TRANSMITTAL LETTER
Change # 3
Pub. 72M
April 2000 Edition
DATE: August 21, 2002


INFORMATION AND SPECIAL INSTRUCTIONS:
Incorporate the attached revisions into the April 2000 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. DF & P submissions to Central Office after November 21, 2002, should include these revisions.

The following represents a listing of the major changes or addition to each standard drawing. Only revised sheets are listed. Remaining sheets of the same standard show new dates only.

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<th>Sheet</th>
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<td>RC - 20M</td>
<td>(1 of 3)</td>
<td>Added Detail C and Detail D; Revised Note 6 &amp; 7; Revised Type D and Alternate Type D detail.</td>
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<td></td>
<td>(2 of 3)</td>
<td>Revised Note 12; Revised captions and combined drawings.</td>
</tr>
<tr>
<td>RC - 23M</td>
<td>(1 of 3)</td>
<td>Revised Note 4.</td>
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<td></td>
<td>(3 of 3)</td>
<td>Removed level in Detail B.</td>
</tr>
<tr>
<td>RC - 24M</td>
<td>(1 of 1)</td>
<td>Revised Section A - A, binder to base.</td>
</tr>
<tr>
<td>RC - 25M</td>
<td>(3 of 6)</td>
<td>Shoulder adjacent to Interstates removed 6.0m (20') joint spacing option; Section B - B revised text.</td>
</tr>
<tr>
<td></td>
<td>(4 of 6)</td>
<td>Revised ramp detail to extend rumble strips and remove traffic separator; Revised text to be consistent with other RCs. Revised Notes 1 and 2 and deleted Note 4.</td>
</tr>
<tr>
<td></td>
<td>(5 of 6)</td>
<td>Revised text to be consistent with other RCs. Revised Notes 1 and 3 and deleted Note 6.</td>
</tr>
<tr>
<td></td>
<td>(6 of 6)</td>
<td>New sheet to show rumble strip details in gore areas.</td>
</tr>
<tr>
<td>RC - 26M</td>
<td>(1 of 5)</td>
<td>Revised Detail B from new joint to patching joint; Revised note labels to be consistent with details; changed legend D to table with height and width of patching joint. Changed Legends B and C to Notes 6 and 7.</td>
</tr>
<tr>
<td></td>
<td>(2 of 5)</td>
<td>Revised to show dowel bars in joints; Revised 6.0m (20') joint spacing to 4.5m (15') joint spacing.</td>
</tr>
<tr>
<td>RC - 27M</td>
<td>(1 of 1)</td>
<td>Revised Section A - A to line up extension line.</td>
</tr>
<tr>
<td>RC - 59M</td>
<td>(3 of 5)</td>
<td>Revised the width of manhole stops from 10' minimum to 12' minimum.</td>
</tr>
<tr>
<td>RC - 52M</td>
<td>(2 of 6)</td>
<td>Changed Splice Bolt dimension from 35(1 5/16&quot;) to 32 (1 ¼&quot;).</td>
</tr>
<tr>
<td>RC - 54M</td>
<td>(2 of 7)</td>
<td>Revised Wood Block to offset bracket for consistency and added Note 1.</td>
</tr>
<tr>
<td></td>
<td>(5 of 7)</td>
<td>Revised Table 2.</td>
</tr>
<tr>
<td></td>
<td>(6 of 7)</td>
<td>Deleted Notes 1 and 4.</td>
</tr>
<tr>
<td></td>
<td>(7 of 7)</td>
<td>Revised title block and made some modification to the details relative to offset brackets and eliminated one post in the post backslope anchorage.</td>
</tr>
<tr>
<td>RC - 57M</td>
<td>(General)</td>
<td>Eliminated Notes 3 and 5 and added Note 2.</td>
</tr>
<tr>
<td></td>
<td>(1 of 8)</td>
<td>Same changes as in sheet 5 second bullet.</td>
</tr>
<tr>
<td></td>
<td>(2 of 8)</td>
<td>Changed wood block to routed offset bracket and rubrail to W-beam rail.</td>
</tr>
<tr>
<td></td>
<td>(3 of 8)</td>
<td>Throughout RC 57M, minor changes were made to the dimensions for consistency between Metric and English.</td>
</tr>
<tr>
<td></td>
<td>(5 &amp; 8 of 8)</td>
<td>Also, changes were made to the bridge to roadway transitions due to changes in the Bridge Standards.</td>
</tr>
<tr>
<td>RC - 58M</td>
<td>(1 of 5)</td>
<td>Revised Note 1.</td>
</tr>
<tr>
<td></td>
<td>(3 of 5)</td>
<td>Deleted the 1270 (50&quot;) detail in Section B - B.</td>
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<tr>
<td></td>
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<td>Revised Table 1.</td>
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<tr>
<td></td>
<td>(6 of 5)</td>
<td>These are new sheets added to show additional bridge to roadway transitions.</td>
</tr>
<tr>
<td></td>
<td>(7 of 5)</td>
<td>Revised Note 1 and added Note 9.</td>
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<td>(3 of 10)</td>
<td>Revised Table 1.</td>
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<td>(1 of 2)</td>
<td>Revised Table 2.</td>
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<td></td>
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<td>Added Note 10.</td>
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<td>Revised Table 1.</td>
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<td>Revised Table 2.</td>
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<td>Revised Table 1.</td>
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<td></td>
<td>(7 of 5)</td>
<td>Revised Table 1.</td>
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</table>
This standard has been deleted. Concrete and
bituminous traffic separators are no longer used. Use
rumble strips as per RC -25M. Also, guidance in DM-2
relative to traffic separators will be deleted in the
next change to DM-2.

This standard was split into 2 sheets for
clarification.

Revised planting pit requirements and bracing
materials.

CANCEL THE FOLLOWING:

| RC - 20M | Nov. 1, 2001 |
| RC - 23M | Nov. 1, 2001 |
| RC - 24M | Nov. 1, 2001 |
| RC - 25M | Nov. 1, 2001 |
| RC - 26M | Nov. 1, 2001 |
| RC - 27M | Nov. 1, 2001 |
| RC - 30M | Nov. 1, 2001 |
| RC - 32M | Apr. 16, 2001 |
| RC - 54M | Nov. 1, 2001 |
| RC - 57M | Nov. 1, 2001 |
| RC - 58M | Nov. 1, 2001 |
| RC - 59M | Nov. 1, 2001 |
| RC - 60M | Apr. 16, 2001 |
| RC - 62M | Apr. 16, 2001 |
| RC - 91M | Apr. 28, 2000 |

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APPROVED FOR ISSUANCE BY:
Bradley L. Mallory
Secretary of Transportation

Michael M. Ryan, P.E.
Deputy Secretary for
Highway Administration
# INDEX OF STANDARDS FOR ROADWAY CONSTRUCTION

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* Change #1 April 16, 2001
* Change #2 November 1, 2001
* Change #3 August 31, 2002

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April 1, 2000 Edition

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<th>STANDARD DRAWING NUMBER</th>
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1. Place a tube from a manufacturer listed in Bulletin 15 over the lubricated end of all dowel bars used in Type P joints and provide a minimum 25 (1") clearance pocket assured by means of a positive spacing device.

2. Cut expansion joint filler material to conform to the cross section of the pavement and furnishing in strips equal to the width of the pavement slab. Make the top surface smooth and plane notes furnished for placing dowel bars having a snug fit without loss in thickness of the material.

3. Construct all transverse joints perpendicular to the centerline.

4. Use minimum No. 52 x 450 (1 1/3" x 18") long dowel bars for pavement depths 250 (10") or less and minimum No. 58 x 450 (1 1/4" x 18") long dowel bars for pavement depths greater than 250 (10").

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 2 1/2" to 10 1/2", below the level of the pavement surface, make the top edges of the contact surfaces on both sides of the seal at the same elevation.

7. Make the top of the joint sealing material from 3 1/2" to 4 1/2" below the surface of the pavement. Use meat resistant joint backing material for hot poured joints.

8. The initial saw cut for type D joint is not required for construction joints.


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:

<table>
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<th>Joint Seal Size</th>
<th>Spacing Size</th>
<th>Width of Saw Cut</th>
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<tr>
<td>4.5 x 8.0</td>
<td>5&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>6.0</td>
<td>5 1/2&quot;</td>
<td></td>
</tr>
</tbody>
</table>

11. When silicone joint sealing material as specified in Bulletin 408, Section 705.4.4, is used for use in transverse joints, type P only, or transverse shoulder joints, use the same joint sealing material. In the longitudinal joints (Alternate Type I and Alternate longitudinal shoulder joints), all dimensions are given in millimeters unless otherwise noted. U.S. customary units in parenthesis.

12. Provide materials and workmanship in accordance with the requirements of Bulletin 408.

Note: Either all metric or all English values must be used on plans, metric and English values shown may not be mixed.

CONCRETE PAVEMENT JOINTS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RECOMMENDED: AUG-21-2002
STANLEY, Bureau of Design

RC-20M
NOTES

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 C CONSTRUCTION JOINTS, AS SHOWN ON RC-20M, SHEET 2.

4. INSTALL NEOPRENE COMPRESSION SEALS TO A UNIFORM DEPTH WITH TOP OF THE SEAL FROM 6 (1/4") TO 10 (1") 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.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BRIDGE APPROACH SLAB

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS, METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
230 (9") MINIMUM WITHOUT CAMBER

FOR JOINT DETAILS, SEE SHEET 1.

1. TILT HOOK TO MAINTAIN PROPER CLEARANCE.

2. AS REQUIRED

3. PRE-STRESSED ENDS AT BEAM DEPTH AND OVER

4. 230 (9") APPROACH SLAB

5. 535 (21") TO 1220 (4' - 0") DEEP ADJACENT COMPOSITE BOX BEAMS WITH 280 (11") DEEP APPROACH SLAB NOTCH

6. TILT HOOK TO MAINTAIN PROPER CLEARANCE.

7. 100 (4") MIN SLAB

8. PRE-STRESSED 325 (13") DEPTH AND OVER

9. 125 (5") MIN

10. 410 (16") APPROACH SLAB

11. 410 (16") APPROACH SLAB

12. SPREAD BOX BEAMS WITH APPROACH SLAB NOTCH 290 (11½") OR DEEPER

13. TILT HOOK TO MAINTAIN PROPER CLEARANCE.

14. SCD-BREAKER, 2-PLY BIT. PAPER

15. 250 (10") APPROACH SLAB

16. 410 (16") APPROACH SLAB

17. 250 (10") APPROACH SLAB

18. 230 (9") APPROACH SLAB

19. 150 (6") APPROACH SLAB

20. 125 (5") APPROACH SLAB

21. 100 (4") APPROACH SLAB

22. 50 (2") MAX

23. 125 (5") MIN

24. 410 (16") APPROACH SLAB

25. 410 (16") APPROACH SLAB

26. 535 (21") TO 1220 (4' - 0") DEEP ADJACENT COMPOSITE BOX BEAMS WITH 280 (11") DEEP APPROACH SLAB NOTCH

27. TILT HOOK TO MAINTAIN PROPER CLEARANCE.

28. FOR JOINT DETAILS, SEE SHEET 1.

29. 1.5 X (5"] - (0"]

30. END OF BEAM

31. 230 (9") APPROACH SLAB

32. 15 (3") MIN

33. 330 (13") WIN

34. COMMONWEALTH OF PENNSYLVANIA

35. DEPARTMENT OF TRANSPORTATION

36. BUREAU OF DESIGN

37. BRIDGE APPROACH SLAB

38. RECOMMENDED AUG. 21, 2002

39. DIRECTOR, BUREAU OF DESIGN

40. 1, 290 OF 3

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

1. TROWEL SMOOTH AND APPLY ONE COAT ASPHALT PAINT.

2. ORIENT THE EDGE OF THE APPROACH SLAB PARALLEL TO THE INTEGRAL ABUTMENT FOR BRIDGE SKEWS LESS THAN 80.5 DEGREES (6:1) SLOPE TO THE PERPENDICULAR TO THE DIRECTION OF TRAFFIC.


4. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 1/8" TO 6 1/4" BELOW THE SURFACE OF THE PAVEMENT.

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF DESIGN**
SCHEDULE OF REINFORCEMENT STEEL

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<td>3.2 m (10'6&quot;)</td>
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<td>D</td>
<td>#10 (4)</td>
<td>300 (12&quot;)</td>
<td>1.5 m (5'0&quot;)</td>
<td>7</td>
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NOTES

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 N/S.)
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-24M. 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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
EFFECTIVE SHOULDER WIDTH, SEE NOTE 5.

ROADWAY PAY LIMIT SHOULDER PAY LIMIT

0.6 m (2'-0")

SEE NOTE 3.

LINE STRIPE

4.0%

FLEXIBLE PAVEMENT

SUBBASE

TYPE SHOULDER

TYPE 1-F SHOULDER

TYPE 1-I SHOULDER

TYPE 1-S SHOULDER

TYPE 1-SP SHOULDER

EFFECTIVE SHOULDER WIDTH @ 0.6 m (2'-0") ROUNDING

SUPERELEVATION (2'-0") (4'-0") GREATER THAN 0:

STRIPE

PAVEMENT SHOULDER @ FOR SUPERELEVATION UNDER 6.01., ELIMINATE THE BIT. SURF. TREATMENT INCIDENTAL TO TYPE 1 SHOULDERS, 25 (3/4") DEPTH

BIT. WEAR. CRSE, ID-2-INCIDENTAL TO TYPE 1-I SHOULDERS, 40 (11/2") DEPTH

DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 1-S SHOULDERS, 20 (3/4") DEPTH

SUPERPAVE, 9.5mm HMA WEARING COURSE, INCIDENTAL TO TYPE 1-SP SHOULDERS, 40 (11/2") DEPTH

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN SHOULDER ROUNDING ON HIGH SIDE OF SUPERELEVATED CURVES.

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

SHOULDER ROUNDING ON HIGH SIDE OF SUPERELEVATED CURVES.
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 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 AGGREGATE BASE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 OR MILLING BITUMINOUS MATERIAL. THE ADDITIONAL MATERIAL IS INCIDENTAL TO THE SHOULDER ITEM.

2. FOR TYPE 5 SHOULDERS, PROPERLY PREPARE EXISTING PAVED SHOULDER BY CLEANSING 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") OR WHEN THERE IS NO GUIDE RAIL, REMOVE, REPLACE AND/OR RESET THE GUIDE RAIL IN ACCORDANCE WITH CURRENT GUIDE RAIL STANDARDS. WHERE GUIDE RAIL HAS RUBBING RAIL ATTACHED, REMOVE THE RUBBING RAIL WHEN THE HEIGHT OF GUIDE RAIL BECOMES LESS THAN 700 (27")

4. REMOVE UNSUITABLE MATERIAL AS DIRECTED, EXCAVATE, AND BACKFILL WITH MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350. MEASURE AND PAY FOR SHOULDER EXCAVATION AND BACKFILL IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 654 AND 656. CROSS SECTIONS ARE NOT REQUIRED.

5. CONSIDER GRADING INCIDENTAL TO THE SHOULDER PAY ITEM. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE GRADING OPERATION TO COMPLETE THIS OPERATION, USE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONNES 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 250 (10") TO 300 (12") CUT SLOPE WHEN INDICATED ON THE PLANS AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY ITEM.

7. "LUMP SUM" ITEMS INCLUDE ALL MATERIALS AND OPERATIONS OF WORK NEEDED TO COMPLETE THAT ITEM WHETHER TABULATED OR NOT.

8. FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATION, USE ONLY BITUMINOUS WEARING COURSE, ID-2 OR ID-3, OR SUPERPAVE, 9.5NM OR 12.5NM HMA WEARING COURSE, 40 (1½") DEPTH MINIMUM.

9. SEE SHEETS 4 AND 5 FOR RUMBLE STRIP DETAILS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS

1. SPECIFY THE AGGREGATE BASE AS IN PUBLICATION 408, SECTION 350.3 AND CONSIDER INCIDENTAL TO THE SHOULDER.
2. SEAL ALL SHOULDER JOINTS IN ACCORDANCE WITH PUBLICATION 408, SECTION 501.3 (a).
3. FOR JOINT DETAILS, SEE RC-25M.
4. ALIGN SHOULDER TRANSVERSE JOINTS TO ADJACENT PAVEMENT JOINTS.
5. SEE RC-25M, SHEET 1, FOR SHOULDER Rounding Detail.
6. AT THE CONTRACTOR'S OPTION, TYPE 2 CONCRETE SHOULDERS MAY BE CONSTRUCTED ON A TAPER, WITH A 150 MINIMUM DEPTH, OR AT THE SAME DEPTH AS THE PAVEMENT, AT NO ADDITIONAL EXPENSE TO THE DEPARTMENT.
7. TYPICALLY, DO NOT PLACE TIE BARS OR TIEBOLTS ON EITHER SIDE OF INTERMEDIATE SHOULDER JOINTS ADJACENT TO PCC PAVEMENT.
8. MUST THE SHOULDER BE STRUCTURALLY PART OF A PARAPET?
9. SEE SHEETS 4 AND 5 FOR RUMBLE STRIP DETAILS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RECOMMENDED AUG. 21, 2002
DIRECTOR, BUREAU OF DESIGN

SHOULders (CONCRETE)
ACCELERATION LANE DETAIL
FOR RUMBLE STRIP INSTALLATION

DECELERATION LANE DETAIL
FOR RUMBLE STRIP INSTALLATION

SECTION DETAILS OF
RUMBLE STRIP PATTERN

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES
MUST BE USED ON PLANS. METRIC AND
ENGLISH VALUES SHOWN MAY NOT BE MIXED.
TYPICAL PLAN VIEW FOR MILLED RUMBLE STRIP ON BITUMINOUS SHOULDERS

TYPICAL INTERSECTION DETAIL FOR RUMBLE STRIP INSTALLATION

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

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULders
RUMBLE STRIPS
(FREE ACCESS HIGHWAYS)

COMMENDED NO. 21, 2000
DIRECTOR, BUREAU OF DESIGN
S.W. A. (P.R.)

RC-25M
MILLED RUMBLE STRIP (TYP.)

DETAIL A
ACCELERATION LANE
GORE AREA RUMBLE STRIPS

300 (12")

RAMP TRAFFIC DIRECTION

MILLED RUMBLE STRIP (TYP.)

DETAIL B
ACCELERATION LANE
OUTSIDE SHOULDER RUMBLE STRIPS

300 (12")

RAMP TRAFFIC DIRECTION

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

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
A TYPICAL PAVEMENT PATCHING JOINT

SECTION A-A

PLATE VIEW

TYPICAL SECTION

CONCRETE PAVEMENT PATCHING

SEE NOTE 1.

LEGEND

1. WHEN ANY PAVEMENT PATCH REPLACES AN EXISTING EXPANSION JOINT AND THE EXISTING EXPANSION JOINT IN AN ADJACENT LANE REMAINS IN PLACE, INSTALL EXPANSION JOINT MATERIAL 19 (¾") THICK IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE REMAINING EXPANSION JOINT. PLACE AN APPROVED TUBE HAVING A MINIMUM 25 (1") CLEARANCE POCKET OVER THE LUBRICATED END OF ALL DOWEL BARS IN THE NEW EXPANSION JOINT.

2. USE 32 (1¼") x 450 (18") LONG DOWEL BARS FOR PAVEMENT DEPTHS 250 (10") OR LESS AND 38 (1½") x 450 (18") LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 250 (10").

3. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 6 (1½").

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

5. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.

6. INITIAL SAW CUT IS NOT REQUIRED AT PATCH JOINT OR WHEN EXPANSION JOINT MATERIAL IS REQUIRED.

7. WHEN PAVEMENT IS TO BE OVERLAID, ONLY THE INITIAL SAW CUT IS REQUIRED.

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

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF TRANSPORTATION

BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION

(PATCHING)

Saw Cuts for Lift Out Method

† Make full depth sawcut to facilitate opening a trench across the slab to relieve compression in pavement prior to lifting out failed area. Sawcut may be omitted provided no spalling on surface or underside of remaining concrete pavement occurs. If spalling occurs, make this cut on subsequent patches. Sawcuts for compression relief need not be at patch edge. At contractor's option, make additional sawcuts inside repair limits to facilitate removal.
1. Construct pavement patches in adjacent lanes, with lengths that are within 1.8 m (6') of each other, to the same length. This length is the length of the longer pavement patch. If the patch lengths differ by more than 1.8 m (6’), then construct to the required lengths.

2. Do not leave less than 1.8 m (6’) 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 6/16” full depth, polyethylene board bond breaker in the longitudinal joint of all patches under 20.0 m (66’) 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’) 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 m (200’) into the next slab, remove a minimum of 1.8 m (6’) and install a new pavement joint in the same position as the original joint.

6. When performing multi-lane patching, and the patches are greater than two slab lengths and less than or equal to 150 m (500’), 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). Additionally, when the joint is extended more than 1.5 m (5’), then construct Multi-lane pavement patching.

7. These drawings are provided as examples to show common patching criteria. They may not cover every field situation.

8. When only one lane to be patched, do not remove more than 1.5 m (5’) into next slab. If more than 1.5 m (5’) is required, remove a new pavement joint at original joint location. For exception, see note 5.

Commonwealth of Pennsylvania
Department of Transportation

Concrete Pavement Rehabilitation

(Conforming to RC-21M and RC-27M)

SHT 2 OF 6

Director, Bureau of Design

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. REMOVE 5/16" (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 PAVERMENT IS 600 (24").
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.
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION

NOTE

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

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION
(PATCHING)

SHEET 4 OF 5

RC-26M
JOINT REHABILITATION

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT
REHABILITATION
(JOINTS)

JOINT SPACING | W | H
--- | --- | ---
< 5.0 M (16') | 25 (10") | 32 (12 1/2")
2.5 M (8') AND < 5.0 M (16') | 19 1/2" | 26 (10")
< 2.0 M (7") | 10 1/2" | 19 (3/4")

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

SEE JOINT SPACING TABLE.
NOTES

1. FOR JOINT DETAILS, SEE RC-20M.
2. CONSTRUCT TYPE D JOINTS ON INTERSTATE, EXPRESSWAY, ARTERIAL AND RAMP PAVEMENTS.
3. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
4. CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMPS WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE RAMP GORE.
5. CONSTRUCT TYPE P JOINT, AS INDICATED, ON COLLECTORS AND LOCAL ROADS.
6. USE A 4.5 m (15') 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.
1. CONSTRUCTION REQUIREMENTS:
   a. Construct in accordance with Publication 428, Sections 428.0, 428.2, 428.3, and 428.4 of Transportation Department Standards for Constructed Manhole Sections, as modified herein.
   b. Minimum Concrete Class:
      - Cast-In-Place, Class 2
      - Precast, Class 3A
   c. Provide Steel Reinforcement in accordance with ASTM A675/A675M, Plain Billet Steel Bars, ASTM A615/A615M, Deformed Billet Steel Bars, and ASTM A185, Steel Welded Wire Fabric ASTM A663/A663M & \( \sigma_{0.2} = 400 \text{ MPa} = 60000 \text{ PSI} \).
   d. Clear Cover for Steel:
      - Walls: Cast-In-Place 50 \( \text{mm} \) (2") Overbars, Precast 50 \( \text{mm} \) (2") Overbars

2. FOR PIPES WITH INSIDE DIAMETER GREATER THAN 750 (30") SEE MODIFIED CAST-IN-PLACE MANHOLE, SECTION 428.1.

3. PROVIDE 300 LAYERS OF HORIZONTAL CLEARANCE BETWEEN STRUCTURAL MEMBER PLATES, AND A 150 LAYERS MINIMUM CLEARANCE AT THE TOP OF THE MANHOLE FOOTING.

4. FORM A CONCRETE CHANNEL AT THE BOTTOM OF THE MANHOLE TO CONFORM TO THE SHAPE OF THE INCOMING AND/OR OUTGOING PIPES. PROVIDE A FULL DEPTH LI-SHAPED CHANNEL WHEN NECESSARY TO REDUCE ENERGY LOSSES.

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

6. CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THROUGHOUT BEFORE PLACING NEXT CONCRETE SEGMENT.

7. A SAFE BEARING CAPACITY OF 0.10 MPa (1.0 Tons Per S.F.) UNDER U.S. CUSTOMARY UNITS IN (1) PARENTHESIS.

8. MINIMUM CONCRETE CLASS:
   - Cast-In-Place 30 \( \text{mm} \) (1 1/8") Top Bars
   - Precast 30 \( \text{mm} \) (1 1/8") Top Bars

9. FOR FOUNDATION JOINTS, BOTH DIRECTIONS, USE NO. 13 (4) BARS AT 300 (12") FOR DEPTHS TO 18.0 m (60') OR 320 \( \text{mm}^2 / \text{m} \) (0.15 \( \text{in} / \text{ft} \)) MAXIMUM OPENING DIAMETER APART.

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

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
**Design Notes for Manhole Box Section:**

1. For construction requirements, see Note 1, Sheet 1.
2. Increase box size when required to keep walls of manhole box section at least 500 mm wide. Calculate all spans for reactions from “edge beams” and the vertical opening. Provide the same reinforcement on the outside face.
3. Walls design. Design walls to carry the axial load due to earth load, live load, and weight of earth. Design the “edge beams” spanning the length of the box, to carry a uniformly distributed load equal to the reaction from the slab.
4. Plan-top of slab. Place additional bars in the slab at 45° around the manhole opening. See Figure 1 for details.
5. Vertical openings. Vertical openings shown for clarity. As required by design, locate horizontal steel for beam above the soffit of the opening. See Figure 2 for details.
6. Design procedure for manhole box section:
   a. Top slab
   b. Design a 500 mm wide slab strip for one-way action to carry dead load, live load, and weight of earth. Design the slab to carry a uniformly distributed load equal to the reaction from the slab. See Figure 1 for details.
   c. Place additional bars in the slab at 45° around the manhole opening. See Section A-A for details.
   d. Edge beam
      i. Design the “edge beam” spanning the length of the box, to carry a uniformly distributed load equal to the reaction from the slab.
      ii. Design the “edge beam” to carry the axial load due to earth load, live load, and weight of earth. Design the “edge beam” to carry a uniformly distributed load equal to the reaction from the slab.
   e. Walls
      i. Design the walls to carry the axial load due to earth load, live load, and weight of earth. Design the “edge beams” spanning the length of the box, to carry a uniformly distributed load equal to the reaction from the slab.
      ii. Provide the same reinforcement on the outside face.
   f. Footing
      i. Design the footing to carry the axial load due to earth load, live load, and weight of earth. Design the “edge beams” spanning the length of the box, to carry a uniformly distributed load equal to the reaction from the slab.
      ii. Provide the same reinforcement on the outside face.

**Construction Joint:**

The top slab shall be constructed as a single joint. See Figure 1 for details.

**Keyway:**

As a minimum, provide two (2) fillet bars at 200 mm centers, top and bottom of slab in the outside direction.

**Section View: Modified Manhole**

For pipe diameters less than 200 mm (7.9 in) to 2100 mm (84 in) inside diameter.

**Notes:**

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

**Commonwealth of Pennsylvania**

**Department of Transportation**

**Bureau of Design**

**Standard Manholes**

**Modified Cast-in-Place Manholes**
PLACE REINFORCEMENT MESH CENTRALLY IN WALL. SEE NOTES 5 AND 6 FOR STEEL REQUIREMENTS AT OPENINGS.

VERTICAL FULL DEPTH BASE SLAB REINFORCEMENT SECTION. SEE DETAIL C.

STEEL REINFORCEMENT HOOKED TO THE REINFORCEMENT IN THE BASE IF MESH IS USED AS WALL REINFORCEMENT.

FOR PIPES 750 (30") INSIDE DIAMETER AND LESS SEE DETAIL A.

MINIMUM 305 (12") TOTAL THICKNESS.

TYPICAL RISER SECTION

STEP WITHOUT HOOKS
SEE NOTE 10.

STEP WITH HOOKS
SEE NOTE 9.

TYPICAL RISER SECTION

PRECAST MANHOLE FOR PIPES 710 (28") INSIDE DIAMETER AND LESS SEE TABLE 6 FOR STEEL QUALITY, TYPE, AND SIZES. FURNISH REINFORCEMENT DETAILS IN EIGHT (8) WORKMAN HANDY SHEETS. SEE SHEET T.

BASE PREPARATION

SUBBASE MATERIAL 300 (12") MIN., CHANNEL SEE NOTE 1.

TOP STEEL

BOTTOM STEEL

DETAIL C

PRECAST MANHOLE BASE PREPARATION

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

SEE DETAIL A

AND NOTE 3,

RAISED LETTERS, 25 (1"

CHECKERED TOP DESIGN

FOR SELF-SEALING
MANHOLE COVER

CAST IRON MANHOLE COVER

(PLATEN COVER)

PLAN VIEW

ELEVATION VIEW

OF MANHOLE FRAME

DETAIL A

GASKET SEALING SYSTEM

RAISED LETTERS, 25 (1"

ELEVATION VIEW

SECTION A-A

ADJUSTMENT RISERS

PLAN VIEW

ONE PIECE ADJUSTMENT RISER

ADJUSTMENT BOLTS - 2 REQUIRED

PLAN VIEW

MULTI-PIECE ADJUSTMENT RISER

SECTION B-B

NOTE:

1. PROVIDE MANHOLE FRAMES AND COVERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605, AS DESIGNED.

2. PROVIDE MANHOLE COVER, FRAMES AND GRADE ADJUSTMENT RISERS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.

3. PROVIDE A GASKET SEALING SYSTEM, DOVETAIL GROOVE AND CONTINUOUS GASKET, AS INDICATED IN DETAIL A, TO PREVENT INFLOW THROUGH THE BEARING SURFACES OF SURFACE RUNOFF WATER INTO THE MANHOLE SYSTEM, WHEN SPECIFIED. PROVIDE 6 (1/4") DIA ONE PIECE SELF-SEAL POLYISOPRENE ROUND GASKET, 40 DUROMETER GLUED IN PLACE. PROVIDE TWO (2) LIFT HOLES AT 180° TO FACILITATE COVER REMOVAL FOR SELF-SEALING MANHOLE COVER.

4. PROVIDE LIFT HOLE TO FACILITATE COVER REMOVAL FOR NON-SEALING MANHOLE COVER.

5. ADJUSTMENT RISERS TO HAVE A MINIMUM BEARING SEAT OF 25 (1") FOR COVER.

6. LOCATE TOP OF FRAME OR ADJUSTMENT RISER 3 (1/2") BELOW THE TOP OF ROADWAY SURFACE.

7. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS AND PROVISIONS OF SECTION 606, AS MODIFIED HEREIN:

A. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASUREMENTS PROVIDED WITH EACH ORDER. PROVIDE GRADE ADJUSTMENT RISERS. PROVIDE AN ADJUSTMENT RISER WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME.

B. MANUFACTURE BAR STOCK AND FORM FEEDER TO BE USED IN PRODUCTION MANUFACTURING. PROVIDE AN ADJUSTMENT RISER WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME.

C. PROVIDE GRADE ADJUSTMENT RISER TO HAVE A MINIMUM BEARING SEAT OF 25 (1") FOR COVER.

D. PROVIDE GRADE ADJUSTMENT RISER TO HAVE A MINIMUM BEARING SEAT OF 25 (1") FOR COVER.

E. PROVIDE GRADE ADJUSTMENT RISER TO HAVE A MINIMUM BEARING SEAT OF 25 (1") FOR COVER.

F. PROVIDE ADJUSTMENT RISER MOUNTED IN THE ORIGINAL FRAME.

G. PROVIDE ALL PARTS MOUNTED IN THE ORIGINAL FRAME.

H. PROVIDE GRADE ADJUSTMENT RISER MOUNTED IN THE ORIGINAL FRAME.

I. PROVIDE GRADE ADJUSTMENT RISER MOUNTED IN THE ORIGINAL FRAME.

J. PROVIDE GRADE ADJUSTMENT RISER MOUNTED IN THE ORIGINAL FRAME.

8. ATTACH FRAME AND/OR PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 THREADED STUDS WITH HEX HEAD BOLTS. PROVIDE AN ADJUSTMENT RISER WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME AND DOES NOT ALLOW EXCESSIVE MOVEMENT. PROVIDE AN ADJUSTMENT RISER WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME AND DOES NOT ALLOW EXCESSIVE MOVEMENT.

9. SET THE BASE OF THE FRAME AND/OR PRECAST CONCRETE GRADE RINGS IN A BED OF CEMENT MORTAR.

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

RECOMMENDED: AUG. 21 2002
DIRECTOR, BUREAU OF DESIGN

RC-39M
1. Design Requirements

   B. Vertical Steel:
   
      2. Vertical Steel:
         B. Design requirements for vertical steel are established by service load methods.

   C. Design the manhole for a live load of PHL 93 CHS 25 (1.5 tons per sq. ft.) and with an impact, except do not use impact in the design of the footings. Design specifications are not to be used on any portion of the manhole that is adjacent to a roadway, and limits are to be applied to certain live loads as approved by the department.

   D. Determine dimensions of design section to carry moment as shown in Figure 1.

   E. Design reinforcement in "column" to carry axial load and of arc section on.

   F. Provide at least minimum reinforcement for shrinkage and temperature at all concrete faces where reinforcement is not required by design.

   G. For construction requirements see note 1, Sheet 1.

2. Vertical Steel:
   A. This procedure is required only when a significant loading exists on one side of the manhole and limited support is provided on the other.

   B. Determine minimum and maximum vertical load applied to manhole at depth H.

   C. Determine overturning moment from unbalanced earth pressure.

   D. Determine dimensions of design section to carry moment as shown in Figure 1.

   E. Design reinforcement to carry axial load and moment, with total cross-section to carry axial load.

   F. Check crack control under service load conditions.

   G. Design the footing for a live load of PHL 93 CHS 25 (1.5 tons per sq. ft.) and with an impact, except do not use impact in the design of the footings. Design specifications are not to be used on any portion of the manhole that is adjacent to a roadway, and limits are to be applied to certain live loads as approved by the department.

3. hoop steel:
   A. Determine service moments and axial thrusts using Figure 2 and Table 1. P/m is not to be greater than one-half of P/m max.
   B. Design hoop reinforcement shown in Figure 3, to carry the moment and axial thrust.
   C. Check crack control under service load.

4. footing design:
   A. Determine footing size using an equivalent circular footing for design.

   B. Design footing to carry moment, both maximum positive and negative, and shear due to resultant pressure as shown in Figure 4 and applied loads.

   C. Check crack control under service load.

   D. Calculate bearing pressures by service load methods.

   E. Allowable bearing pressure P = DL + LL + EP

   F. Design footing to carry moment (both maximum positive and negative) and shear due to resultant pressure as shown in Figure 4 and applied loads.

   G. Check crack control under service load.

   H. Design footing to carry moment (both maximum positive and negative) and shear due to resultant pressure as shown in Figure 4 and applied loads.

   I. Check crack control under service load.

   J. Design footing to carry moment (both maximum positive and negative) and shear due to resultant pressure as shown in Figure 4 and applied loads.

   K. Check crack control under service load.

   L. Design footing to carry moment (both maximum positive and negative) and shear due to resultant pressure as shown in Figure 4 and applied loads.

   M. Check crack control under service load.

   N. Check crack control under service load.

   O. Check crack control under service load.

   P. Check crack control under service load.

   Q. Check crack control under service load.

   R. Check crack control under service load.

   S. Check crack control under service load.

   T. Check crack control under service load.

   U. Check crack control under service load.

   V. Check crack control under service load.

   W. Check crack control under service load.

   X. Check crack control under service load.

   Y. Check crack control under service load.

   Z. Check crack control under service load.

   [Diagram and calculations as shown in the figure]
DRAWING, BC-734, TYPE C.

- ANCHOR BOLTS, 200 (8") LONG. SEE CURRENT BRIDGE CONSTRUCTION STANDARD

- POST NO, 13 (#4) BARS C 150 (6") 1220 X 1220 X 200 C TO C EACH WAY

- GUIDE RAIL WITH CURB OR RUBBER RAIL

- RAIL ELEMENT SECTION B-B

- THICK COLD FORMED CHANNEL OR C150 X 12 (C6" X B.2") RUBBER RAIL

- GUIDES RAIL TRANSITION AT END OF STRUCTURE

- RC-739M STANDARD ANCHOR SYSTEMS

- RC-739M BRIDGE BARRIER TO GUIDE RAIL TRANSITION REFERENCE DRAWINGS

- COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN

- TYPE 2 STRONG POST GUIDE RAIL

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

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.**

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.**

**Notes:**
- 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**
POSITIONING OF ROTATING BRACKET

<table>
<thead>
<tr>
<th>TABLE A</th>
<th>HEIGHT OF POST</th>
<th>400</th>
<th>375</th>
<th>350</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>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES

1. PAYMENT FOR TYPE 2 STRONG POST END TREATMENT INCLUDES 1'430 (37'-6") OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.

2. INSTALL DELINEATOR ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT.

3. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.

4. MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.

5. TYPE 2 STRONG POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF ANY GUIDE RAIL ON HIGH-SPEED, HIGH-VOLUME ROUTES. USE CRASHWORTHY END TREATMENTS ON ALL GUIDE RAILS ON HIGH-SPEED, HIGH-VOLUME ROUTES WITH CURRENT TRAFFIC VOLUMES 2000 VEHICLES PER DAY & ABOVE AND 90 KM/H POSTED SPEED LIMIT & ABOVE. TYPE 2 STRONG POST END TREATMENTS MAY BE USED ON THE TRAILING END OF GUIDE RAIL FOR HIGH SPEED NHS DIVIDED ROADWAYS.

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

SEE NOTE 2.
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 AUG. 21, 2002
DIRECTOR, BUREAU OF DESIGN RC-52M
CASE 2

ELEVATION

3 - 3610 (12' -6") SECTIONS OF NESTED W-BEAM
FOR LENGTH OF NEED, SEE DM-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.

FOR CASE 1 OR CASE 2 INSTALLATIONS, THE LENGTH OF W-BEAM RAIL
MAY BE LONGER THAN AS SHOWN TO ACCOMMODATE SPlicing OF THE
RAIL ELEMENTS. RAIL ELEMENTS MAY BE CUT OR STAGGERED AND
LONGER SPLICE BOLTS MAY BE USED. LAP RAIL ELEMENTS IN THE
DIRECTION OF TRAFFIC.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

TYPE 2 STRONG POST
GUIDE RAIL
ACROSS CULVERTS

RECOMMENDED AUG. 21, 2002
RECOMMENDED AUG. 21, 2002
1. The treatments shown are for four lane divided highways. See the appropriate end treatment at both sides of the obstruction on single lane facilities with two-way travel.

2. 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 using the guidelines found in Publication 13M, DM-2, Chapter 12.

3. The clearance required is determined using the formula specified in Publication 13M, Chapter 12, and shown on the tabulations. The calculated distance is rounded off to the nearest whole foot. Where the D.L.E. (1/3 - 0") required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0").

4. The minimum unobstructed distance from face of guide rail post to face of obstruction is 1.5 m (5') as a minimum distance.

5. The typical distance from the edge of shoulder to the front face of the W-beam rail element is 840 (2' - 9") for heavy-duty rail. This may vary; in general, however, the minimum distance calculated is rounded off to the nearest whole foot. Where the 0.6 m (2') required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

6. The Typical distance from the edge of shoulder to the front face of the W-beam rail element is 4.2 m (14') for all rail types. This may vary, in general, however, the minimum distance calculated is rounded off to the nearest whole foot. Where the 0.6 m (2') required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

7. The treatments shown are for four lane divided highways. See the appropriate end treatment at both sides of the obstruction on single lane facilities with two-way travel.

8. The clearance required is determined using the guidelines found in Publication 13M, DM-2, Chapter 12, and shown on the tabulations. Where the D.L.E. (1/3 - 0") required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

9. The typical distance from the edge of shoulder to the front face of the W-beam rail element is 840 (2' - 9") for heavy-duty rail. This may vary; in general, however, the minimum distance calculated is rounded off to the nearest whole foot. Where the 0.6 m (2') required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

10. The treatments shown are for four lane divided highways. See the appropriate end treatment at both sides of the obstruction on single lane facilities with two-way travel.

11. The clearance required is determined using the guidelines found in Publication 13M, DM-2, Chapter 12, and shown on the tabulations. Where the D.L.E. (1/3 - 0") required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

12. The typical distance from the edge of shoulder to the front face of the W-beam rail element is 840 (2' - 9") for heavy-duty rail. This may vary; in general, however, the minimum distance calculated is rounded off to the nearest whole foot. Where the 0.6 m (2') required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

13. The treatments shown are for four lane divided highways. See the appropriate end treatment at both sides of the obstruction on single lane facilities with two-way travel.

14. The clearance required is determined using the guidelines found in Publication 13M, DM-2, Chapter 12, and shown on the tabulations. Where the D.L.E. (1/3 - 0") required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

15. The typical distance from the edge of shoulder to the front face of the W-beam rail element is 840 (2' - 9") for heavy-duty rail. This may vary; in general, however, the minimum distance calculated is rounded off to the nearest whole foot. Where the 0.6 m (2') required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

16. The treatments shown are for four lane divided highways. See the appropriate end treatment at both sides of the obstruction on single lane facilities with two-way travel.

17. The clearance required is determined using the guidelines found in Publication 13M, DM-2, Chapter 12, and shown on the tabulations. Where the D.L.E. (1/3 - 0") required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).

18. The typical distance from the edge of shoulder to the front face of the W-beam rail element is 840 (2' - 9") for heavy-duty rail. This may vary; in general, however, the minimum distance calculated is rounded off to the nearest whole foot. Where the 0.6 m (2') required clearance to obstruction is not available, use 2-SCC guide rail and 2-SCC double nested rail when the deflection is less than 0.3 m (1' - 0`).
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>Design Speed</th>
<th>Maximum Flare Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>km/h</td>
<td>mph</td>
</tr>
<tr>
<td>120</td>
<td>75</td>
</tr>
<tr>
<td>105</td>
<td>65</td>
</tr>
<tr>
<td>90</td>
<td>55</td>
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<td>80</td>
<td>50</td>
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<tr>
<td>65</td>
<td>40</td>
</tr>
<tr>
<td>60</td>
<td>35</td>
</tr>
</tbody>
</table>

NOTES
1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS. Fcorrected in accordance with the Design Manual. PART 2.

2. PROVIDE SINGLE FACE CONCRETE BARRIER 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.
1. This standard has been prepared as a guide for the placement of earth mounds in the median. It is impractical to provide a standard for all possible conditions. Modifications of treatments can be made to fit existing conditions.

2. For flare rates, see Table 2, Sheet 2.

3. Consider expansion joint material, coarse aggregate, filter drain and weep holes incidental to single face conc. barrier.

4. All materials necessary to construct earth mounds are in accordance with applicable sections of Publication 408.

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. Height of guide rail may be tapered down after crossing ditch bottom to achieve one foot of cover.
2. 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.
3. Provide 230 m (75' 0") minimum from where the guide rail crosses the ramp line to the beginning of the hazard.
4. Backslope anchor terminal pay limit includes the concrete or post anchorages. 3810 (1' 6") deep to rail element and hardware.

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF DESIGN**

**GUIDE RAIL**

**BACKSLOPE ANCHOR TERMINAL**

**SINGLE RAIL**

10:1 FRONT SLOPE

**RECOMMENDED AUG. 21, 2002**
**RECOMMENDED AUG. 21, 2002**

**SHEET 6**

**POST BACKSLOPE ANCHORAGE**

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. The top of the W-beam rail is held constant relative to the roadway profile grade. A second W-beam rail is required where the distance between the ground and bottom of the top rail exceeds 450 mm (18") and is increasing. Maximum height of double rail system is 1140 mm (45"). W-beam rails are to maintain maximum height. Flare rate for the rail is 12 1/2:1.

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

3. Use Z448 L 6'-0" long posts for all post locations with a double rail. Posts for the post anchor are 1830 mm (6'-0") long. When a double rail installation is required, each rail will be measured and paid for at the contract unit price per linear foot of guide rail.

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 23.0 m (75' -0") 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 anchor, 3810 mm (12'-6") of rail element posts and hardware.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. PROVIDE CONCRETE MEDIAN BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 87.

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 PERMANENT AND TEMPORARY BARRIER INSTALLATIONS, USE SIDE-MOUNT BARRIER-MOUNT DELINEATOR OR TOP-MOUNT DELINEATORS (BARRIER-MOUNT DELINEATOR OR REFLECTOR UNIT). AS DEPICTED ON THE SHEET, PLACE THE CENTER OF THE DELINEATOR 600 (24") FROM THE PAVEMENT TO THE CENTER OF THE DELINEATOR. INSTALL TOP-MOUNT DELINEATORS AS FOLLOWS:

   - CENTER BARRIER-MOUNT DELINEATOR ALONG LONGITUDINAL CENTER LINE OF MEDIAN BARRIER.
   - PLACE REFLECTOR UNITS AS SHOWN ON TRAFFIC STANDARD TC-1604.

   FOR PERMANENT INSTALLATIONS, PLACE DELINEATORS AT A MAXIMUM LONGITUDINAL SPACING OF 25 (80'-0") FOR TANGENT SECTIONS AND 12 (40'-0") FOR CURVE SECTIONS WITH A HORIZONTAL RADIUS LESS THAN 305 (1000').

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.

7. PROVIDE PRECAST CONCRETE MEDIAN BARRIER FOR USE AS TEMPORARY (MPT1) 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 ( ) PARENTHESES.

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 RUGGED FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH A ROUGH FINISH TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.

12. SEAL JOINTS WITH AN APPROVED JOINT SEALER.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. A TYPICAL ENO TRANSITION MAY BE USED FOR PERMANENT BARRIER INSTALLATIONS.

- SEE SECTION A-A

- ONLY WHEN THE LAST BARRIER SECTION IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE.

- REFER TO TABLE 1, SHEET 3, FOR FLARE RATE REQUIREMENTS.

- END OF PARALLEL RAMPS OR T INTERSECTIONS, A

- AN IMPACT ATTENUATING DEVICE IS NOT REQUIRED IF ANY OF THE FOLLOWING CONDITIONS ARE SATISFIED:

- ATTENUATING DEVICE. WHEN CONCRETE BARRIER IS TERMINATED AT THE 20:1 SLOPED END TRANSITION IS ACCEPTABLE FOR PERMANENT INSTALLATIONS WHERE USED WHERE THE LEGAL SPEED IS 60 km/h (35 mph) OR LESS.

- FOR BARRIER INSTALLATIONS, THE END OF THE BARRIER SYSTEM IS PROPERLY CONNECTED OR OVERLAPPED WITH EXISTING GUIDE RAIL.

- THE END OF THE BARRIER SYSTEM CAN BE BURIED IN A CUT OF 180 (9"") CLR.

- THE REQUIRED CLEAR ZONE AS DETERMINED IN PUBLICATION 13M.

**NOTES**

- ALL THE BARRIER IS EXTENDED AT THE PROPER FLARE RATE.

- THE BARRIER IS EXTENDED AT THE PROPER FLARE RATE UNLESS OVERLAPPED WITH EXISTING GUIDE RAIL.

- THE BARRIER IS EXTENDED AT THE PROPER FLARE RATE UNTIL THE END OF THE BARRIER SYSTEM IS PROPERLY CONNECTED OR OVERLAPPED WITH EXISTING GUIDE RAIL.

- REFER TO TABLE 1, SHEET 3, FOR FLARE RATE REQUIREMENTS.

3. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER, GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2").

4. EPOXY COATED REINFORCEMENT IS NOT REQUIRED WHEN PRECAST CONCRETE MEDIAN BARRIER IS TO BE USED IN IMPORTANT INSTALLATION ONLY, IN ACCORDANCE WITH SECTION 627, AND IDENTIFIED AS SUCH, AS SPECIFIED IN SECTION 714.6(c).

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

### COMMONWEALTH OF PENNSYLVANIA
### DEPARTMENT OF TRANSPORTATION
### BUREAU OF DESIGN
### CONCRETE MEDIAN BARRIER
### F-SHAPE

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

**Alternate WWF Reinforcement Details**

- WWF replaces the #13 (#4) full length rebars used in the rebar.

- Alternates all other dimensions are typical to the rebar alternate.
DELINEATION OF IMPACT ATTENUATING DEVICES

**NOTES**

1. PROVIDE PLATES, 13 x 305 x 665 (1/2" x 12" x 27") MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02(sl. GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(sl.

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 MOUNTED IN DETAIL "A", ATTACH MARKERS USING SENSITIVE SHEETING MATERIAL WITHOUT RIGID BACKING DIRECTLY TO BARRIER FRONT OR NOSE SECTION. DO NOT POST-MOUNT MARKERS IN FRONT OF IMPACT ATTENUATING DEVICES. MARKERS ARE PROVIDED IN TWO SIZES: 305 x 914 (12" x 36") AND 457 x 914 (18" x 36"). WHEN ONE MARKER IS REQUIRED, USE 457 x 914 (18" x 36"); WHEN TWO MARKERS ARE REQUIRED SIDE BY SIDE, USE 305 x 914 (12" x 36"). PROVIDE COLOR FOR CLEARANCE MARKERS AS FOLL0WS:
   - **A** MESSAGE - BLACK STRIPES (NON-REFLECTORIZED)
   - **B** FIELD - YELLOW (REFLECTORIZED) ORANGE (REFLECTORIZED), CONSTRUCTION ZONES

**COMMONWEAL TH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BARRIER SHT**

**RECOMMENDED AUG.21,2002**

**SHT 3 OF 8**

**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 WIRE REINFORCED BARRIERS, SEE SHEET 2.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

TYPICAL 810 TO 810 (32" TO 32")
BRIDGE TO HIGHWAY TRANSITION
(The bridge barrier is a concrete median barrier)
NOTES
1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE W/P REINFORCED BARRIERS, SEE SHEET 2.

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

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER F-SHAPE

TYPICAL 810 TO 810 (32" TO 32") BRIDGE TO HIGHWAY TRANSITION
(ADJACENT TO BRIDGE WITH SPLIT CONCRETE MEDIAN BARRIER)

PLAN VIEW

SECTION A-A

SECTION B-B

ELEVATION VIEW

ORTHOGRAPHIC VIEW

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER F-SHAPE

TYPICAL 810 TO 810 (32" TO 32") BRIDGE TO HIGHWAY TRANSITION
(ADJACENT TO BRIDGE WITH SPLIT CONCRETE MEDIAN BARRIER)
NOTES

1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2"").

2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 1/4" EXCEPT AS SHOWN.

3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

TYPICAL 810 TO 1270 (32" TO 50") HIGHWAY TRANSITION

PLAN VIEW

SECTION A-A

SECTION B-B

ELEVATION VIEW

ORTHOGRAPHIC VIEW

FOR SLOTTED PLATE CONNECTION DETAILS, SEE SHEET 3.

FOR SLOTTED PLATE CONNECTION DETAILS, SEE SHEET 3.

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

ELEVATION VIEW

ORTHOGONAL VIEW

TYPICAL 1270 TO 1270 (50" TO 50") TRANSITION
BRIDGE TO HIGHWAY TRANSITION

SECTION A-A

SECTION B-B

NOTE
FOR ALTERNATE WF REINFORCED BARRIERS, SEE SHEET 2.

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

ELEVATION VIEW

SECTION A-A
(ADJACENT TO BRIDGE WITH SPLIT CONCRETE GLARE SCREEN MEDIAN BARRIER)

SECTION B-B

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

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 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 ( ) PARENTHESES.

8. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-73GM.

9. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 1/2" IN DEPTH.

TYPICAL PRECAST OR CAST-IN-PLACE SINGLE FACE CONCRETE BARRIER

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
F-SHAPE

RECOMMENDED NOV 21, 2002
RECOMMENDED NOV 21, 2002
SHT 3 OF 5

TYPICAL ROUGH ROCK TREATMENT

NOTES
1. PROVIDE PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105. ALTERNATE CONNECTIONS MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN.
2. WHERE SINGLE FACE CONCRETE BARRIER IS SPECIFIED FOR USE AS A RETAINING WALL AND DRAINAGE TREATMENT IS NECESSARY, CONSTRUCT A PREFORMED FABRIC FILTER DRAIN AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 610. IF THE HEIGHT OF THE BARRIER OR SLOPE IS INCREASED, PROVIDE OVERTURNING MOMENT COMPUTATIONS WITH THE CONSTRUCTION PLANS.
3. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 < 1 " EXCEPT AS SHOWN.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
F-SHAPE

RECOMMENDED NOV 21, 2002
RECOMMENDED NOV 21, 2002
SHT 3 OF 5

TYPICAL DRAINAGE TREATMENT

SEE NOTE 2.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
F-SHAPE

RECOMMENDED NOV 21, 2002
RECOMMENDED NOV 21, 2002
SHT 3 OF 5

TYPICAL ROUGH ROCK TREATMENT

NOTES
1. PROVIDE PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105. ALTERNATE CONNECTIONS MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN.
2. WHERE SINGLE FACE CONCRETE BARRIER IS SPECIFIED FOR USE AS A RETAINING WALL AND DRAINAGE TREATMENT IS NECESSARY, CONSTRUCT A PREFORMED FABRIC FILTER DRAIN AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 610. IF THE HEIGHT OF THE BARRIER OR SLOPE IS INCREASED, PROVIDE OVERTURNING MOMENT COMPUTATIONS WITH THE CONSTRUCTION PLANS.
3. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 < 1 " EXCEPT AS SHOWN.

TYPICAL ROUGH ROCK TREATMENT

NOTES
1. PROVIDE PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105. ALTERNATE CONNECTIONS MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN.
2. WHERE SINGLE FACE CONCRETE BARRIER IS SPECIFIED FOR USE AS A RETAINING WALL AND DRAINAGE TREATMENT IS NECESSARY, CONSTRUCT A PREFORMED FABRIC FILTER DRAIN AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 610. IF THE HEIGHT OF THE BARRIER OR SLOPE IS INCREASED, PROVIDE OVERTURNING MOMENT COMPUTATIONS WITH THE CONSTRUCTION PLANS.
3. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 < 1 " EXCEPT AS SHOWN.
1. Provide single face concrete barrier and guide rail meeting the requirements of Publication 408, Sections 620 and 623.
2. The treatments shown are for four-lane divided highways. Use the approach end treatment on both sides of the obstruction on two-lane facilities with low-ways trapped.
3. If the preferred treatment is to terminate the concrete barrier within the clear zone, bury it into the existing slope, preferably 1:2 (1 horizontal:1 vertical), and post deep otherwise, use an impact attenuating device.
4. This transition is appropriate for connection to a vertical concrete shape and should not be connected directly to a concrete safety shape. Concrete safety shapes should be transitioned to a vertical shape at the guide rail connection.

**Table 1: Flare Rates for Barrier Design**

<table>
<thead>
<tr>
<th>Speed</th>
<th>Concrete Barrier</th>
<th>Guide Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>km/h</td>
<td>m/s</td>
<td>m/s</td>
</tr>
<tr>
<td>120</td>
<td>3.35</td>
<td>1.10</td>
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<tr>
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<td>3.21</td>
<td>1.00</td>
</tr>
<tr>
<td>105</td>
<td>3.08</td>
<td>0.90</td>
</tr>
<tr>
<td>100</td>
<td>2.95</td>
<td>0.80</td>
</tr>
<tr>
<td>90</td>
<td>2.82</td>
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<td>0.40</td>
</tr>
<tr>
<td>50</td>
<td>2.19</td>
<td>0.35</td>
</tr>
</tbody>
</table>

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

1. REFER TO 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 7032. 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 250 R EXCEPT AS SHOWN.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOULD NOT BE MIXED.
TABLE 2

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>MAXIMUM FLARE RATES</th>
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<tr>
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<td>70</td>
<td>45</td>
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<td>60</td>
<td>40</td>
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<tr>
<td>55</td>
<td>35</td>
</tr>
<tr>
<td>45</td>
<td>30</td>
</tr>
</tbody>
</table>

FLARE RATES FOR BARRIED DESIGN

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 BARRIERS ON HIGHWAYS WITH POSTED SPEED LIMITS GREATER THAN 50 MPH AND WITH CURRENT POSTED SPEED LIMITS GREATER THAN 40 MPH. VEHICLES WITH MAXIMUM TOWED WEIGHT GREATER THAN 40 FT.-0" IS RECOMMENDED TO ENTER AND EXIT MOUND VIA "C" BEHIND THE BARRIERS. EARTH MOUNDS ARE CONSTRUCTED OUTSIDE THE CLEAR ZONE AS DETERMINED IN PUBL. 316, DESIGN MANUAL PART 2, CHAPTER 12.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
F-SHAPE
END TREATMENT
BURYING INTO EARTH MOUND

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
SEE TABLE 1.

- FOR ADDITIONAL DETAILS FOR TYPICAL BARRIER TREATMENT AT PIERS, SEE RC-58M, SHEET 9.

- NEEDED FOR GLARE SCREEN IS DEPENDENT ON GEOMETRICS.

- TYPICAL TREATMENT AT PIERS

- SEE TABLE 1.

- EXPANSION JOINT MATERIAL.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>FLARE RATES FOR BARRIER DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPEED (km/h)</td>
<td>MAXIMUM FLARE RATES</td>
</tr>
<tr>
<td>CONCRETE BARRIER</td>
<td>GUIDE RAIL</td>
</tr>
<tr>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>120</td>
<td>75</td>
</tr>
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<tr>
<td>50</td>
<td>35</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

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

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1012.

2. USE JB-11 AND JB-12 JUNCTION BOX IN SHOULDERS OR OTHER LOCATIONS SUBJECT TO VEHICLE LOADS. USE JB-8-1 AND JB-8-2 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS. SEE DETAILS ON RC-81M.

3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1012.

4. PROVIDE PROTECTIVE COATING - STEEL FRAME, HOT DIP GALVANIZED IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.00.

5. PROVIDE 4-Ø6.351 (2") OR NO. 57 OR NO. 67 COARSE AGGREGATE.

6. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLAN.

7. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX AT 76.2 (3") CHORD ALIGNED RADIA L Y, PERPEND ICULAR, TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE Curb EXTENDING TO THE CURB TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY LINE 1.5 m (5') CHORD ALIGNED RADIA L Y, PERPEND ICULAR, TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CURB EXTENDING TO THE CURB.

8. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL LOCATIONS FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION. WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL PLANE, SPACE CONDUITS AT 150 (6") TO C, AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL D.

9. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL 8 AND LOCATE AS INDICATED IN DETAIL B. IGNIT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.00.

10. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A36/A36M.

11. PROVIDE PROTECTIVE COATING - CAST-IN-PLACE CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.

12. PROVIDE O.06 (0.25"") THICKNESS OF COARSE AGGREGATE.

13. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.

14. PROVIDE PROTECTIVE COATING - CAST-IN-PLACE CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF TRANSPORTATION
HIGHWAY LIGHTING
JUNCTION BOXES-HEAVY DUTY
CAST-IN-PLACE OR PRECAST

NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1012.

2. USE JB-11 AND JB-12 JUNCTION BOX IN SHOULDERS OR OTHER LOCATIONS SUBJECT TO VEHICLE LOADS. USE JB-8-1 AND JB-8-2 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS. SEE DETAILS ON RC-81M.

3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1012.

4. PROVIDE PROTECTIVE COATING - STEEL FRAME, HOT DIP GALVANIZED IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.00.

5. PROVIDE 4-Ø6.351 (2") OR NO. 57 OR NO. 67 COARSE AGGREGATE.

6. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLAN.

7. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX AT 76.2 (3") CHORD ALIGNED RADIA L Y, PERPEND ICULAR, TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CURB EXTENDING TO THE CURB.

8. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL LOCATIONS FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION. WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL PLANE, SPACE CONDUITS AT 150 (6") TO C, AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL D.

9. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL 8 AND LOCATE AS INDICATED IN DETAIL B. IGNIT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.00.

10. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A36/A36M.

11. PROVIDE PROTECTIVE COATING - CAST-IN-PLACE CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.

12. PROVIDE O.06 (0.25"") THICKNESS OF COARSE AGGREGATE.

13. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.

14. PROVIDE PROTECTIVE COATING - CAST-IN-PLACE CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF TRANSPORTATION
HIGHWAY LIGHTING
JUNCTION BOXES-HEAVY DUTY
CAST-IN-PLACE OR PRECAST

NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1012.

2. USE JB-11 AND JB-12 JUNCTION BOX IN SHOULDERS OR OTHER LOCATIONS SUBJECT TO VEHICLE LOADS. USE JB-8-1 AND JB-8-2 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS. SEE DETAILS ON RC-81M.

3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1012.

4. PROVIDE PROTECTIVE COATING - STEEL FRAME, HOT DIP GALVANIZED IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.00.

5. PROVIDE 4-Ø6.351 (2") OR NO. 57 OR NO. 67 COARSE AGGREGATE.

6. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLAN.

7. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX AT 76.2 (3") CHORD ALIGNED RADIA L Y, PERPEND ICULAR, TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CURB EXTENDING TO THE CURB.

8. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL LOCATIONS FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION. WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL PLANE, SPACE CONDUITS AT 150 (6") TO C, AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL D.

9. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL 8 AND LOCATE AS INDICATED IN DETAIL B. IGNIT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.00.

10. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A36/A36M.

11. PROVIDE PROTECTIVE COATING - CAST-IN-PLACE CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.

12. PROVIDE O.06 (0.25"") THICKNESS OF COARSE AGGREGATE.

13. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.

14. PROVIDE PROTECTIVE COATING - CAST-IN-PLACE CONCRETE JUNCTION BOXES SUPPLIED BY MANUFACTURER LISTED IN TABLE OF SUPPLIERS. CONFORM TO PUBLICATION 408, SECTIONS 910 AND 1101.
CONDUIT OR SLEEVE, SEE NOTE ON THIS SHEET AND DETAILS C & DON FOR ADDITIONAL REQUIREMENTS.

SECTION C-C
JUNCTION BOX JB-12

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. All mounds created in the planting pit shall consist of soil material from the pit excavation free of all stones and foreign material. Soil +2") or larger in any dimension.

2. Set top of root ball 25") to 50") higher than surrounding ground.

3. Attach collar straps to tree at a point not less than 50") of the height of the tree.

4. Space root contact fertilizer packets equally around the ball of roots and set 150") to 200") deep. Place 75") of tablets at the root zone approximately 15") to 20") deep.

5. Provide materials and construct as specified in Plan Set 2000, Section 2.

6. All dimensions are in millimeters unless otherwise noted. U.S. Customary units in ( ) parenthesis.

7. Use Type 2 or Type 3 bracing, as required.

8. For fertilizer packet schedule see Table B, on Sheet 2.

9. For fertilizer packet schedule see Table B, on Sheet 2.

10. 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

DIRECTOR, BUREAU OF DESIGN

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RECOMMENDED 06-27-2000
SAT. OF 2

SLOPE PLANTING DETAIL FOR DECIDUOUS AND EVERGREEN TREES
- Use Type 2 or Type 3 bracing, as required.
- For fertilizer packet schedule see Table B, on Sheet 2.

BALLEl AND BURLAPPED OR CONTAINER

BARE ROOT

SLOPE PLANTING DETAIL FOR DECIDUOUS AND EVERGREEN TREES
- Use Type 2 or Type 3 bracing, as required.
- For fertilizer packet schedule see Table B, on Sheet 2.
TABLE A
BRACING REQUIREMENTS

<table>
<thead>
<tr>
<th>TREE SIZE</th>
<th>DECIDUOUS</th>
<th>EVERTREEM</th>
<th>MINIMUM POST LINES</th>
<th>REQUIRED POST SIZES</th>
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<tr>
<td>2</td>
<td>60 TO 90 CAL</td>
<td>3/4 TO 3/4</td>
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<tr>
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<td>90 TO 120 CAL</td>
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<td>120 TO 150 CAL</td>
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<td>300 TO 350 CAL</td>
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<tr>
<td>2</td>
<td>600 TO 650 CAL</td>
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</tr>
<tr>
<td>2</td>
<td>650 TO 700 CAL</td>
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</tr>
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<td>700 TO 750 CAL</td>
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</tr>
<tr>
<td>2</td>
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