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. PS&E submissions to Central Office after July 16, 2001 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.

**RC-24M**
- (1 of 1) Section A-A. Changed Bituminous Binder Course, ID-2 to Bituminous Concrete Base Course.

**RC-28M**
- (1 of 1) Revised Table A. Revised the depth of the paving notch to be the same for bituminous or concrete.

**RC-31M**
- (1 of 2) The metric dimension, indicating the length of the Outlet Edwall, was changed from 1400 to 1371 mm

**RC-34M**
- (2 of 10) Revised Notes 1 and 7
- (4 of 10) Revised the dimension in Section B-B.
- (8 of 10) Revised Notes 2 and 9
- (9 of 10) Added Note 6. Existing Note 6 changed to Note 7.

**RC-39M**
- (3 of 5) Revised Note 1.
- (4 of 5) Revised Note 2.

**RC-52M**
- (3 of 6) Revised Note 5
- (4 of 6) Added Note 3
- (6 of 6) Added Notes for Case 1 and Case 2 to indicate that "For length of Need, See DM-2, Chapter 12."

**RC-53M**
- (1 & 2 of 2) The details in RC-53 were changed to reflect the modifications made of the Type 2 Weak Post Guide Rail in order to meet NCHRP Report 350 criteria.

The Weak Post system was crash tested at TTI and approved by the Federal Highway Administration.

The major changes are: 1) the top rail height was increased by 2" to 32". 2) Rail splices are located at mid-span rather than at a post.

**RC-54M**
- (1 of 7) Revised Note 4

**RC-57M, RC-58M**
- (5 of 7) Added Note 6 to indicate pay limits for the backslope Anchor Terminal.

**RC-59M**
- (6 of 7) Revised Note 3 and added Note 7 to indicate pay limits for the backslope Anchor Terminal.

**RC-66M**
- (1 of 1) Revised Section A-A (Conc. Alt.) to indicate that the corrugations can be milled or formed.

**RC-81M**
- (1 of 1) Revised Note 3.

**RC-82M**
- (1 of 1) Revised Note 3.

**CANCEL THE FOLLOWING:**
Index Sheet April 28, 2000
RC-24M April 28, 2000
RC-28M April 28, 2000
RC-52M April 28, 2000
RC-53M April 28, 2000
RC-54M April 28, 2000
RC-57M April 28, 2000
RC-58M April 28, 2000
RC-59M April 28, 2000
RC-66M April 28, 2000
RC-81M April 28, 2000
RC-82M April 28, 2000

**REQUEST ADDITIONAL COPIES FROM:**
Bureau of Office Services
Publications Sales Office
P.O. Box 2028
Middletown, PA 17120

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

Michael M. Ryan, P.E.
Deputy Secretary for Highway Administration
<table>
<thead>
<tr>
<th>STANDARD DRAWING NUMBER</th>
<th>DRAWING DATE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARTHWORK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC-10M</td>
<td>APR 28, 2000</td>
<td>CLASSIFICATION OF EARTHWORK</td>
</tr>
<tr>
<td>RC-11M</td>
<td>APR 28, 2000</td>
<td>CLASSIFICATION OF EARTHWORK FOR STRUCTURES</td>
</tr>
<tr>
<td>RC-12M</td>
<td>APR 28, 2000</td>
<td>BACKFILL AT STRUCTURES</td>
</tr>
<tr>
<td>RC-13M</td>
<td>APR 28, 2000</td>
<td>PAY LIMIT OF SUBBASE</td>
</tr>
<tr>
<td>PAVEMENTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC-20M</td>
<td>APR 28, 2000</td>
<td>CONCRETE PAVEMENT JOINT</td>
</tr>
<tr>
<td>RC-21M</td>
<td>APR 28, 2000</td>
<td>REINFORCED CONCRETE PAVEMENT</td>
</tr>
<tr>
<td>RC-23M</td>
<td>APR 28, 2000</td>
<td>BRIDGE APPROACH SLAB</td>
</tr>
<tr>
<td>RC-24M</td>
<td>APR 16, 2001</td>
<td>PAVEMENT RELIEF JOINT</td>
</tr>
<tr>
<td>RC-25M</td>
<td>APR 28, 2000</td>
<td>SHOULDERS</td>
</tr>
<tr>
<td>RC-26M</td>
<td>APR 28, 2000</td>
<td>CONCRETE PAVEMENT REHABILITATION</td>
</tr>
<tr>
<td>RC-27M</td>
<td>APR 28, 2000</td>
<td>PLAIN CONCRETE PAVEMENT</td>
</tr>
<tr>
<td>RC-28M</td>
<td>APR 16, 2001</td>
<td>OVERLAY TRANSITIONS AND PAYING NOTCHES</td>
</tr>
<tr>
<td>DRAINAGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC-30M</td>
<td>APR 28, 2000</td>
<td>SUBSURFACE DRAINS</td>
</tr>
<tr>
<td>RC-31M</td>
<td>APR 16, 2001</td>
<td>ENDSWALLS</td>
</tr>
<tr>
<td>RC-32M</td>
<td>APR 28, 2000</td>
<td>SLOPE PIPE FITTINGS, PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION</td>
</tr>
<tr>
<td>RC-33M</td>
<td>APR 28, 2000</td>
<td>END SECTIONS FOR PIPE CULVERTS</td>
</tr>
<tr>
<td>RC-34M</td>
<td>APR 16, 2001</td>
<td>INLETS</td>
</tr>
<tr>
<td>RC-35M</td>
<td>APR 28, 2000</td>
<td>DRAINAGE Dike</td>
</tr>
<tr>
<td>RC-36M</td>
<td>APR 28, 2000</td>
<td>SPRING BOXES</td>
</tr>
<tr>
<td>RC-39M</td>
<td>APR 16, 2001</td>
<td>STANDARD MANHOLES</td>
</tr>
<tr>
<td>RC-40M</td>
<td>APR 28, 2000</td>
<td>SLOPE PROTECTION</td>
</tr>
<tr>
<td>RC-43M</td>
<td>APR 28, 2000</td>
<td>GABIONS</td>
</tr>
<tr>
<td>POLLUTION CONTROL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC-70M</td>
<td>APR 28, 2000</td>
<td>EROSION AND SEDIMENT POLLUTION CONTROL</td>
</tr>
<tr>
<td>HIGHWAY LIGHTING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC-80M</td>
<td>APR 28, 2000</td>
<td>HIGHWAY LIGHTING-FOUNDATIONS</td>
</tr>
<tr>
<td>RC-81M</td>
<td>APR 16, 2001</td>
<td>HIGHWAY LIGHTING-JUNCTION BOXES-LIGHT DUTY</td>
</tr>
<tr>
<td>RC-82M</td>
<td>APR 16, 2001</td>
<td>HIGHWAY LIGHTING-JUNCTION BOXES-HEAVY DUTY</td>
</tr>
<tr>
<td>RC-83M</td>
<td>APR 28, 2000</td>
<td>HIGHWAY LIGHTING-LIGHTING POLE DETAILS</td>
</tr>
<tr>
<td>RC-84M</td>
<td>APR 28, 2000</td>
<td>HIGHWAY LIGHTING-LIGHTING AND ELECTRICAL DETAILS</td>
</tr>
<tr>
<td>ROADSIDE DEVELOPMENT AND PLANTING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC-91M</td>
<td>APR 28, 2000</td>
<td>BRACING AND PLANTING DETAILS</td>
</tr>
</tbody>
</table>
### Schedule of Reinforcement Steel

<table>
<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>SPACING C-C</th>
<th>LENGTH</th>
<th>NUMBER REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>#14(4)</td>
<td>300 (12&quot;)</td>
<td>3.2 m (10'-6&quot;)</td>
<td>#/O. 3</td>
</tr>
<tr>
<td>B</td>
<td>#14(4)</td>
<td>300 (12&quot;)</td>
<td>W/100 (4&quot;)</td>
<td>5</td>
</tr>
<tr>
<td>C</td>
<td>#14(4)</td>
<td>150 (6&quot;)</td>
<td>2.0 m (6'-6&quot;)</td>
<td>#/O. 2/2</td>
</tr>
<tr>
<td>D</td>
<td>#14(4)</td>
<td>300 (12&quot;)</td>
<td>W/150 (6&quot;)</td>
<td>1</td>
</tr>
</tbody>
</table>

### 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 HEC.)
3. Include portions of reinforcing bars which are located outside the indicated pay lines in bid price for pavement relief joint.
4. When the pavement grade causes drainage towards the bridge, place a subgrade drain (see RC-30M) under the 150 (6") portion of the subslab. Measure and pay for as specified in Publication 408, Section 612.
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 ( ) parenthesis.

Note: Either all metric or all English values must be used on plans. Metric and English values shown may not be mixed.
OVERLAY TRANSITION WITH PAVING NOTCH ON CONCRETE AND BITUMINOUS PAVEMENTS

PLAN VIEW

SUPERELEVATION SECTION

OVERLAY TRANSITIONS

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

TABLE A

<table>
<thead>
<tr>
<th>FUNCTIONAL CLASSIFICATION</th>
<th>SLOPE (MAXIMUM)</th>
<th>PAVING NOTCH (MINIMUM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERSTATE AND OTHER</td>
<td>0.175% (+5°)</td>
<td>0.0%</td>
</tr>
<tr>
<td>LIMITED ACCESS FREEWAYS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARTERIALS 70 + 85 MPH</td>
<td>0.25% (+5°)</td>
<td>5 m</td>
</tr>
<tr>
<td>SEE NOTE 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARTERIALS 50 + 65 MPH</td>
<td>0.33% (+5°)</td>
<td>3 m</td>
</tr>
<tr>
<td>SEE NOTE 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLLECTORS AND LOCAL ROADS</td>
<td>0.33% (+5°)</td>
<td>3 m</td>
</tr>
<tr>
<td>CROSS STREETS</td>
<td>6.33% (+5°)</td>
<td>3 m</td>
</tr>
<tr>
<td>SEE NOTE 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRIVEWAYS</td>
<td>6.33% (+5°)</td>
<td>3 m</td>
</tr>
<tr>
<td>NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES

1. USE HIGHER APPROPRIATE CRITERIA IF A CROSS STREET HAS A FUNCTIONAL CLASSIFICATION OF COLLECTORS AND LOCAL ROADS OR HIGHER.
2. USE 85TH PERCENTILE SPEED, IF AVAILABLE. OTHERWISE, USE THE POSTED SPEED.
3. PLACE EDGE FLUSH WITH EXISTING PAVEMENT AND SEAL AS SPECIFIED IN PUBLICATION 408, SECTION 401.3(j3).
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

OVERLAY TRANSITIONS AND PAVING NOTCHES
NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND SECTION 714.

2. THIS STANDARD DEPICTS THE SHAPE AND DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. DETAILS ONLY ITM THE GLB 14, LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS TO THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.

3. USE CLASS CONCRETE OR BETTER AND PIPE EXPOSED EYES AT 2.5".

4. PROVIDE PIPE OPENING SIZE IN PRECAST UNITS AT LEAST 0.75" NOT MORE THAN 10% LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE.

5. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING AND INSTALLATION OF PRECAST ENDWALLS. SIZE SINGLE METAL DEVICES AS SPECIFIED IN PUB 408/2000 SECTION 1102.

6. PROVIDE NON-DURABLE EPOXY介紹 THROUGHOUT THE CONTACT SURFACE, WHEN CONNECTING WING AND HEADWALL SECTION TO BASE SECTION. PROVIDE JOINT SEALANT MATERIAL ALONG INTERFACE BETWEEN WING AND HEADWALL SECTION AND BASE SECTION.

7. PROVIDE MINIMUM OF 25 (1") PLACED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES, WHEN REQUIRED.

8. PROVIDE REINFORCEMENT, #10 (#3) BARS, 2.5D1:=-500 (10") TYPED ENDWALL, COVER WITH CEMENT SLURRY OR BITUMINOUS PAINT.

9. THE SLOPED SUBSURFACE DRAIN OUTLET ENDWALL IS DESIGNATED FOR INSTALLATION ALONG INTERSTATES AND EXPRESSWAYS. USE CAST IN PLACE CONCRETE OR PRECAST CONCRETE FOR UNIFORMITY AND COMPATIBILITY. PERMIT ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15, FOR UNIFORMITY AND COMPATIBILITY. PERMIT ONLY ITEMS.

10. 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.
GRADE ADJUSTMENT RING, SEE NOTE 5.

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

INLETS
INLET ASSEMBLIES
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 DRAWING FOR APPROVAL.

2. MOLD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02(R).

3. PROVIDE TRANSVERSE BARS MEETING THE REQUIREMENTS OF PUBLICATION 408.

4. PROVIDES BICYCLE-SAFE, STRUCTURAL STEEL OR CAST IRON VANE GRATES FOR INSTALLATION WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CORRIDORED AREAS OR CULS-DE-SACS, EITHER IN TOWNS OR MUTCD DESIGNATED BIKE PATHS OR HEMING BIKE LINES. ALTERNATE BICYCLE-SAFE GRATE DESIGNS MAY 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.

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

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

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

RC-34M
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, SUCH AS CEMMI ROADWAYS IN URBAN AREAS OR HIGWAYS SPECIFICALLY ESTABLISHED AND SIGNED AS BIKE LANE OR HAVING BIKE LANE. ALTERNATE BICYCLE-SAFE VANE 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, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. Provide materials and construction in accordance with the requirements of Publication No. 519, Section No. 6 and Appendix, except for vane and grade adjustment systems supplied by a manufacturer listed in Bulletin 15. 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. Use full-length continuous welds on box top and bottom flanges. Make the inner weld a bevel weld.
   c. Weld two flanges of the grate and have the outer weld a fillet weld.
   d. Provide an adjustment ring which is flush with cover and does not allow excessive movement.
   e. Provide radius of 1/8" typical for all fillets and rounds, unless noted.

4. Provide metric or English values. Metric and English values shown may not be mixed.

5. Attache 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 an alternate to structural steel grates provided they are supplied by a manufacturer listed in Bulletin 15 and approved for HS-25 loading. CAST IRON GRATES NOT APPROVED FOR HS-25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANE AT THE EDGE OF OUTSIDE SHOULDER, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.
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.

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.
CONTRACT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 415, SECTION 603 AND SECTION 114.

Provide inlets with a minimum height to be the cross-connection. When the required depth exceeds 2700 mm (9') from special details and design for the inlet walls and base, construct inlets that exceed 1500 mm (5') in height with steps similar to manholes (RC-34M).

When a situation cannot be satisfied by the modified inlet boxes shown, provide special details and design.

For orientation of the type C inlet box with modified type C inlet box, the typical installation details are given below. Open any variation on the construction drawings by special details.

Provide inlet boxes with a maximum height to be the grade elevation. Provide a minimum height of 508 mm (20") measured from the top surface of the top unit to the edge of the pipe opening. Provide inlets with a maximum height to be the grade elevation. Provide a minimum height of 508 mm (20") measured from grade is less than 2750 mm (9') - 0". A cover section may be utilized.

The top surface of the top unit to the inside top of the pipe when the top unit and either a modified type I or a modified type II inlet box are constructed monolithically.

For that portion of the inlet assembly where the depth measured from grade is less than 2750 mm (9' - 0") a cover section may be utilized.

Provide only precast modified inlet boxes supplied by a manufacturer listed in Bulletin 15.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS MODIFIED INLET BOXES (CAST-IN-PLACE AND PRECAST)

PIPE OPENING DETAILS

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

BUREAU OF DESIGN
RECOMMENDED: APR 1, 2001
MODIFIED: APR 1, 2001
SHEET: A OF 30

RC-34M
NOTES
1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION AND SECTION 605.
2. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY, PERMITTED FOR GRATES SUPPLIED BY MANUFACTURERS LISTED IN BULLETIN 15.
3. PROVIDE STRENGTH-LEVEL SLIDES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION AND SECTION 605.
4. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A BEARING AREA FOR THE GRATES ON TYPE D-H INLETS WHICH SEAT THE GRATES DIRECTLY WITHIN THE UNIT.
5. FOR PIPE LOCATION AND MAXIMUM ALLOWABLE SIZES, SEE SHEET 8.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
1. PROVIDE MANHOLE FRAMES AND COVERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2. DESIGN MANHOLE FRAME AND GRADE ADJUSTMENT RISERS FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT. SUBMIT SHOP DRAWINGS FOR APPROVAL.

2. PROVIDE MANHOLE FRAMES, COVERS AND GRADE ADJUSTMENT RISERS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. PROVIDE SHOP DRAWINGS FOR APPROVAL.

3. PROVIDE A GASKET SEALING SYSTEM, DOVETAIL GROOVE AND CONTINUOUS GASKET TO PREVENT INFLOW WHEN MANHOLE LID IS REMOVED. PROVIDE TWO (2) LIFT HOLES AT 180° TO FACILITATE COVER REMOVAL FOR SELF-SEALING MANHOLE COVERS.

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

5. PROVIDE MANHOLE FRAMES AND GRADE ADJUSTMENT RISERS TO HAVE A MINIMUM BEARING SEAT OF 25 (1") FOR COVER.

6. PROVIDE MANHOLE FRAME MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 606, AND AS MODIFIED HEREBY:

A. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASURED AND/or PRECUT MATERIALS SUPPLIED WITH EACH ORDER. B. MANUFACTURE BAR STOCK AND PRECUT METAL TO MEET THE CANADA STANDARD CAN/CSA A244.0 AND CAN/CSA A244.0M-06. C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) TO FACILITATE COVER REMOVAL. D. ATTACH FRAME AND/or PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 THREADED STUDS WITH HEX HEAD SCREWS AT 120° AND 50 (2") FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 102 (4") MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE. SET THE BASE OF THE FRAME AND/OR PRECAST CONCRETE GRADE RINGS IN A BED OF CEMENT MORTAR. F. SET THE TOP OF THE FRAME FRAME IN A BED OF CEMENT MORTAR. G. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 606, AND AS MODIFIED HEREIN:

A. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASURED AND/or PRECUT MATERIALS SUPPLIED WITH EACH ORDER. B. MANUFACTURE BAR STOCK AND PRECUT METAL TO MEET THE CANADA STANDARD CAN/CSA A244.0 AND CAN/CSA A244.0M-06. C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) TO FACILITATE COVER REMOVAL. D. ATTACH FRAME AND OR PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 THREADED STUDS WITH HEX HEAD SCREWS AT 120° AND 50 (2") FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 102 (4") MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE. SET THE BASE OF THE FRAME FRAME IN A BED OF CEMENT MORTAR. G. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 606, AND AS MODIFIED HEREIN:

A. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASURED AND/or PRECUT MATERIALS SUPPLIED WITH EACH ORDER. B. MANUFACTURE BAR STOCK AND PRECUT METAL TO MEET THE CANADA STANDARD CAN/CSA A244.0 AND CAN/CSA A244.0M-06. C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) TO FACILITATE COVER REMOVAL. D. ATTACH FRAME AND OR PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 THREADED STUDS WITH HEX HEAD SCREWS AT 120° AND 50 (2") FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 102 (4") MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE. SET THE BASE OF THE FRAME FRAME IN A BED OF CEMENT MORTAR. G. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 606, AND AS MODIFIED HEREIN:

A. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASURED AND/or PRECUT MATERIALS SUPPLIED WITH EACH ORDER. B. MANUFACTURE BAR STOCK AND PRECUT METAL TO MEET THE CANADA STANDARD CAN/CSA A244.0 AND CAN/CSA A244.0M-06. C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) TO FACILITATE COVER REMOVAL. D. ATTACH FRAME AND OR PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 THREADED STUDS WITH HEX HEAD SCREWS AT 120° AND 50 (2") FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 102 (4") MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE. SET THE BASE OF THE FRAME FRAME IN A BED OF CEMENT MORTAR. G. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 606, AND AS MODIFIED HEREIN:

A. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASURED AND/or PRECUT MATERIALS SUPPLIED WITH EACH ORDER. B. MANUFACTURE BAR STOCK AND PRECUT METAL TO MEET THE CANADA STANDARD CAN/CSA A244.0 AND CAN/CSA A244.0M-06. C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) TO FACILITATE COVER REMOVAL. D. ATTACH FRAME AND OR PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 THREADED STUDS WITH HEX HEAD SCREWS AT 120° AND 50 (2") FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 102 (4") MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE. SET THE BASE OF THE FRAME FRAME IN A BED OF CEMENT MORTAR. G. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 606, AND AS MODIFIED HEREIN:

A. CUSTOM FABRICATE EACH ADJUSTMENT RISER FROM MEASURED AND/or PRECUT MATERIALS SUPPLIED WITH EACH ORDER. B. MANUFACTURE BAR STOCK AND PRECUT METAL TO MEET THE CANADA STANDARD CAN/CSA A244.0 AND CAN/CSA A244.0M-06. C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) TO FACILITATE COVER REMOVAL. D. ATTACH FRAME AND OR PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 THREADED STUDS WITH HEX HEAD SCREWS AT 120° AND 50 (2") FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 102 (4") MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE. SET THE BASE OF THE FRAME FRAME IN A BED OF CEMENT MORTAR.
1. DESIGN REQUIREMENTS:

A. DESIGN SPECIFICATIONS: DESIGN DIVISION 1 OF AASHTO, STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 1992, INCLUDING THE REVISED EDITION (INCLUDING LATEST REVISIONS). ASTM C 478M-90, STANDARD SPECIFICATIONS FOR PRECAST CONCRETE MANHOLE SECTIONS.

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

C. THE SAFE BEARING PRESSURE IS NOT TO EXCEED THE EXISTING LOADS AS APPROVED BY THE DEPARTMENT. ADJACENT TO A ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS.

D. DESIGN THE MANHOLE FOR LIVE LOADS AS APPROVED BY THE DEPARTMENT.

E. DESIGN THE MANHOLE FOR A LIVE LOAD OF PH 93 (HS25 60 TONNS) AT 20.3 M (66') CAPACITY.

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.

H. DESIGN THE MANHOLE FOR A LIVE LOAD OF PH 93 (HS25 60 TONNS) AT 20.3 M (66').

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

J. 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. T ANGLE OF INTERNAL FRICTION = 33°.

D. DETERMINE MAXIMUM VERTICAL LOAD APPLIED TO MANHOLE AT DEPTH "H".

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

F. CHECK CRACK CONTROL UNDER SERVICE LOAD CONDITIONS.

3. HOOP STEEL:

A. DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS USING FIGURE 2 AND FIGURE 3. PHH MAX NOT TO BE GREATER THAN ONE-HALF OF PHH MIN.

B. DESIGN HOOP REINFORCEMENT SHOWING THIN AND THICK HOOP STEEL IN SECTION A-A TO CARRY THE MOMENT AND AXIAL THRUST.

C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

D. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

E. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

F. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

G. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

H. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

I. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

J. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

K. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

L. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

M. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

N. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

O. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

P. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

Q. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

R. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

S. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

T. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

U. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

V. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

W. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

X. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

Y. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

Z. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

4. FOOTING DESIGN:

A. DETERMINE FOOTING SITE LAYOUT TO EQUIVALENT CIRCULAR FOOTING FOR DESIGN.

B. CIRCULAR FOOTING NEEDS TO CARRY MAXIMUM MOMENTS AND AXIAL THRUSTS.

C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

E. C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

M. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

O. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

Q. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

S. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

U. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

W. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

Y. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

A. DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS USING FIGURE 2 AND FIGURE 3. PHH MAX NOT TO BE GREATER THAN ONE-HALF OF PHH MIN.

B. DESIGN HOOP REINFORCEMENT SHOWING THIN AND THICK HOOP STEEL IN SECTION A-A TO CARRY THE MOMENT AND AXIAL THRUST.

C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

D. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

E. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

F. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

G. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

H. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

I. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

J. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

K. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

L. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

M. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

N. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

O. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

P. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.

Q. AT REST PRESSURE DIAGRAM TO DETERMINE PHH MAX.
POST DETAILS

NOTE:
- OTHERWISE NOTED.
- ALL HOLES ARE ROUTED WOOD OR PLASTIC Y4 " THICKNESS IS 3/4 " TYP.
- 2 OPTIONAL HOLES FOR MEDIAN BARRIER APPLICATIONS.
- FOR MEDIAN BARRIER APPLICATIONS.
- FOR RUB RAIL OPTIONAL HOLE 128 (5"
- (SEE NOTE 3).

GUIDE RAIL WITH CURB OR RUBBING RAIL

RAIL ELEMENT

SECTION B-B

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

NOTE:
- PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
- PROVIDE STEEL I-BEAM W150x13.5 (W6"x 8.5) FOR STRONG POST MEDIAN BARRIER APPLICATIONS.
- PROVIDE RUBBING RAIL WHEN THE HEIGHT OF STRONG POST GUIDE RAIL IS OVER 710 OVER 710 IN TRANSITION AREAS TO EXISTING GUIDE RAIL.
- ATTACH W-BEAM RAIL ELEMENTS TO EACH POST. SPLICE RAIL ELEMENTS ONLY AT POSTS AND LAP IN THE DIRECTION OF TRAFFIC.
- INSTALL GUIDE RAIL DELINEATORS IN ACCORDANCE WITH TC-7604.
- INSTALL GUIDE RAIL DELINEATORS IN ACCORDANCE WITH TC-7604.
- FOR STRONG POST MEDIAN BARRIER APPLICATIONS, THE INSTALLATION IS A MIRROR IMAGE ON EACH SIDE OF THE POST.
TERMINAL TO BE PLACED ON BACK
OF RAIL ELEMENT

TERMINAL TO BE PLACED ON FACE
OF RAIL ELEMENT

ALTERNATE TERMINAL SECTIONS

** PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND
** FIGHTER ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE.
** CENTER SPLICE BOLTS IN THE SLOTTED HOLES. SEE CURRENT BRIDGE
** CONSTRUCTION DRAWINGS, BC-739M, FOR ATTACHMENT DETAILS.

DETAIL A

** PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND
** FIGHTER ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE.
** CENTER SPLICE BOLTS IN THE SLOTTED HOLES. SEE CURRENT BRIDGE
** CONSTRUCTION DRAWINGS, BC-739M, FOR ATTACHMENT DETAILS.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 STRONG POST
GUIDE RAIL

** PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND
** FIGHTER ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE.
** CENTER SPLICE BOLTS IN THE SLOTTED HOLES. SEE CURRENT BRIDGE
** CONSTRUCTION DRAWINGS, BC-739M, FOR ATTACHMENT DETAILS.

TERMINAL SECTION BRIDGE CONNECTION
POSITIONING OF ROTATING BRACKET

<table>
<thead>
<tr>
<th>TABLE A</th>
<th>WEIGHT OF POST</th>
<th>430</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>
<td></td>
</tr>
</tbody>
</table>

NOTES

1. PAYMENT FOR TYPE 2 STRONG POST END TREATMENT INCLUDES 11430 (37'-6") OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.

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

3. ONLY THE NECESSARY DIMENSIONS, FOR UNIFORMITY AND INTERCHANGEABILITY OF ROTATING BRACKETS, ARE INDICATED. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.

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

5. TYPE 2 STRONG POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF ANY GUIDE RAIL ON NON-HHS HIGH-SPEED, HIGH-VOLUME ROUTES. USE CRASHWORTHY END TREATMENTS ON ALL HHS ROUTES AND ON NON-HHS ROADWAYS WITH TO MAINTAIN A MORT-PROOFED SPEED LIMIT 8 AND 100 MPH CURRENT TRAFFIC. 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

#### Section A-A
- Required grade width: 0.6 m (24"
- Shoulder: 3.6 m (12")
- Embankment: 300 m (10')
- Rounding: 1.5 m (5')
- At termination point: 1.5 m (5')

#### Section B-B
- Shoulder: varies

#### Section C-C
- Shoulder: varies

### 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. Earthmounds may be used to bury guide rail on highways with posted speeds less than 70 mph (112 kph), and with current traffic volume less than 4000 vehicles per day or when they are constructed outside the clear zone as determined in Part 18, Design Manual Part 3, Chapter 13.

### Table B
**Flare Rates for Barrier Design**

<table>
<thead>
<tr>
<th>Design Speed (Kmph)</th>
<th>Maximum Flare Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>5 x 1</td>
</tr>
<tr>
<td>110</td>
<td>10 x 1</td>
</tr>
<tr>
<td>100</td>
<td>15 x 1</td>
</tr>
<tr>
<td>90</td>
<td>20 x 1</td>
</tr>
<tr>
<td>80</td>
<td>25 x 1</td>
</tr>
<tr>
<td>70</td>
<td>30 x 1</td>
</tr>
<tr>
<td>60</td>
<td>35 x 1</td>
</tr>
<tr>
<td>50</td>
<td>40 x 1</td>
</tr>
</tbody>
</table>

### Commonweal of Pennsylvania
Department of Transportation

**Type 2 Strong Post**

**Guide Rail End Treatments**

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

**Recommended:** April 10, 2001

**SHT. A OF 5:**

**RC-52M**
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
SPECIAL DESIGN

TYPE 2 STRONG POST
GUIDE RAIL
POSTS AND OFFSET BRACKETS

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

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.

2. WOOD POSTS ARE TO BE USED FOR ENO 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

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.
6. USE 12" BACKING PLATES FOR THE W-BEAM RAIL ELEMENTS AT ALL POSTS.

SECTION A-A

DETAIL C

BASE PLATE

USE BASE PLATE FOR 12½" H POST BOLT AND NUT, ASTM F 2284, CLASS 4.6. 60 (1 ¼") THICK COLD FORMED CHANNEL POST, ALUMINUM ALLOY POST AND S75 (3½") BOLTS.

SECTION B-B

TYPICAL INSTALLATION

W-BEAM RAIL ELEMENT

AT MID-SPAN SPLICE

OVER UNDERGROUND STRUCTURES

GUIDE RAIL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY

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.
2. SEE RC-52M, FOR END TREATMENT BURIED

NOTES
1. TYPE 2 WEAK 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 SUCH ROUTES AND ON NON-HIGH-SPEED HIGH-VOLUME ROUTES WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE TYPE 2-WEAK POST END TREATMENTS.

2. SEE RC-52M, FOR END TREATMENT BURIED INTO EARTH MOUNDS.

1. TYPE 2 WEAK 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 SUCH ROUTES AND ON NON-HIGH-SPEED HIGH-VOLUME ROUTES WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE TYPE 2-WEAK POST END TREATMENTS.

2. SEE RC-52M, FOR END TREATMENT BURIED INTO EARTH MOUNDS.

- COMMONWEALTH OF PENNSYLVANIA
- DEPARTMENT OF TRANSPORTATION
- BUREAU OF DESIGN
IF TYPE ‘2-S‘ GUIDE RAIL IS USED AT THE OBSTRUCTION, THIS SECTION OF GUIDE RAIL IS NOT REQUIRED.

OR TYPE ‘2-S‘ POST ANCHORAGE SHOULDER TREATMENT, SEE RC-52M SHT. 3

TYPE ‘2-S‘ GUIDE RAIL

SEE TABLE 1.

WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE

TABLE 1

<table>
<thead>
<tr>
<th>TYPE OF GUIDE RAIL</th>
<th>REQUIRED CLEARANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-S</td>
<td>0.3 m (1'-0&quot;)</td>
</tr>
<tr>
<td>2-SC</td>
<td>0.6 m (2'-0&quot;)</td>
</tr>
<tr>
<td>2-W</td>
<td>0.9 m (3'-0&quot;)</td>
</tr>
<tr>
<td>2-MC</td>
<td>1.2 m (4'-0&quot;)</td>
</tr>
<tr>
<td>2-WC</td>
<td>1.5 m (5'-0&quot;)</td>
</tr>
<tr>
<td>2-W</td>
<td>2.1 m (7'-0&quot;)</td>
</tr>
</tbody>
</table>

8 METER MINIMUM OBSTRUCTED DISTANCE FROM FACE OF GUIDE RAIL POST TO FACE OF OBSTRUCTION.

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

<table>
<thead>
<tr>
<th>FLARE RATES FOR BARRIER DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESIGN SPEED</td>
</tr>
<tr>
<td>km/h</td>
</tr>
<tr>
<td>120</td>
</tr>
<tr>
<td>110</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>90</td>
</tr>
<tr>
<td>80</td>
</tr>
<tr>
<td>70</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>50</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. HOWEVER, FOLLOW RECOMMENDED GUIDELINES IN 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-58M.

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

TRAFFIC DIRECTION FOR FLARE RATE, SEE TABLE 2, SHEET 2

1: 10 (10: 1) SLOPE MAX.

EDGE OF SHOULDER (NO CURB)

TREATMENT AT OBSTRACTIONS FOR

MEDIAN WIDTHS GREATER THAN 6.0 m (20'-0")
WHERE CONTINUOUS BARRIER IS NOT REQUIRED

TREATMENT AT OBSTRACTIONS FOR

MEDIAN WIDTHS GREATER THAN 10.0 m (30'-0")
WHERE CONTINUOUS BARRIER IS NOT REQUIRED

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BARRIER PLACEMENT
AT OBSTRUCTIONS

RECOMMENDED APR. 18, 2001
RECOMMENDED APR. 18, 2001
SHEET 1 OF 2
RC-54M
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
EARTH MOUNDS

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
EARTH MOUNDS

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
EARTH MOUNDS

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. A 4:1 (0:41) BACK SLOPE IS DESIRABLE. HOWEVER, STEEPER SLOPES MAY BE USED.
2. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN TO MAINTAIN A 4:1 (18") MAXIMUM DEVIATION FROM GROUND ELEVATION TO BOTTOM OF THE RAIL ELEMENT.
3. WHEN THE GUIDE RAIL LENGTH OF NEED FALLS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO ANCHOR THE GUIDE RAIL TO THE CUT SLOPE.
4. THE ANCHOR TERMINAL HAS BEEN CRASH TESTED TO CRITERIA FOR A 1:6 (6:1) SLOPE. IT CAN BE ANCHORED WITH A CONCRETE BLOCK OR A POST ANCHOR.
5. PROVIDE 2330 (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 ANCHORAGE, 3810 (12' - 6") OF RAIL ELEMENT AND HARDWARE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL
BACKSLOPE
ANCHOR TERMINAL
(NEW CONSTRUCTION OR RECONSTRUCTION)
GENERAL NOTES:

1. A 1:4 (4:1) BACK SLOPE IS DESIRABLE. HOWEVER, STEEPER SLOPES MAY BE USED.
2. THE TOP OF THE W-BEAM RAIL IS HELD CONSTANT RELATIVE TO THE ROADWAY PROFILE GRADE. WHEN THE DISTANCE BETWEEN THE GROUND AND BOTTOM OF THE TOP RAIL EXCEEDS 1100 (4.33') AND IS INCREASING, MAXIMUM HEIGHT OF DOUBLE RAIL SYSTEM IS 1100 (4.33'). TAPER BOTH RAILS TO MAINTAIN MAXIMUM HEIGHT. PLANE RATE FOR THE RAIL IS 12 (1:10).
3. USE 2449 (8' -0") LONG POSTS FOR ALL POST LOCATIONS WITH A DOUBLE RAIL. POSTS FOR THE POST ANCHOR ARE 1830 (6' -0") LONG.
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. THE BACKSLOPE ANCHOR TERMINAL HAS BEEN CRASH TESTED TO CRITERIA FOR A 1:6 (6:1) SLOPE [rehab.] AND A 1:10 (1:10) SLOPE [new construction]. IT CAN BE ANCHORED WITH A CONCRETE BLOCK OR A POST ANCHOR.
6. PROVIDE 23.0 (75' -0") MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE SWALE LINE TO THE BEGINNING OF THE HAZARD.
7. BACKSLOPE ANCHOR TERMINAL PAY LIMIT INCLUDES THE CONCRETE OR POST ANCHORAGE, 381 (12' -6") OF RAIL ELEMENT POSTS AND HARDWARE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

GUIDE RAIL
BACKSLOPE ANCHOR TERMINAL
(Rehab. Projects)
ONLY IF PLATE IS BOLTED TO POST.

BE FIELD DRILLED 50 (2") TO STEEL PLATE WITH 22 (1/2") HEX BOLTS LONG WITH HEX NUTS.

CONCRETE BLOCK ANCHOR

WOOD BLOCK

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 CONCRETE MEDIAN BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.

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 REFLECTION UNIT) AS DETERMINED ON A PROJECT-BY-PROJECT BASIS.

6. COMPACT NO. 2A OR NO. 2G MATERIAL IN ACCORDANCE WITH PUBLICATION 408, SECTION 350. A LAYER 25/6 (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 AND IN PERMANENT INSTALLATIONS.

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 PENNSDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.

11. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A SMOOTH FINISH AT THE BOTTOM SURFACE, BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM WITH STEPPED, WIDE DRUM OR SPECIAL TEMPLATE IN A LATTICE DIRECTION TO REDUCE SPREADS APPROXIMATELY 4 1/16 (1") IN DEPTH.

TYPICAL PRECAST BARRIER

FOR DIMENSIONS AND DETAILS, SEE REMAINING SHEETS OF THIS STANDARD.

TYPICAL CAST-IN-PLACE BARRIER

FOR CONSTRUCTION DETAILS, SEE SHEET 5.

TYPICAL REFLECTOR UNIT, SEE NOTE 5.

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.
A typical end transition may be used for permanent barrier installations. See Section A-A for stirrups.

Refer to Table 1, Sheet 3, for flare rate requirements.

End of parallel ramps or T intersections, a 2:1 zone, as determined in Publication 13M, Design Manual, Part 2, Chapter 12.

If any of the following conditions are satisfied:

- An impact attenuating device is not required if any of the following conditions are satisfied:
  1. The barrier is extended at the proper plate rate until the end of the barrier system is located outside the required clear zone as determined in Publication 13M, Design Manual, Part 2, Chapter 12.
  2. The barrier is extended at the proper plate rate until the end of the barrier system can be buried in a cut section.
  3. The barrier is extended at the proper plate rate until the end of the barrier system is properly connected on overlaps with existing guide rail.

Refer to Table 1, Sheet 3, for flare rate requirements.

Notes:

1. 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. The clear zone is determined at the end of parallel ramps or T intersections. A 2:1 (1"/1") end transition may be used when the legal speed is 60 km/h (35 mph) or less. For barrier installations where the legal speed is 60 km/h (35 mph) or less, for barrier installations, an impact attenuating device is not required if any of the following conditions are satisfied:
   1. The barrier is extended at the proper plate rate until the end of the barrier system is located outside the required clear zone as determined in Publication 13M, Design Manual, Part 2, Chapter 12.
   2. The barrier is extended at the proper plate rate until the end of the barrier system can be buried in a cut section.
   3. The barrier is extended at the proper plate rate until the end of the barrier system is properly connected on overlaps with existing guide rail.

Refer to Table 1, Sheet 3, for flare rate requirements.

2. Providing suitable lifting devices for handling, installing and removing precast concrete barriers. Galvanized metal devices as specified in Publication 408, Section 1105.02.

3. Providing reinforcement steel meeting the requirements of Publication 408, Section 709 with a minimum concrete cover of 40 (1") net.

4. Epoxy coated reinforcement is not required when precast concrete median barrier is to be used in temporary installation only, in accordance with Section 1105.04, and identified as such, as specified in Section 627, and identified as such, as specified in Section 714.5(1).

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.
DETAIL A

DELINEATION OF IMPACT ATTENUATING DEVICES

- IMPACT ATTENUATING DEVICE
- CLEARANCE MARKER W16-2R & 2L
- STEEL PLATE, SEE NOTE 1.
- W16-2R & 2L

SLOT DETAIL

PERMISSIBLE TAPER

SLOTTED PLATE CONNECTION

TABLE 1

<table>
<thead>
<tr>
<th>Flare Rate for Barrier Design</th>
<th>Design Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km/h (mph)</td>
</tr>
<tr>
<td></td>
<td>(55)</td>
</tr>
<tr>
<td></td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concrete Guide Rail Flare Rates</th>
<th>20 x 1</th>
<th>15 x 1</th>
<th>14 x 1</th>
<th>13 x 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCRETE TOP UNIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INLET BOX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAST IRON GRATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES

1. PROVIDE PLATES, 13 x 305 x 645 (1/2" x 12" x 25"), MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02(1). GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(1).

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. PROVIDE SENSITIVE SHEETING, WITHOUT RIGID BACKING, DIRECTLY TO BARRIER FRONT OR NOSE SECTION. DO NOT POST-MOUNT MARKERS IN FRONT OF IMPACT ATTENUATING DEVICES. MARKERS ARE PROVIDED IN WHOLE NUMBERS 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" X 36"). PROVIDE COLOR FOR CLEARANCE MARKERS AS FOLLOWS:

- (AI) MESSAGE = BLACK STRIPES (NON-REFLECTORIZED)
- (BI) FIELD = YELLOW (REFLECTORIZED) ORANGE (REFLECTORIZED), CONSTRUCTION ZONES

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

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.
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 #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.
NOTES
1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2") EXCEPT AS SHOWN.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE RWF 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
NOTE

FOR ALTERNATE WWP 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.
1. PROVIDE SINGLE FACE CONCRETE BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.

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 DELINERATORS, AS INDICATED ON RC-58M.

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.

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

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
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER

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

SINGLE FACE CONCRETE BARRIER
F-SHAPE

TYPICAL ROUGH ROCK TREATMENT

TYPICAL DRAINAGE TREATMENT

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.
### Typical Noncontinuous Single-Face Barrier Treatment at Piers

For flare rates, see Table 1.

**TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED**

#### Notes
1. Provide single face concrete barrier and guide rail meeting the requirements of Publication 408, Sections 620 and 623.
2. The treatments shown are for four-lane divided highways. Use the approach end treatment on both sides of the obstruction on two-lane facilities with two-way traffic.
3. If the preferred treatment is to terminate the concrete barrier within the clear zone, bury it into the existing slope. Provide a 1:10 (2:1) and foot deep concrete barrier, or use an impact attenuating device.

#### Table 1: Plan View 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>110</td>
<td>70</td>
</tr>
<tr>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>90</td>
<td>55</td>
</tr>
<tr>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>70</td>
<td>45</td>
</tr>
<tr>
<td>60</td>
<td>40</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.

---

**Commonwealth of Pennsylvania**

**Department of Transportation**

**Bureau of Design**

**Single Face Concrete Barrier**

**F-Shape Placement at Shoulder Piers**
1. Refer to Bridge Standard Drawings (BD-601MJ) 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-2.

4. Provide No. 57 coarse aggregate that meets the requirements of Publication 448, 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, geotextiles or other suitable material.

6. Round or chamfer all edges with a radius of 25 (1") except as shown.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
SINGLE FACE CONCRETE BARRIER
F-SHAPE
PLACEMENT AT MEDIAN PIERS

USE 20 1/2" EXPANSION JOINT MATERIAL AROUND ALL PIERS.
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 (mph)</td>
<td>CONCRETE BARRIER</td>
</tr>
<tr>
<td>120</td>
<td>175 : 1</td>
</tr>
<tr>
<td>110</td>
<td>170 : 1</td>
</tr>
<tr>
<td>100</td>
<td>160 : 1</td>
</tr>
<tr>
<td>90</td>
<td>155 : 1</td>
</tr>
<tr>
<td>80</td>
<td>150 : 1</td>
</tr>
<tr>
<td>70</td>
<td>145 : 1</td>
</tr>
<tr>
<td>60</td>
<td>135 : 1</td>
</tr>
<tr>
<td>50</td>
<td>130 : 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 POSTED SPEEDS LESS THAN 70 KM/H AND WITH CURRENT TRAFFIC VOLUME LESS THAN 4000 VEHICLES PER DAY OR WHEN THEY ARE CONSTRUCTED OUTSIDE THE CLEAR ZONE AS DETERMINED IN PUB. 13M, DESIGN MANUAL PART 2, CHAPTER 12.

TYPICAL EARTH MOUND FOR BURYING CONCRETE BARRIER

SECTION A-A

SECTION B-B

SECTION C-C

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
SINGLE FACE CONCRETE BARRIER
F-SHAPE
END TREATMENT
BURYING INTO EARTH MOUND