARRIERS (SAND BARRELS), PROVIDE SENSITIVE SHEETING, WITHOUT RIGID BACKING, DIRECTLY TO BARRIER FRONT OR NOSE SECTION. DO NOT POST-MOUNT MARKERS IN FRONT OF IMPACT ATTENUATING DEVICES. MARKERS ARE PROVIDED IN TWO SIZES: 305 X 914 (12" X 36") AND 457 X 914 (18" X 36"). WHEN ONE MARKER IS REQUIRED, USE 457 X 914 (18" X 36"). WHEN TWO MARKERS ARE REQUIRED SIDE BY SIDE, USE 305 X 914 (12" X 36"). PROVIDE COLOR FOR CLEARANCE MARKERS AS FOLLOWS:

(A) MESSAGE : BLACK STRIPES (NON-REFLECTORIZED)
(B) FIELD : YELLOW (REFLECTORIZED)
ORANGE (REFLECTORIZED), CONSTRUCTION ZONES



TYPICAL INLET PLACEMENT AT

CONCRETE MEDIAN BARRIER

TABLE 1
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
110	70	20:1	15:1
105	65	19:1	15:1
100	60	18:1	14:1
90	55	16:1	12:1
80	50	14:1	11:1
70	45	12:1	10:1
65	40	11:1	9:1
60	35	10:1	8:1
50	30	8:1	7:1

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

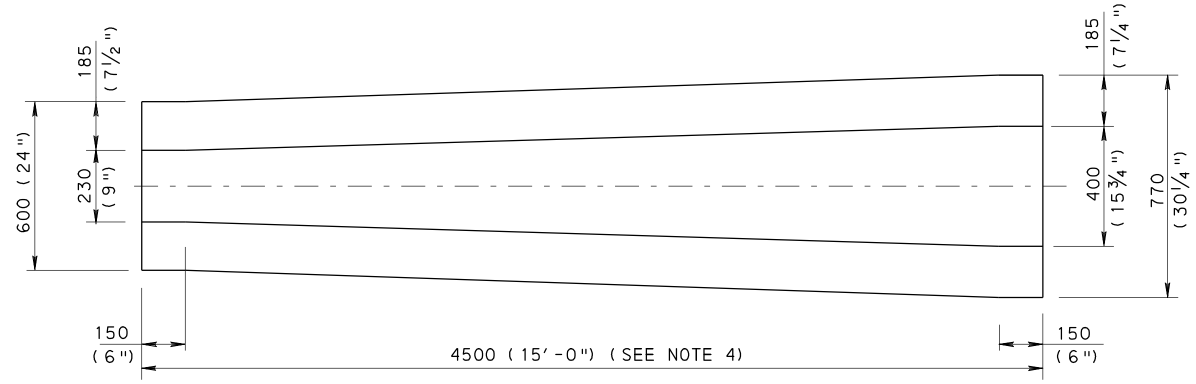
CONCRETE MEDIAN BARRIER F-SHAPE

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

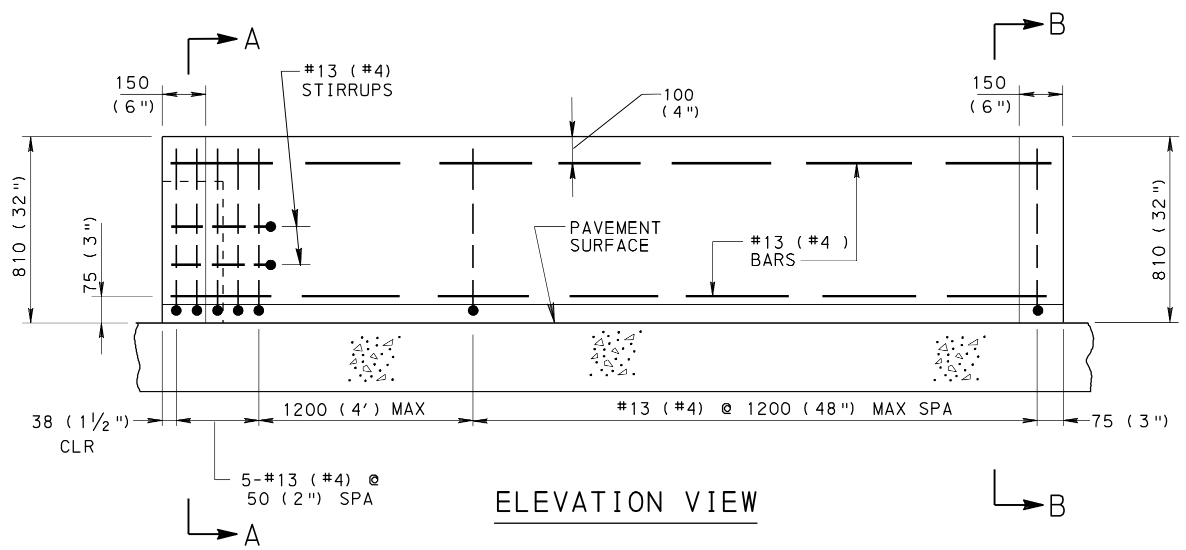
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 3 OF 6

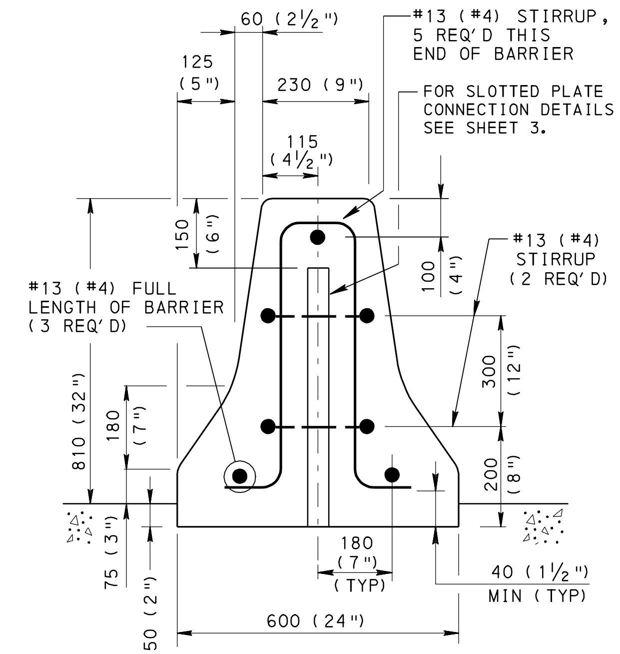
RC-57M



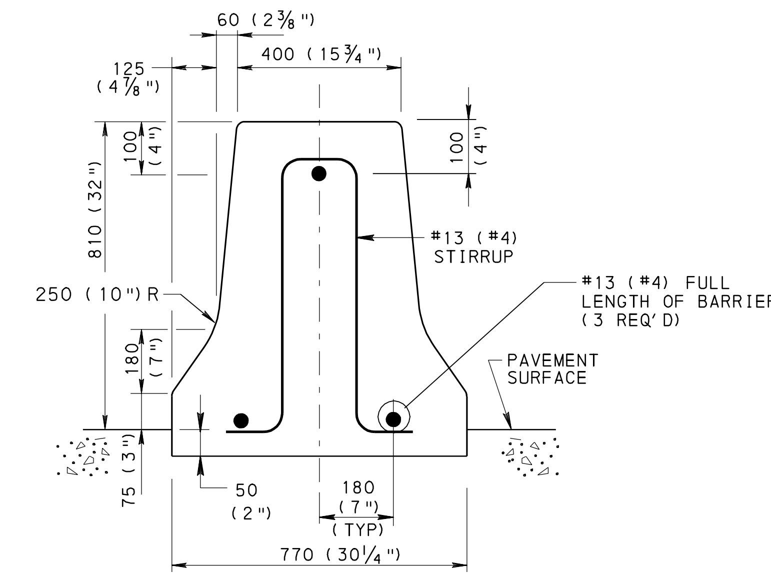
PLAN VIEW



ELEVATION VIEW



SECTION A-A

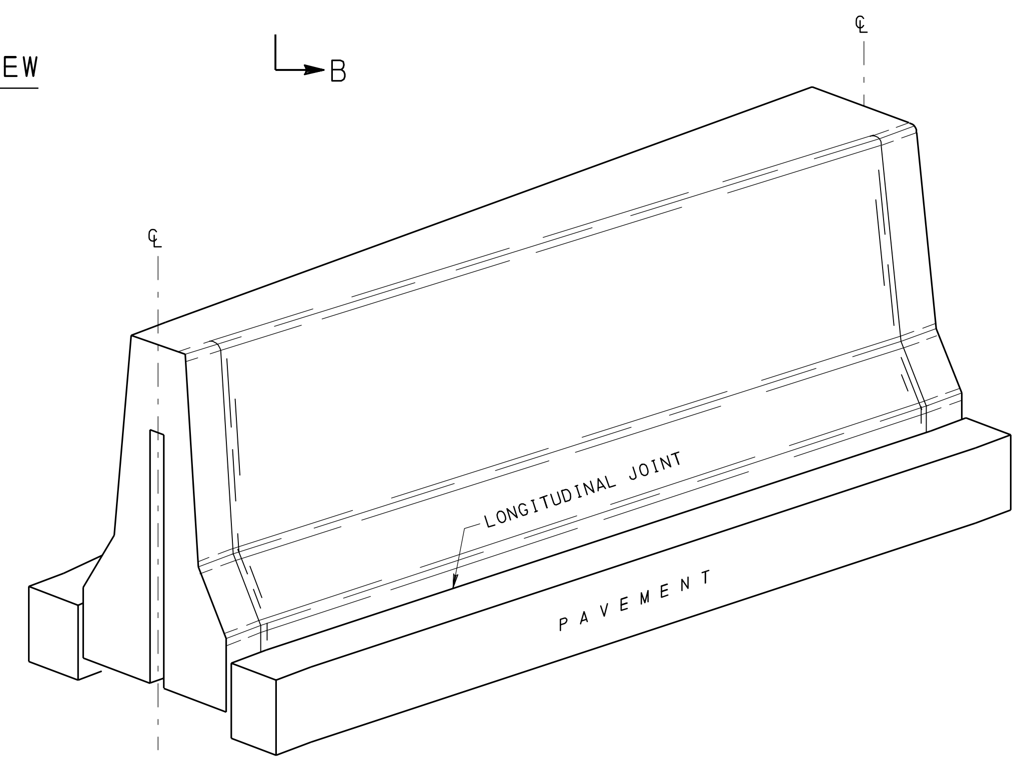


SECTION B-B

(ADJACENT TO BRIDGE WITH CONCRETE MEDIAN BARRIER)

NOTES

1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
4. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.



ORTHOGRAPHIC VIEW

TYPICAL 810 TO 810 (32" TO 32")

BRIDGE TO HIGHWAY TRANSITION

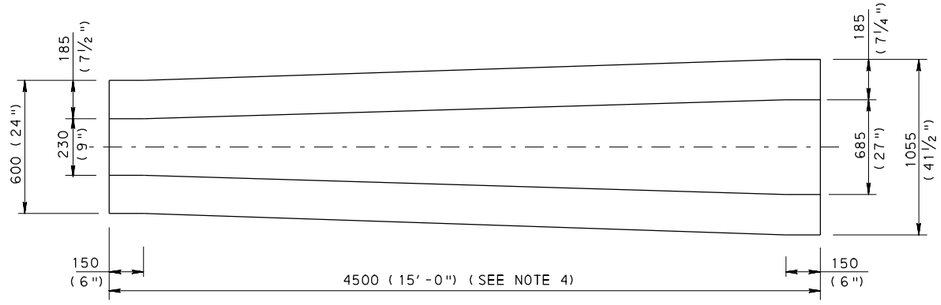
(THE BRIDGE BARRIER IS A CONCRETE MEDIAN BARRIER)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

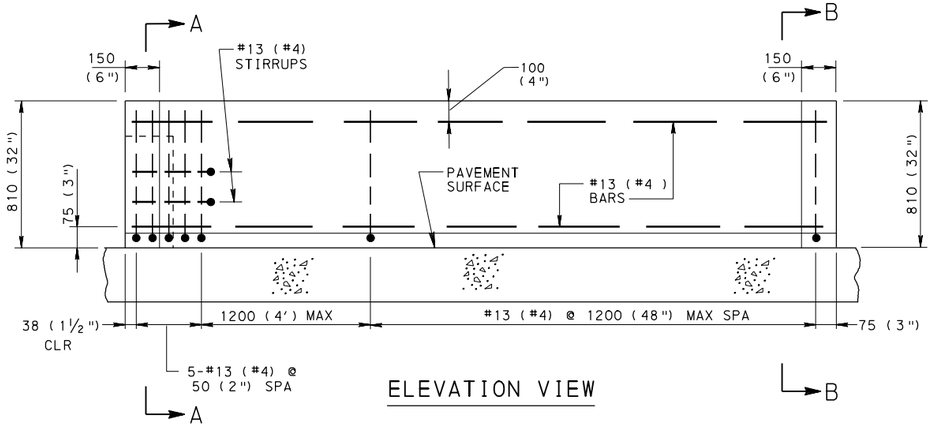
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

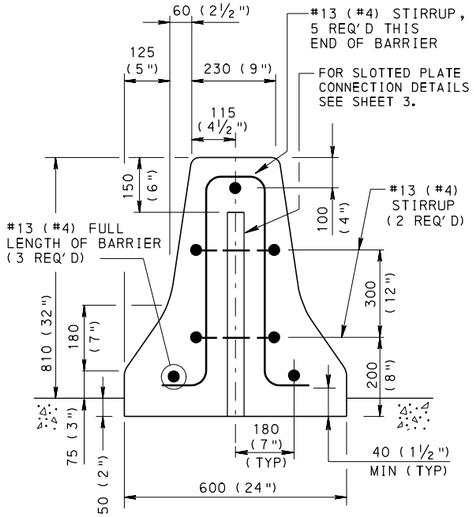
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 6
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-57M



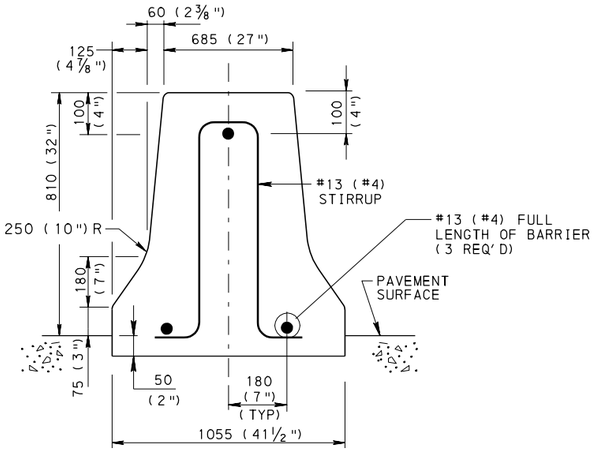
PLAN VIEW



ELEVATION VIEW

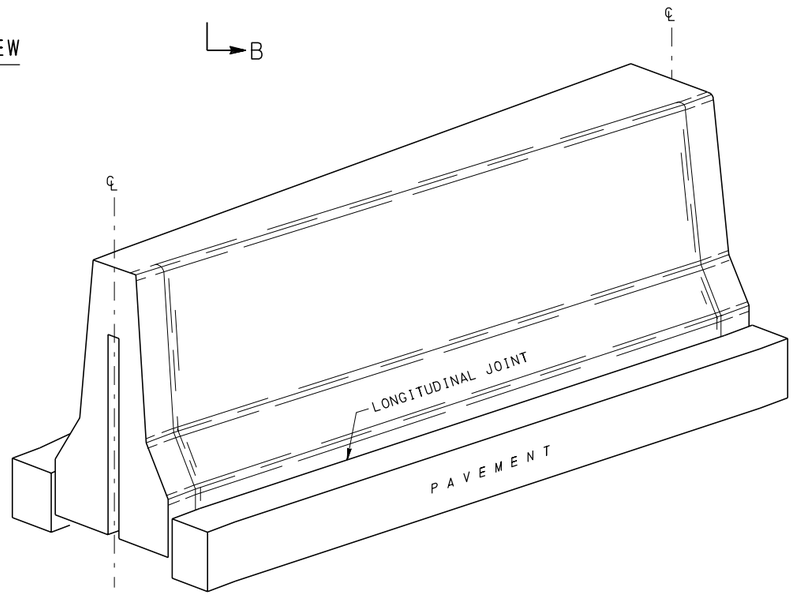


SECTION A-A



SECTION B-B

(ADJACENT TO BRIDGE WITH SPLIT CONCRETE MEDIAN BARRIER)



ORTHOGRAPHIC VIEW

TYPICAL 810 TO 810 (32" TO 32") BRIDGE TO HIGHWAY TRANSITION

(THE BRIDGE BARRIER IS A SPLIT CONCRETE MEDIAN BARRIER)

NOTES

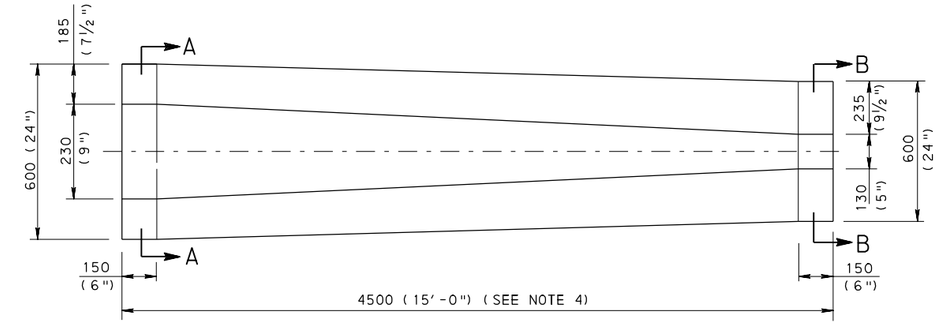
1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
4. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

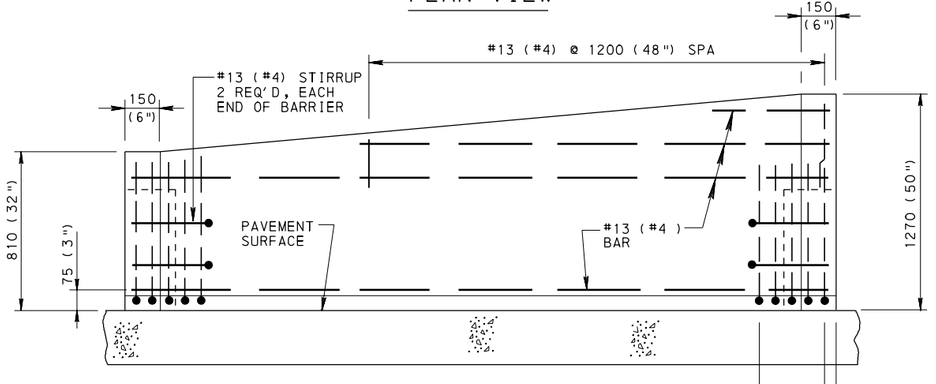
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER F-SHAPE

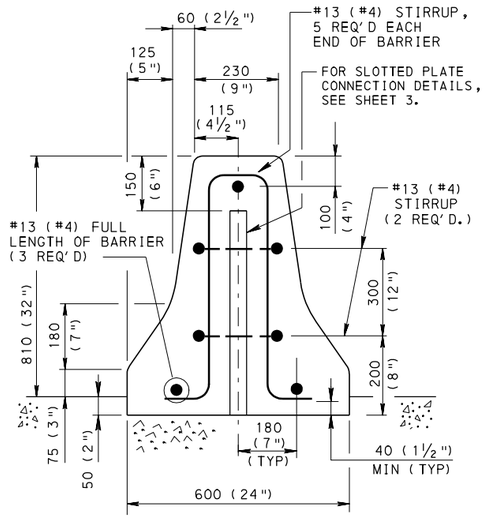
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 5 OF 6
R. Hoar Dilley CHIEF, HWY. QA DIVISION	Bruce E. Hyson DIRECTOR, BUREAU OF DESIGN	RC-57M



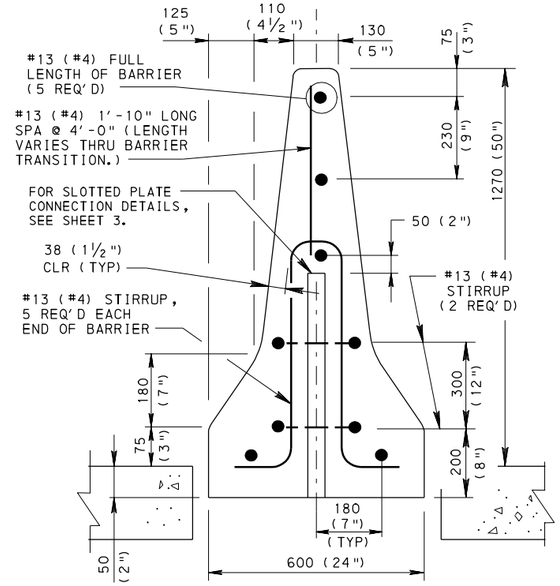
PLAN VIEW



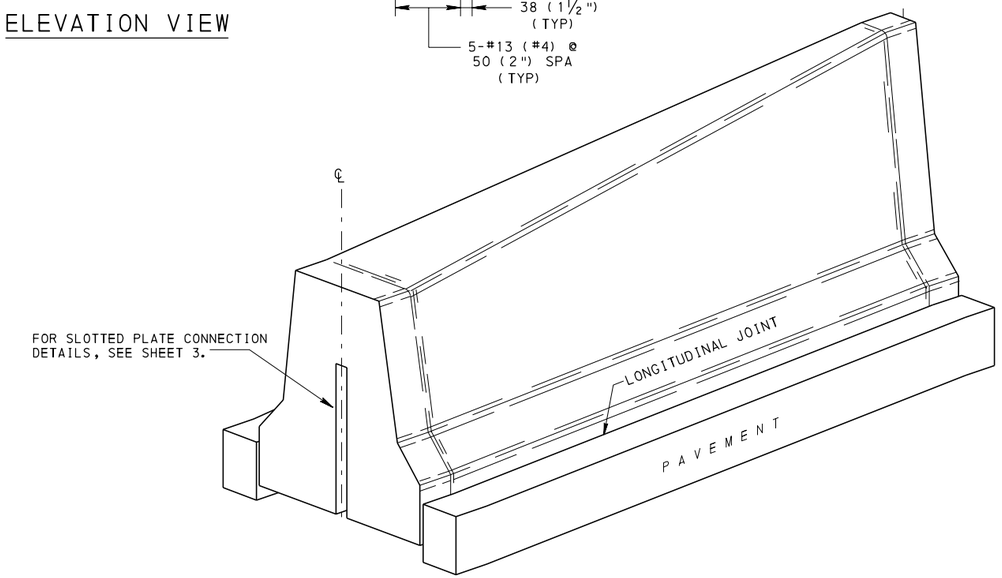
ELEVATION VIEW



SECTION A-A



SECTION B-B



ORTHOGRAPHIC VIEW

TYPICAL 810 TO 1270 (32" TO 50") HIGHWAY TRANSITION

NOTES

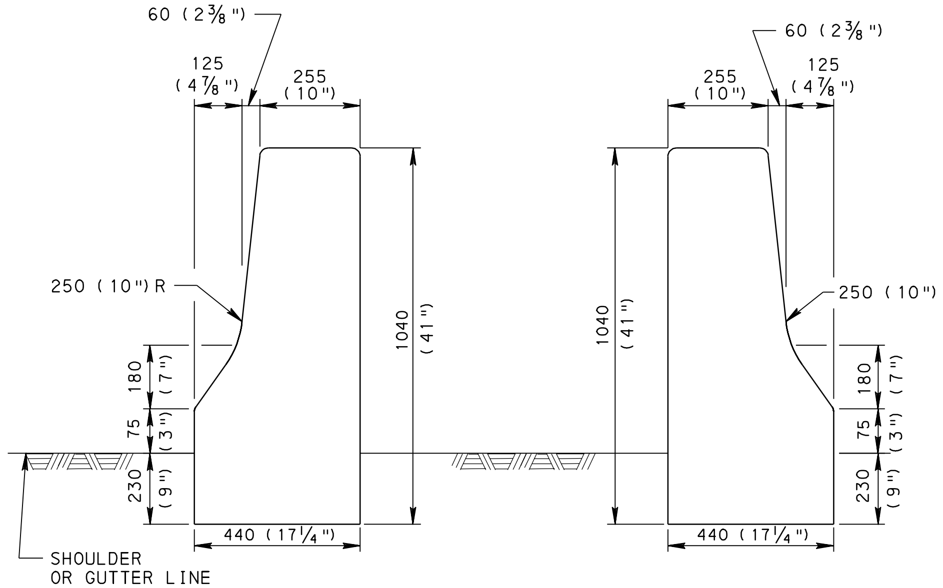
1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1½").
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
4. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

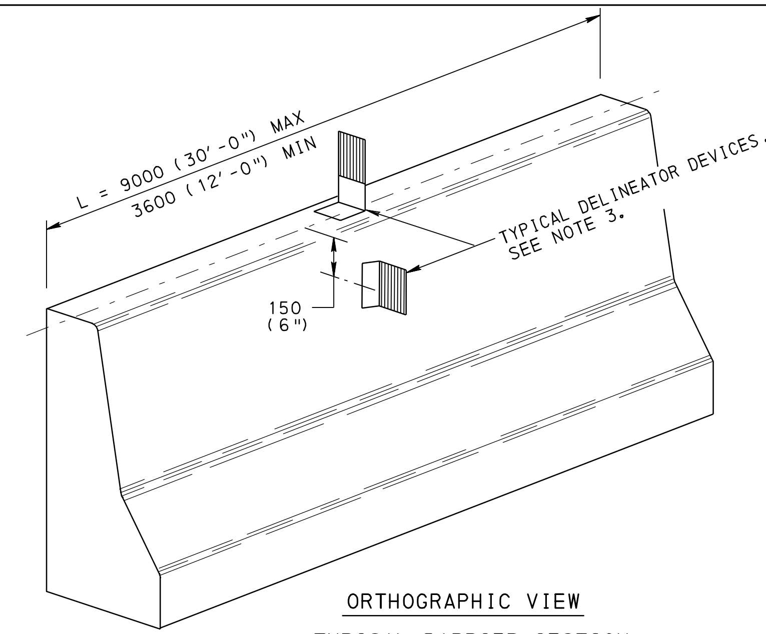
CONCRETE MEDIAN BARRIER F-SHAPE

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 6 OF 6
R. Wood Illy	Bruce E. Ryan	RC-57M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



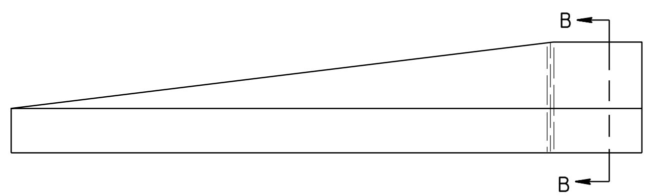
SECTION A-A

SECTION B-B



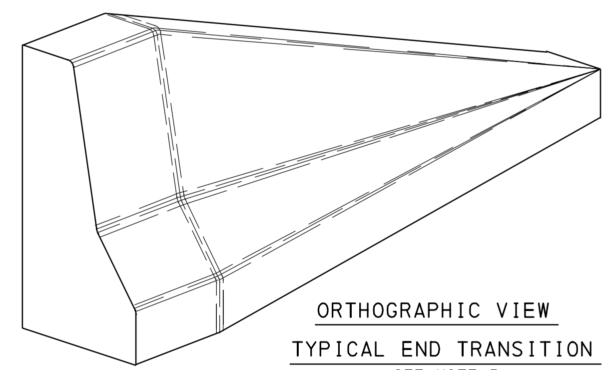
ORTHOGRAPHIC VIEW

TYPICAL BARRIER SECTION



PLAN VIEW

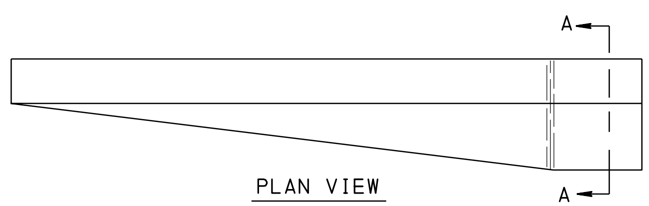
RIGHT END TRANSITION



ORTHOGRAPHIC VIEW

TYPICAL END TRANSITION

SEE NOTE 5.



PLAN VIEW

LEFT END TRANSITION

NOTES

1. PROVIDE SINGLE FACE CONCRETE BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.
   A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
2. PROVIDE PRECAST SINGLE FACE CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. MODIFICATIONS OR DEVIATIONS FROM THE STANDARD REQUIRE THE SUBMISSION OF SHOP DRAWINGS FOR REVIEW.
3. PROVIDE BARRIER-MOUNT OR REFLECTOR UNIT DELINEATORS, AS INDICATED ON TC-8604.
4. PROVIDE REINFORCEMENT FOR SINGLE FACE CONCRETE BARRIER AS INDICATED ON SHEET 2.
5. PROVIDE END TRANSITIONS OR IMPACT ATTENUATING DEVICES AS INDICATED ON RC-57M.
6. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
7. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
8. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (⅛") IN DEPTH.
9. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).
10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

TYPICAL PRECAST OR CAST-IN-PLACE SINGLE FACE CONCRETE BARRIER

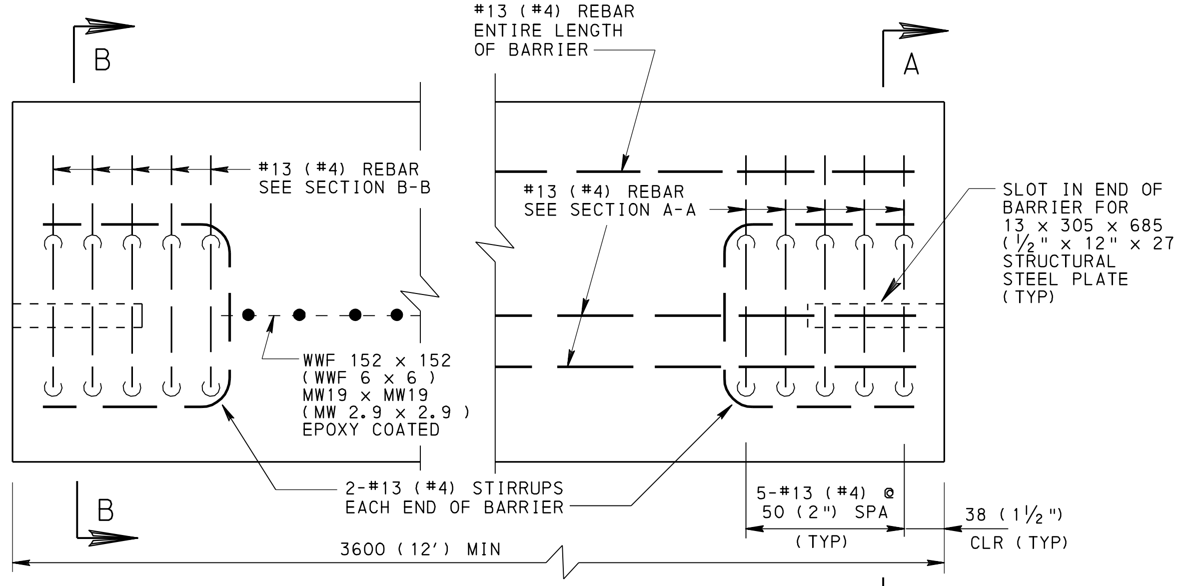
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

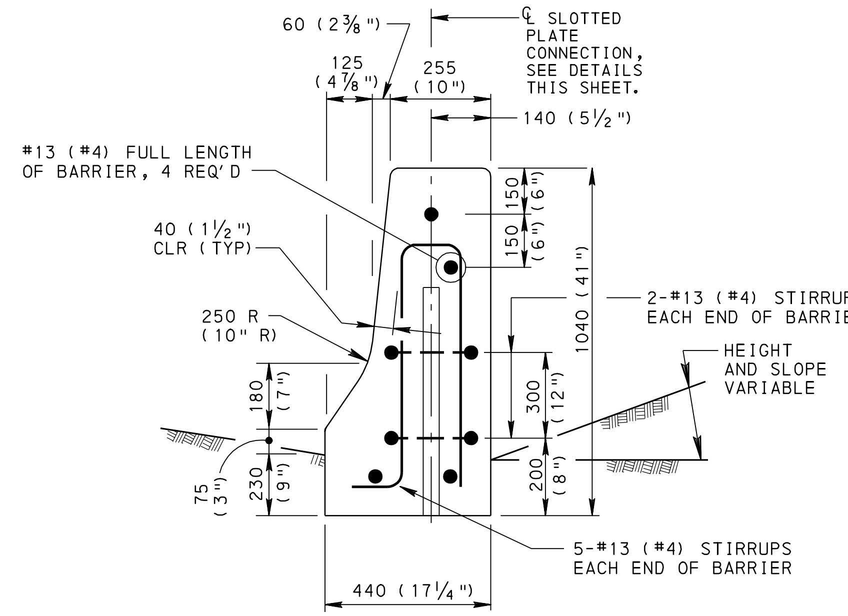
SINGLE FACE CONCRETE BARRIER

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-58M

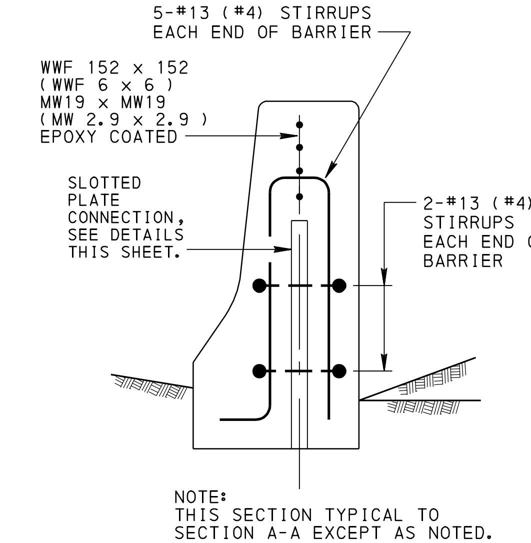


BARRIER PLAN

SHOWN WITH WWF ALTERNATE ON LEFT END OF BARRIER FOR DETAILING PURPOSES. BOTH ENDS OF BARRIER ARE TYPICAL.

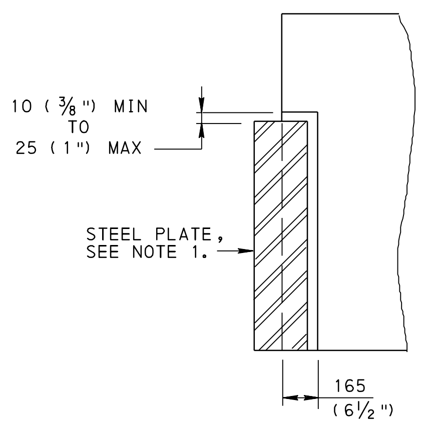


SECTION A-A

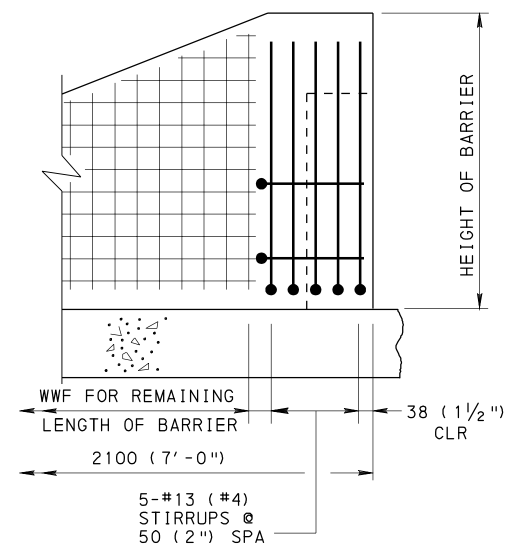


SECTION B-B

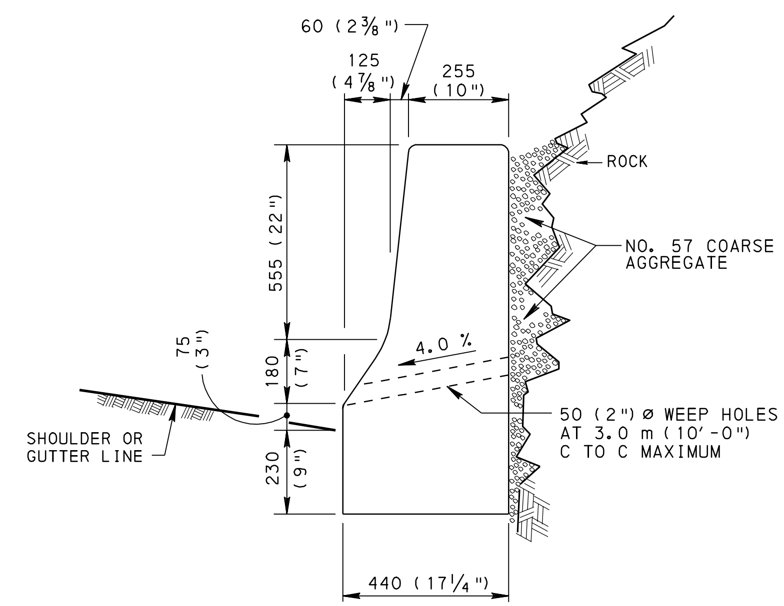
WWF ALTERNATE



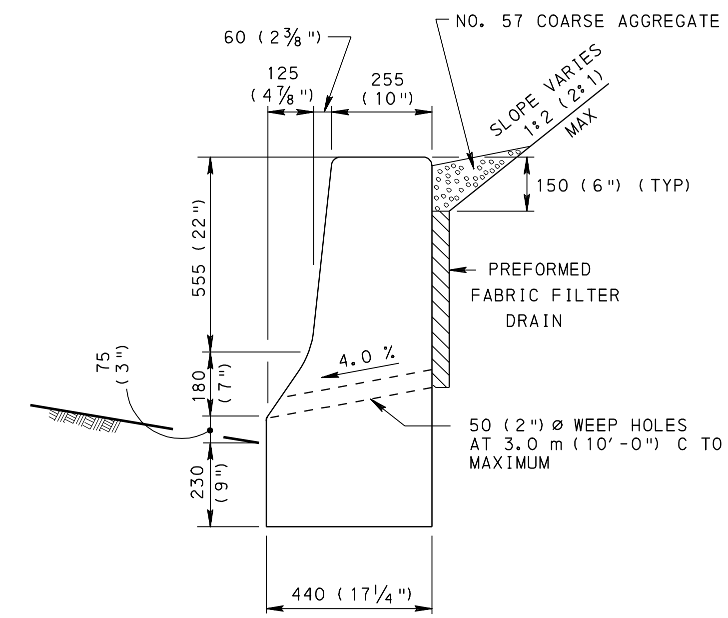
SECTION



TYPICAL END TRANSITION

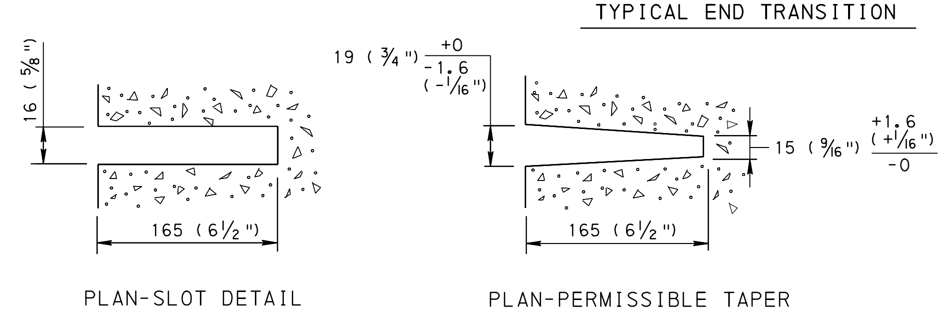


TYPICAL ROUGH ROCK TREATMENT



TYPICAL DRAINAGE TREATMENT

SEE NOTE 2.



SLOTTED PLATE CONNECTION

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

NOTES

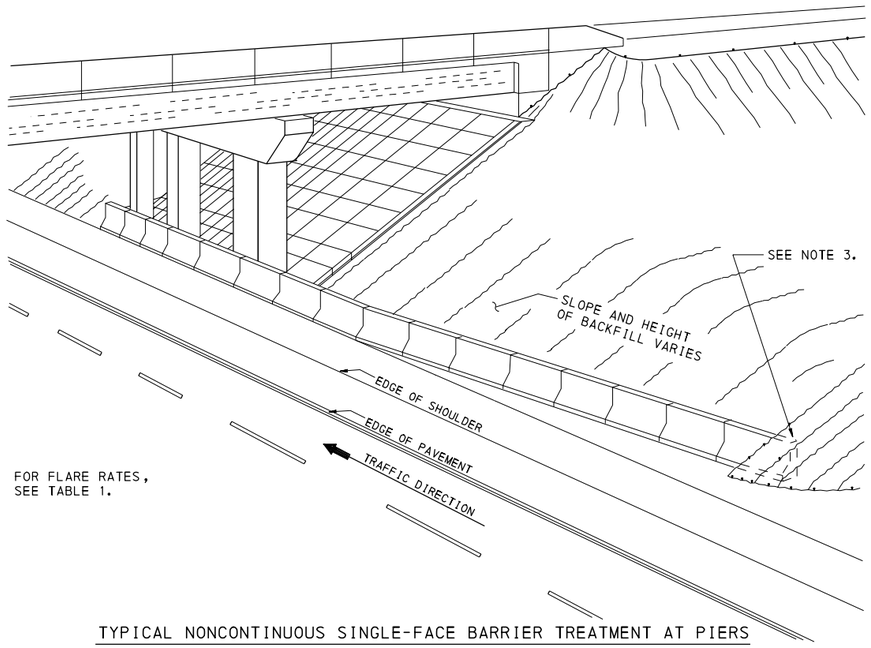
1. PROVIDE STRUCTURAL STEEL PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. FOR PERMANENT BARRIER, GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s). ALTERNATE CONNECTIONS MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN. FOR TEMPORARY BARRIER, DO NOT GALVANIZE THE STRUCTURAL STEEL PLATES.
2. WHERE SINGLE FACE CONCRETE BARRIER IS SPECIFIED FOR USE AS A RETAINING WALL AND DRAINAGE TREATMENT IS NECESSARY, CONSTRUCT A PREFORMED FABRIC FILTER DRAIN AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 610. CHECK STABILITY OF BARRIER USED AS A RETAINING WALL AND PROVIDE COMPUTATION WITH THE CONSTRUCTION PLANS.
3. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.

TYPICAL SINGLE FACE BARRIER SECTIONS

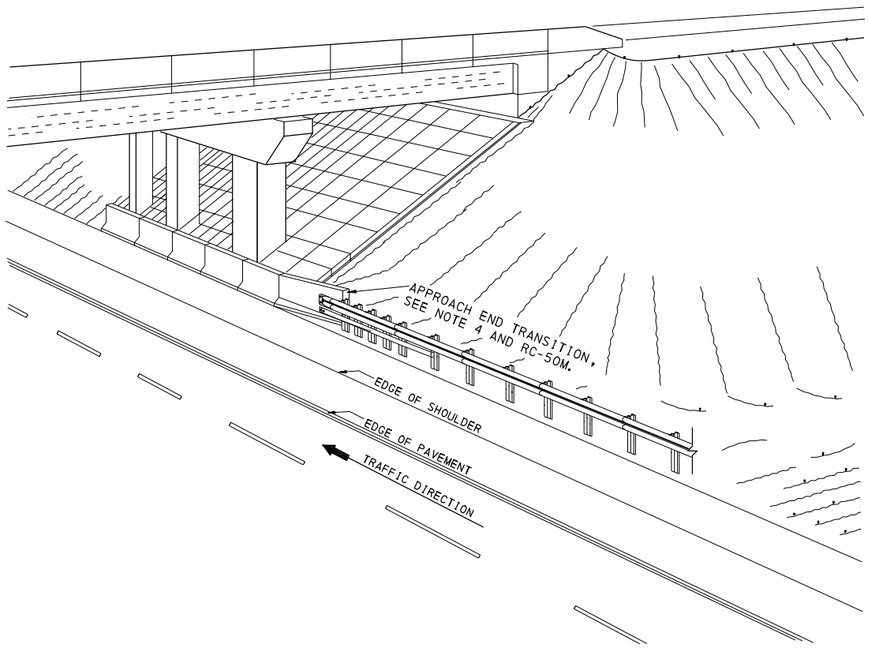
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER F-SHAPE

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-58M



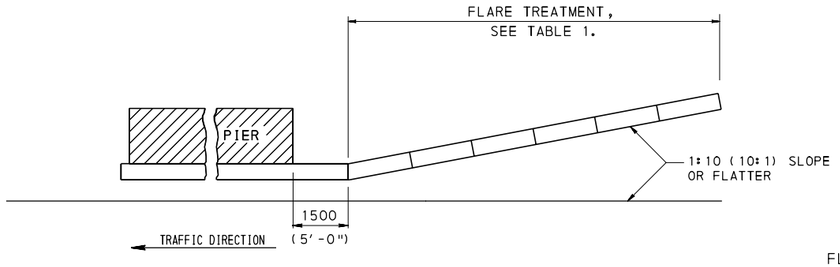
TYPICAL NONCONTINUOUS SINGLE-FACE BARRIER TREATMENT AT PIERS



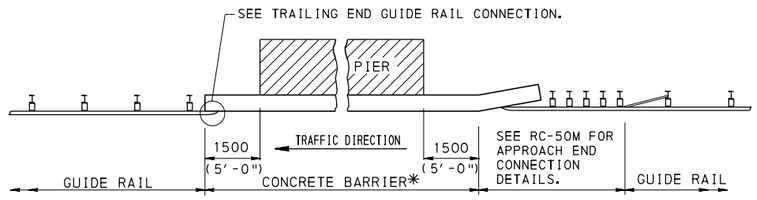
TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED

NOTES

1. PROVIDE SINGLE FACE CONCRETE BARRIER AND GUIDE RAIL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 620 AND 623.
2. THE TREATMENTS SHOWN ARE FOR FOUR-LANE DIVIDED HIGHWAYS. USE THE APPROACH END TREATMENT ON BOTH SIDES OF THE OBSTRUCTION ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC.
3. IF THE CONCRETE BARRIER IS TERMINATED WITHIN THE CLEAR ZONE, BURY IT INTO THE EXISTING SLOPE, PREFERABLY 1:2 (2:1), 300 (1'-0") DEEP. OTHERWISE, USE AN IMPACT ATTENUATING DEVICE.
4. THIS TRANSITION IS APPROPRIATE FOR CONNECTION TO A VERTICAL CONCRETE SHAPE AND SHOULD NOT BE CONNECTED DIRECTLY TO A CONCRETE SAFETY SHAPE. CONCRETE SAFETY SHAPES SHOULD BE TRANSITIONED TO A VERTICAL SHAPE AT THE GUIDE RAIL CONNECTION.
5. THE VIEWS ON THIS SHEET ARE ONLY PICTORIAL REPRESENTATIONS OF GUIDE RAIL TO CONCRETE BARRIER TRANSITIONS. RC-50M MUST BE USED FOR ALL GUIDE RAIL TO BARRIER CONNECTION DETAILS AND HARDWARE.



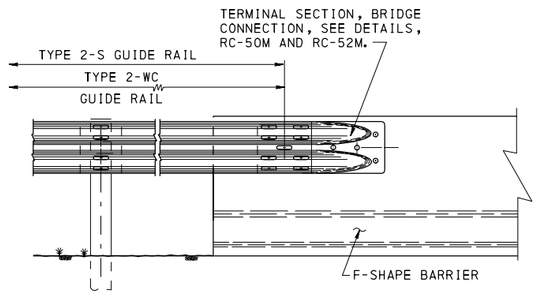
PLAN VIEW



CONTINUOUS GUIDE RAIL WITH SINGLE FACE BARRIER AT PIER

* IF ADEQUATE DEFLECTION DISTANCE IS PROVIDED (RC-54M, SHEET 1, TABLE 1) BETWEEN THE BACK OF THE GUIDE RAIL POST AND FRONT OF OBSTRUCTION, DO NOT USE CONCRETE BARRIER; CONTINUE THE GUIDE RAIL.

PLAN VIEW



TRAILING END GUIDE RAIL CONNECTION TO F-SHAPE BARRIER

TABLE 1
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES	
Km/h	mph	CONCRETE BARRIER	GUIDE RAIL
110	70	20:1	15:1
105	65	19:1	15:1
100	60	18:1	14:1
90	55	16:1	12:1
80	50	14:1	11:1
70	45	12:1	10:1
65	40	11:1	9:1
60	35	10:1	8:1
50	30	8:1	7:1

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

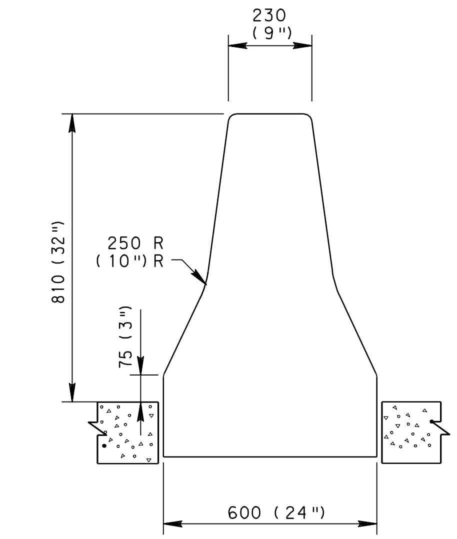
SINGLE FACE CONCRETE BARRIER F-SHAPE PLACEMENT AT SHOULDER PIERS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

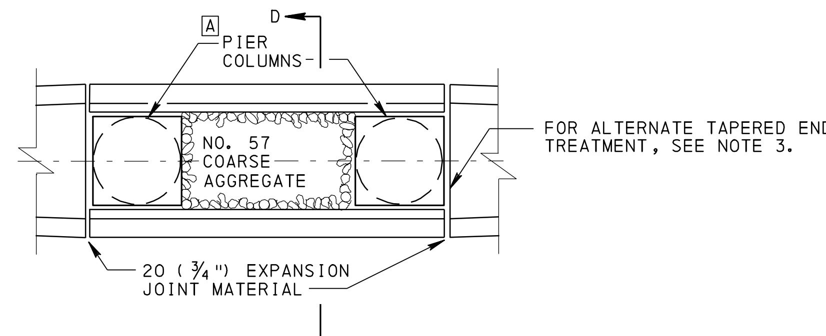
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 3 OF 4

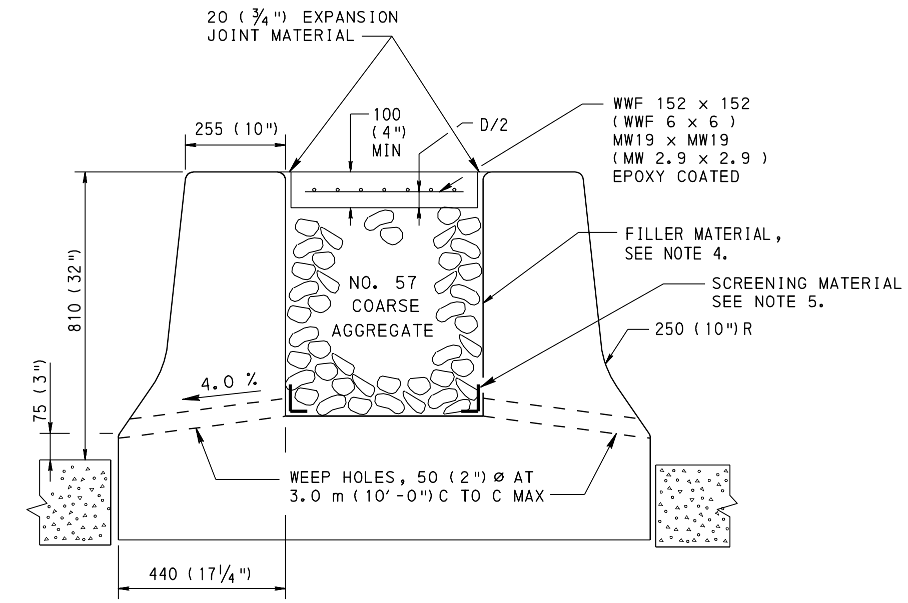
RC-58M



SECTION A-A

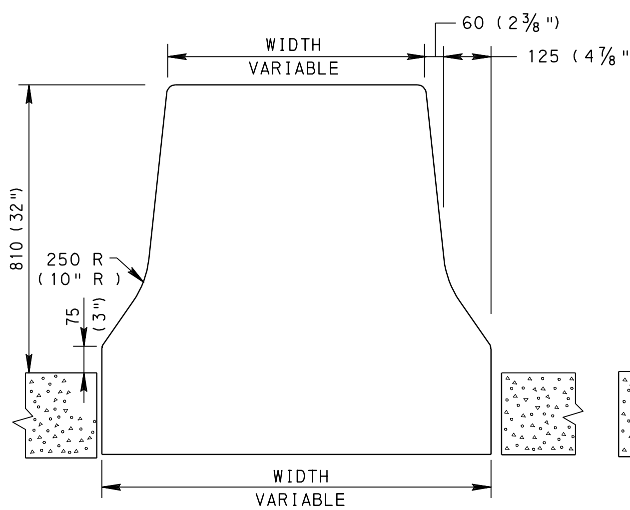


PLAN

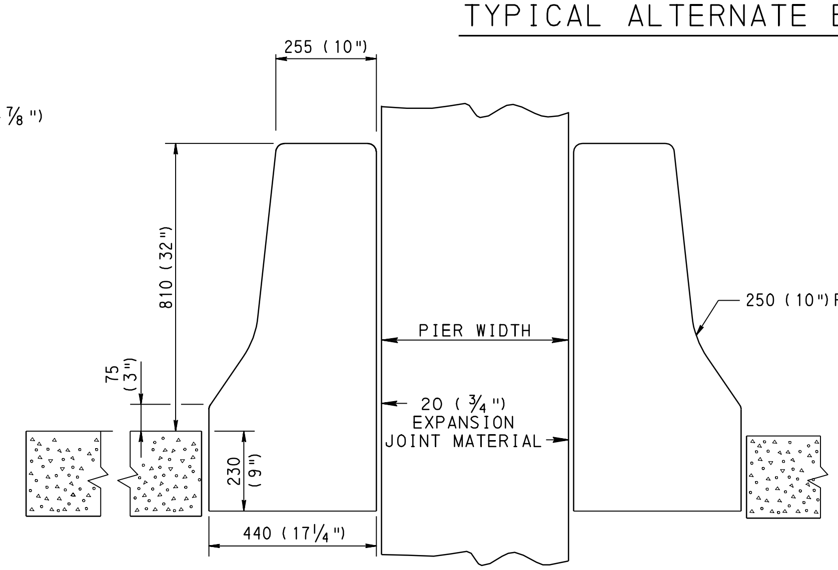


SECTION D-D

TYPICAL ALTERNATE BARRIER TREATMENT AT PIERS



SECTION B-B

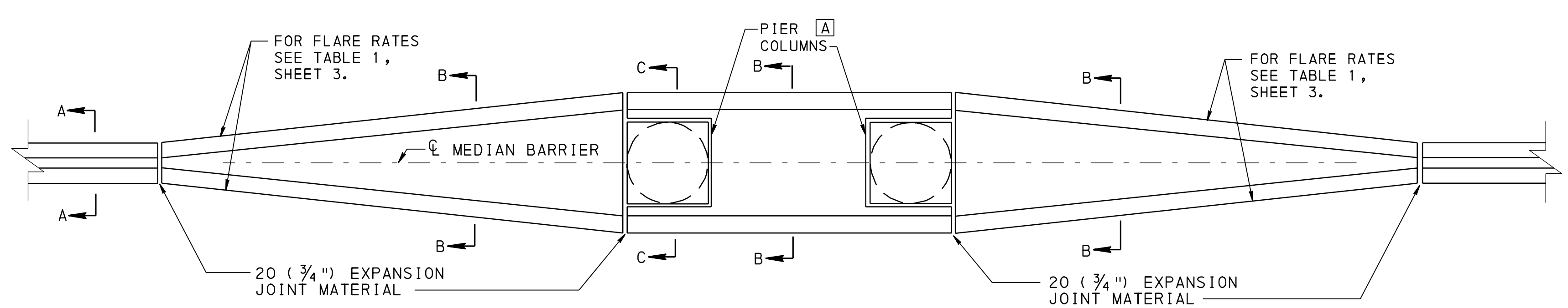


SECTION C-C

NOTES

1. REFER TO BRIDGE STANDARD DRAWINGS (BD-601M) FOR DETAILS OF CONCRETE MEDIAN BARRIER ACROSS STRUCTURES.
2. THE CONCRETE TRANSITIONS AND BARRIER TAPERS AT PIERS ARE INCIDENTAL TO THE MEDIAN BARRIER.
3. CAST ADDITIONAL VOIDS IN THE TAPERED END SECTIONS MEETING THE REQUIREMENTS PRESENTED IN SECTION D-D.
4. PROVIDE NO. 57 COARSE AGGREGATE THAT MEETS THE REQUIREMENTS OF PUBLICATION 408, SECTION 703.2. ALTERNATE SUITABLE GRANULAR MATERIAL MAY BE USED AS FILLER MATERIAL.
5. TO PREVENT INTRUSION OF COARSE AGGREGATE INTO WEEP HOLES, USE WIRE MESH SCREENING, GEOTEXTILES OR OTHER SUITABLE MATERIAL.
6. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



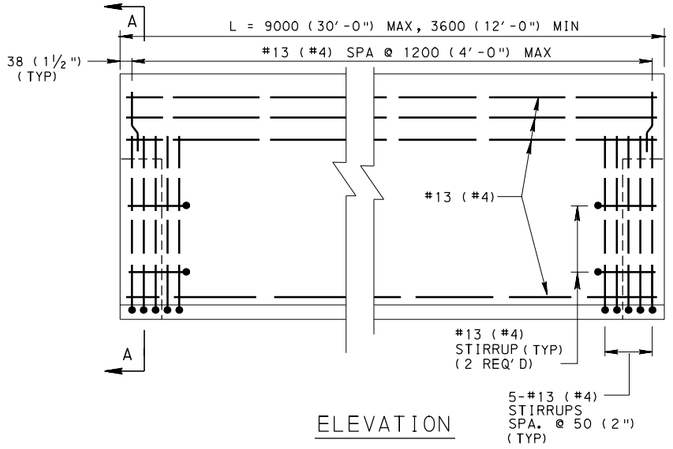
TYPICAL BARRIER TREATMENT AT PIERS

A USE 20 (¾") EXPANSION JOINT MATERIAL AROUND ALL PIERS.

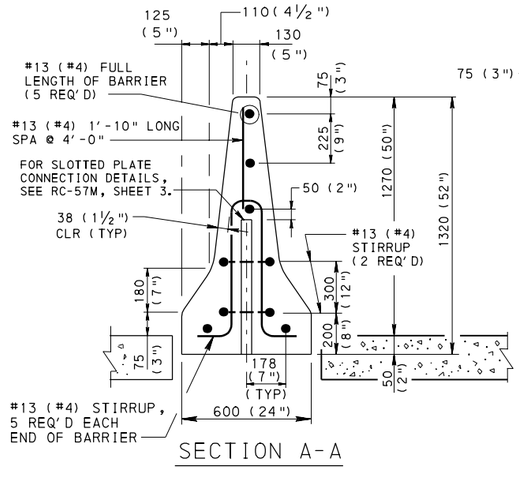
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER F-SHAPE PLACEMENT AT MEDIAN PIERS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-58M

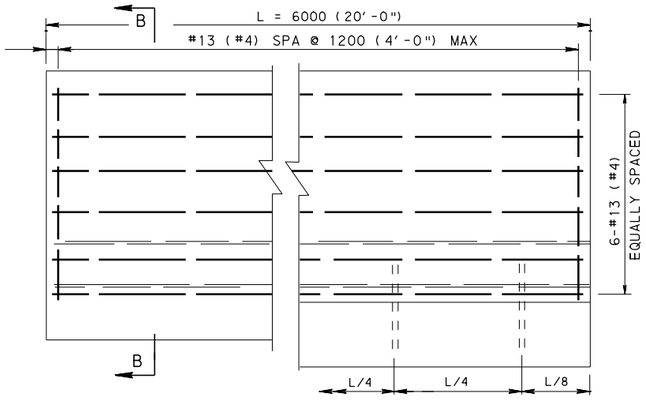


ELEVATION



SECTION A-A

TYPICAL PRECAST



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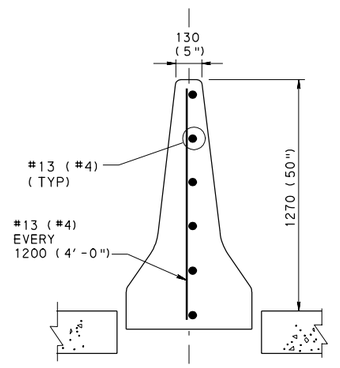
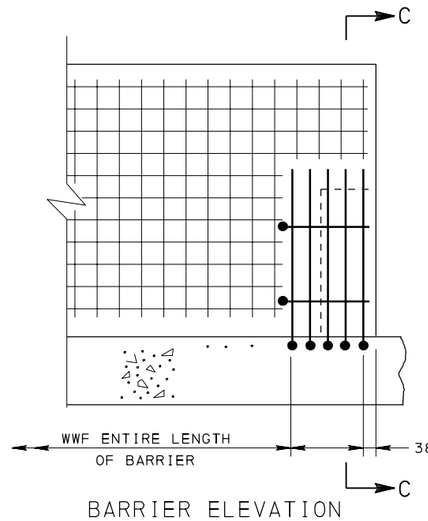


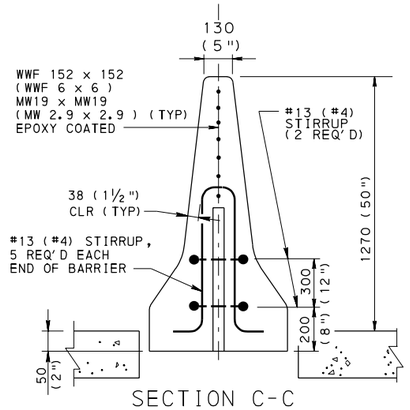
SECTION B-B

THIS SECTION TYPICAL TO SECTION A-A EXCEPT AS NOTED.

TYPICAL CAST-IN-PLACE



BARRIER ELEVATION



SECTION C-C

THIS SECTION TYPICAL TO SECTION A-A EXCEPT AS NOTED.

WWF ALTERNATE

NOTES

1. PROVIDE CONCRETE GLARE SCREEN MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 622 AND 714.
   A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
2. FOR INSTALLATION OF GLARE SCREEN ON TOP OF EXISTING CONCRETE MEDIAN BARRIER, PROVIDE PLASTIC PADDLES OR MODULAR SYSTEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. FOR PRECAST BARRIERS, PROVIDE SLOTTED PLATE CONNECTIONS AS INDICATED ON RC-57M, SHEET 3.
4. PROVIDE PRECAST CONCRETE GLARE SCREEN SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR MODIFICATION OR DEVIATION OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.
5. PROVIDE PRECAST CONCRETE GLARE SCREEN FOR USE AS TEMPORARY (MPT) OR IN PERMANENT INSTALLATIONS. FOR TEMPORARY INSTALLATIONS, EMBEDMENT IS NOT REQUIRED.
6. EPOXY COATED REINFORCEMENT IS NOT REQUIRED WHEN PRECAST CONCRETE GLARE SCREEN IS TO BE USED IN TEMPORARY INSTALLATIONS ONLY, IN ACCORDANCE WITH SECTION 627, AND IDENTIFIED AS SUCH, AS SPECIFIED IN SECTION 714.6(d).
7. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
8. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
9. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (⅛") IN DEPTH.
10. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).
11. PROVIDE STRUCTURAL STEEL PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. FOR PERMANENT BARRIER, GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s). FOR TEMPORARY BARRIER, DO NOT GALVANIZE THE STRUCTURAL STEEL PLATES.
12. MINOR VARIATIONS IN TOP WIDTH DIMENSIONS OF PRECAST BARRIER SEGMENTS OF UP TO PLUS 10 (½"), BOTTOM WIDTH DIMENSIONS OF UP TO MINUS 10 (½"), AND SIDE TAPER DIMENSIONS OF PLUS OR MINUS 5 (¼") ARE PERMITTED TO ACCOUNT FOR VARIATIONS IN FORMING EQUIPMENT PRODUCED WITH PREVIOUS STANDARD DRAWINGS FOR F-SHAPE BARRIER.
13. PLACE PRECAST BARRIER SEGMENTS FORMED USING THE SAME FORMS AND FORM TOGETHER IN CONTINUOUS STRINGS. MINIMIZE THE NUMBER OF LOCATIONS WHERE BARRIER SEGMENTS FROM DIFFERENT SOURCES OR FORMING EQUIPMENT ARE PLACED.
14. INSTALL CONCRETE MEDIAN BARRIER WITH THE VERTICAL CENTERLINE TO NOT BE OUT OF PLUMB BY MORE THAN 6 (¼").
15. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

TYPICAL CAST-IN PLACE AND PRECAST BARRIER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

RC-57M	CONCRETE MEDIAN BARRIER, F-SHAPE
BC-736M	REINFORCEMENT BAR FABRICATION DETAILS

REFERENCE DRAWINGS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

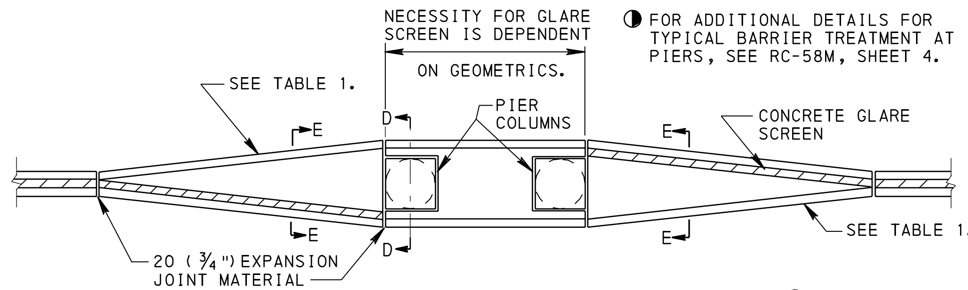
CONCRETE GLARE SCREEN
F-SHAPE

RECOMMENDED JUN. 1, 2010
R. Howard Dilley
CHIEF, HWY. QA DIVISION

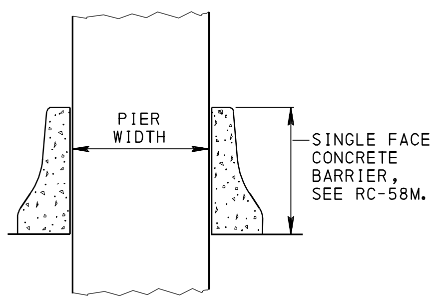
RECOMMENDED JUN. 1, 2010
Bruce E. Hyson
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 4

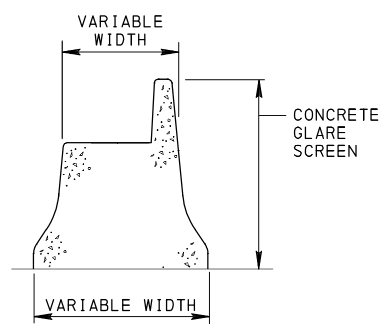
RC-59M



TYPICAL TREATMENT AT PIERS ◑



SECTION D-D



SECTION E-E

TABLE 1
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
110	70	20:1	15:1
105	65	19:1	15:1
100	60	18:1	14:1
90	55	16:1	12:1
80	50	14:1	11:1
70	45	12:1	10:1
65	40	11:1	9:1
60	35	10:1	8:1
50	30	8:1	7:1

NOTE

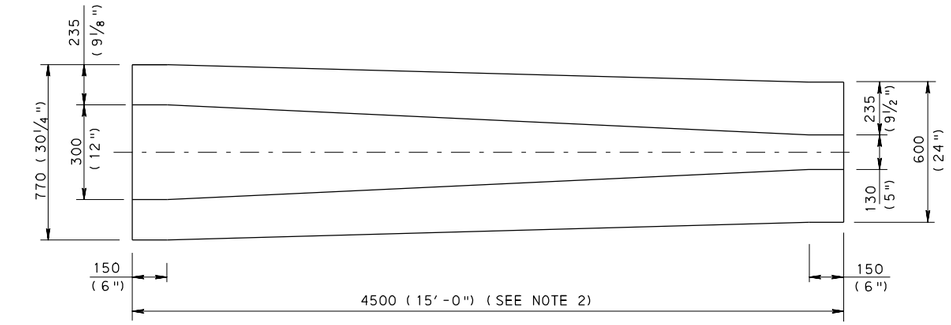
1. PROVIDE BARRIER-MOUNT DELINEATORS, WHEN INDICATED, AS SPECIFIED ON RC-57M, SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

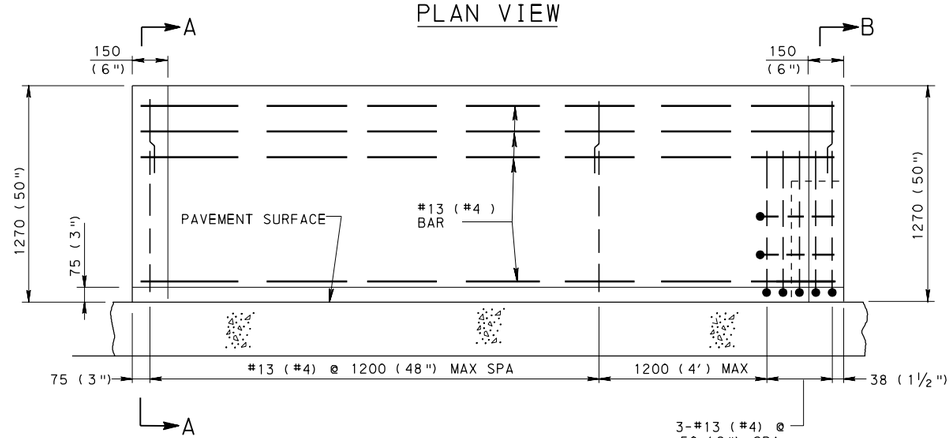
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE GLARE SCREEN
F-SHAPE

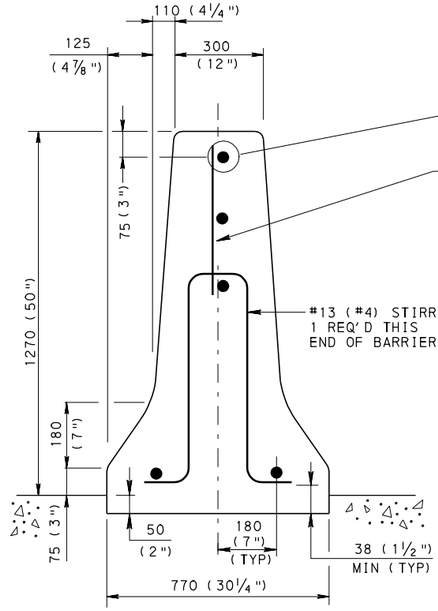
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-59M



PLAN VIEW

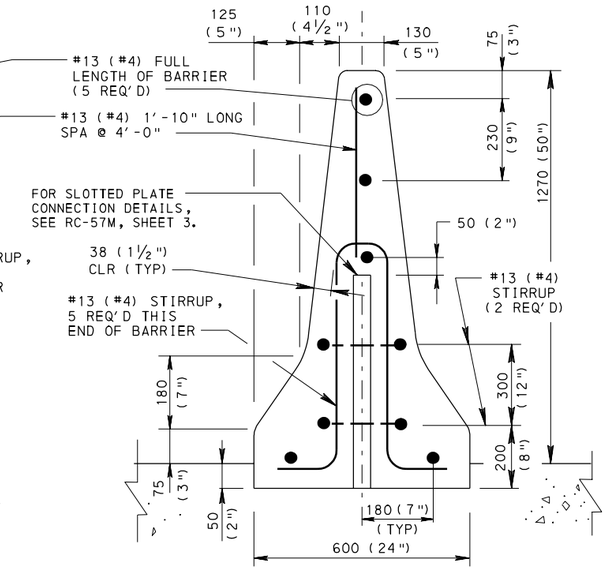


ELEVATION VIEW

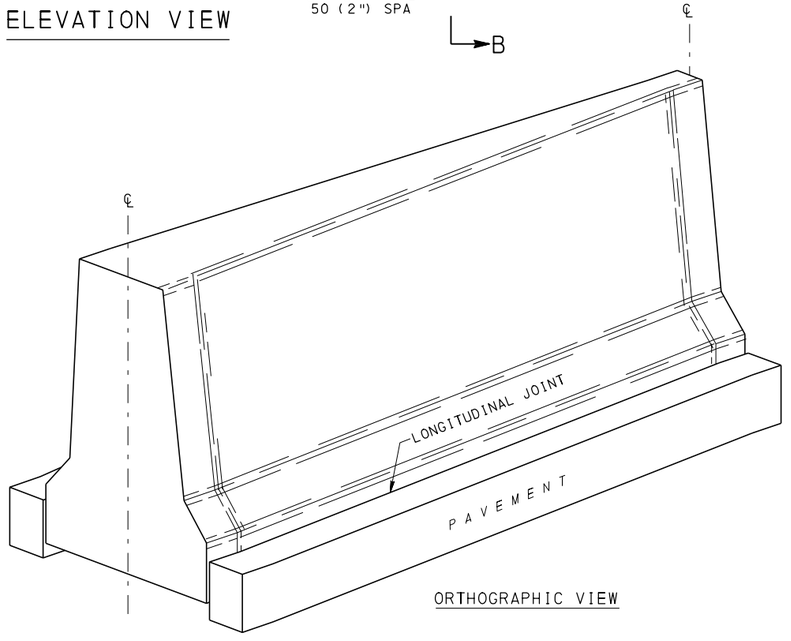


SECTION A-A

(ADJACENT TO BRIDGE WITH CONCRETE GLARE SCREEN MEDIAN BARRIER)



SECTION B-B



ORTHOGRAPHIC VIEW

TYPICAL 1270 TO 1270 (50" TO 50") TRANSITION

BRIDGE TO HIGHWAY TRANSITION

(THE BRIDGE BARRIER IS A CONCRETE GLARE SCREEN MEDIAN BARRIER)

NOTES

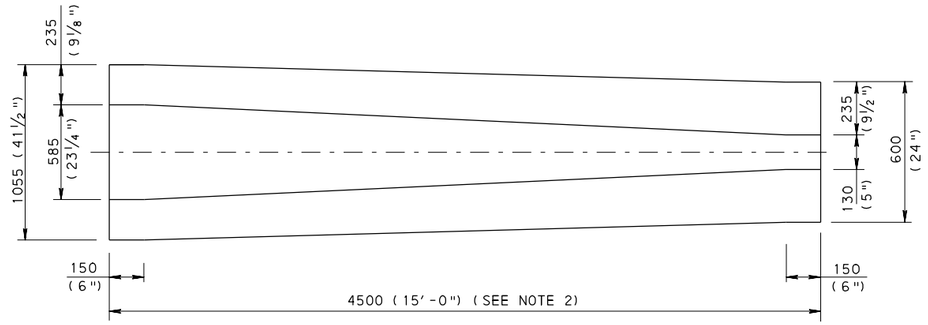
1. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 1.
2. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

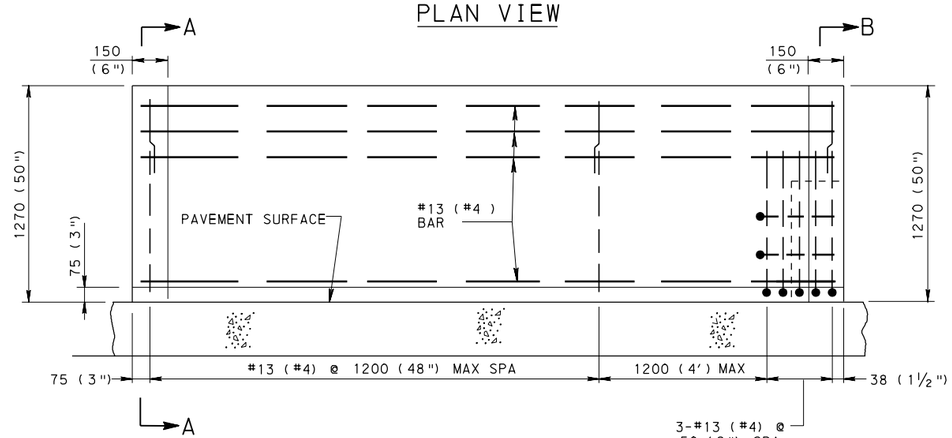
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE GLARE SCREEN
F-SHAPE

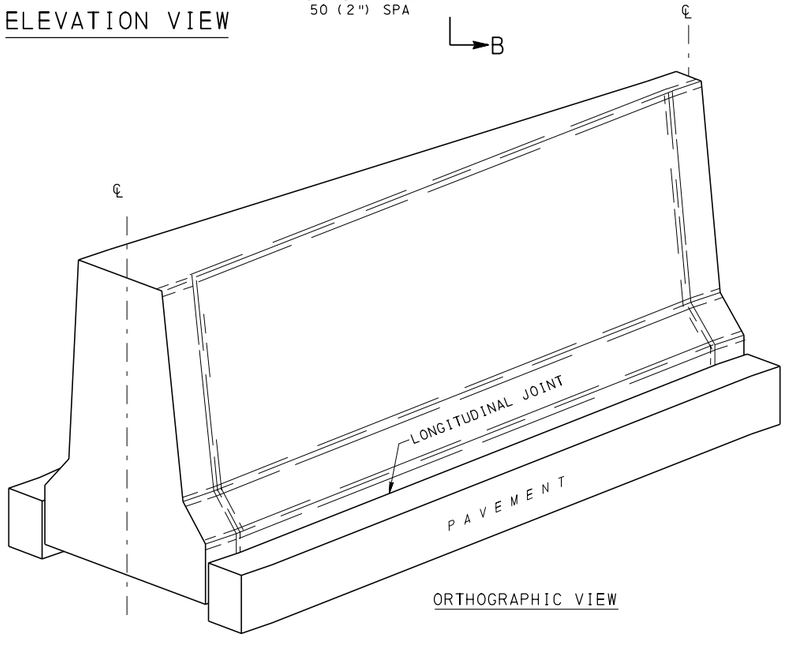
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-59M



PLAN VIEW



ELEVATION VIEW

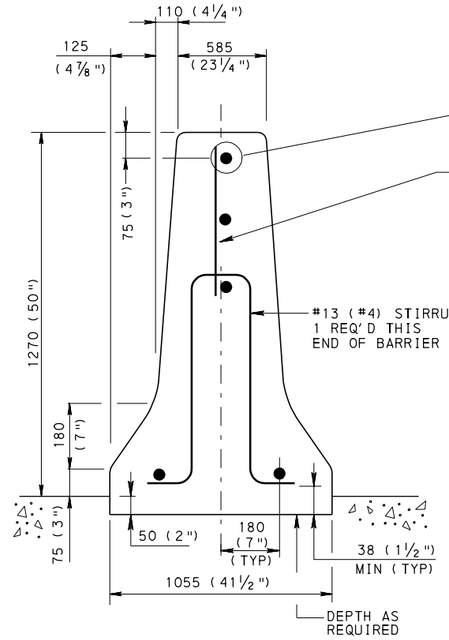


ORTHOGRAPHIC VIEW

TYPICAL 1270 TO 1270 (50" TO 50") TRANSITION

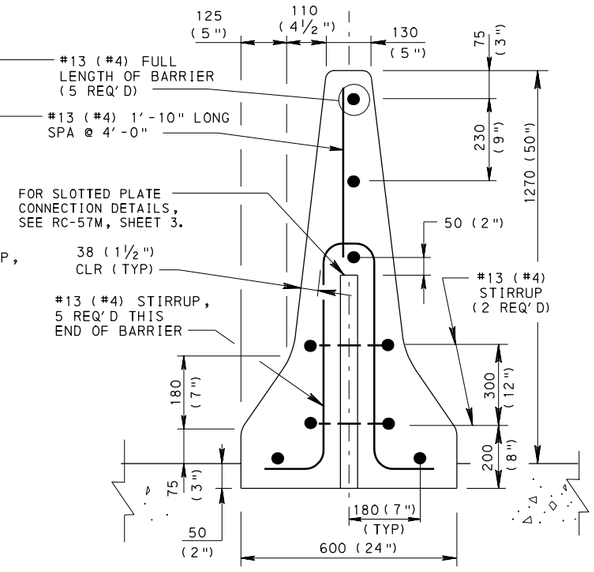
BRIDGE TO HIGHWAY TRANSITION

(THE BRIDGE BARRIER IS A SPLIT CONCRETE GLARE SCREEN MEDIAN BARRIER)



SECTION A-A

(ADJACENT TO BRIDGE WITH SPLIT CONCRETE GLARE SCREEN MEDIAN BARRIER)



SECTION B-B

NOTES

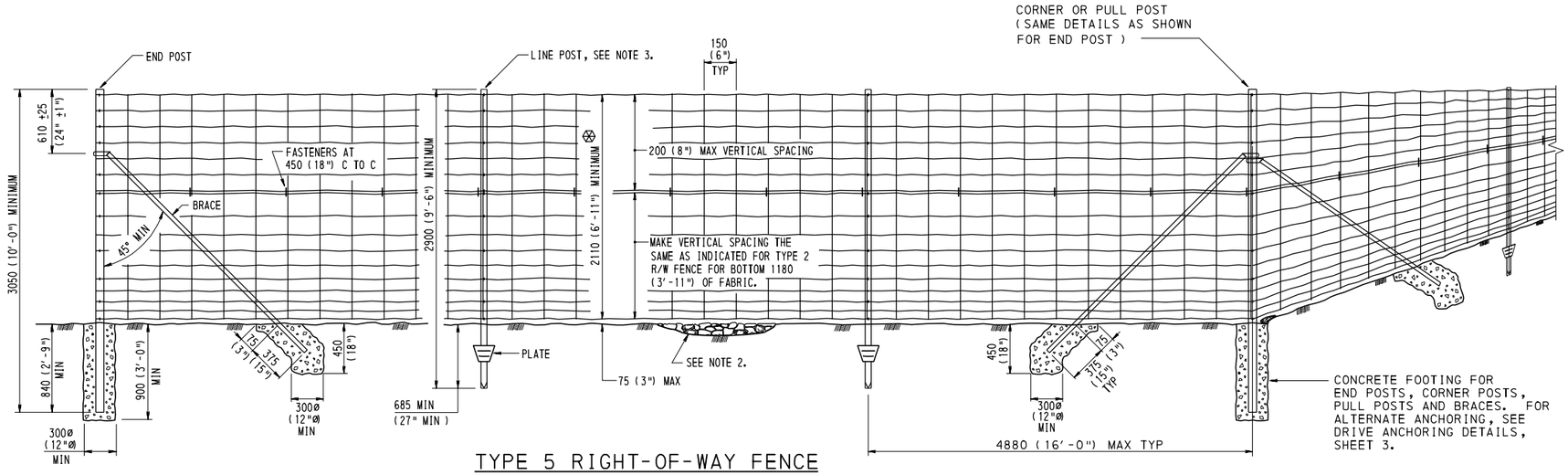
1. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 1.
2. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

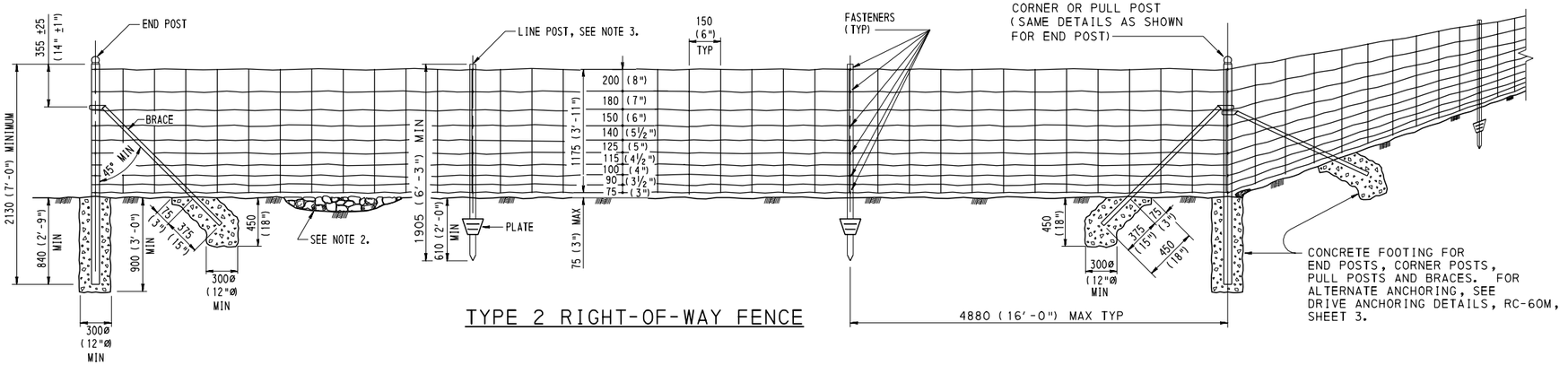
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE GLARE SCREEN F-SHAPE

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-59M



TYPE 5 RIGHT-OF-WAY FENCE



TYPE 2 RIGHT-OF-WAY FENCE

GENERAL NOTES

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 624.
2. FILL ALL DEPRESSIONS GREATER THAN 75 (3") AND LESS THAN 300 (12") WITH ROCKS OR COMPACTED EARTH TO PREVENT ANIMALS FROM GOING UNDER THE RIGHT-OF-WAY FENCE.
3. INSTALL CONCRETE FOOTING OR DRIVE ANCHORS AT MAXIMUM INTERVALS OF 50 m (160') FOR ALL LINE POSTS.
4. PLACE PULL POSTS AT ANGLE POINTS IN VERTICAL ALIGNMENT AT MAXIMUM INTERVALS OF 150 m (500') BETWEEN END AND/OR CORNER POSTS IN LEVEL TERRAIN AND/OR WHERE DIRECTED.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

⊛ FABRIC SHALL BE AS FOLLOWS:

(1.) TYPE 2 R/W FENCE FABRIC AND A 915 (36") WIDE FABRIC CONNECTED AS SHOWN; OR

(2.) A SINGLE FABRIC HAVING A MINIMUM WIDTH OF 2110 (83"); OR

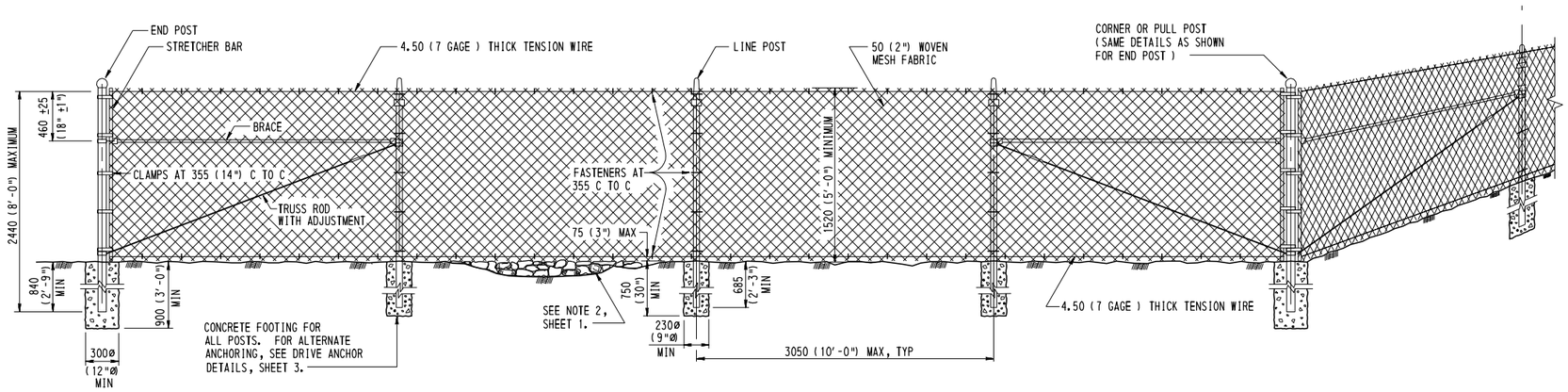
(3.) A COMBINATION OF TWO FABRICS TO ACHIEVE A MINIMUM WIDTH OF 2110 (83"). IF THE FABRICS ARE OVERLAPPED, CONNECT BY FASTENERS SPACED AT 450 (18") C TO C AND STAGGERED ON EACH EDGE OF FABRIC ALONG THE JOINT.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

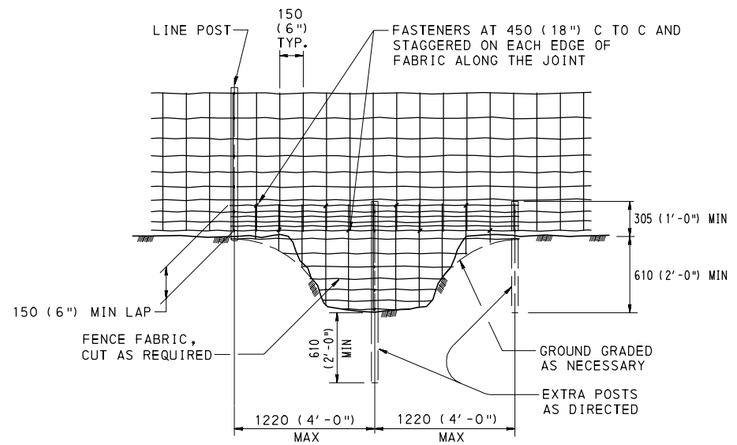
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RIGHT-OF-WAY FENCE

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 3
R. Wyatt Dilly	Bruce E. Thomas	RC-60M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	



TYPE 1 RIGHT-OF-WAY FENCE



TREATMENT AT GROUND DEPRESSIONS GREATER THAN 300 (1'-0")

FOR TYPES 2 AND 5 RIGHT-OF-WAY FENCE
SEE SHEET 1

NOTE

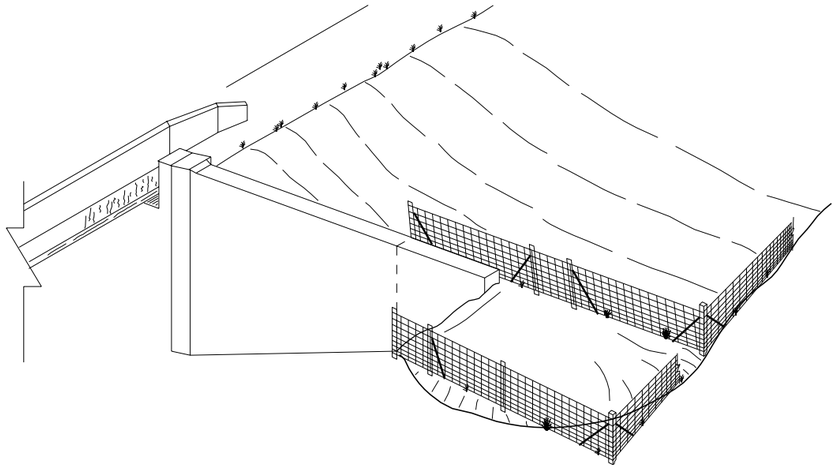
1. FOR GENERAL NOTES SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

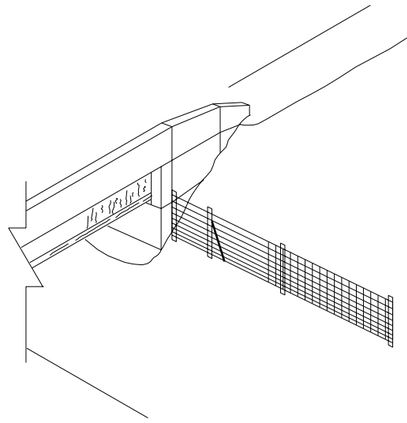
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RIGHT-OF-WAY FENCE

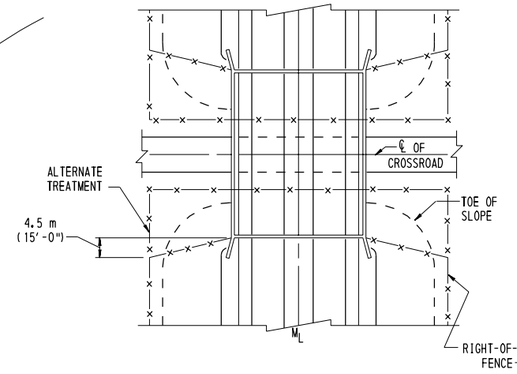
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 3
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-60M



R/W FENCE TREATMENT AT
HIGH WALLED ABUTMENT

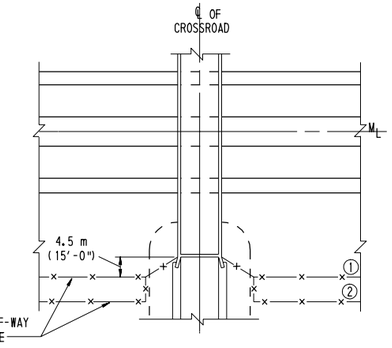


R/W FENCE TREATMENT
AT STUB ABUTMENTS



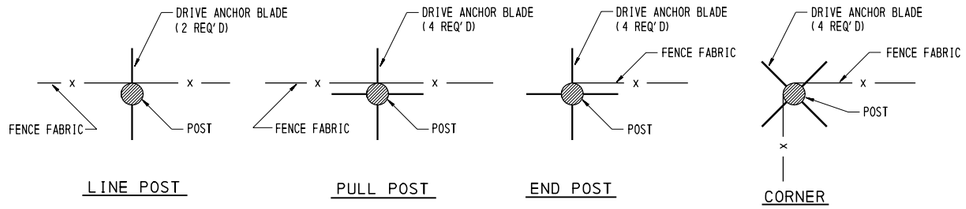
HIGHWAY OVER CROSSROAD

IF THE ROADWAY HAS DUAL STRUCTURES, ERECT THE RIGHT-OF-WAY FENCE TO CLOSE OFF THE MEDIAN AREA.



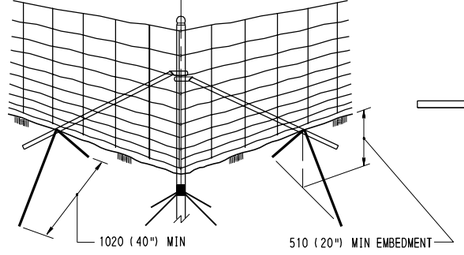
HIGHWAY UNDER CROSSROAD

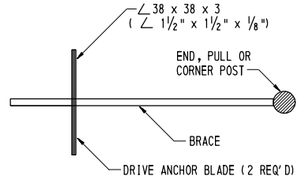
1. IF RIGHT-OF-WAY FENCE IS WITHIN 4.5 m (15'-0") OR LESS OF THE PROJECTED FACE OF THE BACKWALL, ANGLE THE FENCE INTO THE ABUTMENT AS SHOWN.
2. IF RIGHT-OF-WAY FENCE IS GREATER THAN 4.5 m (15'-0") FROM THE PROJECTED FACE OF THE BACKWALL, PLACE FENCE PARALLEL TO CROSSROAD AND ANGLE INTO ABUTMENT AS SHOWN.



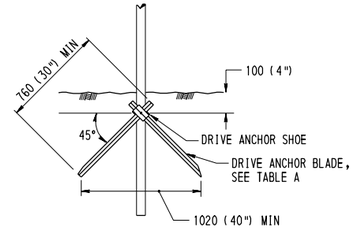
LINE POST | PULL POST | END POST | CORNER POST

DRIVE ANCHOR ORIENTATION



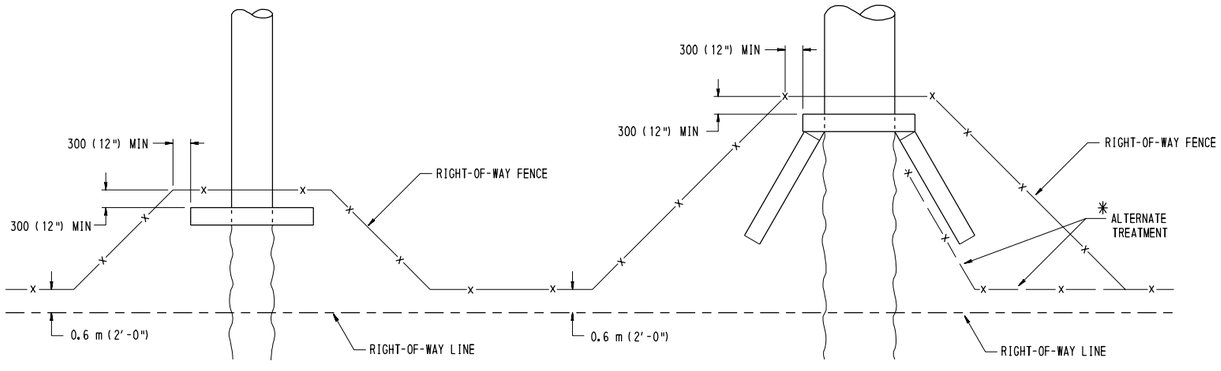


DRIVE ANCHOR DETAILS FOR POST BRACES
ON TYPE 2 AND TYPE 5 R/W FENCE



DRIVE ANCHOR

(USE AS ALTERNATE TO CEMENT CONCRETE FOOTING FOR ALL TYPES OF RIGHT-OF-WAY FENCE.)



R/W FENCE TREATMENT AT CULVERTS

(EXERCISE CAUTION WHEN LOCATING POSTS NEAR THE CULVERT. ANY DAMAGE IS AT CONTRACTOR'S EXPENSE.)

✳ PLACE THE LAST POST WITHIN 150 (6") OF THE WALL AND AT A POINT WHERE THE WALL HEIGHT IS NOT LESS THAN 3.0 m (10'-0").

FENCE HEIGHT	MINIMUM BLADE SIZE
1520 (5'-0") OR LESS	25 x 25 x 3 (1" x 1" x ⅛")
GREATER THAN 1520 (5'-0") BUT LESS THAN 2130 (7'-0")	32 x 32 x 3 (1¼" x 1¼" x ⅛")
2130 (7'-0") OR GREATER	38 x 38 x 3 (1½" x 1½" x ⅛")

TABLE A

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

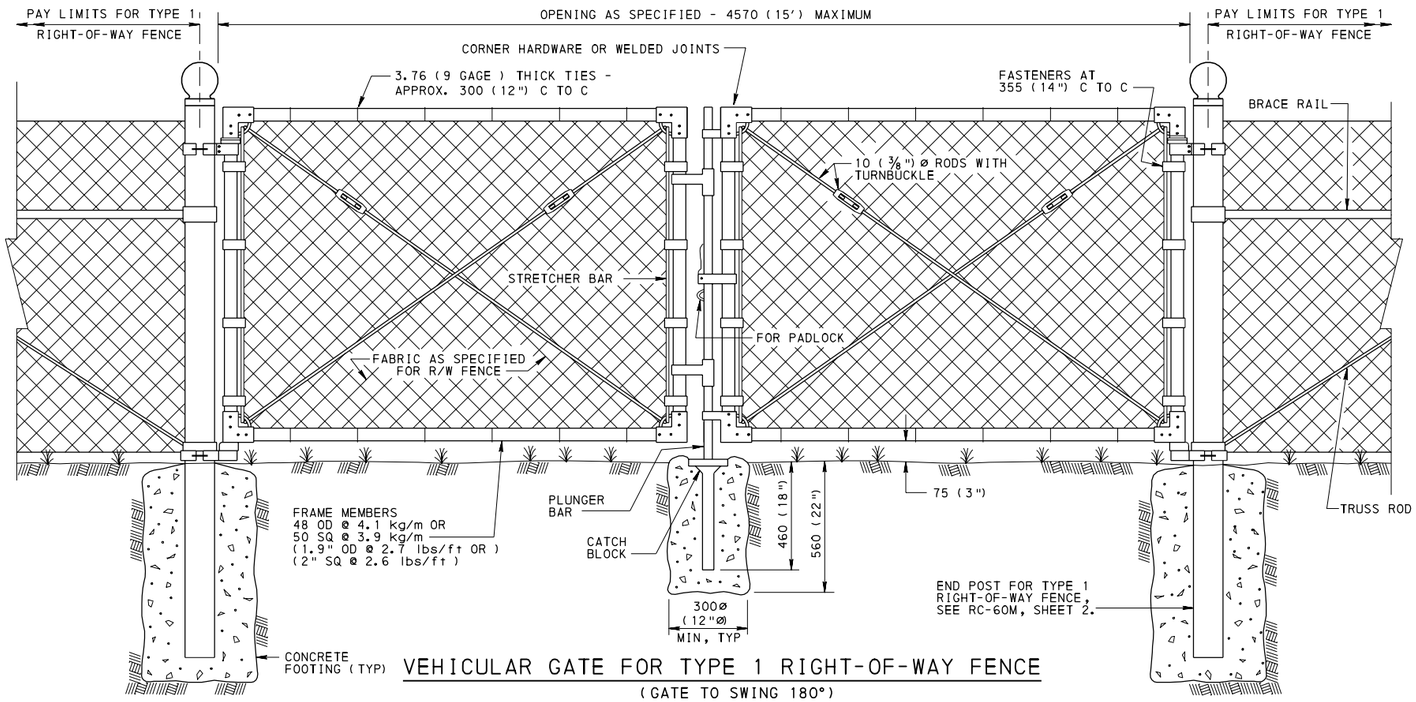
RIGHT-OF-WAY FENCE

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

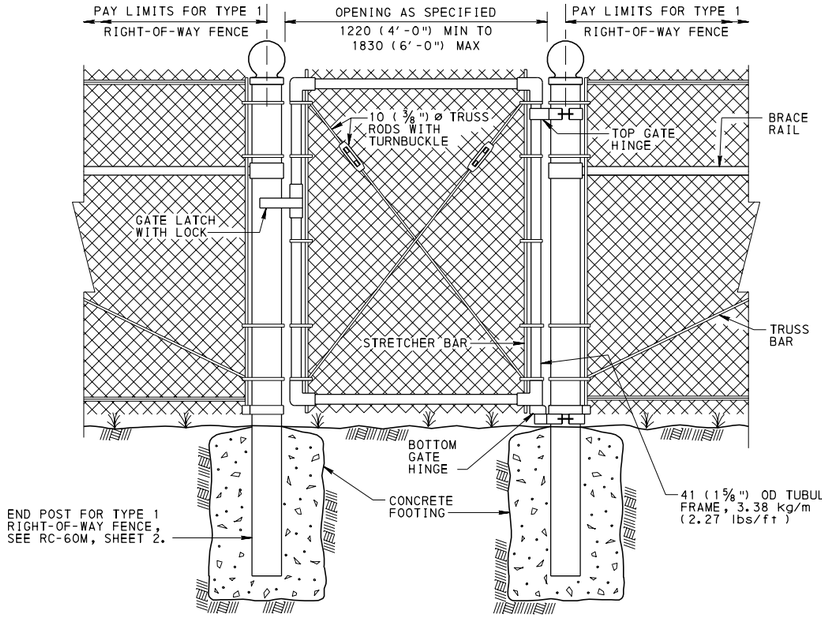
SHT 3 OF 3

RC-60M



VEHICULAR GATE FOR TYPE 1 RIGHT-OF-WAY FENCE

(GATE TO SWING 180°)



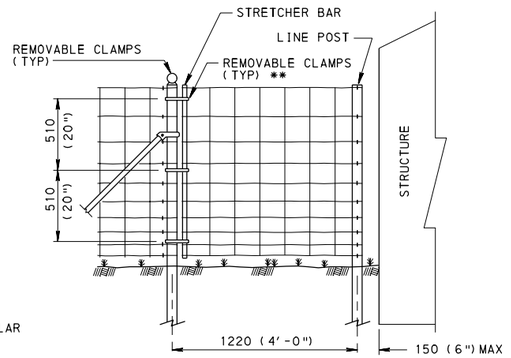
PEDESTRIAN GATE FOR TYPE 1 RIGHT-OF-WAY FENCE

(GATE TO SWING 90°)

* INCLUDES STRETCHER BAR, BRACE AND REMOVABLE CLAMPS OR FASTENERS. SEE RC-60M, SHEET 2, FOR END POST DETAILS.

** FOR TYPE 2 R/W FENCE USE 3 CLAMPS AS SHOWN. FOR TYPE 1 R/W FENCE USE 4 CLAMPS EQUALLY SPACED. FOR TYPE 5 R/W FENCE USE 5 CLAMPS EQUALLY SPACED.

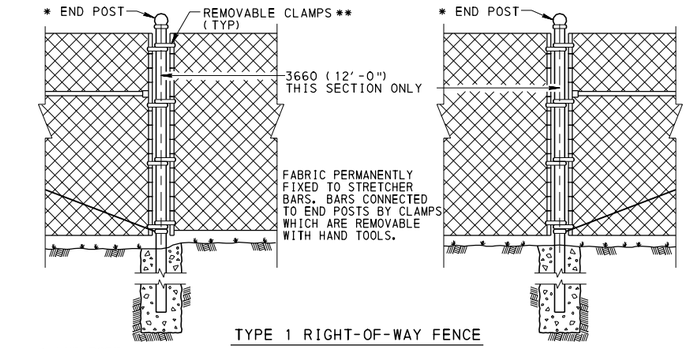
*** CONSIDER THE PAYMENT FOR REMOVABLE FENCE SECTIONS INCIDENTAL TO THE R/W FENCE.



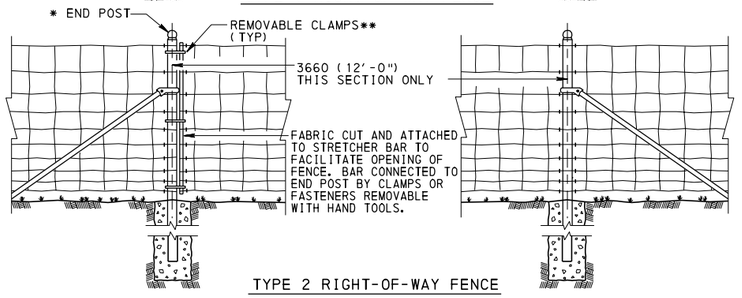
NOTE:

TWO END POSTS ARE REQUIRED IF REMOVABLE FENCE SECTIONS AT STRUCTURES ARE PLACED ANYWHERE IN THE RUN OF FENCE OTHER THAN THE END.

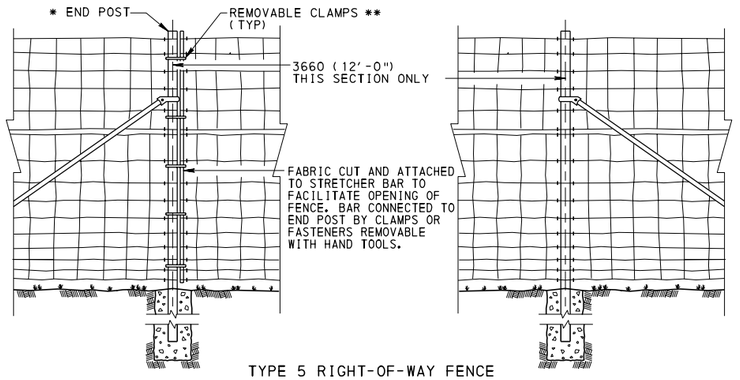
***REMOVABLE FENCE SECTIONS AT STRUCTURES



TYPE 1 RIGHT-OF-WAY FENCE



TYPE 2 RIGHT-OF-WAY FENCE



TYPE 5 RIGHT-OF-WAY FENCE

REMOVABLE FENCE SECTIONS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

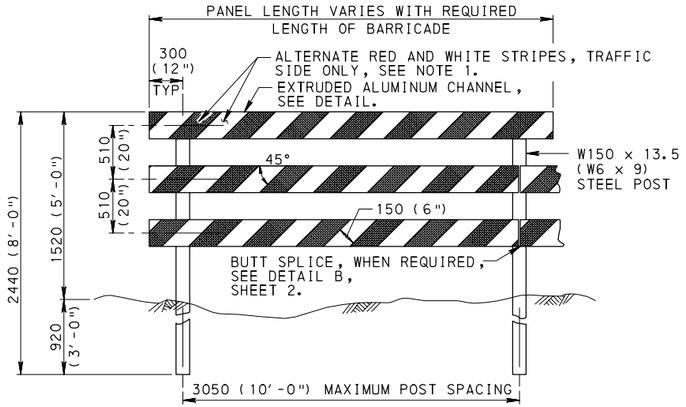
NOTE

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

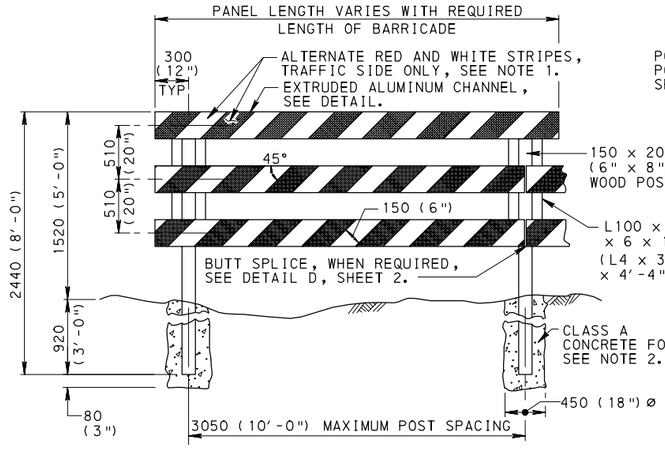
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RIGHT-OF-WAY GATES AND REMOVABLE FENCE SECTIONS

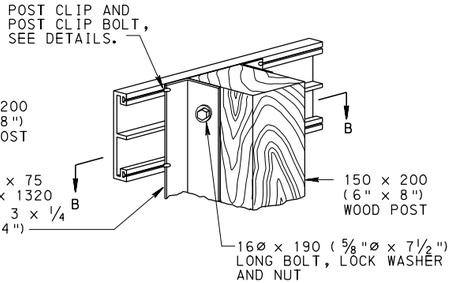
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-61M



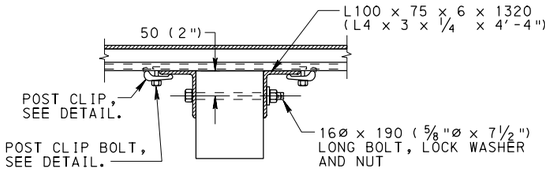
ALUMINUM PANEL - STEEL POSTS



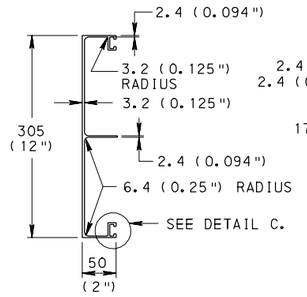
ALUMINUM PANEL - WOOD POSTS



DETAIL B
PANEL TO POST CONNECTION

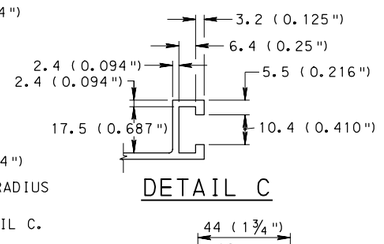


SECTION B-B

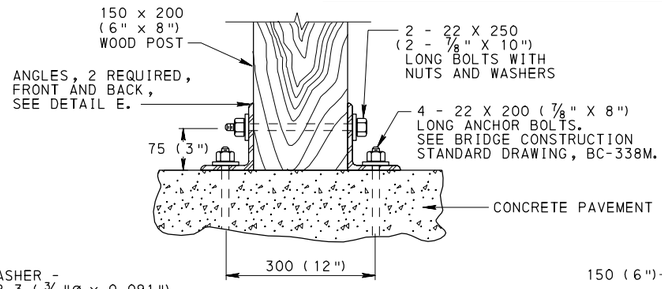


EXTRUDED ALUMINUM CHANNEL

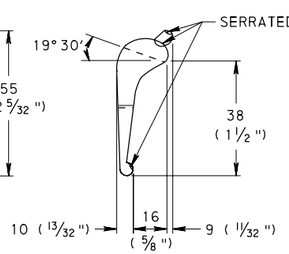
(DIMENSIONS FOR PANELS MAY VARY DEPENDING UPON MANUFACTURING COMPANY'S DESIGN.)



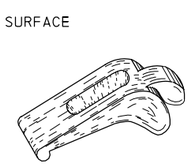
DETAIL C

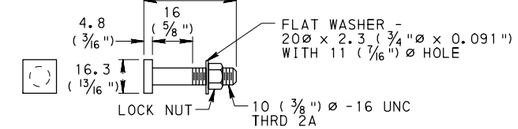


DETAIL D

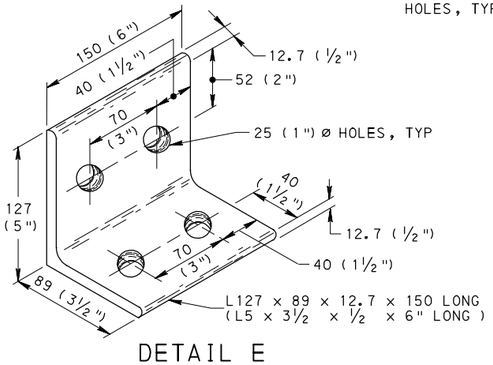


POST CLIP

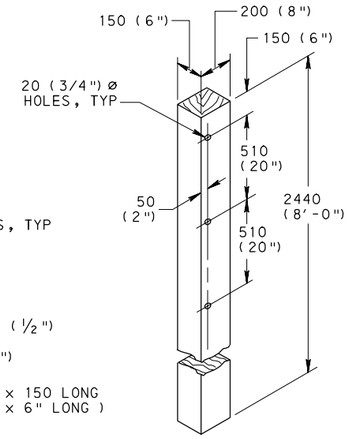




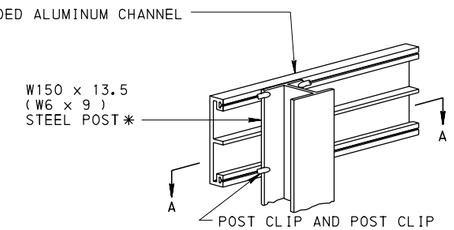
POST CLIP BOLT



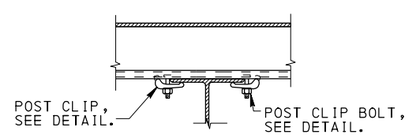
DETAIL E



WOOD POST FOR ALUMINUM PANEL



DETAIL A
PANEL TO POST CONNECTION



SECTION A-A

NOTES

1. PERMIT ONLY RETROREFLECTIVE SHEETING MATERIAL SUPPLIED BY A MANUFACTURER, AS LISTED IN BULLETIN 15.
2. DRIVE POSTS MECHANICALLY OR ERECT IN CONCRETE FOOTING.
3. SEE RC-52M, SHEET 1, FOR MOUNTING OF STEEL POSTS ON CONCRETE PAVEMENT. SEE DETAIL D FOR MOUNTING OF WOOD POSTS ON CONCRETE PAVEMENT.
4. USE MATERIALS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 678.
5. ALL WOOD METRIC DIMENSIONS ARE NOMINAL.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

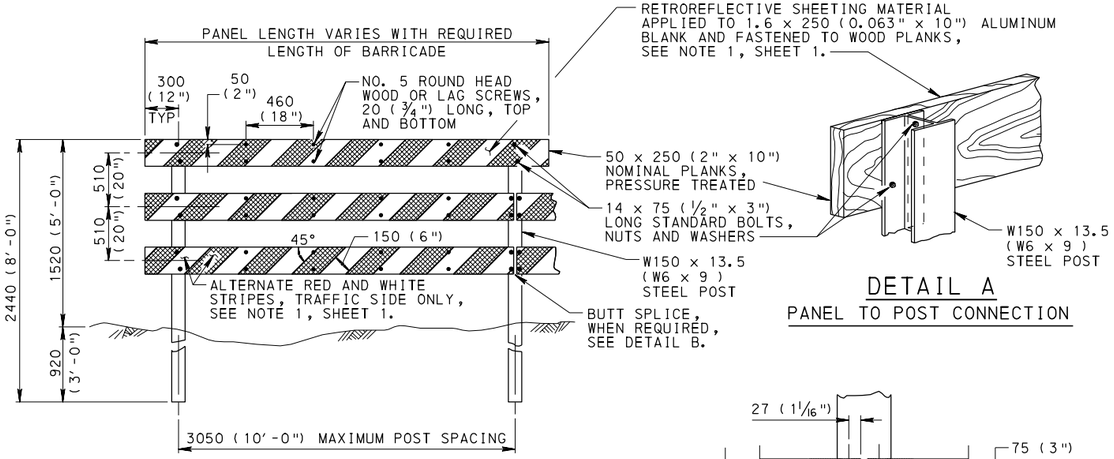
PERMANENT BARRICADES ALUMINUM PANEL

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

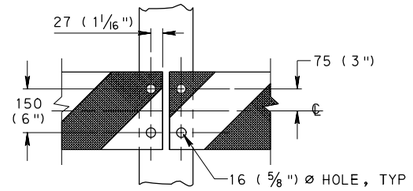
SHT 1 OF 2

RC-63M

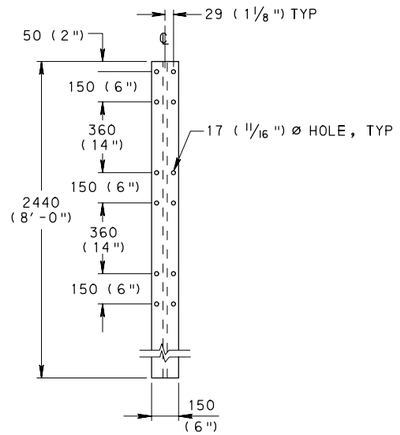


WOOD PANEL - STEEL POSTS

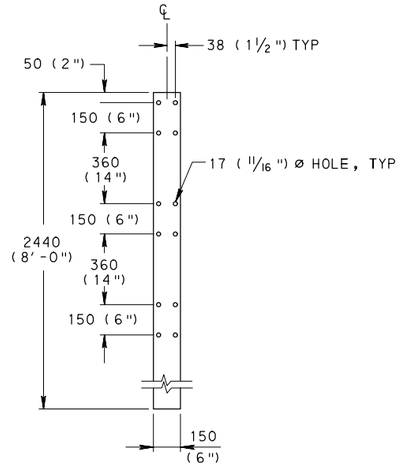
DETAIL A
PANEL TO POST CONNECTION



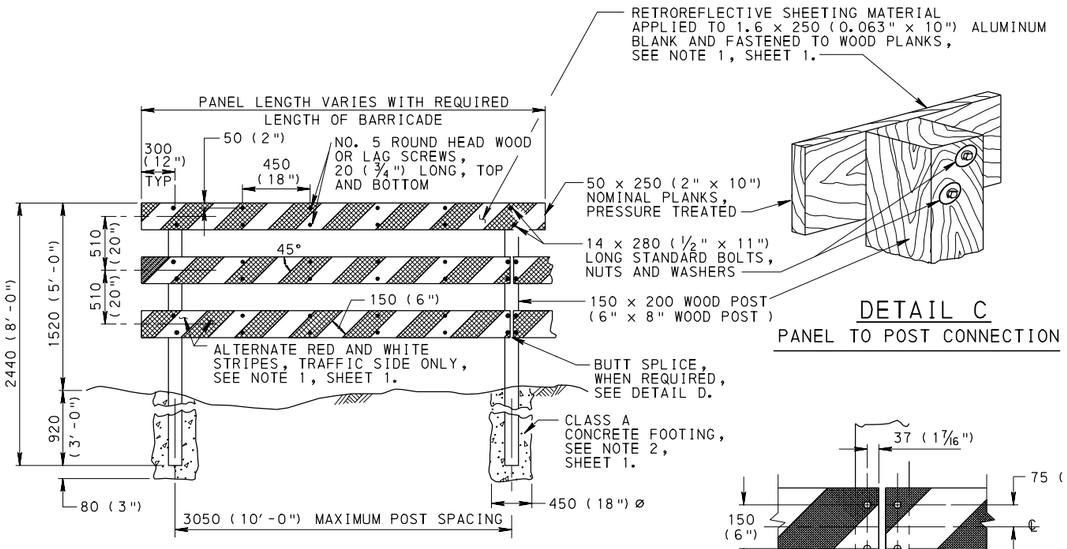
DETAIL B
BUTT SPLICE



STEEL POST FOR
WOOD PANEL

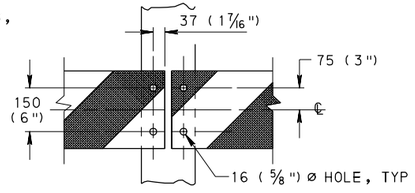


WOOD POST FOR
WOOD PANEL



WOOD PANEL - WOOD POSTS

DETAIL C
PANEL TO POST CONNECTION



DETAIL D

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

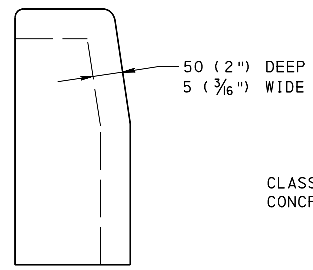
PERMANENT BARRICADES
WOOD PANEL

RECOMMENDED JUN. 1, 2010
R. Hoar Dilley
CHIEF, HWY. QA DIVISION

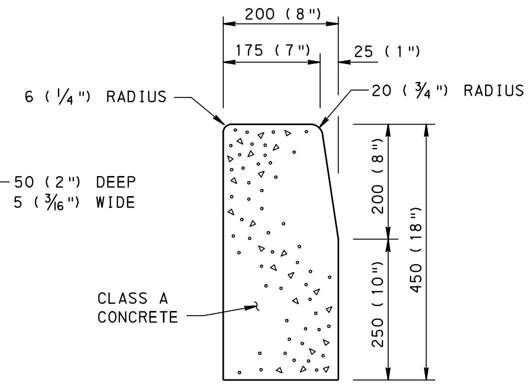
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2

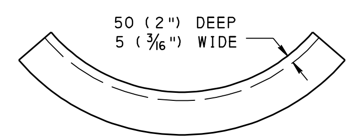
RC-63M



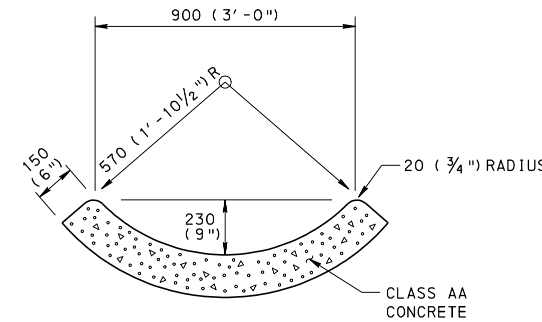
DETAIL A
CONTRACTION JOINT



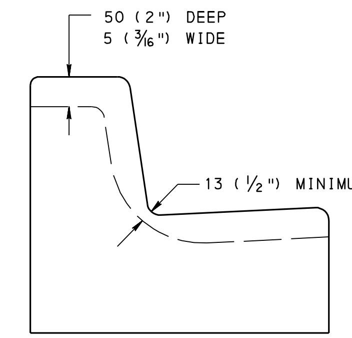
TYPICAL
CROSS SECTION



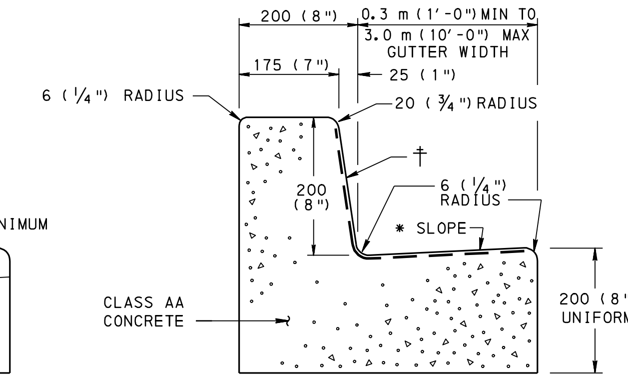
DETAIL B
CONTRACTION JOINT



TYPICAL
CROSS SECTION



DETAIL C
CONTRACTION JOINT

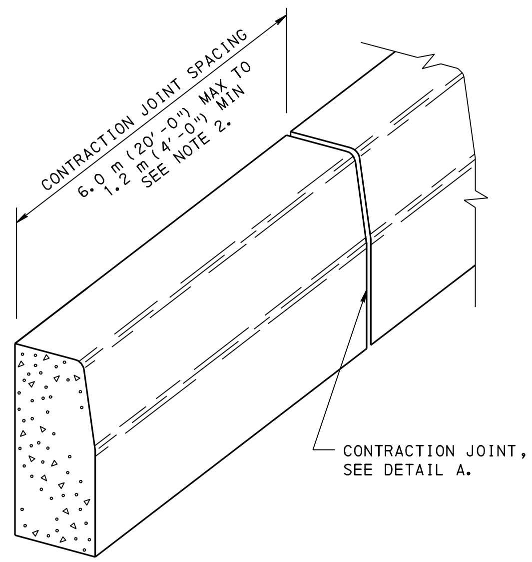


TYPICAL
CROSS SECTION

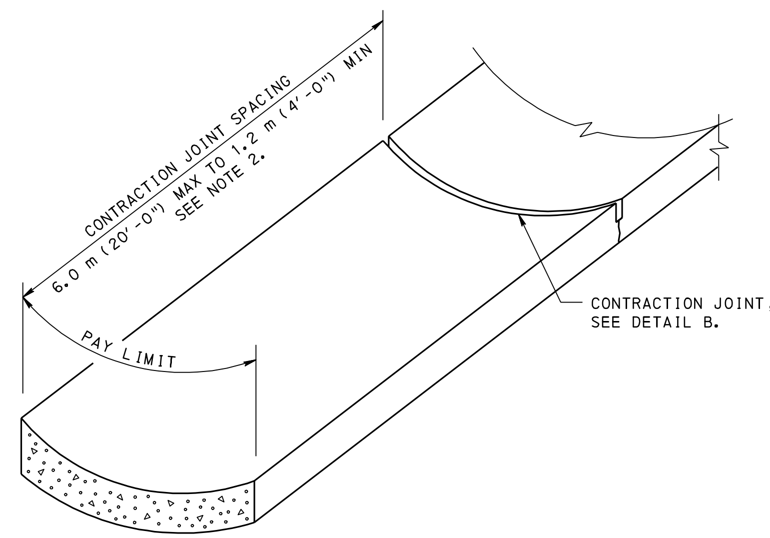
* UNDER 1.5 m (5'-0") GUTTER WIDTH = 8.0% (1"/FT) MIN.
1.5 m (5'-0") AND GREATER GUTTER WIDTH = 4.0% (1/2"/FT) MIN.

NOTE: REFER TO RC-67M FOR MAXIMUM SLOPE OF GUTTER WHEN PLACED AT A CURB RAMP

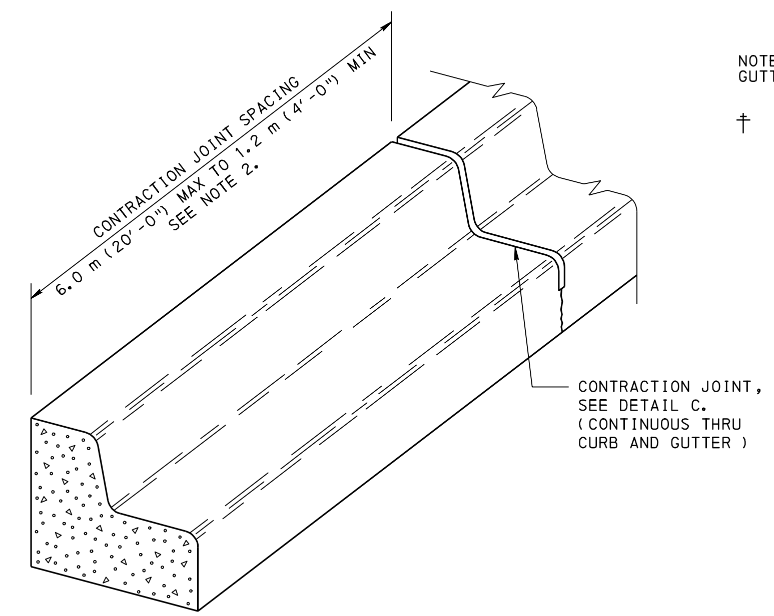
† - - - REPRESENTS WIDTH OF GUTTER FOR COMPUTING PAY AREA.



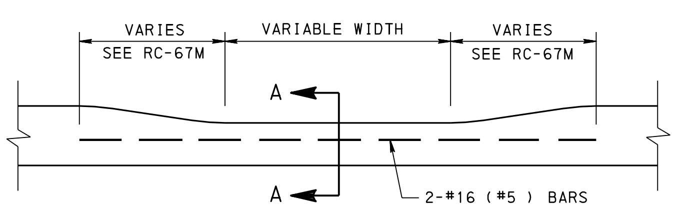
PLAIN CEMENT CONCRETE CURB



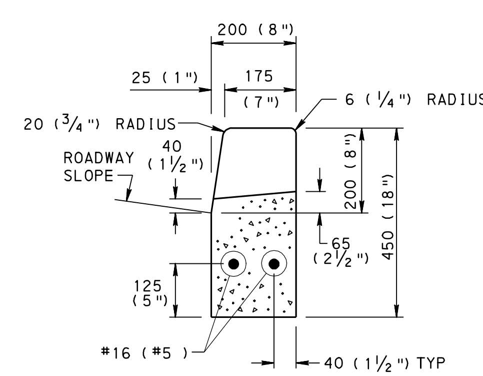
PLAIN CEMENT CONCRETE GUTTER



PLAIN CEMENT CONCRETE CURB GUTTER



ELEVATION VIEW



SECTION A-A

DEPRESSED CURB FOR DRIVEWAYS

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 630 FOR PLAIN CEMENT CONCRETE CURB AND DEPRESSED CURB, SECTION 640 FOR PLAIN CEMENT CONCRETE GUTTER AND SECTION 641 FOR PLAIN CEMENT CONCRETE CURB GUTTER.
2. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS.
3. PLACE 20 (3/4") THICK PREMOLDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
4. SEE RC-50M FOR PLAIN CEMENT CONCRETE CURB SLOPED TOP TREATMENT AT END OF STRUCTURES.
5. WHERE CURBS ARE INSTALLED ADJACENT TO PARKING LANES A 150 (6") HIGH CURB CAN BE UTILIZED WITH APPROVAL FROM THE LOCAL MUNICIPALITY.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

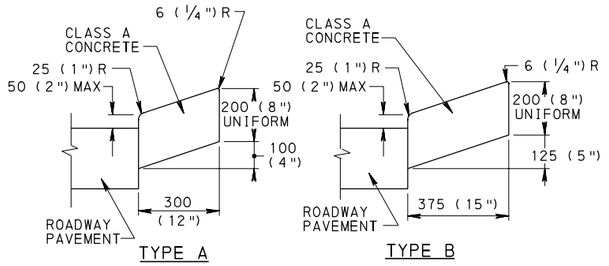
CURBS AND GUTTERS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 1

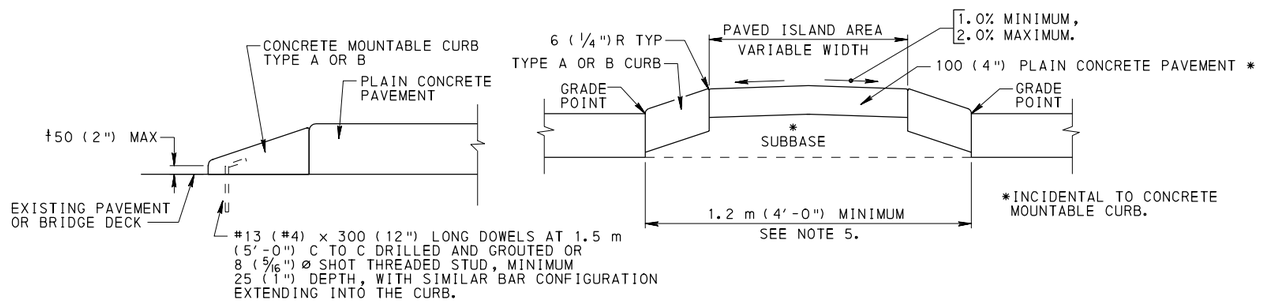
RC-64M



CONCRETE MOUNTABLE CURBS

NOTES

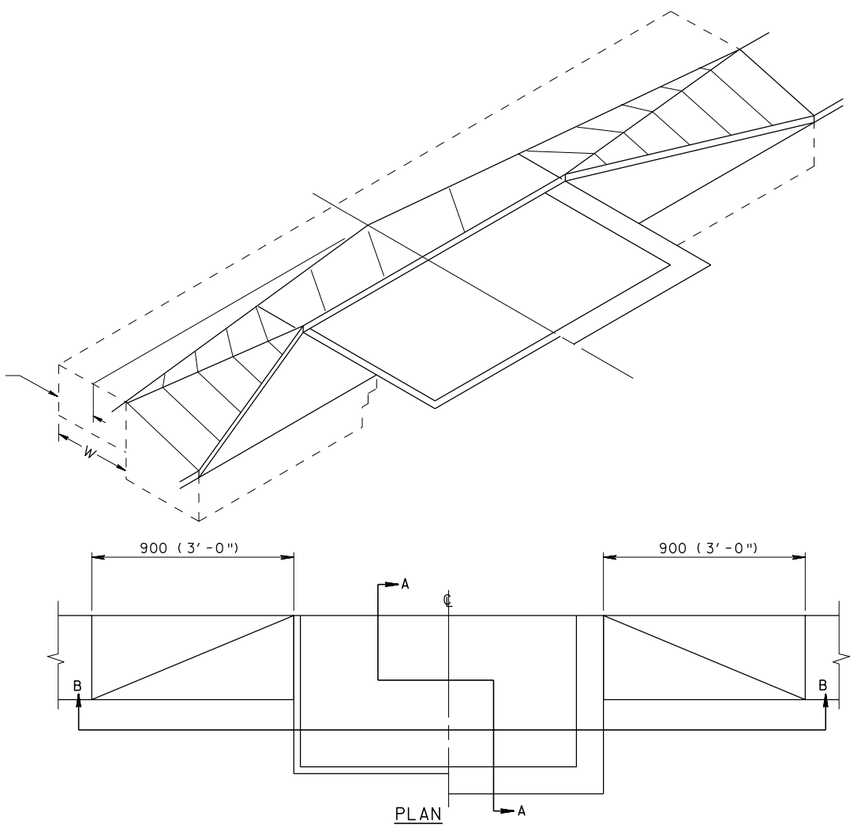
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 633.
2. INSTALL TYPE M INLET WITH CONCRETE MOUNTABLE CURBS AND LOCATE INLET AS SHOWN ON THE DRAWINGS. MAKE THE BACKSLOPE TRAVERSABLE IN THE AREA OF THE INLET AS INDICATED.
3. SPACE CONTRACTION JOINTS TO ALIGN WITH ADJACENT PAVEMENT JOINTS TO ELIMINATE SAWCUT AND SYMPATHY CRACKING. SEAL AS SPECIFIED IN PUBLICATION 408, SECTION 501.3(n).
4. PLACE PREMOLDED EXPANSION JOINT FILLER MATERIAL 13 (1/2") THICK AND POLYSTYRENE BOND BREAKER 6 (1/4") THICK ADJACENT TO CURBS AND OTHER STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
5. PROVIDE ELONGATED ISLANDS NOT LESS THAN 1.2 m (4'-0") WIDE AND 6.0 m (20'-0") LONG, EXCEPT IN SPECIAL CASES WHERE SPACE IS SEVERELY LIMITED.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

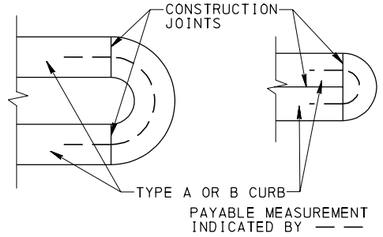


CONCRETE MOUNTABLE CURB ON EXISTING CONCRETE PAVEMENT AND BRIDGE DECKS

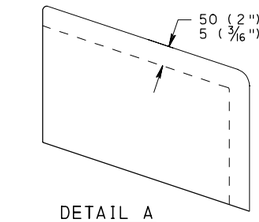
† PLANS MAY PROVIDE FOR A DEEPER FACE AT CURB WHEN AN OVERLAY IS PLACED ON THE EXISTING PAVEMENT. HOWEVER, BUILD EXPOSED FINAL FACE OF CURB AT 50 (2") MAXIMUM.

TYPICAL CONSTRUCTION

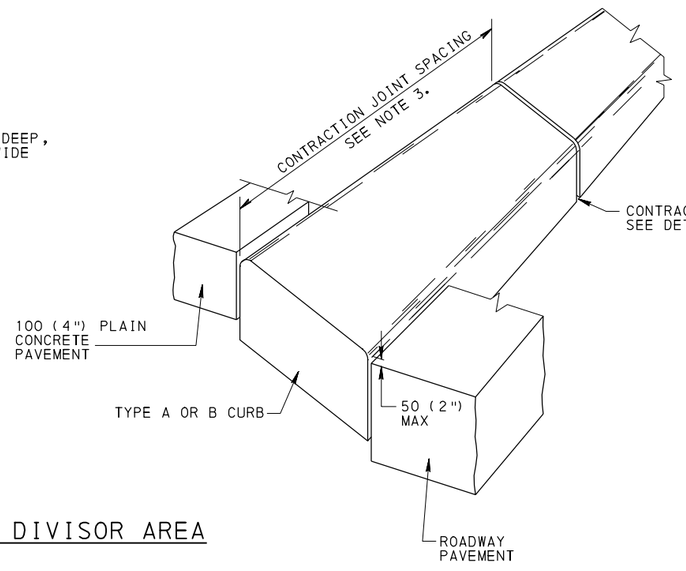




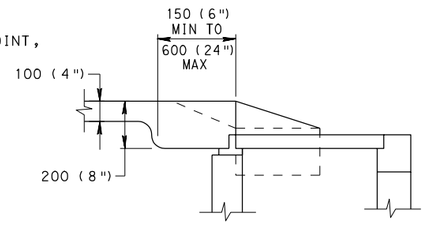
END DETAILS



DETAIL A
CONTRACTION JOINT



TYPICAL DIVISOR AREA



SECTION A-A

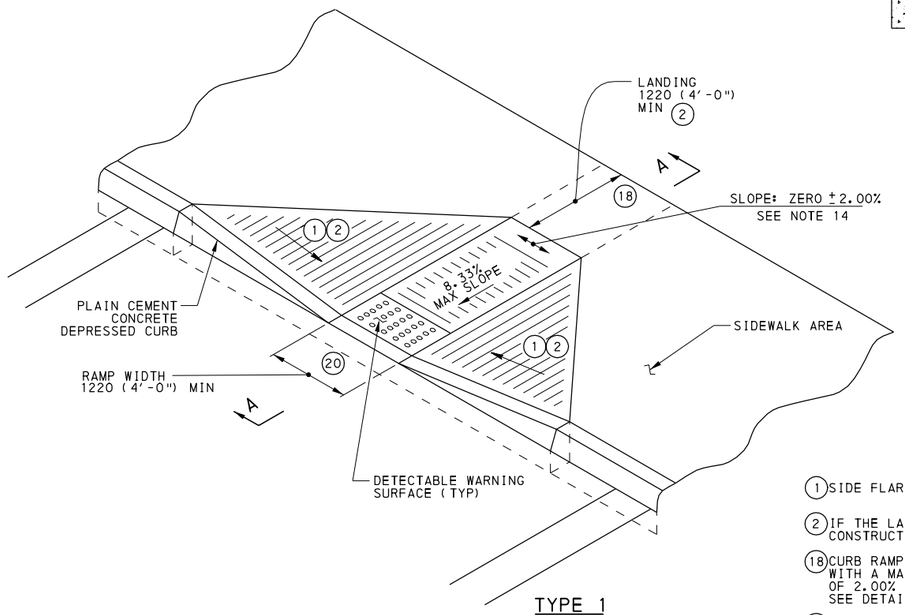
TREATMENT FOR CONCRETE MOUNTABLE CURBS AT INLETS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

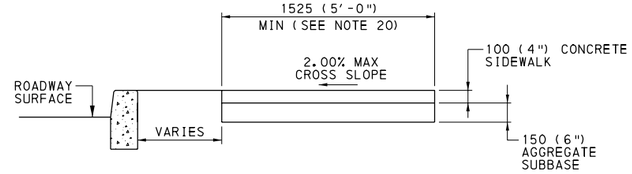
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MOUNTABLE CURBS

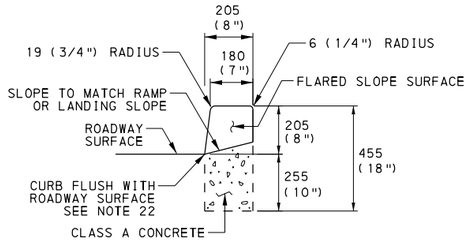
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
CHIEF, HWYS QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-65M



TYPE 1
CURB RAMP



SIDEWALK
TYPICAL SECTION



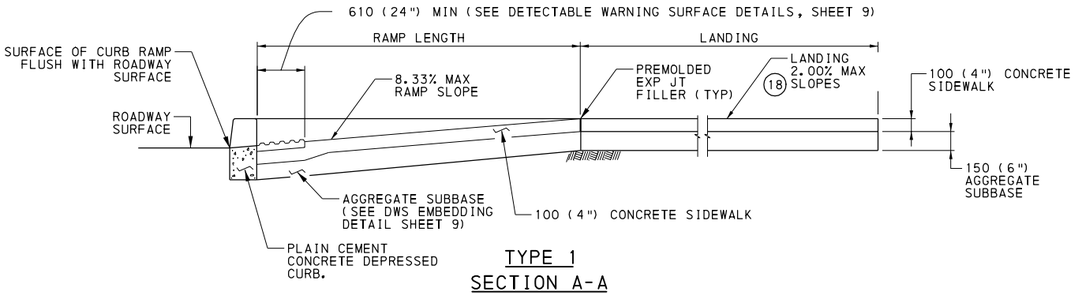
DEPRESSED CURB
FOR CURB RAMPS

(1) SIDE FLARES 10.00% MAX SLOPE

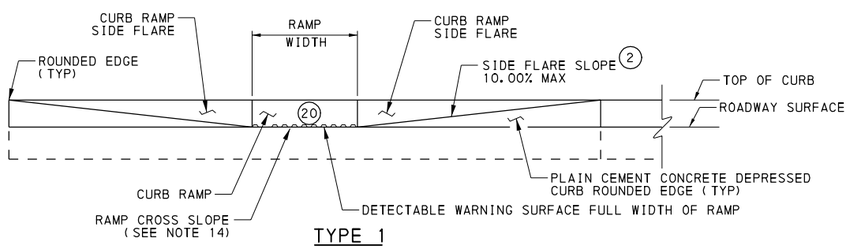
(2) IF THE LANDING IS INDICATED TO BE LESS THAN 1220 (4'-0"), CONSTRUCT SIDE FLARES 8.33% MAX SLOPE.

(18) CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

(20) CONSTRUCT DEPRESSED CURB SLOPE TO MATCH ROADWAY PROFILE AND HAVE A FLUSH CONNECTION. DO NOT EXCEED 3.00% PER 305 (1'-0") CROSS SLOPE RATE OF CHANGE WHEN TRANSITIONING FROM LEVEL LANDING TO ROADWAY PROFILE. A TECHNICALLY INFEASIBLE FORM IS REQUIRED WHEN RAMP CROSS SLOPE EXCEEDS 2.00%.



TYPE 1
SECTION A-A



TYPE 1
ELEVATION

PERCENT SLOPE	EQUIVALENT SLOPE
10.00%	10:1 (1:10)
8.33%	12:1 (1:12)
7.14%	14:1 (1:14)
5.00%	20:1 (1:20)
2.00%	50:1 (1:50)
1.00%	100:1 (1:100)

EQUIVALENT SLOPES

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 350, 409, 630, 676 AND 694.
2. PROVIDE EXPANSION JOINT MATERIAL 13 (1/2") THICK WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.
3. CONSTRUCT CURB RAMPS WITH A MINIMUM 1220 X 1220 (4'-0" X 4'-0") CLEAR SPACE BEYOND THE CURB FACE, WITHIN THE WIDTH OF THE CROSSWALK AND WHOLLY OUTSIDE THE PARALLEL VEHICLE TRAVEL LANE. SEE SHEET 7 FOR CROSSWALK DETAILS.
4. SEAL JOINTS WITH AN APPROVED SEALING MATERIAL.
5. PROVIDE SLIP RESISTANT TEXTURE ON CURB RAMP BY COARSE BROOMING TRANSVERSE TO THE SLOPE OF THE RAMP. EXTEND TEXTURE THE FULL WIDTH AND LENGTH OF THE CURB RAMP INCLUDING FLARED SIDE RAMPS.
6. MODIFY CONSTRUCTION DETAILS TO ADAPT DIMENSIONS TO EXISTING CURB HEIGHTS WHERE THE CURB IS LESS THAN THE STANDARD 205 (8") HEIGHT.
7. CURB RAMP AND SIDE FLARE LENGTHS ARE VARIABLE AND BASED ON CURB HEIGHT AND THE SIDEWALK SLOPE.
8. TO AVOID CHASING GRADE INDEFINITELY WHEN TRAVERSING THE HEIGHT OF CURB, RAMP LENGTH NOT TO EXCEED 4500 (15'-0"). ADJUST RAMP SLOPE AS NEEDED TO PROVIDE ACCESS TO THE MAXIMUM EXTENT FEASIBLE.
9. NON-WALK AREA IS AN OBSTRUCTED OR GRASS/NON-PAVED AREA ADJACENT TO THE PEDESTRIAN ACCESS ROUTE THAT IS NOT USED BY THE PEDESTRIAN FOR ACCESS.
10. THE DETAILS DEPICT PEDESTRIAN PUSHBUTTON POLES TO ILLUSTRATE THE RECOMMENDED PLACEMENT OF PEDESTRIAN PUSHBUTTONS. FOR ALTERATION PROJECTS, PROVIDE ACCESS TO EXISTING PEDESTRIAN PUSHBUTTONS TO THE MAXIMUM EXTENT FEASIBLE. INSTALL PEDESTRIAN PUSHBUTTON STUB POLES, WHERE APPLICABLE, SO AS NOT TO CREATE PEDESTRIAN OBSTRUCTIONS.
11. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. US CUSTOMARY UNITS IN () PARENTHESIS.
12. ALIGN DETECTABLE WARNING SURFACE TRUNCATED DOMES ON A SQUARE GRID IN THE PREDOMINANT DIRECTION OF THE RAMP AND PERPENDICULAR TO CURB.
13. PROVIDE DETECTABLE WARNING SURFACES (DWS) 610 (24") MINIMUM (IN THE DIRECTION OF PEDESTRIAN TRAVEL) ACROSS FULL WIDTH OF RAMP AT THE GRADE BREAK NEAR STREET EDGE. PROVIDE DWS THAT CONTRAST VISUALLY WITH ADJACENT WALKWAY SURFACES, EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT FOR THE FULL WIDTH OF RAMP.
14. FOR NEW CONSTRUCTION, DO NOT EXCEED 2.00% CROSS SLOPE ON THE CURB RAMP OR PEDESTRIAN ACCESSIBLE ROUTE.
15. FOR NEW CONSTRUCTION AND ALTERATIONS, CONSTRUCT CURB RAMP AND FLARE SLOPES WITH THE FLATTEST SLOPE POSSIBLE. THE SLOPES INDICATED IN THE DETAILS SHOW THE MAX SLOPE ALLOWABLE. SLOPES THAT EXCEED THOSE INDICATED IN THE DETAILS, OR CONTRACT DOCUMENTS AS APPLICABLE, WILL NOT BE ACCEPTED AND WILL BE RECONSTRUCTED.
16. CONSTRUCT SIDEWALKS AT A LONGITUDINAL SLOPE NOT TO EXCEED 5.00%. FOR ROADWAY PROFILE SLOPES THAT EXCEED 5.00%, CONSTRUCT PARALLEL SIDEWALKS ADJACENT TO ROADWAY AT A LONGITUDINAL SLOPE NOT TO EXCEED ROADWAY PROFILE SLOPE.
17. THE CHANGE IN GRADE AT THE BOTTOM OF THE CURB RAMP AND ADJOINING ROAD SURFACE IS NOT TO EXCEED AN ALGEBRAIC DIFFERENCE OF 11.00%. THE COUNTER SLOPE OF THE GUTTER OR ROAD AT THE FOOT OF A CURB RAMP, LANDING OR BLENDED TRANSITION IS NOT TO EXCEED 5.00%. SEE SHEET 8 FOR DETAILS.
18. THE CONSTRUCTION STANDARDS DEPICTED ARE MOST APPROPRIATE FOR NEW CONSTRUCTION. ALL CONSTRUCTION MUST MEET THE STANDARDS CONTAINED HEREIN UNLESS OTHERWISE NOTED OR DIRECTED.
19. ALL SLOPES ARE MEASURED WITH RESPECT TO A LEVEL PLANE. THEREFORE, THE LENGTH OF RAMP IS NOT SOLELY DEPENDANT ON THE HEIGHT OF CURB. (FOR EXAMPLE, A 150 (6") CURB DOES NOT NECESSARILY MEAN A RAMP LENGTH OF 1830 (6'-0") FOR A 12:1 (1:12) SLOPE.
20. SIDEWALK WIDTH MAY BE REDUCED TO 1220 (4'-0"), WHEN PASSING AREAS 1525 X 1525 (5'-0" X 5'-0") ARE PROVIDED EVERY 61 METERS (200').
21. THE TRAVEL LANE IS DEFINED BY THE OUTSIDE EDGE OF THE WHITE PAVEMENT MARKING LINE. IF A WHITE PAVEMENT MARKING LINE DOES NOT EXIST, THE TRAVEL LANE IS DEFINED BY THE CONTRACT DOCUMENTS.
22. CONSTRUCT DEPRESSED CURB FOR CURB RAMPS FLUSH TO ADJACENT ROADWAY. GRADE EDGE OF ROAD ELEVATIONS AT THE FLOW LINE TO ENSURE POSITIVE DRAINAGE AND PREVENT PONDING. FOR LEVEL LANDINGS BEHIND DEPRESSED CURB, ADJUST SLOPES TO PROVIDE POSITIVE DRAINAGE.
23. CHEEK WALLS ARE PERMITTED WHEN ADJACENT TO NON-WALK AREAS OR ELEVATION DIFFERENCES CANNOT BE ACCOMMODATED BY FLARES OR GRADING. GRADE GRASS AREAS OR OTHER NON-WALK AREAS AT 3:1 (1:3) MAXIMUM. DO NOT INSTALL CHEEK WALLS THAT INTERSECT THE PEDESTRIAN ACCESS ROUTE.
24. CONSTRUCT TOP OF PLAIN CEMENT CONCRETE DEPRESSED CURB TO BE FLUSH WITH ADJACENT SURFACES (RAMPS, SIDEWALKS, FLARES).
25. FOR CURB RAMPS THAT LEAD TO A SINGLE CROSSWALK, THE RAMP (EXCLUDING FLARES) TO BE FULLY INSIDE OF MARKED CROSSWALK LINES. SEE SHEET 7 FOR DETAILS.
26. A 1220 (4'-0") MAXIMUM DIGITAL DISPLAY LEVEL WILL BE USED TO VERIFY THE SLOPES OF CURB RAMPS AND SIDEWALKS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CURB RAMPS AND SIDEWALKS

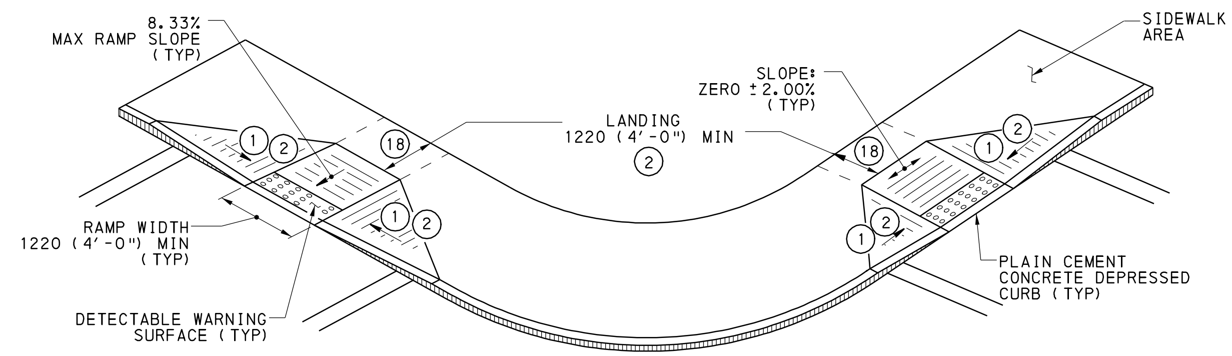
NEW CONSTRUCTION OR ALTERATION DETAILS
TYPE 1 TYPICAL SECTIONS

RECOMMENDED JUN. 1, 2010
R. Wood Willey
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

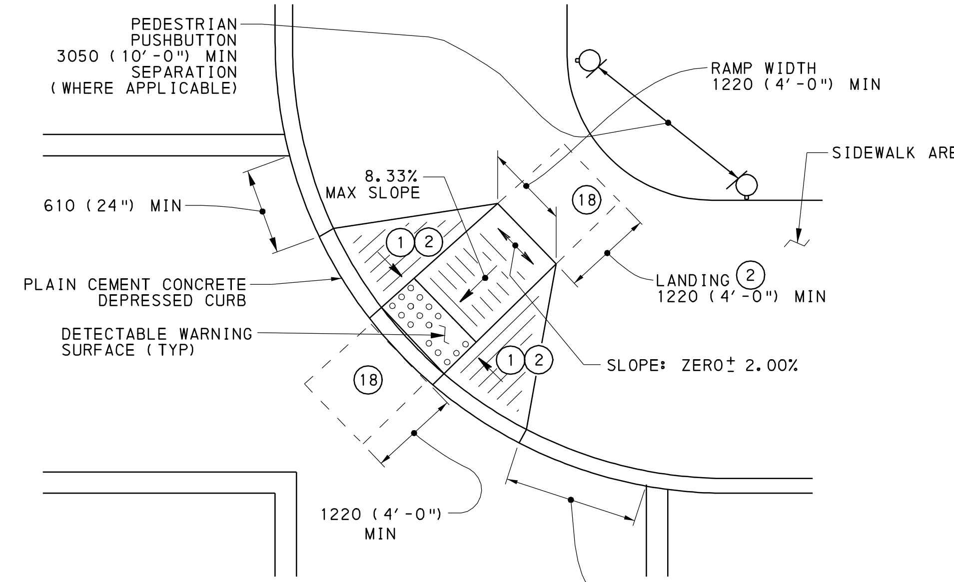
SHT 1 OF 13

RC-67M

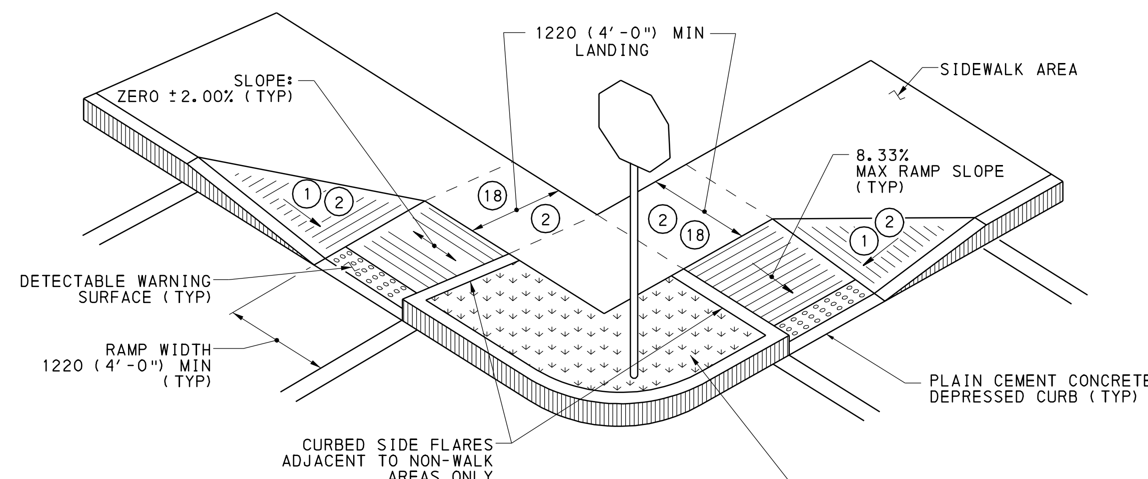


NOTE: IF SPACE IS LIMITED, IT MAY BE NECESSARY TO CURB THE SIDE FLARES OF THE TYPE 1 CURB RAMPS (SEE ALTERNATE INSTALLATION DETAIL BELOW). PEDESTRIAN TRAFFIC SHOULD NOT BE DIRECTED TO CROSS THE VERTICAL DROP.

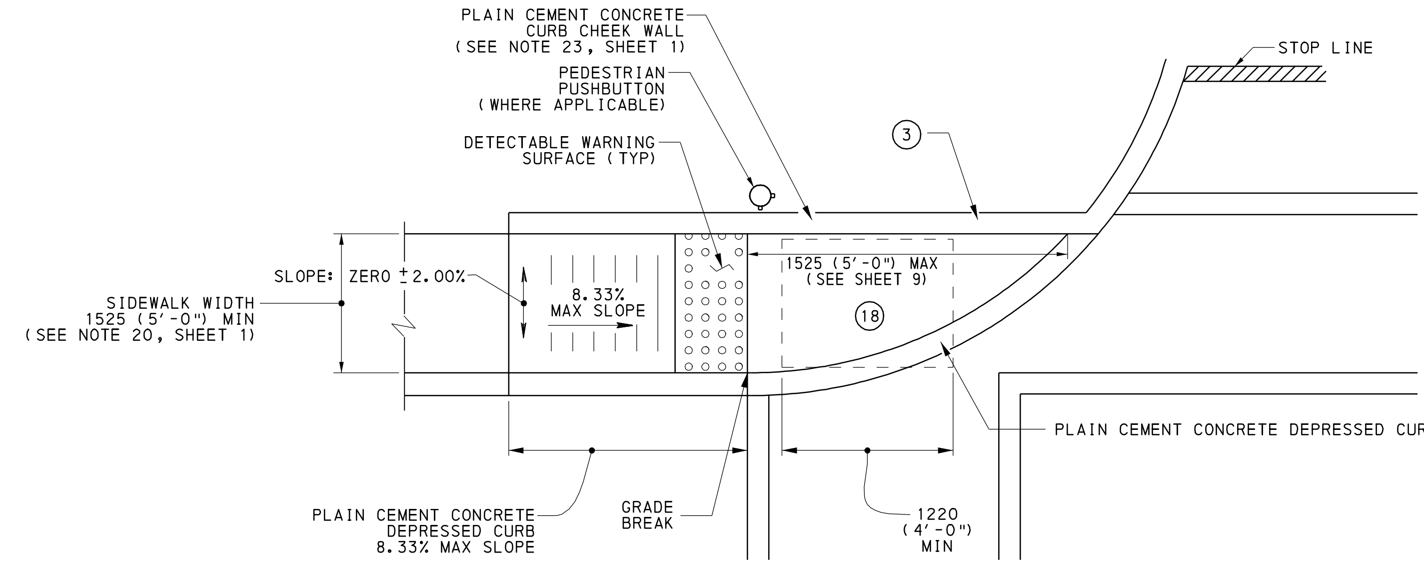
TYPE 1
DOUBLE CURB RAMPS
(PREFERRED INSTALLATION)



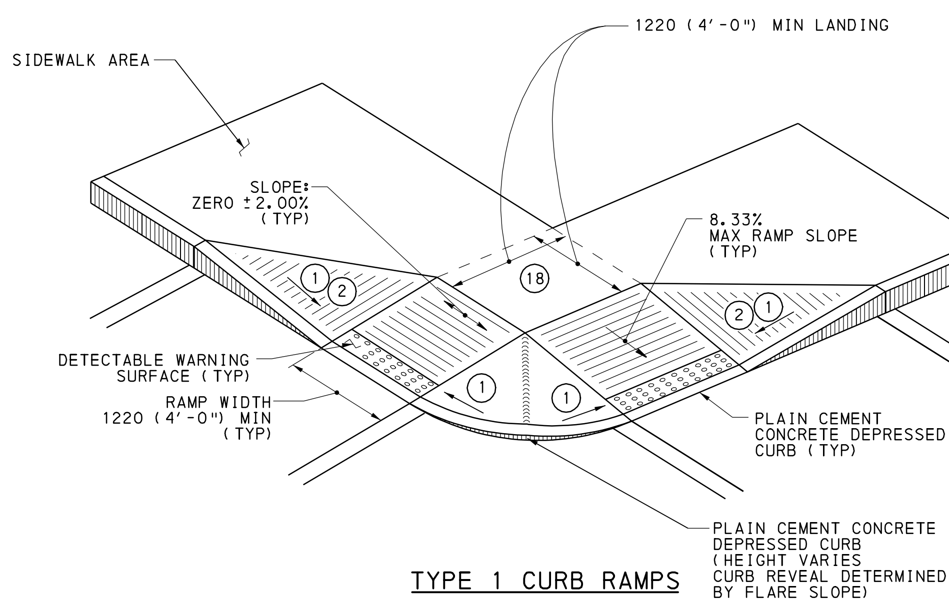
TYPE 1
CURB RAMP
(DIAGONAL - REQUIRES ASSISTANT DISTRICT EXECUTIVE APPROVAL)



TYPE 1
DOUBLE CURB RAMPS
(ALTERNATE INSTALLATION)



TYPE 1A
CURB RAMP
ASSISTANT DISTRICT EXECUTIVE APPROVAL
REQUIRED IF LANDING FOR TURNING MANEUVER
IS NOT ENTIRELY ON SIDEWALK



TYPE 1 CURB RAMPS
WITH SHARED LANDING

(1) SIDE FLARES 10.00% MAX SLOPE

(2) IF THE LANDING IS INDICATED TO BE LESS THAN 1220 (4'-0"), CONSTRUCT SIDE FLARES 8.33% MAX SLOPE.

(3) OPTIONAL ROLLED CONCRETE SURFACE OR REGRADE SLOPE CAN BE USED TO MEET THE ADJACENT SURFACES IN LIEU OF A RETURN CURB CHEEK WALL.

(18) CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

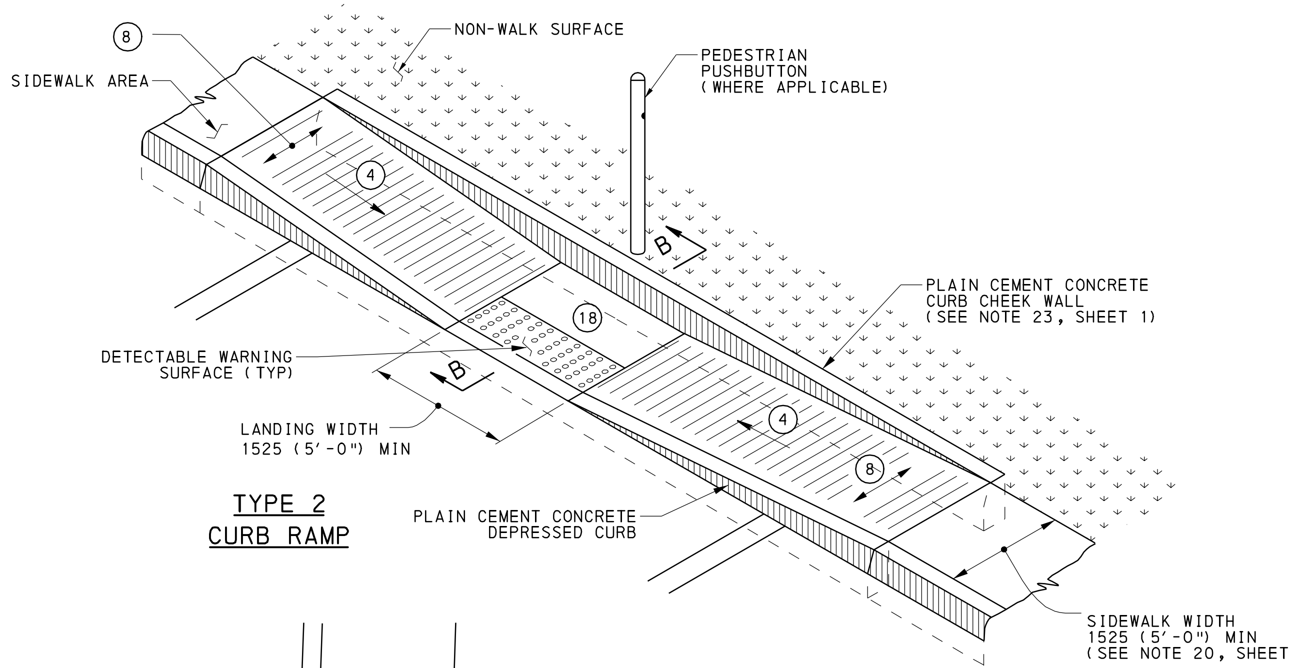
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

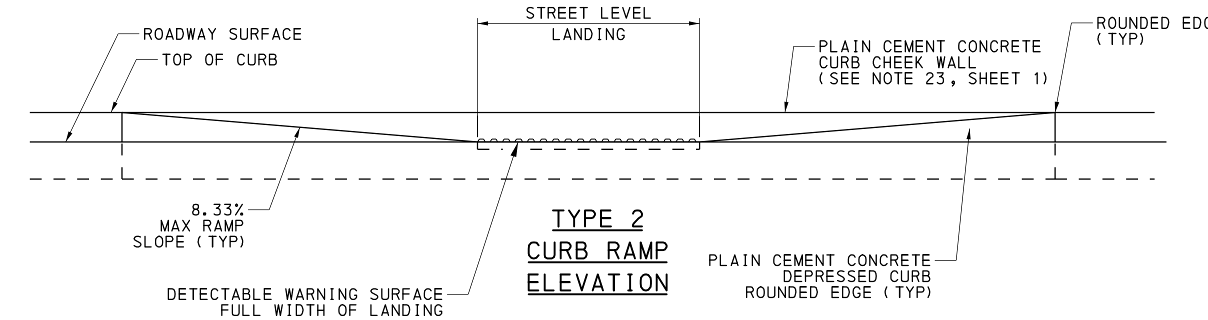
CURB RAMPS AND SIDEWALKS

NEW CONSTRUCTION OR ALTERATION DETAILS
TYPE 1 CURB RAMPS

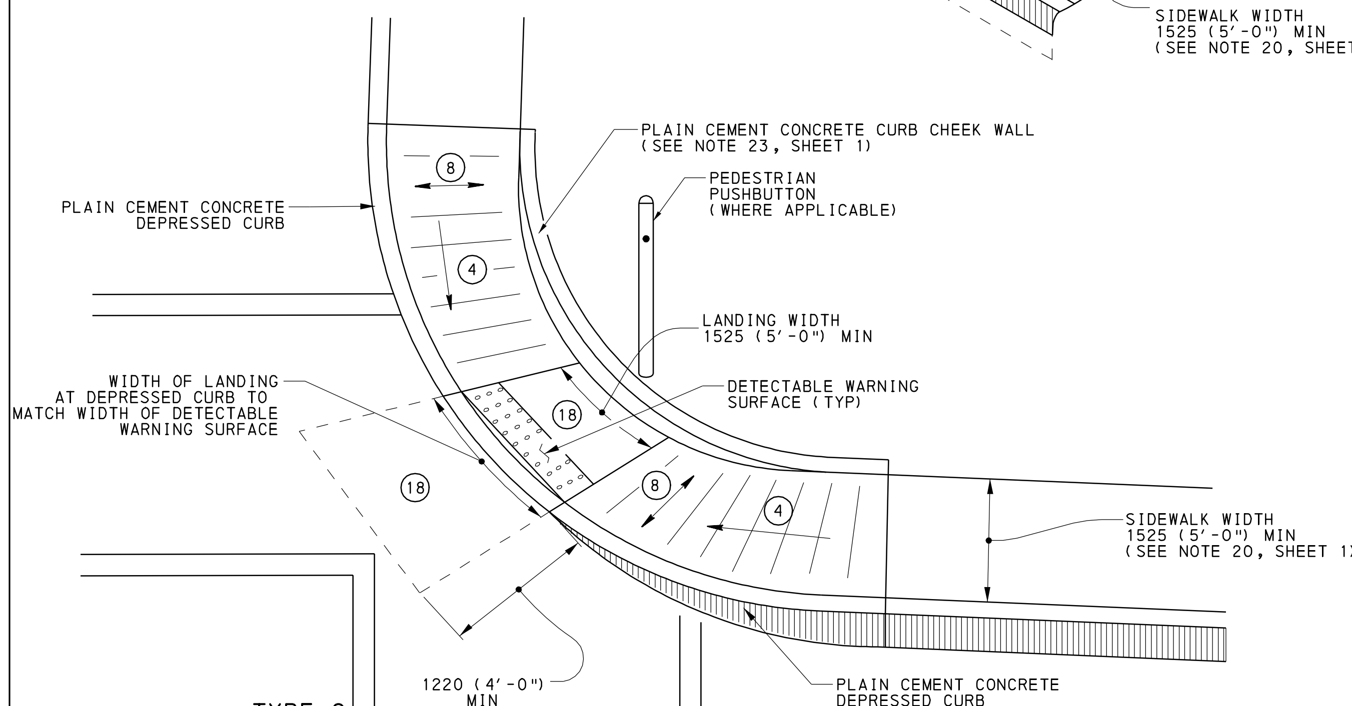
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 13
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-67M



TYPE 2
CURB RAMP

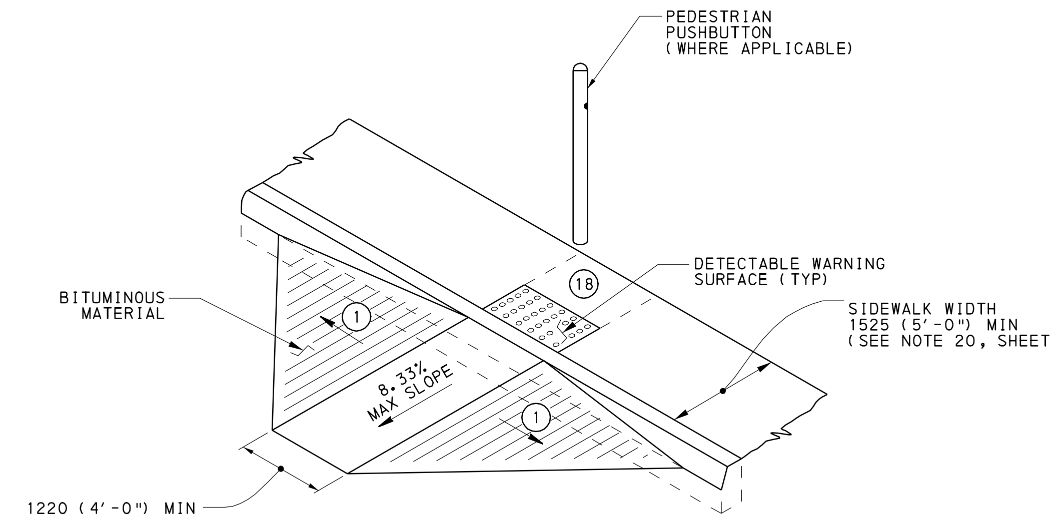


TYPE 2
CURB RAMP
ELEVATION



TYPE 2
CURB RAMP

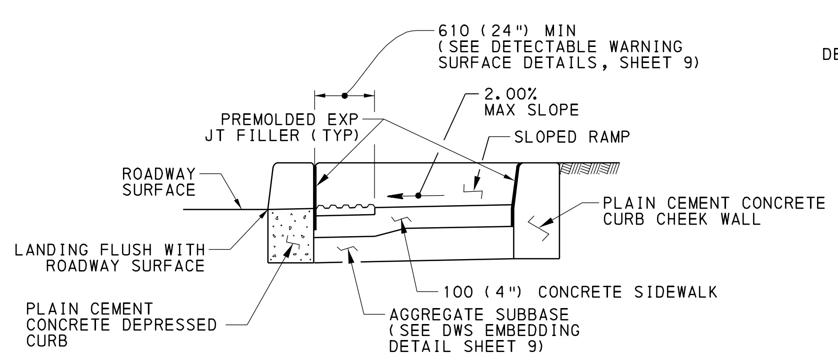
ASSISTANT DISTRICT EXECUTIVE APPROVAL
REQUIRED IF LANDING FOR TURNING MANEUVER
IS NOT ENTIRELY ON SIDEWALK



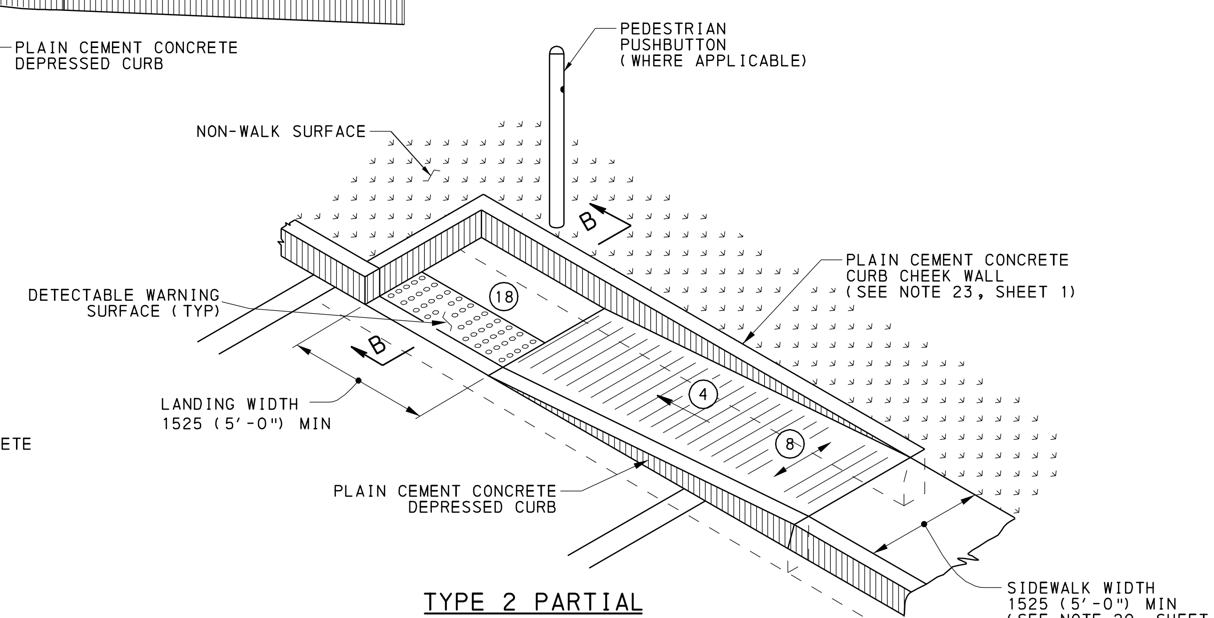
NOTES: DO NOT USE TYPE 3 CURB RAMPS IN VEHICULAR TRAFFIC LANES, PARKING SPACES, OR ACCESS AISLES.

CONSTRUCT TYPE 3 BUILT-UP CURB RAMP OF BITUMINOUS MATERIAL AS INDICATED, INCLUDING SURFACE PREPARATION AND TACK COAT, AS REQUIRED.

TYPE 3
CURB RAMP
(BUILT-UP, FOR ALTERATIONS ONLY)



TYPE 2
CURB RAMP
SECTION B-B



TYPE 2 PARTIAL
CURB RAMP

(1) SIDE FLARES 10.00% MAX SLOPE

(4) 8.33% MAX RAMP SLOPE

(8) SLOPE: ZERO ±2.00%

(18) CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

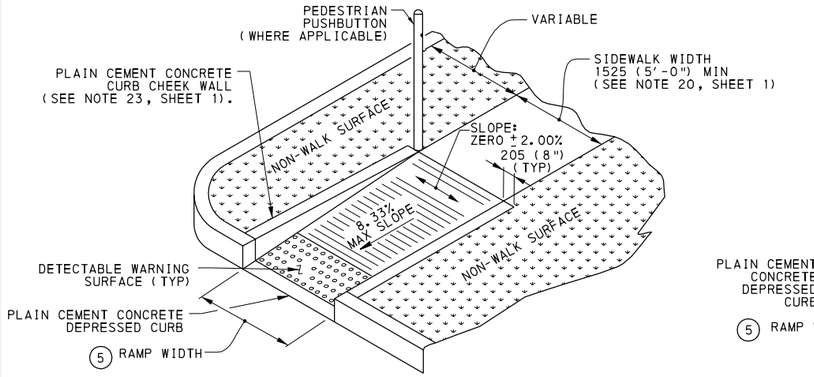
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

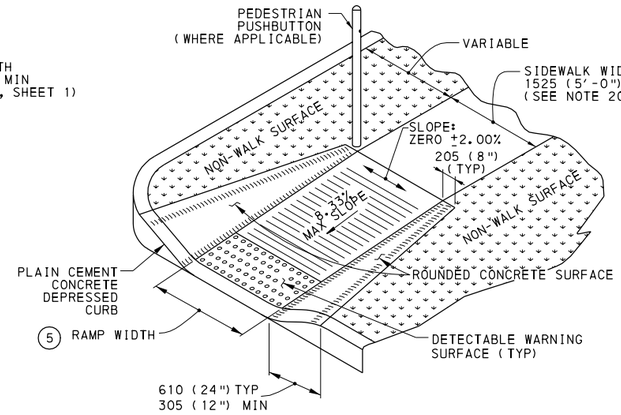
CURB RAMPS AND SIDEWALKS

NEW CONSTRUCTION OR
ALTERATION DETAILS
TYPE 2 AND TYPE 3 CURB RAMPS

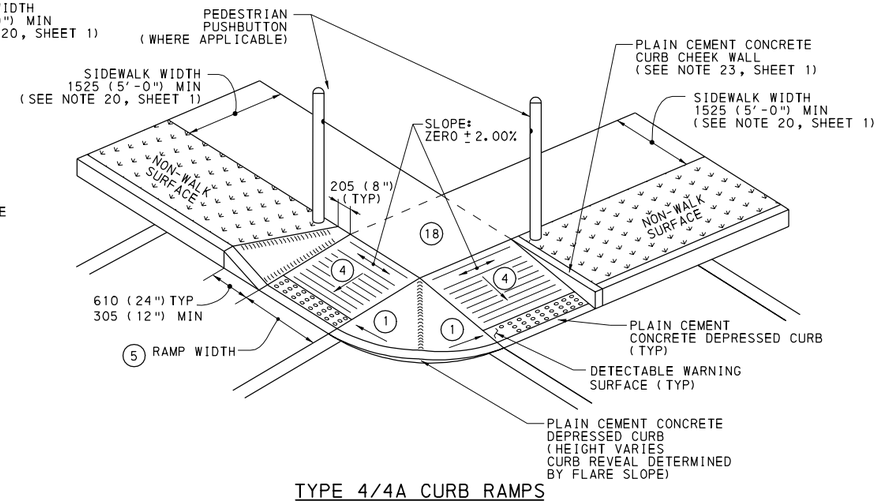
RECOMMENDED ---. --, 2009	RECOMMENDED JUN. 1, 2010	SHT 3 OF 13
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-67M



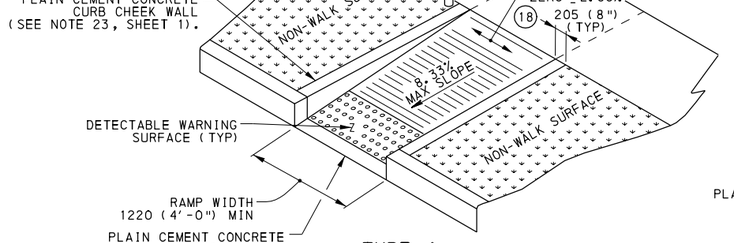
TYPE 4
CURB RAMP
(PARALLEL)



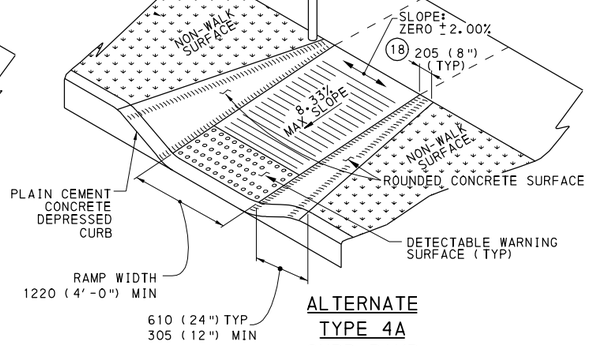
ALTERNATE
TYPE 4A
CURB RAMP
(PARALLEL)



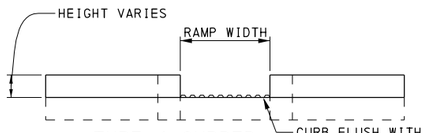
TYPE 4/4A CURB RAMPS
WITH SHARED LANDING



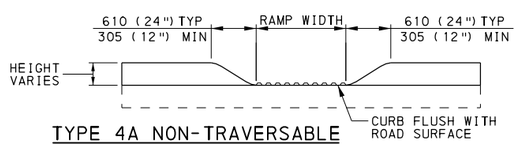
TYPE 4
CURB RAMP
(PERPENDICULAR)



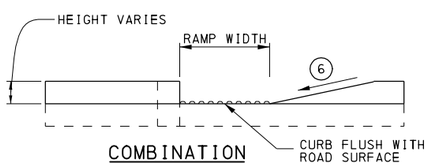
ALTERNATE
TYPE 4A
CURB RAMP
(PERPENDICULAR)



TYPE 4 CURBED
FLARE TRANSITION



TYPE 4A NON-TRAVERSABLE
ROLLED FLARE TRANSITION



COMBINATION
TRANSITION

TYPICAL ELEVATIONS
FOR DEPRESSED CURBS

(1) SIDE FLARES 10.00% MAX SLOPE

(4) 8.33% MAX RAMP SLOPE

(5) CURB RAMP WIDTH IS EQUAL TO SIDEWALK WIDTH WHEN THE SIDEWALK WIDTH IS GREATER THAN OR EQUAL TO THE MINIMUM 1220 (4'-0").

(6) SLOPE VARIES SEE RAMP DETAILS

(18) CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

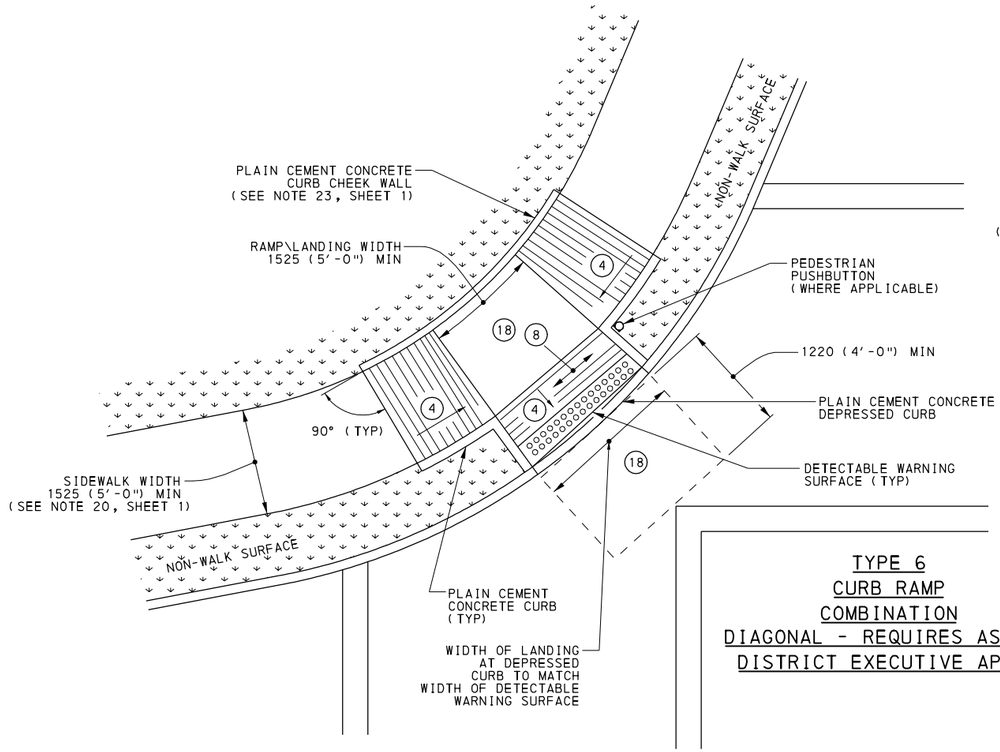
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

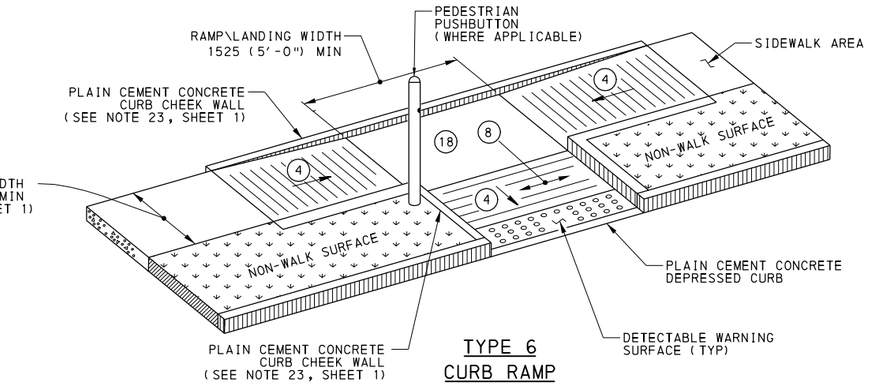
CURB RAMPS AND SIDEWALKS

NEW CONSTRUCTION OR ALTERATION DETAILS
TYPE 4 CURB RAMPS

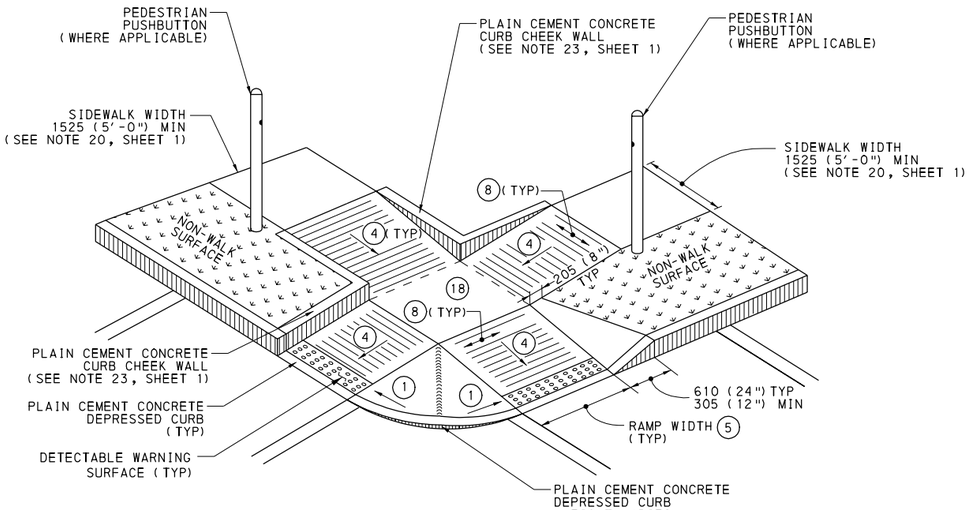
RECOMMENDED JUN. 1, 2010 R. Wyatt Dilley CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 Bruce E. Hyson DIRECTOR, BUREAU OF DESIGN	SHT 4 OF 13 RC-67M



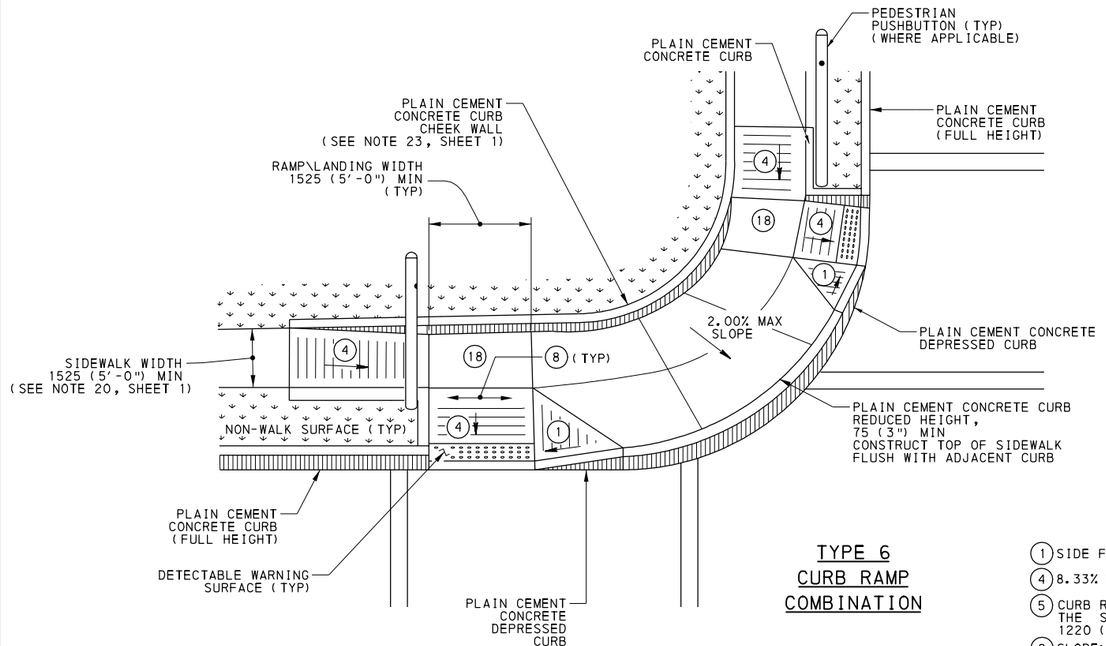
TYPE 6
CURB RAMP
COMBINATION
DIAGONAL - REQUIRES ASSISTANT
DISTRICT EXECUTIVE APPROVAL



TYPE 6
CURB RAMP
COMBINATION



TYPE 6 CURB RAMPS
WITH SHARED LANDING



TYPE 6
CURB RAMP
COMBINATION

(1) SIDE FLARES 10.00% MAX SLOPE
(4) 8.33% MAX RAMP SLOPE
(5) CURB RAMP WIDTH IS EQUAL TO SIDEWALK WIDTH WHEN THE SIDEWALK WIDTH IS GREATER THAN OR EQUAL TO 1220 (4'-0").
(8) SLOPE: ZERO ± 2.00%
(18) CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CURB RAMPS AND SIDEWALKS NEW CONSTRUCTION OR ALTERATION DETAILS TYPE 6 CURB RAMPS AND TYPICAL ELEVATIONS

RECOMMENDED JUN. 1, 2010
R. Wade Willy
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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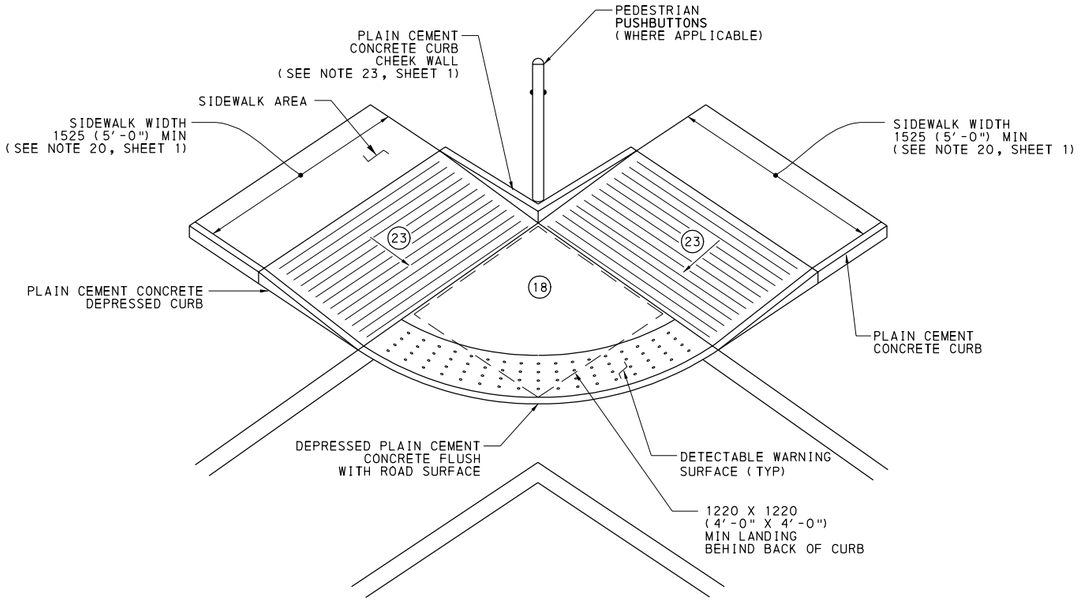
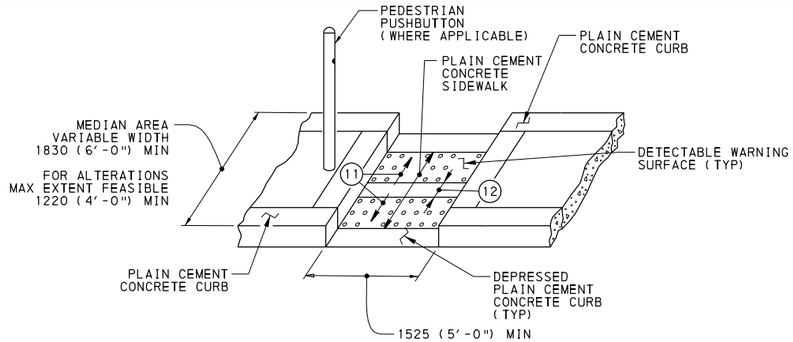


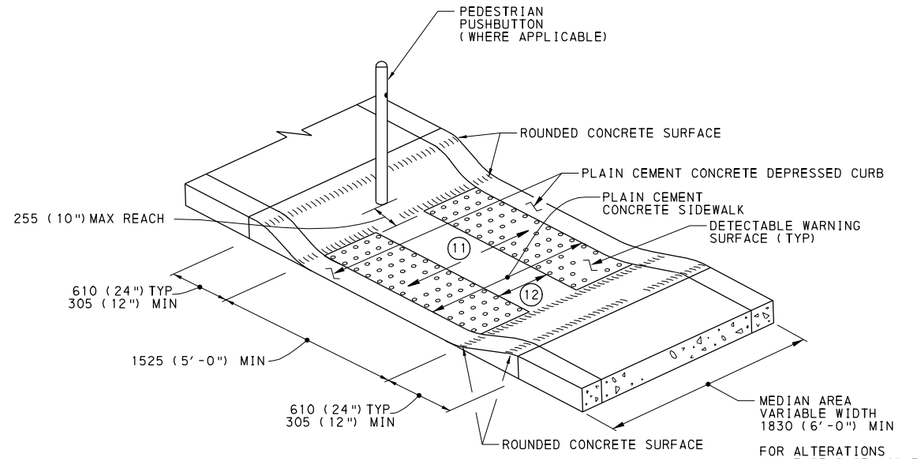
NOTE: DO NOT INSTALL GRATINGS, ACCESS COVERS AND OTHER APPURTENANCES ON THE BLENDED TRANSITION SURFACE WITHIN THE PEDESTRIAN ACCESS ROUTE. EXISTING UTILITY COVERS IN THE PATH OF TRAVEL ARE ACCEPTABLE IF THE TOP SURFACE IS FLUSH [LESS THAN 6 (1/4") IN ELEVATION DIFFERENCE], FIRM, STABLE AND SLIP RESISTANT. INLET GRATES MUST HAVE OPENINGS NO GREATER THAN 13 (1/2") IN DIRECTION OF TRAVEL.

BLENDED TRANSITION



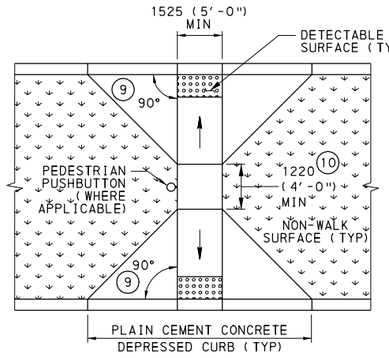
TYPE A
TYPICAL MEDIAN OR ISLAND ACCESS OPENING WITH CURB SIDES

(NARROW MEDIANS)

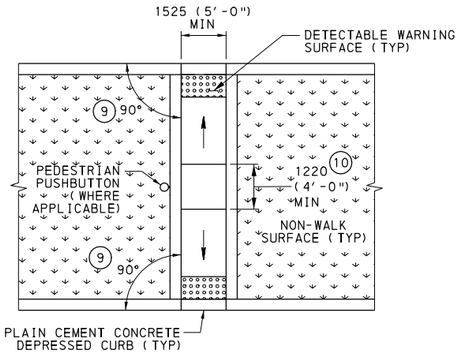


TYPE B
TYPICAL MEDIAN OR ISLAND ACCESS OPENING WITH FLARED SIDES

(NARROW MEDIANS)



RAMPED MEDIAN OR ISLAND ACCESS OPENING
(TYPE 1 DOUBLE CURB RAMPS)



RAMPED MEDIAN OR ISLAND ACCESS OPENING
(TYPE A DOUBLE CURB RAMPS)

(9) 90° DESIRABLE

(10) LANDINGS ARE NOT REQUIRED FOR LONGITUDINAL SLOPES 5.00% OR LESS

(11) PROVIDE ADEQUATE SLOPE FOR DRAINAGE (5.00% MAX)

(12) NO SEPARATION BETWEEN DETECTABLE WARNING SURFACES FOR MEDIANS WITH LESS THAN 1220 (4'-0") BETWEEN BACK OF CURBS.

(18) CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

(23) 5.00% MAX RUNNING SLOPE FOR BLENDED TRANSITION. FOR SLOPES GREATER THAN 5.00% SEE TYPE 2 CURB RAMPS ON SHEET 3 FOR ADDITIONAL DETAILS.

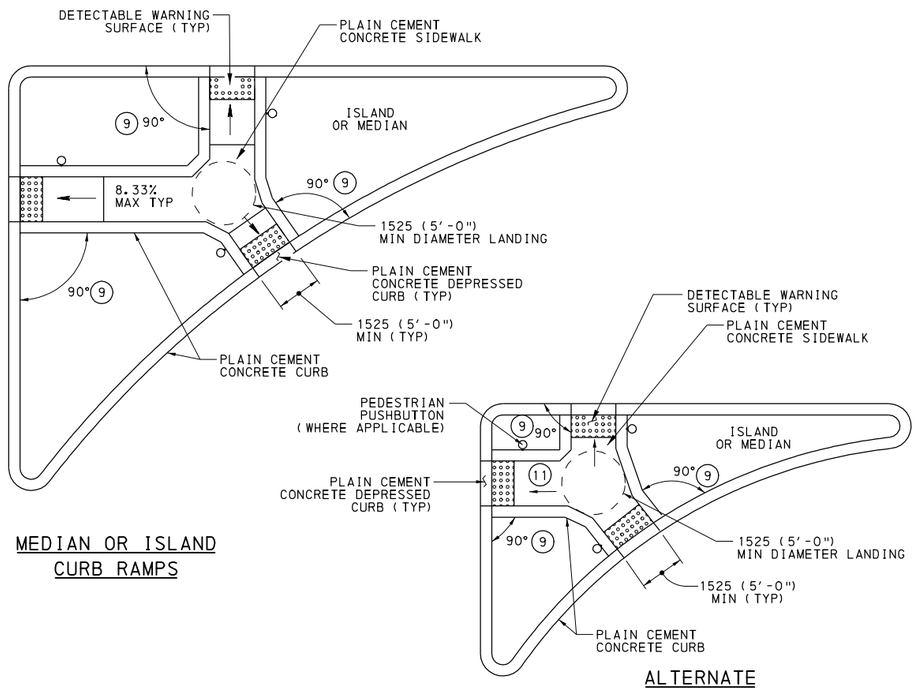
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CURB RAMPS AND SIDEWALKS

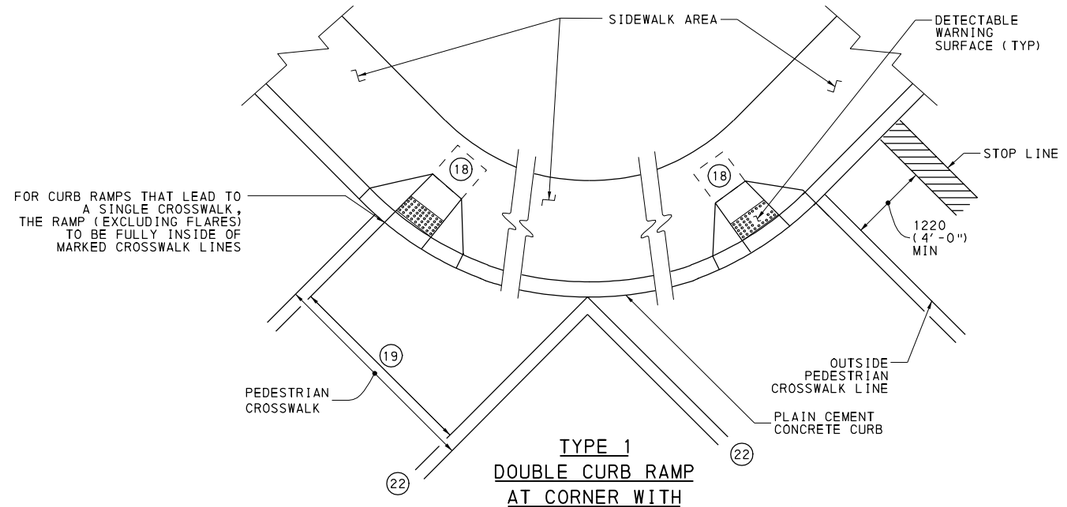
NEW CONSTRUCTION OR ALTERATION DETAILS
BLENDED TRANSITION / MEDIANS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 6 OF 13
R. Wyatt Dilley	Bruce E. Hyson	RC-67M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	

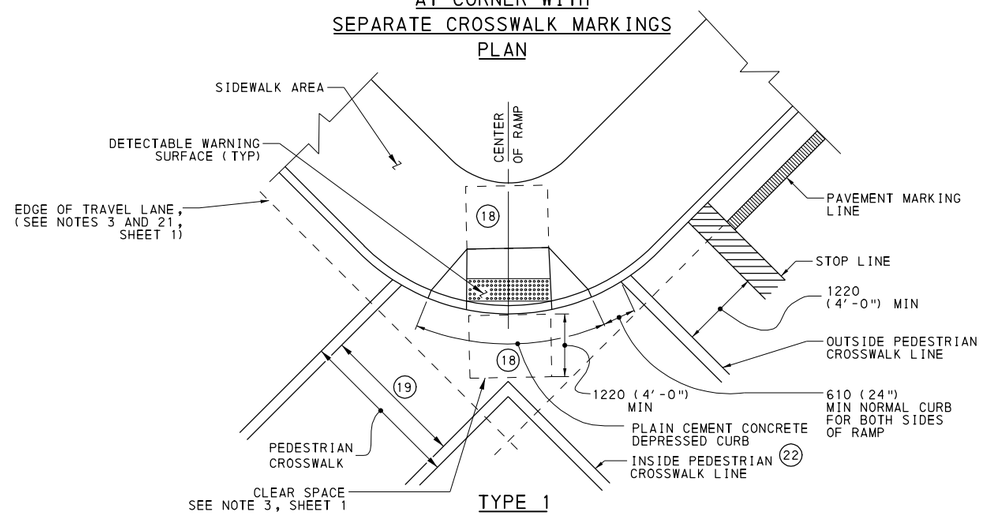


MEDIAN OR ISLAND CURB RAMPS

ALTERNATE SMALL ISLAND WITH CUT THROUGH



TYPE 1 DOUBLE CURB RAMP AT CORNER WITH SEPARATE CROSSWALK MARKINGS PLAN



TYPE 1 SINGLE CURB RAMP AT CORNER WITH CROSSWALK MARKINGS PLAN (DIAGONAL- REQUIRES ASSISTANT DISTRICT EXECUTIVE APPROVAL)

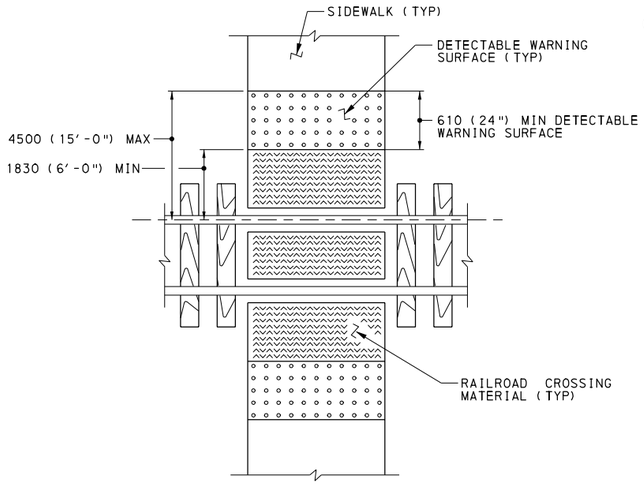
9 90° DESIRABLE

11 PROVIDE ADEQUATE SLOPE FOR DRAINAGE (5.00% MAX)

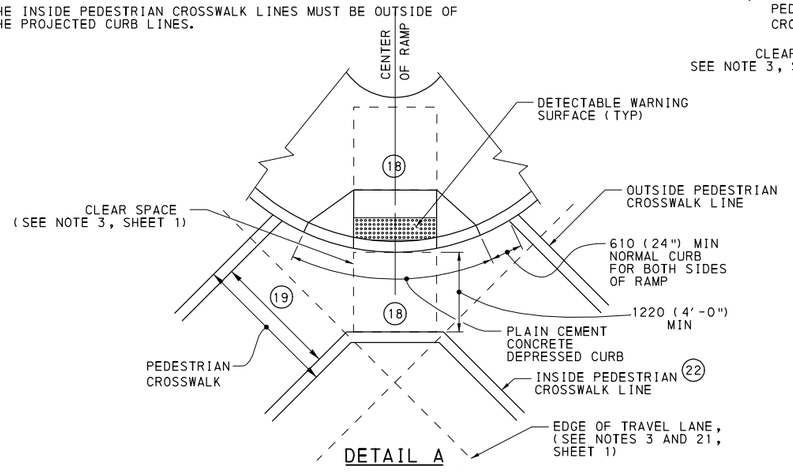
18 CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

19 1830 (6'-0") MIN MEASURED FROM INSIDE OF PAINTED EDGE TO INSIDE OF PAINTED EDGE

22 THE INSIDE PEDESTRIAN CROSSWALK LINES MUST BE OUTSIDE OF THE PROJECTED CURB LINES.



TYPICAL DETECTABLE WARNING SURFACE AT RAILROAD CROSSING



DETAIL A CLEAR SPACE AT CROSSWALK MARKINGS PLAN (DIAGONAL - REQUIRES ASSISTANT DISTRICT EXECUTIVE APPROVAL)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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CURB RAMPS AND SIDEWALKS NEW CONSTRUCTION OR ALTERATION DETAILS

CROSSWALKS, MEDIANS, RAILROAD CROSSING, DETECTABLE WARNING SURFACE

RECOMMENDED JUN. 1, 2010
R. Wood Willey
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
Bruce E. Thomas
DIRECTOR, BUREAU OF DESIGN

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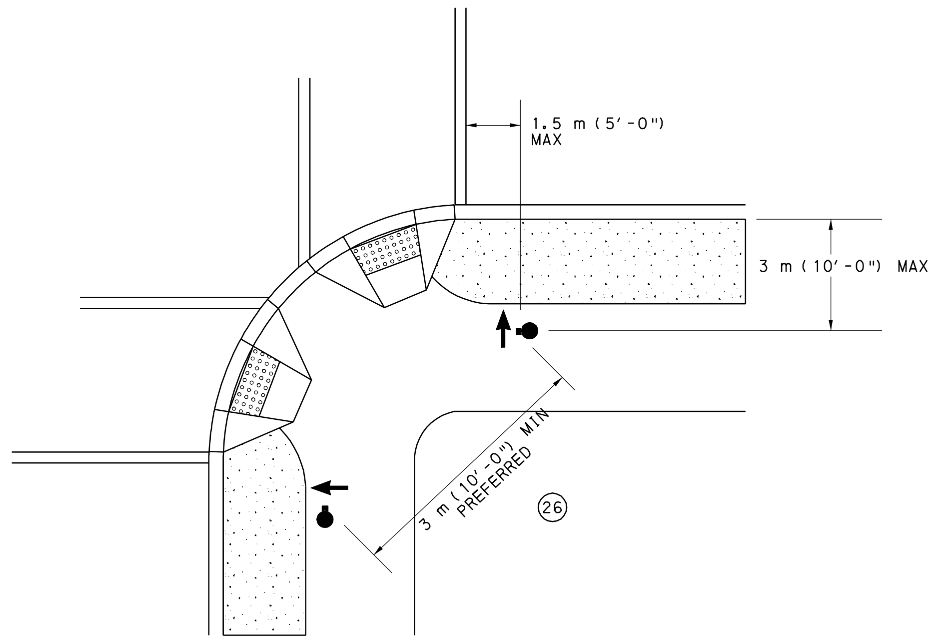
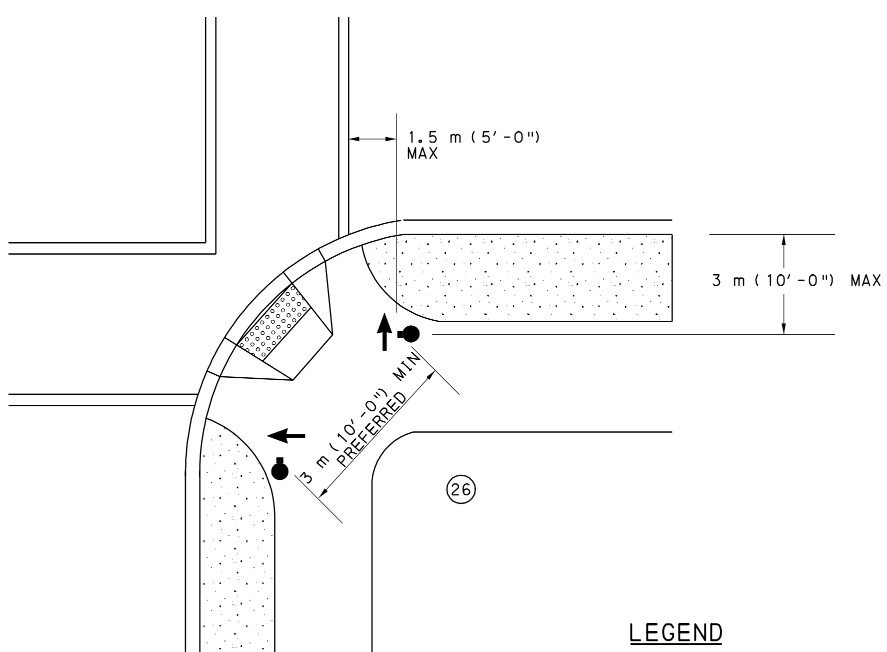


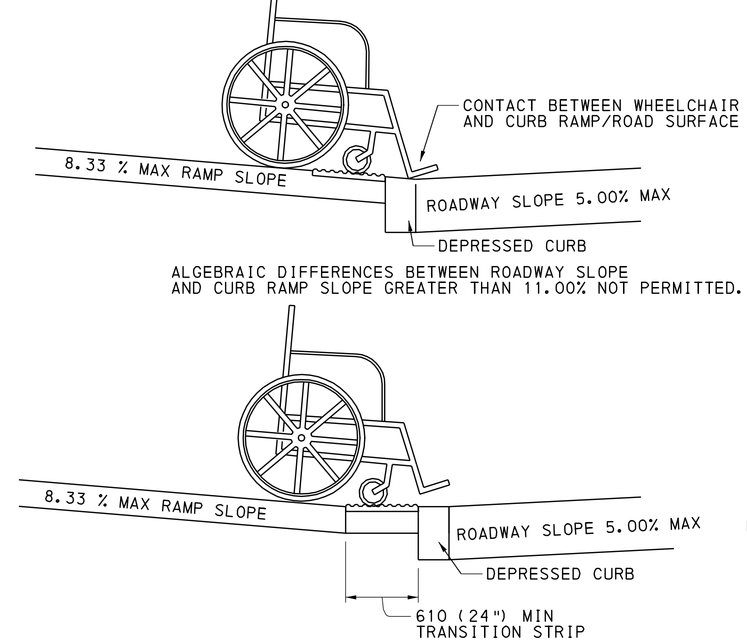
RECOMMENDED PUSHBUTTON LOCATIONS



RECOMMENDED PUSHBUTTON LOCATIONS

LEGEND

PEDESTRIAN PUSHBUTTON

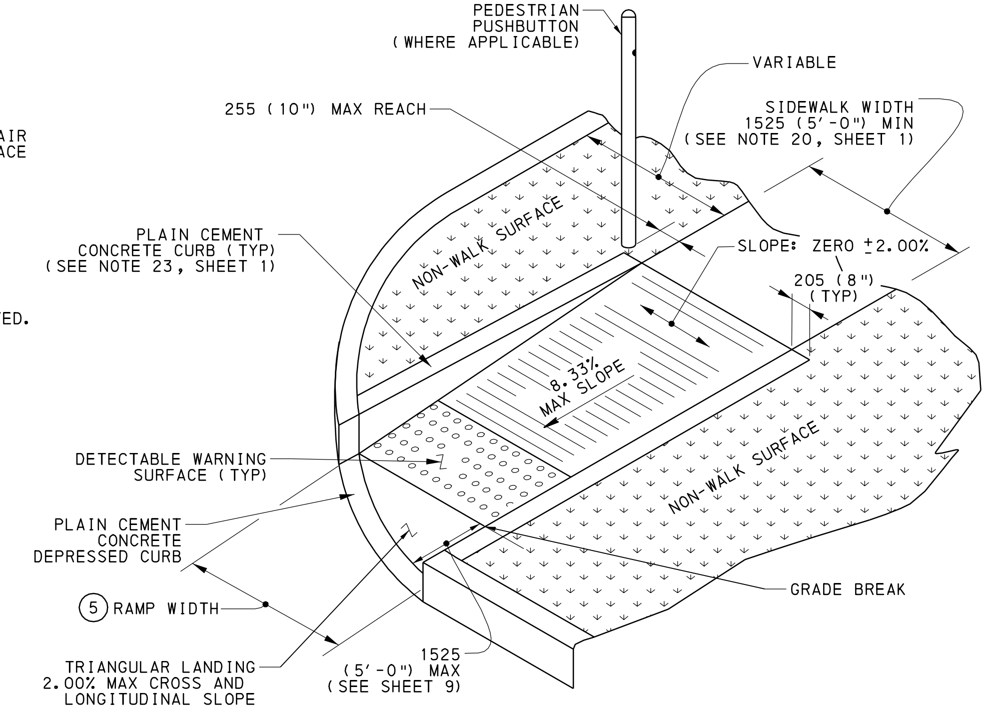


ALGEBRAIC DIFFERENCES BETWEEN ROADWAY SLOPE AND CURB RAMP SLOPE GREATER THAN 11.00% NOT PERMITTED.

PROVIDE A 610 (24") MIN TRANSITION STRIP IF ALGEBRAIC DIFFERENCES BETWEEN ROADWAY SLOPE AND CURB RAMP SLOPE ARE GREATER THAN 11.00%.

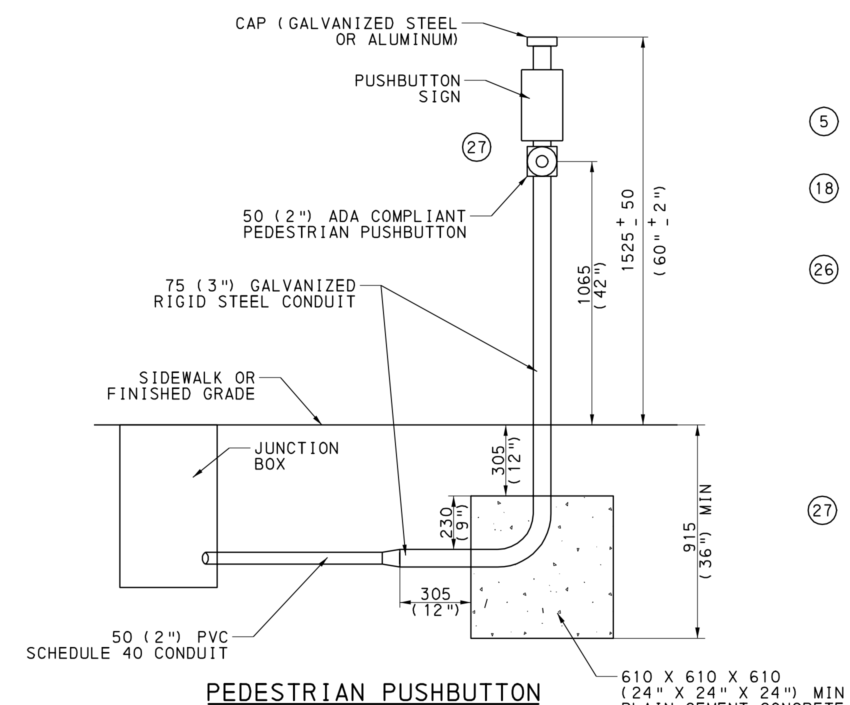
TRANSITION STRIP SLOPE NOT TO EXCEED 2.00%

CHANGE OF GRADE LIMITATIONS

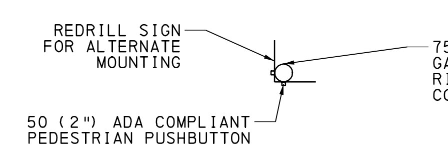


TRIANGULAR LANDING FOR DIRECTIONAL RAMPS ON CURB RETURNS

PROVIDE A LEVEL TRIANGULAR LANDING WHEN DIRECTIONAL RAMPS ARE INSTALLED ON A CURB RETURN TO TRANSITION THE GRADE BREAK.



PEDESTRIAN PUSHBUTTON DETAIL



PEDESTRIAN PUSH BUTTON DUAL SIGN MOUNTING DETAIL PLAN VIEW

(5) CURB RAMP WIDTH IS EQUAL TO SIDEWALK WIDTH WHEN THE SIDEWALK WIDTH IS GREATER THAN OR EQUAL TO 1220 (4'-0").

(18) CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.

(26) NEW CONSTRUCTION MUST COMPLY WITH RECOMMENDED LOCATIONS. FOR ALTERATION PROJECTS LOCATE PEDESTRIAN PUSHBUTTONS, TO THE MAXIMUM EXTENT FEASIBLE, AS FOLLOWS:

- ADJACENT TO A LEVEL NON-SLIP SURFACE TO PROVIDE ACCESS FROM A WHEELCHAIR, AND WHERE THERE IS A NON-SLIP WHEELCHAIR ACCESSIBLE ROUTE TO THE RAMP.
- WITHIN 1525 (5'-0") OF THE CROSSWALK EXTENDED.
- BETWEEN 455 (1'-6") AND 3050 (10'-0") OF THE EDGE OF CURB, SHOULDER OR PAVEMENT.
- PARALLEL TO THE CROSSWALK TO BE USED.

(27) MOUNT PEDESTRIAN PUSHBUTTON 1065 (42") ABOVE THE SIDEWALK OR FINISHED GRADE TO THE CENTER OF THE PUSHBUTTON AND 255 (10") MAX LATERALLY FROM LANDING.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

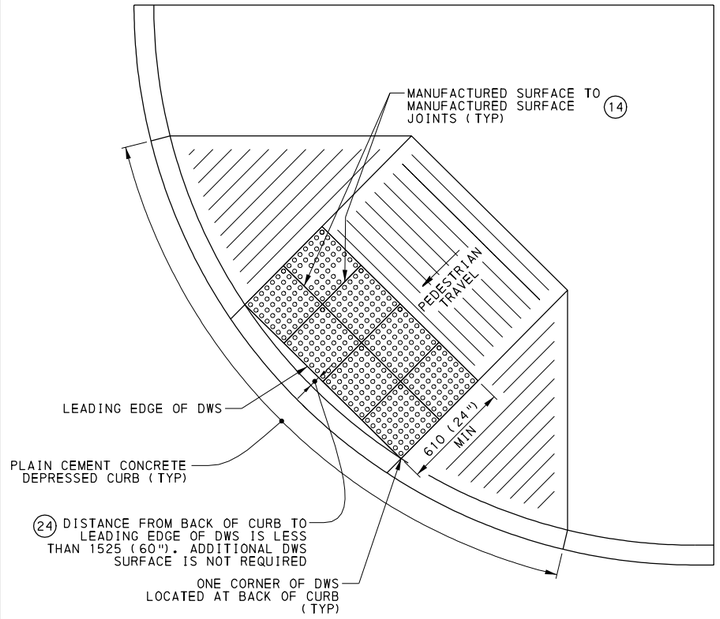
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

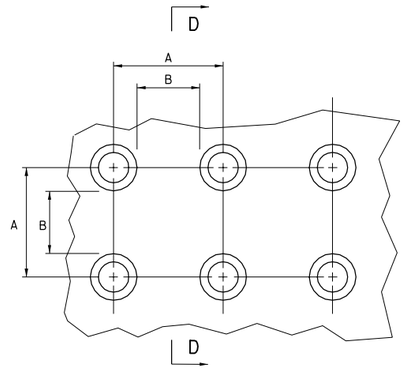
CURB RAMPS AND SIDEWALKS

NEW CONSTRUCTION OR ALTERATION DETAILS
PUSHBUTTONS / TRIANGULAR LANDING

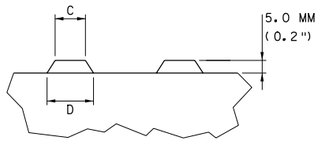
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 8 OF 13
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-67M

SEE NOTE 3 ON SHEET 1 CONCERNING DIAGONAL RAMPS





PLAN



SECTION D-D

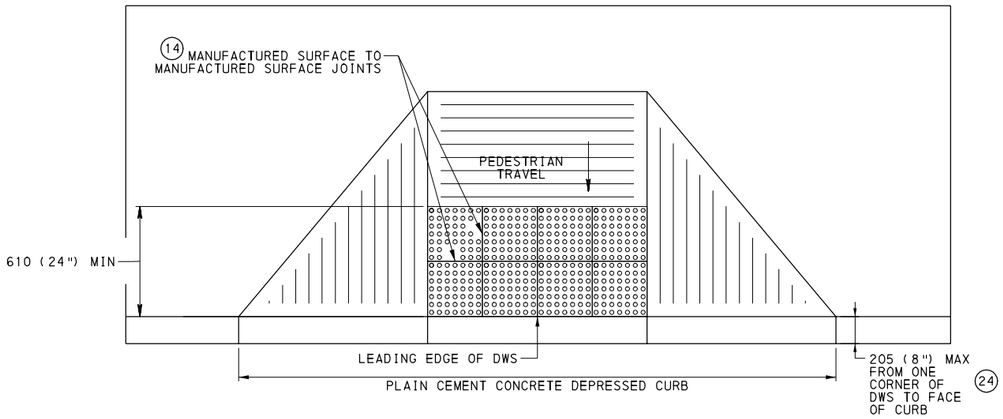
TRUNCATED DOME DIMENSIONS		
DIM	MIN mm (inch)	MAX mm (inch)
A	41 (1.6")	61 (2.4")
B	17 (0.65")	37 (1.5")
C	(13)	(13)
D	23 (0.9")	36 (1.4")

DETECTABLE WARNING SURFACE (DWS)
TRUNCATED DOME DETAILS

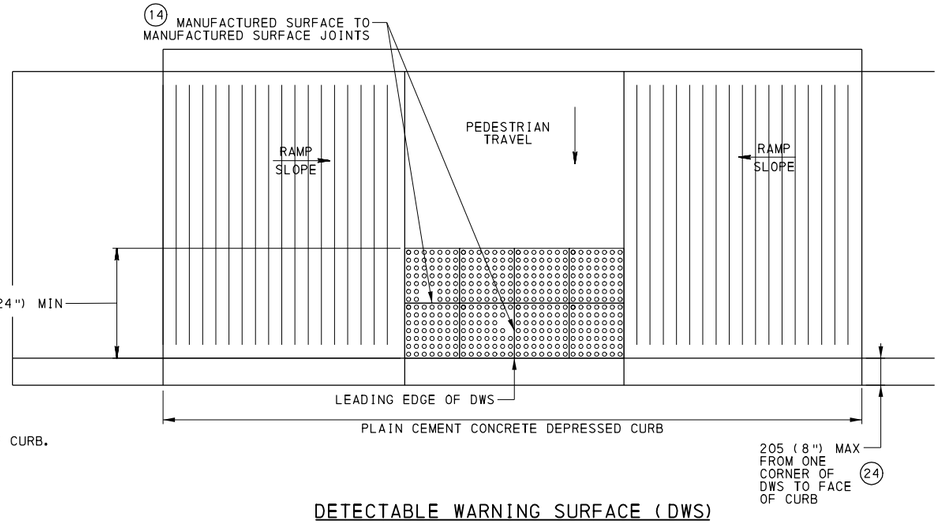
(13) THE C DIMENSION IS 50% TO 65% OF THE D DIMENSION.

(14) PLACE ADJACENT DWS TILES WITH MANUFACTURED SURFACE TO MANUFACTURED SURFACE. CUT TILES ALONG THE PERIMETER ONLY.

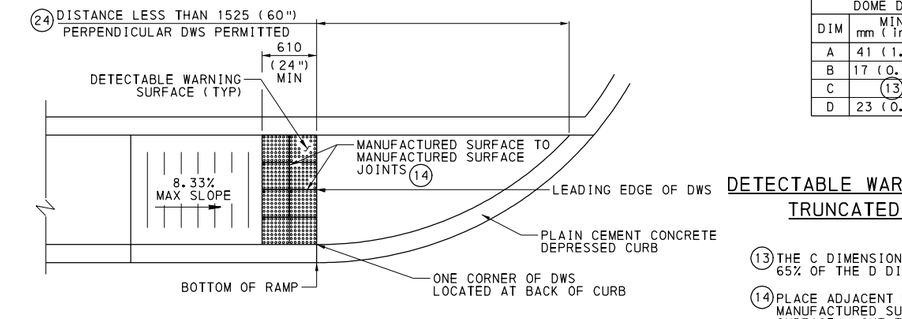
(24) LOCATE ONE CORNER OF THE DWS AT THE BACK OF CURB. NO OTHER POINT ON THE LEADING EDGE OF THE DWS MAY BE MORE THAN 1525 (60") AWAY FROM THE BACK OF CURB.

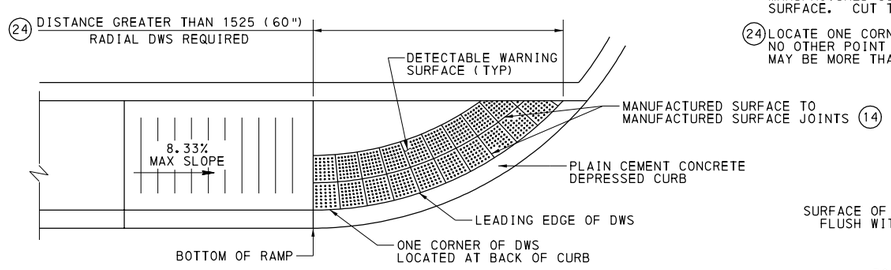


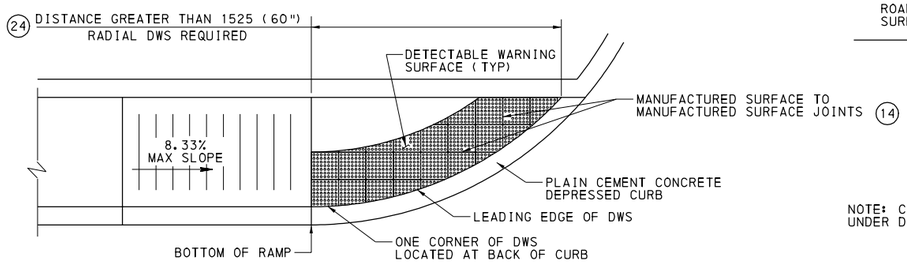
DETECTABLE WARNING SURFACE (DWS)
ON TYPE 1 CURB RAMP



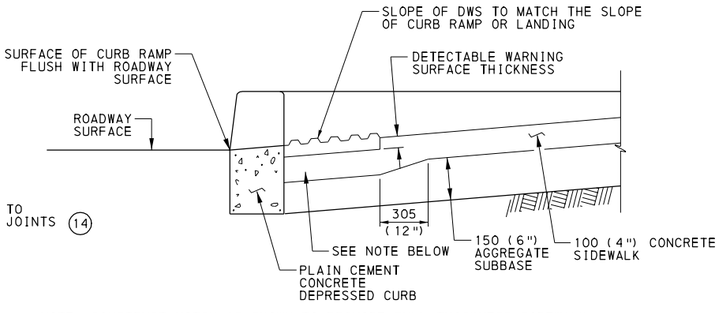
DETECTABLE WARNING SURFACE (DWS)
ON TYPE 2 CURB RAMP







DETECTABLE WARNING SURFACE (DWS)
ON CURVED SURFACES



NOTE: CONSTRUCT NOTCH AS SHOWN TO PROVIDE FULL THICKNESS SIDEWALK UNDER DETECTABLE WARNING SURFACE.

DETECTABLE WARNING SURFACE
EMBEDDING DETAIL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CURB RAMPS AND SIDEWALKS

NEW CONSTRUCTION OR ALTERATION DETAILS DETECTABLE WARNING SURFACE

RECOMMENDED JUN. 1, 2010
R. Wood Willey
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

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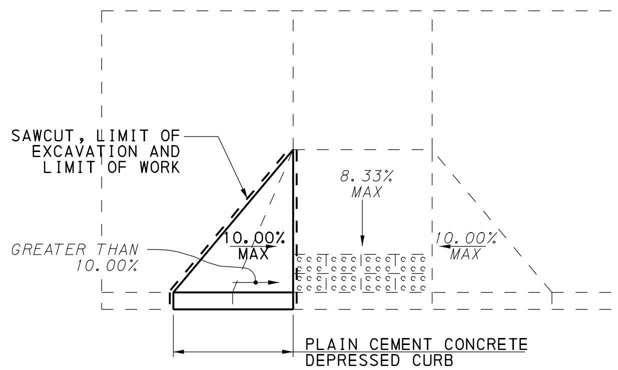
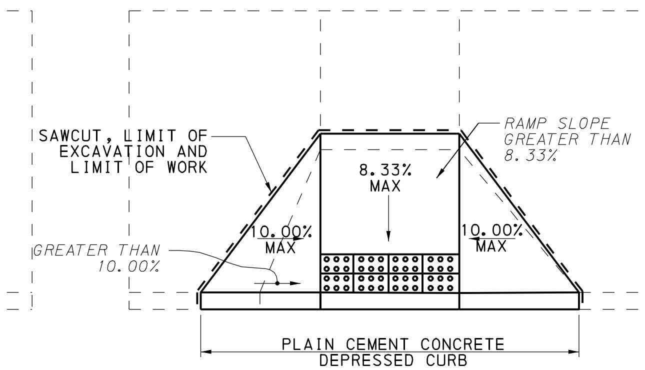


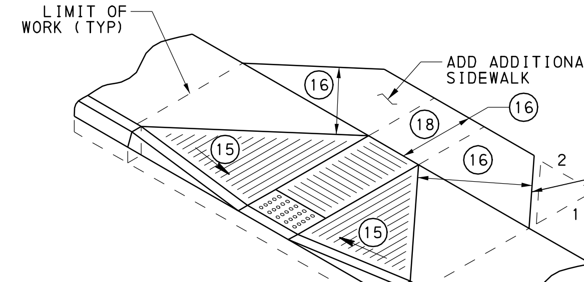
DETAIL ILLUSTRATES FLARE REMOVAL AND REPLACEMENT.

SIDE FLARE RECONSTRUCTION

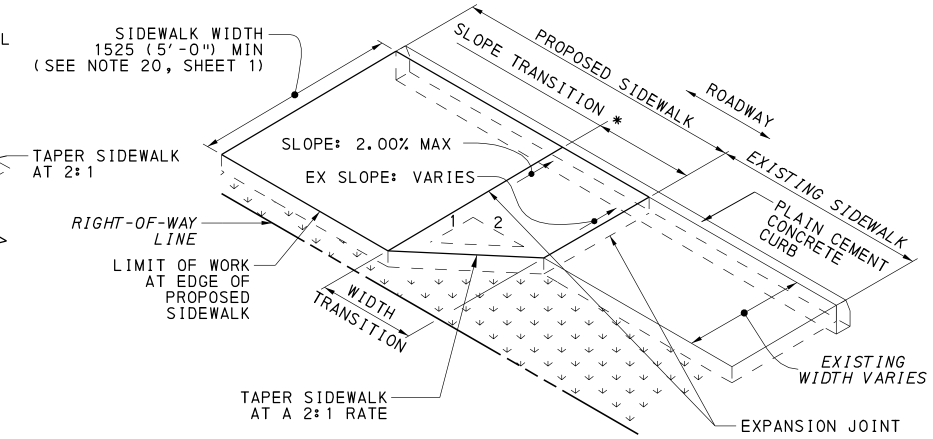


DETAIL ILLUSTRATES CURB RAMP (INCLUDING FLARES) REPLACEMENT.

TOTAL RAMP RECONSTRUCTION



TYPE 1 CURB RAMP LANDING INSTALLATION



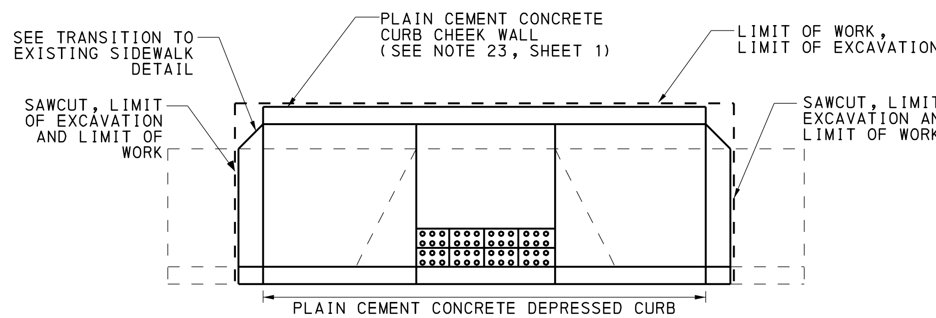
TRANSITION TO EXISTING SIDEWALK DETAIL

* MINIMUM SLOPE TRANSITION LENGTH BASED ON THE DIFFERENCE OF PROPOSED SIDEWALK CROSS SLOPE AND EXISTING SIDEWALK CROSS SLOPE AT THE LOCATION OF TIE IN. THIS MINIMUM LENGTH TO BE DETERMINED BY THE FOLLOWING FORMULA:
DELTA % SLOPE X 150 (0.5').

THE MINIMUM WIDTH TRANSITION SHALL BE CALCULATED USING THE FOLLOWING FORMULA:
CHANGE IN WIDTH X (2).

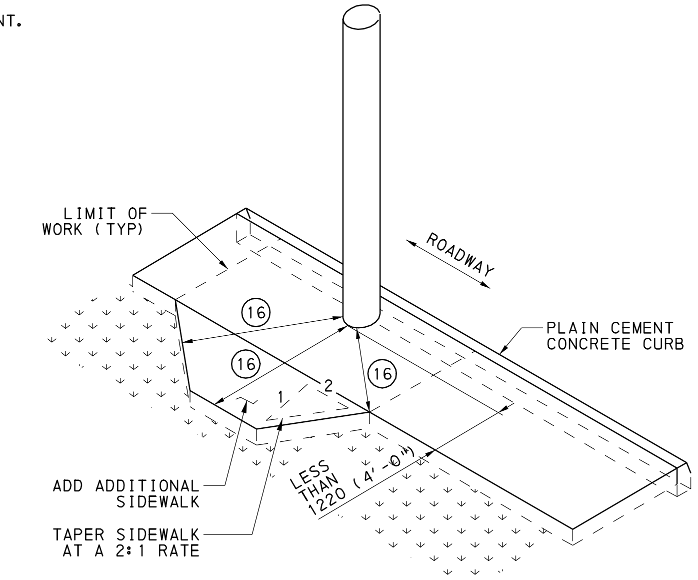
DEPENDING ON WHICH IS LONGEST, EITHER THE SLOPE TRANSITION OR WIDTH TRANSITION WILL CONTROL THE LENGTH OF SIDEWALK TRANSITION.

TRANSITION AREAS SERVE AS TEMPORARY CONNECTIONS OF THE PEDESTRIAN ACCESS ROUTE. FUTURE IMPROVEMENTS TO THE REMAINING PORTION OF EXISTING SIDEWALK SHALL INCLUDE REMOVING THE TRANSITION AREA AND CONSTRUCTING A FULLY COMPLIANT SIDEWALK.



DETAIL ILLUSTRATES A TYPE 1 EXISTING RAMP REPLACED WITH A TYPE 2 RAMP. USE THIS DETAIL AS AN EXAMPLE TO REPLACE ANY RAMP WITH A DIFFERENT CURB RAMP TYPE.

TOTAL RAMP RECONSTRUCTION (RAMP TYPE CHANGE)

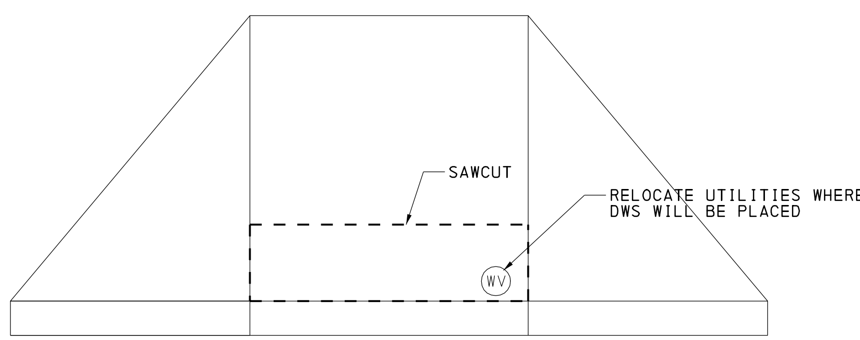


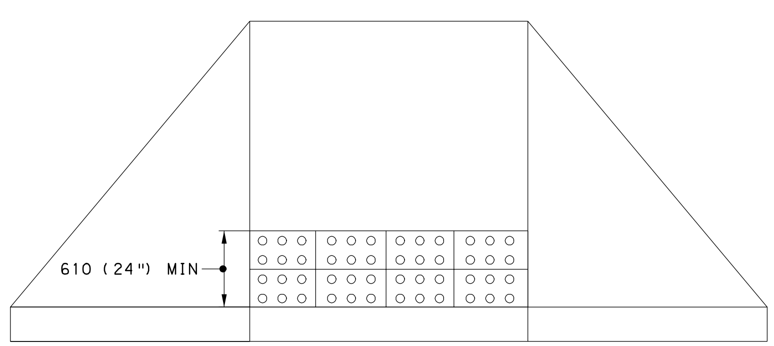
SIDEWALK ADDITION DUE TO OBSTRUCTIONS

(15) SIDE FLARES 10.00% MAX FOR RAMPS WITH LANDINGS 1220 (4'-0") OR GREATER.
SIDE FLARES 8.33% MAX FOR RAMPS WITH LANDINGS LESS THAN 1220 (4'-0").

(16) 1220 (4'-0") MIN ACCESSIBLE PATH WIDTH

(18) CURB RAMPS REQUIRE A 1220 (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SEE DETAILS FOR LOCATIONS AND DIMENSIONS.





DETECTABLE WARNING SURFACE (DWS) INSTALLATION DETAIL

DETECTABLE WARNING SURFACE (DWS) INSTALLATION INSTRUCTIONS

1. SAW CUT EXISTING CURB RAMP SURFACE WHERE THE DWS WILL BE PLACED.
2. REMOVE EXISTING CONCRETE FROM THIS AREA.
3. REPLACE AND COMPACT ANY DISTURBED AGGREGATE SUBBASE.
4. PLACE NEW CEMENT CONCRETE AND LEVEL TO A 100 (4 INCH) DEPTH SO THAT THE TOP OF THE CONCRETE IS LOWER THAN THE ADJOINING SIDEWALK, EQUIVALENT TO THE EMBEDDING DEPTH OF THE DWS MATERIAL.
5. LAY OUT AND PROPERLY FIT EACH UNIT PRIOR TO SETTING IN WET CONCRETE.
6. CUT UNITS AS NECESSARY ALONG PERIMETER OF DETECTABLE WARNING SURFACE.
7. PLACE UNITS ACROSS THE ENTIRE WIDTH OF THE CURB RAMP SURFACE AND/OR WHERE THE CURB IS FLUSH.
8. PRESS UNITS INTO FULL CONTACT WITH THE FRESH CONCRETE.
9. ADJUST HEIGHT OF EACH UNIT EDGE TO BE LEVEL WITH ADJACENT RAMP SURFACES.
10. ONLY TRUNCATED DOMES SHOULD BE ABOVE THE ADJACENT FINISHED CONCRETE.
11. FILL ANY SAW CUT GAPS WITH APPROVED JOINT SEALANT MATERIAL.

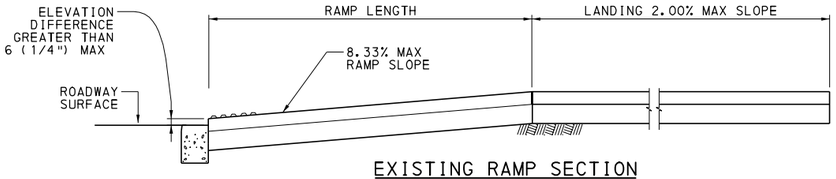
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CURB RAMPS AND SIDEWALKS

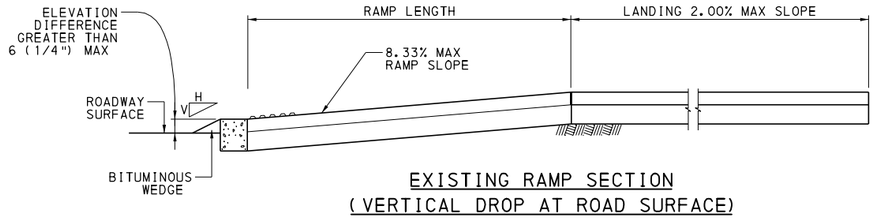
ALTERATION DETAILS

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 10 OF 13 RC-67M



EXISTING RAMP SECTION
(VERTICAL DROP AT RAMP)

RECOMMENDED CORRECTION:
RECONSTRUCT THE ENTIRE (OR PORTIONS OF) RAMP, LANDINGS AND FLARES WHERE APPLICABLE
(SEE RAMP RECONSTRUCTION DETAIL ON SHEET 10)

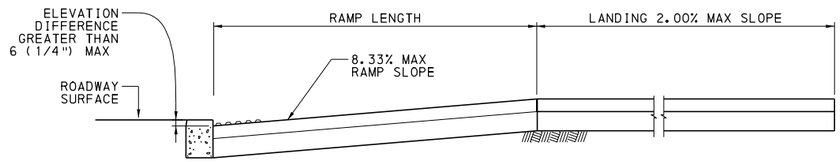


EXISTING RAMP SECTION
(VERTICAL DROP AT ROAD SURFACE)

RECOMMENDED CORRECTION:
ELEVATION DIFFERENCE GREATER THAN 6 (1/4") AND LESS THAN OR EQUAL TO 12 (1/2"):
PLACE BITUMINOUS MATERIAL AT FACE OF CURB TO BEVEL TRANSITION
AT A 2:1 (HORZ:VERT) RATE AS SHOWN

ELEVATION DIFFERENCE GREATER THAN 12 (1/2"), USE 8.33% MAX:
PLACE BITUMINOUS MATERIAL AT FACE OF CURB TO BEVEL TRANSITION
AT A SLOPE EQUAL TO THE RAMP SLOPE OR LANDING SLOPE

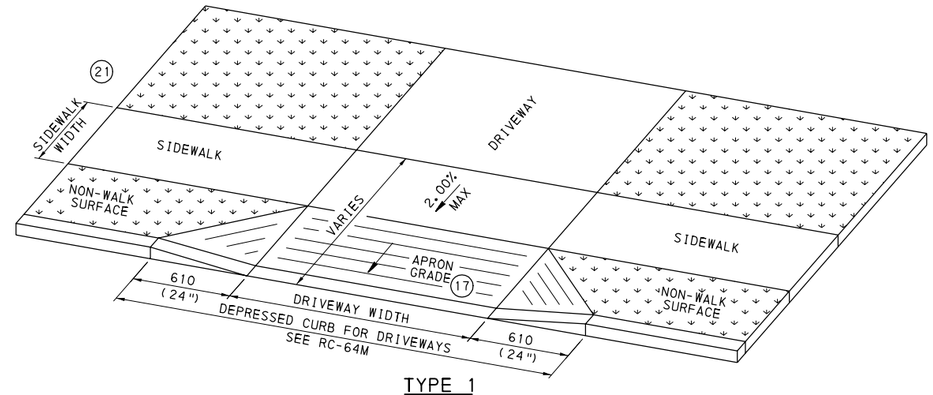
GRINDING THE CURB TO PROVIDE A MAX SLOPE OF 8.33% IS ACCEPTABLE
FINISHED SURFACE MUST NOT HAVE ELEVATION DIFFERENCES GREATER THAN 6 (1/4")



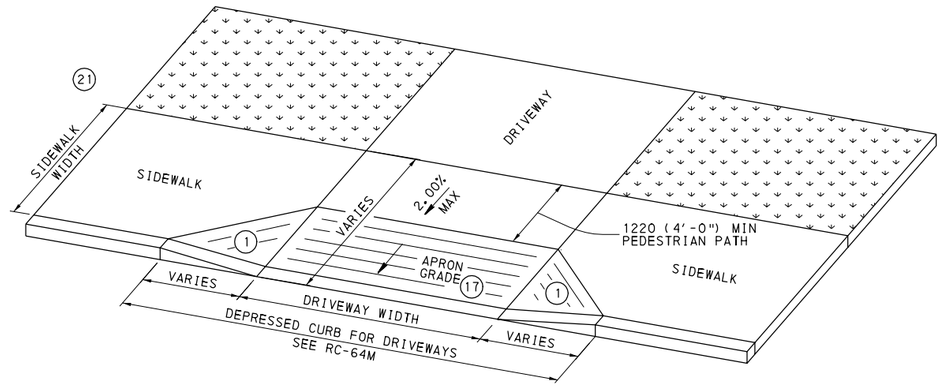
EXISTING RAMP SECTION
(RAMP SETTLEMENT)

RECOMMENDED CORRECTION:
RECONSTRUCT THE ENTIRE (OR PORTIONS OF) RAMP, LANDINGS AND FLARES WHERE APPLICABLE
(SEE RAMP RECONSTRUCTION DETAIL ON SHEET 10)

ALTERATION DETAILS



TYPE 1
DRIVEWAY APRON



TYPE 1A
DRIVEWAY APRON

(1) SIDE FLARES 10.00% MAX SLOPE

(17) 8.00% MAX CHANGE IN GRADE BETWEEN ROAD SURFACE AND DRIVEWAY

(21) MINIMUM SIDEWALK WIDTH 1525 (5'-0")
(SEE NOTE 20, SHEET 1)

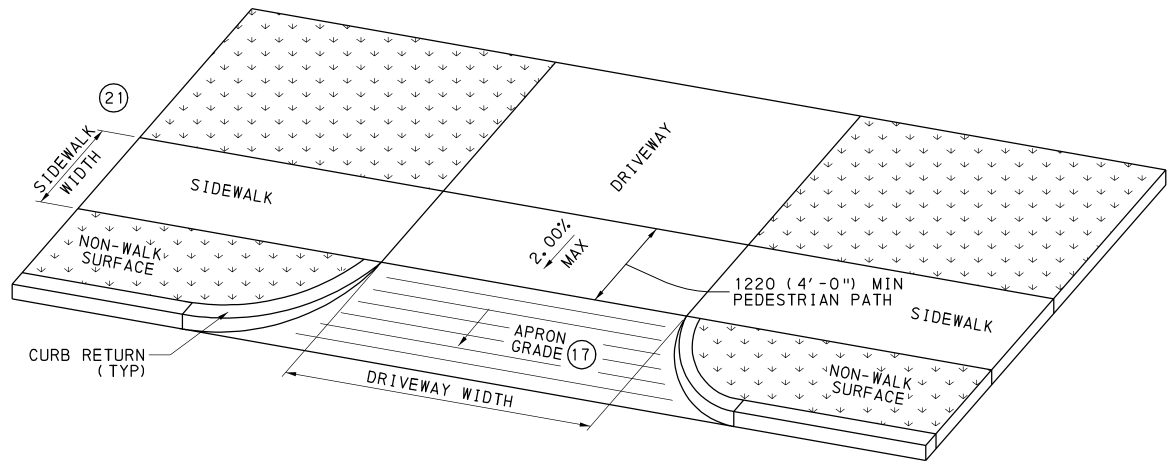
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

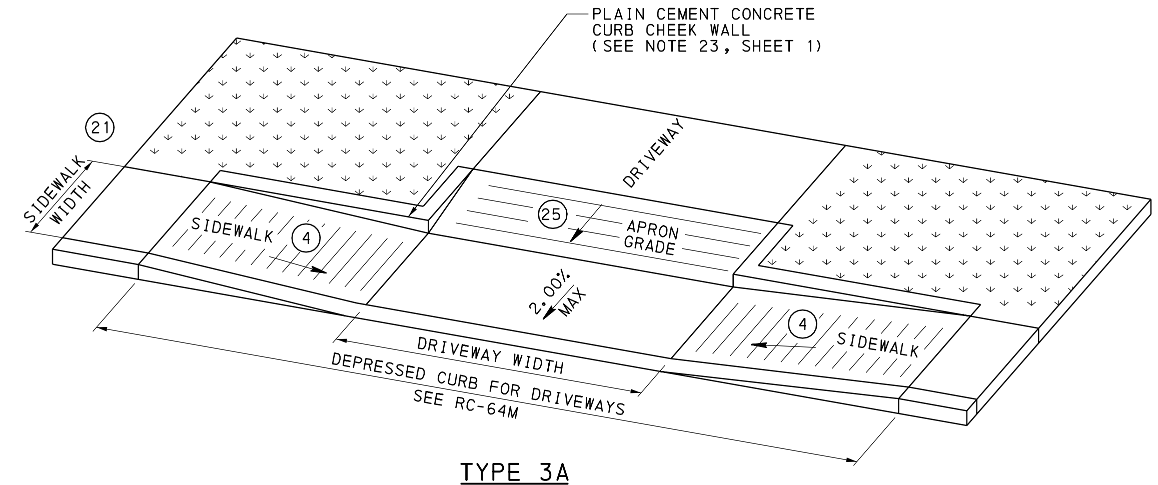
CURB RAMPS AND SIDEWALKS

ALTERATION DETAILS
AND DRIVEWAY APRONS

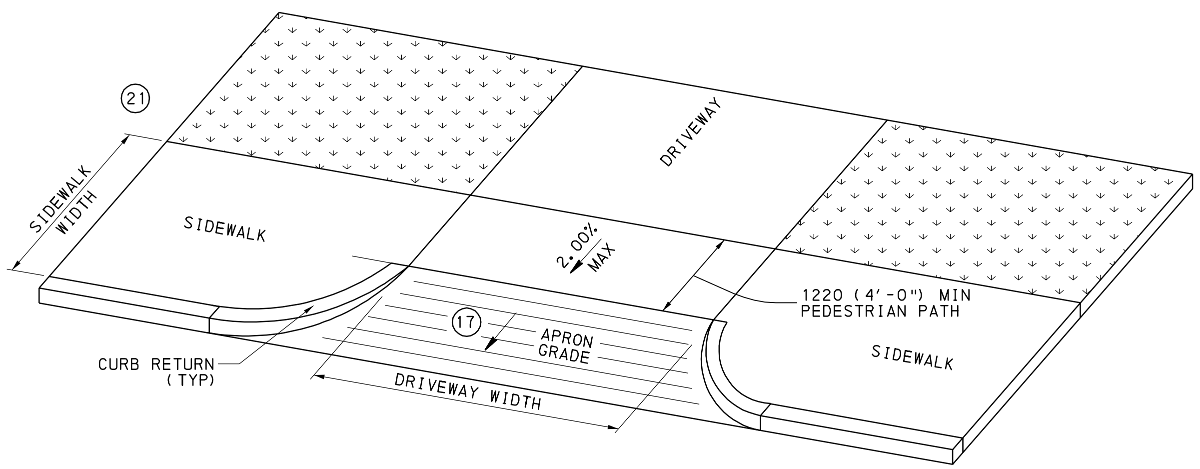
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 11 OF 13
R. Wood Willey		
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-67M



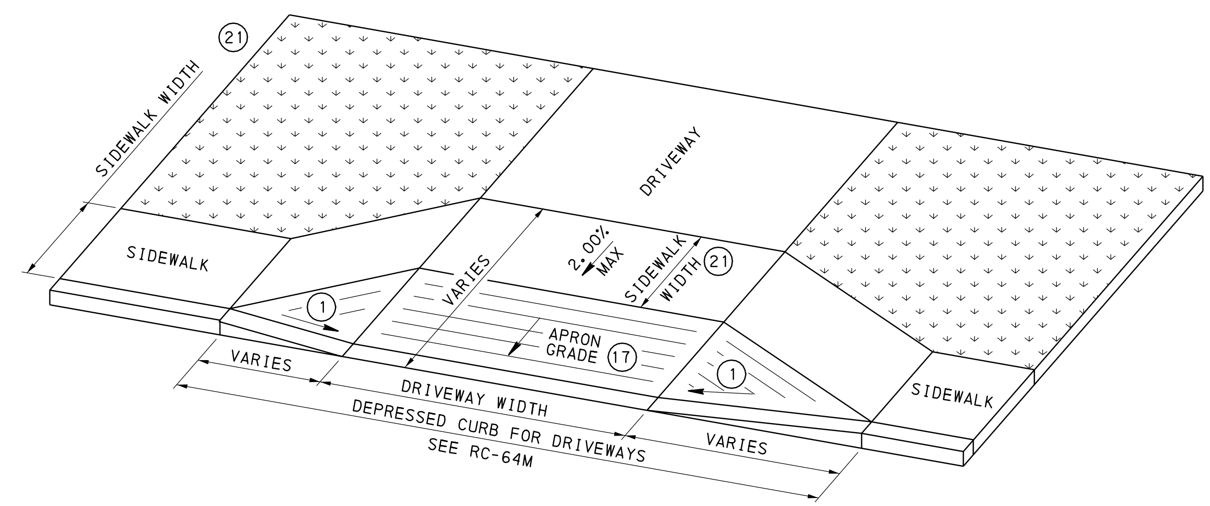
TYPE 2
DRIVEWAY APRON



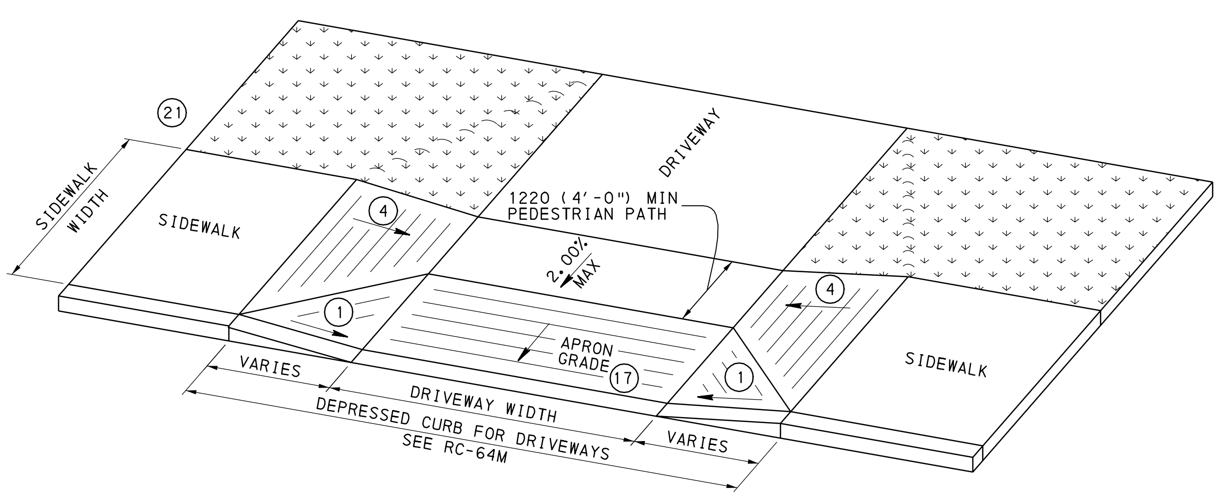
TYPE 3A
DRIVEWAY APRON



TYPE 2A
DRIVEWAY APRON



TYPE 4
DRIVEWAY APRON



TYPE 3
DRIVEWAY APRON

(1) SIDE FLARES 10.00% MAX SLOPE

(4) 8.33% MAX RAMP SLOPE

(17) 8.00% MAX CHANGE IN GRADE BETWEEN ROAD SURFACE AND DRIVEWAY

(21) MINIMUM SIDEWALK WIDTH 1525 (5'-0") (SEE NOTE 20, SHEET 1)

(25) 8.00% MAX CHANGE IN GRADE BETWEEN DRIVEWAY SURFACE AND SIDEWALK

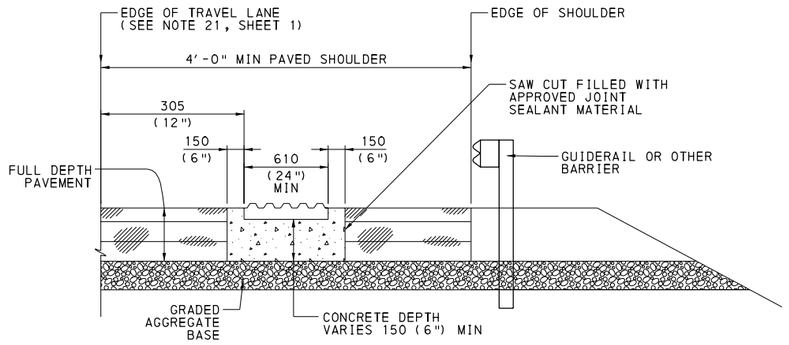
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

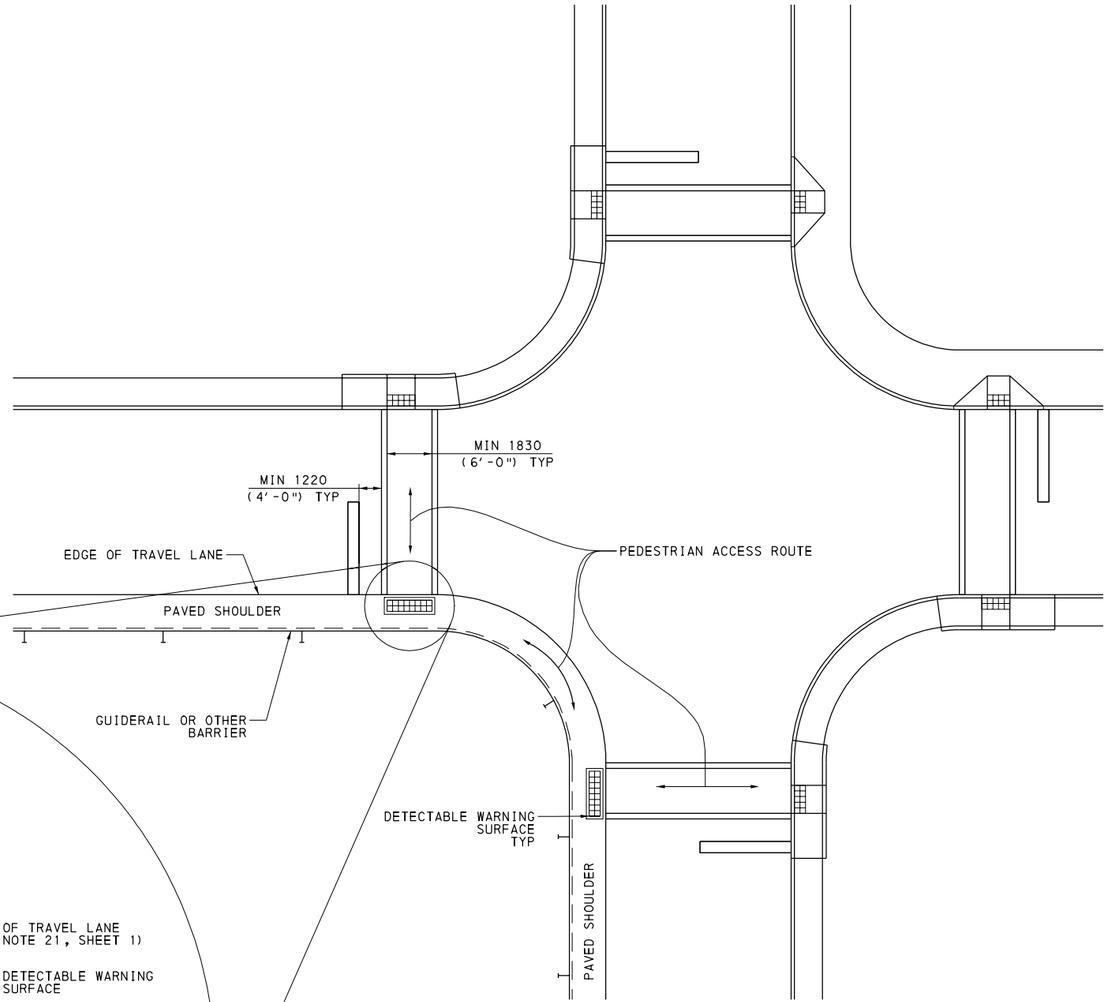
CURB RAMPS AND SIDEWALKS

DRIVEWAY APRONS

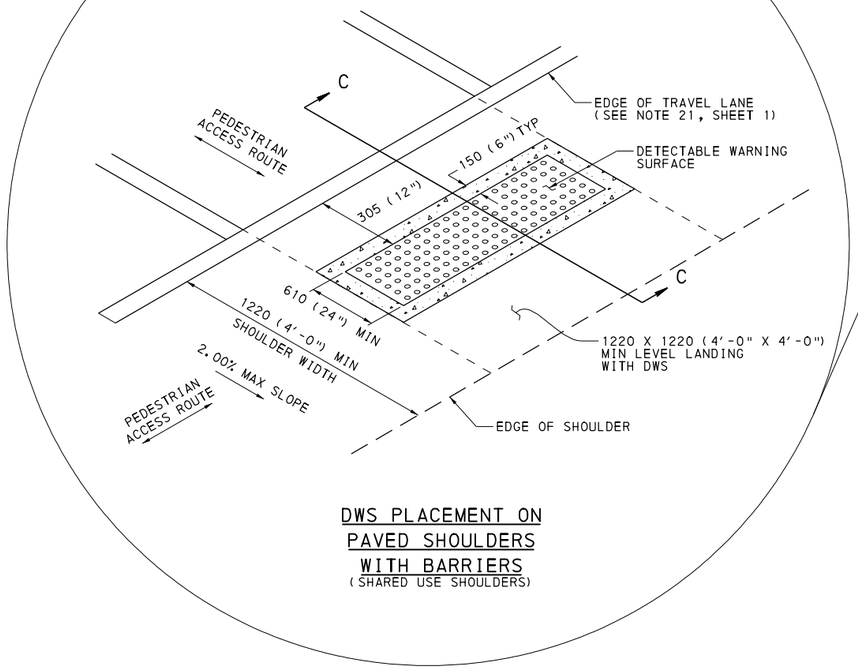
RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 12 OF 13 RC-67M



SECTION C-C



TYPICAL INTERSECTION PLAN
WITH DWS ON PAVED SHOULDERS
WITH BARRIERS
(SHARED USE SHOULDERS)



DWS PLACEMENT ON
PAVED SHOULDERS
WITH BARRIERS
(SHARED USE SHOULDERS)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

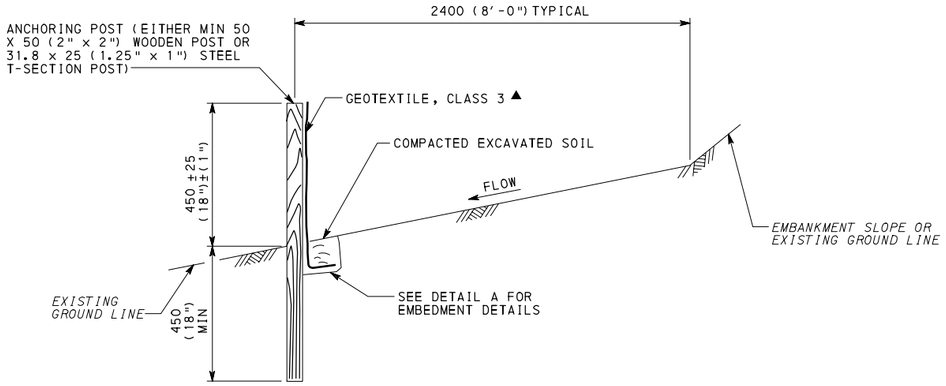
CURB RAMPS AND SIDEWALKS

DWS PLACEMENT ON
PAVED SHOULDERS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 13 OF 13
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-67M

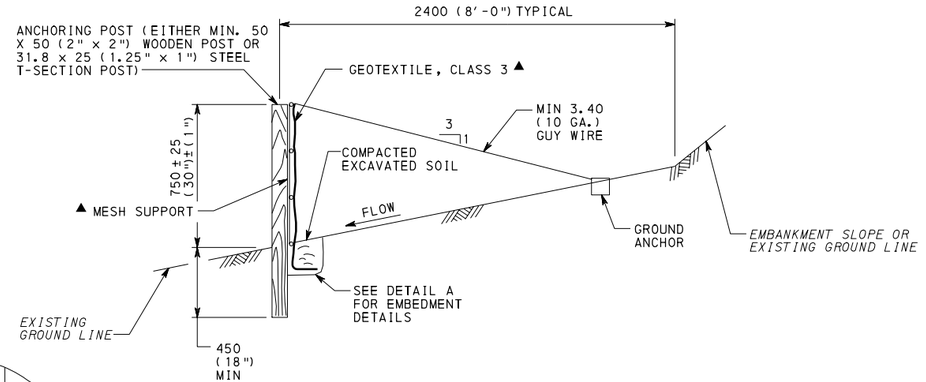
NOTES

1. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE-HALF THE ABOVE GROUND HEIGHT OF THE SILT FENCE.
2. ADHERE TO THE MANUFACTURER'S RECOMMENDATIONS RELATIVE TO REQUIRED GEOTEXTILE REPLACEMENT DUE TO WEATHERING.
3. PLACE SILT FENCE ON LEVEL GRADE. EXTEND BOTH ENDS OF THE FENCE AT LEAST 2400 (8'-0") UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
4. REPLACE UNDERCUT AND OVERTOPPED SECTIONS OF THE FENCE WITH A ROCK FILTER OUTLET (SEE SHEET 2). ROCK FILTER OUTLETS SHOULD BE INSTALLED ALONG THE SILT BARRIER FENCE AT POINTS OF FREQUENT FAILURES AND WHERE REQUIRED BY THE EROSION AND SEDIMENT POLLUTION CONTROL PLAN.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.



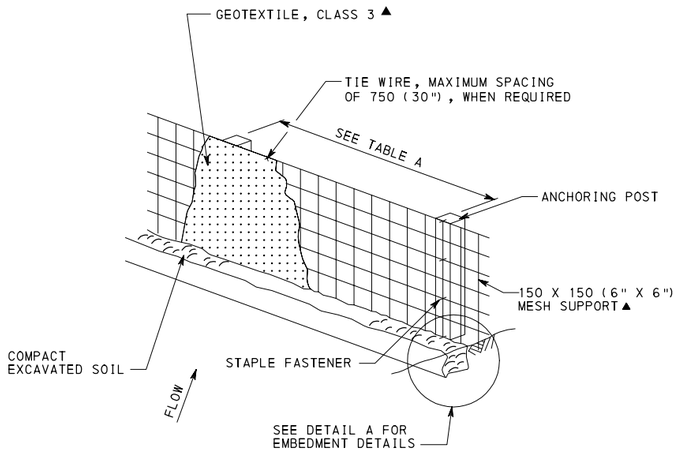
SILT BARRIER FENCE, 450 (18") HEIGHT

▲ SEE TABLE A



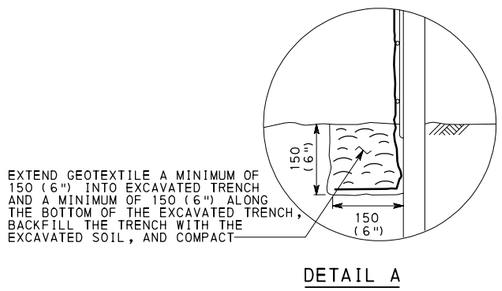
SILT BARRIER FENCE, 750 (30") HEIGHT

▲ SEE TABLE A

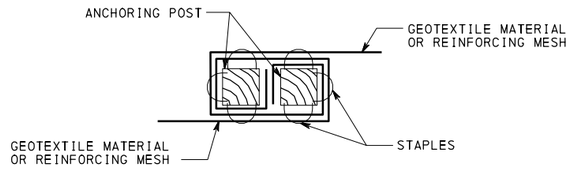


SILT BARRIER FENCE

▲ SEE TABLE A



DETAIL A



SILT BARRIER FENCE JOINING DETAIL

TABLE A
SILT BARRIER FENCE
GEOTEXTILE SELECTION

SILT BARRIER FENCE, HEIGHT	TYPE OF CLASS 3 GEOTEXTILE MATERIAL	NOMINAL GEOTEXTILE HEIGHT	POST SPACING WITHOUT MESH SUPPORT	MAX POST SPACING WITH MESH SUPPORT
450 (18")	3A	750 (30")	2.4 m (8'-0")	NA
750 (30")	3A	1050 (42")	NA	2.4 m (8'-0")
450 (18")	3B	750 (30")	1.2 m (4'-0")	NA
750 (30")	3B	1050 (42")	NA	1.2 m (4'-0")

NA = NOT APPLICABLE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PERIMETER CONTROL DEVICES

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 3

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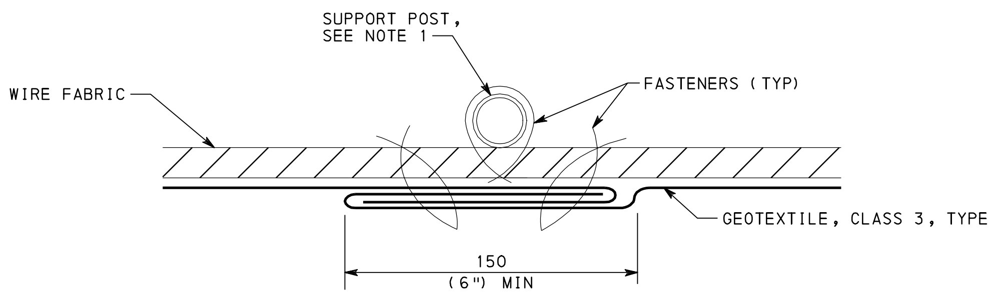
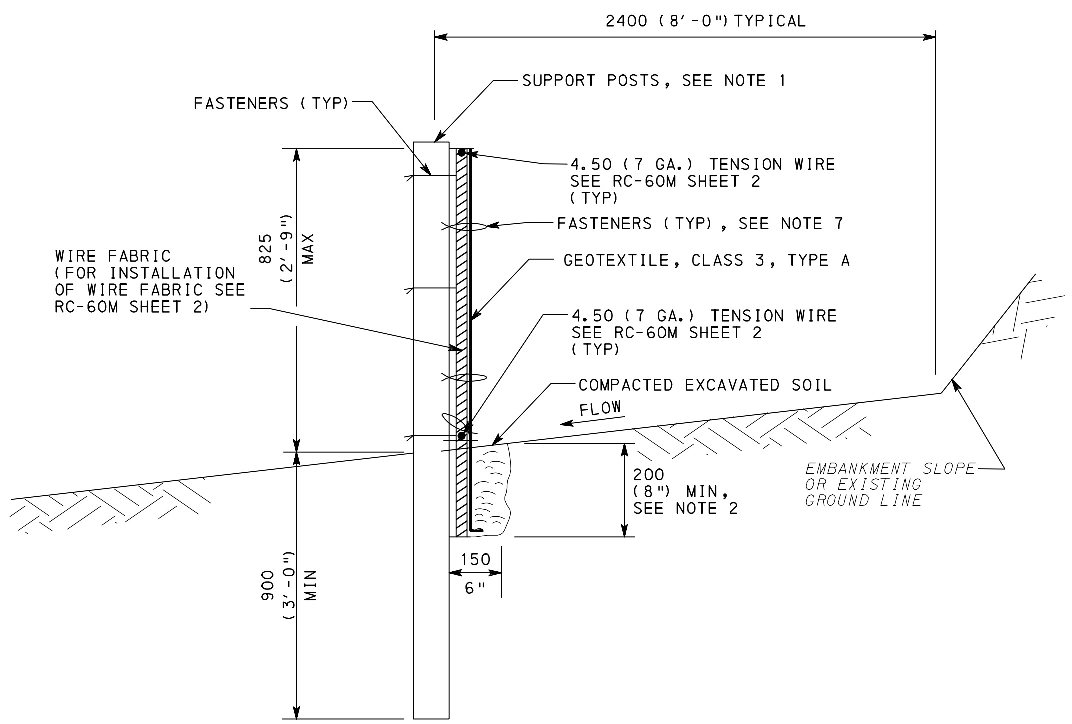
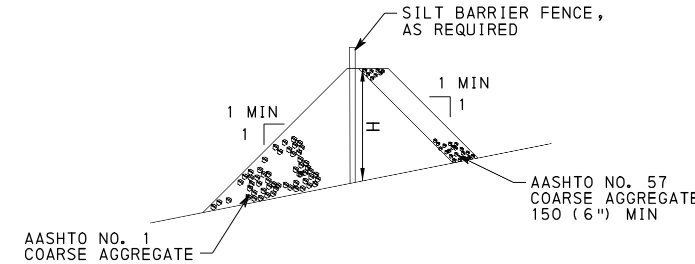


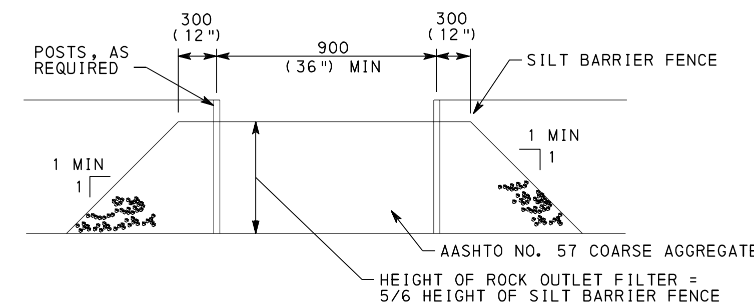
GEOTEXTILE OVERLAP DETAIL



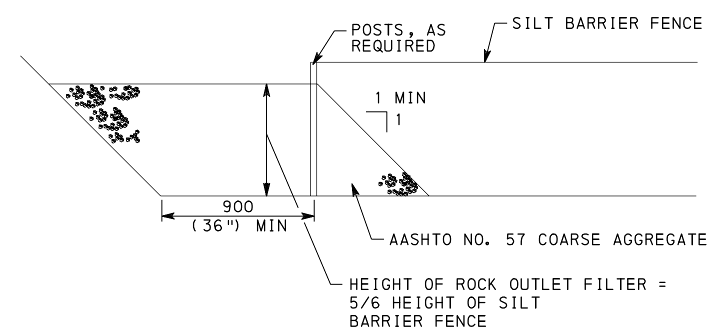
HEAVY DUTY SILT BARRIER FENCE



CROSS SECTION



FILTER AT INTERSECTION
OF SILT BARRIER FENCE
UPSLOPE FACE



FILTER AT TOE OF SLOPE

ROCK FILTER OUTLET

NOTES

1. SPACE POSTS AT 3000 (10'-0") MAXIMUM. USE 64 (2.5") DIAMETER GALVANIZED STEEL OR ALUMINUM POSTS.
2. EXTEND GEOTEXTILE AND WIRE FABRIC 200 (8") MIN INTO EXCAVATED TRENCH.
3. PLACE HEAVY DUTY SILT BARRIER FENCE ON LEVEL GRADE. EXTEND BOTH ENDS OF THE FENCE AT LEAST 2400 (8'-0") UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
4. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE-HALF THE ABOVE GROUND HEIGHT OF THE SILT FENCE.
5. ADHERE TO THE MANUFACTURER'S RECOMMENDATIONS RELATIVE TO REQUIRED GEOTEXTILE REPLACEMENT DUE TO WEATHERING.
6. REPLACE UNDERCUT AND OVERTOPPED SECTIONS OF THE FENCE WITH A ROCK FILTER OUTLET. ROCK FILTER OUTLETS SHOULD BE INSTALLED ALONG THE SILT BARRIER FENCE AT POINTS OF FREQUENT FAILURES AND WHERE REQUIRED BY THE EROSION AND SEDIMENT POLLUTION CONTROL PLAN.
7. SPACE GEOTEXTILE TO WIRE FABRIC FASTENERS AT 600 (24") MAX CENTER TO CENTER.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

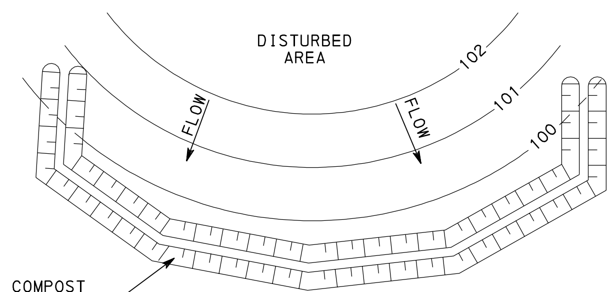
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PERIMETER CONTROL DEVICES

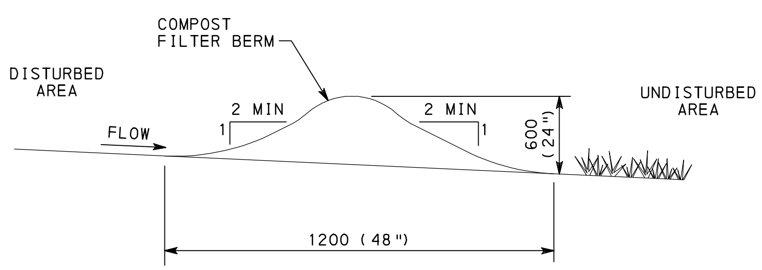
RECOMMENDED JUN. 1, 2010 [signature] CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 [signature] DIRECTOR, BUREAU OF DESIGN	SHT 2 OF 3 RC-70M

NOTES

1. REMOVE DEPOSITS WHEN SEDIMENT ACCUMULATION IS ONE-THIRD THE HEIGHT OF THE EXPOSED COMPOST FILTER BERM OR ONE-HALF OF THE EXPOSED COMPOST FILTER SOCK.
2. PLACE COMPOST FILTER SOCK/BERM ON LEVEL GRADE. EXTEND BOTH ENDS OF THE COMPOST FILTER SOCK/BERM AT LEAST 2400 (8'-0") UPSLOPE AT 45 DEGREES TO THE MAIN ALIGNMENT.
3. REPLACE BIODEGRADABLE FILTER SOCK AFTER 6 MONTHS; PHOTODEGRADABLE AFTER 12 MONTHS.

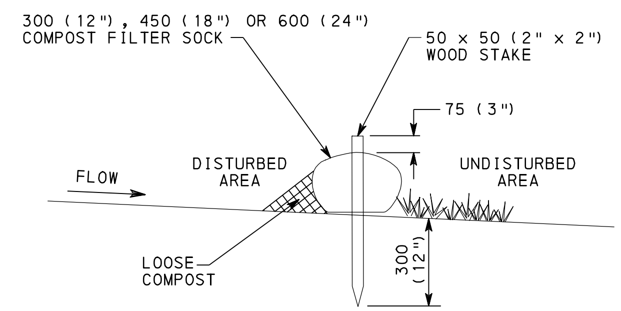


PLAN VIEW

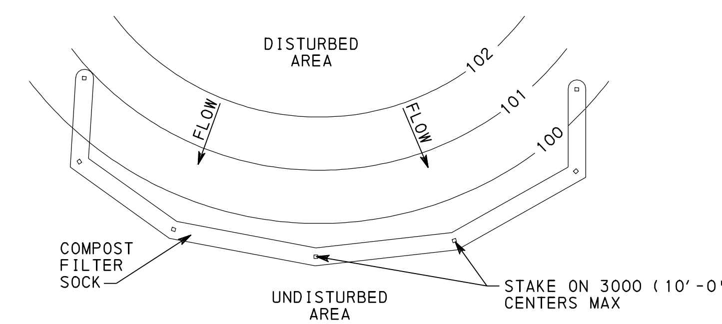


SECTION VIEW

COMPOST FILTER BERM



SECTION VIEW



PLAN VIEW

COMPOST FILTER SOCK

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PERIMETER CONTROL DEVICES

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

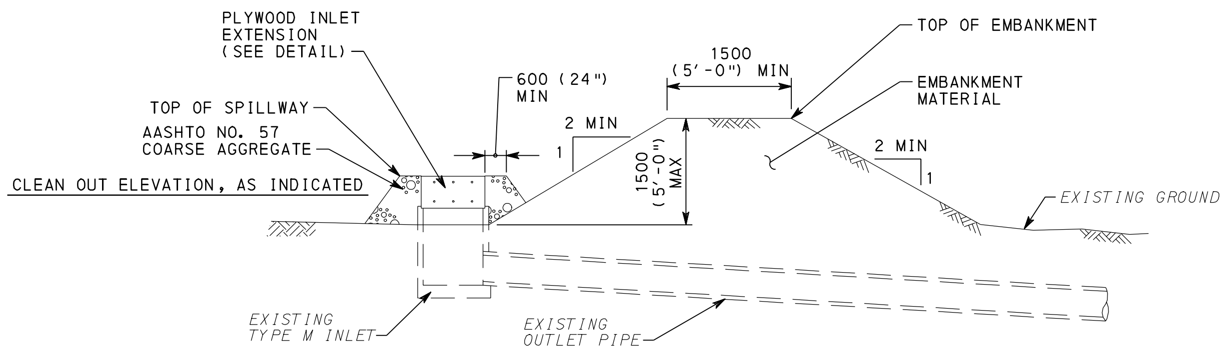
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 3 OF 3

RC-70M

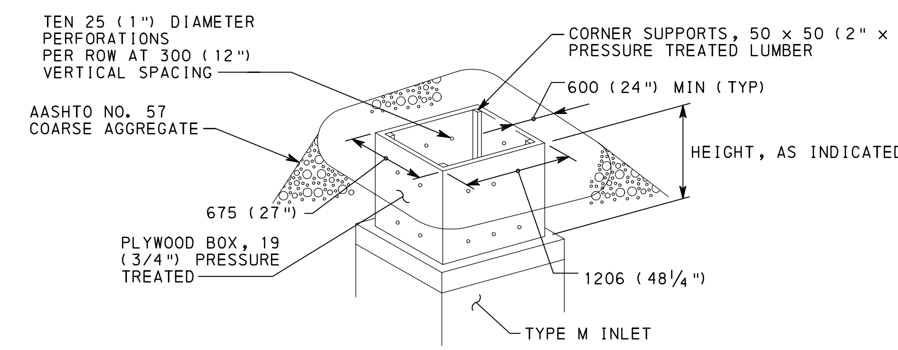
NOTES

1. PLACE CLEAN OUT STAKES NEAR THE CENTER OF SEDIMENT TRAP. REMOVE SEDIMENT WHEN THE CLEAN OUT ELEVATIONS ON THE STAKES HAVE BEEN MET. DURING REMOVAL, IF REQUIRED, REMARK CLEAN OUT ELEVATIONS ON THE STAKES. SATISFACTORILY DISPOSE OF SEDIMENT.
2. STABILIZE INTERIOR AND EXTERIOR SLOPES WITH SEEDING AND SOIL SUPPLEMENTS AND MULCH AS INDICATED.
3. INSPECT SEDIMENT TRAP ONCE A WEEK AND AFTER EACH STORM EVENT THAT PRODUCES RUNOFF.
4. REPAIR DAMAGED OR CLOGGED SPILLWAYS IMMEDIATELY.
5. REMOVE ALL TRASH AND OTHER DEBRIS FROM SEDIMENT TRAP AND SPILLWAY WHEN DIRECTED.
6. WHEN DIRECTED, REMOVE TEMPORARY SEDIMENT TRAP.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

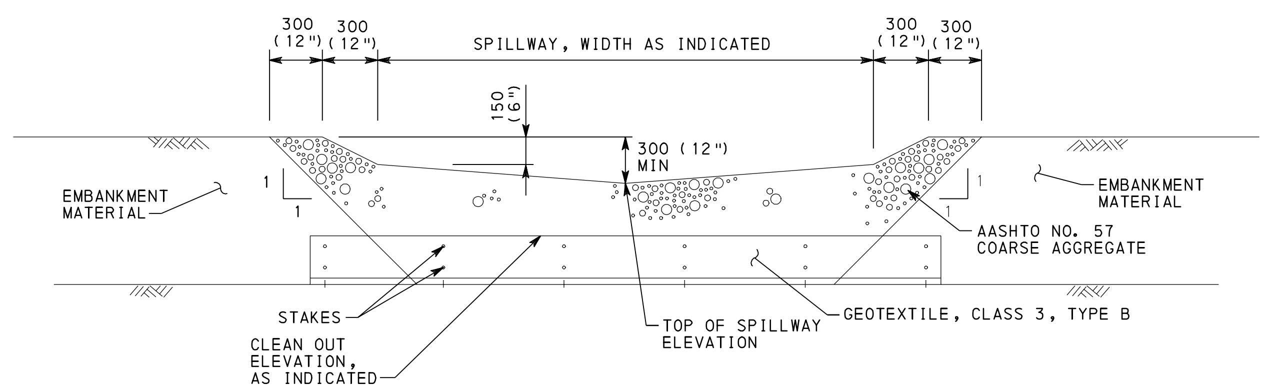


SECTION VIEW THROUGH SPILLWAY

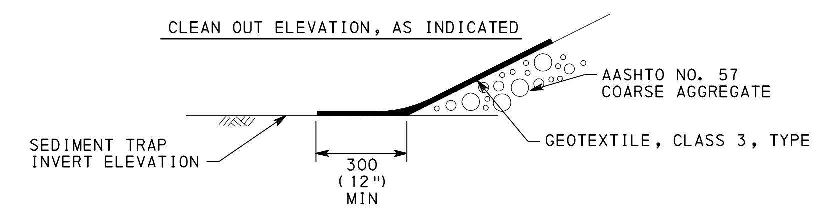
EMBANKMENT SEDIMENT TRAP (TYPE M INLET)



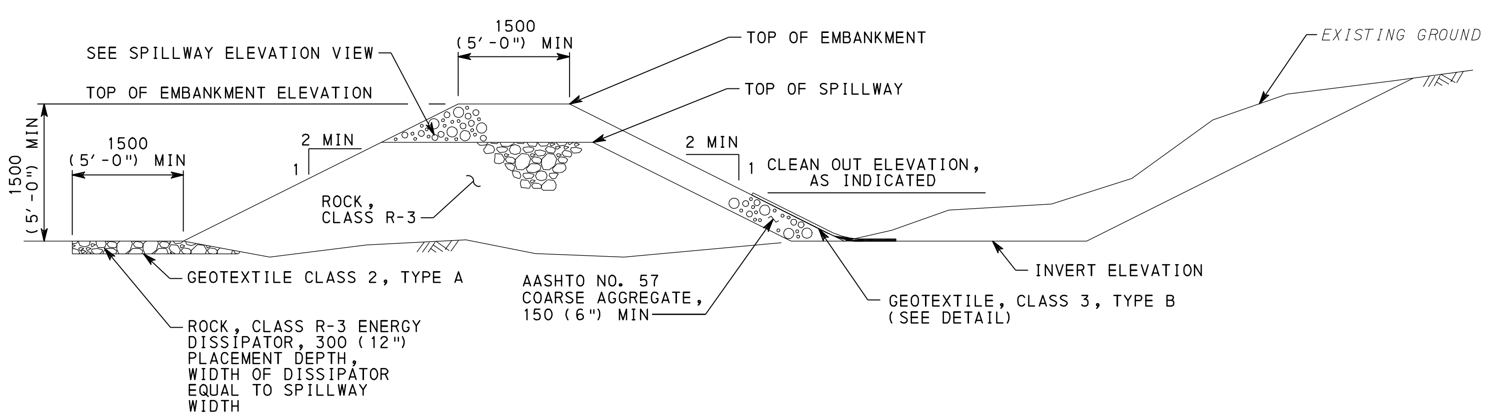
PLYWOOD INLET EXTENSION DETAIL



ELEVATION VIEW (INTERIOR OF SPILLWAY)



GEOTEXTILE PLACEMENT DETAIL



SECTION VIEW THROUGH SPILLWAY

SEDIMENT TRAP (EMBANKMENT)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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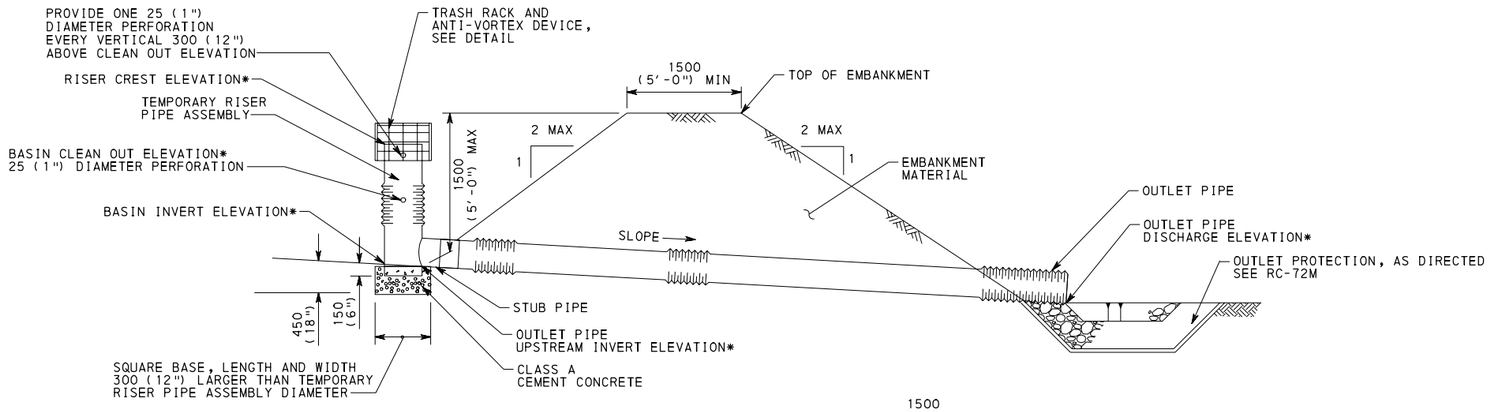
SEDIMENT BASIN AND SEDIMENT TRAP

RECOMMENDED JUN. 1, 2010 [signature] CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 [signature] DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 4 RC-71M

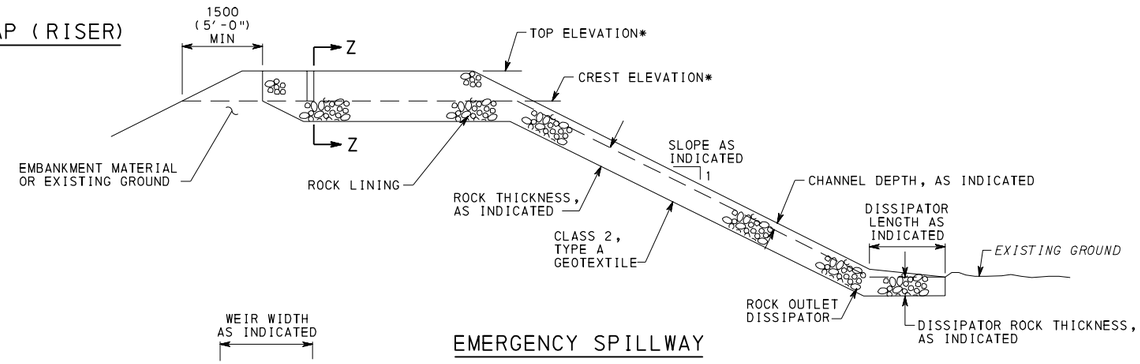
NOTES

1. PROVIDE SUITABLE MATERIAL TO ENSURE THAT EMBANKMENTS, RISERS, PIPES AND CONNECTIONS DO NOT LEAK.
2. PLACE CLEAN OUT STAKES NEAR THE CENTER OF SEDIMENT TRAP. REMOVE SEDIMENT WHEN THE CLEAN OUT ELEVATIONS ON THE STAKES HAVE BEEN MET. DURING REMOVAL, IF REQUIRED, REMARK CLEAN OUT ELEVATIONS ON THE STAKES. SATISFACTORILY DISPOSE OF SEDIMENT.
3. STABILIZE INTERIOR AND EXTERIOR SLOPES WITH SEEDING AND SOIL SUPPLEMENTS AND MULCH AS INDICATED.
4. INSPECT SEDIMENT TRAP/BASIN ONCE A WEEK, AFTER EACH RUNOFF STORM EVENT, OR AS DIRECTED.
5. REPAIR DAMAGED OR CLOGGED SPILLWAYS IMMEDIATELY.
6. REMOVE ALL TRASH AND OTHER DEBRIS FROM SEDIMENT TRAP/BASIN AND SPILLWAY AS DIRECTED.
7. WHEN DIRECTED REMOVE TEMPORARY SEDIMENT TRAP/BASIN OR CONVERT TEMPORARY SEDIMENT TRAP/BASIN TO PERMANENT STORMWATER MANAGEMENT FACILITY AS INDICATED.

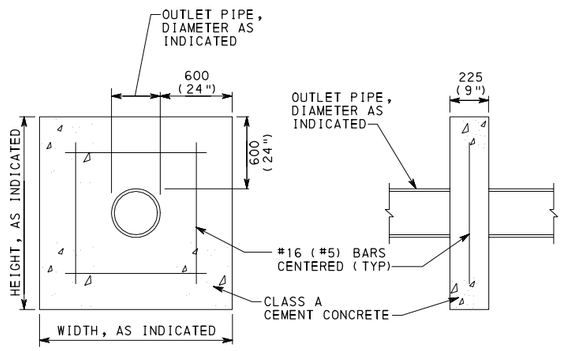
* ELEVATION AS INDICATED



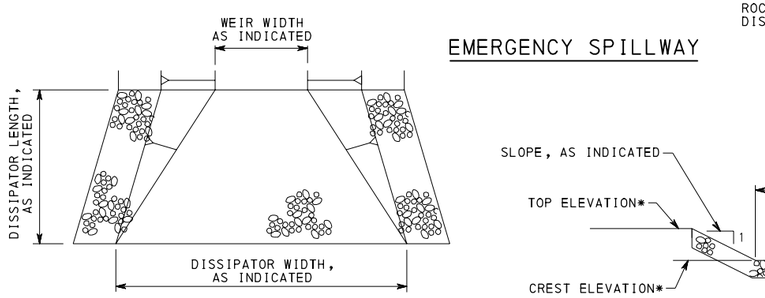
SEDIMENT TRAP (RISER)



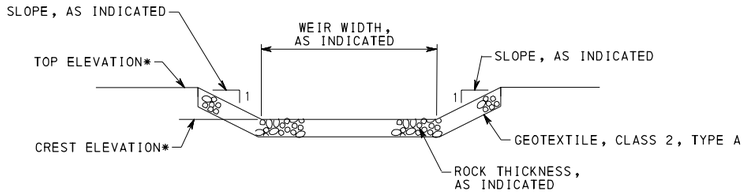
EMERGENCY SPILLWAY



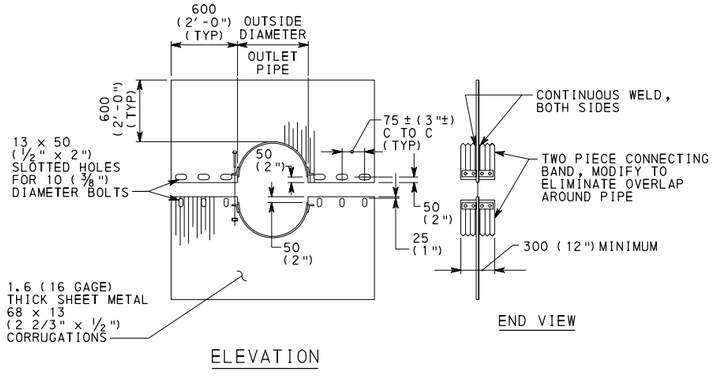
CONCRETE ANTI-SEEP COLLAR



PLAN VIEW: ROCK OUTLET DISSIPATOR

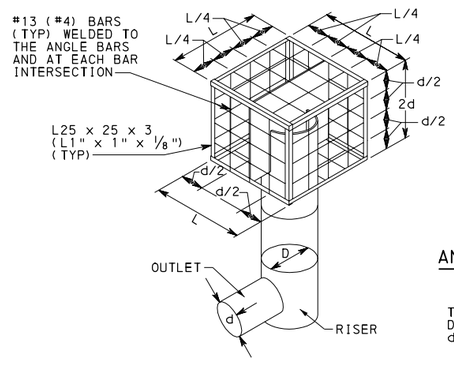


WEIR SECTION Z-Z

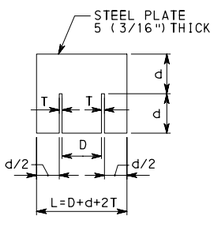


CMP ANTI-SEEP COLLAR

CAULK THE LAP BETWEEN THE TWO HALF-SECTIONS WITH BITUMINOUS MASTIC AT THE TIME OF INSTALLATION. MARK UNASSEMBLED COLLARS BY PAINTING OR TAGGING TO IDENTIFY MATCHING PAIRS.



TRASH RACK AND ANTI-VORTEX DEVICE



ANTI-VORTEX DEVICE

T = THICKNESS OF RISER PIPE
D = DIAMETER OF RISER PIPE
d = DIAMETER OF OUTLET PIPE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SEDIMENT BASIN AND SEDIMENT TRAP

RECOMMENDED JUN. 1, 2010
R. Wood Willey
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 4

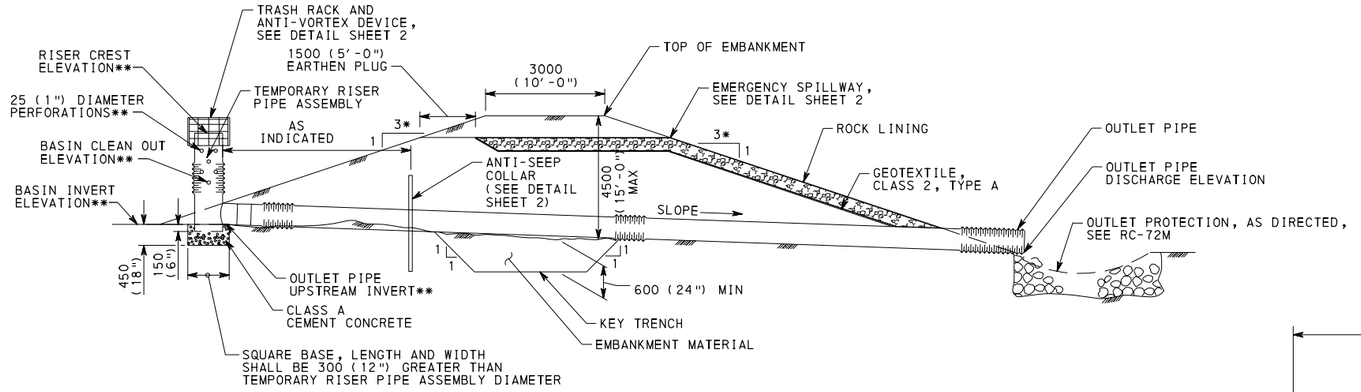
RC-71M

NOTE

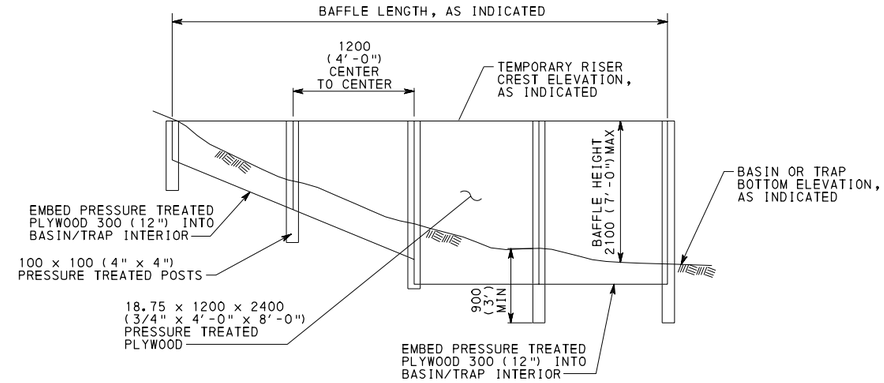
1. REFER TO SHEET 2 FOR SEDIMENT BASIN CONSTRUCTION NOTES.

* HORIZONTAL COMPONENT OF SIDE SLOPES SHALL NOT EXCEED 3:1 IN AREAS ADJACENT TO TRAFFIC WHERE SLOPES NEED TO BE TRAVERSABLE.

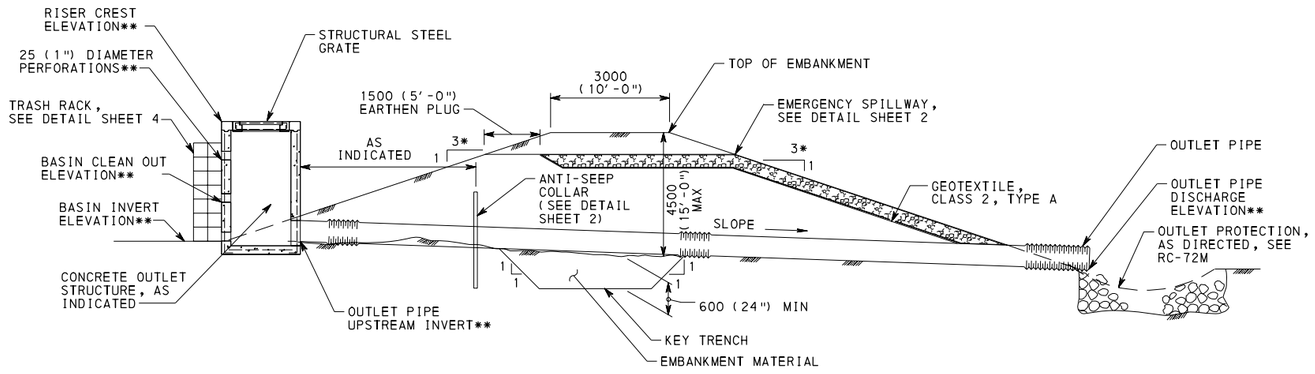
** ELEVATION AS INDICATED



SEDIMENT BASIN - TEMPORARY CONFIGURATION



TEMPORARY BAFFLE WALL



SEDIMENT BASIN - PERMANENT CONFIGURATION

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

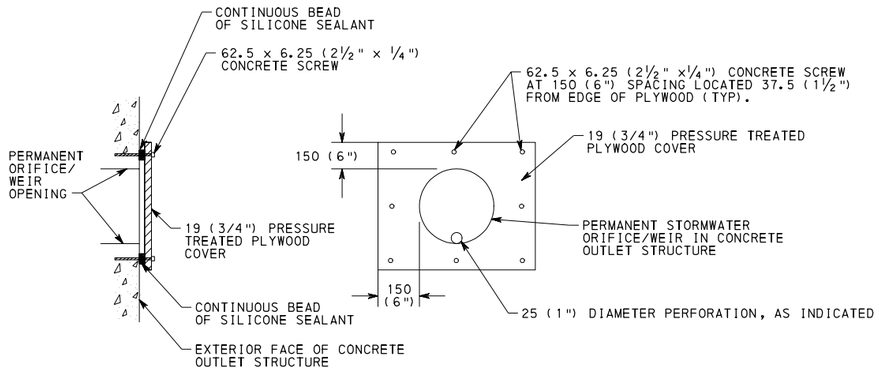
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SEDIMENT BASIN AND SEDIMENT TRAP

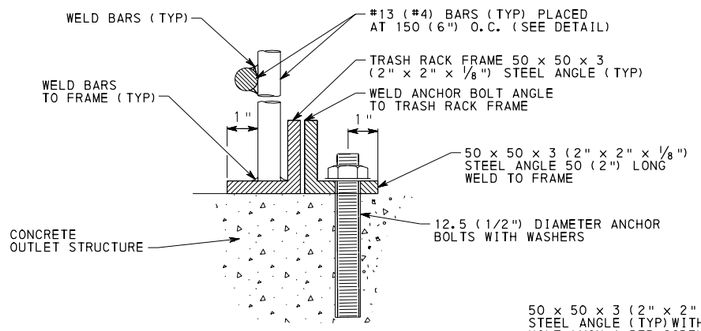
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 4
R. Wood Willey	Bruce E. Ryan	RC-71M
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	

NOTE

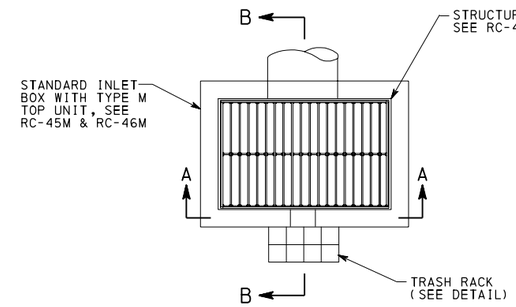
1. FORM BOTTOM OF OUTLET STRUCTURE TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE.



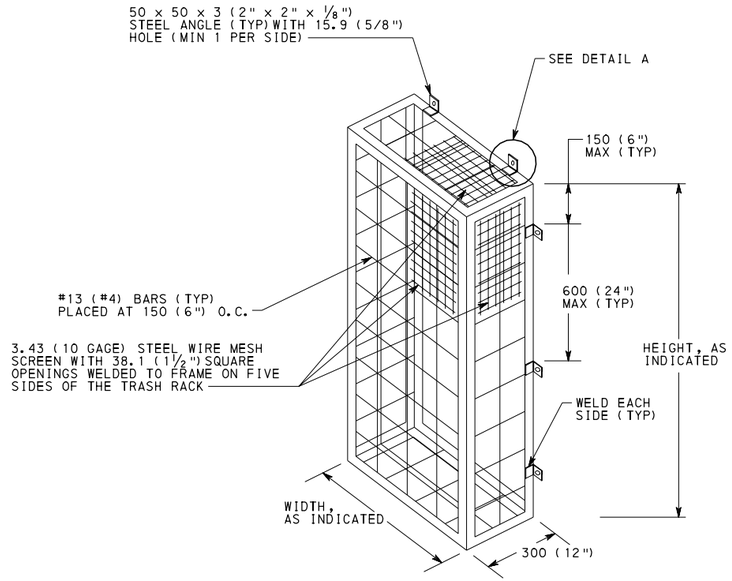
TEMPORARY ORIFICE COVER PLATE



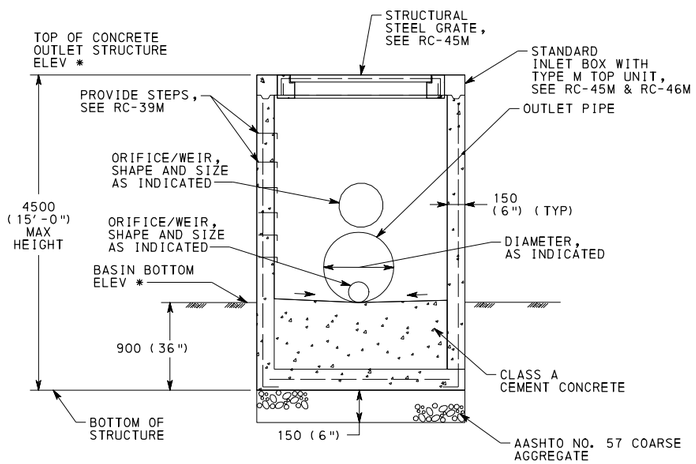
DETAIL A



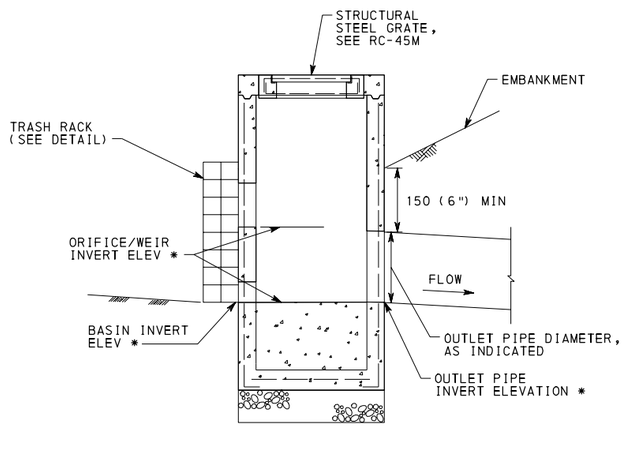
PLAN



TRASH RACK



SECTION A-A



* ELEVATION AS INDICATED

SECTION B-B

CONCRETE OUTLET STRUCTURE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

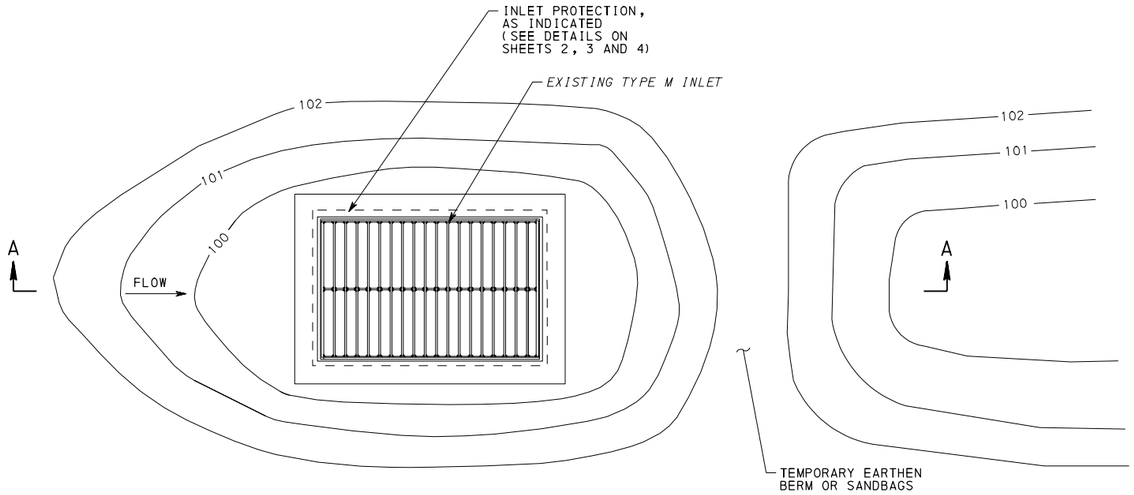
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SEDIMENT BASIN AND SEDIMENT TRAP

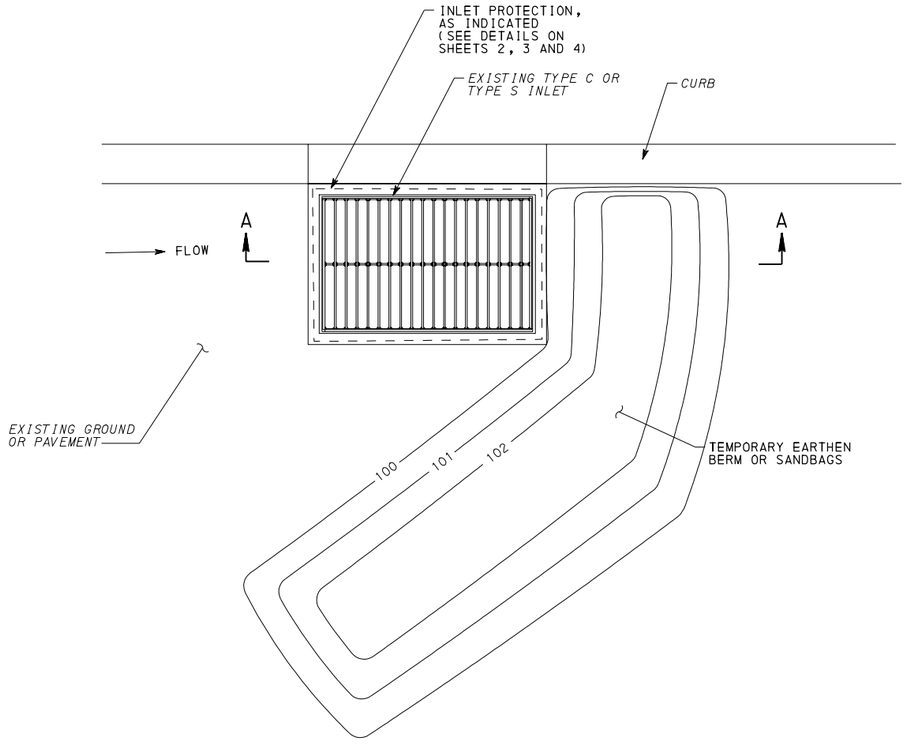
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 4
R. Wood Willey		
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-71M

NOTES

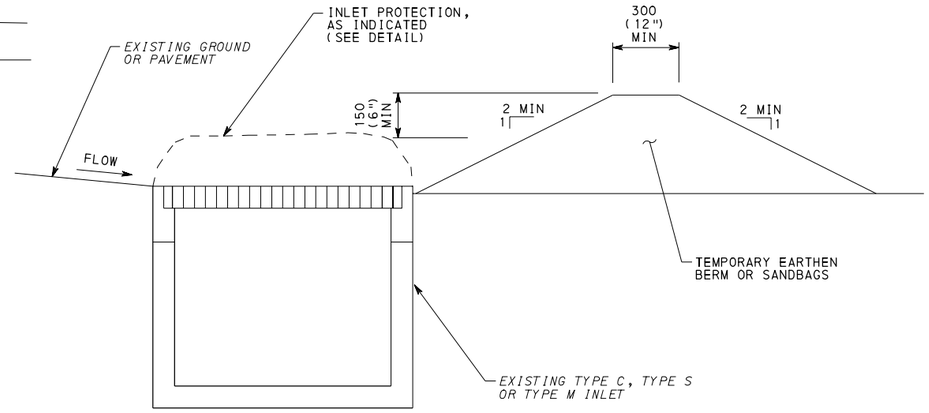
1. TEMPORARY EARTHEN BERMS OR SANDBAGS CAN BE USED FOR ALL INLET PROTECTION.
2. USE BERMS AS REQUIRED.
3. DO NOT USE INLET PROTECTION ON ROADWAYS WHERE PONDING WATER OR INLET PROTECTION MAY BE HAZARDOUS TO VEHICULAR TRAFFIC.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.



TYPE M INLET PROTECTION



TYPE C OR TYPE S INLET PROTECTION



SECTION A-A

TYPE C, TYPE S OR TYPE M INLET PROTECTION SIDE VIEW

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

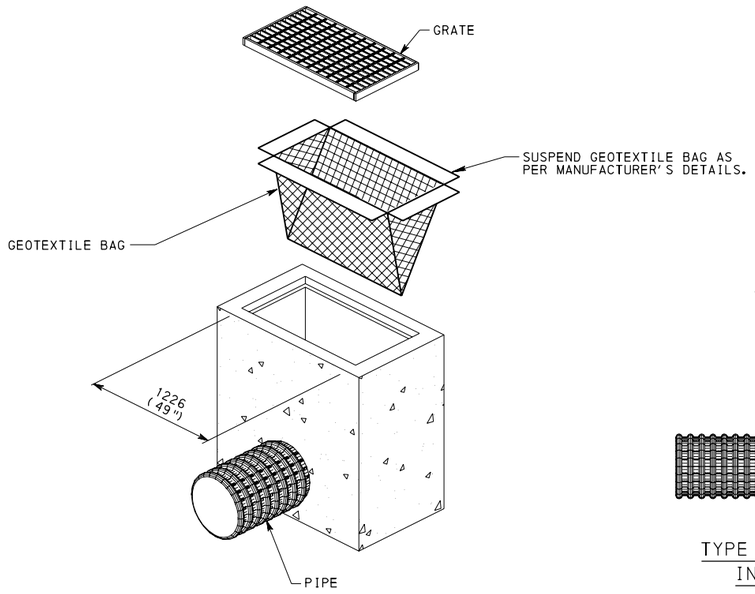
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET AND OUTLET PROTECTION

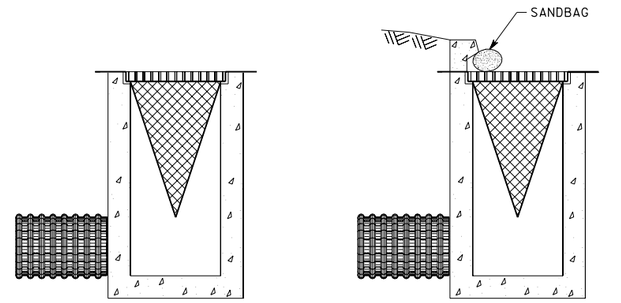
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 7
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-72M

NOTES

1. INSPECT INLET FILTER BAG AFTER EACH RUNOFF EVENT. MAINTAIN AS REQUIRED TO ENSURE PROPER FUNCTIONING OF THE BAG.
2. REMOVE ACCUMULATED SEDIMENT/DEBRIS WHEN THE INLET FILTER REACHES ONE-HALF MAXIMUM CAPACITY.
3. REPLACE FILTER BAG IF RIPPED OR TORN.
4. PROVIDE DOWN GRADIENT BERM AS INDICATED ON SHEET 1. DO NOT USE IN SAG/SUMP CONDITIONS.
5. USE SANDBAGS AT TYPE C INLET CURB OPENINGS TO TO PREVENT BYPASS FLOW.
6. REMOVE AND PROPERLY DISPOSE OF INLET FILTER BAG WHEN NO LONGER NEEDED.



ISOMETRIC VIEW



TYPE M OR TYPE S INLET INSTALLATION (TYP)

TYPE C INLET INSTALLATION (TYP)

SIDE VIEW

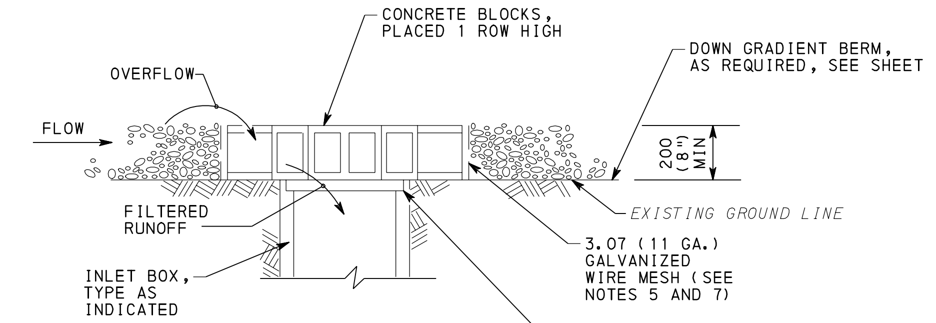
INLET FILTER BAG

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

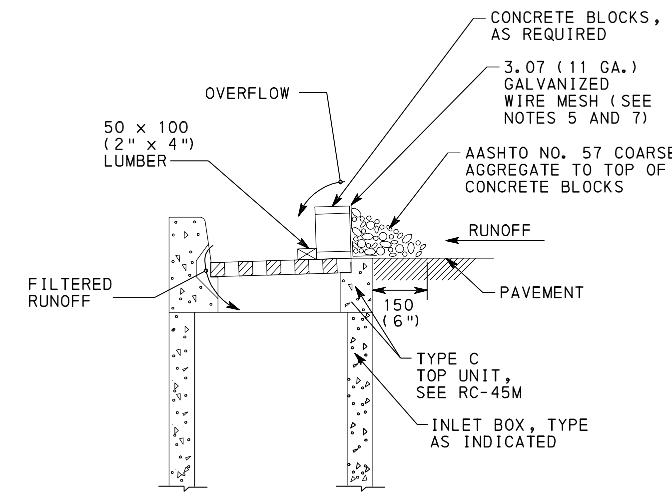
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET AND OUTLET PROTECTION

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 7
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-72M



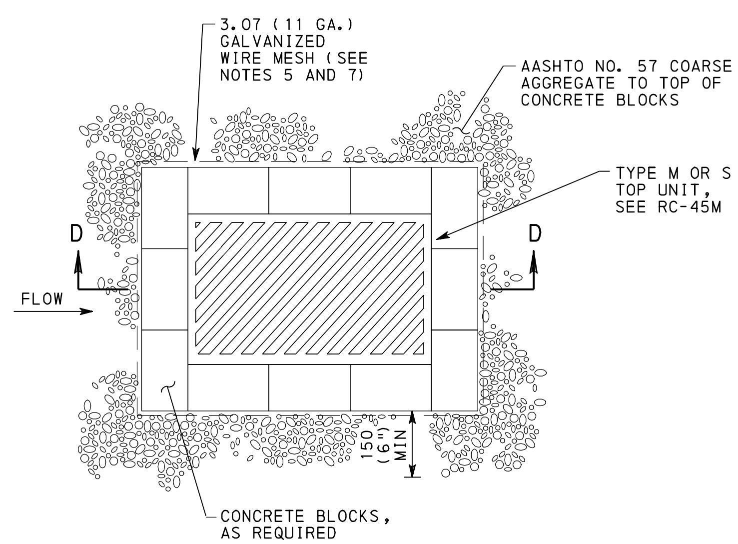
SECTION D-D



SECTION C-C

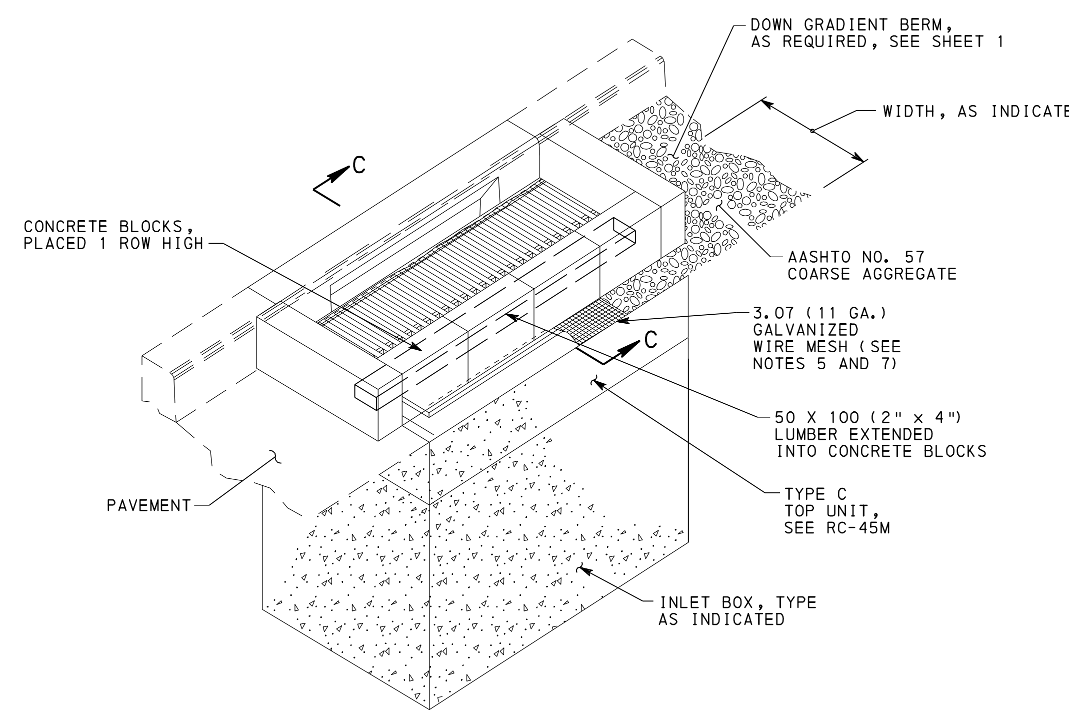
NOTES

1. INSPECT AND REPAIR CONCRETE BLOCK/GRAVEL INLET FILTER AFTER EACH RUNOFF EVENT. REMOVE ACCUMULATED SEDIMENT AS NECESSARY. REMOVE AND DISPOSE OF SEDIMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 860.
2. REMOVE SEDIMENT AS REQUIRED OR WHEN DIRECTED FROM TRAVELED ROADWAYS.
3. REPLACE AND SATISFACTORILY DISPOSE OF CLOGGED FILTER STONE (AASHTO NO. 57 COARSE AGGREGATE). RAKE PERIODICALLY TO INCREASE INFILTRATION.
4. PLACE 3.07 (11 GA.) GALVANIZED WIRE MESH AROUND PERIMETER OF CONCRETE BLOCKS TO PREVENT MOVEMENT OF GRAVEL.
5. UPON APPROVAL, 6.25 (1/4") MAX PLASTIC MESH MAY BE SUBSTITUTED FOR GALVANIZED WIRE MESH.
6. PLACE CONCRETE BLOCKS MEETING THE REQUIREMENTS OF PUBLICATION 408 AROUND INLET PERIMETER.
7. PLACE 3.07 (11 GA.) GALVANIZED WIRE MESH OVER EXPOSED GRATE AREA OF TYPE C INLETS ONLY. PLACE WIRE MESH ALONG PERIMETER OF CONCRETE BLOCKS PRIOR TO PLACING AASHTO NO. 57 COARSE AGGREGATE, ALL INLET TYPES.
8. PROVIDE DOWN GRADIENT BERM AS INDICATED ON SHEET 1. DO NOT USE IN SAG/SUMP CONDITIONS.
9. DO NOT USE INLET PROTECTION ON ROADWAYS WHERE PONDING WATER OR INLET PROTECTION MAY BE HAZARDOUS TO VEHICULAR TRAFFIC.



PLAN

CONCRETE BLOCK/GRAVEL INLET PROTECTION
(TYPE M OR TYPE S INLETS)



PLAN

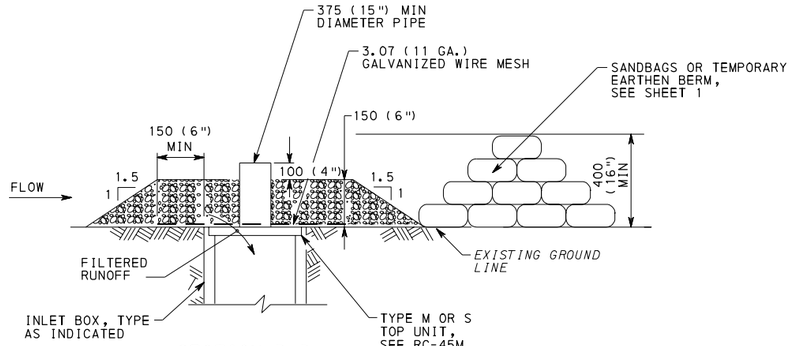
CONCRETE BLOCK/GRAVEL INLET PROTECTION
(TYPE C INLET)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

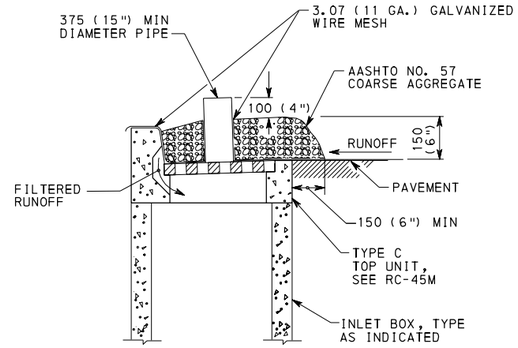
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET AND OUTLET PROTECTION

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 7
R. Wyckoff Willey (signature) CHIEF, HWY. QA DIVISION	(signature) DIRECTOR, BUREAU OF DESIGN	RC-72M



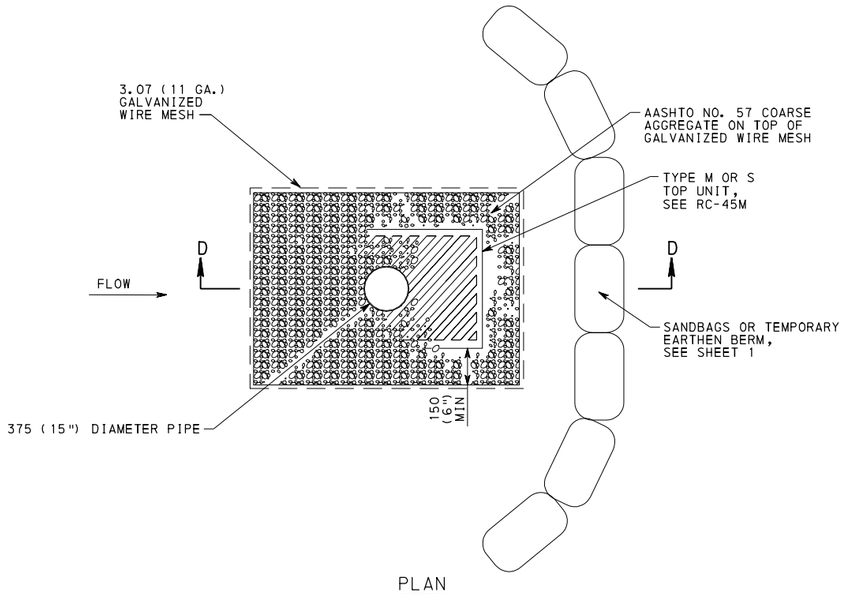
SECTION D-D



SECTION C-C

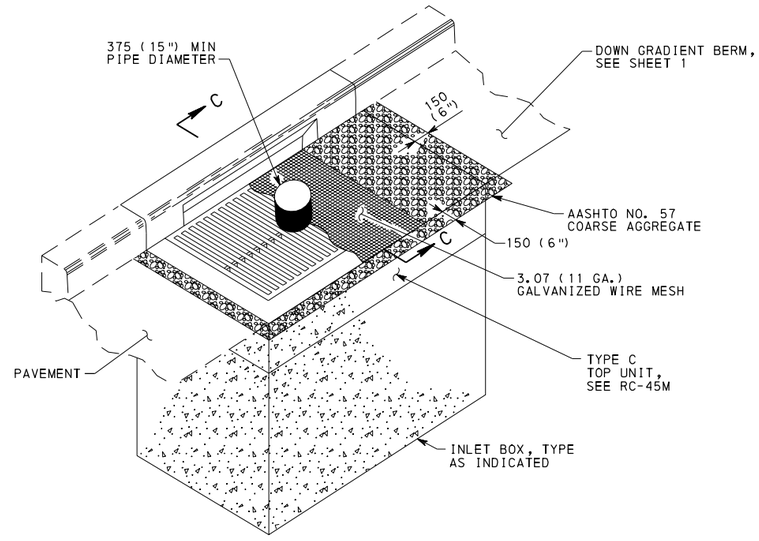
NOTES

1. INSPECT AND REPAIR PIPE/GRAVEL INLET FILTER AFTER EACH RUNOFF EVENT. REMOVE ACCUMULATED SEDIMENT AS NECESSARY. REMOVE AND DISPOSE OF SEDIMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 860.
2. REMOVE SEDIMENT AS REQUIRED OR WHEN DIRECTED FROM TRAVELED ROADWAYS.
3. REPLACE AND SATISFACTORILY DISPOSE OF CLOGGED FILTER STONE (AASHTO NO. 57 COARSE AGGREGATE). RAKE PERIODICALLY TO INCREASE INFILTRATION.
4. PLACE 3.07 (11 GA.) GALVANIZED WIRE MESH ON TOP OF INLET.
5. PLACE 375 (15") DIAMETER PIPE ON WIRE MESH AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 860.
6. DO NOT USE INLET PROTECTION ON ROADWAYS WHERE PONDING WATER OR INLET PROTECTION MAY BE HAZARDOUS TO VEHICULAR TRAFFIC.



PLAN

PIPE/GRAVEL INLET PROTECTION
(TYPE M OR TYPE S INLET)



PLAN

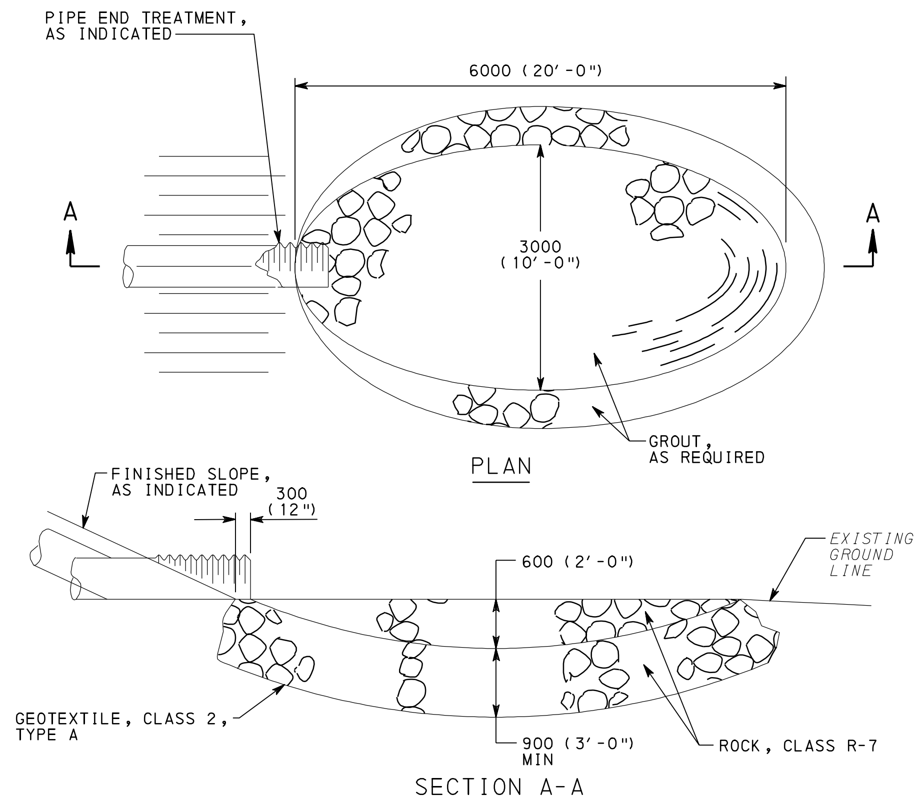
PIPE/GRAVEL INLET PROTECTION
(TYPE C INLET)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

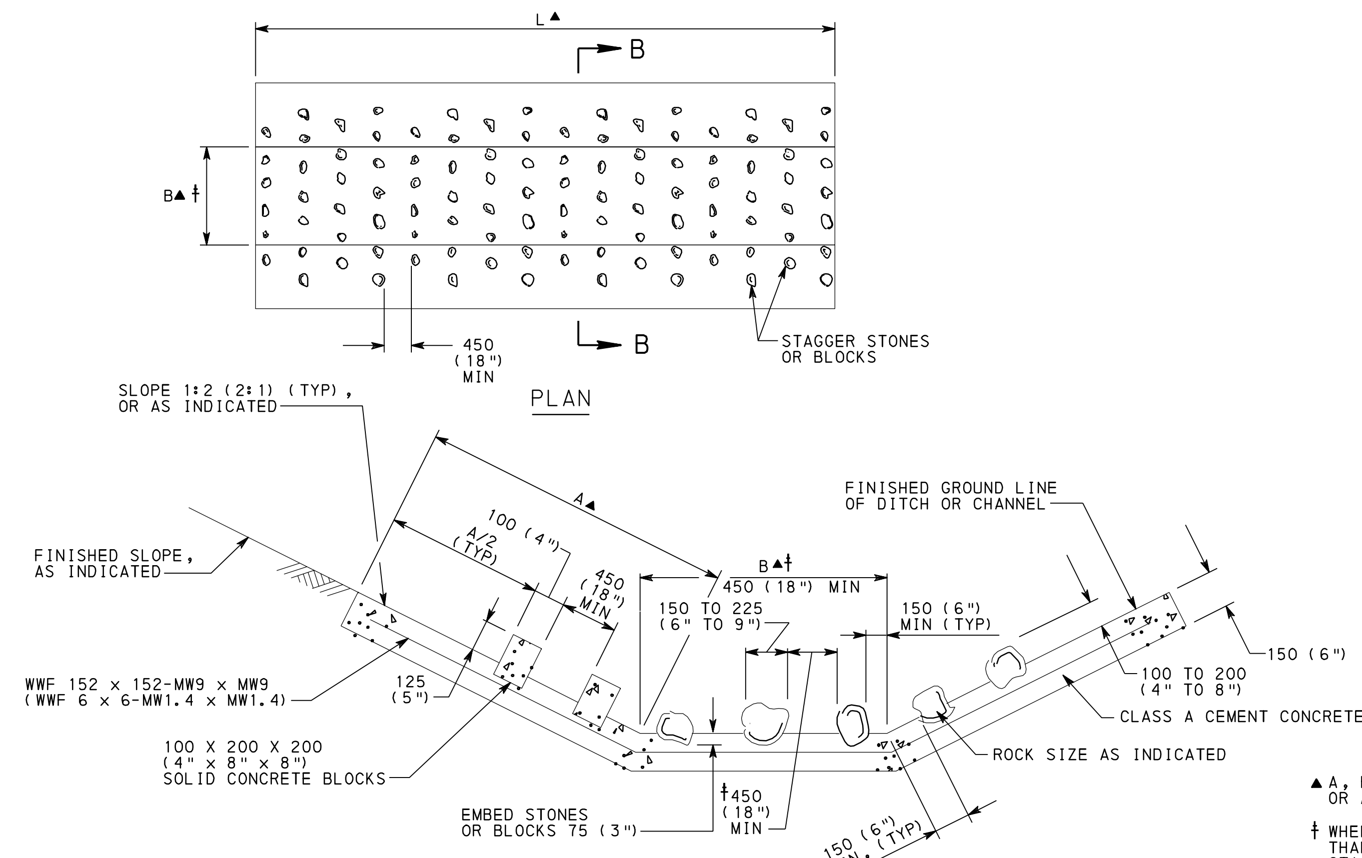
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET AND OUTLET PROTECTION

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 7
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-72M



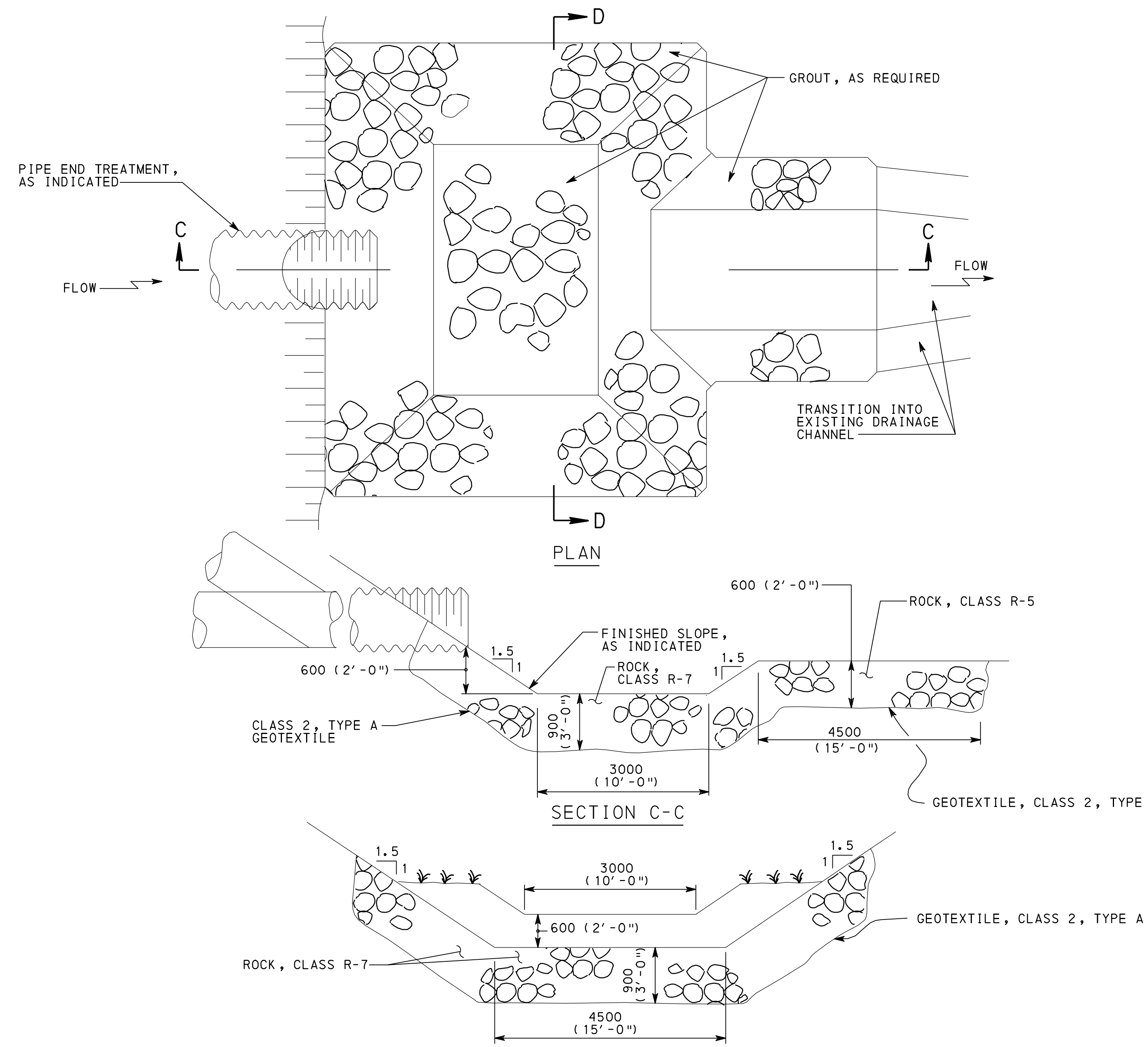
ROCK BASIN



PAVED ENERGY DISSIPATOR

▲ A, B, AND L AS INDICATED OR AS DIRECTED

ǂ WHEN CHANNEL BOTTOM WIDTH IS LESS THAN 900 (3'-0"), USE A SINGLE, STAGGERED ROW OF STONES OR BLOCKS ALONG CHANNEL BOTTOM



ROCK ENERGY DISSIPATOR

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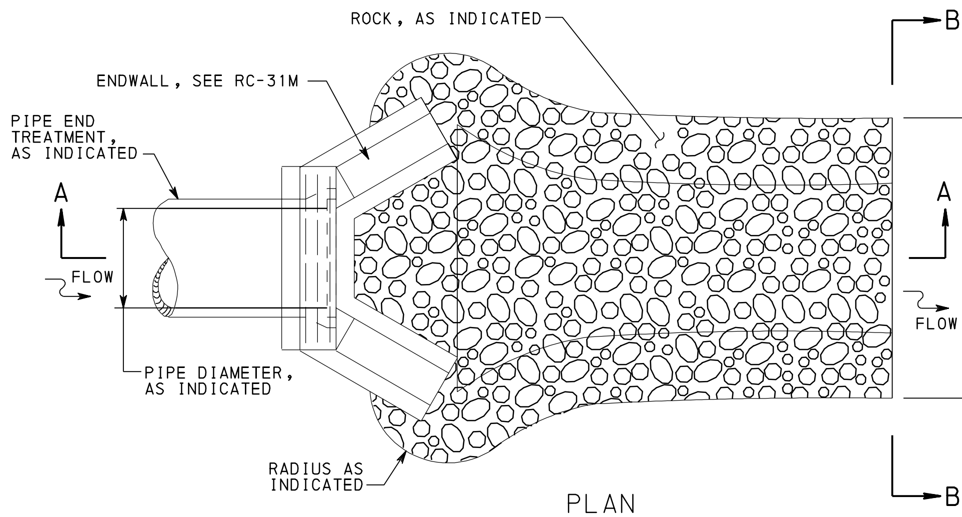
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET AND OUTLET PROTECTION

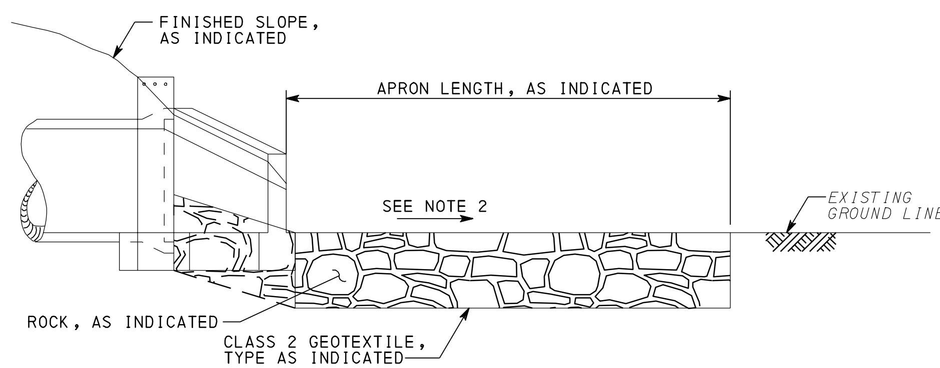
RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 5 OF 7 RC-72M

NOTES

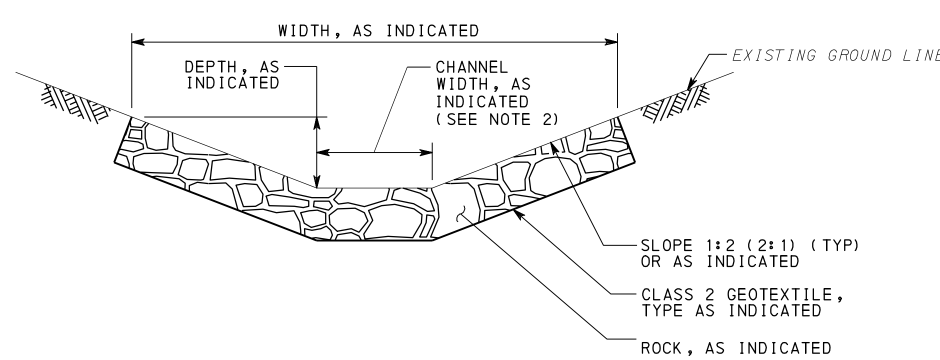
1. PROVIDE GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
2. SLOPE SHOULD BE LEVEL OR AS CLOSE TO LEVEL AS REASONABLY POSSIBLE BASED ON SITE CONDITIONS.



PLAN



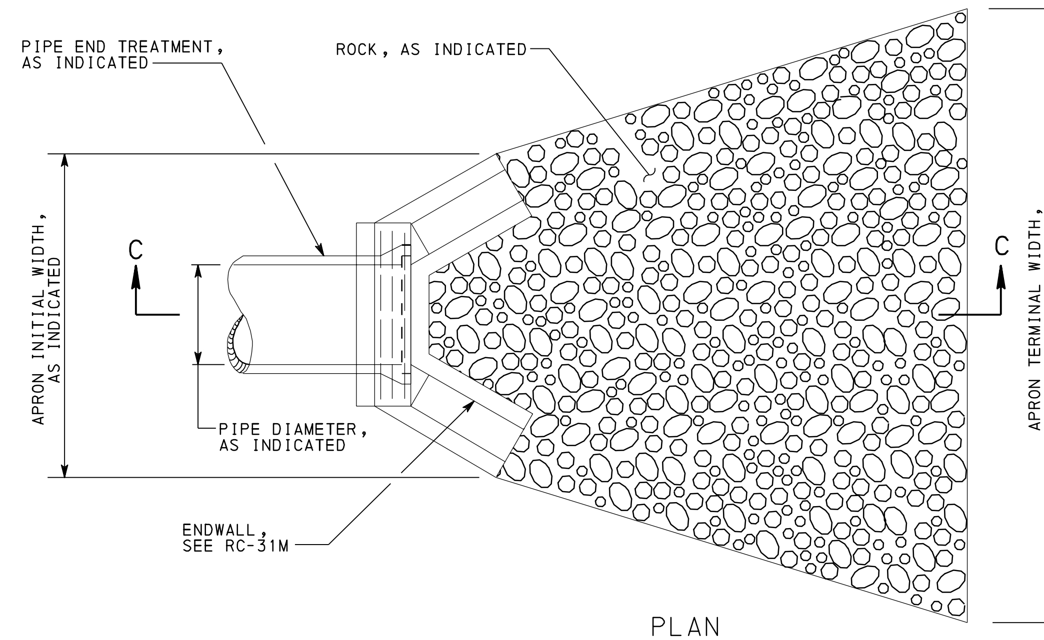
SECTION A-A



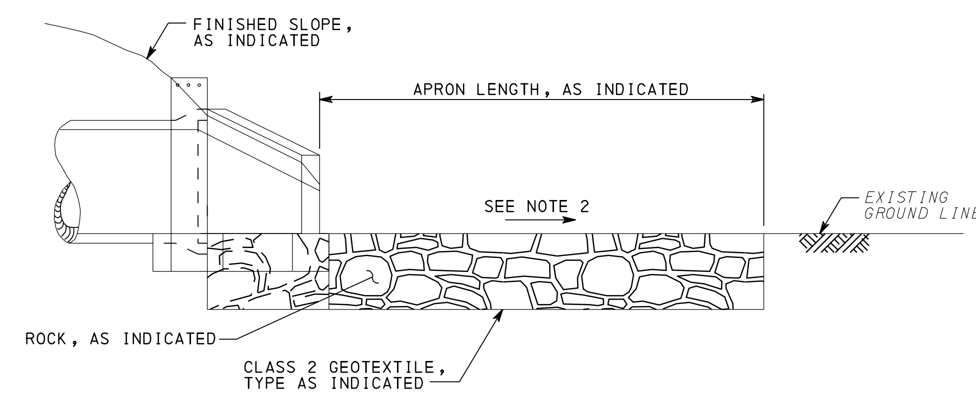
SECTION B-B

ROCK APRON (DEFINED CHANNEL)

NOT TO SCALE



PLAN



SECTION C-C

ROCK APRON (FLAT AREA)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

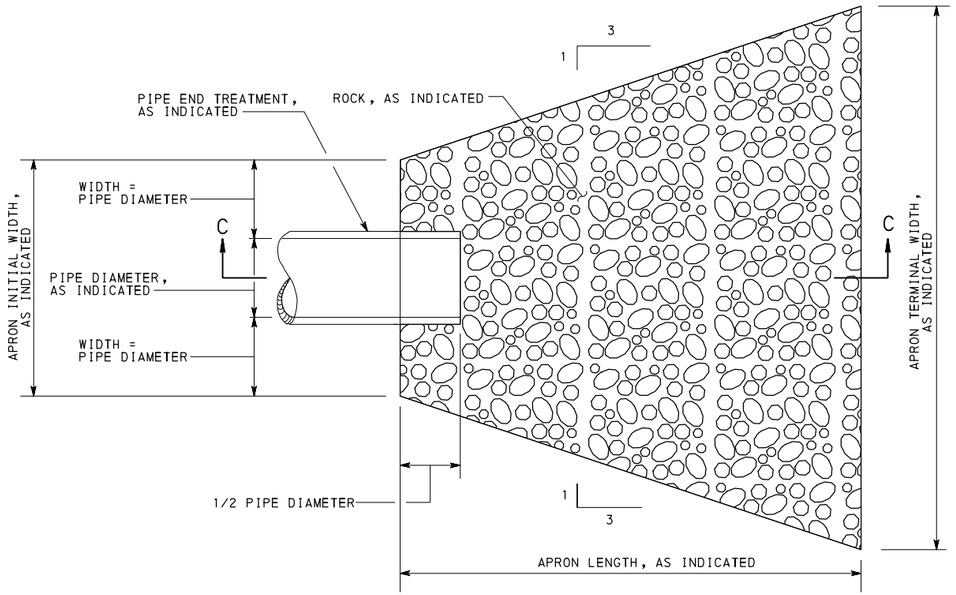
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET AND OUTLET PROTECTION

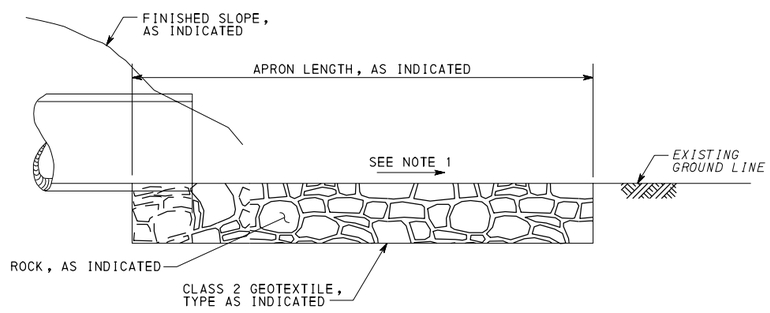
RECOMMENDED JUN. 1, 2010 (signature) CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 (signature) DIRECTOR, BUREAU OF DESIGN	SHT 6 OF 7 RC-72M

NOTE

1. SLOPE SHOULD BE LEVEL OR AS CLOSE TO LEVEL AS REASONABLY POSSIBLE BASED ON SITE CONDITIONS.



PLAN



SECTION C-C

ROCK APRON (FLAT AREA)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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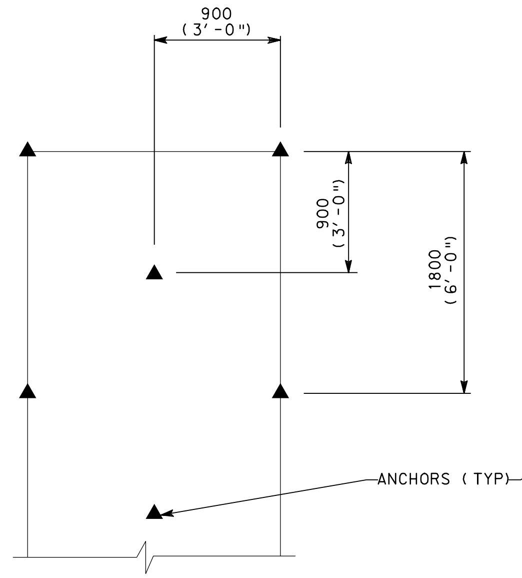
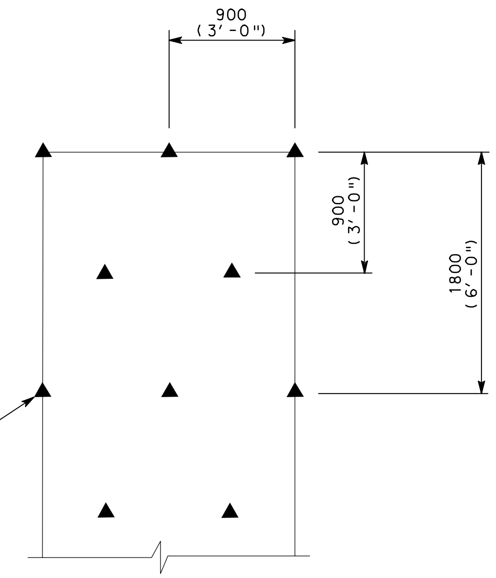
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 7 OF 7
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-72M



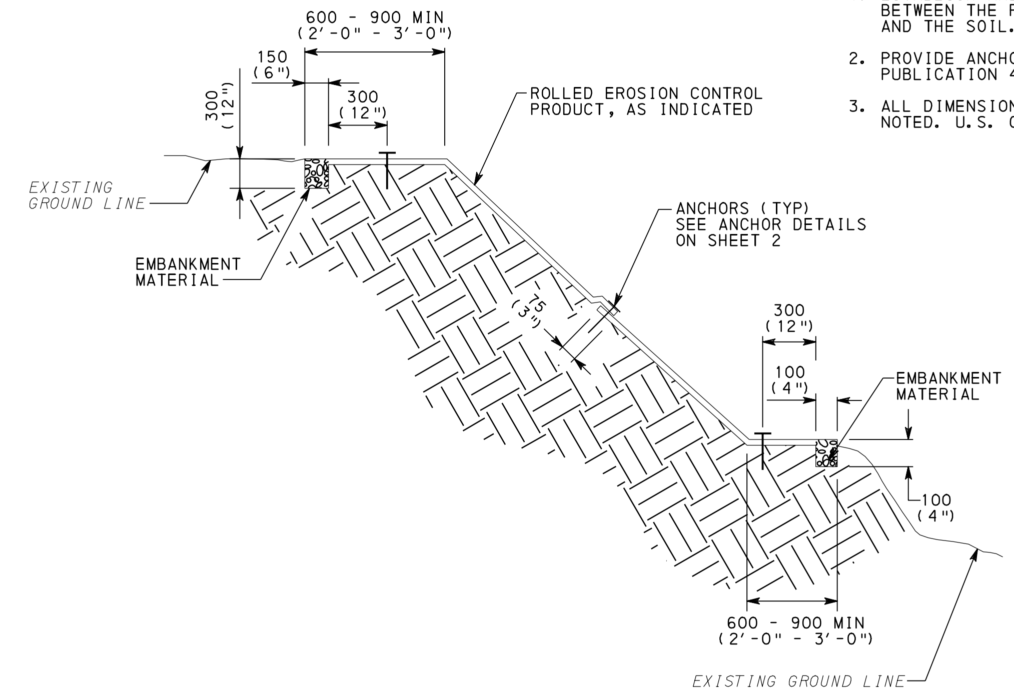
ANCHOR PATTERN FOR
SLOPES FLATTER THAN 3:1

PLACE 1.2 ANCHORS/m² (1 ANCHOR/SY)



ANCHOR PATTERN FOR SLOPES
BETWEEN 3:1 AND 2:1
(INCLUDING 3:1)

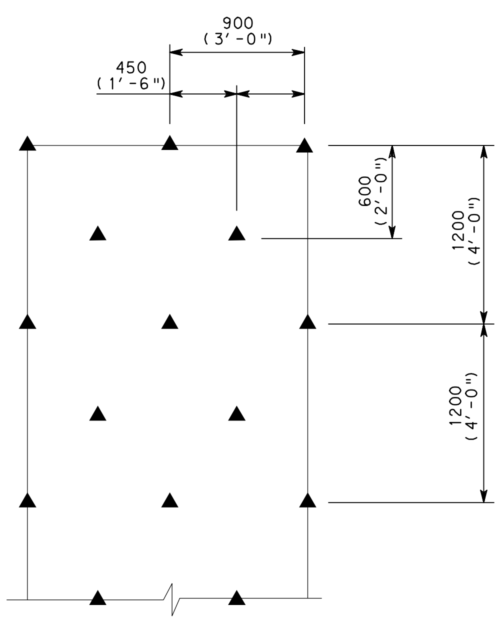
PLACE 1.8 ANCHORS/m² (1½ ANCHORS/SY)



TYPICAL SLOPE CROSS-SECTION

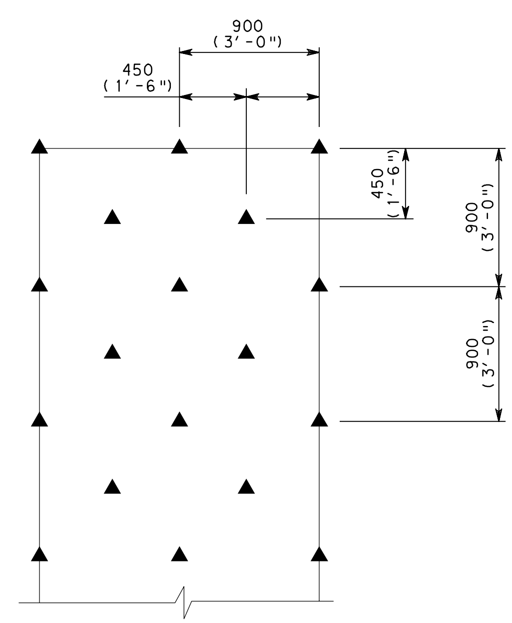
NOTES

1. ESTABLISH AND MAINTAIN CONTINUOUS CONTACT BETWEEN THE ROLLED EROSION CONTROL PRODUCTS AND THE SOIL.
2. PROVIDE ANCHORING DEVICES IN ACCORDANCE WITH PUBLICATION 408, SECTION 806.2(d).
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.



ANCHOR PATTERN FOR SLOPES
BETWEEN 2:1 AND 1:1
(INCLUDING 2:1)

PLACE 2.5 ANCHORS/m² (2 ANCHORS/SY)



ANCHOR PATTERN FOR
1:1 OR STEEPER

PLACE 3 ANCHORS/m² (2½ ANCHORS/SY)

ANCHOR PATTERNS FOR SLOPES

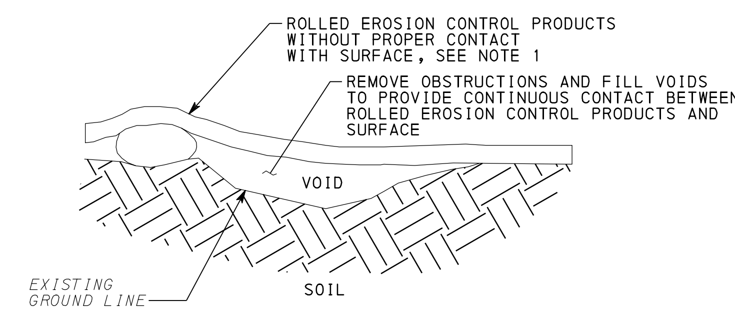


FIGURE 1

LACK OF CONTINUOUS CONTACT

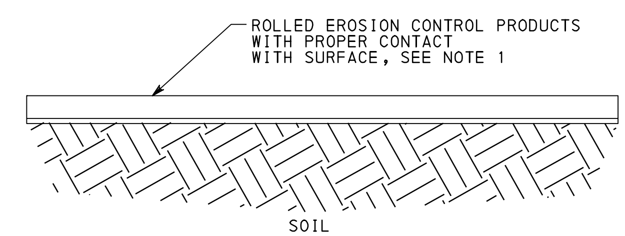


FIGURE 2

CONTINUOUS CONTACT

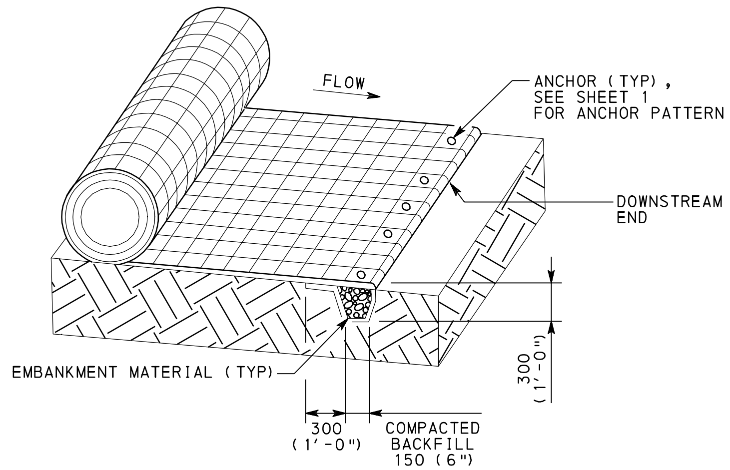
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

ROLLED EROSION CONTROL PRODUCTS (RECP)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

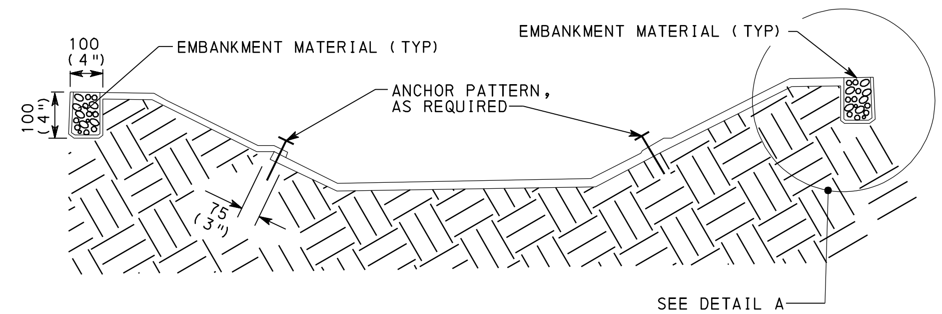
CHANNEL AND SLOPE PROTECTION

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 4 RC-73M



INITIAL ANCHOR TRENCH

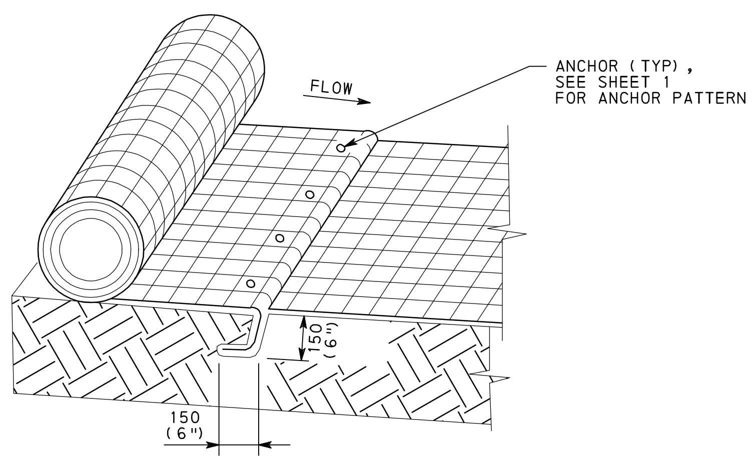
SEE NOTE 1



TYPICAL TRAPEZOIDAL CHANNEL CROSS-SECTION

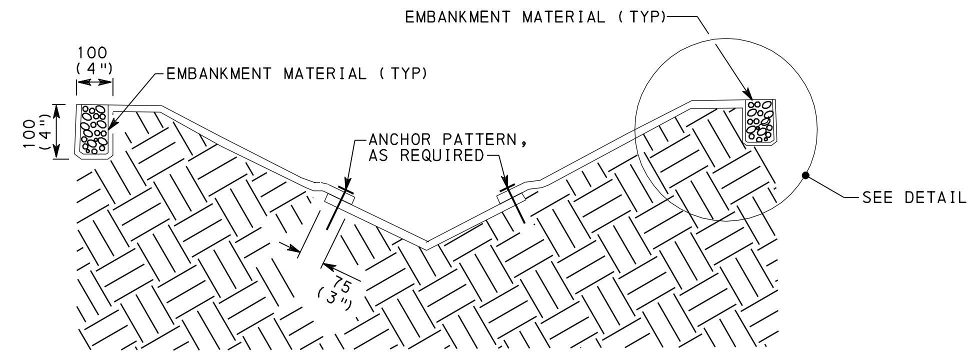
NOTES

1. EXCAVATE INITIAL ANCHOR TRENCH 300 (1'-0") DEEP AND 150 (6") WIDE ACROSS THE WIDTH OF THE CHANNEL TO PREVENT UNDERMINING OF THE ROLLED EROSION CONTROL PRODUCTS.
2. EXCAVATE INTERMITTENT CHECK SLOT 150 (6") DEEP AND 150 (6") WIDE ACROSS THE WIDTH OF THE CHANNEL AT 7000 TO 9000 (25'-0" TO 30'-0") ALONG THE LENGTH OF THE ROLLED EROSION CONTROL PRODUCTS TO PREVENT LOOSE SOIL FROM BEING TRANSPORTED DOWNSTREAM BENEATH THE ROLLED EROSION CONTROL PRODUCTS.
3. EXCAVATE TERMINAL ANCHOR TRENCH 300 (1'-0") DEEP AND 150 (6") WIDE ACROSS THE WIDTH OF THE CHANNEL TO ENSURE WATER FLOW TRANSITIONS SMOOTHLY ONTO THE ROLLED EROSION CONTROL PRODUCTS WITHOUT SEPARATION FROM THE SOIL.
4. EXTEND ROLLED EROSION CONTROL PRODUCTS 600 - 900 (2'-0" - 3'-0") ABOVE THE CREST OF CHANNEL SIDE WHENEVER POSSIBLE.
5. PLACE 3 ANCHORS/m^2 (2½ ANCHORS/SY).
6. PROVIDE ANCHORING DEVICES IN ACCORDANCE WITH SECTION 806.2(d) OF PUBLICATION 408.

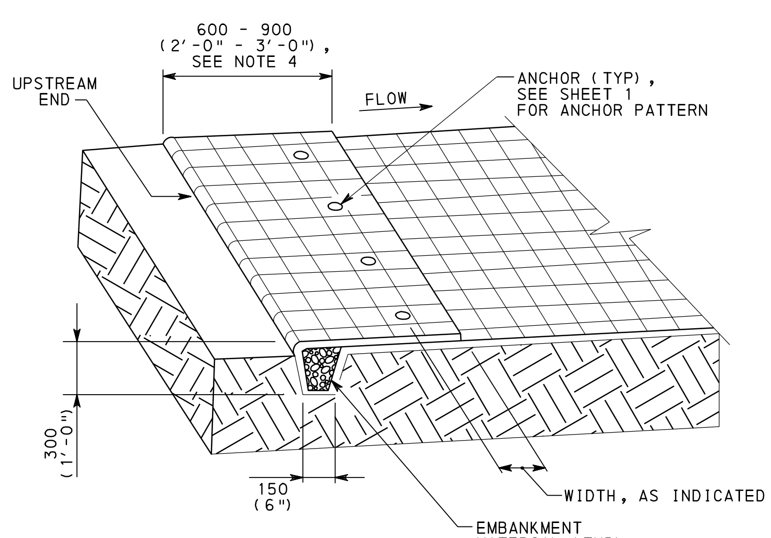


INTERMITTENT CHECK SLOT

SEE NOTE 2

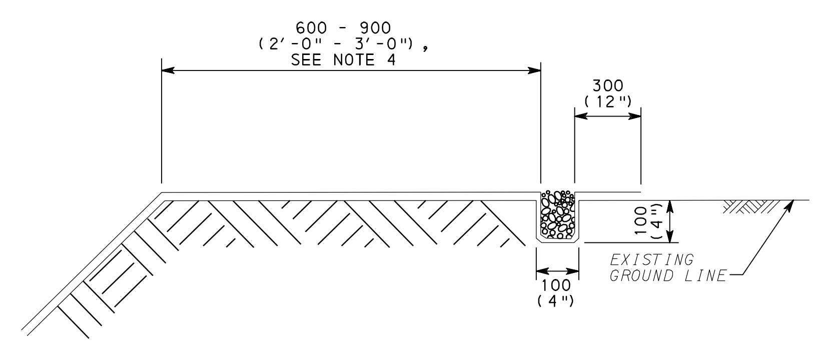


TYPICAL V-DITCH CROSS-SECTION



TERMINAL ANCHOR TRENCH

SEE NOTE 3



DETAIL A

ROLLED EROSION CONTROL PRODUCTS (RECP)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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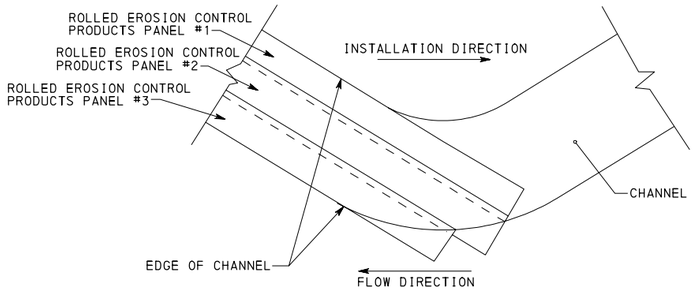
CHANNEL AND SLOPE PROTECTION

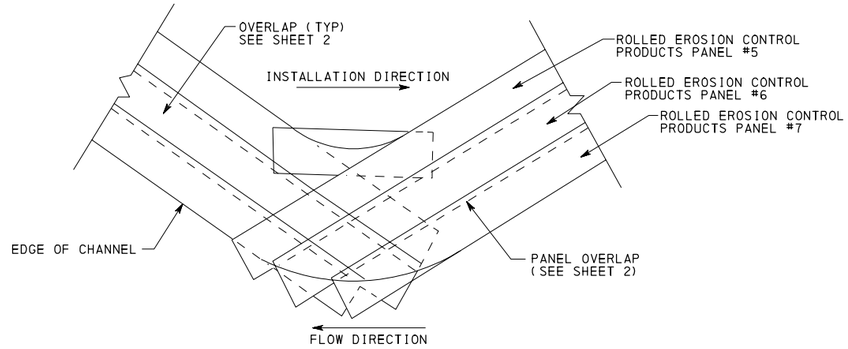
RECOMMENDED JUN. 1, 2010 (signature) CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 (signature) DIRECTOR, BUREAU OF DESIGN	SHT 2 OF 4 RC-73M

NOTES

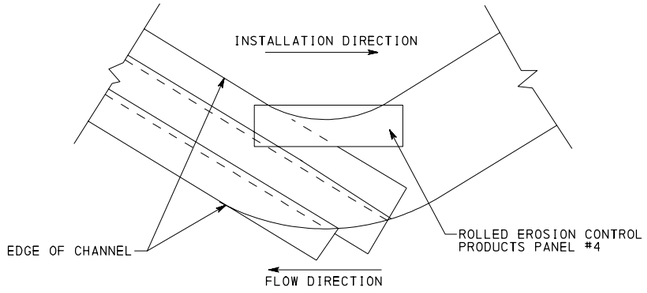
1. INSTALL ROLLED EROSION CONTROL PRODUCTS IN STRAIGHT SECTIONS AROUND CHANNEL BEND TO AVOID CURLING OF MAT EDGES. INSTALL ROLLED EROSION CONTROL PRODUCTS STARTING WITH PANEL #1.
2. ESTABLISH AND MAINTAIN CONTINUOUS CONTACT BETWEEN THE ROLLED EROSION CONTROL PRODUCTS AND SOIL SURFACE.
3. INSTALL ROLLED EROSION CONTROL PRODUCTS AS INDICATED AND AS SHOWN ON SHEET 2.
4. TERMINATE PANELS AT CHANNEL EDGE OR AS DIRECTED BY THE REPRESENTATIVE.



ROLLED EROSION CONTROL PRODUCTS PANELS 1, 2 & 3



ROLLED EROSION CONTROL PRODUCTS PANELS 5, 6 & 7



ROLLED EROSION CONTROL PRODUCTS PANEL 4

INSTALLATION FOR CHANNEL BENDS
ROLLED EROSION CONTROL PRODUCTS (RECP)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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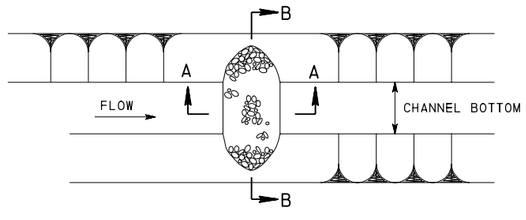
CHANNEL AND SLOPE PROTECTION

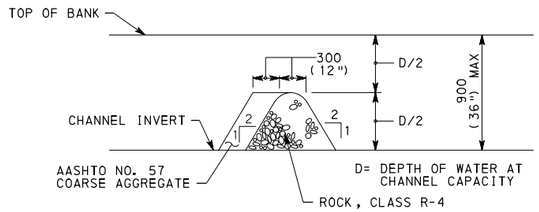
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-73M

NOTES

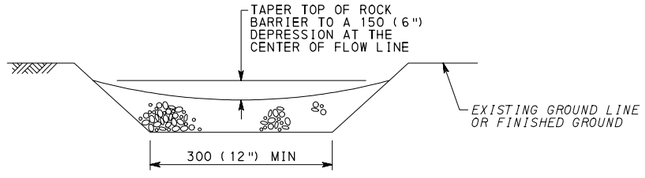
1. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES ONE-HALF THE HEIGHT OF THE ROCK BARRIER. REPLACE CLOGGED FILTER STONE. REMOVE AND DISPOSE OF SEDIMENT IN AN APPROVED MANNER.
2. PROVIDE GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.



PLAN VIEW

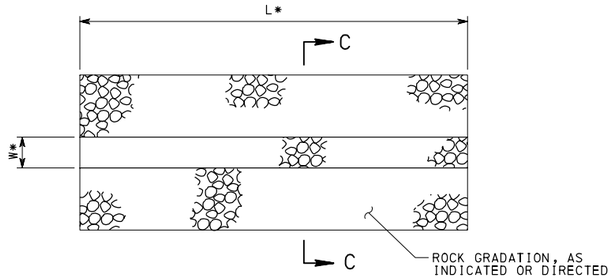


SECTION A-A



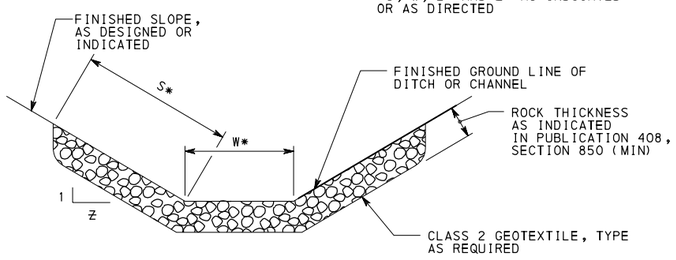
SECTION B-B

ROCK BARRIER



PLAN

*S, W, L AND Z AS INDICATED OR AS DIRECTED



SECTION C-C

ROCK LINING FOR CHANNELS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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CHANNEL AND SLOPE PROTECTION

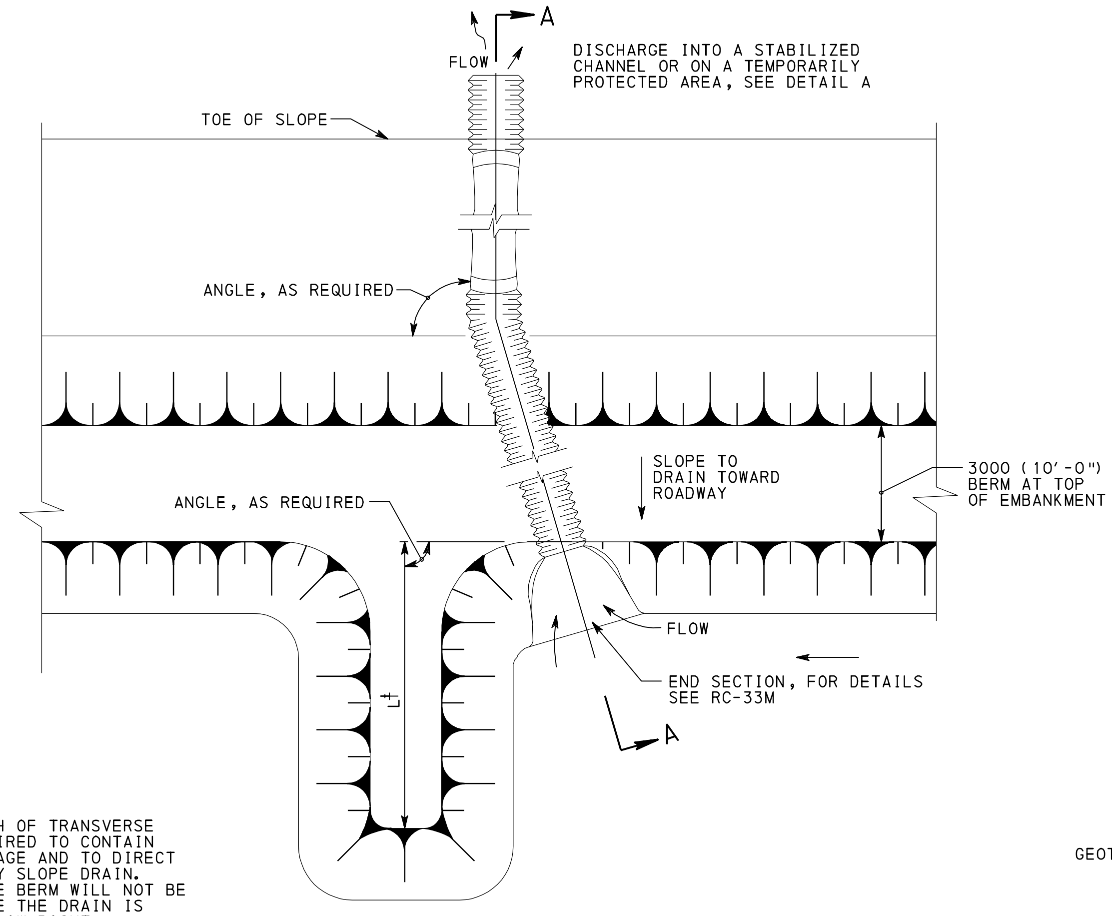
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-73M

NOTES

1. MAINTAIN SLOPE PIPES AT ALL TIMES AS INDICATED IN PUBLICATION 408, SECTION 854. CLEAN OR REPAIR ALL CLOGGED OR LEAKING PIPES AS NECESSARY. REPLACE ALL INLETS AND OUTLETS AS NECESSARY. REMOVE ACCUMULATED SEDIMENT FROM THE ENTRANCE OR EXIT OF EACH SLOPE PIPE AND DISPOSE OF IN AN APPROVED MANNER.
2. INSPECT TEMPORARY SLOPE PIPES ONCE A WEEK AND AFTER EACH STORM EVENT THAT PRODUCES RUNOFF.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

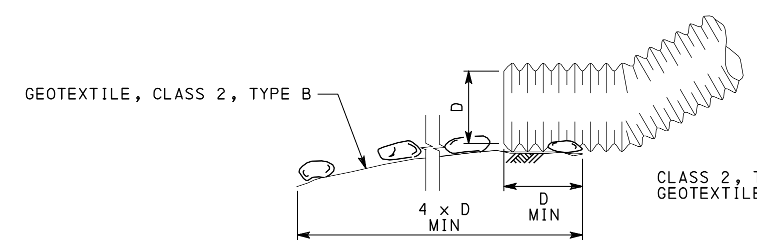
TABLE A
SUGGESTED MINIMUM SIZES

DRAINAGE AREA HECTARES (ACRES)	CORRUGATED PIPE SIZE DIAMETER MILLIMETERS (INCHES)	MINIMUM BERM HEIGHT MILLIMETERS (INCHES)
0 TO 0.8 (0 TO 2)	300 (12)	600 (24)
0.8 TO 1.6 (2 TO 4)	375 (15)	675 (27)
1.6 TO 2.0 (4 TO 5)	450 (18)	750 (30)

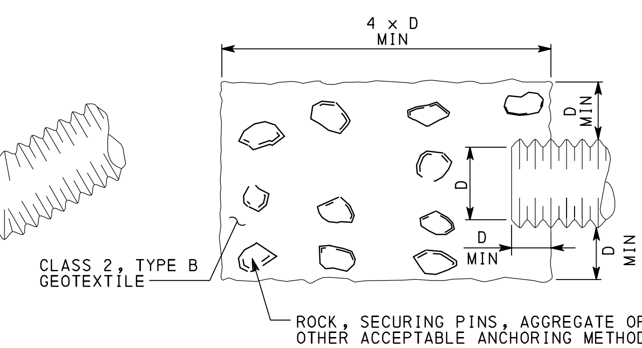


† PROVIDE LENGTH OF TRANSVERSE BERM (L) REQUIRED TO CONTAIN SURFACE DRAINAGE AND TO DIRECT INTO TEMPORARY SLOPE DRAIN. THE TRANSVERSE BERM WILL NOT BE REQUIRED WHERE THE DRAIN IS LOCATED AT A LOW POINT.

PLAN

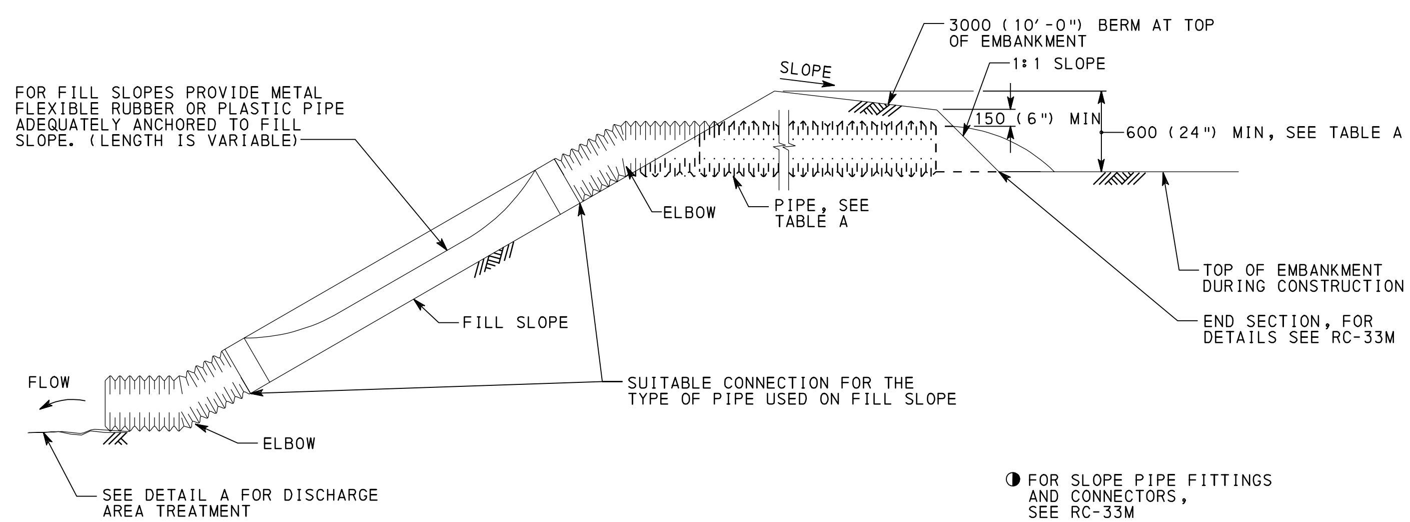


SECTION



PLAN

DETAIL A



◑ FOR SLOPE PIPE FITTINGS AND CONNECTORS, SEE RC-33M

SECTION A-A

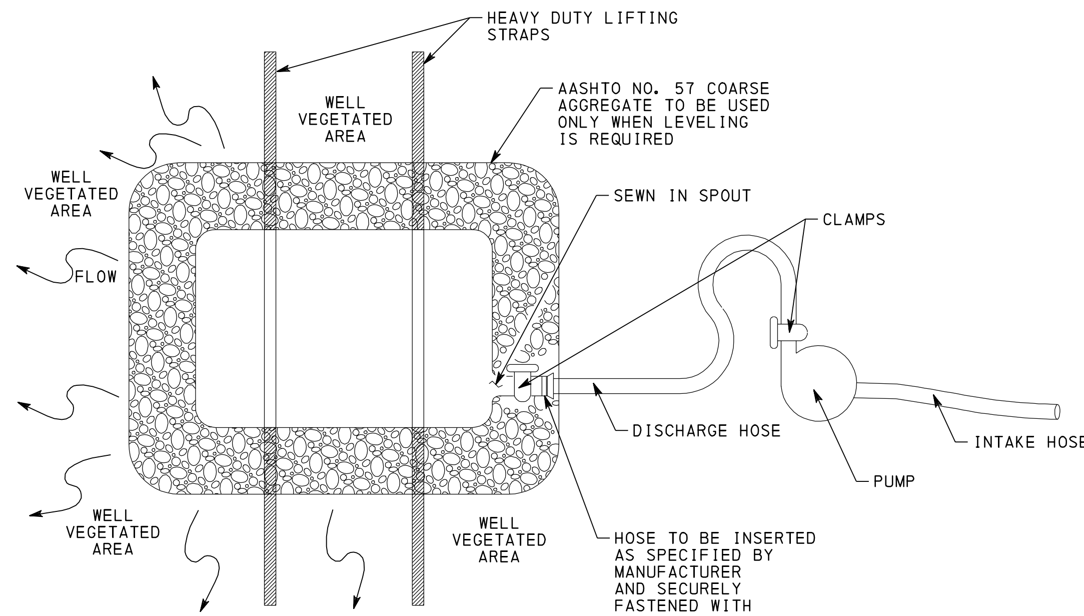
TEMPORARY SLOPE PIPE ◑

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

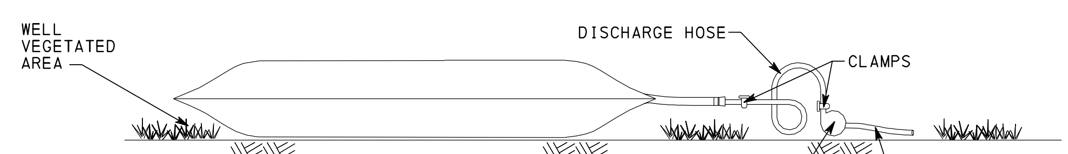
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TEMPORARY DIVERSIONS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-74M



TOP VIEW



SIDE VIEW

PUMPED WATER FILTER BAG

NOTES

1. LOCATE BAG IN LEVEL AREAS (LESS THAN 5% GRADE). WHEN LEVEL AREAS ARE NOT AVAILABLE, PLACE AASHTO NO. 57 COARSE AGGREGATE TO LEVEL THE BAG.
2. LOCATE BAG IN A WELL VEGETATED AREA. DISCHARGE ONTO A STABLE, EROSION RESISTANT AREA. WHEN VEGETATED AREA IS NOT AVAILABLE, PROVIDE A GEOTEXTILE (CLASS 4, TYPE A) LINED FLOW PATH TO A STABLE EROSION RESISTANT RECEIVING WATER COURSE OR A WELL VEGETATED AREA.
3. LOCATE BAG IN AN AREA ACCESSIBLE BY EQUIPMENT FOR MAINTENANCE AND REMOVAL PURPOSES.
4. DO NOT INSERT MORE THAN ONE HOSE INTO A BAG.
5. REPLACE THE BAG WHEN 50% OF THE SEDIMENT CAPACITY HAS BEEN FILLED AND/OR WHEN THERE IS A FAILURE. THE ADDITIONAL BAGS WILL BE PAID AS EACH.
6. REMOVE AND PROPERLY DISPOSE OF THE PUMPED WATER FILTER BAGS. RESTORE THE AREA IN ACCORDANCE WITH THE SPECIFICATIONS IN PUBLICATION 408. DO NOT CUT FILTER BAG OR DISTRIBUTE AND SEED SEDIMENT.
7. DO NOT PERMIT DISCHARGE FROM THE BAG TO DRAIN BACK INTO WORK OR ACCESS AREAS OF THE PROJECT.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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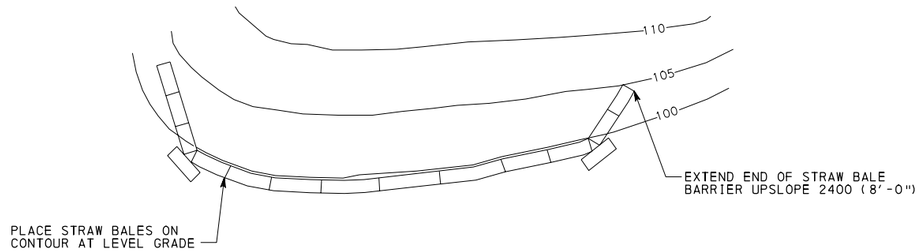
DEWATERING DEVICES

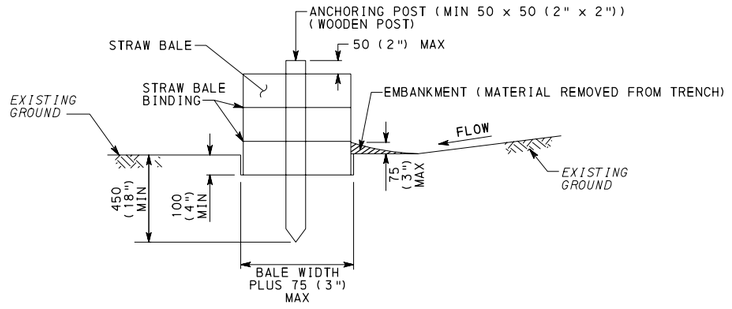
RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 1 RC-75M

NOTES

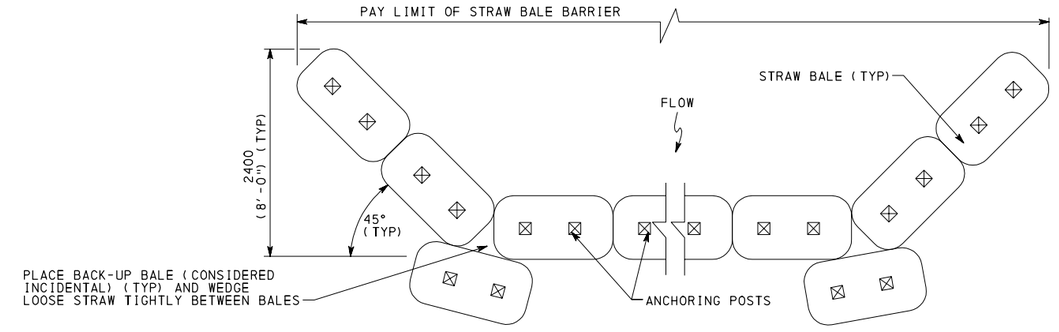
1. PLACE AND COMPACT EMBANKMENT MATERIAL FROM THE TRENCH EXCAVATION ON THE UPSLOPE SIDE OF THE STRAW BALE BARRIER.
2. PLACE STRAW BALE BARRIER ON UNIFORM GRADE. EXTEND BOTH ENDS UPSLOPE 2400 (8'-0") MIN AT 45 DEGREES FROM MAIN STRAW BALE BARRIER ALIGNMENT.
3. REMOVE SEDIMENT ACCUMULATION WHEN DEPTH OF SEDIMENT EQUALS 75 (3") ABOVE THE COMPACTED EMBANKMENT MATERIAL.
4. PLACE BALES SO BINDINGS ARE IN THE HORIZONTAL POSITION.
5. ANCHOR EACH BALE WITH TWO WOOD STAKES MINIMUM. DRIVE FIRST STAKE AT AN ANGLE AND INTO THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
6. REMOVE/REPLACE STRAW BALE BARRIER EVERY THREE MONTHS WHEN DIRECTED OR WHEN NO LONGER NEEDED. PROPERLY DISPOSE OF STRAW, POSTS AND SEDIMENT.
7. REPLACE UNDERCUT AND OVERTOPPED SECTIONS OF THE BARRIER WITH A ROCK FILTER OUTLET.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.



CONTOUR PLAN

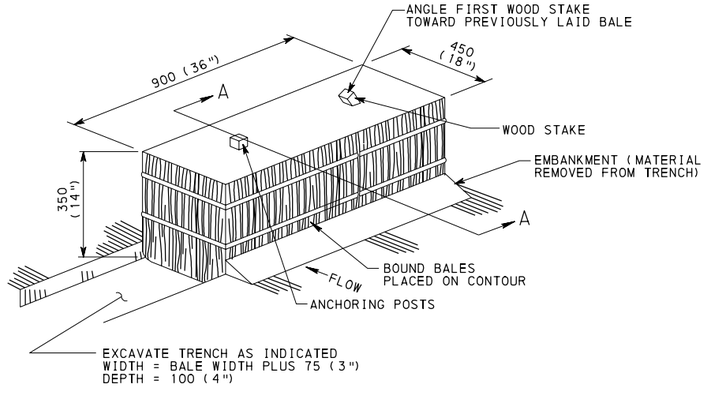


SECTION A-A



PLAN

STRAW BALE BARRIER



STRAW BALE BARRIER DETAIL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

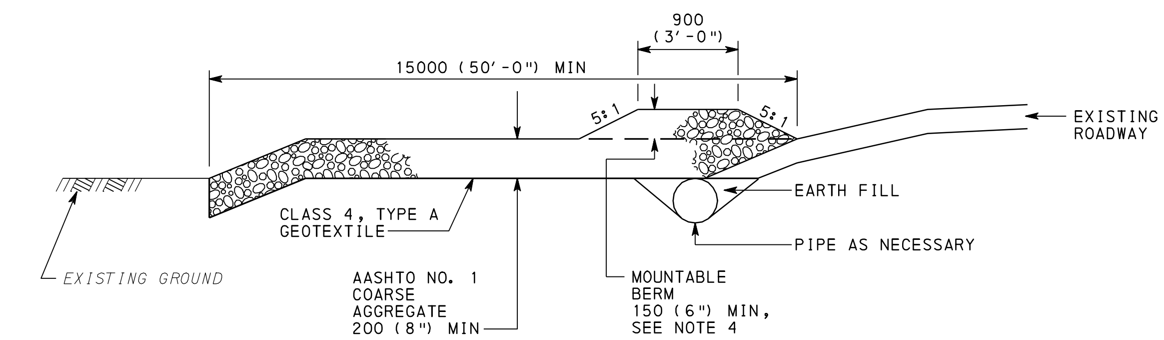
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STRAW BALE BARRIER

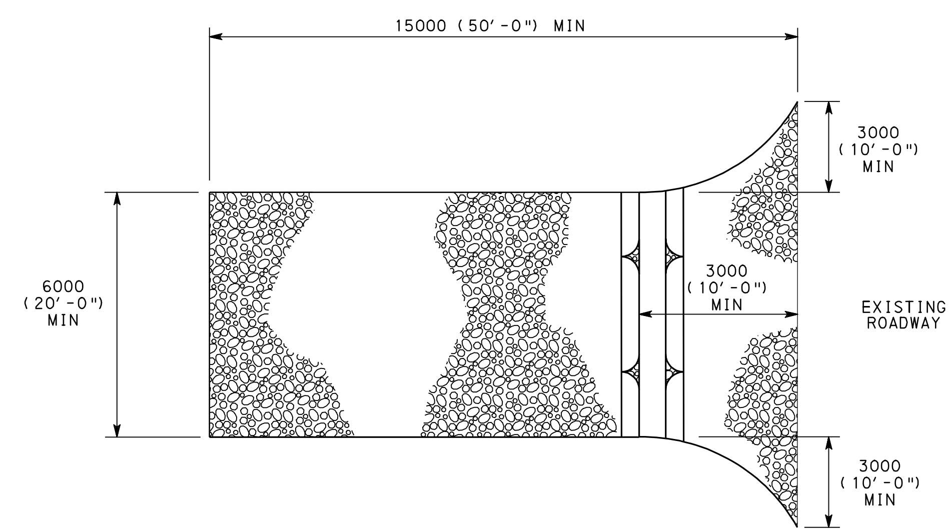
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
R. Wyatt Dilley		
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-76M

NOTES

1. INSPECT THE ENTRANCE DAILY. REMOVE ALL SEDIMENT DEPOSITED ON THE PUBLIC ROADWAYS AND RETURN TO THE CONSTRUCTION SITE. WASHING OF THE ROADWAY WILL NOT BE PERMITTED.
2. MAINTAIN THE SPECIFIED ROCK CONSTRUCTION ENTRANCE THICKNESS. PLACE ADDITIONAL ROCK WHENEVER ROCK BECOMES CLOGGED WITH SEDIMENT.
3. MAINTAIN STOCKPILE OF AASHTO NO. 1 COARSE AGGREGATE.
4. CONSTRUCT A MOUNTABLE BERM ONLY WHEN 150 (6") MIN COVER CANNOT BE PROVIDED OVER THE PIPE.
5. SATISFACTORILY REMOVE MATERIALS AS PER SPECIFICATION IN PUBLICATION 408, SECTION 849 WHEN ROCK CONSTRUCTION ENTRANCE IS NO LONGER NEEDED.
6. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 735. FURNISH AND INSTALL IN ACCORDANCE WITH PUBLICATION 408, SECTION 212. PROVIDE GEOTEXTILE ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
7. CONSTRUCT ROCK CONSTRUCTION ENTRANCE WITHIN THE RIGHT-OF-WAY OR EASEMENT AREAS. ENTRANCE MAY BE CONSTRUCTED ON A SKEW IF ADEQUATE PULL OUT SIGHT DISTANCE IS AVAILABLE.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.



PROFILE



PLAN

ROCK CONSTRUCTION ENTRANCE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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ROCK CONSTRUCTION ENTRANCE

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-77M

NOTES FOR STANDARD CONNECTIONS BETWEEN GEOCELL SECTIONS:

1. STAPLE ADJACENT GEOCELL SECTIONS TOGETHER USING MANUFACTURER APPROVED STAPLERS AND STAPLES.
2. HOLD THE TOP EDGES OF ADJACENT CELL WALLS FLUSH WHEN STAPLING.
3. INTERLEAF SIDE CONNECTIONS BETWEEN EXPANDED GEOCELL SECTIONS AS SHOWN IN FIGURE B. ALIGN WELDED EDGE SEAMS WHEN STAPLING.
4. BUTT END CONNECTIONS BETWEEN GEOCELL SECTIONS AS SHOWN IN FIGURE A. ALIGN AND STAPLE THE LONGITUDINAL CENTER-LINES OF ABUTTING EXTERNAL CELLS AT THE CELL WALL CONTACT POINT.

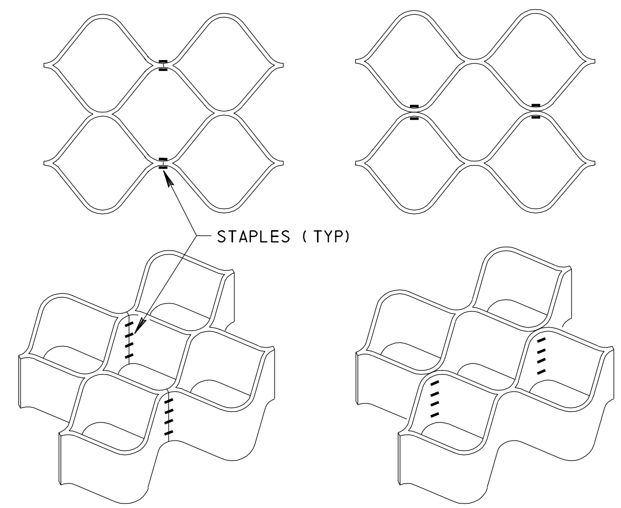
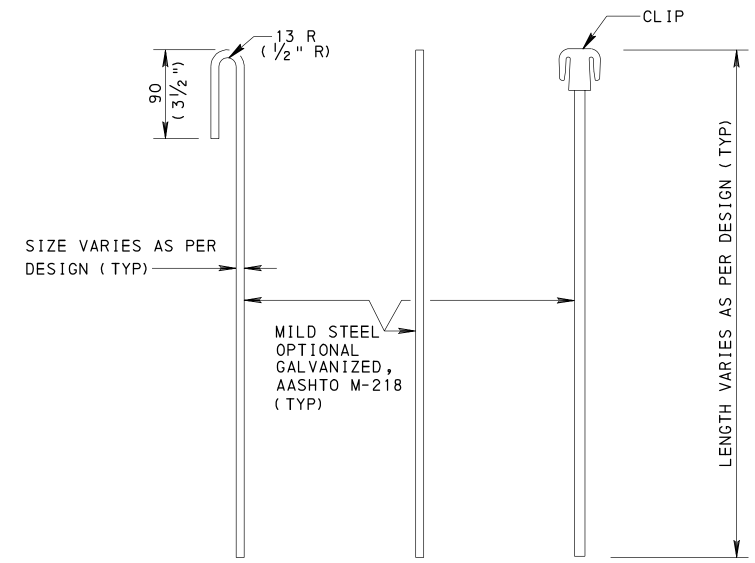


FIGURE A
END CONNECTION DETAIL
ABUTTED

FIGURE B
SIDE CONNECTION DETAIL
INTERLEAFED

STAPLED END CONNECTION DETAILS



J-PIN STAKE ANCHOR

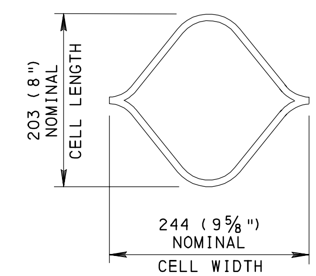
STRAIGHT STAKE ANCHOR

CLIP STAKE ANCHOR

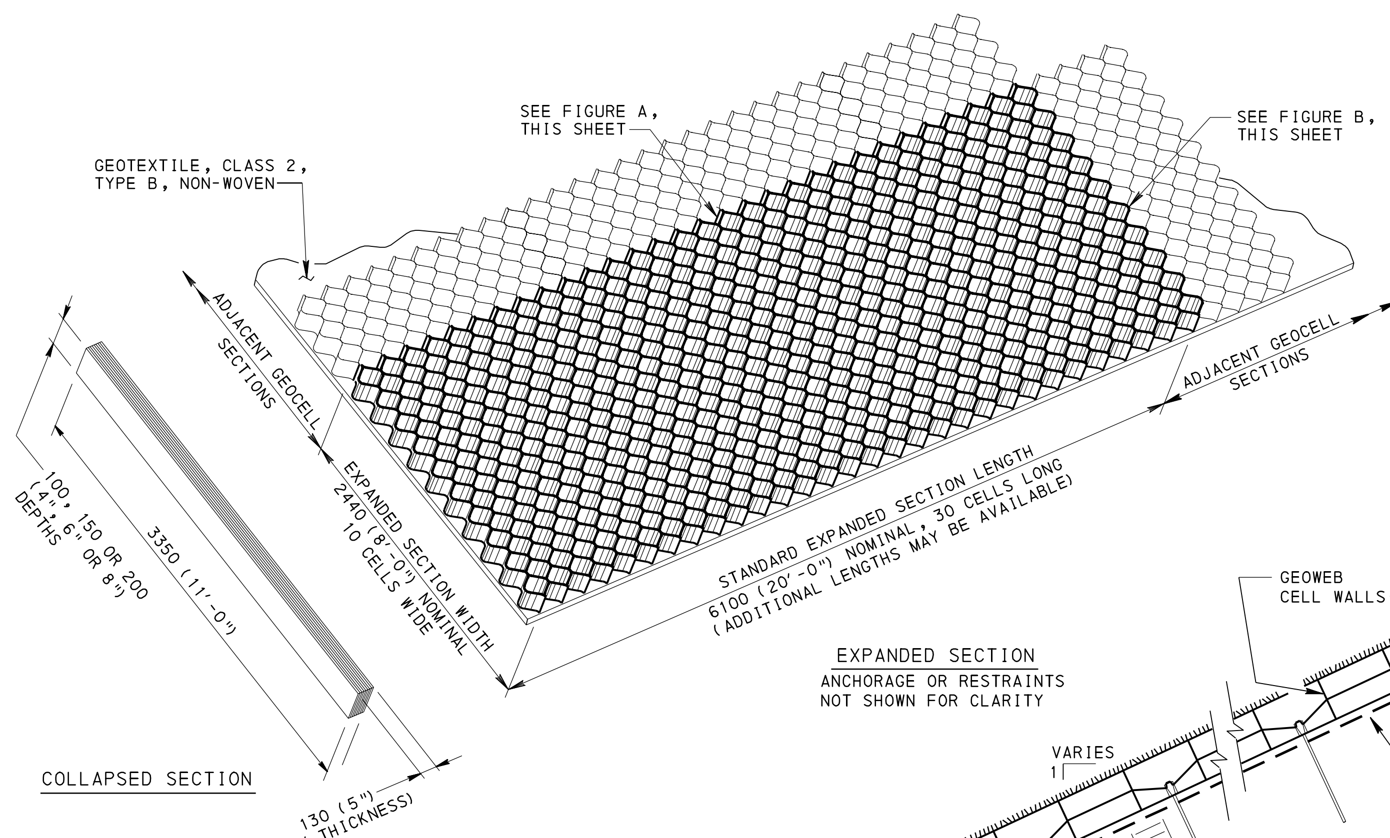
STAKE ANCHOR DETAILS

GENERAL INSTALLATION NOTES:

1. PROVIDE MATERIAL MEETING THE CONSTRUCTION REQUIREMENTS OF PUBLICATION 408, SECTION 858.
2. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH FULL GROUND CONTACT.
3. EXCAVATE AND SHAPE AN EVEN SLOPE/CHANNEL SUBGRADE TO ACCEPT GEOCELL SECTIONS WHICH ARE EXPANDED DOWN THE SLOPE (NOT ACROSS THE SLOPE).
4. PLACE TOP OF GEOCELL FLUSH WITH OR SLIGHTLY LOWER THAN SUBGRADE OR FINAL GRADE, AND PROPERLY COMPACT SUBGRADE.
5. OVERLAP ADJACENT GEOTEXTILE PIECES. PROVIDE ADEQUATE PINNING AND PLACEMENT OF FABRIC IN PERIMETER TOE IN TRENCHES.
6. ANCHOR UPPER AND LOWER EDGE OF PROPOSED PROTECTION AREA PER DESIGN.
7. EXPAND DOWN SLOPE.
8. PROPERLY ALIGN SECTIONS TO INTERLEAVE AND MECHANICALLY CONNECT ADJOINING SECTIONS OR BUTT AND MECHANICALLY CONNECT END SECTIONS, FLUSH BETWEEN UPPER SURFACES OF SECTIONS.
9. BEGIN INFILLING ONLY AFTER ANCHORING IS IN PLACE.
10. LIMIT DROP HEIGHT OF INFILL MATERIAL TO 1000 (3').
11. INFILL FROM CREST OF SLOPE TO THE TOE.
12. CONTROL CELL OVERFILL TO ALLOW FOR COMPACTION.
13. ENSURE FILL IS FLUSH TO CELL TOP SURFACE AT COMPLETION OF WORK.
14. AVOID EXCESSIVE OVERFILLING AND PLACEMENT OF LARGE CLUMPS OF SOIL INFILL IN CELLS.
15. TAMP SOIL INFILL TO REMOVE EXCESSIVE AIR VOIDS FROM THE TOPSOIL.
16. ENSURE THAT SOIL INFILL CELLS ARE COMPLETELY FILLED AFTER LIGHTLY TAMPING THE INFILL.
17. AVOID OVERTAMPING (COMPACTING) OF SOIL INFILL THAT MAY RETARD ESTABLISHMENT OF VEGETATION.
18. COMMENCE SEEDING AND INSTALLATION OF EROSION BLANKETS IMMEDIATELY FOLLOWING PLACEMENT OF SOIL INFILL.
19. ON SLOPES, AVOID END DUMPING OR DROPPING SMALL INFILL AGGREGATE FROM HEIGHTS GREATER THAN 1000 (3') AND LARGE INFILL AGGREGATE FROM HEIGHTS GREATER THAN 500 (1'-6"). ENSURE THAT AGGREGATE INFILL CELLS ARE FULL BUT NOT EXCESSIVELY OVER-FILLED.
20. COMPACT AGGREGATE INFILL INTO THE GEOCELL CELLS WITH A PLATE TAMPER OR USING THE BACK OF A SMOOTH BUCKET ON THE PLACEMENT EQUIPMENT.
21. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

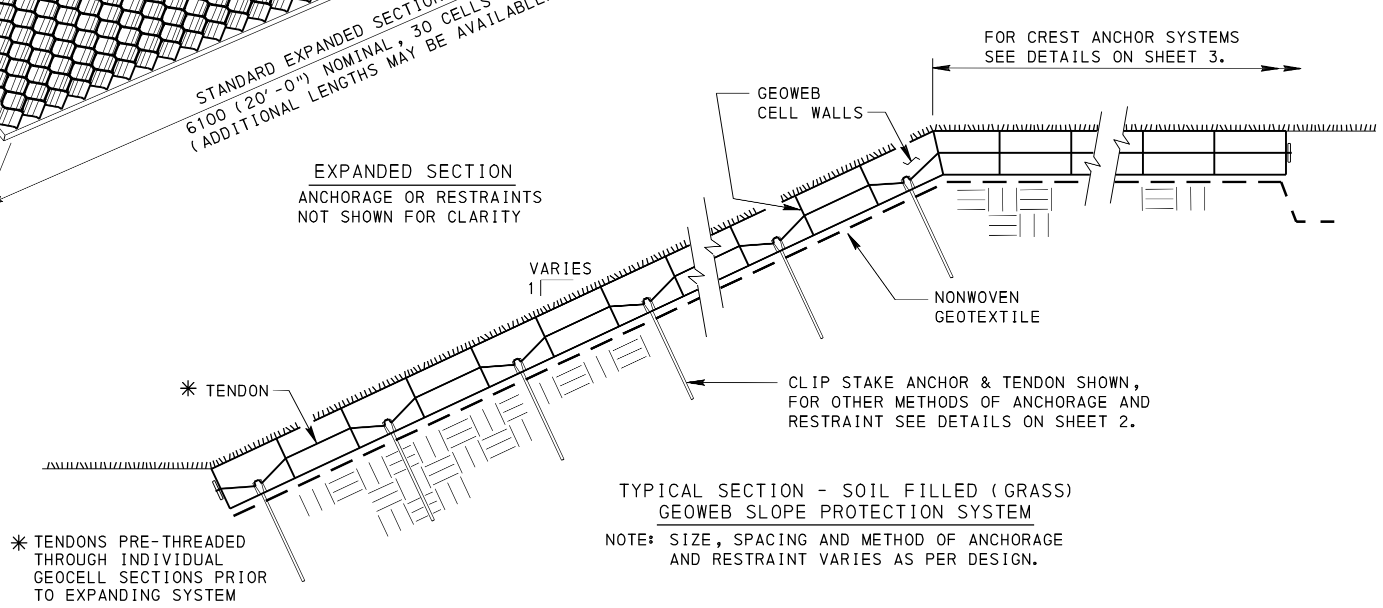


GEOCELL CELL DIMENSIONS



COLLAPSED SECTION

EXPANDED SECTION
ANCHORAGE OR RESTRAINTS
NOT SHOWN FOR CLARITY



✱ TENDONS PRE-THREADED THROUGH INDIVIDUAL GEOCELL SECTIONS PRIOR TO EXPANDING SYSTEM

TYPICAL SECTION - SOIL FILLED (GRASS)
GEOWEB SLOPE PROTECTION SYSTEM

NOTE: SIZE, SPACING AND METHOD OF ANCHORAGE AND RESTRAINT VARIES AS PER DESIGN.

TYPICAL GEOCELL SECTION DETAILS, STANDARD SIZE CELLS NON-PERFORATED

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SLOPE PROTECTION GEOCELL CELL AND GEOCELL SECTION DETAILS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

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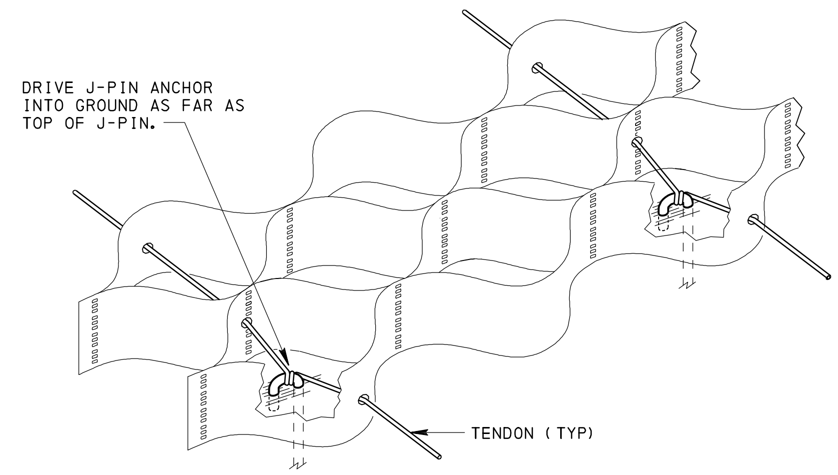
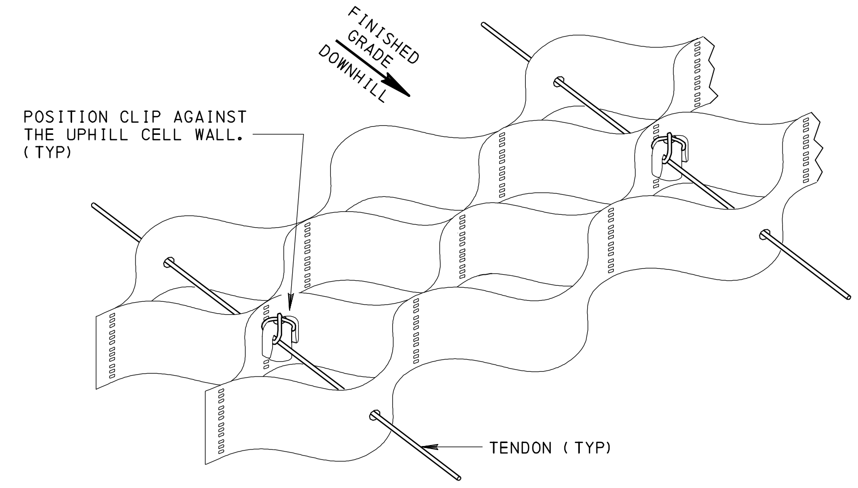
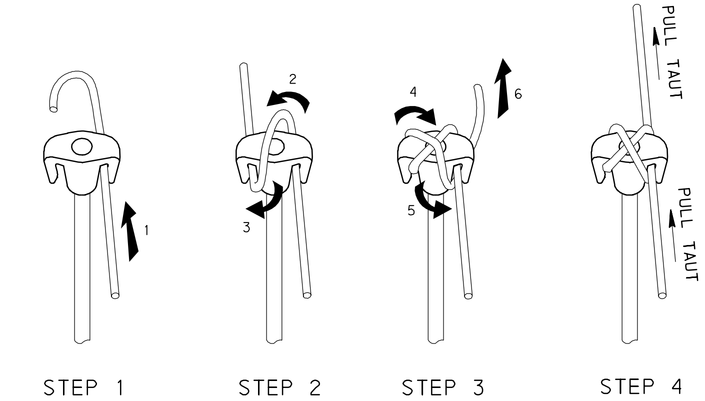
DIRECTOR, BUREAU OF DESIGN



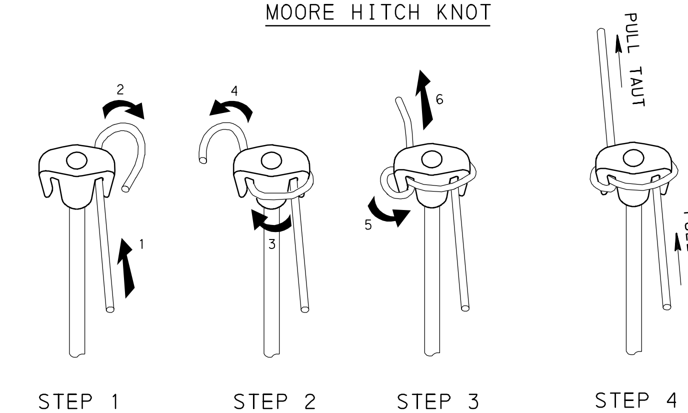
J-PIN STAKE ANCHOR & TENDON DETAIL



RESTRAINT CLIP & TENDON DETAIL

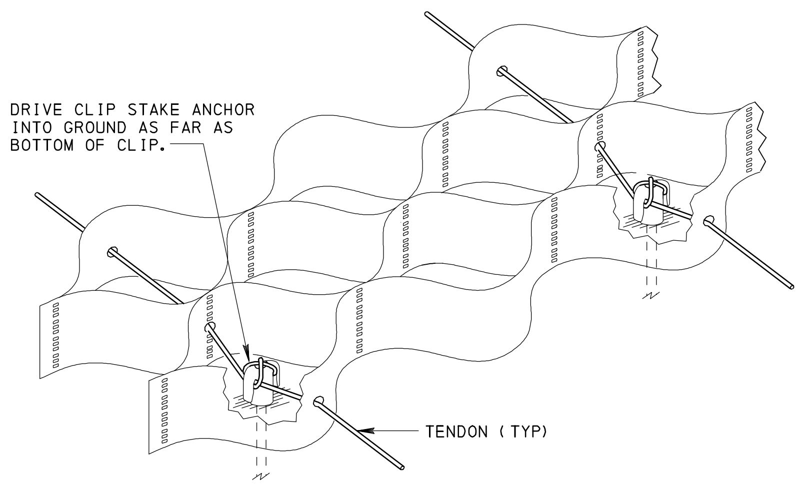


MOORE HITCH KNOT

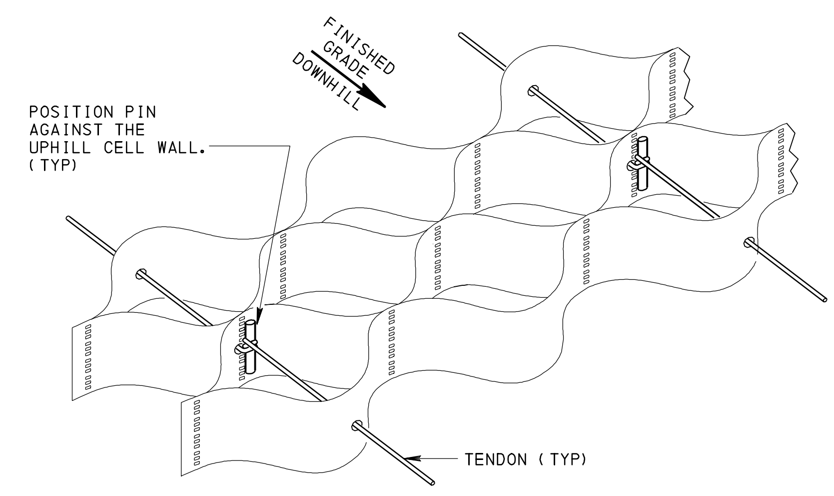


CLOVE HITCH KNOT

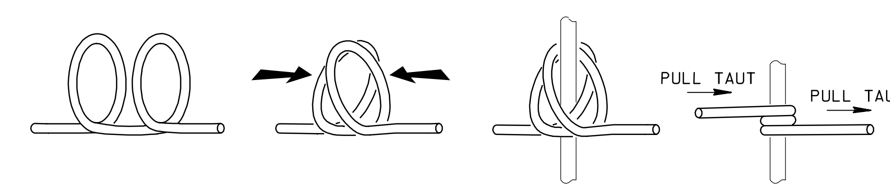
KNOTS FOR RESTRAINT CLIP & TENDON SYSTEM
AND CLIP STAKE ANCHOR & TENDON SYSTEM



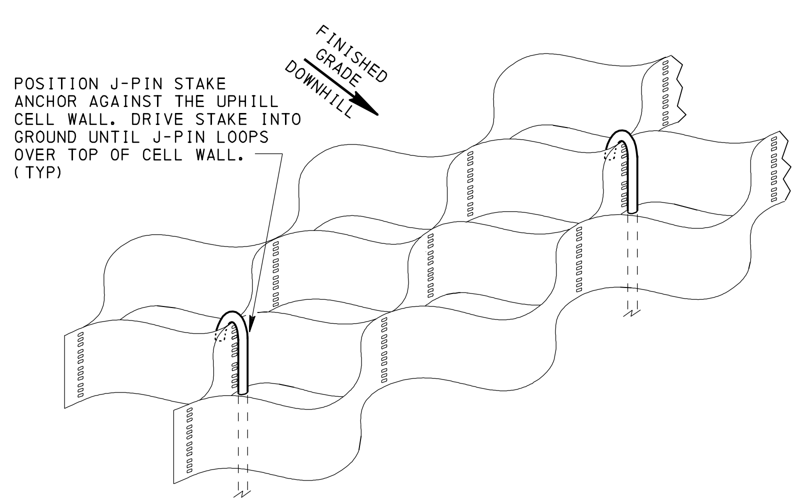
CLIP STAKE ANCHOR & TENDON DETAIL



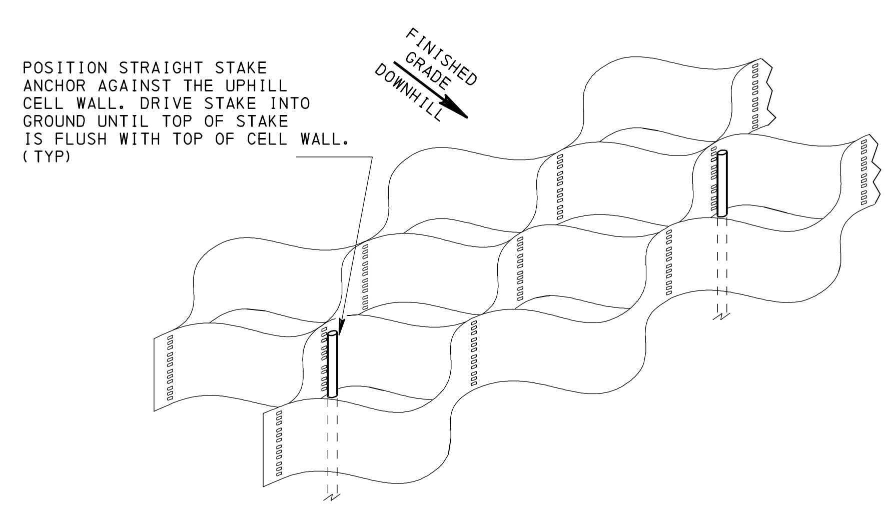
RESTRAINT CLIP & TENDON DETAIL



KNOT FOR RESTRAINT PIN & TENDON SYSTEM
AND CLIP STAKE ANCHOR & TENDON SYSTEM



J-PIN STAKE ANCHOR DETAIL



STRAIGHT STAKE ANCHOR DETAIL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
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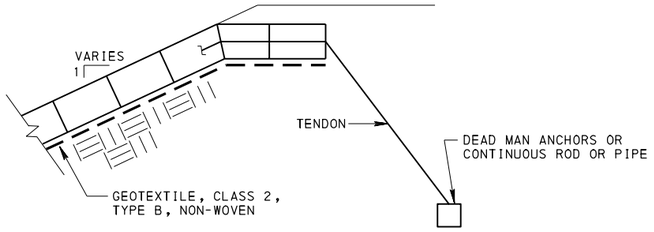
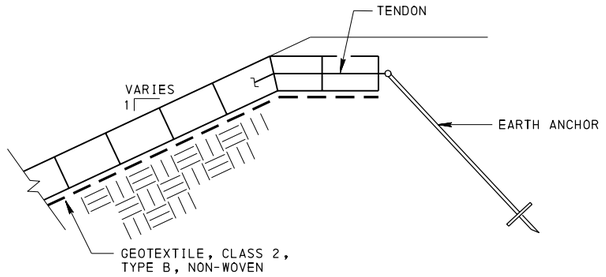
SLOPE PROTECTION
GEOCELL CELL AND GEOCELL
SECTION DETAILS

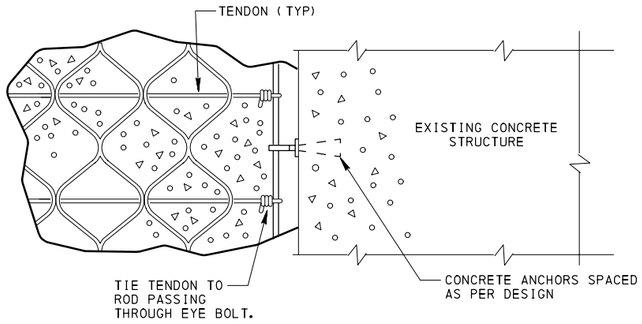
RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 2 OF 4 RC-78M



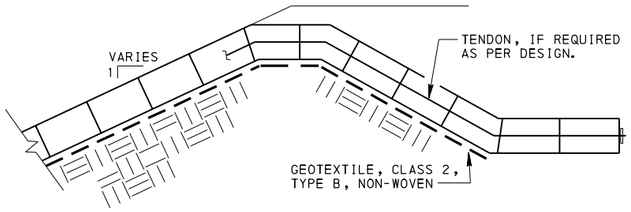
DEADMAN ANCHOR



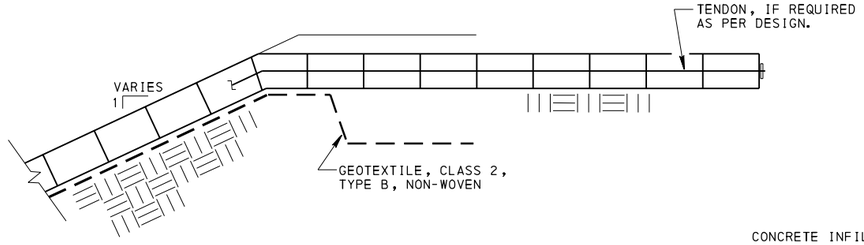
EARTH ANCHOR



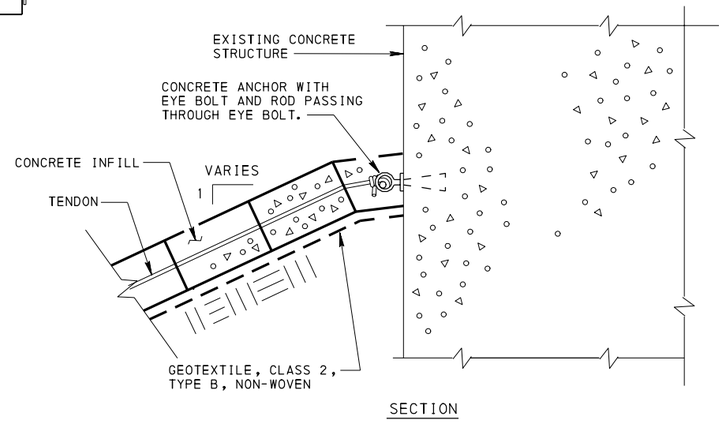
PLAN



ANCHOR TRENCH

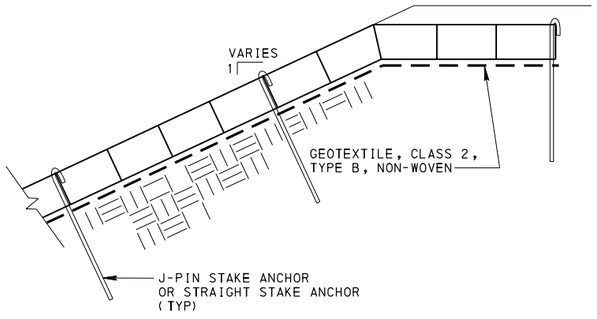


SOIL COVER EMBEDMENT

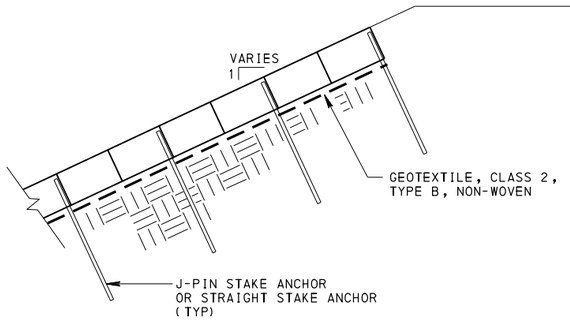


SECTION

CONCRETE ANCHOR CONNECTION
TO EXISTING STRUCTURE



STAKE AND CREST ANCHORAGE



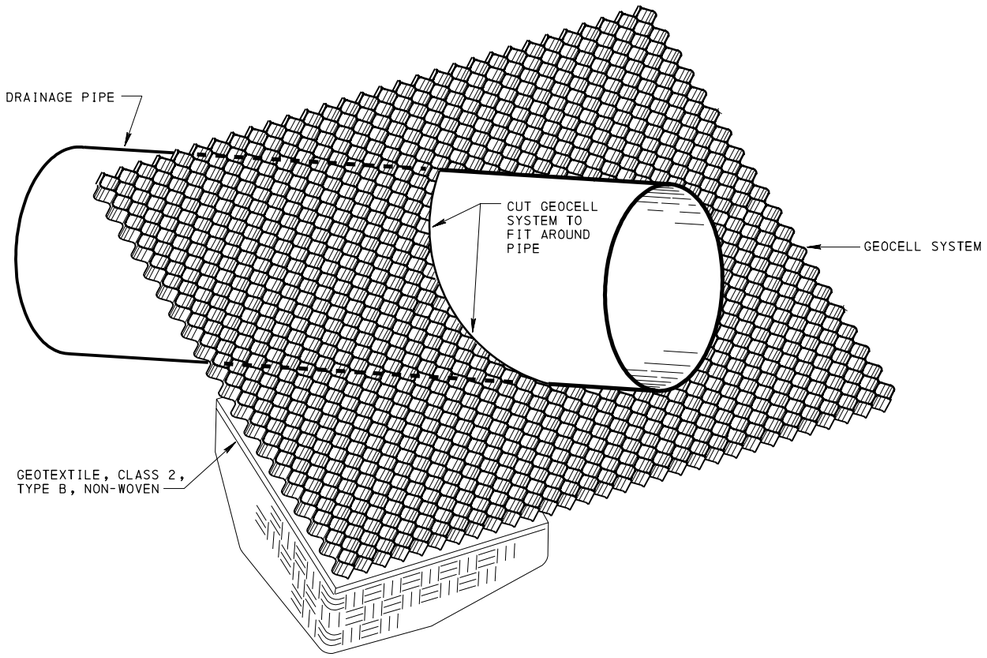
STAKE ONLY ANCHORAGE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

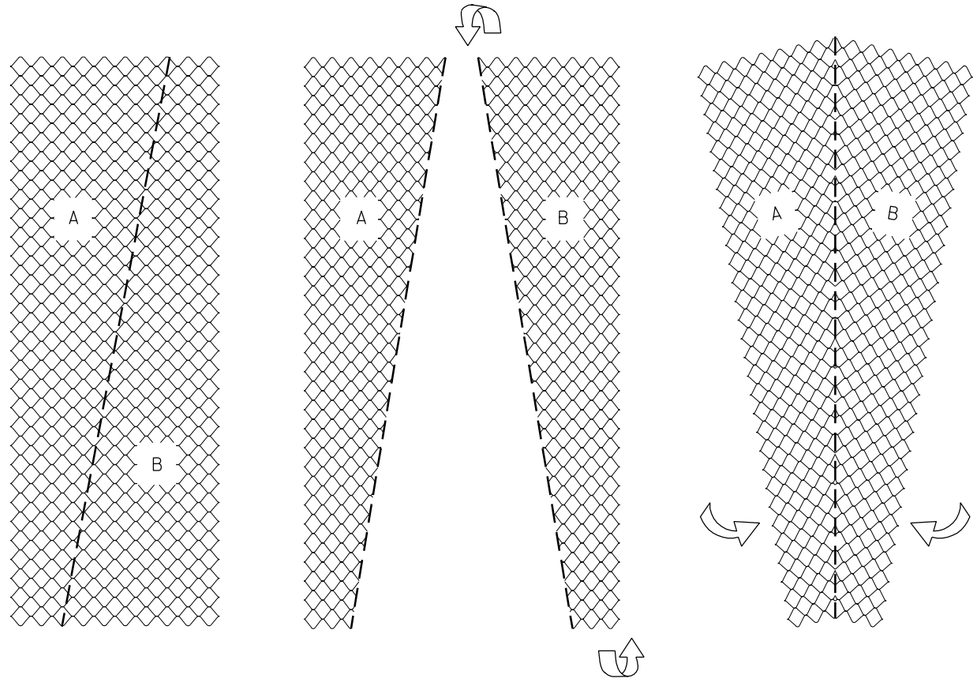
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SLOPE PROTECTION GEOCELL CELL AND GEOCELL SECTION DETAILS

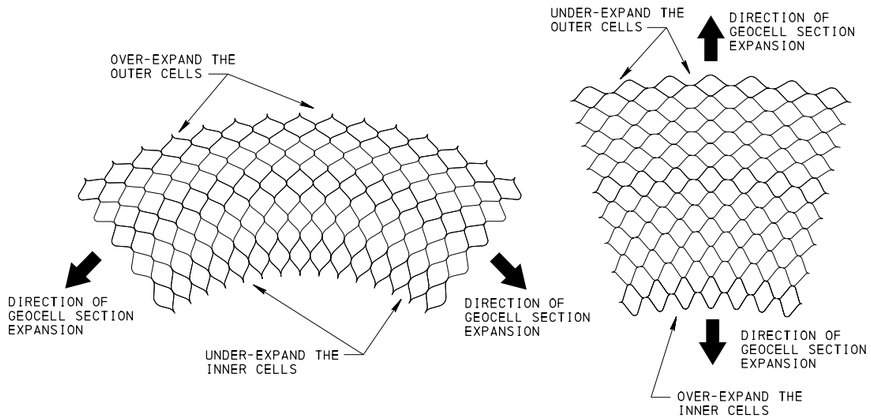
RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 3 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-78M



GEOCELL SECTION AROUND PIPE ON SLOPE



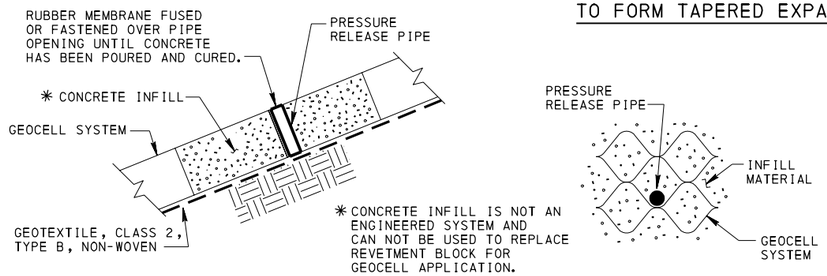
FIELD CUTTING GEOCELL SYSTEM
TO FORM TAPERED EXPANSION



CURVED EXPANSION - PLAN

TAPERED EXPANSION - PLAN

CURVED AND TAPERED EXPANSION OF GEOCELL SECTION



SECTION

PLAN

PRESSURE RELIEF HOLES
DRAINAGE THROUGH GEOCELL SYSTEM

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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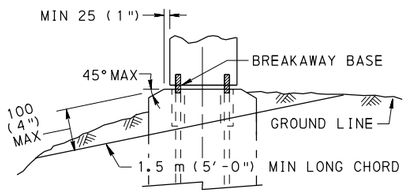
SLOPE PROTECTION GEOCELL CELL AND GEOCELL SECTION DETAILS

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 4 OF 4
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-78M

▲ FORM 150 (6") BELOW GROUND LEVEL. BELOW THIS POINT, PLACE CONCRETE AGAINST NATURAL GROUND.

ǂ DESIGNED FOR 9.1 m (30'-0") MAXIMUM ARM LENGTH. SEE TABLE A FOR FOUNDATION DIMENSIONS.

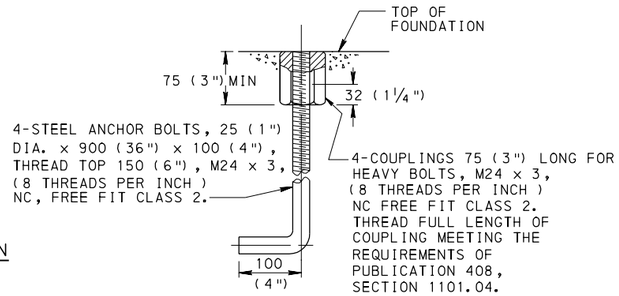
SEE TYPE A POLE BASE FOUNDATION DETAILS FOR ADDITIONAL TYPE S POLE BASE FOUNDATION REQUIREMENTS.



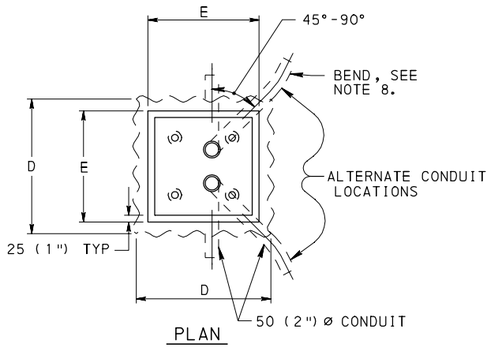
DETAIL FOR TYPE S POLE BASE FOUNDATION

(SEE NOTE 12.)

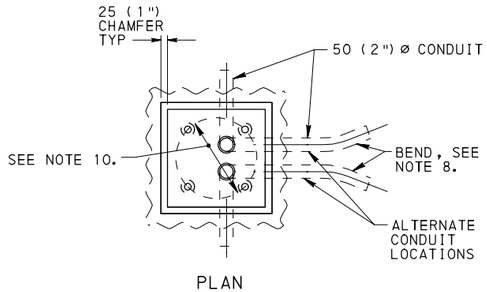
THE MAXIMUM NEGATIVE SLOPE FOR TYPE S POLE BASE FOUNDATION LOCATION IS 1:6 (6:1).



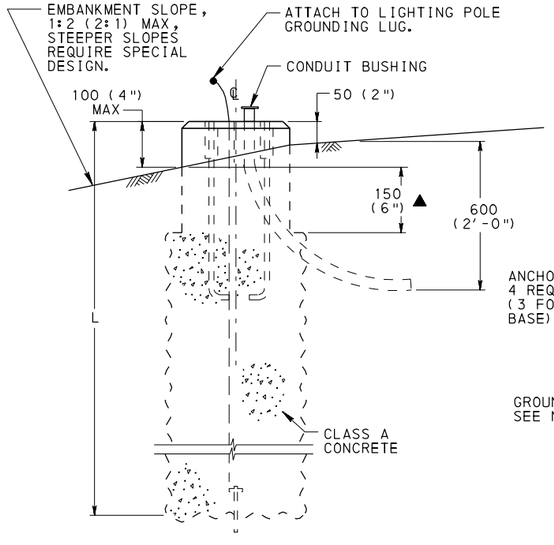
DETAIL OF ANCHOR BOLT



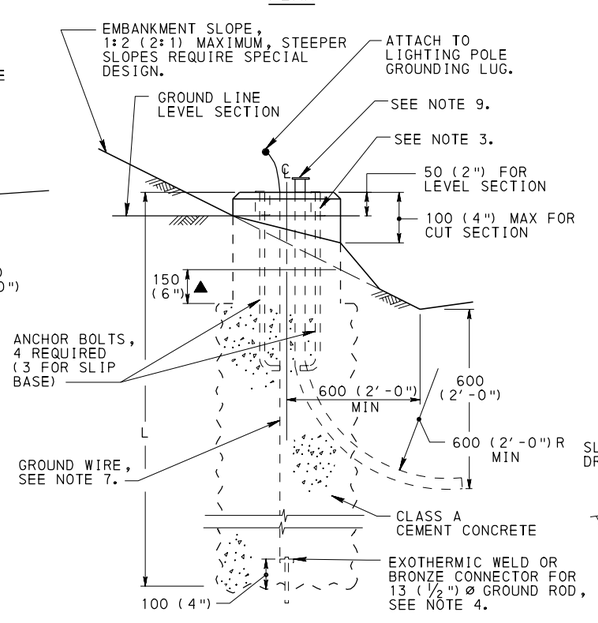
PLAN



PLAN



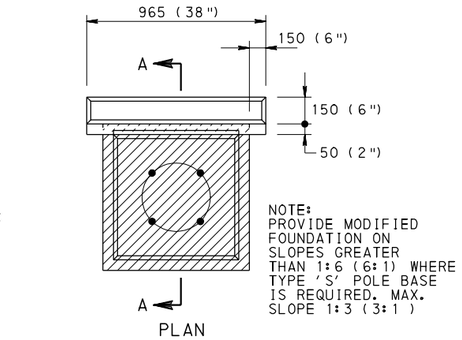
DETAIL FOR TYPE A POLE BASE FOR FILL SECTION



DETAIL FOR TYPE A POLE BASE FOR CUT OR LEVEL SECTION

TYPE FC FOUNDATION ǂ

SEE NOTE 12.



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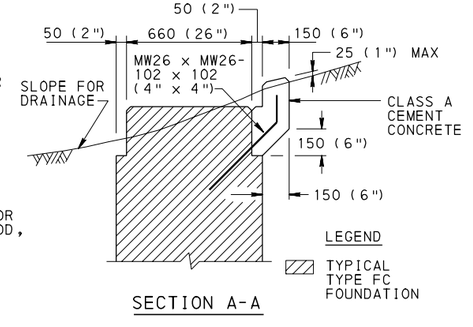

SECTION A-A

TYPE FC MODIFIED FOUNDATION

NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. LEVEL TOP OF FORMS IN BOTH DIRECTIONS.
3. GALVANIZE ALL ANCHORAGE HARDWARE, STEEL FLAT OR SPRING LOCK WASHERS AND TOP 300 (12") OF ANCHOR BOLTS.
4. GROUND ROD 13 (½") Ø x 2.4 m (8'-0") MINIMUM, COPPER CLAD STEEL WITH 25 Ω MAXIMUM RESISTANCE TO EARTH GROUND.
5. SEE RC-83M FOR POLE DETAILS.
6. FOR LIGHTING POLE ANCHORAGES ON BRIDGES, SEE BRIDGE CONSTRUCTION STANDARD DRAWINGS, BC-722M.
7. PROVIDE 750 (30") OF 21.15 mm^2 (#4) GROUND WIRE COILED ABOVE FOUNDATION, WIRE EXTENDS THROUGH CENTER OF FOUNDATION.
8. MINIMUM BEND RADIUS TO BE TWELVE TIMES CONDUIT DIAMETER, UNLESS OTHERWISE SPECIFIED.
9. TOP OF CONDUIT BUSHING NOT TO BE HIGHER THAN 25 (1") FROM THE TOP OF THE FOUNDATION.
10. THE LIGHTING POLE MANUFACTURER PROVIDES TEMPLATE FOR SETTING ANCHOR BOLTS FOR TYPE "A" OR TYPE "S" LIGHTING POLES, AND ALL HARDWARE.
11. USE 3-CONDUIT ACCESS WHERE PLAN CIRCUITS INDICATE BRANCH TAP INSIDE POLE BASE. POSITION CONDUITS IN FOUNDATION TO AVOID UNNECESSARY BENDS. PROVIDE ONE, TWO OR THREE CONDUITS AS REQUIRED.
12. FOR TYPE S POLES - PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE FOUNDATION, ANCHOR BOLT, OR STUB OF BREAK-AWAY DEVICE, WHICHEVER IS HIGHER, MEASURED FROM AN IMAGINARY 1.5 m (5'-0") LONG CHORD, ALIGNED RADIALLY PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE SUPPORT. PROVIDE A MAXIMUM TAPER OF 45° TO THE EDGE OF THE FOUNDATION AS REQUIRED TO SATISFY THE ABOVE REQUIREMENT. BEGIN THE TAPER NOT LESS THAN 25 (1") FROM THE OUTSIDE OF THE BREAKAWAY BASE DIMENSION. MOUNTING SURFACE OF FOUNDATION IS TO EXTEND ABOVE THE GROUND LINE.
13. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

TABLE A
FOUNDATION DIMENSIONS

MOUNTING HEIGHT	D x D	E x E	AUGER DIAMETER	L
UP TO 9.1 m (UP TO 30')	610 x 610 (2'-0" x 2'-0")	510 x 510 (1'-8" x 1'-8")	710 (2'-4")	1800 (6'-0")
10.7 m (35')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	1800 (6'-0")
12.2 m (40')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2000 (6'-6")
13.7 m (45')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2100 (7'-0")
15.2 m (50')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2300 (7'-6")

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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HIGHWAY LIGHTING FOUNDATIONS CONVENTIONAL LIGHTING POLE

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

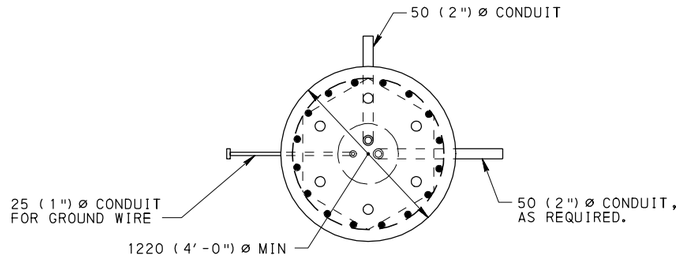
SHT 1 OF 2

RC-80M

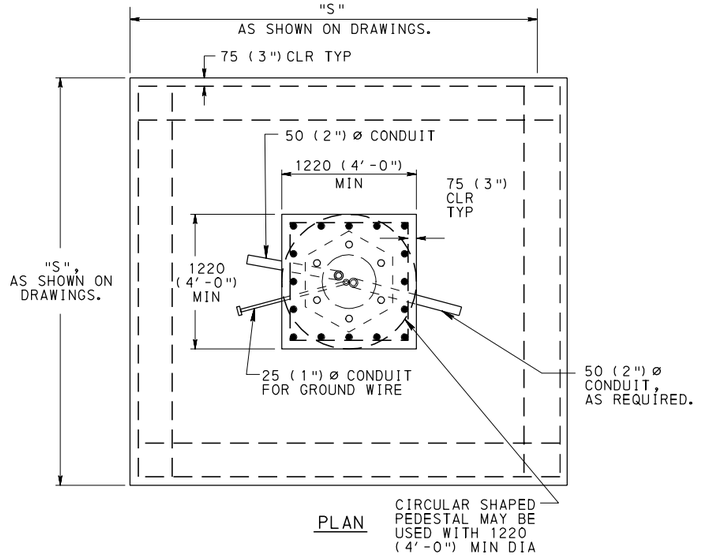
14-JUN-2010

TABLE C

POLE HEIGHTS	BASE PLATE THICKNESS	# OF ANCHOR BOLTS	MINIMUM ANCHOR BOLT DIAMETER
18.3 m (60′-0")	50 (2")	6	38 (1½")
21.3 m (70′-0")	50 (2")	8	38 (1½")
24.4 m (80′-0")	63 (2½")	8	38 (1½")
27.4 m (90′-0")	63 (2½")	8	38 (1½")
30.5 m (100′-0")	76 (3")	10	38 (1½")
33.5 m (110′-0")	76 (3")	10	38 (1½")
36.6 m (120′-0")	76 (3")	12	44 (1¾")



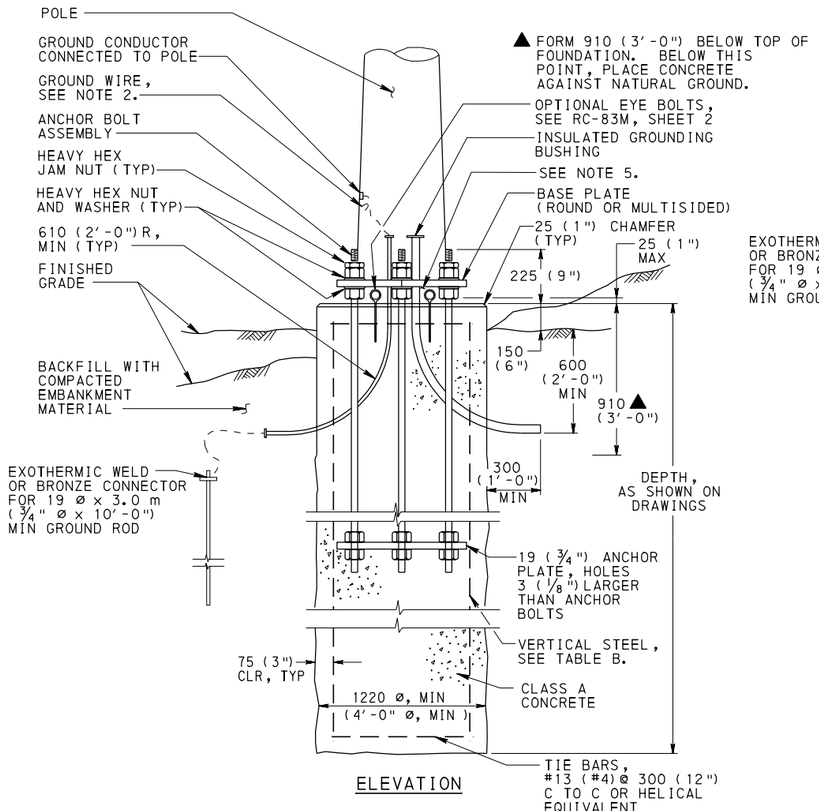
PLAN



PLAN

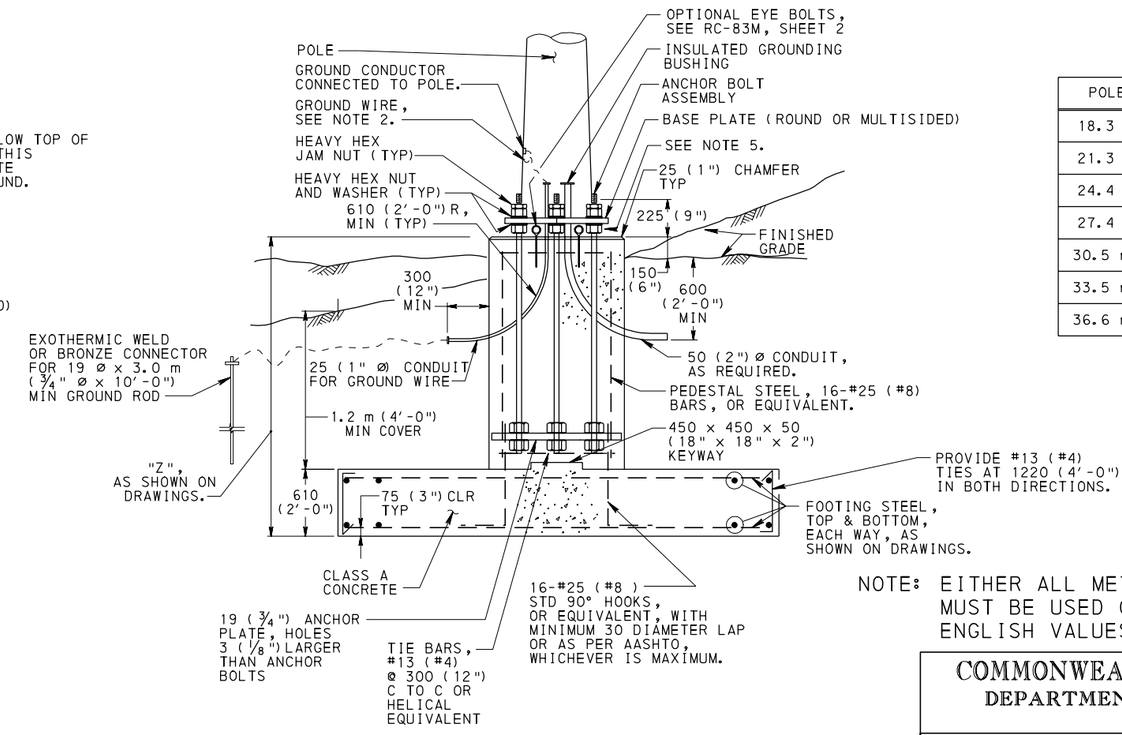
NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. PROVIDE A 750 (30") LENGTH OF 21.15 mm^2 (#4) GROUND WIRE COILED ABOVE FOUNDATION. EXTEND WIRE THROUGH THE 25 (1") ø CONDUIT IN THE CENTER OF THE FOUNDATION.
3. THE SIZE OF PEDESTAL OR DRILLED CAISSON SHOWN ACCOMMODATES THE PREASSEMBLED ANCHOR BOLT ASSEMBLY SUPPLIED BY THE MANUFACTURER FOR BOLT CIRCLE DIAMETERS 865 (34") OR LESS. FOR BOLT CIRCLE DIAMETERS GREATER THAN 865 (34"), MODIFY PEDESTAL OR DRILLED CAISSONS ACCORDINGLY.
4. FOR REINFORCEMENT BAR FABRICATION DETAILS, SEE BRIDGE CONSTRUCTION STANDARD DRAWING, BC-736M. DEVELOPMENT AND LAP SPLICE LENGTHS ARE AS PER AASHTO ONLY.
5. SEAL WITH STAINLESS STEEL SCREEN, 6 TO 10 (¼" TO ⅜") OPENING, TO PREVENT ENTRY OF RODENTS. SCREEN IS TO BE REMOVABLE AND ATTACHED TO BASE PLATE WITH STAINLESS STEEL HARDWARE. SCREEN IS TO BE OF SUFFICIENT STIFFNESS TO PREVENT ENTRY BETWEEN SCREEN AND FOUNDATION WHILE PERMITTING DRAINAGE.
6. VERIFY THE GROUND ELEVATION AT THE FOUNDATION LOCATION FOR ALL HIGH MAST POLE FOUNDATIONS. NOTIFY THE DEPARTMENT OF ANY DISCREPANCY OF MORE THAN 1.0 m (3′-0") BEFORE PROCEEDING WITH CONSTRUCTION. THE POLE LENGTH MAY BE AFFECTED.



ELEVATION

DRILLED CAISSON FOUNDATION



ELEVATION

SPREAD FOOTING FOUNDATION

TABLE B

POLE HEIGHTS	VERTICAL STEEL
18.3 m (60′-0")	16-#29 (#9)
21.3 m (70′-0")	16-#29 (#9)
24.4 m (80′-0")	16-#29 (#9)
27.4 m (90′-0")	16-#29 (#9)
30.5 m (100′-0")	16-#29 (#9)
33.5 m (110′-0")	16-#29 (#9)
36.6 m (120′-0")	16-#36 (#11)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

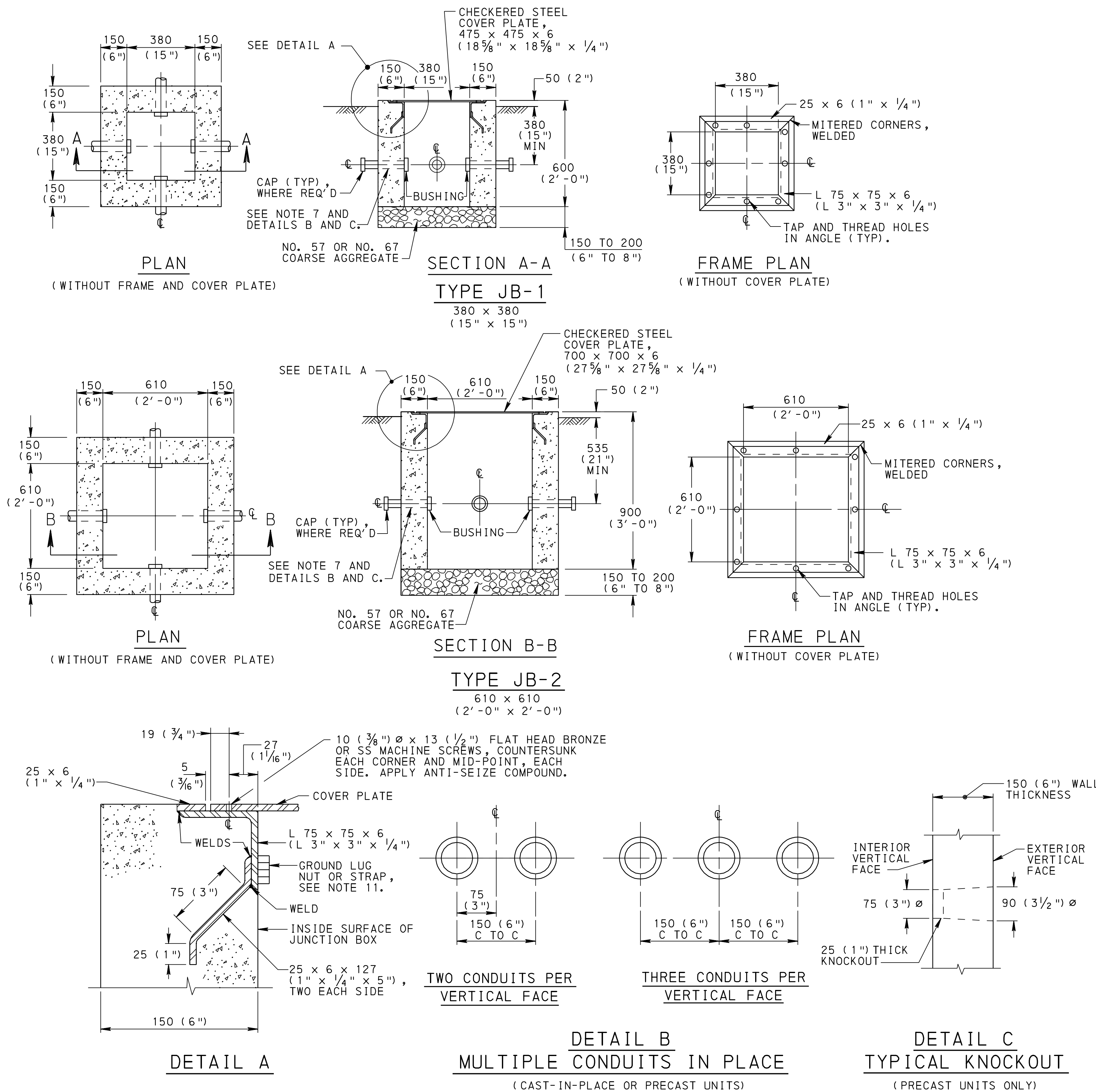
HIGHWAY LIGHTING FOUNDATIONS HIGH MAST LIGHTING POLE

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilly
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
Gene E. Hyatt
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2

RC-80M



NOTES

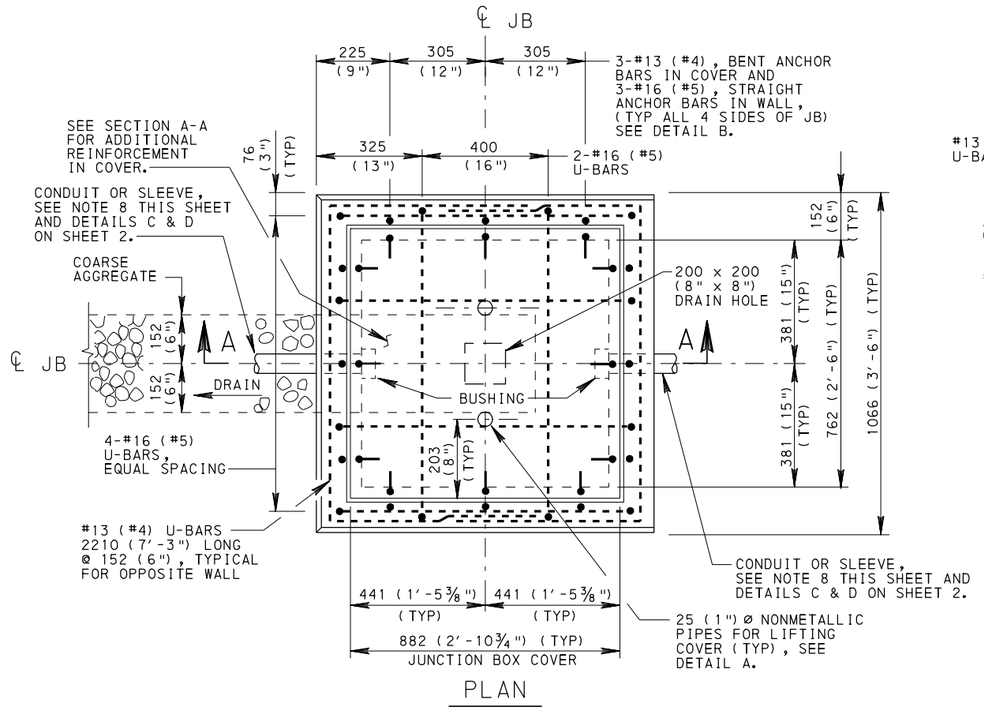
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS SUBJECT TO LOADS NO HEAVIER THAN PEDESTRIAN TRAFFIC. USE JB-11 AND JB-12 JUNCTION BOXES IN OTHER LOCATIONS AS SHOWN ON RC-82M.
3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
4. PROTECTIVE COATING - STEEL FRAME AND STEEL COVER PLATE. HOT DIP GALVANIZE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
5. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLANS.
6. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 1.5 m (5'-0") CHORD ALIGNED RADIALLY (PERPENDICULAR) TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.
7. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL POSITIONS. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE, SPACE CONDUITS AT 150 (6") C TO C AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL B, WITH FULL WALL THICKNESS BETWEEN OPENINGS. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL C AND LOCATE AS INDICATED IN DETAIL B. GROUT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 910.3(p).
8. PROVIDE POSITIVE DRAINAGE 38 - 50 (1 1/2" - 2") NONMETALLIC CONDUIT FOR JUNCTION BOXES WHEN FEASIBLE. PROVIDE RODENT PROOF DRAIN. SEE RC-82M, NOTE 5.
9. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A36/A36M.
10. PROVIDE AS A MINIMUM :
    CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND
    CLASS AA CONCRETE FOR PRECAST BOXES.
11. GROUND EXPOSED METAL PARTS OF JUNCTION BOXES. DO NOT CONNECT GROUND WIRE DIRECTLY TO LID.
12. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

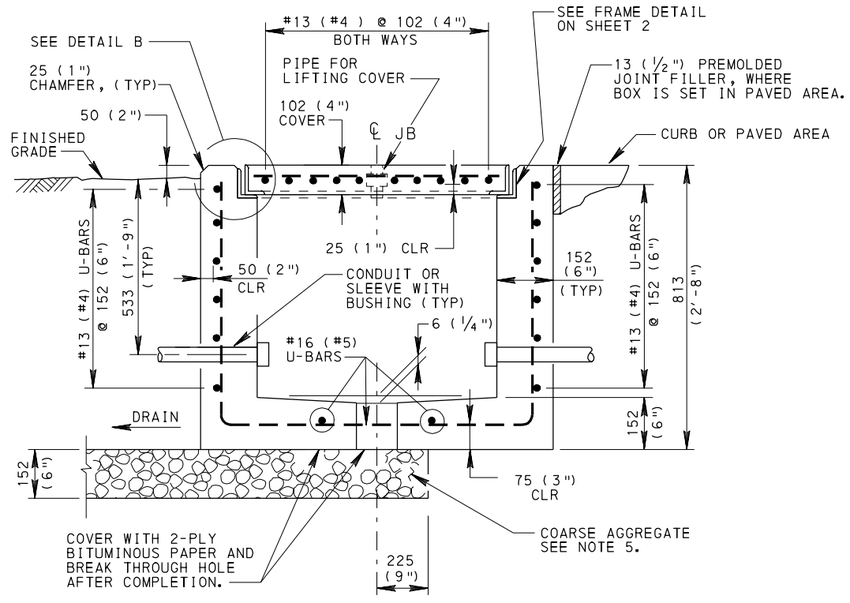
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING
JUNCTION BOXES-LIGHT DUTY
CAST-IN-PLACE OR PRECAST

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-81M

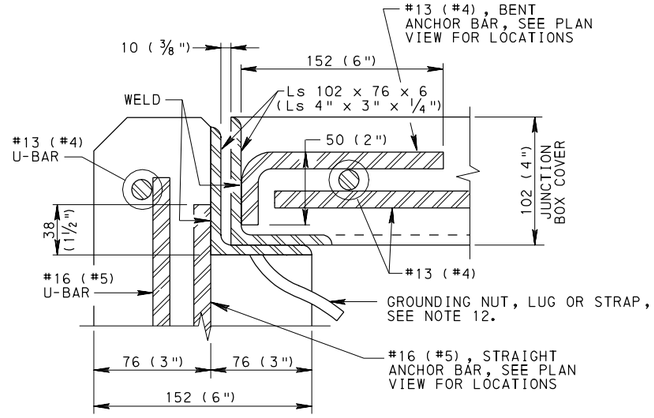


PLAN



SECTION A-A

JUNCTION BOX JB-11



DETAIL B

COVER FRAME AND SUPPORTING FRAME

NOTES

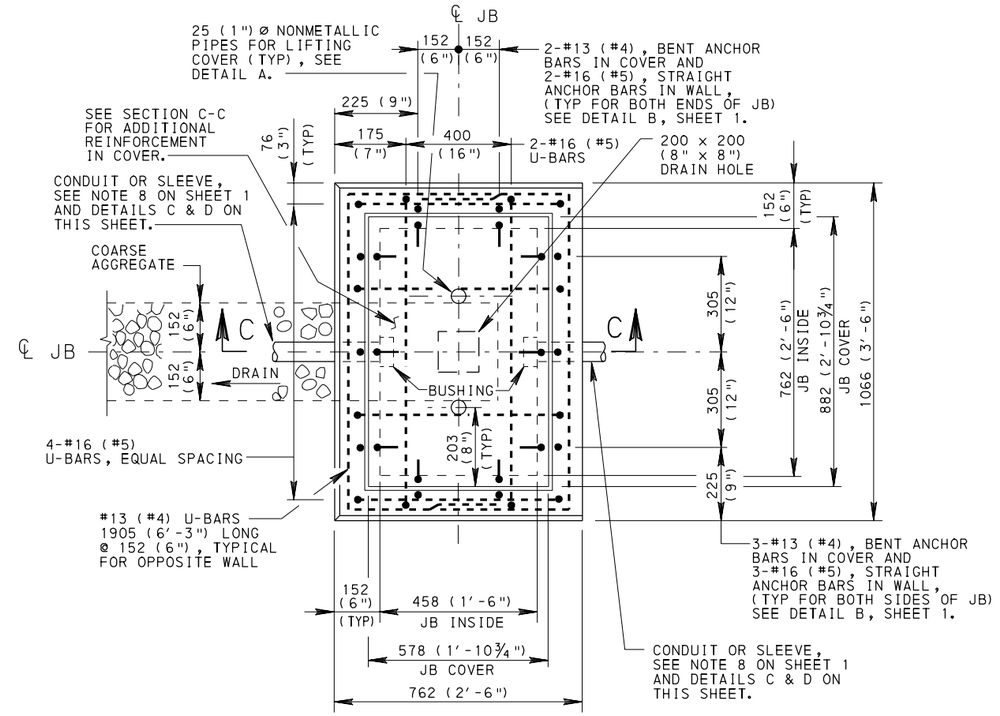
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. USE JB-11 AND JB-12 JUNCTION BOXES IN SHOULDERS OR OTHER LOCATIONS SUBJECT TO VEHICULAR LOADS. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS. SEE DETAILS ON RC-81M.
3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
4. PROTECTIVE COATING - STEEL FRAME. HOT DIP GALVANIZE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
5. PROVIDE 0.06 m^3 (2 FT^3) OF NO. 57 OR NO. 67 COARSE AGGREGATE.
6. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLANS.
7. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 1.5 m (5'-0") CHORD ALIGNED RADIALLY, PERPENDICULAR, TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.
8. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL POSITIONS. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE, SPACE CONDUITS AT 150 C TO C AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL C, WITH FULL WALL THICKNESS BETWEEN OPENINGS. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL D AND LOCATE AS INDICATED IN DETAIL C. GROUT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 910.3(p).
9. PROVIDE POSITIVE DRAINAGE, 38 - 50 (1 1/2" - 2") NONMETALLIC CONDUIT, FOR JUNCTION BOXES WHEN FEASIBLE. PROVIDE RODENT PROOF DRAIN.
10. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM-A36/A36M. PROVIDE ALUMINUM CONFORMING TO ASTM-B221 ALLOY 6061 - T6.
11. PROVIDE AS A MINIMUM :
    CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND
    CLASS AA CONCRETE FOR PRECAST BOXES.
12. GROUND EXPOSED METAL PARTS OF JUNCTION BOXES. DO NOT CONNECT GROUND WIRE DIRECTLY TO LID.
13. ALL REINFORCEMENT STEEL BARS SHOWN TO MEET ASTM A 615M, A 616M AND A 706M.
14. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

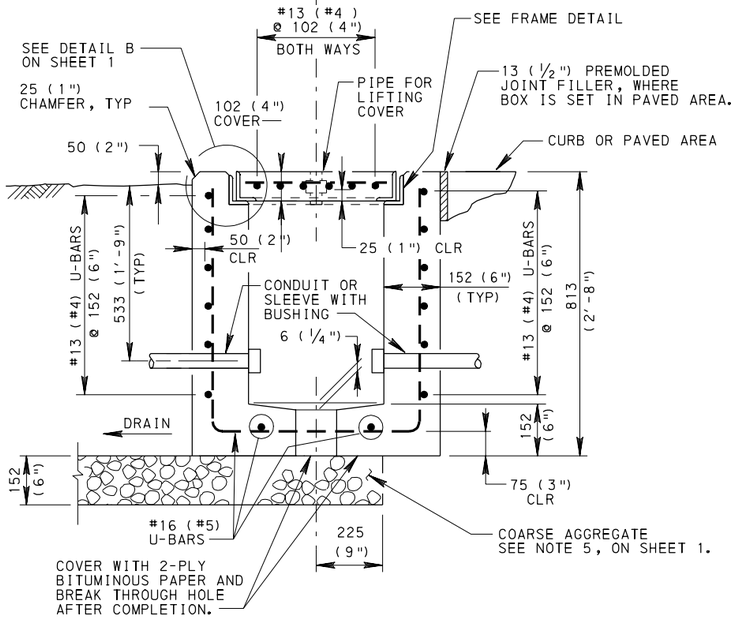
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING
JUNCTION BOXES-HEAVY DUTY
CAST-IN-PLACE OR PRECAST

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 2
R. Hyde Wilby		
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-82M

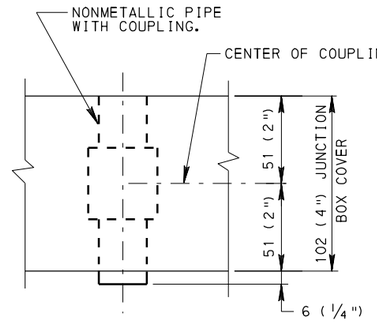


PLAN

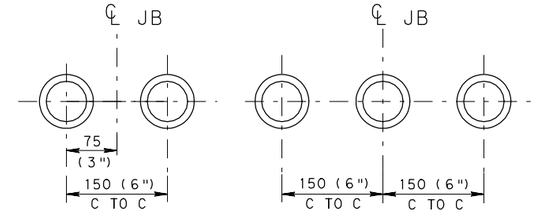


SECTION C-C

JUNCTION BOX JB-12



DETAIL A



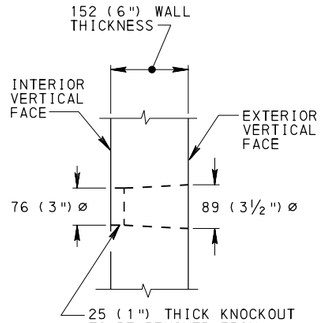
TWO CONDUITS PER VERTICAL FACE

THREE CONDUITS PER VERTICAL FACE

DETAIL C

MULTIPLE CONDUITS IN PLACE

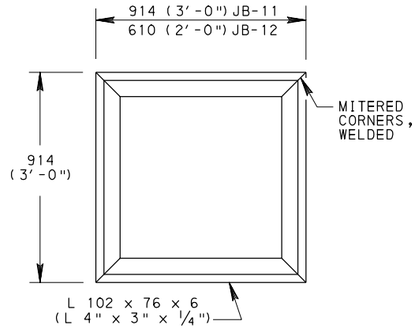
CAST-IN-PLACE OR PRECAST UNITS



DETAIL D

TYPICAL KNOCKOUT

(PRECAST UNITS ONLY)



PLAN

FRAME DETAIL

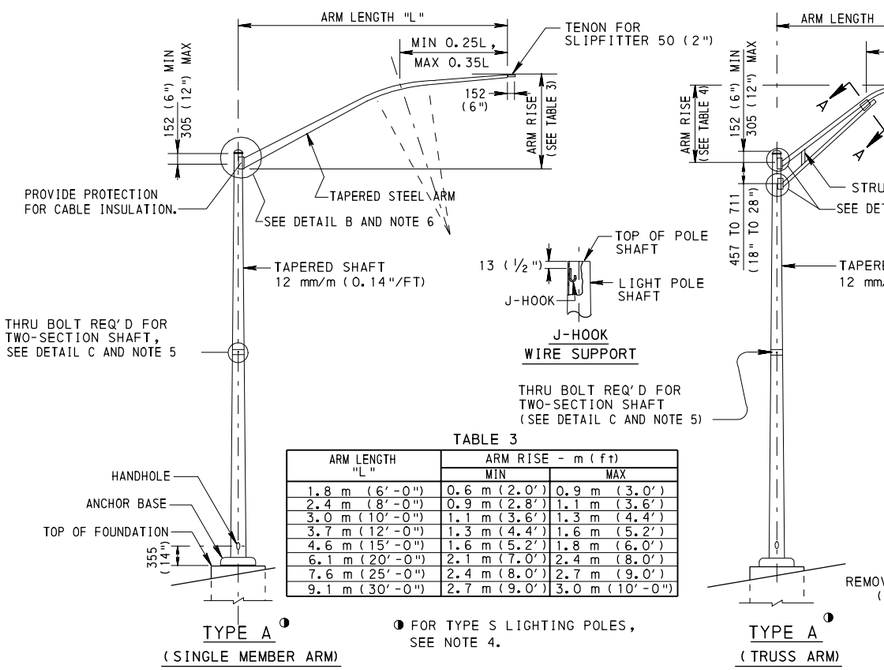
(STEEL OR ALUMINUM)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING
JUNCTION BOXES-HEAVY DUTY
CAST-IN-PLACE OR PRECAST

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 2 OF 2
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-82M



TYPE A
(SINGLE MEMBER ARM)

◑ FOR TYPE S LIGHTING POLES, SEE NOTE 4.

TABLE 3

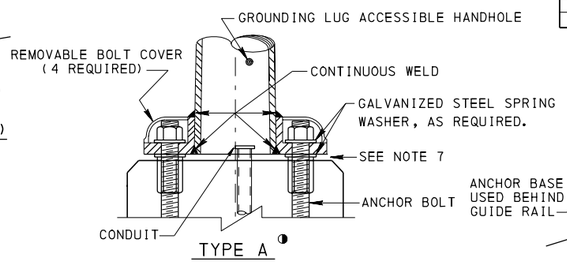
ARM LENGTH "L"	ARM RISE - m (ft) MIN	ARM RISE - m (ft) MAX
1.8 m (6'-0")	0.6 m (2.0')	0.9 m (3.0')
2.4 m (8'-0")	0.9 m (2.8')	1.1 m (3.6')
3.0 m (10'-0")	1.1 m (3.6')	1.3 m (4.4')
3.7 m (12'-0")	1.3 m (4.4')	1.6 m (5.2')
4.6 m (15'-0")	1.6 m (5.2')	1.8 m (6.0')
6.1 m (20'-0")	2.1 m (7.0')	2.4 m (8.0')
7.6 m (25'-0")	2.4 m (8.0')	2.7 m (9.0')
9.1 m (30'-0")	2.7 m (9.0')	3.0 m (10'-0")

TYPE A
(TRUSS ARM)

J-HOOK
WIRE SUPPORT

TABLE 4

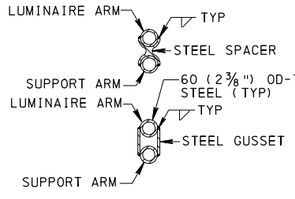
ARM LENGTH "L"	ARM RISE - m (ft) MIN	ARM RISE - m (ft) MAX
1.8 m (6'-0")	0.9 m (3.0')	1.2 m (4.0')
2.4 m (8'-0")	1.2 m (4.0')	1.8 m (6.0')
3.0 m (10'-0")	1.5 m (5.0')	1.8 m (6.0')
3.7 m (12'-0")	1.5 m (5.0')	1.8 m (6.0')
4.6 m (15'-0")	1.5 m (5.0')	1.8 m (6.0')
6.1 m (20'-0")	2.1 m (7.0')	2.4 m (8.0')
7.6 m (25'-0")	2.4 m (8.0')	2.7 m (9.0')
9.1 m (30'-0")	2.7 m (9.0')	3.0 m (10.0')



TYPE A ◑

POLE MOUNTING DETAILS

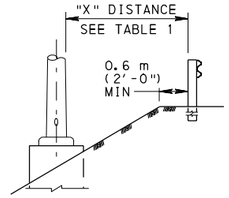
◑ FOR TYPE S LIGHTING POLES, SEE NOTE 5.



SECTION A-A

TABLE 1

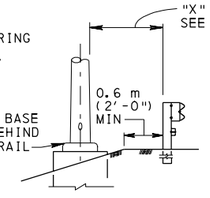
TYPE OF GUIDE RAIL	"X" DISTANCE - m (ft) MINIMUM
2-W	2.1 m (7.0')
2-WC	1.5 m (5.0')
2-WCC	1.2 m (4.0')



WEAK POST GUIDE RAIL

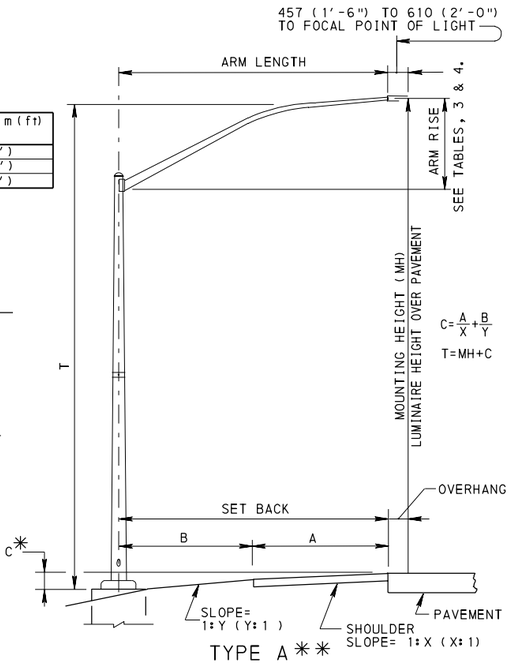
TABLE 2

TYPE OF GUIDE RAIL	"X" DISTANCE m (ft) MINIMUM
2-S	0.9 m (3'-0")
2-SC	0.6 m (2'-0")



STRONG POST GUIDE RAIL

GUIDE RAIL CLEARANCES



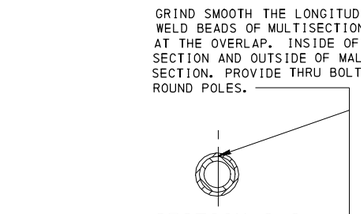
TYPE A**

* C-DIMENSIONS, APPLICABLE TO CONVENTIONAL LIGHTING POLES, ARE FOR ESTIMATING PURPOSES ONLY AND SHOULD NOT BE USED FOR DETERMINING LIGHTING POLE DIMENSIONS WITHOUT VERIFICATION. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING LIGHTING POLES OF PROPER DIMENSIONS TO PROVIDE THE MOUNTING HEIGHT SPECIFIED. THE C-DIMENSIONS ARE BASED ON INFORMATION FROM CROSS SECTION PLANS. CHANGES OF ROADSIDE FIELD CONDITIONS MAY AFFECT THE C-DIMENSION. NEGATIVE C-DIMENSION MEANS ELEVATION OF TOP OF FOUNDATION IS HIGHER THAN ELEVATION OF EDGE OF PAVEMENT.

** FOR TYPE S LIGHTING POLES, TAKE INTO CONSIDERATION THE BREAKAWAY DEVICE HEIGHT.

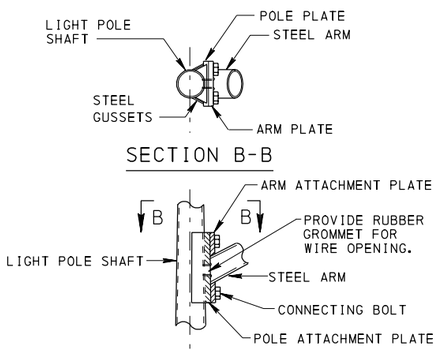
TERMINOLOGY

ROUND STEEL POLES



SECTION C-C

DETAIL C
POLE OVERLAP DETAIL



SECTION B-B

DETAIL B
ARM ATTACHMENT TO POLE SHAFT

NOTES

1. PROVIDE MATERIALS, CONSTRUCTION AND MANUFACTURER'S CERTIFICATION OF COMPLIANCE WITH LOAD TESTS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 910 AND 1101.
2. SEE RC-80M FOR POLE FOUNDATION DETAILS.
3. PROVIDE IDENTIFICATION AND DATE TAGS, AS SHOWN ON SHEET 2, FOR ALL POLES. DESIGNATE ID AS ON PROJECT PLANS.
4. PROVIDE FHWA CERTIFIED BREAKAWAY BASES FOR TYPE S POLES MEETING THE LATEST AASHTO REQUIREMENTS FOR BREAKAWAY SUPPORTS. MOUNT TYPE S POLES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PLACE WASHERS, FLAT OR SPRING TYPE, WHEN REQUIRED, AS RECOMMENDED, AND THREADED PARTS, TORQUED AS SPECIFIED.
5. CONSTRUCT POLE SHAFTS 9.1 m (30'-0") OR LESS IN LENGTH OF ONE PIECE. POLE SHAFTS OVER 9.1 m (30'-0") IN LENGTH MAY BE TWO SECTIONS. MINIMUM SECTION LENGTH FOR TWO SECTION POLE SHAFT IS 4.6 m (15'-0").
6. PROVIDE POLE ARM ATTACHMENT TO POLE SHAFT AS SHOWN IN DETAIL "B", WITH TWO, THREE OR FOUR ATTACHMENT BOLTS, AS REQUIRED FOR DIFFERENT ARM LENGTHS.
7. PROVIDE A 3 TO 6 (1/8" TO 1/4") DRAINAGE GAP BETWEEN THE BASE AND THE FOUNDATION. USE HOT DIPPED GALVANIZED OR STAINLESS STEEL SHIMS OR WASHERS (FENDER OR USS), WITH A MINIMUM EQUIVALENT OD OF 62 (2 1/2"). WHEN TRANSFORMER BASES REQUIRE LARGER OD INSIDE WASHERS, PROVIDE BOTTOM WASHERS WITH THE SAME OD. REFER TO ASTM F84404 FOR THE WASHER SPECIFICATIONS. CAULK TO PREVENT CORROSION IF AN ALUMINUM BASE COMES IN CONTACT WITH A CONCRETE FOUNDATION; OTHERWISE, CAULKING IS NOT REQUIRED.
8. FURNISH CONVENTIONAL STEEL LIGHTING POLES WITH SINGLE MEMBER BRACKET TYPE ARMS UNLESS OTHERWISE INDICATED OR SPECIFIED ON THE PLANS OR SPECIAL PROVISIONS.
9. THE MOUNTING HEIGHT IS DEFINED AS THE HEIGHT OF THE LUMINAIRE ABOVE THE ROADWAY AND IS TO BE WITHIN 0.3 m (1'-0") OF THE MOUNTING HEIGHT SPECIFIED.
10. WHEN PROVIDING ALUMINUM POLES, PROVIDE ALUMINUM POLES WITH TRUSS ARMS MEETING THE GENERAL SILHOUETTE REQUIREMENTS OF STEEL POLES.
11. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

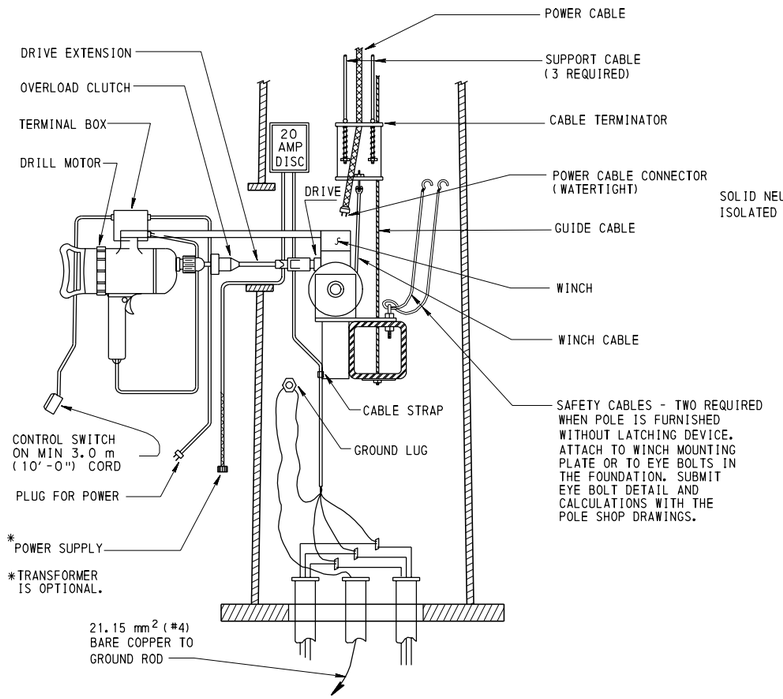
HIGHWAY LIGHTING CONVENTIONAL LIGHTING POLE DETAILS

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

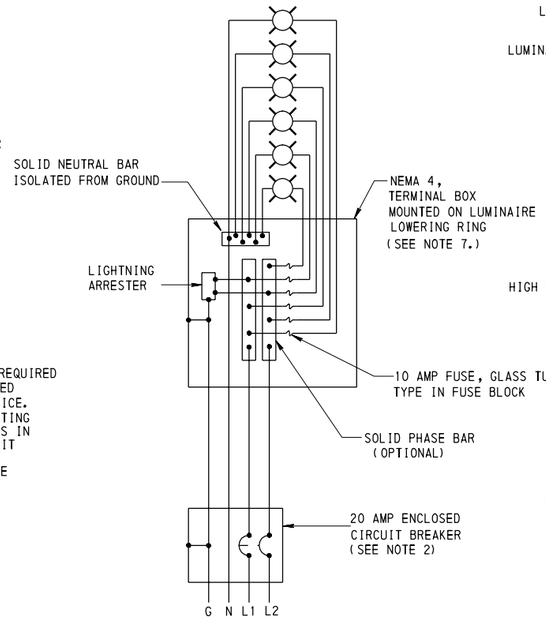
RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 1 OF 2

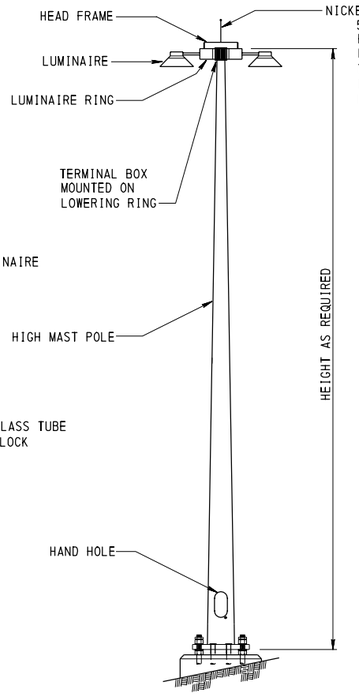
RC-83M



TYPICAL LOWER SECTION MECHANISM



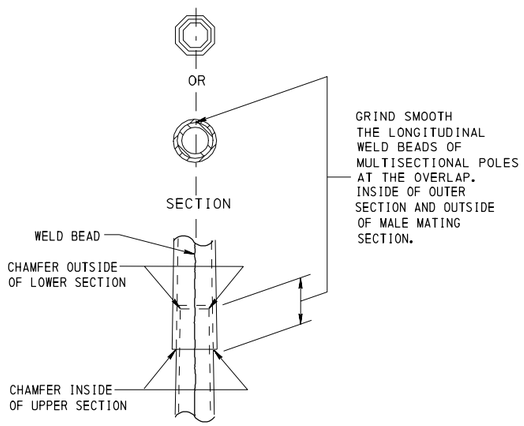
TYPICAL CIRCUIT SCHEMATIC



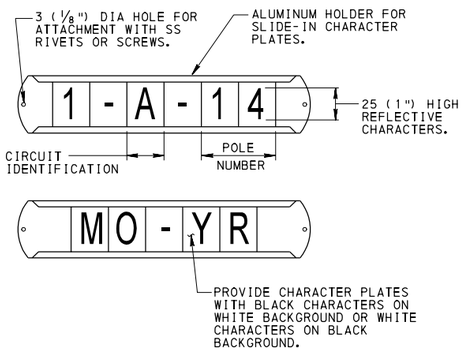
TYPICAL HIGH MAST POLE

NOTES

1. SEAL HEAD FRAME AND LUMINAIRE ASSEMBLIES TO PREVENT INTRUSION OF BIRD LIFE.
2. PROVIDE 2 POLE, CIRCUIT BREAKER DISCONNECT, IN NEMA 1 ENCLOSURE WITH EXTERNAL OPERATION.
3. GROUND LIGHTNING ROD GROUNDING CONDUCTOR DIRECTLY ON THE POLE SHAFT WITH LUGS PROVIDED BY THE MANUFACTURER OF LIGHTNING ROD. BOND THE NEUTRAL WIRE TO THE GROUND EITHER AT THE GROUND LUG OR INSIDE THE ENCLOSURE AT THE POLE BASE.
4. PROVIDE STAINLESS STEEL HARDWARE.
5. PROVIDE WIRING, FROM TERMINAL BOX TO LUMINAIRE, IN WIREWAY PROVIDED IN LUMINAIRE RING OR IN SEALTITE FLEXIBLE CONDUIT.
6. AFFIX POLE IDENTIFICATION AND DATE TAG TO EACH HIGH MAST POLE.
7. PROVIDE BOX AS PER PUBLICATION 408, SECTION 1101.11 (c). PADLOCKS ARE NOT REQUIRED.



POLE OVERLAP DETAIL



POLE IDENTIFICATION AND DATE TAG DETAIL

FOR CONVENTIONAL AND HIGH MAST POLES

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

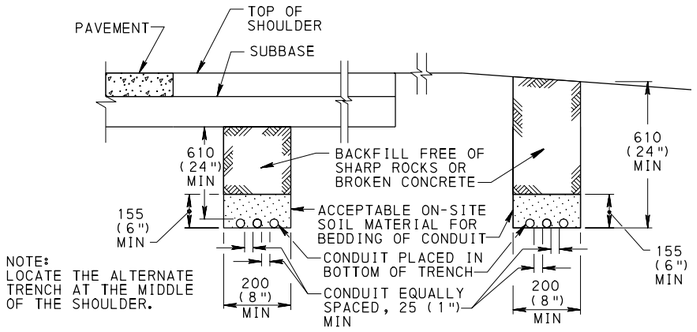
HIGHWAY LIGHTING HIGH MAST LIGHTING POLE DETAILS

RECOMMENDED JUN. 1, 2010
R. Wyatt Dilley
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2

RC-83M

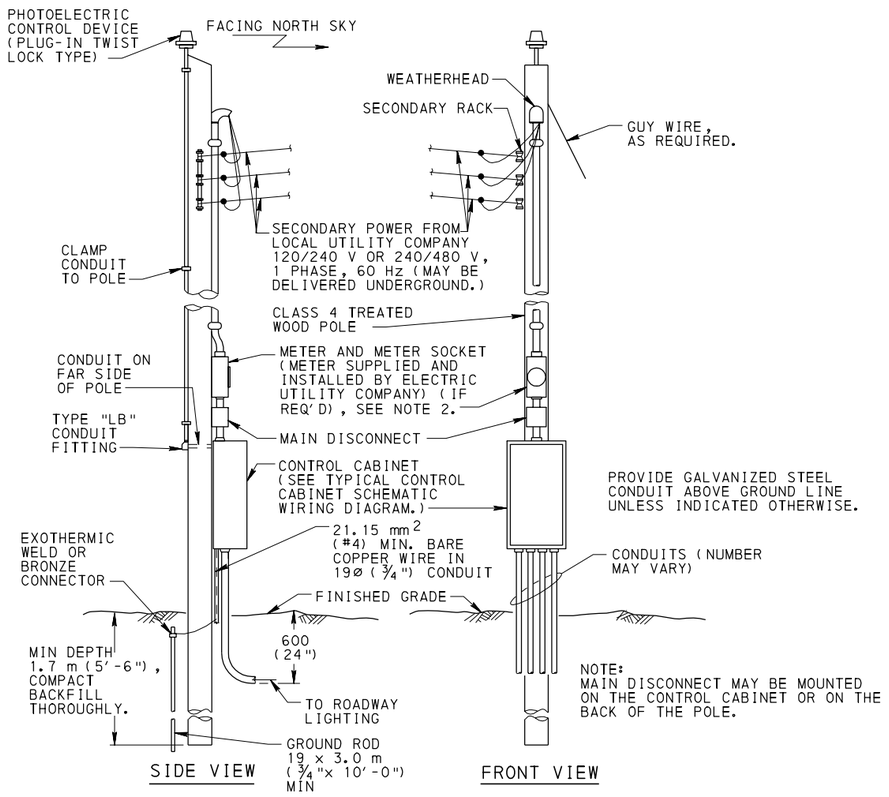


ALTERNATE TREATMENT PREFERRED TREATMENT

UNDERGROUND CABLE AND CONDUIT

NOTES FOR UNDERGROUND CABLE AND CONDUIT

- TRENCH ALONG THE GENERAL LINE SHOWN ON THE PLANS.
- DO NOT TRENCH IN GUIDE RAIL LINE.
- LOCATE UNDERGROUND CABLE AND CONDUIT WITH TEMPORARY PLASTIC MARKERS OR OTHER APPROVED METHODS WHERE THERE IS A POSSIBILITY OF DISTURBANCE BY GUIDE RAIL ERECTION OR SIMILAR CONSTRUCTION. VERIFY GUIDE RAIL LOCATIONS SHOWN ON THE LIGHTING PLANS.
- HAVE ALTERNATE TRENCH LINE, OTHER THAN AS SHOWN ON THE PLANS, APPROVED BY THE ENGINEER. IN NO CASE APPROVE AN ALTERNATE TRENCH LINE WHICH RESULTS IN INCREASING THE CIRCUIT LENGTH MORE THAN 5%.
- INSTALL CONDUIT TO PERMIT DRAINAGE TOWARDS NEAREST EARTH JUNCTION BOX AS APPLICABLE.
- PROVIDE PERMANENT MARKING TAPE IN THE LAST LIFT FOR THE ENTIRE TRENCH LENGTH.

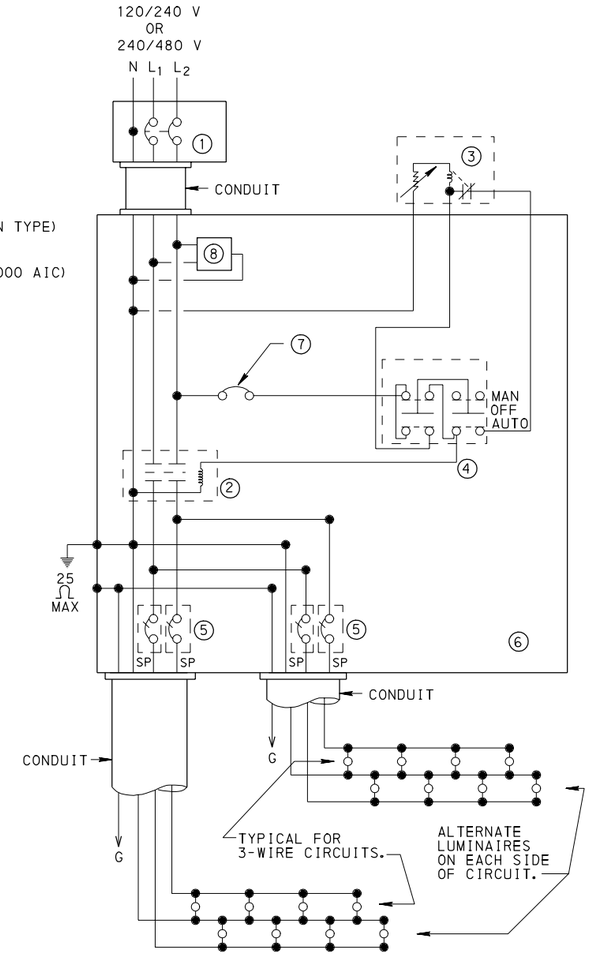


TYPICAL TERMINAL POLE EQUIPMENT ARRANGEMENT FOR POWER SUPPLY

ITEMS

N -NEUTRAL
L_1-LINE 1
L_2-LINE 2
M -MANUAL
A -AUTOMATIC
① -MAIN DISCONNECT
② -CONTROL CONTACTOR
③ -PHOTOELECTRIC CELL (PLUG-IN TYPE)
④ -SELECTOR SWITCH
⑤ -DISTRIBUTION BREAKERS (10 000 AIC)
⑥ -CONTROL CABINET
⑦ -15 A, SP BREAKER
⑧ -LIGHTNING ARRESTER
SP-SINGLE POLE
DP-DOUBLE POLE

ITEMS ②, ③, ④ AND ⑦ ARE NOT REQUIRED IF EACH LUMINAIRE HAS A PHOTOELECTRIC CONTROL ELEMENT.



TYPICAL CONTROL CABINET SCHEMATIC WIRING DIAGRAM

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. PROVIDE METERED ELECTRIC SERVICE EXCEPT WHERE DEPARTMENT APPROVED SPECIAL UNMETERED ENERGY ONLY RATE IS AVAILABLE.
3. MAKE SPLICES WITH PRE-MOLDED, DISCONNECTABLE CONNECTOR KITS. PROVIDE SPLICES WITH FUSES FOR TAPS TO LUMINAIRES FOR CONVENTIONAL LIGHTING. CONNECT THE GROUNDING ELECTRODE CONDUCTOR TO THE EQUIPMENT GROUNDING CONDUCTOR WITH A SPLIT BOLT CONNECTOR AND COAT WITH CORROSION INHIBITOR.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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HIGHWAY LIGHTING LIGHTING AND ELECTRICAL DETAILS

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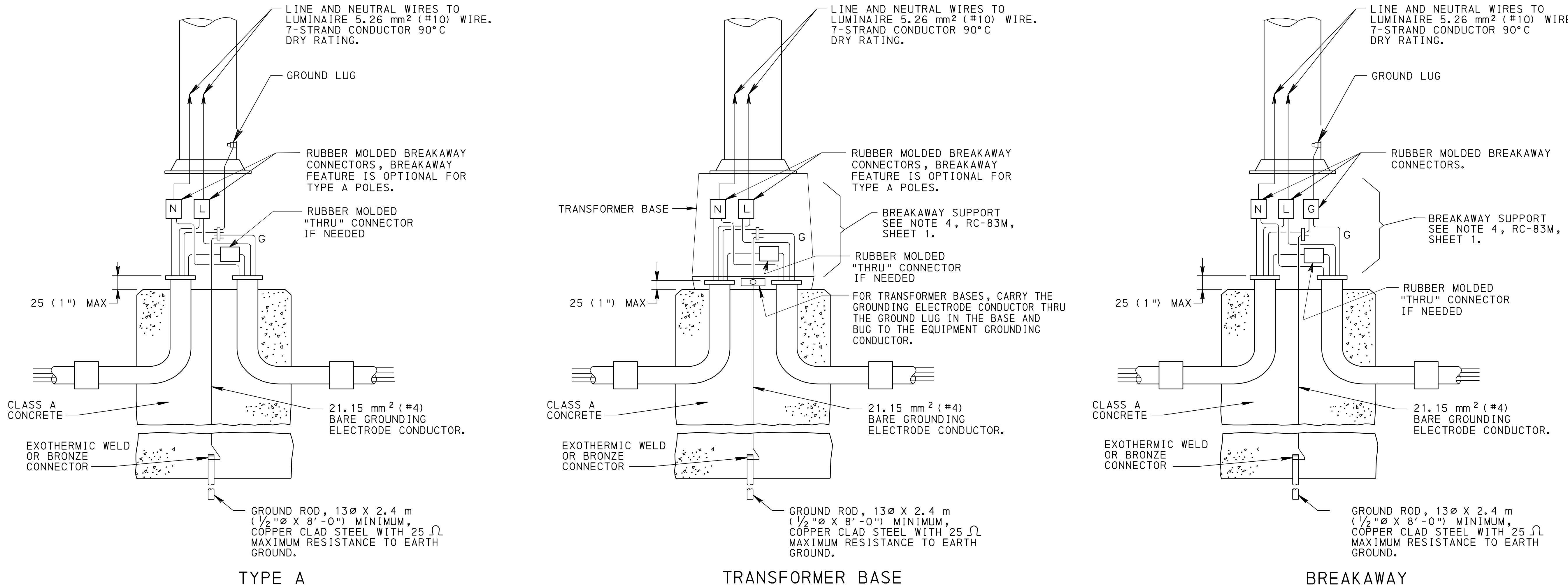
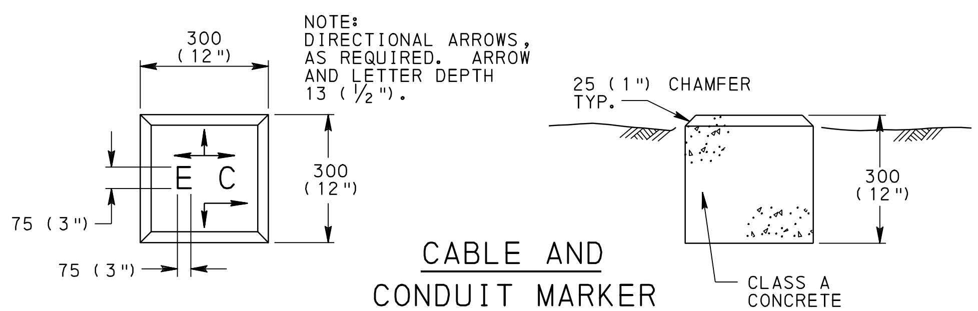
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-84M



WIRING DETAILS



CABLE AND CONDUIT MARKER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING
LIGHTING AND ELECTRICAL DETAILS

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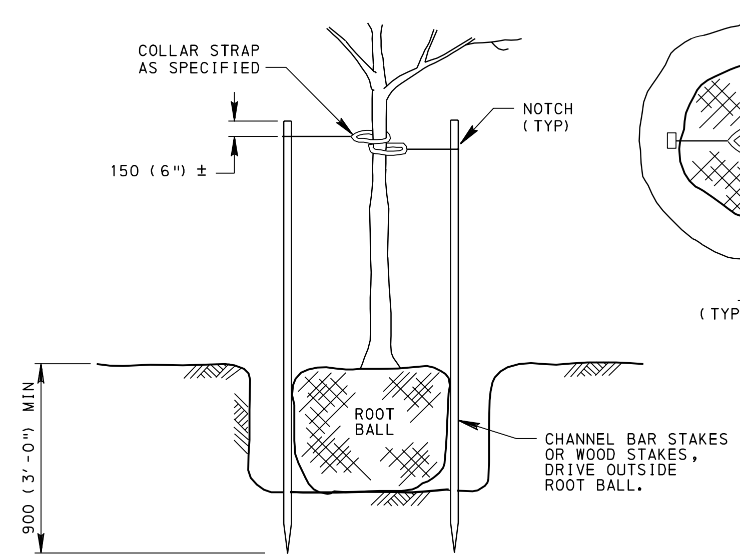
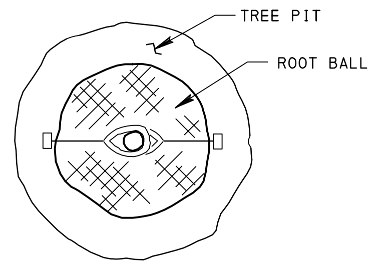


ELEVATION

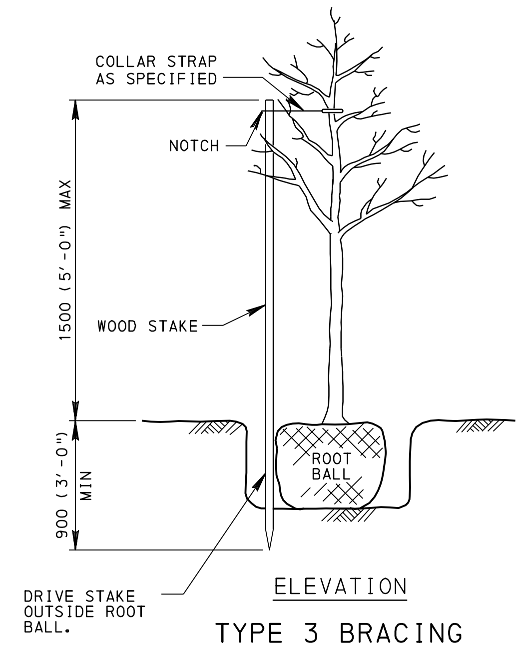


PLAN

(TYPE 2 BRACING)

TYPE 2 BRACING

FOR DECIDUOUS TREES OVER 40 (1½") CALIPER AND ALL EVERGREEN TREES 1.2 m (4'-0") TO 2.4 m (8'-0") HEIGHT.



ELEVATION

TYPE 3 BRACING

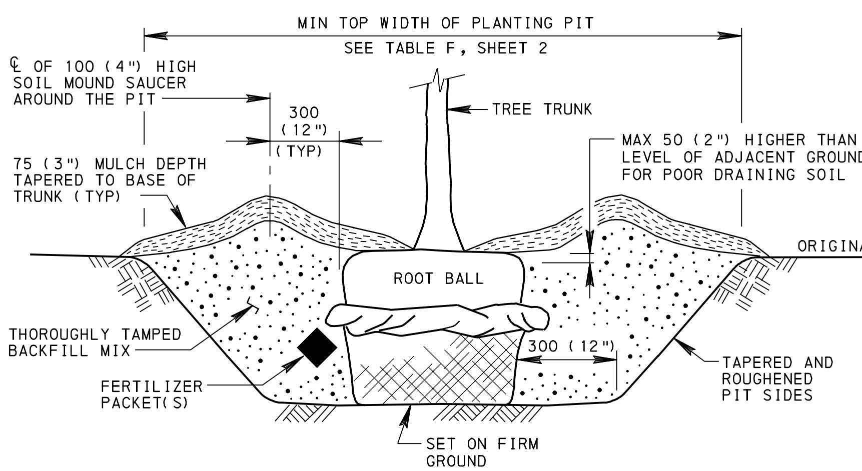
FOR DECIDUOUS TREES 1.5 m (5'-0") TO 40 (1½") CALIPER

NOTES

1. ALL MOUNDS CREATED IN THE PLANTING PIT SHALL CONSIST OF SOIL MATERIAL FROM THE PIT EXCAVATION FREE OF ALL STONES AND FOREIGN MATERIAL 50 (2") OR LARGER IN ANY DIMENSION.
2. SET TOP OF ROOT BALL 25 TO 50 (1" TO 2") HIGHER THAN SURROUNDING GROUND.
3. ATTACH COLLAR STRAPS TO THE TREE AT A POINT NOT LESS THAN 50% OF THE HEIGHT OF THE TREE.
4. SPACE ROOT CONTACT FERTILIZER PACKETS EQUALLY AROUND THE BALL OR ROOTS AND SET 150 TO 200 (6" TO 8") DEEP. PLACE FERTILIZER TABLETS AT THE ROOT ZONE APPROXIMATELY 75 TO 100 (3" TO 4") DEEP.
5. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 805 AND 808.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

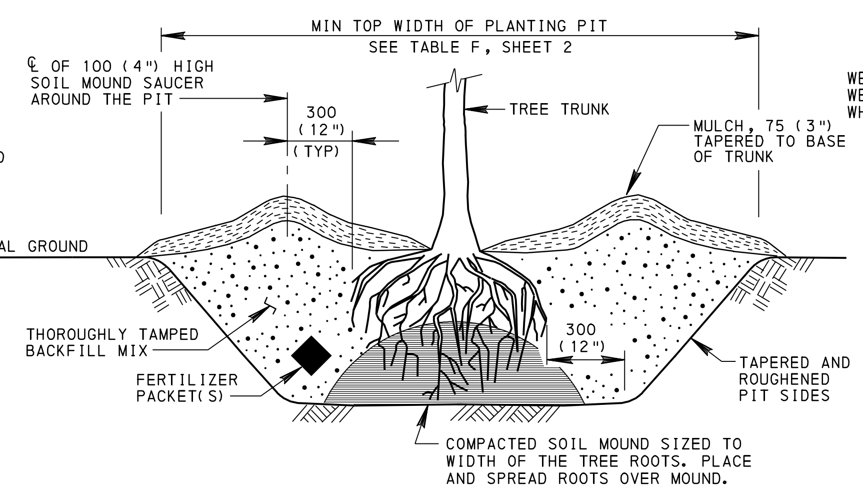
BRACING DETAILS

FOR BRACING REQUIREMENTS SEE TABLES A AND D ON SHEET 2.



BALLED AND BURLAPPED

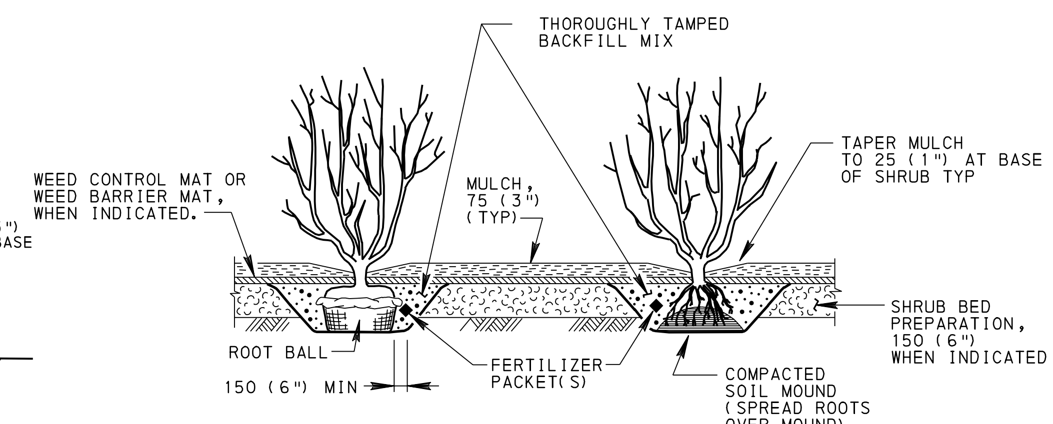
OR CONTAINER



BARE ROOT

TREE PLANTING DETAILS

FOR FERTILIZER PACKET SCHEDULE SEE TABLE B ON SHEET 2.

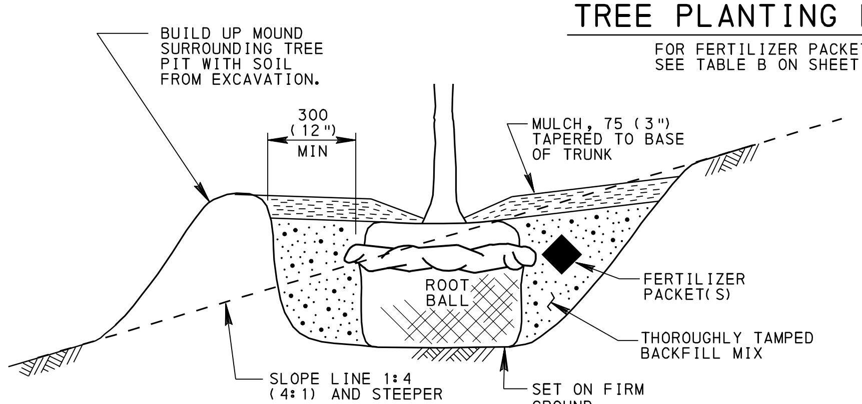


BALLED AND BURLAPPED

OR CONTAINER

BARE ROOT

SHRUB PLANTING AND SHRUB BED PREPARATION DETAILS



SLOPE PLANTING DETAIL FOR DECIDUOUS AND EVERGREEN TREES

- USE TYPE 2 OR TYPE 3 BRACING, AS REQUIRED.
- FOR FERTILIZER PACKET SCHEDULE SEE TABLE B ON SHEET 2.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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BRACING AND PLANTING DETAILS

RECOMMENDED JUN. 1, 2010 CHIEF, HWY. QA DIVISION	RECOMMENDED JUN. 1, 2010 DIRECTOR, BUREAU OF DESIGN	SHT 1 OF 2 RC-91M

TABLE A
BRACING REQUIREMENTS

BRACING TYPE	TREE SIZE		MINIMUM POST LENGTH	STAKE BRACE TYPE	REQUIRED POST SIZES ‡
	DECIDUOUS	EVERGREEN			
2	-----	1.2 m TO 1.8 m HEIGHT (4'-0" TO 6'-0" HEIGHT)	2.0 m (6'-6")	CHANNEL BAR	0.57 kg (1¼ LB) POST H2-1
				WOOD	50 x 50 (2" x 2") FULL DIM
2	40 TO 60 CALIPER (1½" TO 2½" CALIPER)	1.8 m TO 2.4 m HEIGHT (6'-0" TO 8'-0" HEIGHT)	2.4 m (8'-0")	CHANNEL BAR	1.36 kg (3 LB) POST H2-2
				WOOD	50 x 50 (2" x 2") FULL DIM
2	60 TO 90 CALIPER (2½" TO 3½" CALIPER)	-----	3.4 m (11'-0")	CHANNEL BAR	1.36 kg (3 LB) POST H2-2
				WOOD	75 x 75 (3" x 3") FULL DIM
2	OVER 90 CALIPER (OVER 3½" CALIPER)	-----	3.8 m (12'-6")	CHANNEL BAR	1.36 kg (3 LB) POST H2-3
				WOOD	75 x 75 (3" x 3") FULL DIM
3	1.5 m HEIGHT TO 40 CALIPER (5'-0" HEIGHT TO 1½" CALIPER)	-----	2.4 m (8'-0")	WOOD	50 x 50 (2" x 2") FULL DIM

‡ ROUND WOOD STAKES MAY BE SUBSTITUTED AS FOLLOWS:
50 x 50 (2" x 2") = 50 (2") DIAMETER ROUND STAKE AND
75 x 75 (3" x 3") = 75 (3") DIAMETER ROUND STAKE.

TABLE B
110 g, 16-8-16 ROOT CONTACT FERTILIZER PACKET SCHEDULE

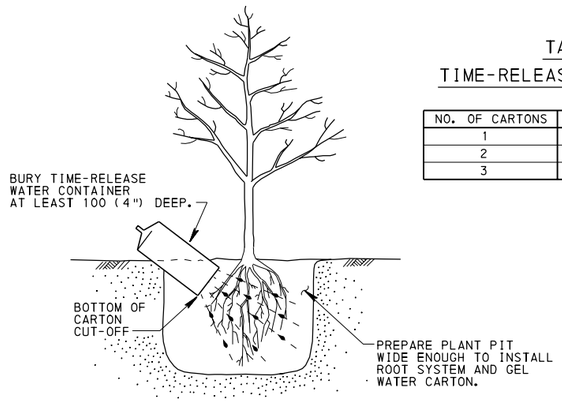
TREE SIZE		NUMBER OF PACKETS
DECIDUOUS	EVERGREEN	
UNDER 25 (1") CALIPER	450 TO 900 (18" TO 36") HEIGHT	1
25 TO 50 (1" TO 2") CALIPER	900 TO 1.8 m (3'-0" TO 6'-0") HEIGHT	2
50 TO 60 (2" TO 2½") CALIPER	1.8 m TO 2.4 m (6'-0" TO 8'-0") HEIGHT	3
60 TO 90 (2½" TO 3½") CALIPER	-----	4
90 TO 100 (3½" TO 4") CALIPER	-----	5
100 TO 125 (4" TO 5") CALIPER	-----	6
FLOWERING TREES		NUMBER OF PACKETS
1.5 m TO 3.0 m (5'-0" TO 10'-0") HEIGHT		3
SHRUBS		NUMBER OF PACKETS
300 TO 600 (12" TO 24") SPREAD OR HEIGHT		1
600 TO 900 (24" TO 36") SPREAD OR HEIGHT		2
900 TO 1.5 m (3'-0" TO 5'-0") HEIGHT		3

TABLE C
10 g, 20-10-5 FERTILIZER TABLET SCHEDULE

ALL EVERGREEN/DECIDUOUS SEEDLINGS	1 TABLET
ALL GROUNDCOVER MATERIAL	1 TABLET

TABLE D
COLLAR STRAP BRACING SCHEDULE

BRACING - RUBBER COLLAR STRAP SCHEDULE	
TREE SIZE	STRAP SIZE
TREES UNDER 50 (2") CALIPER	MIN 38 (1½") WIDE x 335 (14") LENGTH
TREES 50 (2") CALIPER OR LARGER	MIN 75 (3") WIDE x 480 (19") LENGTH
BRACING - FIBER COLLAR STRAP SCHEDULE	
ALL TREES-100 (4") CALIPER AND SMALLER	MIN 20 (¾") WIDE x APPROPRIATE LENGTH-WITHOUT GROMMETS
TREES 75 (3") CALIPER AND SMALLER	MIN 25 (1") WIDE x 450 (18") LENGTH-WITH GROMMETS
TREES LARGER THAN 75 (3") CALIPER	MIN 25 (1") WIDE x 600 (24") LENGTH-WITH GROMMETS
TREES 100 (4") CALIPER AND SMALLER	MIN 25 (1") WIDE x 850 (34") LENGTH-WITH NAIL TACK



PLANTING METHOD B
SEEDLING MATERIAL & SEEDLING TRANSPLANTS

TABLE E
TIME-RELEASE WATER CARTON

NO. OF CARTONS	PLANT HEIGHT
1	UP TO 300 (12")
2	300 TO 600 (12" TO 24")
3	600 TO 900 (24" TO 36")

TABLE F
TREE PLANTING PIT SIZE CRITERIA

DECIDUOUS TREES					EVERGREEN TREES	
B&B, AND WIRE ROOT PROTECTION DEVICES			CONTAINER GROWN		TREE HEIGHT	MIN TOP DIAMETER OF PLANTING PIT
CALIPER	HEIGHT	MIN TOP DIAMETER OF PLANTING PIT	HEIGHT	MIN TOP DIAMETER OF PLANTING PIT		
25 (1")	——	1.5 m (5')	1.2 m (4') #2 CONTAINER	900 (3')	900-1.5 m (3'-5')	1.5 m (5')
40 (1½")	——	1.5 m (5')	1.5 m (5') #5 CONTAINER	1.2 m (4')	1.8 m-2.4 m (6'-8')	1.8 m (6')
50 (2")	——	1.8 m (6')				
60 (2½")	——	1.8 m (6')	1.8 m (6') #5 CONTAINER	1.2 m (4')		
80 (3")	——	2.0 m (7')				
90 (3½")	——	2.0 m (7')	30 (1¼") #10 CONTAINER	1.5 m (5')		
100 (4")	——	2.5 m (8')				
——	1.2 m-2.4 m (4'-8')	1.5 m (5')	40 (1½") #15 CONTAINER	1.5 m (5')		
BARE ROOT						
——	1.2 m-2.4 m (4'-8')	1.5 m (5')				

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COMMONWEALTH OF PENNSYLVANIA
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BRACING AND PLANTING DETAILS

RECOMMENDED JUN. 1, 2010
CHIEF, HWY. QA DIVISION

RECOMMENDED JUN. 1, 2010
DIRECTOR, BUREAU OF DESIGN

SHT 2 OF 2

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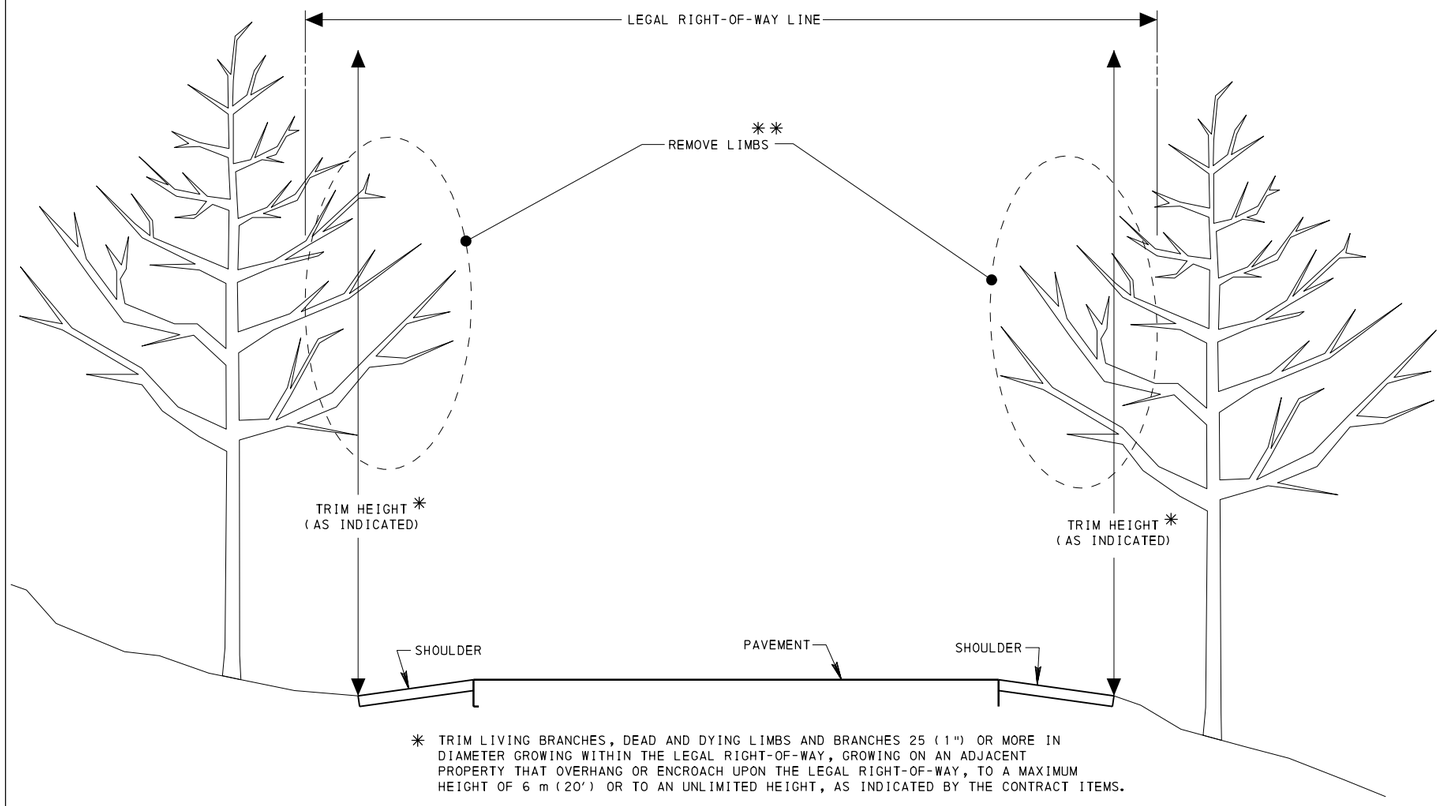


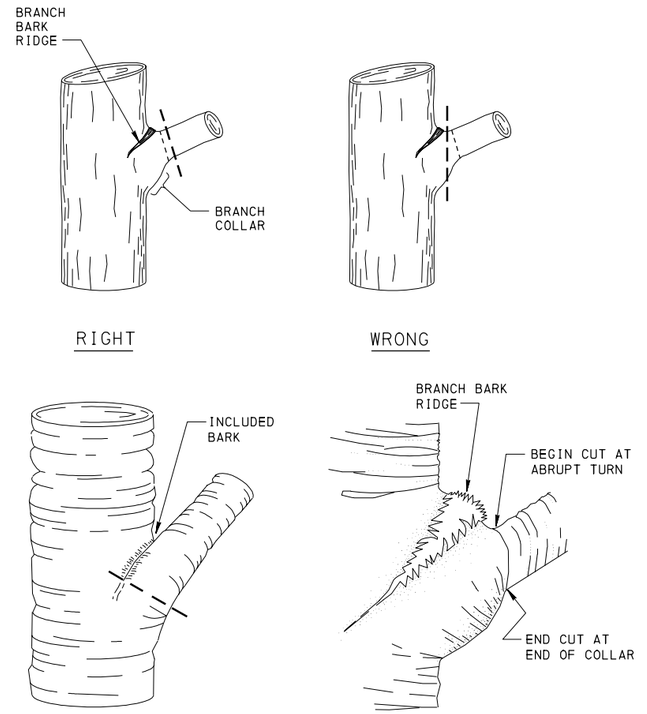
* TRIM LIVING BRANCHES, DEAD AND DYING LIMBS AND BRANCHES 25 (1") OR MORE IN DIAMETER GROWING WITHIN THE LEGAL RIGHT-OF-WAY, GROWING ON AN ADJACENT PROPERTY THAT OVERHANG OR ENCROACH UPON THE LEGAL RIGHT-OF-WAY, TO A MAXIMUM HEIGHT OF 6 m (20') OR TO AN UNLIMITED HEIGHT, AS INDICATED BY THE CONTRACT ITEMS.

** REMOVE LIMBS TO THE BRANCH COLLAR.

TREE TRIMMING REMOVAL LIMITS

LEGEND

- – – POSITION OF CUT
- - - - BOUNDARY BETWEEN TRUNK TISSUE AND BRANCH TISSUE



BRANCH REMOVAL

NOTES

1. COMPLETE TREE TRIMMING AS SPECIFIED IN PUBLICATION 408, SECTION 810.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

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REMOVAL LIMITS OF TREE TRIMMING

RECOMMENDED JUN. 1, 2010	RECOMMENDED JUN. 1, 2010	SHT 1 OF 1
CHIEF, HWY. QA DIVISION	DIRECTOR, BUREAU OF DESIGN	RC-92M