
INFORMATION AND SPECIAL INSTRUCTIONS:
Incorporate the attached revisions into the April 2004 Edition of the Standards for Roadway Construction. These revisions should be adopted as soon as practical on all new and existing designs without affecting any letting schedules. PS&E submissions to Central Office after June 30, 2006 should include these revisions.

The major revisions for each Standard Drawing are presented below. Only revised sheets are listed. Remaining sheets of the standard show new dates only. Since all minor changes may not be indicated, it is strongly advised that all recipients thoroughly examine the changes and revisions incorporated in this Change.

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<td>Changed Note 11.</td>
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<td>RC-20M</td>
<td>1 of 3</td>
<td>Changed Note 11. In typical layout detail, changed distance of first tie bar or tiebolt to transverse joint. Minor change in Type D and Type E joint details. Minor changes to Note 4.  2 of 3 Minor changes to Note 2.  3 of 3 Clarifications to Side Frame Details of Expansion Joint Assembly. Added anchor stake locations and placement details in expansion and contraction joint assembly details. Revised Notes 1, 2, and 3.</td>
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<td>RC-21M</td>
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<td>Minor change in dimension units for consistency. Changed Note 9.</td>
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<td>Added 450 (18”) dimension for thickness of approach slab. Changed 400 (16”) to 650 (26”) for #16 (#5) bar in Elevation View.</td>
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RC-24M 1 of 1 Minor correction to reinforcing details.
RC-25M All Sheets Renumbered to reflect new sheet 7.
RC-26M All Sheets Minor changes to Notes 2, 6 and 7. Added Note 8.
RC-28M All Sheets Standard expanded from 5 sheets to 9 sheets. Renumbered to reflect new sheets. 1 of 9 Minor changes to Notes 2, 6 and 7. Added Note 8. In concrete pavement patching typical section, changed 90 ± 25 (3 ½”) to 60 (2 ½”) min – d/2 – 15 (1/2") max. 2 thru 5 of 9 Expanded old Sheet 2 into new sheets for Single Lane Patching, Multi-Lane Patching, Single Lane Patching Skewed Joints, and Multi-Lane Patching Skewed Joints. 2 of 9 Dimension changes to single lane pavement patching typicals.
Changed Note 4. Removed old Note 6.

3 of 9
New Sheet from old Sheet 2. Dimension changes to multi-lane pavement patching typicals.

Changed Notes 4 and 8.

4 of 9
New Sheet from old Sheet 2. Dimension changes to single lane skewed joint pavement patching typicals.

Changed Notes 3, 4, and 8. Removed old Note 6.

5 of 9
Dimension changes to multi-lane skewed joint pavement patching typicals.

Changed Notes 4 and 8.

6 of 9
Minor dimensional format changes.

8 of 9
Minor dimensional format changes.

Added Dowel Retrofit details.

9 of 9
New sheet for Rehabilitation (Lane Widening).

RC-27M
1 of 1
Changed distance of first tie bar or tiebolt to transverse joint from 375 (15") to 750 (30") in interstate and other limited access freeways, arterials, and ramps.

RC-28M
1 of 1
Added "PAINT WITH PG 64-22" note to typical section of longitudinal notched wedge joint.

RC-29M
All Sheets
Initial release of "BRIDGE ANTI-ICING SYSTEM". Companion to BC-723M.

RC-30M
1 of 5
Added English dimensions to pavement base drain typicals.

2 of 5
Revised typical of combination storm sewer and underdrain; added Note 4 which reads "PLACE 2A AGGREGATE MATERIAL IN A LIFT 75 (3") THICK, COMPACT TO 95% SPECIFIC DENSITY".

4 of 5
Added word "BARREL" after "PIPE" in "PIPE INSTALLATION PROCEDURES, STEP 3".

Changed dimension in typical of Step 6D from (75 min) to 75 (3")

RC-31M
All Sheets
Clarrifications to D-E and E-S Endwall details. Moved "SUBSURFACE DRAIN OUTLET ENDWALL (SLOPED)" detail to Sheet 2.

1 of 2
Changed Note 4 for clarity.

RC-33M
1 of 2
Added Note 8: "PROVIDE TOE WALL OF CLASS A CONCRETE."

RC-34M
3 of 10

RC-40M
1 of 1
Added "GEOSYNTHETIC CLAY LINER" details.

Minor revisions to stone slope wall and typical section details for clarity.

Added Note 5.

RC-50M
6 of 16
Revised dimensions and stud locations in end connection plate details for constructability.

Revised End Connection Angle size.

Additions to Connection Plate Assembly Details for clarity.

RC-52M
All sheets
Standard expanded form 6 sheets to 8 sheets. Renumbered to reflect new sheets.

1 of 8
Moved side and front views of Routed Offset Bracket to Sheet 5.

Added Note 9.

Revised metric dimension for steel base plate for consistency.

Revised to 2-S guide rail only into earth mounds.

New details for "TYPE 2 STRONG POST GUIDE RAIL ACROSS CULVERTS AND SMALL STRUCTURES 3810 (12'-6") SPAN".

New details for "TYPE 2 STRONG POST GUIDE RAIL ACROSS CULVERTS AND SMALL STRUCTURES 5715 (18'-9") SPAN".

New details for "TYPE 2 STRONG POST GUIDE RAIL ACROSS CULVERTS AND SMALL STRUCTURES 7620 (25'-0") SPAN".
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<th>Revised offset to face of Guide Rail to match DM-2 and other RC Standards.</th>
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<td>Revised Note 4.</td>
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<td>Added new Note 6.</td>
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<td>Changed &quot;SOLID OBSTRUCTION&quot; to &quot;AREA OF CONCERN (OBSTACLE)&quot;. Minor revision to Table 1.</td>
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<tr>
<td></td>
<td></td>
<td>Revised metric dimensions for consistency.</td>
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<tr>
<td></td>
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<td>Changed &quot;SOLID OBSTRUCTION&quot; to &quot;AREA OF CONCERN (OBSTACLE)&quot;.</td>
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<tr>
<td></td>
<td></td>
<td>Revised offset from edge of shoulder to face of guide rail to be consistent with DM-2 and other RC standards.</td>
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<tr>
<td></td>
<td></td>
<td>Revised metric dimensions for consistency.</td>
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<tr>
<td></td>
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<td>Moved &quot;GRADING DETAIL FOR FLARED TERMINALS&quot; and Section B-B to Sheet 4.</td>
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<tr>
<td></td>
<td></td>
<td>Revised notes in &quot;TREATMENT AT OBSTRUCTION DETAILS&quot;.</td>
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<td>Eliminated Median Earth Mound Detail for Overhead Structures and related section views.</td>
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<tr>
<td></td>
<td></td>
<td>Moved &quot;TYPICAL MEDIAN EARTH MOUND DETAIL FOR AT--GRADE DUAL BRIDGES&quot; and Section A-A to Sheet 3 and renamed to Section B-B.</td>
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<tr>
<td></td>
<td></td>
<td>Added detail for &quot;GRADING DETAIL FOR FLARED TERMINALS&quot; and new Sections C-C &amp; D-D to this sheet.</td>
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<td></td>
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<td>Changes to plan and elevation views of anchor terminal for clarity and conformance to the Roadside Design Guide and FHWA recommendations.</td>
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<td></td>
<td></td>
<td>Changed Sections A-A, B-B, and C-C to Sections E-E, F-F, and G-G.</td>
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<tr>
<td></td>
<td></td>
<td>Added new Note 1 and renumbered other notes with minor revisions.</td>
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<td></td>
<td>6 of 7</td>
<td>Changes to plan and elevation views of anchor terminal for clarity and conformance to the Roadside Design Guide and FHWA recommendations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changed Sections A-A, B-B and C-C to Sections H-H, J-J, and K-K.</td>
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<td></td>
<td></td>
<td>Revised Notes 2, 3, and 5.</td>
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<td></td>
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<td>Changed height from 1125 (44 ½&quot;) to 1140 (45&quot;) in TYPICAL ELEVATION, STEEL POST detail.</td>
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<td>RC-57M</td>
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<td>Changed &quot;TYPICAL REFLECTOR UNIT&quot; to &quot;TOP-MOUNT BARRIER DELINEATOR&quot; and &quot;TYPICAL BARRIER-MOUNT DELINEATOR&quot; to &quot;SIDE-MOUNT BARRIER DELINEATOR&quot;.</td>
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<tr>
<td></td>
<td></td>
<td>Revised Note 5.</td>
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<td>Revised Slotted Plate Connection, Permissible Taper dimension</td>
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<tr>
<td></td>
<td>All Sheets</td>
<td>Revised some dimensions on typical barrier sections to be more in line with the latest AASHTO-AGC-ARTBA Guide to Standardized Highway Barrier Hardware and industry standard practices. Dimensions on the bridge side of the Bridge to Highway Transitions match those in the Bridge Design (BD) Standards.</td>
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<td>RC-58M</td>
<td>1 of 5</td>
<td>Changed diagrams of Typical Delineator Devices to current delineators.</td>
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<tr>
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<td>Revised Note 3 and added Note 10.</td>
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<td></td>
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<td>Revised dimension from 13 (1/2&quot;) to 15 (9/16&quot;) in bottom of tapered slotted plate connection detail.</td>
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<tr>
<td></td>
<td>3 of 5</td>
<td>Revised Note 3 and added Note 5.</td>
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<td>Revised Sheet reference in &quot;TYPICAL BARRIER TREATMENT AT PIERS&quot; detail.</td>
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<td>Changed &quot;TYPICAL REFLECTOR UNIT&quot; to &quot;TOP-MOUNT BARRIER DELINEATOR&quot; and &quot;SIDE-MOUNT BARRIER DELINEATOR&quot; in typical cast-in-place and precast barrier.</td>
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</table>
Added Note 11.

Revised some dimensions on typical barrier sections to be more in line with the latest AASHTO-AGC-ARTBA Guide to Standardized Highway Barrier Hardware and industry standard practices.

Revised Note 1: Replaced “CLASS I, CLASS I-A OR CLASS II REFLECTIVE SHEETING MATERIAL” with “TYPE III, IV, VII, VIII, OR IX RETROREFLECTIVE SHEETING MATERIAL.”

Replaced “CLASS I, CLASS I-A OR CLASS II REFLECTIVE MATERIAL APPLIED TO...” with “RETRO-REFLECTIVE SHEETING MATERIAL APPLIED TO...”

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REQUEST ADDITIONAL COPIES FROM:

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For All Others:
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Sales Store
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Harrisburg, PA 17105
Telephone: (717) 787-6746

APPROVED FOR ISSUANCE BY:
Allen D. Biehler, P.E. – Secretary of Transportation
By:

SOL 430-05-13 June 29, 2005
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April, 2004 Edition

* See Change 1 for Mar. 30, 2006 Standard Revisions
TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL

TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT

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

NOTE: EXCAVATE THE LAST 600 (2 ft) WITH BUCKET WITHOUT TEETH TO KEEP THE FOUNDATION FIRM. BOTTOM MAY BE SLOPED IN ONE DIRECTION.

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

BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES

NOTE: SEE SHEET 2 FOR GENERAL NOTES.
GENERAL NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUB 408. PLACE BACKFILL AND EMBA NKMENT 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 850.210; AASHTO NO. 1, 3, 5 OR 57 COARSE AGGREGATE MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS OF PUBLICATION 408, TABLE A. PLACE A CLASS 2, TYPE E GROUTABLE PLASTER AS A BARRIER BETWEEN THE STRUCTURE BACKFILL AND THE EXCAVATION ENCLOSURE MATERIALS AS SHOWN ON THE STRUCTURAL DRAWINGS OR AS DIRECTED BY THE ENGINEER.

3. PLACE STRUCTURE BACKFILL AND ADJACENT EMBANKMENT SIMULTANEOUSLY UNLESS OTHERWISE PERMITTED BY THE ENGINEER.

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

5. IDENTIFIES NOTES THAT APPLY ONLY TO INTEGRAL ABUTMENTS.

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

BACKFILL AT STRUCTURES

RECOMMENDED MAR. 30, 2006
CHIEF ENGINEER RC-12M
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 2" (51 mm) clearance pocket assured by means of a positive spacing device.

2. Cut expansion joint filler to conform to the cross section of the pavement and furnish in strips equal to the width of the pavement slab. Make the top 3/4" (19 mm) of the joint filler above the holes punched for dowel bars. 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 0.75 x 450 (1 1/4" x 18") long dowel bars for pavement depths 250 (10") or less, and minimum 0.88 x 450 (1 1/2" 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 (1 grade 420 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 1/6" to 1/2" below the level of the pavement surface. Make the top edge of the contact surfaces on both sides of the seal at the same elevation.

7. Make the top of the joint sealing material from 1/8" to 1/2" 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.

9. Saw depths of Neoprene Seal:

   - Seal size: 61/2" x 3/4" x 61/2"
   - Saw cut depths: 32" x 32" x 32"
   - 50-53, 1/2"
   - 50-53, 1/2"

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 Sealing Width of Saw Cut | SPACING SIZE | Width of Saw Cut |
    |-------------------------------|---------------|-----------------|
    | Type E                        | 4.5 m & C.o. | 50-53, 1/2"     |
    | Type E                        | 3.0 m & 50    | 50-53, 1/2"     |
    | Type E                        | 2.0 m & 50    | 50-53, 1/2"     |

11. When silicone joint sealing material, as specified in Publication 408, Section 705.4(c), 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 1 and alternate longitudinal shoulder joints).

12. All dimensions are given in millimeters unless otherwise noted. U.S. Customary units in parenthesis.

13. Provide materials and workmanship in accordance with the requirements of Publication 408.

**Commonwealth of Pennsylvania**
**Department of Transportation**
**Director, Bureau of Design**

**Concrete Pavement Joints**

**Notes:**
- Either all metric or all English values must be used on Plans, Metric and English values shown may not be mixed.
- Required units are either English or Metric.

**ADJACENT LANE**

**LONGITUDINAL JOINT**

**COATED DOMEL BARS**

**SEE NOTES 4 AND 5.**

**JOINT SEALING MATERIAL**

**SEE NOTE 7.**

**LONGITUDINAL JOINT**

**SEE RC-20W**

**TRANSVERSE JOINT**

**JOINT SEALING MATERIAL**

**SEE NOTE 7.**

**COATED DOMEL BARS**

**SEE NOTES 4 AND 6.**

**JOINT SEALING MATERIAL**

**SEE NOTE 7.**

**EXPANSION JOINT FILLER**

**SEE NOTE 2.**

**JOINT BACKING MATERIAL 13 1/2" BACKER ROD**

**JOINT SEALING MATERIAL**

**SEE NOTE 7.**

**JOINT BACKING MATERIAL 13 1/2" BACKER ROD**

**JOINT SEALING MATERIAL**

**SEE NOTE 7.**

**JOIN T DETAIL**

**SHT. OF2.**

**PLANS**

**NOTES**

**CONCRETE PAVEMENT JENTS**

**RECOMMENDED MAY 22, 2006**

**DEPARTMENT OF TRANSPORTATION**

**RECOMMENDED MAY 22, 2006**

**SHEET**

**DRAWN**

**CHECKED**

**NIT. 1 OF 3**

**RC-20M**
DO WEL BAR KEEPER CLIP, SEE NOTE 6.

"J" DESIGN "A" DESIGN

EDGE OF PAVEMENT

PLAN

TYPICAL EXPANSION JOINT ASSEMBLY

ANCHOR STAKE (TYP.)

ELEVATION

EXPANSION JOINT ASSEMBLY

NOTE:

1. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE ALL THE DETAILS ...

2. PROVIDE ANCHOR STAKES TO SECURE UNIT FROM MOVEMENT INCLUDING UPLIFT. USE A MINIMUM OF EIGHT STAKES PER 3. 6 ...

3. PROVIDE •13 (# 4) DEFORMED REINFORCEMENT BARS OR 13 ( ½"l SMOOTH RODS AS ANCHOR STAKES. STAKES SHALL BE OF SUFFICIENT ...

4. AFTER EACH LOAD TRANSFER ASSEMBLY IS SECURED IN PLACE, RE ...

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:

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 DOWELS AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408.

9. PROVIDE DOWEL BAR KEEPER CLIPS IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONTRACTION AND EXPANSION JOINT ASSEMBLIES.

10. MOLD REQUIREMENTS AS LISTED BELOW AND TESTED PER MANUFACTURER'S QUALITY CONTROL PLAN FOR WELD SHEAR.

11. WIRE TOLERANCES PER ASTM A510M IS 0.05 mm (0.003in.1

QUALITY CONTROL PLAN FOR WELD SHEAR.

WELD

"E" SIDE SUPPORT WIRE OR LESS ( 6"

SIDE SUPPORT WIRE

SIDE SUPPORT WIRE

SIDE SUPPORT WIRE

SIDE SUPPORT WIRE

SIDE SUPPORT WIRE

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

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:

| PART DEPTH | MW35 OR MD35 5/8 OR 3/4 | 200 (6) |
| MW35 OR MD35 5/8 OR 3/4 | 230 (7) |
| MW35 OR MD35 5/8 OR 3/4 | 250 (10) |
| MW35 OR MD35 5/8 OR 3/4 | 280 (11) |
| MW35 OR MD35 5/8 OR 3/4 | 300 (12) |
| MW35 OR MD35 5/8 OR 3/4 | 330 (15) |

4. KINKED 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 9/16 OR 09.5.

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 OR 60 (2½") TO A MAXIMUM OF ONE-HALF THE PAVEMENT DEPTH MINUS 151/2-½".

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 ( ) PARENTHESIS.

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

REINFORCED CONCRETE PAVEMENT

RECOMMENDED MAY 30, 2006
RECOMMENDED MAY 30, 2006
SHT J OR J
DIRECTOR, DIVISION OF DESIGN CHIEF ENGINEER

RC-21M
1. Construct in accordance with this standard drawing or as indicated on the structure drawings.

2. The Type E Joint does not apply when Approach Slab is constructed in conjunction with a pavement relief joint or with a flexible pavement. See RC-24M.

3. When construction involves more than 2 lanes, connect additional lanes required to standard 2 lane bridge approach slab using Type L construction joints, as shown on RC-DN sheet 2.

4. Install Neoprene compression seals to a uniform depth with top of the seal from 6 (1/4") to 10 (3/4") 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.

5. Determine "d" by adding 20 (3/4") to the maximum compressed height of the Neoprene compression seal. (See manufacturer's information.)

6. Construct the bridge approach slab after the bridge deck is constructed.

7. Provide reinforcement bars, epoxy coated in accordance with publication 408, section 709.1(c).

8. All dimensions are in millimeters unless otherwise noted. U.S. customary units in ( ) parenthesis.

Provide 40 (1 1/4") with nominal 100 mesh Neoprene compression seal for 20 (3/4") movement classification. See note 4.

Closed Cell Neoprene Sponge

Detail A (Alternate) To apply only when indicated on structure drawings.

Commonwealth of Pennsylvania Department of Transportation Bureau of Design

Recommended Mar. 30, 2006

Director, Bureau of Design

Chief Engineer

Mar. 30, 2006

Recommended Mar. 30, 2006

SHT 1 OF 3

RC-23M

Notes:

1. Either all metric or all English values must be used on plans. Metric and English values shown may not be mixed.
430 (17") DEEP ADJACENT COMPOSITE BOX BEAMS WITH 230 (9") DEEP APPROACH SLAB NOTCH

535 (21") TO 1220 (4'-0") DEEP ADJACENT COMPOSITE BOX BEAMS WITH 280 (11") DEEP APPROACH SLAB NOTCH

NOTES

1. WHEN MAKING CONSTRUCTION CHANGES IN THE FIELD, THIS DRAWING IS TO SERVE AS A GUIDE FOR MODIFYING NOTCH DETAILS SHOWN ON P/I'S STANDARD DRAWINGS FOR ACCOMMODATING THE STANDARD 410 (16") BRIDGE APPROACH SLAB.

2. AT BEAM ENDS, BURN OFF REINFORCEMENT PROTRUDING INTO APPROACH SLAB NOTCH.

3. INCREASE IN FIELD, PROVIDING OVERHANG, IF REQUIRED.

4. PROVIDE REINFORCEMENT BARS, EPOXY COATED, IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.1(c).

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BUREAU OF DESIGN

BRIDGE APPROACH SLAB

RECOMMENDED MAR. 30, 2006

DIRECTOR, BUREAU OF DESIGN

CHIEF ENGINEER

SHEET 2 OF 3

RC-23M
NOTES:

1. TROWEL SMOOTH AND APPLY ONE COAT ASPHALT PAINT OR, SEE NOTE 1.

2. ORIENT THE EDGE OF THE APPROACH SLAB PARALLEL TO THE INTEGRAL ABUTMENT FOR BRIDGE SKEWS LESS THAN 90.5 DEGREES (E. G. 6: 1) SLOPE TO THE PERPENDICULAR TO THE DIRECTION OF TRAFFIC.


4. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 0.1 TO 0.5 INCHES BELOW THE SURFACE OF THE PAVEMENT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BRIDGE APPROACH SLAB
1. PAVEMENT RELIEF JOINTS ARE APPLICABLE FOR ALL CEMENT CONCRETE PAVEMENTS.

2. USE CLASS AA CONCRETE IN SUBSLAB. (AT CONTRACTOR'S OPTION, SUBSLAB CONCRETE MAY BE REINFORCED.)

3. INCLUDE PORTIONS OF REINFORCING BARS WHICH ARE LOCATED OUTSIDE THE INDICATED PAY LINES IN BID PRICE FOR PAVEMENT RELIEF JOINT.


5. 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.

6. 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. IN THESE CASES, PROVIDE THE SUBSLAB AS A UNIFORM 150 (6") THICK AND 2.1 m (7') WIDE.

7. 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.

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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SCHEDULE OF REINFORCEMENT STEEL

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>SPACING</th>
<th>LENGTH</th>
<th>NUMBER REQUIRED</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>#13</td>
<td>300 (12&quot;)</td>
<td>3.2 m (10')</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>#13</td>
<td>500 (12&quot;)</td>
<td>6.4 m (20')</td>
<td>5</td>
</tr>
<tr>
<td>C</td>
<td>#13</td>
<td>150 (6&quot;)</td>
<td>2.1 m (7')</td>
<td>7</td>
</tr>
<tr>
<td>D</td>
<td>#13</td>
<td>300 (12&quot;)</td>
<td>1.8 m (6')</td>
<td>5</td>
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</tbody>
</table>

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 MAR 30, 2006
SCHEDULE OF REINFORCEMENT STEEL

SHEET 1 OF 1

RECOMMENDED MAR 30, 2006
SHEET 1 OF 1

PAY LIMIT FOR BRIDGE APPROACH SLAB

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

SECTION A-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

PAVEMENT RELIEF JOINT

RECOMMENDED MAR 30, 2006
SCHEDULE OF REINFORCEMENT STEEL

SHEET 1 OF 1

RECOMMENDED MAR 30, 2006
SHEET 1 OF 1

PAY LIMIT FOR BRIDGE APPROACH SLAB

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

SECTION A-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
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PAVEMENT RELIEF JOINT

RECOMMENDED MAR 30, 2006
SCHEDULE OF REINFORCEMENT STEEL

SHEET 1 OF 1

RECOMMENDED MAR 30, 2006
SHEET 1 OF 1

PAY LIMIT FOR BRIDGE APPROACH SLAB

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

SECTION A-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

PAVEMENT RELIEF JOINT

RECOMMENDED MAR 30, 2006
SCHEDULE OF REINFORCEMENT STEEL

SHEET 1 OF 1

RECOMMENDED MAR 30, 2006
SHEET 1 OF 1

PAY LIMIT FOR BRIDGE APPROACH SLAB

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

SECTION A-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

PAVEMENT RELIEF JOINT
NOTES

1. Construct aggregate base as specified in Publication 409, Section 390.1 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 < 3.4 m (11'). Slope shoulder at 4.0% for effective shoulder widths > 3.4 m (11').

5. For effective shoulder widths 1.8 m (6') and less, paved out-of-out of shoulders with full depth roadway pavement.

6. For shoulders that specify rumble stripes installations, use only bituminous wearing course, ID-2 or ID-3, or Superpave, 9.5mm or 12.5mm, HMA wearing course, 40 (1½") minimum.

7. When installing rumble stripes on a Type 1-I or 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 stripes 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 strips details.

10. Shoulder pay quantities are included in mainline items for Section 409 of Pub 409 paving items.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RECOMMENDED

MAR. 30, 2006

CHIEF ENGINEER

DIRECTOR, BUREAU OF DESIGN

SHOULDERS

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
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 RUBBER RAIL ATTACHED, REMOVE THE RUBBER RAIL WHEN THE HEIGHT OF GUIDE RAIL BECOMES LESS THAN 480 (19").

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 GRADE 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 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 ENTIRE ITEM WHETHER TABULATED OR NOT.

8. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATION, USE ONLY BITUMINOUS WEARING COURSE, 10-2 OR 10-3, OR SUPERPAVE, 9.5 OR 12.5m HMA WEARING COURSE, 40 (1 ½") 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.

TYPICAL SHOULDER DETAIL
 WITH BITUMINOUS TAPER SHOULDER WEDGE

PROPOSED RESURFACING
ACROSS SHOULDER

PRIME COAT

SHOULDER SLOPE

EXISTING MATERIAL

EDGE OF EXISTING OR WIDENED
PAVEMENT

SHOULDER PAY LIMIT

GRADE TO THIS LINE

FULL SURFACE NEEDS TO MEET
SUBGRADE SPECIFICATIONS.

EXISTING MATERIAL

SHOULDER PAY LIMIT

GRADE TO THIS LINE

EXISTING MATERIAL

EDGE OF
EXISTING OR
WIDENED
PAVEMENT

SHOULDER SLOPE

TYPE 4 SHOULDER

250 TO 300 (10" TO 12"

VARIABLE WIDTH

PAVED SHOULDERS

TYPE 4-7 TOP

SHOULDER WEDGE

SEE NOTE 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

RECOMMENDED MAR. 30, 2006

DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER

SHOULders
(RECONSTRUCTED)

RECOMMENDED MAR. 30, 2006

Sht 2 of 7

RC-25M
CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS

REINFORCEMENT AT OPENINGS

SECTION A-A

CONCRETE SHOULDER EXPANSION JOINTS

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

NOTES:

1. EXPANSION JOINTS MAY BE SUBSTITUTED WITH OGS MATERIAL AS PER SEC. 350.5 OF PUB. 408.

2. SEAL ALL SHOULDER JOINTS IN ACCORDANCE WITH PUBLICATION WYX, SECTIONS 501.1/4.

3. FOR JOINT DETAILS, SEE RC-25M.

4. ALLOWS SHOULDER TRANSVERSE JOINTS TO ADJACENT PAVEMENT JOINTS.

5. SEE RC-5M, SHEET 1, FOR SHOULDER MOUNTING DETAIL ON HIGH SIDE OF SUPERELEVATION.

6. AT THE CONTRACTOR'S OPTION, TYPE 2 CONCRETE SHOULDERS MAY BE CONSTRUCTED ON A TAPER, WITH A MINIMUM DEPTH OF 150 < 6" > MIN. OR AT THE SAME DEPTH AS THE PAVEMENT, AT NO ADDITIONAL COST TO THE DEPARTMENT.

7. TYPICALLY, DO NOT PLACE TIE BARS OR TIEBOLTS ON EITHER SIDE OF INTERMEDIATE SHOULDER JOINTS ADJACENT TO RCC PAVEMENTS.

8. WHEN THE SHOULDER IS STRUCTURALLY PART OF A BARRIER MOMENT RESISTANCE SLAB (i.e., BARRIER/SLAB ON AN MSE WALL) SEE BC-799 SHEET 3 FOR REQUIRED MINIMUM SPACING OF THE TRANSVERSE SHOULDER JOINTS.

9. SEE SHEETS 8 AND 9 FOR SMILEY STRAP DETAILS.

10. FOR USE ON FULL DEPTH CONCRETE SHOULDERS, SHOULDER PAY QUANTITIES AND INCLUSIONS MUST BE LIQUIDATED FOR SECTION 501 OR 506 OF PUB. 408 PAVING QUANTITIES.

11. CONSTRUCT ONLY RCC SHOULDER ADJACENT TO RCC PAVEMENT AND PCC SHOULDER ADJACENT TO PCC PAVEMENT.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

SHOULDER RELIEF JOINTS

SECTION B-B

NOTES:

- EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS, METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON BITUMINOUS SHOULDERS

TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS

ACCELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION

DECELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION

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 NO. 46 FOR SECTION 46.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

SHOULders
RUMBLE STRIPS
(LIMITED ACCESS HIGHWAYS)

SPT. 6 OF J. G. BURNE
RECOMMENDED: MAR. 30, 2006

RC-25M
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 460.

3. Do not construct shoulder rumble strips across a joint.

4. 300 ± 13 \( \frac{1}{2}\) " for left (median) shoulders, 450 ± 13 \( \frac{1}{2}\) " for right shoulders 3.6 m (12') wide, for right shoulders less than 3.6 m (12') 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 STRIP ON BITUMINOUS SHOULDERS**

- **MEDIAN**
- **RUMBLE STRIP**
- **PAVEMENT SHOULDER JOINT**

**TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS**

- **MEDIAN**
- **RUMBLE STRIP**
- **PAVEMENT SHOULDER JOINT**

**TYPICAL INTERSECTION DETAIL FOR RUMBLE STRIP INSTALLATION**

- **PLAN**
- **SECTION B-B**
- **SECTION A-A**

**SECTION DETAILS OF RUMBLE STRIP PATTERN**

**GENERAL PLAN**

**RUMBLE STRIP PATTERN**

**COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION**

**SHOULDERS RUMBLE STRIPS (FREE ACCESS HIGHWAYS)**

**RECOMMENDED MAY 30, 2006**

**DIRECTOR, BUREAU OF DESIGN**

**RC-25M**
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 406 SECTION 660.

4. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAM PAVEMENTS.

5. FORM JOINTS IN GORE AREA CONNECTING MAINLINE AND RAM PAVEMENTS 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.
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 2.4m (8') AND A MAXIMUM WIDTH OF 3.6m (12').

3. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAMP PAVERMENTS.

4. PLACE 19.05 3/4" PREMOLDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CROSS SECTIONAL AREAS.

5. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2m (14'6"), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.

6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN PARENTHESES.

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 RC-25M, SHEET 6 OF 7.

12. USE LOAD TRANSFER UNITS IF MAINLINE SHOULDER IS CONSTRUCTED USING LOAD TRANSFER UNITS. INSTALL IN ACCORDANCE WITH RC-27M.

13. PLACE A 6 1/2" 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
SINGLE LANE PAVEMENT PATCHING

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 5 (1.5") full depth, polystyrene board bond breaker in the longitudinal joint of all patches under 50.0 m (164') 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 (20") 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 (20") 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 1.8 m (6' - 0") into next slab. If more than 1.8 m (6' - 0") is required, remove a minimum of 1.8 m (6' - 0") and provide new pavement joint at original joint location. For exception, see "E" in legend.

NOTE: Either all metric or all English values must be used on plans. Metric and English values shown may not be mixed.
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 MINIMUM OF 600 mm (2' -0") FULL DEPTH POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES UNDER 2.0 m (6'-0") IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.

4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 1.8 m (6'-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 mm (2'-0") INTO THE NEXT SLAB, REMOVE A MINIMUM OF 1.8 m (6'-0") AND INSTALL A NEW PAVEMENT JOINT PERPENDICULAR IN THE LOCATION OF THE ORIGINAL JOINT IN THE ADJACENT LANE.

6. WHEN REPLACING 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.

LEGEND

C PAVEMENT PATCHING JOINT, SEE SHEET 1.
F NEW PAVEMENT JOINT, SEE RC-20M.
O EXCEPTION TO 1.8 m (6'-0") MAXIMUM REMOVAL.
5 DETAILS APPLY TO EITHER END OF PATCH.

CONCRETE PAVEMENT REHABILITATION
(MULTI-LANE PATCHING)

NOTE EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS, METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. Construct pavement patches in adjacent lanes, with lengths that are within 1.8 m (6 ft) 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 ft), then construct to the required lengths.

2. Do not leave less than 1.8 m (6 ft) 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 under 20.0 m (60 ft) 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 ft) and install a new pavement joint perpendicular in the location of the original joint in the adjacent lane.

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 1.8 m (6 ft) into the next slab from the far point of the skew. If more than 1.8 m (6 ft) is required, remove a minimum of 1.8 m (6 ft) and provide new pavement joint perpendicular at original joint location at the adjacent slab edge. For exception, see (c) in legend.

Notes:

- Either all metric or all English values must be used on plans. Metric and English values shown may not be mixed.
### 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 6¼" (160 mm) full depth, polystyrene board bond breaker in the longitudinal joint of all patches under 20.0 ft (6000 mm) 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 ft (182.9 mm) 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 10.0 ft (3.0 m) onto 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. When performing multilane patching, and the patches are greater than two slab lengths and less than or equal to 150 ft (4572 mm), 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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**Legend**

- **E**: Pavement patching joint, see Sheet 1.
- **F**: New pavement joint, see RC-20M.

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**NOTES**

1. 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**

(MULTI-LANE PATCHING) **SKEWED JOINTS**

**NOTE:** Either all metric or all English values must be used on plans. Metric and English values shown may not be mixed.

**RECOMMENDED MAR. 30, 2006**

**DIRECTOR, BUREAU OF DESIGN**

**CHIEF ENGINEER**

**SHEET S OF 9**
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 (1/8") TO 6 (1/4") 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 REHABILITATION

(CRC PATCHING)

RECOMMENDED MAR. 30, 2006

Director, Bureau of Design
Chief Engineer

RC-26M
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION

NOTE 1. DRILL NEW HOLES FOR REGROUTING 1.5" 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.
JOINT REHABILITATION

SEE JOINT SPACING TABLE.

NOTES:
1. EXISTING STEEL PLATE IS EITHER 2.01 THICK (14 GAUGE) WITH LAPPED TOP OR FLAT PLATE 3 (1/8") THICK.
2. REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.
3. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.

J O I N T S P A C I N G  \( \pm 15 \text{ m} \leq 50' -0" \) AND \( \pm 6 \text{ m} < 20' -0" \) AND \( \pm 6 \text{ m} < 20' -0" \).

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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION (JOINTS)

RECOMMENDED MAR. 30, 2006

SECTION B-B  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' (500 MM).
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 4500 (20'-0'”), USE 4500 (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
REHAB OF DESIGN

CONCRETE PAVEMENT REHABILITATION (LANE WIDENING)

RECOMMENDED MAR. 30, 2006
SIGNED 5/3/06
RECOMMENDED MAR. 30, 2006
SIGNED 5/3/06
1. FOR JOINT DETAILS, SEE RC-20M.
2. CONSTRUCT TYPE E 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') 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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PLAIN CONCRETE PAVEMENT

RECOMMENDED NOV 30, 2006

DRAWN: \nREVIEWED: \nAPPROVED: 

SHT 1 OF 1

SMITH, DIOR, DEPT. OF DESIGN
CHIEF ENGINEER

RC-2TM
OVERLAY TRANSITION WITH PAVING NOTCH ON CONCRETE AND BITUMINOUS PAVEMENTS

OVERLAY TRANSITIONS

LONGITUDINAL NOTCHED WEDGE JOINT

NOTE:
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 40B, SECTION 401.3.
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.
**General Notes**

1. All dimensions are in millimeters unless otherwise noted. U.S. customary units are in 1/16 in. when otherwise specified.

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 1101.09c.

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 Pub. 408, Section 1080.2c, for embedding anti-icing hardware in concrete.

8. To avoid damaging or conflicting with reinforcing steel in existing concrete, adjust disk location to provide minimum clearance of 12 1/8 in. to the reinforcing steel top surface.

9. No conduit joints are permitted for installation in existing concrete. Field bends are permitted when internal diameter is maintained.

**Approach Plan**

- Place all in-ground valve boxes outside of shoulder limits.

**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 Bridge Anti-Icing System Approach Installation**

**Recommended Mar. 30, 2006**

**Director, Bureau of Design**

**Chief Engineer**
INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM
NEW APPROACH CONCRETE PAVEMENT

LEGEND:

- CONCRETE ROADWAY
- ROADWAY SUBBASE
- EMBANKMENT MATERIAL

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

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
SPRAY DISC ADJUSTMENT TO ACCOMMODATE BITUMINOUS OVERLAY

(OPTIONAL SPRAY DISK INSTALLED AFTER CONSTRUCTION OF 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. AFT PR GROUT HARDENS, REMOVE

SPONGE AND INSTALL 9 (3/4"

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.

REINFORCED PLASTIC MORTAR

JUNCTION BOX 1.800-24 OR 1A-27

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD
BRIDGE ANTI-ICING SYSTEM
SPRAY DISK ADJUSTMENT FOR APPROACH OVERLAY

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, 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 50 (2") 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 PARENTHESES.

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**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF DESIGN**

**SUBSURFACE DRAINS**

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

**LEGEND**

- D: DEPTH
- T: THICKNESS
- G: GEOTEXTILE MATERIAL
- P: PIPE
- S: SUBBASE
- B: BASE COURSE
- C: CURB
- M: METER
- **N**: FOOT
- **°**: DEGREE

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**DRAWING:**

- DIRECTOR, BUREAU OF DESIGN
- CHIEF ENGINEER
- RC-30M

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**DATE:**

- RECOMMENDED MAY 30, 2006
- SPC-01 I 001

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**SHOWN:**

- COMMONWEALTH OF PENNSYLVANIA
- DEPARTMENT OF TRANSPORTATION
- BUREAU OF DESIGN
- RC-30M
NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 610 FOR PAVEMENT BASE DRAIN, SECTION 612 FOR SUBGRADE DRAIN AND SECTION 604 FOR COMBINATION STORM SEWER AND UNDERDRAIN.

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 A G A G G R E G A T E MATERIAL, IN A LIFT 13 (1 / 2") IN THICK, COMPACT TO MSE SPG.

LEGEND

- DEPTH BELOW SUBBASE EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 2 (2")
- WHEN STORM SEWER IS REQUIRED AND IT INTERFERS WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN.
- 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 75-150 (3-6") 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.

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

SUBSURFACE DRAINS
BACKFILL DETAIL AT ENDWALL
(FOR CONCRETE PIPE)

END SECTION

COMPACTED 2A MATERIAL, SEE SHEET 4.

X = 300 (12") MAX AROUND ENTIRE ENDWALL FOOTING.

EXCAVATION FOR ENDWALLS

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

NOTE: 300 (12") MAX FROM BOTTOM OF TRENCH TO START OF 1:1.5 LAYBACK. PAY LIMITS FOR PIPE EXCAVATION BASE THE PAY LIMIT ON THE LAYBACK SLOPE UP TO A MAX OF 1:1.5.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS
PIPE PLACEMENT
EXCAVATION - BEDDING - BACKFILL

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

CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:
1. PIPE Laying in Top of the Natural Ground, Rock or Compacted Fill
2. The Existing Ground is between the Top of Pipe and the Proposed Elevation, and the Pipe Is to Be Covered with Earth Fill
3. For a Top of Pipe Below the Level of the Natural Ground on Compacted Fill, To Ensure That Soil and to Be Covered with Earth Fill, to Heights Above the Natural Ground.

STEP 1: REMOVE TOPSOIL (COMPRRESSIBLE LAYER OF ORGANIC MATERIAL) FROM THE EXCAVATION.

STEP 2: CONSTRUCT THE EMBANKMENT TO 1200 (4'-0") ABOVE THE EXISTING GROUND.

STEP 3: EXCAVATE THE TRENCH TO THE WIDTH OF 5 OUTSIDE DIAMETERS OF PIPE BARREL PLUS 1200 (4'-0") AND CREATE AN APPROPRIATE MANNER IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE, COMPACT TO 95¼ SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.

STEP 4: PLACE 2A COARSE AGGREGATE MATERIAL (AASHTO NO. 81) ON TOP OF THE BEDDING AND FORM THE CRADLE.

STEP 5: LAKE PIPE IN APPROPRIATE BEDDING, SEE STEP 60 FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.

STEP 6: PLACE IMMEDIATE SUITABLE MATERIAL (AASHTO NO. 81) TO A HEIGHT OF 300 (12") ABOVE THE EXISTING GROUND, COMPACT TO 97¼ SPD. PAY AS CLASS 1 EXCAVATION.

STEP 7: 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 95¼ SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.

STEP 8: PLACE IMMEDIATE SUITABLE MATERIAL TO A HEIGHT OF 300 (12") ABOVE THE EXISTING GROUND, COMPACT TO 97¼ SPD. PAY AS CLASS 1 EXCAVATION.

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

STEP 9: 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 95¼ SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.

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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SUBSURFACE DRAINS
PIPE PLACEMENT
EXCAVATION - BEDDING - BACKFILL
FLOWABLE BACKFILL DETAIL

NOTES:

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE RECOMMENDATIONS OF PUBLICATION 408, SECTIONS 601 AND 202.

2. FLOWABLE BACKFILL WILL ENVELOP THE LAST SECTION OF PIPE OR END SECTION. CONSTRUCT SIDE OF FLOWABLE BACKFILL MATERIAL AS SPECIFIED IN SPECIAL PROVISION OR PROVIDE FORMWORK TO CONTAIN FLOWABLE BACKFILL.

3. PAYMENT FOR THE BACKFILL ENVELOP (AGGREGATE, BENDING AND BACKFILL OR FLOWABLE BACKFILL MATERIAL) 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 CONTAINS NO DEBRIS, ORGANIC MATERIAL MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN 0.5 TIMES 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.
GENERAL NOTES

1. PROVIDE END SECTIONS MEETING THE REQUIREMENTS OF PUB. 408, SECTION 6.6. PROVIDE GROOVE ON OUTLET END SECTIONS, IF TONGUE ON INLET END SECTIONS.

2. PROVIDE 0.77 THICK (12 GAUGE) SIDES AND 0.50 THICK (10 GAUGE) CENTER PANEL FOR A PIECE UNIT. PROVIDE END PANELS WITH A GABLE END CONDITION. PROVIDE 20" CAP JOINT TIGHTLY FASTENED BY 10 (¾") GALVANIZED OR ALUMINIZED MOUNTS INSTEAD OF BOLTS FOR STEEL UNITS AND ALUMINUM ALLOY BOLTS FOR ALUMINUM UNITS OR ON STEEL UNITS. PROVIDE TOE WALLS OF THE SAME THICKNESS AND PIECES AS THE END SECTION.

3. PROVIDE THE PLATES OF THE SAME MATERIAL AS THE END SECTION. LOCATE PUNCHED HOLES IN PLATE TO MATCH HOLES IN SKIRT. PROVIDE TOE PLATES 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+450 (+20"
- PIPE 750 (30") DIAMETER OR SMALLER - W+250 (+10"
- PIPE 900 (36") DIAMETER OR LARGER - W+550 (+25"

SUPPLEMENT REINFORCED EDGES WITH GALVANIZED STEEL STIFFENER ANGLES WITH GALVANIZED OR ALUMINIZED BOLTS AND NUTS OR ALUMINUM ALLOY STIFFENER ANGLES WITH ALUMINUM ALLOY BOLTS AND BOLTS OF THE FOLLOWING SIZES:

- 63 (2 ½") X 63 (2 ½") X 6 (1/4") FOR 1500 TO 2100 (60" TO 84") DIAMETER PIPE.

PLACE ANGLE REINFORCEMENT UNDER THE CENTER PANEL SEAMS FOR 1950 x 1320, 1850 x 1400 (77"x 52", 73"x 53") AND 2100 x 1450, 2050 x 1500 (83"x 57", 81"x 59") PIPE-ARCH CULVERTS.

ANCHOR ALUMINUM OR STEEL END SECTIONS, THAT ARE USED ON THE INLET END OF PIPE LARGER THAN 1350 (54") DIAMETER, AS INDICATED ON THE DRAWING.

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

END SECTIONS FOR PIPE CULVERTS

END SECTIONS FOR PIPE CULVERTS

RECOMMENDED MAR, 30, 2004

SHEET 1 OF 2

DRAWN: DIRECTOR, BUREAU OF DESIGN

CRC-33M
### TABLE A-DIMENSIONS FOR END SECTION FOR CONCRETE PIPE

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### TABLE B-DIMENSIONS FOR END SECTIONS FOR CIRCULAR CORRUGATED METAL PIPE

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### TABLE C-DIMENSIONS FOR END SECTIONS FOR CORRUGATED METAL PIPE-ARCH

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### 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 MAR. 30, 2006**

**DIRECTOR**, **BUREAU OF DESIGN**

**DEPARTMENT OF TRANSPORTATION**

**NOTE:** FOR GENERAL NOTES SEE SHEET 1.
NOTES

1. CONSTRUCTION REQUIREMENTS
   A. CONSTRUCT IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 603, 704 AND 714 AND AS MODIFIED HEREBY.
   B. MINIMUM CONCRETE CLASS CAST-IN-PLACE A PRECAST CLASS AA
   C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH TABLE 408.3 FOR CONCRETE 150 (6") NPS AND 300 (12") NPS
   D. CLEAR COVER FOR STEEL WALLS CAST-IN-PLACE 30 (1 1/2") PRECAST 30 (1 1/2") TOP BARS 40 (1 1/2") BUTTON BARS 40 (1 1/2") SIDE COVER
   E. PROVIDE CONCRETE SLABS CAST-IN-PLACE 30 (1 1/2") TOP & BOTTOM BARS
   F. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 709. PROVIDE MINIMUM YIELD STRENGTH OF 400 MPa (60,000 PSI).
   G. PROVIDE GRADE ADJUSTMENT RINGS. SHEET 6 OF 10 FOR FRAMES, SHEET 5 OF 10 FOR GRATES AND SHEET 4 OF 10 FOR TYPE D H INLET

2. EACH TYPE OF INLET SHOWN IS SUITABLE FOR A PARTICULAR SITUATION AS FOLLOWS
   A. TYPE C INLET IS DESIGNATED FOR INSTALLATION WITH NON-MOUNTABLE CURBS.
   B. TYPE M INLET IS DESIGNATED FOR INSTALLATION IN SHOULDER SWALE AREAS.
   C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 603, 704 AND 714; AND AS MODIFIED HEREBY.

3. USE PRECAST CONCRETE OR STEEL GRADE ADJUSTMENT RINGS WHEN REQUIRED. (REHABILITATION PROJECTS)

4. FOR M13, REINFORCEMENT BOTH DIRECTIONS, USE 200' X 10' X 25' MIN EACH WAY, EACH PAIR 10" X 16" MAX. SPACING.

5. PROVIDE HOLES IN INLET BOXES WHEN REQUIRED.

6. PIPE MAY BE CONNECTED TO DRAINAGE STRUCTURES (PRECEDENT CONSTRUCTION REQUIREMENTS) WITH MORTAR OR WATERPROOF RUBBER FLEXIBLE CONNECTORS.

7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

8. EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. This sheet depicts the shape and dimensions required for uniformity and compatibility. Permit only top units supplied by a manufacturer listed in Bulletin 15. For deviations or modifications of the standards submit shop drawings for approval.

2. Cast-in-place top units may be monolithic with the inlet box.

3. Provide angles embedded in the concrete as a bearing area for the grate for all top units which seat the grate directly within the unit.

4. Place a Type W inlet adjacent to the back edge of the curb, flush with the pavement surface. When required within a concrete mountable curb section.

5. Dowel Type C inlet top units with $2 \times 25 \times 300 \text{ mm}^2$ dowel bars and place premolded expansion joint filler 2 in. wide when connecting to adjacent curb sections.

6. The placement of the Type S inlet relative to the gutter inlets is dependent on the rate of back slope. For back slopes greater than $1:20$ (2:1), locate the inlet where the back slope line intersects the back, top outside corner of the inlet. For back slopes less than $1:20$, locate the inlet where the back slope line intersects the edge of the inlet grate.

7. Tapers may be provided on inside vertical faces of precast inlet tops to facilitate form stripping. Tapers may result in internal bottom dimensions that vary to a maximum of 20 mm (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

INLETS
CONCRETE TOP UNITS
CAST-IN-PLACE AND PRECAST

RECOMMENDED MAY 20, 2004
SHT. 2 OF 3D

CHIEF ENGINEER
BUREAU OF DESIGN

RC-34M
TYPICAL CORNER DETAILS

NOTES

1. THESE DETAILS DEPICT THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING.

2. BOLD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.

3. PROVIDE TRANSVERSE BARS MEETING THE REQUIREMENTS OF PUBLICATION 408. PROVIDE GRADE 345 (GRADE 50) STRUCTURAL STEEL FOR ALL PERIMETER AND BEARING BARS.

4. PROVIDE BICYCLE-SAFE, STRUCTURAL STEEL OR CAST IRON VANE GRATES FOR INSTALLATION 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 SUBMISSION, AS SPECIFIED IN NOTE 1, AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT CONCRETE TOP UNITS.

5. FABRICATE SLOTS BY BURNING, DRILLING, SHEARING OR PUNCHING. HAVE THE BOTTOM OF ALL BURNED OR DRILLED SLOTS CONFORM TO THE SHAPE OF THE ROD.

6. PROVIDE STRUCTURAL STEEL GRATES WITH THE GRATE SPACERS LOCATED FLUSH ALONG THE TOP SURFACE OF THE GRATE.

7. PROVIDE A 25 L 1 "WIDE YELLOW PAINT STRIP LENGTHWISE ALONG THE TOP OF THE INLET GRATE AS A FIELD IDENTIFIER OF INSTALLATION LOCATION. PLACE TWO RAISED WELD BEADS, EACH TWO INCHES LONG, ON THE CENTER TOP OF ONE LONGITUDINAL PERIMETER BAR.

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 GRATES

RECOMMENDED MAR. 30, 2006
SHEET 3 OF 3P

NOTE: PLACE SPACER BARS AT LONGITUDINAL OF GRATE.
NOTES

1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. PERMIT ONLY GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.

2. PROVIDE BICYCLE-SAFE, STRUCTURAL STEEL OR CAST IRON VANE GRATES FOR INSTALLATION WHERE BICYCLE TRAFFIC IS ANTICIPATED OR Designated, such as curbed roadways in urban areas or roadways specifically established and signed as bike paths or bike lanes. ALTERNATE BICYCLE-SAFE GRATE DESIGNS SHALL REQUIRE A SHOP DRAWING SUBMISSION, AS SPECIFIED IN NOTE 1, AND SHALL CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT CONCRETE TOP UNITS.

3. CAST IRON GRATES MAY BE USED AS ALTERNATES TO STRUCTURAL STEEL GRATES PROVIDED THEY ARE SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 AND APPROVED FOR HS25 LOADING. CAST IRON GRATES NOT APPROVED FOR HS25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANES; AT THE EDGE OF OUTSIDE SHOULDERS, MEDIAN, WIDE MEDIAN, MEDIAN, AND INFIELD AREAS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006

INLET GRATES

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

CAST GRAY IRON GRATES
XSWM A-491, CLASS 35B
(SEE NOTE 31)
1. Provide materials and construction in accordance with the requirements of Park Section 408, Sections 605, 606 and 714. Presently only steel and grade adjustment rings are specified for this project. For deviations or modifications of the standards, submit shop drawings for approval.

2. Install vane grates with curve vanes facing the direction of flow.

3. Grade adjustment rings:
   a. Custom fabricate each adjustment ring from measurements provided with each order.
   b. Manufacture bar stock and retainer clips from U.S. made carbon steel meeting or exceeding the minimum requirements of ASTM A-36 and AASHTO Table 10.32. Taper one end of the bar stock and retainer clips to conform to the shape of the original frame.
   c. Provide an adjustment ring which is flush with the cover plate and does not allow excessive movement.
   d. Provide an adjustment ring which conforms to the shape of the original frame.

4. Provide radius of 3 (1 1/8") typical for all fillets and rounds, unless noted.

5. Attach steel grade adjustment rings rigidly to the frame and set precast concrete grade adjustment rings on a mortar bed.

6. Cast iron grates may be used as alternate to structural steel grates provided they are supplied by a manufacturer listed in Bulletin 15 and approved for test loading. The manufacturer shall furnish full details and shop drawings. They shall be used outside of the travel lanes at the edge of outside shoulders, inside 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.
1. This sheet depicts the dimensions required for uniformity and interchangeability. It does not include details required for fabrication or manufacturing. Permit only frames supplied by a manufacturer listed in Bulletin 15. For deviations or modifications of the standards, submit shop drawings for approval.

2. Provide either gray, malleable or ductile iron castings or structural steel frames.

3. Weld structural steel frames in accordance with the requirements of Publication 408, Section 1105.03.

Notes:
1. This sheet depicts the dimensions required for uniformity and interchangeability. It does not include details required for fabrication or manufacturing. Permit only frames supplied by a manufacturer listed in Bulletin 15. For deviations or modifications of the standards, submit shop drawings for approval.

2. Provide either gray, malleable or ductile iron castings or structural steel frames.

3. Weld structural steel frames in accordance with the requirements of Publication 408, Section 1105.03.

Note: Either all metric or all English values must be used on plans. Metric and English values shown may not be mixed.
FOR ALTERNATE JOINTS, SEE DETAILS A.

1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 405.

2. PROVIDE INLET BOXES WITH 1150 (45 1/4") STANDARD OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS.

3. PROVIDE ALTERNATE JOINTS, SEE DETAILS A.

4. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, PROVIDE INLET WALLS 150 (6") THICK, UNLESS OTHERWISE INDIKAED.

5. PROVIDE INLET BARS 950 (36") LONG, SAFE SPACED AT 3600 (120") C TO C, AS DOWELS BETWEEN THE INLET BASE AND WALLS WHEN THE CONCRETE WALLS AND INLET BASE ARE NOT CONSTRUCTED MONOLITHICALLY. THE DOWELS MAY BE ELIMINATED IF AN ALTERNATE JOINT IS CONSTRUCTED AS SHOWN IN DETAILS A & B.

6. PLACE #13 (#4) REINFORCEMENT BARS, MINIMUM 300 (12") LONG, SPACED 3600 (120") C TO C AS DOWELS BETWEEN THE INLET BASE AND WALLS WHEN THE CONCRETE WALLS AND INLET BASE ARE NOT CONSTRUCTED MONOLITHICALLY. THE DOWELS MAY BE ELIMINATED IF AN ALTERNATE JOINT IS CONSTRUCTED AS SHOWN IN DETAILS A & B.

7. FOR PIPE DIAMETERS SMALLER THAN 1200 (48") RCP OR 1350 (54") CMP USE A MODIFIED INLET BOX. SEE SHEET 9.

8. FOR PIPE DIAMETERS LARGE THAN 1200 (48") RCP OR 1350 (54") CMP USE A MODIFIED INLET BOX. SEE SHEET 9.

9. FOR pipe INLETS OTHER THAN SHOWN AS THE STANDARDS, PROVIDE REINFORCEMENT BASED ON PHL 93 AND 5-62 LOADINGS AND IN ACCORDANCE WITH PUBLICATION 408.

10. PROVIDE INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.

11. FOR SUBBASE, SEE NOTE 6 ON SHEET 6.

12. WHEN NECESSARY, THE BLOCKOUT MAY REMOVE UP TO 25 mm (1") OF EACH WALL AT 3600/9000 LOCATIONS FOR RC PIPE CONNECTIONS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS
STANDARD INLET BOXES
(CAST-IN-PLACE)

NOTES
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 405.
2. PROVIDE INLET BOXES WITH 1150 (45 1/4") STANDARD OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS.
3. PROVIDE ALTERNATE JOINTS, SEE DETAILS A.
4. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, PROVIDE INLET WALLS 150 (6") THICK, UNLESS OTHERWISE INDICATED.
5. PROVIDE INLET BARS 950 (36") LONG, SPACED 3600 (120") C TO C, AS DOWELS BETWEEN THE INLET BASE AND WALLS WHEN THE CONCRETE WALLS AND INLET BASE ARE NOT CONSTRUCTED MONOLITHICALLY. THE DOWELS MAY BE ELIMINATED IF AN ALTERNATE JOINT IS CONSTRUCTED AS SHOWN IN DETAILS A & B.
6. PLACE #13 (#4) REINFORCEMENT BARS, MINIMUM 300 (12") LONG, SPACED 3600 (120") C TO C AS DOWELS BETWEEN THE INLET BASE AND WALLS WHEN THE CONCRETE WALLS AND INLET BASE ARE NOT CONSTRUCTED MONOLITHICALLY. THE DOWELS MAY BE ELIMINATED IF AN ALTERNATE JOINT IS CONSTRUCTED AS SHOWN IN DETAILS A & B.
7. FOR PIPE DIAMETERS SMALLER THAN 1200 (48") RCP OR 1350 (54") CMP USE A MODIFIED INLET BOX. SEE SHEET 9.
8. FOR pipeline INLETS OTHER THAN SHOWN AS THE STANDARDS, PROVIDE REINFORCEMENT BASED ON PHL 93 AND 5-62 LOADINGS AND IN ACCORDANCE WITH PUBLICATION 408.
9. PROVIDE INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
10. PROVIDE INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
11. FOR SUBBASE, SEE NOTE 6 ON SHEET 6.
12. WHEN NECESSARY, THE BLOCKOUT MAY REMOVE UP TO 25 mm (1") OF EACH WALL AT 3600/9000 LOCATIONS FOR RC PIPE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS; METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
NOTES
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 714.
2. TERMINATE PRECAST INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. USE CLASSES AS DETERMINED FOR PRECAST BOXES FOR DEVIATIONS ON MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
3. PROVIDE STANDARD INLET BOXES AND COVER ADJUSTMENT SLABS WITH A MAX 6 x 10 x 1500 (24" x 46") OPENING TO ACCOMMODATE STANDARD TOP COMPONENTS.
4. FOR INLETS THAT DEVIATE FROM THE STANDARD SUBMIT SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE TO THE SUBERAL OF CONSTRUCTION FOR REVIEW AND APPROVAL. CONSTRUCT INLETS THAT EXCEED 1500 (24") IN HEIGHT WITH TAPS SIMILAR TO MANHOLES (SEE RC-39M). FOR INLETS OTHER THAN STANDARD BOXES, SUBMIT SHOP DRAWINGS BASED ON PUBLICATION 408.
5. LOCATE PIPE OR PIPES AS INDICATED, WITH THE INLET BOTTOM SHAPE TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE. WHEN PROJECT CONDITIONS REQUIRE PIPE BLOCKOUTS TO BE FORMED WITHIN 100 (4") FROM THE TOP OF THE INLET BOX, PROVIDE ADDITIONAL 4IN (10CM) REINFORCEMENT FOR EACH PIPE BLOCKOUT OF WALL TO 25 (1"").
6. PROVIDE CONSTRUCTION JOINTS AS REQUIRED FOR INLET BOXES THAT ARE NOT MONOLITHIC. SEE DETAILS A & B SHEET 7 FOR JOINT DETAILS.
7. FOR PIPE DIAMETERS LARGER THAN 1200 (48") RCP OR 1350 (54") CMP, USE A MODIFIED INLET BOX. SHEET 9.
8. PROVIDE CONSTRUCTION JOINTS AS REQUIRED FOR INLET BOXES THAT ARE NOT MONOLITHIC. SEE DETAILS A & B SHEET 7.
9. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING AND INSTALLATION. CALCULATE METAL DEVICES AS SPECIFIED IN PUBL. HRD SECTION 1100.
10. PROVIDE ENDS OF THE VERTICAL MASSES OF PRECAST INLET BOX BASE SUFFICIENT TO FACILITATE FORM STRIPPING. TAPERS WILL RESULT IN INTERNAL BOTTOM DIMENSIONS THAT VARY TO A MAXIMUM OF 25 (1").

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS
STANDARD INLET BOXES
(PRECAST)
NOTES

1. Construct in accordance with the requirements of Publication 40B Section 605.

2. This sheet depicts the dimensions required for uniformity and interchangeability. Structures supplied by a manufacturer shall be in accordance with their installation manual.

3. Use structural steel grates in accordance with the requirements of Publication 408, Section 1105.03. Actual shoulder slope may vary depending on the design requirements.

4. Provide angles embedded in the concrete as a bearing area for the grates. Type D-H inlets must seat the grates directly within the unit.

5. For typical D-H inlet location, see sheet A.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

INLETS
TYPE D-H INLET
(CAST-IN-PLACE AND PRECAST)

RECOMMENDED MAR 30, 2006
RECOMMENDED MAR 30, 2006
SH 12 OF 10

DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
USE CROSS WALLS AT THE BEGINNING AND END OF PAVED DIITCH OR CHANNEL AND AT THE UPGRADE END OF EVERY FOURTH SECTION.

CONCRETE PAVING FOR STREAM BEDS

C I

ANCHOR BOLT

1 1/2 DIA., 300 (6") MIN.

ANCHOR BOLT AND NUT, SEE DETAIL C.

CONSTRUCT SIDE SLOPES AND BOTTOM WIDTH CONFORMING TO ADJACENT PARALLEL DITCHES.

PIVING GRADE

TOP OF DITCH

300 (12") MIN.

EMBANKMENT MATERIAL

LIMIT OF OIL

SECTION A-A

CEMENT CONCRETE PIPE ANCHOR

DETAIL D

Cement concrete pipe anchor

ANCHOR BOLT AND NUT, SEE DETAIL C.

CLASS A CONCRETE PLAIN AND MORTARED STONE SLOPE WALL

PROVIDE TOE WALLS AS PLAIN OR MORTARED STONE MASONRY TO CORRESPOND WITH TYPE OF SLOPE WALL, OR AS CEMENT CONCRETE, IF INDICATED ON THE DRAWINGS. BATTER TOE WALL 4:1.

PLACE CONCRETE PIPE ANCHORS AT THE ENDS OF PIPE, UNDER ALL JOINTS AND AT INTERMEDIATE LOCATIONS AS REQUIRED. PROVIDE 3.0 m (10') MAXIMUM SPACING BETWEEN ANCHORS.

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

DO NOT LINE ANY DITCHES OR SWALES WHERE GCL HAS BEEN INSTALLED WITH LIMESTONE OR CARBONATE ROCK RIPROCK USED FOR EROSION CONTROL.

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

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
OPTIONAL HOLES FOR MEDIAN BARRIER APPLICATIONS.

FOR W150x13.5 (W6x8.5 OR 9) POST

10 (3/4") TYP, FOR W150x13.5 (W6x8.5) POST

FOR W200x31.3 (WBx21l POST

NOTE: W200x31.3 (WBx21l POSTS 1 THRU 3 SIMILAR, SEE DETAILS ON SHEETS 1 AND 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

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS

RECOMMENDED APR. 30, 2000
RECOMMENDED MAY 31, 2000
SHR 3 OF 16

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER

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

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS

RECOMMENDED APR. 30, 2000
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SHR 3 OF 16

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER
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
THREE-BEAM TO PA BRIDGE BARRIER CONNECTION PLATE DETAILS

RECOMMENDED MAR. 30, 2006

DIRECTOR, BUREAU OF DESIGN

CHIEF ENGINEER

SHT 10 OF 16

RC-50M
POSTS 5 AND 6

W6 x 9 (W6 x 9) POSTS 2135 (7'-0") LONG
W 150x220x336 (6"x8"x1'-2") OFFSET BRACKET

POST 1

W150x22 (W6 x 15) STEEL POST 2591 (8'-6") LONG
W 150x200x458 (6"x8"x1'-6") OFFSET BRACKET

POST 2

W150x22 (W6 x 15) STEEL POST 2591 (8'-6") LONG
W 150x200x458 (6"x8"x1'-6") OFFSET BRACKET

POST 3

W150x22 (W6 x 15) STEEL POST 2591 (8'-6") LONG
W 150x200x458 (6"x8"x1'-6") OFFSET BRACKET

POST 4

W150x22 (W6 x 15) STEEL POST 2591 (8'-6") LONG
W 150x200x458 (6"x8"x1'-6") OFFSET BRACKET

POST 5 AND 6

W6 x 9 (W6 x 9) POSTS 2135 (7'-0") LONG
W 150x220x336 (6"x8"x1'-2") OFFSET BRACKET

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

GALVANIZED STEEL, 272 GAGE) THICK
SYMMETRIC ABOUT

RAIL ELEMENT
SECTION B-B

THREE-BEAM RAIL ELEMENT
SECTION A-A

(A BACKING PLATE NOT SHOWN FOR CLARITY)

NOTES:
1. THE THREE-BEAM RAIL ELEMENTS AND TRANSITION SECTIONS ARE ONLY USED IN THREE-BEAM TO PA TYPE 10M BRIDGE BARRIER, THREE-BEAM TO PA BRIDGE BARRIER, AND THREE-BEAM TO VERTICAL WALL TRANSITION CONNECTIONS.

2. USE 300 mm (12") BACKING PLATE FOR THE THREE-BEAM RAIL ELEMENTS AT ALL INTERMEDIATE POSTS WITH THE SAME SECTION AS ON THE THREE-BEAM RAIL ELEMENT.

3. 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
THREE-BEAM TRANSITION SECTION AND RAIL ELEMENT DETAILS

RECOMMENDED MAR. 30, 2006
CHIEF ENGINEER

SHEET 15 OF 16

RC-50M
THREE-BEAM TERMINAL SECTION
AT PA TYPE 10M BRIDGE BARRIER
SHOWN WITH CONNECTION PLATE ASSEMBLY

25 (17/32") Holes for 22.2 (5/16") #5 Bolts—
18 TOTAL. SEE SHEETS 4 AND 6 FOR
CONNECTION PLATE ASSEMBLY DETAILS.

DRILL AND TAP HOLE FOR
25 (17/32") #5 BOLT.
SEE SHEETS 4 AND 6 FOR
CONNECTION PLATE ASSEMBLY DETAILS.

THREE-BEAM TERMINAL SECTION
AT PA BRIDGE BARRIER
SHOWN WITH CONNECTION PLATE ASSEMBLY

4-25 (17/32") Holes for 22.2 (5/16")
HEX HEAD CAP SCREWS AND WASHERS.
SEE SHEETS 8 AND 10 FOR CONNECTION
PLATE AND ANCHOR INSERT ASSEMBLIES.

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.
**TERMINAL TO BE PLACED ON BACK OF RAIL ELEMENT**

**ALTERNATE TERMINAL SECTIONS**

**TERMINAL TO BE PLACED ON FACE OF RAIL ELEMENT**

**DETAIL A**

**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.

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF DESIGN**

**TYPE 2 STRONG POST GUIDE RAIL**

**TERMINAL SECTION BRIDGE CONNECTION**
POSITIONING OF ROTATING BRACKET

TABLE A

<table>
<thead>
<tr>
<th>HEIGHT OF POST</th>
<th>450</th>
<th>370</th>
<th>300</th>
<th>215</th>
<th>115</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROTATION ANGLES</td>
<td>-15°</td>
<td>30°</td>
<td>45°</td>
<td>60°</td>
<td>75°</td>
</tr>
</tbody>
</table>

TYPICAL FOR 15° THRU 75° POSITIONS

ROTATING BRACKET

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 DELINER ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT.
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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

TYPE 2 STRONG POST GUIDE RAIL END TREATMENTS

RECOMMENDED MAR. 30, 2006

DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS, METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
TYPICAL EARTH MOUND FOR BURYING GUIDE RAIL

SEE NOTE 2.

NOTES
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. ALL MATERIAL NECESSARY TO CONSTRUCT EARTH MOUNDS ARE IN ACCORDANCE WITH APPLICABLE SECTIONS OF PUBLICATION 408.
3. EARTH MOUNDS MAY BE USED TO BURY GUIDE RAIL ON HIGHWAYS WITH FASTER SPEEDS LESS THAN 70 MPH, AND WITH CURRENT TRAFFIC VOLUME LESS THAN 4000 VEHICLES PER DAY OR WHEN THEY ARE CONSTRUCTED OUTSIDE THE CLEAR ZONE AS DETERMINED IN PUB 404, DESIGN MANUAL PART 2, CHAPTER 12.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
WOOD OR PLASTIC OFFSET BRACKET
TO BE USED WITH WOOD POSTS

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.

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 MAR. 30, 2006
DIRECTOR, ENGINEER OF DESIGN
GUIDE RAIL, TYPE 2-S ENO TREATMENT, TYPE 2-S POST ANCHORAGE OR APPROPRIATE ENO TREATMENT

3810 (12'-6") SPAN NESTED W-BEAM (TYPE 2-S) GUIDERAIL
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 96" (8'-0") BEHIND THE REAR FACE OF THE GUIDE RAIL POST MUST BE CLEAR OF HAZARDS.
4. FOR NESTED RAIL ELEMENT SPLICES (FOR PANELS THICK), USE 5/8" 10-1/2" SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHT. 5.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT OF TYPE 2-S GUIDE RAIL.
6. PROVIDE A MINIMUM OF 50.9 m (165 FT) OF STRONG POST GUIDE RAIL BETWEEN NESTED SECTIONS OF W-BEAM RAIL ELEMENTS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
**GUIDE RAIL, TYPE 2-S END TREATMENT, TYPE 2-5 POST ANCHORAGE OR APPROPRIATE END TREATMENT**

FOR LENGTH OF NEED SEE OM 2, CHAPTER 12

**ELEVATION**

5715 (18'-9") SPAN NESTED W-BEAM (TYPE 2-S) GUIDERAIL

ACROSS LOW-FILL CULVERTS AND SMALL STRUCTURES

**PLAN**

3 x 3810 (12'-6") SECTIONS OF NESTED W-BEAM - 11430 (37'-6") ELEMENT (TYP.)

STEEL POST, SEE SHT.1

CASE 1

**CASE 2**

**SPLICE LOCATIONS**

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 MAR. 30, 2006
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 100 (30' -0") BEHIND THE NEAR FACE OF THE GUIDE RAIL POST MUST BE CLEAR OF HAZARDS.
4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 54 (21/8") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHEET 5.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT OF TYPE 2 STRONG POST GUIDE RAIL.
6. PROVIDE A MINIMUM OF 60, 9 x 3810 (12' -6") SECTIONS OF NESTED W-BEAM - 30460 (100' -0").
7. ONE 7620 (25'-0") W-BEAM PANEL IS AN EQUIVALENT FOR TWO 3610 (12'-6") W-BEAM PANEL SECTIONS.

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 MAY 30, 2006
SHEET RC-52M

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

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF SPECIFICATION FOR HIGHWAY STRUCTURES, SECTIONS A-R.
2. THE BRIDGE IS 150' X 57' COLD-FORMED CHANNEL POST, STphx6.5 (3' x 4 1/2") POST.
3. USE REBAR PLATING FOR THE W-Beam RAIL ELEMENT AT ALL POSTS WITH THE SAME SECTION AS THE W-Beam RAIL Element.

SECTION B-B

TYPICAL INSTALLATION

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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BUREAU OF DESIGN

TYPE 2-W GUIDE RAIL POSTS

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

1. TYPE 2 WEAK POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF OR ANY GUIDE RAIL ON THE NHS, OR OF ANY GUIDE RAIL ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROUTES, USE CRASHWORTHY HIGH-SPEED, HIGH-VOLUME END TREATMENTS (RT-52M) POSTED ACROSS LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4,000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. WEAK POST END TREATMENTS ARE POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST END TREATMENTS CAN NOT BE USED INTO EARTH MOUNDS.

2. SEE RC-53M, FOR END TREATMENTS BURIED INTO EARTH MOUNDS.

3. PRIOR TO THE ATTACHMENT OF A CRASHWORTHY END TREATMENT, REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS.

4. HIGH-SPEED, HIGH-VOLUME ROADWAYS WITH 70 MPH SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4,000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. WEAK POST END TREATMENTS ARE POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST END TREATMENTS CAN NOT BE USED INTO EARTH MOUNDS.

5. TYPE 2-WEAK POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF OR ANY GUIDE RAIL ON THE NHS, OR OF ANY GUIDE RAIL ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROUTES, USE CRASHWORTHY HIGH-SPEED, HIGH-VOLUME END TREATMENTS (RT-52M) POSTED ACROSS LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4,000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. WEAK POST END TREATMENTS ARE POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST END TREATMENTS CAN NOT BE USED INTO EARTH MOUNDS.

6. EXEMPLARY END TREATMENT AT DRIVEWAYS & OPENINGS

7. USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS

8. SEE DETAILS A AND B.

9.etch DETAILS A AND B.

10. FOR CONCRETE ANCHORS, SEE DETAILS A AND B.

11. USE BOTH SIDES OF DRIVEWAYS & OPENINGS

12. ENDED POST SUPPORT ANGLES, SEE DETAIL D.

13. CONCRETE ANCHOR

14. ANCHOR THIS END.

15. SHOP BENDING REQUIRED TO MAKE THE END TREATMENT AT DRIVEWAYS & OPENINGS.

16. COMMONWEALTH OF PENNSYLVANIA

17. DEPARTMENT OF TRANSPORTATION

18. BUREAU OF DESIGN

19. CHIEF ENGINEER

20. 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. WEAK POST END TREATMENTS ARE POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST END TREATMENTS CAN NOT BE USED INTO EARTH MOUNDS.

21. EXEMPLARY END TREATMENT AT DRIVEWAYS & OPENINGS

22. USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS

23. FOR CONCRETE ANCHORS, SEE DETAILS A AND B.

24. SEE DETAILS A AND B.

25. FOR CONCRETE ANCHORS, SEE DETAILS A AND B.

26. USE BOTH SIDES OF DRIVEWAYS & OPENINGS

27. ENDED POST SUPPORT ANGLES, SEE DETAIL D.

28. CONCRETE ANCHOR

29. ANCHOR THIS END.

30. SHOP BENDING REQUIRED TO MAKE THE END TREATMENT AT DRIVEWAYS & OPENINGS.

31. COMMONWEALTH OF PENNSYLVANIA

32. DEPARTMENT OF TRANSPORTATION

33. BUREAU OF DESIGN

34. CHIEF ENGINEER

35. 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. WEAK POST END TREATMENTS ARE POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST END TREATMENTS CAN NOT BE USED INTO EARTH MOUNDS.

36. EXEMPLARY END TREATMENT AT DRIVEWAYS & OPENINGS

37. USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS

38. FOR CONCRETE ANCHORS, SEE DETAILS A AND B.

39. SEE DETAILS A AND B.

40. FOR CONCRETE ANCHORS, SEE DETAILS A AND B.

41. USE BOTH SIDES OF DRIVEWAYS & OPENINGS

42. ENDED POST SUPPORT ANGLES, SEE DETAIL D.

43. CONCRETE ANCHOR

44. ANCHOR THIS END.

45. SHOP BENDING REQUIRED TO MAKE THE END TREATMENT AT DRIVEWAYS & OPENINGS.

46. COMMONWEALTH OF PENNSYLVANIA

47. DEPARTMENT OF TRANSPORTATION

48. BUREAU OF DESIGN

49. CHIEF ENGINEER

50. 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. WEAK POST END TREATMENTS ARE POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST END TREATMENTS CAN NOT BE USED INTO EARTH MOUNDS.

51. EXEMPLARY END TREATMENT AT DRIVEWAYS & OPENINGS

52. USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS

53. FOR CONCRETE ANCHORS, SEE DETAILS A AND B.

54. SEE DETAILS A AND B.

55. FOR CONCRETE ANCHORS, SEE DETAILS A AND B.

56. USE BOTH SIDES OF DRIVEWAYS & OPENINGS

57. ENDED POST SUPPORT ANGLES, SEE DETAIL D.

58. CONCRETE ANCHOR

59. ANCHOR THIS END.

60. SHOP BENDING REQUIRED TO MAKE THE END TREATMENT AT DRIVEWAYS & OPENINGS.

61. COMMONWEALTH OF PENNSYLVANIA

62. DEPARTMENT OF TRANSPORTATION

63. BUREAU OF DESIGN

64. CHIEF ENGINEER

65. 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. WEAK POST END TREATMENTS ARE POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER D & A ABOVE. ON 2-LANE HIGHWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST END TREATMENTS CAN NOT BE USED INTO EARTH MOUNDS.

66. EXEMPLARY END TREATMENT AT DRIVEWAYS & OPENINGS

67. USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS

68. FOR CONCRETE ANCHORS, SEE DETAILS A AND B.

69. SEE DETAILS A AND B.
TYPICAL GUIDE RAIL TREATMENT

WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE

TYPICAL GUIDE RAIL TREATMENT

WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE

TYPICAL GUIDE RAIL TREATMENT WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS NOT AVAILABLE

**TABLE 1**

<table>
<thead>
<tr>
<th>TYPE OF GUIDE RAIL</th>
<th>CLEARANCES</th>
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</thead>
<tbody>
<tr>
<td>2-SCC</td>
<td>1200 (4'-0&quot;)</td>
</tr>
<tr>
<td>2-SC</td>
<td>1200 (4'-0&quot;)</td>
</tr>
<tr>
<td>2-SCM</td>
<td>1200 (4'-0&quot;)</td>
</tr>
<tr>
<td>2-MC</td>
<td>1500 (5'-0&quot;)</td>
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<tr>
<td>2-M</td>
<td>1500 (5'-0&quot;)</td>
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<tr>
<td>2-WC</td>
<td>1500 (5'-0&quot;)</td>
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<tr>
<td>2-W</td>
<td>1500 (5'-0&quot;)</td>
</tr>
<tr>
<td>2-WCC</td>
<td>1200 (4'-0&quot;)</td>
</tr>
</tbody>
</table>

*The minimum unobstructed distance from back of guide rail post to face of obstruction is less than 300 (1'-0"), use 2-SCC double nested rail.*

**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 130, SW-2, Chapters 12.

3. This distance varies. Determine the required lengths using the guidelines found in Publication 130, SW-2, Chapter 12, and show on the tabulations. Where calculations show a distance less than 15 (5'-0") but greater than 12 (4'-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 2-SCC double nested rail.

5. The distance from the edge of shoulder to the front face of the W-beam rail element is to be 200 (7'-0") or less. This may vary based on actual placement of the barrier. In situations where it is impractical to place the barrier as far from the edge of shoulder as possible, it should be placed such that the clearance is maintained.

6. 1000 (3'-0") steel tube may be used without soil plate.

7. All dimensions are in millimeters unless otherwise noted. U.S. customary units are in parentheses.

**COMMONWEALTH OF PENNSYLVANIA**

DEPARTMENT OF TRANSPORTATION

BARRIER PLACEMENT AT OBSTRUCTIONS

RECOMMENDED MAY 31, 2006

SHRNE OF DESIGNS

DIRECTOR, BUREAU OF DESIGN CHIEF ENGINEER
TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 6.0 m (20') OR LESS WHERE CONTINUOUS BARRIER IS REQUIRED

TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS OF 6.0 m (20') TO 10.0 m (30') WHERE CONTINUOUS BARRIER IS REQUIRED

Table 2: Flare Rates for Barrier Design

<table>
<thead>
<tr>
<th>MIN.</th>
<th>MAX.</th>
<th>CONCRETE MEDIAN BARRIER</th>
<th>GUIDE RAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>20</td>
<td>1</td>
<td>15 x 1</td>
</tr>
<tr>
<td>175</td>
<td>20</td>
<td>1.5</td>
<td>15 x 1</td>
</tr>
<tr>
<td>190</td>
<td>20</td>
<td>2</td>
<td>15 x 1</td>
</tr>
<tr>
<td>205</td>
<td>20</td>
<td>2.5</td>
<td>15 x 1</td>
</tr>
<tr>
<td>220</td>
<td>20</td>
<td>3</td>
<td>15 x 1</td>
</tr>
</tbody>
</table>

NOTE:

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIERS. 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.

2. PROVIDE SINGLE FACE CONCRETE BARriers THROUGH THE AREA OF THE OBSTRUCTION. NO MINIMUM BARRIER-TO-OBSTRUCTION DISTANCE IS REQUIRED. FOR DETAILS, SEE RC-SBM.

NOTE:

EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
GRADING DETAIL FOR PARALLEL TERMINALS

GRADING DETAIL FOR FLARED TERMINALS

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
GRADING DETAILS
GENERAL 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 one foot of cover over the anchor terminal.
3. When the guide rail length on 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 hazard.
5. Backslope anchor terminal pay limit includes the concrete or post anchorage, 3810 (12'-6") of rail element and hardware.

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
TYPE 1
ANCHORED BACKSLOPE TERMINAL
SINGLE RAIL
10'-1 FRONT SLOPE

RECOMMENDED MAR. 30, 2006

DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER RC-54M
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 if the distance between the ground and bottom of the top rail exceeds 45" H. Maximum height of double rail system is 114". If necessary, taper both rails to maintain maximum height.

2. Height of guide rail may be tapered down after crossing ditch bottom to achieve one foot of cover over the anchor.

3. Use 2400" long posts for all post locations with double rail. Posts for the post anchor are 1800" 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' minimum from where the guide rail crosses the swale line to the beginning of the hazard.

6. Backslope anchor terminal pay limit includes the concrete or post anchorage, 3810" of rail element, posts and hardware.

GENERAL 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 if the distance between the ground and bottom of the top rail exceeds 45" H. Maximum height of double rail system is 114". If necessary, taper both rails to maintain maximum height.

2. Height of guide rail may be tapered down after crossing ditch bottom to achieve one foot of cover over the anchor.

3. Use 2400" long posts for all post locations with a double rail. Posts for the post anchor are 1800" 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' minimum from where the guide rail crosses the swale line to the beginning of the hazard.

6. Backslope anchor terminal pay limit includes the concrete or post anchorage, 3810" of rail element, posts and hardware.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
GUIDE RAIL
TYPE 1
ANCHORED BACKSLOPE TERMINAL
DOUBLE RAIL
6:1 FRONT SLOPE

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

RECOMMENDED APR 30, 2006
DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER

RC-54M
ONLY IF PLATE IS BOLTED TO POSTS.

BE FIELD DRILLED SQUARE WASHER. 5 (⅜" THICK) - GALVANIZED STEEL PLATE.

RAIL AND ATTACHED RAIL AND THROUGH HOLE IN POST FLANGE, ATTACH SQUARE WASHER, 50 (⅜"").

STEEL POST - 13 mm (⅛") SQUARE WASHER.

STEEL POST 1800 (6'-0") LONG 7 1/2" STEEL PLATE.

CONCRETE BLOCK ANCHOR HOLE TO BE DRILLED EXTRA 2½" DEEP TO ATTACH STEEL PLATE TO POST WITH SQUARE WASHER.

GUIDE RAIL BOLT PLATE TO POST WITH 4-16, ⅜" HEX BOLTS ¾" LONG WITH SQUARE WASHER.

STEEL POST 2400 (8'-0") LONG.

GUIDE RAIL STEEL PLATE.

25 (⅜") HOLES TO BE FIELD DRILLED IN RAIL AND THROUGH HOLE IN POST FLANGE, ATTACH TO STEEL PLATE WITH 22 (⅜") HEX BOLTS ¾" LONG WITH SQUARE WASHER.

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

ANCHOR TERMINAL DETAILS
END ANCHORAGE DETAILS

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

RECOMMENDED MAR. 30' 2006

SHT. 1 OF 1

TYPICAL ELEVATION STEEL POST W150x13.5 (W6x8.5)
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. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

10. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.

11. 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.

**NOTES**

- **TOP-MOUNT BARRIER DELINEATOR**, SEE NOTE 5.
- **SEAL JOINTS WITH AN APPROVED JOINT SEALER.**

**COMMONWEALTH OF PENNSYLVANIA**

DEPARTMENT OF TRANSPORTATION

RECOMMENDED MAR. 30, 2006

DIRECTOR, BUREAU OF DESIGN

CHIEF ENGINEER

F-SHAPE

CONCRETE MEDIAN BARRIER

REFERENCE DRAWINGS

Commonwealth of Pennsylvania

Department of Transportation

Bureau of Design

Concrete Median Barrier

F-Shape

Recommended Mar. 30, 2006

Director, Bureau of Design

Set A of A

RECOMMENDED MAR. 30, 2006

Set A of A

Reference Drawings

RC-57M
A TYPICAL END TRANSITION MAY BE USED FOR PERMANENT BARRIER INSTALLATIONS ONLY WHEN THE LAST BARRIER SECTION IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE AS DETERMINED IN PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 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 MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

PRODUCT

A TYPICAL END TRANSITION MAY BE USED FOR PERMANENT BARRIER INSTALLATIONS ONLY WHEN THE LAST BARRIER SECTION IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE AS DETERMINED IN PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 12.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

PRODUCT

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

PRODUCT

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

PRODUCT

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

PRODUCT

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

PRODUCT

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
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WEIGHT OF BARRIER

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
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WEIGHT OF BARRIER

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
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WEIGHT OF BARRIER

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
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WEIGHT OF BARRIER

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

PRODUCT

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
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WEIGHT OF BARRIER

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
SCH. 7 OF 3

WEIGHT OF BARRIER

PRODUCT

A TYPICAL END TRANSITION MAY BE USED FOR PERMANENT BARRIER INSTALLATIONS ONLY WHEN THE LAST BARRIER SECTION IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE AS DETERMINED IN PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 12.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED MAR. 30, 2006
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WEIGHT OF BARRIER

PRODUCT

A TYPICAL END TRANSITION MAY BE USED FOR PERMANENT BARRIER INSTALLATIONS ONLY WHEN THE LAST BARRIER SECTION IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE AS DETERMINED IN PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 12.

NOTE: Either all metric or all English values must be used on plans. Metric and English values shown may not be mixed.
Delineation of Impact Attenuating Devices

NOTES
1. PROVIDE PLATES, 13 x 305 x 685 (½" x 12" x 27") MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02(1). GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(2).

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 (SANDBARRELS), PROVIDE REFLECTIVE SHEETING, WITHOUT FIXED MOUNTING, DIRECTLY TO 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

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

TABLE 1

<table>
<thead>
<tr>
<th>DEGREE</th>
<th>CONCRETE GUIDE RAIL BARRIER</th>
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006

DIRECTOR, BUREAU OF DESIGN

CHIEF ENGINEER RC-57M
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.

NOTES
1. EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
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 W/F 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.
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 (1/2") EXCEPT AS SHOWN.

2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.

3. FOR ALTERNATE WFF 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 MAR. 10, 2006
RECOMMENDED MAR. 20, 2006
SHT 8 OF 2

DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER

RC-57M
NOTE

1. FOR ALTERNATE NRF REINFORCED BARRIERS, SEE SHEET D.
2. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-0") 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 NOV. 7, 2006

RECOMMENDED NOV. 30, 2006

SHH 7 OF 8
The bridge barrier is a split concrete glare screen median barrier.

For alternate WWF reinforced barriers, see Sheet 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 Median Barrier
F-Shape

Recommended: Jan 30, 2006
Sheet: B of 2

Director, Bureau of Design
Engineer, Bureau of Design
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 RC-57M.

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

8. FABRICATE REINFORCEMENT BARS ACCORDING TO PENN DOT BRIDGE CONSTRUCTION STANDARD, BC-736M.

9. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A RIBBED 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 X 1/16" IN DEPTH.

10. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02TS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
BARRIER PLAN

SHOWN WITH WWF ALTERNATE ON LEFT END OF BARRIER FOR DETAILING PURPOSES.
BOTH ENDS OF BARRIER ARE TYPICAL.

STEEL PLATE CONNECTION

5-#13 (#4) STIRRUPS EACH END OF BARRIER

TYPICAL SINGLE FACE BARRIER SECTIONS

NOTES

1. PROVIDE PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.
   GALLVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 610.
   CHECK STABILITY OF BARRIER USED AS A RETAINING WALL AND DRAINAGE TREATMENT IS NECESSARY, CONSTRUCT A PREFORMED
   GUTTER LINE AND PROVIDE COMPUTATION WITH THE CONSTRUCTION PLANS.

2. WHERE SINGLE FACE CONCRETE BARRIER IS SPECIFIED FOR USE AS A RETAINING WALL, THE DRAINAGE TREATMENT IS NECESSARY.
   PLACE A PREFORMED FABRIC FILTER DRAIN AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.
   GROUND SLOPE 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 C 1" EXCEPT AS SHOWN.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

SINGLE FACE CONCRETE BARRIER
F-SHAPE

SECTION A-A

SLOTTED PLATE CONNECTION SEE DETAILS ON THIS SHEET.440 (11 1/4")

5-#13 (#4) STIRRUPS EACH END OF BARRIER

TYPICAL ROCK TREATMENT

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

DIRECTOR, DIVISION OF DESIGN
CHIEF ENGINEER

DEPARTMENT OF TRANSPORTATION
CHIEF ENGINEER
FOR FLARE RATES SEE TABLE 1.

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 APPROVED ONE 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 IN THE SOIL UNLESS THE CLEAR ZONE DEPTH 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 GUIDE RAIL. A TRANSITION 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-SOM MUST BE USED FOR ALL GUIDERAIL TO BARRIER CONNECTION DETAILS AND HARDWARE.

FLARE TREATMENT, SEE TABLE 1.

TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED

FOR FLARE RATES SEE TABLE 1.

TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

SINGLE FACE CONCRETE BARRIER
F-SHAPE PLACEMENT AT SHOULDER PIERS
TYPICAL ALTERNATE BARRIER TREATMENT AT PIERS

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 " 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 EARTH MOUND FOR BURYING CONCRETE BARRIER

SECTION A-A

SHOULDER

3.0 m (10'-0") END TREATMENT

300 FT DROP

0.6 m (2'-0") AT TERMINATION

1.5 m (5'-0") Rounding

SHOULDER

VARYING

SECTION B-B

SHOULDER

VARYING

SECTION C-C

SHOULDER

VARYING

END TREATMENT

3.0 m (10'-0") BURYING INTO EARTH MOUND

TABLE 2
MAXIMUM FLARE RATES FOR BARRIER DESIGN

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<thead>
<tr>
<th>DESIGN SPEED</th>
<th>MAXIMUM FLARE RATES</th>
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<tr>
<td>km/h (mph)</td>
<td>CONCRETE BARRIER</td>
</tr>
<tr>
<td>120 (75)</td>
<td>20:1</td>
</tr>
<tr>
<td>110 (70)</td>
<td>20:1</td>
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<tr>
<td>100 (60)</td>
<td>19:1</td>
</tr>
<tr>
<td>80 (50)</td>
<td>14:1</td>
</tr>
<tr>
<td>70 (40)</td>
<td>12:1</td>
</tr>
<tr>
<td>65 (40)</td>
<td>11:1</td>
</tr>
<tr>
<td>60 (35)</td>
<td>10:1</td>
</tr>
<tr>
<td>50 (30)</td>
<td>6:1</td>
</tr>
</tbody>
</table>

NOTES:
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. ALL MATERIALS NECESSARY TO CONSTRUCT EARTH MOUNDS ARE IN ACCORDANCE WITH APPLICABLE SECTIONS OF PUBLICATION 408.
3. EARTH MOUNDS MAY BE USED TO BURY CONCRETE BARRIER ON HIGHWAYS WITH CURVATURE 1/500 OR GREATER, WITH RADIUS 400 FEET OR LESS. EARTH MOUNDS SHALL BE CONSTRUCTED OUTSIDE THE CLEAR ZONE AS DETERMINED IN PUB. 13M, DESIGN MANUAL PART 2, CHAPTER 12.
4. EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. Provide concrete glare screen meeting the requirements of Publication 485, Section 422 and 434.

2. For installation of glare screen on top of existing concrete and in barrier, provide plastic products of 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 screens supplied by a manufacturer as listed in Bulletin 15 for modification or deviation of the standards submitted for approval.

5. Provide precast concrete glare screen for use as temporary (MPT) or in permanent installations. For temporary installations, الإسلامية 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(e).

7. Sound on barrier all edges with a radius of 25 (1") except as shown.

8. All dimensions are in millimeters unless otherwise noted.

9. Designate reinforcement bars according to Pennsylvania Bridge Construction Standards, 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 set, finish the bottom surface with a wire brush or a special template in a longitudinal direction to produce scores approximately 4/16" in depth.

11. Provide suitable lifting devices for handling, installing, and removing precast concrete barrier galvanized metal depicted as specified in Publication 603, Section 710.06(g).
TYPICAL TREATMENT AT PIERS

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 ENGINEERING

CONCRETE GLARE SCREEN
F-SHAPE

RECOMMENDED MAY 30, 2006
DIRECTOR, BUREAU OF ENGINEERING

CHIEF ENGINEER

SECTION D-D
SECTION E-E

TABLE 1

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>MAXIMUM FLARE RATES</th>
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<tr>
<td>km/h</td>
<td>Con. Barrier</td>
</tr>
<tr>
<td>120</td>
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<td>110</td>
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<td>3</td>
</tr>
<tr>
<td>50</td>
<td>3</td>
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</tbody>
</table>
PERMANENT BARRICADES
ALUMINUM PANEL

SECTION A-A

DETAIL A

ALUMINUM PANEL - STEEL POSTS

ALUMINUM PANEL - WOOD POSTS

DETAIL B

SECTION B-B

NOTES

1. PERMIT ONLY TYPE III, III, III, or III 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

DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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COMMONWEALTH OF PENNSYLVANIA
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RECOMMENDED MAR. 30, 2006
CHIEF ENGINEER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PERMANENT BARRICADES
WOOD PANEL

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