STANDARDS FOR ROADWAY CONSTRUCTION, RC 0-100

INFORMATION AND SPECIAL INSTRUCTIONS:


The Standard Drawings cancelled by this change should be maintained for reference on projects now under construction. The new Standard Drawings should be adopted as soon as practical on all new and existing designs without affecting any letting schedules. P.S.&E. submissions to Central Office after July 1, 1994 shall include these revisions.

RCs-100 to 104 have been deleted since we did not receive approval from the Washington Office of the Federal Highway Administration. However, appropriate details may be submitted for approval on a case by case basis.

Any comments or questions on the new Edition relative to revisions, new details and standards may be directed to the Highway Design Quality Control Division.

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

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RC-32  (1 of 1) - No major changes.  
RC-33  (1 of 1) - Revised Note 1.  
RC-34  (1 of 1) - The major changes to RC-34 are the reinforcement for inlet boxes and the increase in bar sizes for inlet grates to provide HS25 Loading.  
(1 of 9) - Deleted Note 4 and added Notes 1, 6 and 7.  
(2 of 9) - Revised the reinforcement.  
(3 of 9) - Revised grate bar sizes and added Note 7.  
(4 of 9) - Added Note 6.  
(5 of 9) - No changes.  
(6 of 9) - Revised the reinforcement and relative notes 8 through 10 and added new Note 11. Also added detail B.  
(7 of 9) - Revised the reinforcement. Deleted detail B-B and reordered old details. Also deleted Note 7.  
(8 & 9 of 9) - No major changes.  
RC-35  (1 of 1) - No changes.  
RC-36  (1 of 1) - No changes.  
RC-39  (1 of 5) - Revised Note 1.C. and Note 4.  
(2 of 5) - Revised Note 2.  
(3, 4 & 5 of 5) - No changes.  
RC-40  (1 of 1) - No major changes.  
RC-43  (1 of 1) - No major changes.  
RC-50  (1 of 1) - Numbers were added to the posts in both elevation views.  
RC-52  (1, 2 & 4 of 5) - No major changes.  
RC-53  (5 of 5) - Revised Note 5.  
RC-54  (1 & 2 of 2) - No major changes.  
RC-55  (1 & 2 of 3) - No major changes.  
RC-57  (1, 2 & 3 of 3) - No major changes.  
RC-58  (1, 2, 3 & 4 of 5 & 5 of 5) - No major changes.  
RC-59  (1 & 2 of 2) - No major changes.  
RC-60  (1 & 2 of 2) - No major changes.  
RC-61  (1 of 1) - No major changes.  
RC-63  (1 & 2 of 2) - No major changes.  
RC-64  (1 of 1) - No major changes.  
RC-65  (1 of 1) - No major changes.  
RC-66  (1 of 1) - No major changes.  
RC-67  (1 & 2 of 2) - RC-67 was updated to incorporate accessibility guidelines for disabled persons required by the 1990 Americans with Disabilities Act. New details and notes complement the revisions made to Chapter 6 of DM-2 in Change #4. The basic design of curb ramps has not changed. However, additional options are provided including state-of-the-art details, especially for existing curbs and sidewalk.  
RC-70  (1, 2, 3 & 4 of 4) - No major changes.  
RC-80  (1 of 2) - Changed ground rod from 5' minimum to 8' minimum in Note 4.  
(2 of 2) - No major changes.
SUBJECT:
Revisions to Standards for Roadway Construction Change #1
RC-30

INFORMATION AND SPECIAL INSTRUCTIONS:
Incorporate the attached revisions into the March 1994 Edition of the Standards for Roadway Construction. The revisions to RC-30 were adopted on June 19, 1995 and issued with SOL 430-95-43 "Policy on Design, Fabrication and Installation of Pipes".

This formal revision to the March, 1994 Edition of the RC-Standards is made to be used and referenced on projects under design in English units. For Metric projects, use RC-30M dated September 25, 1995.

CANCEL THE FOLLOWING:
- RC-30 dated March 25, 1994

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Secretary of Transportation

Michael H. Ryan, P.E.
Deputy Secretary for Highway Administration
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## ROADSIDE DEVELOPMENT AND PLANTING

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* Change #1, Effective Oct. 24, 1995

March 1994 Edition
Areas for circular concrete and metal pipes, metal pipe-arches, and concrete elliptical pipe, metal plate pipes, and metal plate pipe-arches.

Roadway section showing Class I excavation.

Excavation for embankment and parallel ditch details.

For circular concrete and metal pipes, metal pipe-arch and concrete elliptical pipe and polyethylene (PE) corrugated pipe.

Class I excavation.

Class II excavation.

Class III excavation.

Common borrow excavation.

Commonwealth of Pennsylvania Department of Transportation.

Classification of earthwork.
NOTES
1. FOLLOW OSHA SAFETY REQUIREMENTS IN ALL UNSHORED EXCAVATION AREAS;
   5 FEET MAXIMUM FOR VERTICAL CUT, OTHERWISE 4 FEET MAXIMUM FROM BOTTOM
   OF EXCAVATION TO START OF 1½:1 LAYBACK SLOPE. SEE DETAIL A.
2. NO PAYMENT WILL BE ALLOWED FOR EXCAVATION IN EXCESS OF SPECIFIED
   LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
CLASSIFICATION OF EARTHWORK
FOR STRUCTURES

1. FOLLOW OSHA SAFETY REQUIREMENTS IN ALL UNSHORED EXCAVATION AREAS;
2. NO PAYMENT WILL BE ALLOWED FOR EXCAVATION IN EXCESS OF SPECIFIED
   LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.

STRUCTURES OVER STREAMS
INCLUDING METAL PLATE ARCH WITH FOOTING
* WHEN RIGHT ANGLE SPAN IS LESS THAN 8'-0", ALL EXCAVATION IS CLASS 3.

GRADE SEPARATION STRUCTURES

EXTRA DEPTH EXCAVATION FOR
R.C. BOX AND ARCH CULVERTS ON
FINE GRAIN SOIL

CLASSIFICATION OF EARTHWORK
FOR STRUCTURES
NOTES
1. PROVIDE EXCAVATION, INCLUDING THE PORTIONS OF ENDO WALLS ABOVE THE FLOW LINE AND TO A MAXIMUM OF 4' 0" ABOVE THE TOP OF THE PIPE OR PIPE-ARCH, AS CLASS 4 EXCAVATION FOR PIPE OR PIPE-ARCH LESS THAN 4' 0" INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND CLASS 1 EXCAVATION FOR PIPE OR PIPE-ARCH 4' 0" OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY.

2. FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 4' 0" OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, PROVIDE EXCAVATION BETWEEN THE FLOW LINE AND THE LOWER LIMIT OF CLASS 1 EXCAVATION CONFORMING TO THE AREA SHOWN WITH THE CLASS 3 EXCAVATION SYMBOL. MEASURE AND PAY CLASS 3 EXCAVATION QUANTITY TO THE RECTANGULAR LIMITS SHOWN AS A AND B IN SECTION C-C.

3. WHEN DEEMED NECESSARY TO EXCAVATE BELOW THE BOTTOM OF THE FLOW LINE, PAY ALL EXCAVATION WITHIN THE LIMITS OF THE BOTTOM OF THE EXCAVATED TRENCH AND THE TOP OF THE EXISTING GROUND AS CLASS 1 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 4' 0" OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND AS CLASS 4 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH LESS THAN 4' 0" INSIDE DIAMETER OR SPAN, RESPECTIVELY. PLACE AND SHAPE BACKFILL MATERIAL FOR THE UNDERCUT AREA CONFORMING TO THE BOTTOM OF THE CULVERT AND CONSIDER INCIDENTAL TO THE CLASS SPECIFIED.

4. MEASURE AND PAY EXCAVATION AS SHOWN IN SECTION A-A, SECTION B-B AND SECTION C-C.

LEGEND
CLASS 1 OR 4 EXCAVATION
ROADWAY ITEM
(TO BE INCLUDED IN ROADWAY QUANTITIES)

CLASS 3 EXCAVATION
STRUCTURE ITEM
(TO BE INCLUDED IN STRUCTURE QUANTITIES)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
CLASSIFICATION OF EARTHWORK
FOR STRUCTURES
NOTES

1. PLACE BACKFILL AND EMBANKMENT IN ACCORDANCE WITH THIS STANDARD DRAWING UNLESS OTHERWISE SHOWN ON THE STRUCTURE DRAWINGS.

2. USE ONLY R-3 ROCK LINING, MEETING THE REQUIREMENTS OF SECTION 850.20; AASHTO NO. 1, 2, 5, OR 57 COARSE AGGREGATES, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN SECTION 703.2, TABLE B; OR TYPE OG COARSE AGGREGATE, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN SECTION 703.2, TABLE 3.

3. MEASURE AND PAY STRUCTURE BACKFILL AS SELECTED BORROW EXCAVATION STRUCTURE BACKFILL. DO NOT USE R-3 FOR STRUCTURE BACKFILL FOR ANY TYPE R.C. OR METAL PLATE CULVERT. PLACE A CLASS 2, TYPE A GEOTEXTILE BLANKET AT A BARRIER BETWEEN THE STRUCTURE BACKFILL AND EXCAVATION/EMBANKMENT MATERIAL. PLACE A CLASS 2, TYPE B GEOTEXTILE BLANKET ON THE TOP OF THE COMPLETED STRUCTURE BACKFILL PRIOR TO PLACING ANY SUBBASE MATERIAL FOR THE ROADWAY. THE GEOTEXTILE BLANKET IS CONSIDERED INCIDENTAL TO THE SELECTED BORROW EXCAVATION STRUCTURE BACKFILL AND WILL NOT BE PAID FOR SEPARATELY.

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

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

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

7. INDICATE STRUCTURE BACKFILL QUANTITIES ON THE STRUCTURE DRAWINGS.

8. FOUNDATION PREPARATION FOR R.C. BOX AND ARCH CULVERTS ON FINE GRAIN SOIL ONLY

   NOTE: EXCAVATE THE LAST 2' WITH BUCKET WITHOUT TEETH TO KEEP THE FOUNDATION FIRM.

   FOR CULVERTS WITH SPANS LESS THAN 8', BOTTOM MAY BE SLOPED IN ONE DIRECTION.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
BACKFILL AT STRUCTURES
THE PAYMENT FOR THIS AREA OF SUBBASE WILL BE CONSIDERED INCIDENTAL TO THE SHOULDER.
COATED DOWEL BARS, SEE NOTES 4 AND 5.

TYPICAL LAYOUT

DETAIL A

DETAIL B

TYPE E

TYPE D

TYPE P

TYPE G

NOTES

1. PLACE AN APPROVED TUBE OVER THE LUBRICATED END OF ALL DOWEL BARS USED IN TYPE E JOINTS AND PROVIDE A MINIMUM 1/8" 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 PROVIDE A MINIMUM DEPTH OF 1/4" FROM A PERPENDICULAR TO A TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.

3. USE MINIMUM 1/2" x 1/8" x 1/8" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1/2" x 1/8" x 1/8" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10". APPROVED ALTERNATE DOWEL BARS HAVING EQUIVALENT PROPERTIES TO CONVENTIONAL ROUND DOWEL BARS MAY BE USED.


5. INSTALL NEOPRENE SEALS TO A UNIFORM DEPTH WITH THE TOP OF THE SEAL NOT LESS THAN 1/16" NOR MORE THAN 1/8" BELOW THE LEVEL OF THE PAVEMENT SURFACE. THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDES OF THE SEAL SHALL BE AT THE SAME ELEVATION.

6. THE INITIAL SAW CUT FOR TYPE D AND TYPE G JOINTS IS NOT REQUIRED FOR CONSTRUCTION JOINTS.

7. DETERMINE SAW DEPTH BY ADDING 1/8" TO THE MAXIMUM COMPRESSED HEIGHT OF THE NEOPRENE COMPRESSION SEAL. (SEE MANUFACTURER'S INFORMATION.)

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

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<th>SPACING/ 'SIZE</th>
<th>(60°</th>
<th>80°</th>
<th>90°</th>
<th>120°</th>
<th>180°</th>
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* PAVEMENT SURFACE TEMPERATURE, °F.
TIEBOLT DETAIL

TIEBOLTS SHALL BE 3/8" BAR WITH ROLLER THREADS OR 3/8" BAR WITH CUT THREADS. EACH TIEBOLT SHALL BE FASTENED TO THE FACE-TILTED TOOL-OUT OR TIEBOLT DETAIL AND NOTE 4. A MINIMUM LOAD OF 15,000 POUNDS. TIEBOLTS WHICH ARE SUPPLIED BY AN APPROVED MANUFACTURER, AS LISTED IN BULLETIN 19, WILL BE PERMITTED. SEE SECTION 709 OF PUBLICATION 438.

NOTE 1.
TIE BARS SHALL BE 30" LONG AND SPACED AT 30" INTERVALS. MEASURE TIE BAR DEPTH FROM THE TOP OF PAVEMENT TO THE TOP OF THE BAR.

NOTE 2.
MAKE THREADED SLEEVE NUT FROM STEEL PIPE OR HEXAGONAL STEEL BAR 1 1/8" X 1 1/8" X 3 1/2" LONG OR HIGH STRENGTH STEEL BAR 3/8" X 2" X 1 1/8" LONG.

NOTE 3.
SECURELY FASTEN THE KEY FORMER TO THE STEEL FORM.

NOTE 4.
Screw TIEBOLTS UNTIL SNUG. FOR 6", 7", AND 8" PAVEMENTS AND SHOULDERS THE HOOK SHALL BE PARALLEL TO THE GRADE. IF NECESSARY, LOOSEN TIE BOLTS SO THAT THE HOOK IS PARALLEL TO THE GRADE.

NOTE 5.
AT THE CONTRACTORS OPTION, THE CONCRETE SHOULDER MAY BE CONSTRUCTED AT THE SAME TIME AS THE PAVEMENT. IN THIS CASE, A TYPE L CONTRACTION JOINT SHALL BE USED. SEE DETAILS, THIS SHEET.
NOTES

1. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND SIMILARITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 70-101 MAY BE PERMITTED.

2. PROVIDE A MINIMUM OF EIGHT ANCHOR STAKES (FOUR PER SIDE). ADDITIONAL STAKES AS NECESSARY TO SECURE ASSEMBLIES.

3. PROVIDE 12" MINIMUM ANCHOR STAKES TO SECURE ASSEMBLY WHEN A NO. 2A SUBBASE COURSE IS USED. WHEN A LEAN CONCRETE BASE COURSE OR UNBONDED CONCRETE OVERLAY AND NO. 2A SUBBASE COURSE IS USED AND 18" MINIMUM ANCHOR STAKES WHEN A NO.0GS SUBBASE COURSE IS USED.

4. PROVIDE DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE. TOLERANCE OF THIS PLACEMENT SHALL BE WITHIN 1/4" INCH PER DOWEL BAR.

5. PROVIDE DOWEL CAPS AND ASSEMBLY DETAILS THAT CONFORM TO THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND SIMILARITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION.

6. DOWEL BAR KEEPER CLIPS MAY BE USED IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONSTRUCTION AND EXPANSION JOINT ASSEMBLIES.

7. PROVIDE DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE. TOLERANCE OF THIS PLACEMENT SHALL BE WITHIN 1/4" INCH PER DOWEL BAR.

8. PROVIDE ANCHOR STAKES TO ENGAGE LOWER SIDE FRAME WIRES. USE ADDITIONAL STAKES AS NECESSARY TO SECURE ASSEMBLIES.

9. PROVIDE DOWEL ASSEMBLY AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408 SPECIFICATIONS.

10. EXPANSION JOINT FILLER, ANCHOR STAKES OR OTHER ACCEPTABLE MEANS TO HOLD THE ASSEMBLY STATIONARY DURING THE PAVING OPERATION MAY BE ANCHOR PINS, STEEL FORMS, OR OTHER ACCEPTABLE MEANS TO KEEPER THE ASSEMBLY STATIONARY DURING THE PAVING OPERATION.

11. Provide additional details that conform to this standard.

12. This standard depicts the dimensions required for uniformity and similarity. It does not include all the details required for fabrication. Only items supplied by a manufacturer listed in Bulletin 70-101 may be permitted.

13. Provide minimum of eight anchor stakes (four per side). Additional stakes as necessary to secure assemblies.

14. Provide 12" minimum anchor stakes to secure assembly when a No. 2A subbase course is used. When a lean concrete base course or unbonded concrete overlay and No. 2A subbase course is used and 18" minimum anchor stakes when a No.0GS subbase course is used.

15. Provide dowel bars parallel to the centerline and to the pavement surface. Tolerance of this placement shall be within 1/4" inch per dowel bar.

16. Provide additional details that conform to this standard.
NOTES

1. PART 6.1.3.1.4.4.01 OF THE DESIGNATION A-82 SPECIFICATIONS FOR CONCRETE REINFORCEMENT AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

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2. PROVIDE A MINIMUM OF FOUR ANCHOR STAKES FOR EACH SIDE SUPPORT ASSEMBLY. ANCHOR STAKES SHALL ENGAGE LOWER SIDE FRAME WIRES. USE ADDITIONAL ANCHORS AS NECESSARY, TO SECURE ASSEMBLIES AS DIRECTED BY THE CONTRACTOR.

3. PROVIDE A MINIMUM OF FOUR ANCHOR STAKES TO SECURE ASSEMBLIES WHEN A NO. 2A SUBBASE COURSE IS USED. WHEN A LEAN CONCRETE BASE COURSE OR CONCRETE OVERLAY IS USED PROVIDE THE CURRENT ASTM STANDARD FOR CONSTRUCTION AND EXPANSION JOINT ASSEMBLIES. THE CURRENT ASTM STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY, IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR CONSTRUCTION AND EXPANSION JOINT ASSEMBLIES. SEE DETAIL A.

4. PROVIDE ANCHOR STAKES WITHOUT USE OF SIDE SUPPORT ASSEMBLIES. ANCHOR STAKES SHALL ENGAGE LOWER SIDE FRAME WIRES. USE ADDITIONAL ANCHORS AS NECESSARY, TO SECURE ASSEMBLIES AS DIRECTED BY THE CONTRACTOR.

5. PROVIDE SIDE SUPPORT ASSEMBLIES CONFORMING TO THE CURRENT ASTM DESIGNATION A-82 SPECIFICATIONS FOR CONCRETE REINFORCEMENT AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

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6. DOWEL BAR CLIPS MAY BE USED IN LIEU OF SIDE SUPPORT ASSEMBLIES. USE SIDE SUPPORT ASSEMBLIES IN LIEU OF DOWEL BAR CLIPS. SEE DETAIL B.

7. PROVIDE A MINIMUM OF EIGHT ANCHOR STAKES FOR EACH CENTRE SUPPORT ASSEMBLY. ANCHOR STAKES SHALL ENGAGE LOWER SIDE FRAME WIRES. USE ADDITIONAL ANCHORS AS NECESSARY, TO SECURE ASSEMBLIES AS DIRECTED BY THE CONTRACTOR.

8. PROVIDE ANCHOR STAKES WITHOUT USE OF SIDE SUPPORT ASSEMBLIES. ANCHOR STAKES SHALL ENGAGE LOWER SIDE FRAME WIRES. USE ADDITIONAL ANCHORS AS NECESSARY, TO SECURE ASSEMBLIES AS DIRECTED BY THE CONTRACTOR.

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10. EXPANSION JOINT ASSEMBLIES SHALL BE SECURED IN PLACE, REMOVE AND PROPERLY DISPOSE OF ALL STEEL RODS OR SHIPING WIRE PRIOR TO INSTALLING EXPANSION FLOOR.

11. PROVIDE SIDE SUPPORT ASSEMBLIES CONFORMING TO THE CURRENT ASTM DESIGNATION A-82 SPECIFICATIONS FOR CONCRETE REINFORCEMENT AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

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15. PROVIDE ANCHOR STAKES WITHOUT USE OF SIDE SUPPORT ASSEMBLIES. ANCHOR STAKES SHALL ENGAGE LOWER SIDE FRAME WIRES. USE ADDITIONAL ANCHORS AS NECESSARY, TO SECURE ASSEMBLIES AS DIRECTED BY THE CONTRACTOR.
1. For variable width pavement cut the reinforcement as required.

2. Wire fabric reinforcement may be placed with transverse wires above or below longitudinal wires.

3. Provide longitudinal wires for wire fabric reinforcement of the following minimum sizes:

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<tr>
<th>Wire Size</th>
<th>Min. Long. Wire Size</th>
<th>Min. Depth</th>
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<tbody>
<tr>
<td>1/8&quot;</td>
<td>0.065&quot;</td>
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<tr>
<td>3/32&quot;</td>
<td>0.080&quot;</td>
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<tr>
<td>1/16&quot;</td>
<td>0.100&quot;</td>
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<tr>
<td>5/32&quot;</td>
<td>0.125&quot;</td>
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4. Hinged fabric reinforcement may be used. Have hinges detail approved by the engineer.

5. Securely tie all longitudinal and transverse laps of wire fabric reinforcement.

6. On projects where additional lanes are being added to existing cement concrete pavements and the existing joint spacing is more than 100', use a minimum longitudinal wire size of 0.065" or 0.080".

7. Wire fabric reinforcement may be constructed of smooth wire sizes designated by W or deformed wire (S) sizes designated by D or a combination of both.

8. See RC-20 for joint details.

9. Provide a minimum depth for placement of wire fabric reinforcement. Measured from top of pavement to top of fabric of 2.0" to a maximum of one half the pavement depth.

10. When the slab or lane width exceeds 14 feet, a Type L joint is required at the midpoint.
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 BEING CONSTRUCTED IN CONJUNCTION WITH A PAVEMENT RELIEF JOINT OR WITH A FLEXIBLE PAVEMENT, SEE RC-24.
3. WHEN CONSTRUCTION INVOLVES MORE THAN 2 LANES, CONNECT ADDITIONAL LANES REQUIRED TO STANDARD 2 LANE BRIDGE APPROACH SLAB USING TYPE L CONSTRUCTION JOINTS, AS SHOWN ON RC-20, SHEET 2 OF 2.
4. INSTALL NEOPRENE COMPRESSION SEALS TO A UNIFORM DEPTH WITH TOP OF THE SEAL NOT LESS THAN ¼" NOR MORE THAN ½" BELOW THE LEVEL OF THE PAVEMENT SURFACE. THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDES OF THE SEAL SHALL BE AT THE SAME ELEVATION.
5. DETERMINE "d" BY ADDING ½" 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.
9" MINIMUM WITHOUT CAMBER
4" MIN. SLAB

17" DEEP ADJACENT COMPOSITE BOX BEAMS
WITH 9" DEEP APPROACH SLAB NOTCH

4 1/2" MINIMUM WITHOUT CAMBER
8" MIN.

SPREAD BOX BEAMS WITH APPROACH
SLAB NOTCH 11 1/2" OR DEEPER

21" TO 48" DEEP ADJACENT COMPOSITE BOX BEAMS
WITH 11" DEEP APPROACH SLAB NOTCH

FOR JOINT DETAILS
SEE SHEET 1 OF 2
TILT HOOK TO MAINTAIN PROPER CLEARANCE
BOND-BREAKER, 2-PLY BIT. PAPER
PRESTRESSED
BOX BEAM
AND OVER
PREMOLDED
EXPANSION
JOINT FILLER
4 1/2" MINIMUM CLEARANCE

16" APPROACH SLAB
8" MIN.

ELEVATION
DIAPHRAGM
END OF BEAM
9" MIN.
See Note 3

PLAN
1-BEAMS

NOTES
1. WHEN MAKING CONSTRUCTION CHANGES IN THE FIELD, THIS
DRAWING IS TO SERVE AS A GUIDE FOR MODIFYING NOTCH
DETAILS SHOWN ON P/VS STANDARD DRAWINGS FOR
ACCOMMODATING THE STANDARD 16" BRIDGE APPROACH SLAB.
2. AT BEAM ENDS, BURN OFF REINFORCEMENT PROTRUDING INTO
APPROACH SLAB NOTCH.
3. INCREASE IN FIELD, PROVIDING OVERHANG, IF REQUIRED.
4. PROVIDE REINFORCEMENT BARS, EPOXY COATED, IN ACCORDANCE
WITH PUBLICATION 408, SECTION 709.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BRIDGE APPROACH SLAB

DIRECTOR, BUREAU OF DESIGN

MAR. 25, 1994

SHEET 2 OF 2

RC-23
PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR PAVEMENT RELIEF JOINT

PAY LIMIT FOR BRIDGE APPROACH SLAB

PAY LIMIT FOR BRIDGE APPROACH SLAB

PAY LIMIT FOR PAVEMENT RELIEF JOINT

NOTE 1. PAVEMENT RELIEF JOINTS ARE APPLICABLE FOR ALL CEMENT CONCRETE PAVEMENTS.

NOTE 2. CONCRETE IN SUBSLAB SHALL BE CLASS AA (AT CONTRACTOR'S OPTION, SUBSLAB CONCRETE MAY BE H.E.S.T.).

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


NOTE 5. WHERE BRIDGES ARE LOCATED LESS THAN 1,000 FT. APART, AS MEASURED FROM THE FACE OF THE NEAREST ABUTMENTS, NO RELIEF JOINT WILL BE USED BETWEEN THE BRIDGES.

NOTE 6. WHERE BRIDGES ARE LOCATED BETWEEN 1,000 FT. AND 1,500 FT. APART, AND THE PAVEMENT STRUCTURE IS CEMENT CONCRETE, ONE RELIEF JOINT SHALL BE PLACED MIDWAY BETWEEN THE BRIDGES. IN THESE CASES, THE SUBSLAB SHALL BE A UNIFORM 6 IN. THICK AND 7 FT. WIDE.


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PAVEMENT RELIEF JOINT

SCHEDULE OF REINFORCEMENT STEEL

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DESIGNATED TRAVELWAY WIDTH FOR SHOULDER IMMEDIATELY SEE DETAILS ON SHEET 1.

EFFECTIVE SHOULDER WIDTH, SEE NOTE 5.

1. CONSTRUCT AGGREGATE BASE AS SPECIFIED IN SECTION 350.3, PUBLICATION 408 AND CONSIDER AS PART OF THE SHOULDER.

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

3. DEPTH OF SHOULDER TO BE THE COMBINED DEPTH OF SURFACE AND BASE COURSES.

4. SLOPE SHOULDER AT 0.06 FT./FT. FOR EFFECTIVE SHOULDER WIDTHS ≤ 8 FT.

5. FOR EFFECTIVE SHOULDER WIDTHS 6 FT. AND LESS, PAVE OUT-TO-OUT OF SHOULDERS WITH FULL DEPTH ROADWAY PAVEMENT.

6. FOR SHOULDERS WITH NYS INSTALLATIONS USE ONLY BIT. WRG. CRSE. ROADWAY PAVEMENT LIMIT 2' - 0" SEE NOTE 3.

FOR SUPERELEVATION UNDER 0.06 FT./FT., ELIMINATE THE 4'-0" ROUNDING AND USE THE 0.02 FT./FT. SHOULDER SLOPE BEGINNING FROM THE EDGE OF PAVEMENT.

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 SCRAPSIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE SHAPING OPERATION, COMPLETE THE WORK BY EITHER ADDING ADDITIONAL AGGR. BASE CRSE. MATERIAL MEETING THE REQUIREMENTS OF SEC. 350, PUB 408 OR MILLED BITUMINOUS MATERIAL. THE ADDITIONAL MATERIAL IS INCIDENTAL TO THE SHOULDER ITEM.

2. FOR TYPE 7 SHOULDERS PROPERLY PREPARE EXISTING PAVED SHOULDER BY CLEANING AND PATCHING.

3. THE GUIDE RAIL TYPE, HEIGHT AND LOCATION FROM SHOULDER MAY VARY, BUT WHEN THE HEIGHT FROM THE TOP OF RAIL TO PROPOSED SURFACE BECOMES LESS THAN 24", REMOVE, REPLACE AND/OR RESET THE GUIDE RAIL. IN ACCORDANCE WITH CURRENT GUIDE RAIL STANDARDS. WHERE GUIDE RAIL IS TO BE ATTACHED, REMOVE THE RUBBING RAIL WHEN THE HEIGHT OF GUIDE RAIL BECOMES LESS THAN 27".

4. REMOVAL INSUFFICIENT MATERIAL AS DIRECTED, EXCAVATE, AND BACKFILL WITH MATERIAL MEETING THE REQUIREMENTS OF SECTION 350, PUB 408. SHOULDER EXCAVATION AND BACKFILL WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH SECTIONS 654 AND 656, PUB 408. CROSS SECTIONS NOT REQUIRED.

5. GRADING WILL BE CONSIDERED 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 SEC. 350, PUB 408, WHICH WILL BE PAID FOR AS TONS OF SELECTED BORROW EXCAVATION. WHERE THERE IS AN EXCESS OF MATERIAL FROM THE SHOULDER EXCAVATION OR GRADING OPERATION, REMOVE THIS MATERIAL AS SOON AS POSSIBLE AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY ITEM.

6. PROVIDE BITUMINOUS TAPER SHOULDER WEDGE 10 TO 12 INCHES UP CUT SLOPE WHEN INDICATED ON THE PLANS AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY STEAL.

7. "LUMP SUM" ITEMS INCLUDE ALL MATERIAL OR OPERATION OF WORK NECESSARY TO COMPLETE THAT ENTIRE ITEM WHETHER TABULATED OR NOT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RECONSTRUCTED SHOULders

NOTES

1. FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/OR SCRAPSIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE SHAPING OPERATION, COMPLETE THE WORK BY EITHER ADDING ADDITIONAL AGGR. BASE CRSE. MATERIAL MEETING THE REQUIREMENTS OF SEC. 350, PUB 408 OR MILLED BITUMINOUS MATERIAL. THE ADDITIONAL MATERIAL IS INCIDENTAL TO THE SHOULDER ITEM.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RECONSTRUCTED SHOULders

NOTES

1. FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/OR SCRAPSIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE SHAPING OPERATION, COMPLETE THE WORK BY EITHER ADDING ADDITIONAL AGGR. BASE CRSE. MATERIAL MEETING THE REQUIREMENTS OF SEC. 350, PUB 408 OR MILLED BITUMINOUS MATERIAL. THE ADDITIONAL MATERIAL IS INCIDENTAL TO THE SHOULDER ITEM.

2. FOR TYPE 7 SHOULDERS PROPERLY PREPARE EXISTING PAVED SHOULDER BY CLEANING AND PATCHING.

3. THE GUIDE RAIL TYPE, HEIGHT AND LOCATION FROM SHOULDER MAY VARY, BUT WHEN THE HEIGHT FROM THE TOP OF RAIL TO PROPOSED SURFACE BECOMES LESS THAN 24", REMOVE, REPLACE AND/OR RESET THE GUIDE RAIL. IN ACCORDANCE WITH CURRENT GUIDE RAIL STANDARDS. WHERE GUIDE RAIL IS TO BE ATTACHED, REMOVE THE RUBBING RAIL WHEN THE HEIGHT OF GUIDE RAIL BECOMES LESS THAN 27".

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7. "LUMP SUM" ITEMS INCLUDE ALL MATERIAL OR OPERATION OF WORK NECESSARY TO COMPLETE THAT ENTIRE ITEM WHETHER TABULATED OR NOT.
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PA乘VEMENT
REHABILITATION

PATCHING

SHT. 2 OF 5
RC-26
SINGLE LANE PAVEMENT PATCHING

1. Construct pavement patches in adjacent lanes, with lengths that are within 6' - 0" of each other, to the same length. This length will be the length of the larger pavement patch. If the patch lengths differ by more than 6' - 0", then construct to the required length.

2. Do not leave less than 6' - 0" of original pavement in place between patches or between joints.

3. When performing single lane pavement patching, or patching one lane at a time, place a slurry, full depth, polystyrene board bonded breaker in the longitudinal joint of all patches under 65' - 0" in length, prior to placing the new concrete in the patch area.

4. When patching adjacent to an existing joint, remove a minimum of 6' - 0" of pavement in the next slab to avoid the existing dowel bars.

5. When replacing one full slab length and the deterioration extends more than 2' - 0" into the next slab, remove a minimum of 6' - 0" 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 500' - 0", the joint spacing of the area being patched is to conform to RC-20 or RC-21 for the specific type of pavement being placed (i.e. RCC or PCC).

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

8. When only one lane is being patched, do not remove more than 8' - 0" into the next slab. If more than 8' - 0" is required, remove a minimum of 6' - 0" and provide a new pavement joint at original joint location. For exception, see Note 7.

LEGEND

- Pavement Patching Joint, see SHEET 1.
- New Pavement Joint, see RC-20.
- Exception to 5' - 0" maximum removal.
- Details apply to either end of patch.

NOTES

- Review notes for additional information on pavement nourishment and rehabilitation project specifications.
**COMMONWEALTH OF PENNSYLVANIA\nDEPARTMENT OF TRANSPORTATION\nBUREAU OF DESIGN\nCONCRETE PAVEMENT\nREHABILITATION (CRC PATCHING)\n
_**NOTES:**_  
1. REMOVE 20" MIN. BY HANO FOR TIED SPLICES. REMOVE 8" BY HAND FOR WELDED SPLICES.  
2. OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 6".  
3. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS.  
4. MINIMUM DISTANCE FROM PATCH EDGE TO EXISTING CRACK IN CRC PAVEMENT IS 24".  
5. WHEN TRANSVERSE SPACING OF LONGITUDINAL REINFORCING BARS IS OTHER THAN 6" C TO C., MATCH EXISTING REINFORCING.

**DETAIL A**  
- NEW REINF. BARS REPLACE IN KIND 8" C TO C. TYP. ACROSS SLABI SEE NOTE 5.  
- NEW REINF. BARS RETAINED AT 6" C TO C. TYP. ACROSS SLABI  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  

**SECTION A-A**  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  

**SECTION B-B**  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  

**SECTION C-C**  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  

**DETAIL B**  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  

**LEGEND:**  
- MAINTAIN EXIST. EDGE CLR.  
- EXIST. REBAR  
- NEW REBAR  
- USE THE FOLLOWING TABLE TO DETERMINE DEVELOPMENT LENGTH.  

<table>
<thead>
<tr>
<th>BAR DEVELOPMENT SIZE</th>
<th>DEVELOPMENT LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>20&quot;</td>
</tr>
<tr>
<td>6</td>
<td>23&quot;</td>
</tr>
<tr>
<td>7</td>
<td>27&quot;</td>
</tr>
</tbody>
</table>

- WHEN THE JOINT SPACING IS LESS THAN 50' - 0" W = 1".  
- WHEN JOINT SPACING IS 50' - 0" OR MORE, W = 6".

**CRC PATCH**  
- NO SCALE  
- SEE NOTE 1.  
- SEE NOTE 2.  

**WELDED SPLICE**  
- REINFORCEMENT BAR DETAIL  
- NO SCALE  
- NEW REINF. BARS REPLACE IN KIND 8" C TO C. TYP. ACROSS SLABI SEE NOTE 5.  
- NEW REINF. BARS RETAINED AT 6" C TO C. TYP. ACROSS SLABI  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  
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- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  
- NEW REINF. BARS HORIZ. AT 3" C TO C. TYP. SPACING AS EXIST. TRANSVERSE BARS (10 TYP).  

**TIED SPLICE**  
- REINFORCEMENT BAR DETAIL  
- NO SCALE  

**CRC PATCHING JOINT DETAILS**  
- SEE DETAIL A  
- SEE DETAIL B  
- SEE DETAIL C  
- SEE DETAIL D  
- SEE DETAIL E  
- SEE DETAIL F  
- SEE DETAIL G  
- SEE DETAIL H  
- SEE DETAIL I  
- SEE DETAIL J  
- SEE DETAIL K  
- SEE DETAIL L  
- SEE DETAIL M  
- SEE DETAIL N  
- SEE DETAIL O  
- SEE DETAIL P  
- SEE DETAIL Q  
- SEE DETAIL R  
- SEE DETAIL S  
- SEE DETAIL T  
- SEE DETAIL U  
- SEE DETAIL V  
- SEE DETAIL W  
- SEE DETAIL X  
- SEE DETAIL Y  
- SEE DETAIL Z  

**CONCRETE PAVEMENT REHABILITATION**  
- CRC PATCHING  
- NO SCALE  
- SEE NOTE 1.  
- SEE NOTE 2.  

**NOTES:**  
1. REMOVE 20" MIN. BY HANO FOR TIED SPLICES. REMOVE 8" BY HAND FOR WELDED SPLICES.  
2. OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 6".  
3. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS.  
4. MINIMUM DISTANCE FROM PATCH EDGE TO EXISTING CRACK IN CRC PAVEMENT IS 24".  
5. WHEN TRANSVERSE SPACING OF LONGITUDINAL REINFORCING BARS IS OTHER THAN 6" C TO C., MATCH EXISTING REINFORCING.
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION

TYPICAL PLACEMENT OF APPROVED DEFORMATION MEASURING DEVICE AT JOINT

NOTES
1. DRILL NEW HOLES FOR REROUTING 6 INCHES CLOSER TO JOINT OR CRACK.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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CONCRETE PAVEMENT REHABILITATION
(PATCHING)
JOINT REHABILITATION

NOTES

1. EXISTING STEEL PLATE IS EITHER 14 GAUGE WITH
   LAPPED TOP OR FLAT PLATE $\frac{1}{16}$ " THICK.

2. WHEN EXISTING JOINT SPACING IS LESS THAN 50'-0",
   $W = \frac{1}{4}$ "; WHEN EXISTING JOINT SPACING
   IS 50'-0" OR MORE, $W = 1$ ".

3. REMOVE THE STEEL PLATE WITHIN THE SEALANT
   RESERVOIR.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT
REHABILITATION
(PATCHING)

RECOMMENDED Mar. 25, 1994
SIGNED D.J. Leiblein, M.E.

RC-26
NOTES

1. SKEW THE CONSTRUCTION JOINTS FOR PLAIN CEMENT CONCRETE PAVEMENTS AND MAKE EITHER UNIFORM DEPTH WITH LOAD TRANSFER DOWEL BARS OR UNDOEWELLED PAVEMENT BUTTED WITH THICKENED SLABS AS SHOWN IN THE TERMINAL SLAB DETAIL.

2. FOR JOINT DETAILS, SEE RC-20.

3. CONSTRUCT ALL TRANSVERSE JOINTS ON A 6:1 COUNTERCLOCKWISE SKEW. ON CURVES, MEASURE THE SKEW FROM A PERPENDICULAR TO A TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.

4. CONSTRUCT TYPE E JOINTS ON INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS AND RAMPS. CONSTRUCT TYPE G JOINTS ON ARTERIAL PAVEMENTS. REFER TO THE TYPICAL SECTIONS TO DETERMINE WHICH TYPE OF JOINT APPLIES.

5. WHEN RAMP WIDTH EXCEEDS 14 FEET, A TYPE L JOINT IS REQUIRED AT THE MID-POINT.

6. CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMPS WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE SHOULDER GORE. CONSTRUCT THE REMAINDER OF THE RAMP WITH PLAIN CEMENT CONCRETE PAVEMENT.

7. ON COLLECTORS AND LOCAL ROADS, CONSTRUCT TYPE G OR P JOINTS, AS INDICATED.

8. IS-FOOT JOINT SPACING IS TO BE USED ON ALL PAVEMENTS LESS THAN 10-INCHES THICK. 20-FOOT JOINT SPACING IS TO BE USED ON ALL PAVEMENTS EQUAL TO OR GREATER THAN 10-INCHES THICK.

PLAIN CONCRETE PAVEMENT
SEE NOTE 4

MINIMUM

SEE NOTE I

LI.

SEE TABLE A

FOR DIMENSIONAL REQUIREMENTS.

APPLY TACK COAT, AS INDICATED.

OVERLAY TRANSITION ON

CONCRETE PAVEMENT

LI.

MINIMUM

SEE NOTE 1

LI.

TRIANGULAR OR

IRREGULAR PAVING NOTCH

SEE NOTE 5

APPLY TACK COAT, AS INDICATED.

OVERLAY TRANSITION WITH

PAVING NOTCH ON BITUMINOUS PAVEMENT

6:1 SKEW (TYP.)

PLAN VIEW

TANGENT SECTION

TWO-LANE DIRECTIONAL

PLAN VIEW

TANGENT SECTION

TWO-LANE, TWO-WAY TRAFFIC

PLAN VIEW

SUPERELEVATION SECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

OVERLAY TRANSITIONS
AND
PAVING NOTCHES

CONFIRMED: MAY 13, 1994
EDIT 1 OF 1

OVERLAY TRANSITIONS

AND

PAVING NOTCHES

CONFIRMED: MAY 13, 1994
EDIT 1 OF 1
NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 610 FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN, AND SECTION 615 FOR SUBSURFACE DRAIN OUTLETS.

2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.

LEGEND

A DEPTH BELOW SUBBASE EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 2 INCHES.

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

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

D* TYPE I OR TYPE II BACKFILL

TYPICAL PLACEMENT (OPEN GRADED SUBBASE)

TYPICAL PLACEMENT (STANDARD SUBBASE)

PAVEMENT BASE DRAIN

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS

RECOMMENDED: OCT. 14, 1995
RECOMMENDED: OCT. 24, 1995
SAT: 1 OF 4

MA-699
SHEET 1
EDGE OF PAVEMENT
BITUMINOUS CONCRETE BASE COURSE, WHEN REQUIRED.

SHOULDER

SUBBASE

EXCAVATED MATERIAL RECOMPACTED IN MAXIMUM OF 6" COMPACTED LIFTS.

PREFABRICATED PAVEMENT BASE DRAIN SYSTEM

4" MAX.

PREFABRICATED PAVEMENT BASE DRAIN INSTALLATION METHOD A
(REHABILITATION)
SEE NOTE 3 THIS SHEET.

PREFABRICATED PAVEMENT BASE DRAIN INSTALLATION METHOD B
(REHABILITATION)
SEE NOTES 3 AND 4 THIS SHEET.

PAVEMENT BASE DRAIN INSTALLATION METHOD C
(REHABILITATION)

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

LEGEND

A DEPTH BELOW SUBBASE EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 2 INCHES.

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

C SUBBASE DEPTH.

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

E MINIMUM WIDTH IS EQUAL TO THE THICKNESS OF THE PAVEMENT BASE DRAIN PLUS 1".

F VARY TO MAINTAIN THE NECESSARY SUBGRADE SLOPE. ADDITIONAL AGGREGATE WILL BE CONSIDERED INCIDENTAL TO THE SUBGRADE DRAIN PAY ITEM.
1. PROVIDE MATERIALS & CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 601 FOR PIPE CULVERTS, SECTION 602 CORRUGATED METAL PIPE-ARCH CULVERTS, AND SECTION 603 METAL PLATE CULVERTS.

2. SHORING OR TRENCH BOX INSTALLATION FOR FLEXIBLE PIPE SHALL NOT BE USED. IF SHORING OR TRENCH BOX INSTALLATION IS PERMITTED IN SPECIAL CIRCUMSTANCES, REFER TO PUBLICATION 408, SECTION 601.

3. IN ALL EXCAVATION AREAS OSHA SAFETY REQUIREMENTS WILL BE FOLLOWED.

4. DO NOT COMPACT "A" MATERIAL USED FOR BEDDING UNDER CONCRETE PIPES.

5. NO PAYMENT WILL BE ALLOWED FOR EXCAVATION EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.

6. PAYMENT FOR THE BACKFILL ENVELOPE, INCLUDING BEDDING, AGGREGATE AND SUITABLE MATERIAL UP TO 1 FOOT ABOVE THE PIPE WILL BE INCIDENTAL TO THE PIPE.

7. FOR BOTTOM TRENCH WIDTHS 28'-0" OR SMALLER EXCAVATION IS CLASS II.

8. FOR INLET OR OUTLET PROTECTION SEE DETAIL A.

---

**NOTES**

**LEGEND**

- Class 4 Excavation
- Class 1 Excavation
- Aggregate for Bedding (AASHTO M-81)
- Coarse Aggregate (2A)

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF DESIGN**

**SUBSURFACE DRAINS**

**PIPE PLACEMENT**

**EXCAVATION - BEDDING - BACKFILL**

**DETAIL A - PIPE INLET OR OUTLET PROTECTION**

D > 18'-1'4" ROCK FOR PIPES LESS THAN 36" INSIDE DIAMETER OR SPAN + 2'4"-8" ROCK FOR PIPES 36" AND GREATER INSIDE DIAMETER OR SPAN.

**PAY LIMITS FOR PIPE EXCAVATION**

SHORE OR A TRENCH BOX TO USE.

**EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN**

**BOTTOM OF TAMPED SOIL**

PIPE UNDERDRAIN OR PAVEMENT BASE DRAIN (PAVEMENT DRAIN)

**VERTICAL FACE FOR EXTRA DEPTH UNDERDRAIN** (TYP.), BOTH SIDES

**1/2" BATTER FOR EXTRA DEPTH UNDERDRAIN (TYP.), BOTH SIDES**

**EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN**

**NOTE:**

- Variable extra depth for pipe underdrain and pavement base drain.
- Vertical face for extra depth base drain (TYP.), both sides.
- 1/2" batter for extra depth underdrain (TYP.), both sides.

**DETAIL A - PIPE INLET OR OUTLET PROTECTION**

D > 18'-1'4" ROCK FOR PIPES LESS THAN 36" INSIDE DIAMETER OR SPAN

D = 2'4"-8" ROCK FOR PIPES 36" AND GREATER INSIDE DIAMETER OR SPAN.

**PAY LIMITS FOR PIPE EXCAVATION**

Above drawing shows excavation for pipe in cut or fill where bedding is 3'-0" above the bottom of the trench.

**NOTICE TO SHAPER**

- Do not place "A" material under last section.
- Use compacted "A" material.

**BACKFILL DETAIL AT ENDWALL**

- For concrete pipe.
- Use compacted "A" material.

**BACKFILL DETAIL AT END SECTION**

- For concrete pipe.
- Use compacted "A" material.

**BACKFILL DETAIL AT LAST SECTION OF PIPE**

- For concrete pipe.
- Use compacted "A" material.

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**DRAWING SHEET**

- RIGHTS IMMEDIATELY

**SIGNATURES**

- RECOMMENDED OCT. 24, 1995

- DIRECTOR, BUREAU OF DESIGN

- COMMONWEALTH OF PENNSYLVANIA

- DEPARTMENT OF TRANSPORTATION

- BUREAU OF DESIGN

**SUBSURFACE DRAINS**

**PIPE PLACEMENT**

**EXCAVATION - BEDDING - BACKFILL**

**DETAIL A - PIPE INLET OR OUTLET PROTECTION**

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**PAY LIMITS FOR PIPE EXCAVATION**

Above drawing shows excavation for pipe in cut or fill where bedding is 3'-0" above the bottom of the trench.

**NOTE:**

- Variable extra depth for pipe underdrain and pavement base drain.
- Vertical face for extra depth base drain (TYP.), both sides.
- 1/2" batter for extra depth underdrain (TYP.), both sides.

**DETAIL A - PIPE INLET OR OUTLET PROTECTION**

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D = 2'4"-8" ROCK FOR PIPES 36" AND GREATER INSIDE DIAMETER OR SPAN.

**PAY LIMITS FOR PIPE EXCAVATION**

Above drawing shows excavation for pipe in cut or fill where bedding is 3'-0" above the bottom of the trench.

**NOTE:**

- Variable extra depth for pipe underdrain and pavement base drain.
- Vertical face for extra depth base drain (TYP.), both sides.
- 1/2" batter for extra depth underdrain (TYP.), both sides.

**DETAIL A - PIPE INLET OR OUTLET PROTECTION**

D > 18'-1'4" ROCK FOR PIPES LESS THAN 36" INSIDE DIAMETER OR SPAN

D = 2'4"-8" ROCK FOR PIPES 36" AND GREATER INSIDE DIAMETER OR SPAN.
PIPE INSTALLATION PROCEDURES

CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS

1. PIPE LAYING ON TOP OF THE NATURAL GROUND, ROCK OR COMPACTED FILL.

2. THE TOP OF PIPE IS BELOW THE LEVEL OF THE NATURAL GROUND OR COMPACTED FILL, TO MINIMUM 6' (SPD) AND TO BE COVERED WITH EARTH FILL TO HEIGHTS ABOVE THE MATERIAL GROUND.

3. NOTE: IF UNSUITABLE MATERIAL IS FOUND, UNDERCUT AS DIRECTED AND BACKFILL WITH SUITABLE MATERIAL TO BOTTOM OF PIPE.

STEP 1: REMOVE TOPSOIL TO A WIDTH EQUAL TO 5 DIAMETERS OF PIPE.

STEP 2: CONSTRUCT THE ENVELOPE TO FOUR (4) FEET ABOVE THE TOP OF PIPE OR TO THE SUBGRADE ELEVATION, WHICHEVER IS LESS. FOR PIPES 72" OR GREATER HD. DEEP FROM 1'-0" TO 1'-3".

STEP 3: EXCAVATE THE TRENCH TO THE WIDTH OF 6'. PLACEMENT OF BACKFILL MATERIAL IN 8 INCH LAYERS IS RECOMMENDED.

STEP 4: FOR CONCRETE PIPE, IF THIS EXCAVATION IS THROUGH ROCK, OR HARD SHALE, OR IN AREAS OF UNSUITABILITY, PROVIDE A MINIMUM 6' LONG EMBANKMENT.

STEP 5: LAY PIPE ON THE PREPARED CRADLE, SEE STEP 5 OF METAL PIPE AND METAL PLATE PIPE ARCH.

STEP 6: LAY PIPE ON THE PREPARED CRADLE AND METAL PIPE ARCH. LAY THE PIPE ON THE PREPARED CRADLE ON TOP OF ETCHED MATERIAL AND METAL PIPE ARCH.

STEP 6A: CONCRETE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL (1' 4" LIFTS) ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 6'. PLACE UNCOMPACTED MATERIAL OF THE SAME TYPE AS BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 650.

STEP 6B: THERMOPLASTIC PIPE

PLACE 2A COARSE AGGREGATE MATERIAL (1' 4" LIFTS) ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 6'. PLACE UNCOMPACTED MATERIAL OF THE SAME TYPE AS BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 650.

STEP 6C: THERMOPLASTIC PIPE

PLACE 2A COARSE AGGREGATE MATERIAL (1' 4" LIFTS) ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 6'. PLACE UNCOMPACTED MATERIAL OF THE SAME TYPE AS BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 650.

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

PLACE 2A COARSE AGGREGATE MATERIAL (1' 4" LIFTS) ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 6'. PLACE UNCOMPACTED MATERIAL OF THE SAME TYPE AS BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 650.

LEGEND

- AGGREGATE FOR BEDDING (AASHTO M20), UNCOMPACTED
- COARSE AGGREGATE (AASHTO M20)
- STANDARD PROCTOR DENSITY
- INSIDE DIAMETER
- OUTSIDE DIAMETER OF PIPE, FEET

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PIPE PLACEMENT
EXCAVATION - BEDDING - BACKFILL

RECOMMENDED OCT. 24, 1995
RECOMMENDED OCT. 24, 1995
GUT.5.F.A
STUDENT GROUP OF DESN

RC-30
TABLE A

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
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NOTES:
1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATIONS AS OUTLINED IN PUBLICATION 408, SECTION 709. SEE SHEET 2 OF 2.
2. CHAMFER EXPOSED EDGES ONE INCH.
3. PROVIDE REINFORCEMENT (.12 in 2/Lin.Fr.) IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATIONS AS OUTLINED IN PUBLICATION 408, SECTION 709. SEE SHEET 2 OF 2.
4. INCLUDE 4% SEMICIRCULAR PIPE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

ENDWALLS

[Diagram of endwalls, elevations, and sections]
PIPE DIAMETER
18" ANO 21"
24" ANO 27"
30" ANO 33"

PROVIDE I LAYER or REINFORCEMENT BARS (.12 in.2/Ln. Ft.)
(EACH WAY

<table>
<thead>
<tr>
<th>5'</th>
<th>7'</th>
<th>9'</th>
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</table>

PLAN VIEW

SECTION C-C
FRONT ELEVATION VIEW

TYPE D ENDWALL

SUBSURFACE DRAIN OUTLET ENDFALL

LOCAL CONDITIONS WILL GOVERN DIAMETER Of 10-

<table>
<thead>
<tr>
<th>5'</th>
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PLAN VIEW

SECTION D-D
SIDE ELEVATION VIEW

TYPE D-E ENDWALL

SIDE ROAD WALL TO BE PARALLEL TO SIDE ROAD

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<th>5'</th>
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PLAN VIEW

SECTION E-E
SIDE ELEVATION VIEW

TYPE E-S ENDWALL

NOTES
1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 609 AND SECTION 704.
2. THIS STANDARD DEPICTS THE SHAPE AND DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR MANUFACTURING AND HANDLING PRECAST UNITS. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 WILL BE PERMITTED. ANY MANUFACTURER DESIRING TO BE LISTED IN BULLETIN 15 SHALL SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE MATERIALS AND TESTING DIVISION, DEPARTMENT OF TRANSPORTATION, FOR APPROVAL. THE SHOP DRAWINGS SHALL SHOW ALL DETAILS INCLUDING DIMENSIONS, TOLERANCES, REINFORCEMENT AND ANY MANUFACTURING DRAFTS.
3. CHAMFER EXPOSED EDGES ONE INCH.
4. PROVIDE PIPE OPENING SIZE IN PRECAST UNITS AT LEAST TWO INCHES BUT NOT MORE THAN FOUR INCHES LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE.
5. PROVIDE CYLINDRICAL SLEEVE 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.
6. PROVIDE A 1-INCH MORTAR BED PLACED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES, WHEN REQUIRED.
7. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
PRECAST ENDFALLS

RC-31
PAVED SHOULDER
NORMAL EDGE OF PAVEMENT
WIDENED PAVEMENT
2" DEPRESSION
SLOPE PIPE FITTING
1" HOLE
NO. 5 BARS
12" LONG
EXISTING TYPE
TO "D" ENDWALL
PAY LIMIT OF CONCRETE
COLLAR INCLUDES 12 INCHES
OF PIPE FOR PIPE EXTENSION
ADJACENT TO STRUCTURE AND/OR PAVED SHOULDER
SIDE VIEW
CONCRETE COLLAR FOR PIPE EXTENSION
FOR PIPES UP TO AND INCLUDING 33" OD, SEE NOTE 1
PLAN
SLOPE PIPE FITTING
PAY LIMIT OF R.C.C. PIPE
PAY LIMIT OF CORRUGATED METAL PIPE
SIDE ELEVATION
FRONT ELEVATION
BACK ELEVATION
END VIEW
5,000-12" CONCRETE COLLAR FOR PIPE EXTENSION
FOR PIPES UP TO 33" OD, SEE NOTE 1
<table>
<thead>
<tr>
<th>NOMINAL DIAMETER OF PIPE</th>
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</tbody>
</table>

* RESTRICT SLOPE PIPES DRRAINING ONLY SHOULDER AREAS IN EMBANKMENTS OTHER THAN THOSE ADJACENT TO STRUCTURES, TO 12 INCHES MINIMUM DIAMETER.

1. FOR OTHER TYPES OF ENDWALLS AND FOR PIPES LARGER THAN 33" OD, A SPECIAL COLLAR DESIGN IS REQUIRED.
2. REMOVE PORTIONS OF EXISTING ENDWALL IF REQUIRED TO MAINTAIN 4" GROUND COVER.
3. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 616 FOR SLOPE PIPE FITTINGS AND SECTION 618 FOR CONCRETE COLLAR FOR PIPE EXTENSION.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
SLOPE PIPE FITTINGS
PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION

DIRECTOR, BUREAU OF DESIGN
1. **Construction Requirements**

   A. Construct in accordance with: PennDOT Publication 408 Specifications, Sections 402, 403, 714, and as modified herein.

   B. Minimum concrete class:

   - Cast-in-place Class A
   - Precast Class AA

   C. Provide steel reinforcement in accordance with Sec. 710. Provide minimum yield strength of 40,000 P.S.I.

   D. Clear cover for steel:

   - Walls: Cast-in-place 2" Precast 1½"
   - Footings: Cast-in-place 2½" (top bars)
   - 2" (bottom bars)
   - 2" (side covers)
   - Precast 1½" (top bars)
   - 1½" (bottom bars)
   - 1½" (side covers)

   Slabs: Cast-in-place 2½" (top & bottom bars)

2. This sheet depicts the various components required for complete inlet assemblies. For individual components and other special details, see the following:

   - Sheet 9 of 9 for Type D-H Inlets
   - Sheet 8 of 9 for Modified Inlet Boxes Precast
   - Sheet 3 of 9 and Sheet 4 of 9 for Grates and other special details
   - Sheet 2 of 9 for Concrete Top Units
   - Sheet 1 of 9 for Framed Grates

3. Each type of inlet shown is suited for a particular situation as follows:

   - Type C Inlet is designated for installation with non-mountable curbs.
   - Type M Inlet is designated for installation in median areas and mountable curbs.
   - Type W Inlet is designated for installation in shoulder areas.

4. The selection of components to achieve a specified inlet assembly is the contractor’s responsibility.

5. Use precast concrete or steel grade adjustment rings when required. (Rehabilitation Projects)

6. For wall reinforcement, both directions, use 0.12 in./ft., min. each way, each face.

7. For footing reinforcement, top and bottom, use #4 bars at 12" centers each way or 0.20 in./ft., W.W.F. 16" max. spacing.

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**Notes**

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS
INLET ASSEMBLIES

RECOMMENDED: MAY 26, 1994
APPROVED: MAY 29, 1994

SHEET [3 OF 3]
1. This sheet depicts the shape and dimensions required for uniformity and compatibility. It does not include details required for manufacturing and handling precast top units. Only top units supplied by a manufacturer listed in Bulletin 15 shall be permitted. For a bulletin 15 listing, submit a 22" x 36" reproducible shop drawing to the Bureau of Construction and Materials, Materials and Testing Division for review and approval.

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

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

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

5. Dowel Type S inlet top units with $2\times 8\times 1\frac{1}{2}$" dowel bars and place 1/8" preformed expansion joint filler when connecting to adjacent curb sections.

6. The placement of the Type S inlet relative to the gutter invert is dependent on the rate of back slope. For back slopes greater than 2', locate the inlet where the back slope line intersects the back top, outside corner of the inlet. For back slopes less than 2', locate the inlet where the back slope line intersects the edge of the inlet grate.

Department of Transportation
Bureau of Design

Commonwealth of Pennsylvania

Concrete Top Units

Inlets

RC-34
SEE TYPICAL CORNER DETAILS

SECTION A-A

SECTION B-B

SECTION C-C

NOTES

1. This sheet depicts the dimensions required for uniformity and interchangeability. It does not include details required for fabrication or manufacturing. Only grates supplied by a manufacturer listed in Bulletin 15 shall be permitted. For a Bulletin 15 listing, submit a 22" x 36" reproducible shop drawing to the Bureau of Construction and Materials, Materials and Testing Division for review and approval.

2. Weld structural steel grates in accordance with the requirements of Publication 404, Section 105.03(R).

3. Provide transverse bars, meeting the requirements of PUB 404.

4. Provide bicycle-safe, structural steel or cast iron vane grates for installation only where bicycle traffic is anticipated, such as curbed roadways in urban areas or roadways specifically established for bike lanes. Alternate bicycle-safe grate designs shall require a shop drawing submission, as specified in Note 1, and shall conform to the dimensional requirements for proper installation with the current concrete top units.

5. Fabricate slots by burning, drilling, shearing or punching, have the bottom of all burned or drilled slots conform to the shape of the rod.

6. Provide structural steel grates with the grate spacers located flush along the top surface of the grate.

7. Do not use cast iron grates within the travel lanes. These grates are permitted at the edge of outside shoulders, swales, wide median swales and infield areas that are outside the travel lanes or curb to curb roadways.

FOR SLOT FABRICATION SEE NOTE 5

CAST IRON GRATE

INLETS GRATES

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RECOMMENDED: MAR. 25, 1994
RECOMMENDED: MAR. 25, 1994

RC-34
NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 605, 606 AND 714. ONLY GRATES AND GRADE ADJUSTMENT SYSTEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN 15 LISTING, SUBMIT A 22"x36" REPRODUCIBLE SHOP DRAWING TO THE MATERIALS AND TESTING DIVISION, BUREAU OF CONSTRUCTION AND MATERIALS FOR REVIEW AND APPROVAL.

2. INSTALL VANE GRATES WITH CURVE VANES FACING THE DIRECTION OF FLOW.

3. GRADE ADJUSTMENT RINGS:
   A. EACH ADJUSTMENT RING TO BE CUSTOM FABRICATED FROM MEASUREMENTS PROVIDED WITH EACH ORDER.
   C. FULL CIRCUMFERENTIAL WELDS ARE REQUIRED ON BOTH TOP AND BOTTOM RINGS. THE INNER WELD TO BE A BEVEL GROOVE WELD FOR PROPER SEATING OF GRATE AND THE OUTER WELD TO BE FILLET WELD.
   D. PROVIDE AN ADJUSTMENT RING WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME.

4. PROVIDE 3/8" RADIUS (TYPICAL) FOR ALL FILLETS AND ROUNDS, UNLESS NOTED.

5. STEEL GRADE ADJUSTMENT RINGS TO BE ATTACHED RIGIDLY TO THE FRAME AND PRECAST CONCRETE GRADE ADJUSTMENT RINGS TO BE SET ON A MORTAR BED.

6. DO NOT USE CAST IRON VANE GRATES WITHIN THE TRAVEL LANES. THESE GRATES ARE PERMITTED AT THE EDGE OF OUTSIDE SHOULDER, SWALES, MEDIAN SWALES, INFIELD AREAS THAT ARE OUTSIDE THE TRAVEL LANES OR CURB TO CURB ROADSIDE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS GRATES
GRADE ADJUSTMENT SYSTEMS
1. Construct inlet boxes in accordance with the requirements of Publication 408, Section 605.

2. Provide inlet boxes with 24" x 45 1/4" standard opening to accommodate the standard top components.

3. For cast-in-place or precast construction, provide 6" inlet walls unless otherwise indicated.

4. Inlets that exceed the minimum height shown shall require special details and design for the inlet walls and base. Construct inlets that exceed 5 feet in height with steps similar to manholes, see RC-39.

5. Locate pipes or pipes, as indicated, with the inlet bottom shaped to channel the flow toward the outlet pipe.

6. Place four reinforcement bars, minimum 12 inches long, spaced at 12 inches ctc., at domes between the inlet base and walls when one concrete wall is used in the inlet case. If a second wall is not provided, an alternate joint is constructed as shown in details A & B.

7. For cast-in-place construction, when the base is constructed monolithically with the vertical walls, provide 5 inch minimum from the bottom of the pipe to the bottom of the inlet box.

8. For pipe diameters larger than 48" R.C.C.P. or 54" C.M.P. use a modified inlet box, see Sheet 8 of 9.

9. For pipe diameters larger than 48" R.C.C.P. or 54" C.M.P. in the long direction or larger than 24" in the short direction, special detail and design is required.

10. For inlets other than as shown on the standards, provide reinforcement based on HSD loading and in accordance with AASHTO specifications.

11. Construction joints and keys may be constructed upward or downward. Joints and keys are to be thoroughly cleaned before placing next concrete segment.

**NOTE:**

- Construct inlets in accordance with the requirements of Publication 408, Section 605.
- Provide inlet boxes with 24" x 45 1/4" standard opening to accommodate the standard top components.
- For cast-in-place or precast construction, provide 6" inlet walls unless otherwise indicated.
- Inlets that exceed the minimum height shown shall require special details and design for the inlet walls and base. Construct inlets that exceed 5 feet in height with steps similar to manholes, see RC-39.
- Locate pipes or pipes, as indicated, with the inlet bottom shaped to channel the flow toward the outlet pipe.
- Place four reinforcement bars, minimum 12 inches long, spaced at 12 inches ctc., at domes between the inlet base and walls when one concrete wall is used in the inlet case. If a second wall is not provided, an alternate joint is constructed as shown in details A & B.
- For cast-in-place construction, when the base is constructed monolithically with the vertical walls, provide 5 inch minimum from the bottom of the pipe to the bottom of the inlet box.
- For pipe diameters larger than 48" R.C.C.P. or 54" C.M.P. use a modified inlet box, see Sheet 8 of 9.
- For pipe diameters larger than 48" R.C.C.P. or 54" C.M.P. in the long direction or larger than 24" in the short direction, special detail and design is required.
- For inlets other than as shown on the standards, provide reinforcement based on HSD loading and in accordance with AASHTO specifications.
- Construction joints and keys may be constructed upward or downward. Joints and keys are to be thoroughly cleaned before placing next concrete segment.
1. Construct in accordance with the requirements of Publication 408, Section 605 and Section 714.

2. Inlets that exceed the maximum height shown shall require special details and design for the inlet walls and base. Construct inlets that exceed 7 feet in height with steps similar to manholes. See RC-59.

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

4. For orientation of the type C inlet with modified type I inlet box, the typical installation details are shown below. Any variation shall be shown on the construction drawings by special details.

5. Provide a minimum height of 20 inches measured from 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.

6. Only precast modified inlet boxes supplied by a manufacturer listed in Bulletin 15 shall be permitted. For a Bulletin 15 listing, submit a 22" x 36" reproducible shop drawing to the Bureau of Construction and Materials, Materials and Testing Division for review and approval.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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

NOTES

1. Inlets that exceed the maximum height shown shall require special details and design for the inlet walls and base. Construct inlets that exceed 7 feet in height with steps similar to manholes. See RC-59.

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

3. For orientation of the type C inlet with modified type I inlet box, the typical installation details are shown below. Any variation shall be shown on the construction drawings by special details.

5. Provide a minimum height of 20 inches measured from 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.

6. Only precast modified inlet boxes supplied by a manufacturer listed in Bulletin 15 shall be permitted. For a Bulletin 15 listing, submit a 22" x 36" reproducible shop drawing to the Bureau of Construction and Materials, Materials and Testing Division for review and approval.
NOTES

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION G06.

2. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAIL SPECIFICATIONS FOR MANUFACTURE OF MATERIALS. ONLY GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A COMPLETE LISTING, SUBMIT A 22"x36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF DESIGN FOR REVIEW AND APPROVAL.

3. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(R).

4. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A SEARING AREA FOR THE GRATES FOR TYPE D-H INLETS WHICH SEAT THE GRATES DIRECTLY WITHIN THE UNIT.

5. FOR PIPE LOCATION AND MAXIMUM ALLOWABLE SIZES, SEE SHEET 7 OF 9.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS
TYPE D-H INLET

SECTION A-A

SECTION D-B

SECTION D-D

SECTION C-C

BAR GRATE

PLAN VIEW

TYPICAL D-H INLET LOCATION

PLAN VIEW

PIPE LOCATION AND SIZE AS REQUIRED, SEE NOTE 5
1. Do not construct drainage dike to a height which causes flooding of the subbase.
2. Construction of the drainage dike shall be considered incidental to the Class 1 excavation.

NOTE:

- Height: 6" for swales, 12" for medians, unless otherwise directed.
NOTES:

1. PROVIDE SPRING BOXES MEETING THE REQUIREMENTS OF PUBLICATION 408.

2. PRECAST SPRING BOXES MAY BE USED IN LIEU OF CAST-IN-PLACE SPRING
   BOXES. ONLY PRECAST BOXES SUPPLIED BY AN APPROVED MANUFACTURER
   LISTED IN BULLETIN 408 WILL BE PERMITTED.

3. LOCATE OUTLET PIPE AS REQUIRED TO SUIT FIELD CONDITIONS.

4. PLACE 4" REINFORCEMENT BARS WITHIN 12 INCHES LONG, SPACED AT
   12" C. TO C. AS DOWELS BETWEEN THE FOUNDATION AND WALLS WHEN THE
   CONSTRUCTION, EXCLUDING COVER, IS NOT MONOLITHIC. THE DOWELS MAY
   BE ELIMINATED IF THE ALTERNATE JOINTS SHOWN IN DETAILS B OR C ARE
   CONSTRUCTED.

5. PROVIDE REINFORCEMENT FOR WALLS AND FOUNDATIONS OF PRECAST BOXES
   MEETING THE REQUIREMENTS OF AASHTO M-199.

6. WHEN FILL HEIGHT OVER TOP OF BOX EXCEEDS 10 FEET, A SPECIAL DESIGN
   WILL BE REQUIRED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SPRING BOXES

RC-36
CONSTRUCTION joint to be located at Top of Manhole
1. CONSTRUCTION REQUIREMENTS

A. CONSTRUCT IN ACCORDANCE WITH ENGINEER’S PUBLICATION AND SPECIFICATIONS, SECTION 6-01-91, COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION.

B. MINIMUM CONCRETE CLASS:

- CAST-IN-PLACE CLASS A
- PRECAST CLASS AA

C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM A615, REINFORCED BILLET STEEL BARS OR ASTM A416, PLAIN BILLET STEEL BARS OR ASTM A642, PLAIN BILLET STEEL BARS. PROVIDE MINIMUM YIELD STRENGTH OF 60,000 PSI.

2. FOR PIPES WITH INSIDE DIAMETERS GREATER THAN 30" SEE MODIFIED CAST-IN-PLACE MANHOLE, SHEET 2 OF 9.

3. PROVIDE 12" MINIMUM HORIZONTAL CLEARANCE BETWEEN OPENINGS LOCATED AT THE SAME DEPTH. OPENINGS NOT LOCATED AT THE SAME DEPTH MUST BE LOCATED VERTICALLY AT LEAST 10" TIMES MAXIMUM OPENING DIAMETER APART.

4. FORM A CONCRETE CHANNEL AT THE BOTTOM OF THE MANHOLE, CONFORMING TO THE SHAPE OF THE OUTER HALF OF THE INLETING AND/OR OUTGOING PIPES. A FULL DEPTH U-SHAPED CHANNEL SHOULD BE PROVIDED WHEN NECESSARY TO REDUCE ENERGY LOSSES.

5. USE 5" THICK WALLS FOR PIPES WITH INSIDE DIAMETERS GREATER THAN 30" SEE TABLE A.

6. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM C-478-90, STANDARD SPECIFICATION FOR REINFORCED CONCRETE MANHOLE SECTIONS, AS MODIFIED HEREIN.

7. A SAFE BEARING CAPACITY OF 1,5 TONS PER SQUARE FOOT UNDER THE ENTIRE BASE SLAB IS ASSUMED TO DETERMINE THE BASE SIZE.

8. CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. JOINTS AND KEYS ARE TO BE THOROUGHLY CLEANED BEFORE PLACING NEXT CONCRETE SEGMENT.

9. A SAFE BEARING CAPACITY OF 0.8 TONS PER SQUARE FOOT UNDER THE ENTIRE BASE SLAB IS ASSUMED TO DETERMINE THE BASE SIZE. WHEN THE SUBSOIL IS EXTREMELY POOR, PROCEED WITH CONSTRUCTION ONLY AFTER THE ENGINEER SPECIFIES AN ADEQUATE BASE DESIGN.

10. FOR FOOTING, TOP REINFORCEMENT BOTH DIRECTIONS, USE 6" BARS AT LEAST 4 BARS TO 60 FEET OR 5 BARS TO 50 FEET FOR DEPTHS LESS THAN 30 FEET, 6" MAXIMUM SPACING.

11. FOR FOOTING BOTTOM REINFORCEMENT BOTH DIRECTIONS, USE 4" BARS AT LEAST 4 BARS TO 60 FEET OR 5 BARS TO 50 FEET FOR DEPTHS GREATER THAN 30 FEET, 6" MAXIMUM SPACING.

TABLE A

<table>
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<tr>
<th>MAX. DEPTH FROM TOP OF MANHOLE TO TOP OF FOOTING</th>
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<th>FOOTING DIAMETER</th>
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES
CAST-IN-PLACE MANHOLES

CAST-IN-PLACE MANHOLE FOR PIPES 30 INCHES INSIDE DIAMETER AND LESS
FOR BASE SLAB DIMENSIONS SEE TABLE A

FOR FRAME AND COVER CASTING DETAILS SEE SHEET 4 OF 6
FOR TOPICAL STEP DETAIL SEE SHEET 3 OF 9
FOR CAST-IN-PLACE MANHOLE FOR PIPES 30 INCHES INSIDE DIAMETER AND LESS
FOR BASE SLAB DIMENSIONS SEE TABLE A

REFERENCE DRAWINGS

CONSTRUCTION joint to be located at Top of Manhole
1. CONSTRUCTION REQUIREMENTS

A. CONSTRUCT IN ACCORDANCE WITH ENGINEER’S PUBLICATION AND SPECIFICATIONS, SECTION 6-01-91, COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION.

B. MINIMUM CONCRETE CLASS:

- CAST-IN-PLACE CLASS A
- PRECAST CLASS AA

C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM A615, REINFORCED BILLET STEEL BARS OR ASTM A416, PLAIN BILLET STEEL BARS OR ASTM A642, PLAIN BILLET STEEL BARS. PROVIDE MINIMUM YIELD STRENGTH OF 60,000 PSI.

2. FOR PIPES WITH INSIDE DIAMETERS GREATER THAN 30" SEE MODIFIED CAST-IN-PLACE MANHOLE, SHEET 2 OF 9.

3. PROVIDE 12" MINIMUM HORIZONTAL CLEARANCE BETWEEN OPENINGS LOCATED AT THE SAME DEPTH. OPENINGS NOT LOCATED AT THE SAME DEPTH MUST BE LOCATED VERTICALLY AT LEAST 10" TIMES MAXIMUM OPENING DIAMETER APART.

4. FORM A CONCRETE CHANNEL AT THE BOTTOM OF THE MANHOLE, CONFORMING TO THE SHAPE OF THE OUTER HALF OF THE INLETING AND/OR OUTGOING PIPES. A FULL DEPTH U-SHAPED CHANNEL SHOULD BE PROVIDED WHEN NECESSARY TO REDUCE ENERGY LOSSES.

5. USE 5" THICK WALLS FOR PIPES WITH INSIDE DIAMETERS GREATER THAN 30" SEE TABLE A.

6. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM C-478-90, STANDARD SPECIFICATION FOR REINFORCED CONCRETE MANHOLE SECTIONS, AS MODIFIED HEREIN.

7. A SAFE BEARING CAPACITY OF 1,5 TONS PER SQUARE FOOT UNDER THE ENTIRE BASE SLAB IS ASSUMED TO DETERMINE THE BASE SIZE.

8. CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. JOINTS AND KEYS ARE TO BE THOROUGHLY CLEANED BEFORE PLACING NEXT CONCRETE SEGMENT.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES
CAST-IN-PLACE MANHOLES

CAST-IN-PLACE MANHOLE FOR PIPES 30 INCHES INSIDE DIAMETER AND LESS
FOR BASE SLAB DIMENSIONS SEE TABLE A

FOR FRAME AND COVER CASTING DETAILS SEE SHEET 4 OF 6
FOR TOPICAL STEP DETAIL SEE SHEET 3 OF 9
FOR CAST-IN-PLACE MANHOLE FOR PIPES 30 INCHES INSIDE DIAMETER AND LESS
FOR BASE SLAB DIMENSIONS SEE TABLE A
1. For construction requirements see Note 1, Sheet 1 of 5.
2. Increase box size when required to keep walls of manhole box section flush with the opening for pipes larger than 6" inches inside diameter.
3. Design procedure for manhole box section.
   - Design all members for moment, crack control, and shear at distance of effective depth of member from face of support.
   - Place additional bars in the slab at 45 degrees around the manhole opening. See Section A-A for details.
   - Design the "edge beams," spanning the length of the box, to carry a uniformly distributed load equal to the reaction from the slab.
   - Place additional bars in the slab at 45 degrees around the manhole opening. See Figure 2 for details.
   - Design the "edge beam" spanning the length of the box to carry a uniformly distributed load equal to the reaction from the slab.

Design all members for moment, crack control, and shear at distance of effective depth of member from face of support.

For construction requirements see Note 1, Sheet 1 of 5.

Increase box size when required to keep walls of manhole box section flush with the opening for pipes larger than 6" inches inside diameter.

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Commonwealth of Pennsylvania
Department of Transportation
Bureau of Design

Standard Manholes
Modified Cast-In-Place Manholes
PRECAST MANHOLE FOR PIPES 30 INCHES DIAMETER AND LESS

SECTION B-B

TOP STEEL

BOTTOM STEEL +

DIFFERENTIAL MAXIMUM Spacing

WALL REINFORCEMENT 1.52 minimum VERTICAL FOOT FULL DEPTH 1/4 IN VERTICAL FOOT PLATE REINFORCEMENT HORIZONTALLY 1/2 THICK FOR STEEL REQUIREMENTS AT OPENINGS

NOTE:
1. PRECAST MANHOLES MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 714, MAY BE SUBSTITUTED FOR THE STANDARD CAST-IN-PLACE MANHOLE.

2. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1 OF 5.

3. FOR DESIGN REQUIREMENTS SEE NOTE 1, SHEET 5 OF 5.

4. FOR PIPES LOCATION OF PIPES SEE PLAN VIEW AND NOTE 3, SHEET 1 OF 5.

5. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND OPENINGS AS SHOWN ON STEEL REQUIREMENTS DETAILS AT OPENINGS SHEET 1 OF 5.

6. PROVIDE MINIMUM 1" SECTION DIMENSIONS FOR NON-DETERIORATING STEEL.

7. PROVIDE MINIMUM 1" SECTION DIMENSION FOR METAL STEPS.

8. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND OPENINGS AS SHOWN ON STEEL REQUIREMENTS DETAILS AT OPENINGS SHEET 1 OF 5.

9. PROVIDE ADDITIONAL STEEL REQUIREMENTS BARS AROUND OPENINGS AS SHOWN ON STEEL REQUIREMENTS DETAILS AT OPENINGS SHEET 1 OF 5.

10. PROVIDE MINIMUM 1" SECTION DIMENSIONS FOR NON-DETERIORATING STEEL.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

BUREAU OF DESIGN

STANDARD MANHOLES
PRECAST MANHOLES & MANHOLE STEPS

RC-39 SHT. 1 OF 5
NOTES:

1. PROVIDE MANHOLE FRAMES AND COVERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 608.2. DESIGN MANHOLE FRAME, COVER AND GRADE ADJUSTMENT RINGS FOR HS25 LIVE LOAD. IF MANHOLES ARE NOT IN OR ADJACENT TO ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT.

2. PROVIDE MANHOLE FRAMES, COVERS AND GRADE ADJUSTMENT RISERS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS MATERIALS AND TESTING DIVISION FOR REVIEW.

3. PROVIDE A GASKET SEALING SYSTEM (O-C-RING AND CONTINUOUS COTTON), AS INDICATED IN DETAIL A, TO PREVENT SURFACE RUNOFF WATER INTO THE MANHOLE SYSTEM. WHEN SPECIFIED, PROVIDE "TYPICAL LIFT HOLE" MULTIPLE RISING COTTON GASKET 40 DOWEL CLIPS IN PLACE. PROVIDE TWO (2) LIFT HOLES AT 180° TO FACILITATE COVER REMOVAL FOR SELF-Sealing MANHOLE COVER.

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

5. FRAME AND GRADE ADJUSTMENT RISER TO HAVE A MINIMUM 1" BEARING SEAT FOR COVER.

6. LOCATE TOP OF FRAME OR ADJUSTMENT RISER 1/4" BELOW THE TOP OF ROADWAY SURFACE.

7. GRADE ADJUSTMENT RISERS

   PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 608.2 AND AS MODIFIED HEREIN:

   A. EACH ADJUSTMENT RISER TO BE CUSTOM FABRICATED FROM MEASUREMENTS PROVIDED WITH EACH ORDER.


   C. FULL CIRCUMFERENTIAL WELDS ARE REQUIRED ON BOTH TOP AND BOTTOM RINGS. THE INNER WELD TO BE BEVEL GROOVE FIELD WELD AND THE OUTER WELD TO BE FLAT WELD.

   D. SOCKET HEAD BOLTS FOR MULTIPLE PIECE ADJUSTMENT RISER TO BE TAPPED FOR 1/2" DIAMETER ADJUSTMENT BOLT.

   E. ADJUSTMENT RISER TO BE ADEQUATELY REINFORCED TO PREVENT BENDING.

   F. PROVIDE AN ADJUSTMENT RISER WHICH IS FLUSH WITH COVER AND DOES NOT ALLOW EXCESSIVE MOVEMENT.

8. FRAME AND/OR PRECAST CONCRETE GRADE RINGS TO BE ATTACHED RIGIDLY TO TOP OF MANHOLE. USE 3/8"-15" DIA. TAPPED STUDS WITH HEX HEAD NUTS AND WASHERS. INSERTED THROUGH HOLES SET IN MANHOLE FRAME AND/OR RINGS, HOLES TO BE SIZED AT 120° AND 2" FROM OUTSIDE EDGE OF FRAME. PROVIDE "TYPICAL LIFT HOLE" MULTIPLE RISING COTTON GASKET 40 DOWEL CLIPS IN PLACE. PROVIDE TWO (2) LIFT HOLES AT 180° TO FACILITATE COVER REMOVAL FOR SELF-Sealing MANHOLE COVER.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES
COVERS, FRAMES AND
ADJUSTMENT RISERS

RC-39
1. **DESIGN REQUIREMENTS**


   B. **CALCULATE FOUNDATION BEARING PRESSURES BY SERVICE LOAD METHODS**.

   C. THE SAFE BEARING PRESSURE IS NOT TO EXCEED THE EXISTING LOAD AS APPROVED BY THE DEPARTMENT.

   D. Design the Manhole for a live load of HS25 and L.L. Maximum live load plus dead load of manhole, L.L. = live wheel load + no impact.

   E. Design the Manhole for:
      1. This procedure is required only when a significant loading exists on one side of the manhole and limited support is provided on the other.

   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 OF 5**.

   H. **VERTICAL STEEL**

   A. **DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS**.

   B. **DETERMINE OVERTURNING MOMENT FROM UNBALANCED EARTH PRESSURE**.

   C. **CHECK CRACK CONTROL UNDER SERVICE LOAD**.

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

   E. **DESIGN REINFORCEMENT IN "COLUMN" TO CARRY AXIAL LOAD AND MOMENT**.

   F. **CHECK CRACK CONTROL UNDER SERVICE LOAD**.

2. **HOOP STEEL**

A. **DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS**

   b. **DETERMINE OVERTURNING MOMENT FROM UNBALANCED EARTH PRESSURE**

   c. **CHECK CRACK CONTROL UNDER SERVICE LOAD**

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

   e. **DESIGN REINFORCEMENT IN "COLUMN" TO CARRY AXIAL LOAD AND MOMENT**

   f. **CHECK CRACK CONTROL UNDER SERVICE LOAD**

3. **FOOTING DESIGN**

A. **DETERMINE FOOTING SIZE**

   b. **DETERMINE MOMENTS**

   c. **CHECK CRACK CONTROL UNDER SERVICE LOAD**

4. **DIAMETRICAL SECTION THROUGH FOOTING**

   a. **RESULTANT PRESSURE**

   b. **DIAMETRICAL SECTION THROUGH FOOTING**

   c. **RESULTANT PRESSURE**

---

**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF TRANSPORTATION**
**BUREAU OF DESIGN**

**STANDARD MANHOLES**

**DESIGN PROCEDURE**

---

**FIGURE 1**

**DESIGN SECTION TO CARRY MOMENT**

**FIGURE 2**

**DIAMETRICAL SECTION THROUGH FOOTING**

**FIGURE 3**

**DIFFERENTIAL PRESSURE LOADING TO DETERMINE P MAX**

**FIGURE 4**

**DIAMETRICAL SECTION THROUGH FOOTING**

**FIGURE 5**

**DIFFERENTIAL PRESSURE LOADING TO DETERMINE P MAX**

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**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF TRANSPORTATION**
**BUREAU OF DESIGN**

**STANDARD MANHOLES**

**DESIGN PROCEDURE**

---

**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF TRANSPORTATION**
**BUREAU OF DESIGN**

**STANDARD MANHOLES**

**DESIGN PROCEDURE**

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**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF TRANSPORTATION**
**BUREAU OF DESIGN**

**STANDARD MANHOLES**

**DESIGN PROCEDURE**

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**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF TRANSPORTATION**
**BUREAU OF DESIGN**

**STANDARD MANHOLES**

**DESIGN PROCEDURE**

---
SLOPE PROTECTION

1. PROVIDE GEOTEXTILE MATERIAL MEETING THE CONSTRUCTION REQUIREMENTS OF PUBLICATION 2, SPECIFICATIONS, SECTION 212 AND MATERIAL REQUIREMENTS OF SECTION 735.
2. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
3. PLACE CONCRETE PIPE ANCHORS AT THE BEGINNING AND END OF PIPE EXCAVATION, AND AT EVERY FOURTH SECTION.
4. PROVIDE TEN FOOT MAXIMUM SPACING BETWEEN ANCHORS.
5. PLACEMENT OF CONCRETE PIPE ANCHORS IS INDICATED ON THE DRAWINGS, OR AS DIRECTED.

CONCRETE PAVING FOR STREAM BEDS

CONCRETE PAVING FOR STREAM BEDS

RECOMMEND THE USE OF CROSS WALLS AT THE BEGINNING AND END OF PAVED DITCH OR CHANNEL, AND AT THE AVERAGE END OF EVERY FOURTH SECTION.

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

PLACE OR CUT OFF END OF PIPE FLUSH WITH THE SLOPING FACE OF PAVING.

CONCRETE PAVING FOR STREAM BEDS

PLACE OR CUT OFF END OF PIPE FLUSH WITH THE SLOPING FACE OF PAVING.

PLACEMENT OF CONCRETE PIPE ANCHORS IS INDICATED ON THE DRAWINGS, OR AS DIRECTED.

CONCRETE PAVING FOR STREAM BEDS

RECOMMEND THE USE OF CROSS WALLS AT THE BEGINNING AND END OF PAVED DITCH OR CHANNEL, AND AT THE AVERAGE END OF EVERY FOURTH SECTION.

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PLACE OR CUT OFF END OF PIPE FLUSH WITH THE SLOPING FACE OF PAVING.

CONCRETE PAVING FOR STREAM BEDS

PLACE OR CUT OFF END OF PIPE FLUSH WITH THE SLOPING FACE OF PAVING.

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

PLACE OR CUT OFF END OF PIPE FLUSH WITH THE SLOPING FACE OF PAVING.
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, SECTION 626, GABIONS.

2. TYPE A GABIONS SHALL CONSIST OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OR COARSE AGGREGATE, AT LEAST ALONG THE EXPOSED FACES, FOR A UNIFORM APPEARANCE.

3. TYPE B GABIONS SHALL CONSIST OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OR SMALL POWER EQUIPMENT PLACEMENT OR COARSE AGGREGATE.

4. CORROSION RESISTANT TYPE A AND TYPE B GABIONS SHALL BE THE SAME AS TYPE A AND TYPE B GABIONS EXCEPT THAT THE WIRE-MESH SHALL BE SHEATHED IN POLYVINYL CHLORIDE PLASTIC.

5. THE APRON OR TOE WALL IS REQUIRED WHERE THE SLOPE WALL IS INSTALLED ADJACENT TO WATER, THE APRON SHOULD BE APPROXIMATELY TWO TIMES AS WIDE AS THE ANTICIPATED DEPTH OF SCOUR AND THE TOE WALL HEIGHT SHOULD BE AT LEAST EQUAL TO THE ANTICIPATED DEPTH OF SCOUR.

6. WHEN GABIONS ARE PLACED ON A 1½:1 SIDE SLOPE OR STEEPER, DRIVE HARDWOOD STAKES THROUGH THE GABIONS, ALONG THE TOP EDGE, TO ANCHOR THE INSTALLATION. MINIMUM EMBEDMENT OF STAKES BELOW GABION BOTTOM SHALL BE 18 INCHES.

7. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND SECTION 735.

8. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.

**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF TRANSPORTATION**
**BUREAU OF DESIGN**

**GABIONS SIZES**

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ADDITIONAL SIZES MAY BE AVAILABLE ON A SPECIAL ORDER BASIS.
1. Provide materials and workmanship in accordance with Publication 408.
2. Provide approach end guide rail treatment at both the approach end and trailing ends of structure parapets or on two lanes facilities entering two way traffic. On four lane divided highways, guide rail is not required on trailing ends of parapets unless warranted by other obstructions.
3. When connecting to type 25 guide rail use 27" or type 2-W guide rail 350°, transition up or down 1° per 25'.
4. Bolt rubbing rail to post without washers.
5. Terminal section and rubbing rail end must be attached flush with sloped toe of safety shape. Installation can be greatly simplified by fabricating or shop twisting to be consistent with the slope of safety shape.
6. Provide 1, 2, 3 & 5 posts 7'-0" long and embed them 1'-0" deeper than the other posts.
7. Steel spacer tube, schedule 40 galvanized pipe, 6" x 1.142", connect to rail elements using splice bolt no.1.
8. Galvanize all hardware, guide rail material posts and rubbing rail in accordance with Pub. 408, Section 1.09.
9. Provide materials and workmanship in accordance with Publication 408, Section 1.09.
10. Provide brackets, steel spacer tube, rubbing rail, rubber rail, brackets, terminal section bridge connection and associated hardware.

**NOTES**

- On structures where structure mounted type 25W guide rail is used, the approach end transition is not required.
- Posts that are denoted with "W" are bolted to the "W" beam.
W6 x 8.5 OR W6 x 9 POST DETAILS

5 7/8" COLD FORMED C-POST DETAILS

NOTES
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION CAR, SECTION 602.

2. PROVIDE EITHER 5 7/8" C-POST OR W6 x 8.5 OR W6 x 9 POSTS WITH MATCHING NUTS AND BOLTS FOR THE STRONG POST GUIDE RAIL. MATERIALS OF DIFFERENT POSTS AND OFFSET BRACKETS WILL NOT BE ACCEPTABLE WITHIN A PROJECT.

3. NO SEPARATE PAYMENT WILL BE MADE FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES. CONCRETE, REINFORCEMENT BARS AND HARDWARE ARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.

4. PROVIDE RUBBING RAIL WHEN THE HEIGHT OF STRONG POST GUIDE RAIL IS OVER 28" IN TRANSITION AREAS TO EXISTING GUIDE RAIL.

5. ATTACH M-BEAM RAIL ELEMENTS TO EACH POST. SPLICE RAIL ELEMENTS ONLY AT POSTS AND LAP IN THE DIRECTION OF TRAFFIC.

6. USE 12" BACKING PLATES FOR THE M-BEAM RAIL ELEMENT AT ALL INTERMEDIATE POSTS WITH THE SAME SECTION AS THE M-BEAM RAIL ELEMENT.
**NOTES**

1. Use splice bolts to develop the design strength of the rail element.
2. Provide terminal section bridge connection, with molded plate for safety, as an incidental item.
3. Slightly notch round heads of post and splice bolts to provide for wrench, when required.

**COMMONWEALTH OF PENNSYLVANIA**
**DEPARTMENT OF TRANSPORTATION**
**BUREAU OF DESIGN**

**TYPE 2 STRONG POST**
**GUIDE RAIL**

**TERMINAL SECTION BRIDGE CONNECTION**

**DETAIL A**

- 7/8" x 9/16" holes for 3/8" cap screws and washers.
- 7/8" x 1" slotted holes.
- 1" holes for 3/4" hexagon head cap screws and washers. See current bridge construction standard drawing, BC-709, for bolts and nuts.

**BRACKET TO POST BOLT AND NUT**

- Bolt and nut, 2" X 6".
- Belt to clear rail element by 1/2".
- Tabs to clear rail element by 1/4".

**POST BOLT**

- Splice bolt.
- Nut.
- Flared or recessed chamfered nut.

**SPLICE BOLT**

- Lock nut or double nut.
- 2" X 6".

- Use 1/4" for all rubbing rail, to guide rail post connections and use 1/2" for all Y-beam rail element to guide rail post connections and offset bracket connections.

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

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

**ALTERNATE TERMINAL SECTIONS**

- 1/4" thick plate.
- 1/4" holes in R.
- 1/2" holes for 3/8" cap screws and washers.
- Seal weld both sides.

- Provide splice bolts with a lock nut or double nut.
- Provide splice bolts in the slotted holes.

- Center splice bolts in the slotted holes.
- See current bridge construction drawings, BC-709, for attachment details.

**FACE OF WALL**

- 3 1/4" thick plate.
- On to be determined by engineer.

**SEE DETAIL A**

- For modification with flared safety wall, or where required.

**SEE DETAIL B**

- For splice and post bolts, see details. For all splice bolt connections, provide a type A plain washer. See details. For splice bolts, see detail B.

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**BUREAU OF DESIGN**

**TYPE 2 STRONG POST**
**GUIDE RAIL**

**MARKINGS**

- [Signed]
- [Date: May 25, 1994]

**DATE**

- [Signed]
- [Date: May 25, 1994]

**SHEET 2 OF 3**
**Breakaway Cable Terminal End Treatment**

**Plan View**
- End Treatment Fasteners
- Steel Washer and Hex Nut
- 3/8" Hex Bolt
- Machine Bolt with Hex Nut
- Terminal Post
- Cable Assembly
- Foundation Anchor Plate
- 14 Gauge Wire
- Bearing Plate
- Tapered Washer
- High Strength Hex Bolt
- Anchor Plate

**Elevation View**
- Terminal Post
- Anchor Plate
- Side View
- Front View
- 3/8" Hex Nut and Steel Washer

**Notes**
1. Payment for the Breakaway Cable Terminal End Treatment includes the last 25' of rail element, post, terminal section, wrench, cable assembly hardware, anchor and bearing plates, excavation, and cast-in-place concrete.
2. To retain bearing plate position after installation, wrap a single 14 gauge galvanized wire around terminal post and plate near top of plate.

**Commonwealth of Pennsylvania Department of Transportation**

**Type 2 Strong Post Guide Rail**

**Breakaway Cable Terminal (B.C.T.) End Treatment**

**Director, Bureau of Design**

**Mar. 25, 1994**

**Sht 2 of 5**

**RC-52**
TYPICAL FOR
15° THRU 15° POSITIONS
ROTATING BRACKET

M6x9 POST
5 1/2" C-POST

POSITIONING OF ROTATING BRACKET

TABLE A

<table>
<thead>
<tr>
<th>HEIGHT OF POST</th>
<th>12&quot;</th>
<th>18&quot;</th>
<th>24&quot;</th>
<th>30&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROVATION ANGLES</td>
<td>15°</td>
<td>30°</td>
<td>45°</td>
<td>60°</td>
</tr>
</tbody>
</table>

NOTES

1. PAYMENT FOR TYPE 2 STRONG POST END TREATMENT INCLUDES 17'-6" OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.
2. INSTALL DELINEATOR ASSEMBLY UNDER SEPARATE PAY ITEM OR CONTRACT. FOR ADDITIONAL DETAILS, SEE TRAFFIC STANDARD TC7709.
3. THE OFFSET DIMENSIONS FOR UNIFORMITY AND INTERCHANGEABILITY OF ROTATING BRACKETS, ARE INDICATED. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 1.
4. MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.
5. TYPE 2 STRONG POST AND ALTERNATE TYPE 2 WEAK POST END TREATMENTS MAY BE USED TO TERMINATE STRONG POST GUIDE RAIL EXCEPT ON THE INTERIM PANS WHICH HAVE POSTED SPEEDS OF 50 MPH AND ABOVE AND WITH CURRENT TRAFFIC VOLUMES IN EXCESS OF 6,000 VEHICLES PER DAY.
12 GA. GALVANIZED STEEL DRAWING, BC-738.

- 4 BARS 3/4" X 2 1/4" CONCRETE, REINFORCEMENT BARS, AND HARDWARE WILL BE CONSIDERED INCIDENTAL TO THE GUIDE RAIL PAY ITEM.

* FOR SPlice DETAILS, SEE RC-52.

** W-BEAM RAIL ELEMENT

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.

2. THE 3 1/8" X 2 1/4" COLD FORMED CHANNEL POST, 5 3/4" X 5 7/8 POST AND ALUMINUM ALLOY POST MAY BE ALTERED AS ALTERED FOR TYPE 2-W POST GUIDE RAIL SYSTEM, HOWEVER, W16-G10 POSTS WILL NOT BE ACCEPTABLE WITHIN A PROJECT.

3. DURING ERECTION, USE TEMPORARY SUPPORT BOLTS OR TEMPORARY SUPPORT BOLTS TO SUPPORT THE RAIL ELEMENT UNTIL 3/16" POST BOLTS ARE PROPERLY TORKED.

4. ATTACH W-BEAM RAIL ELEMENT TO EACH POST. SPLICE ONLY AT POSTS AND LAY IN THE DIRECTION OF TRAFFIC.

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TYPE 2-W GUIDE RAIL POSTS

POST DETAILS FOR TYPE 2-W MEDIAN BARRIER SHALL CONFORM TO THE DETAILS AS SHOWN, EXCEPT THAT THE USE BASE PLATE FOR 3 1/8" X 2 1/4" COLD FORMED CHANNEL POST, ALUMINUM ALLOY POST AND 5 3/4" X 5 7/8 POST.

NOTES FOR TYPE 2-W POST GUIDE RAIL SYSTEM;

1. ATTACH W-BEAM RAIL ELEMENT TO EACH POST.

2. POST BOLT AND SUPPORT BOLT HOLES SHALL BE LOCATED ON THE FRONT AND REAR FLANGES.

3. POST BOLT AND SUPPORT BOLT HOLES SHALL BE LOCATED ON THE FRONT AND REAR FLANGES.

4. SPLICE ONLY AT POSTS AND LAY IN THE DIRECTION OF TRAFFIC.

TYPICAL INSTALLATION
ALTERNATE TERMINAL SECTION
SEE RC-51

SHOULDER

E.S. 1 EDGE OF SHOULDER

I.B. 1 EDGE OF PAVEMENT

SHOULDER

TYPICAL NON-CONTINUOUS GUIDE RAIL TREATMENT
WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE

TYPICAL CONTINUOUS GUIDE RAIL TREATMENT
WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE

TREATMENT WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS NOT AVAILABLE

COMMONWEALTH OF PENNSYLVANIA
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BARRIER PLACEMENT AT OBSTRUCTIONS

MAY 1994

RC-54
TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 16' OR LESS
WHERE CONTINUOUS BARRIER IS REQUIRED

TABLE 2
FLARE RATES FOR BARRIER DESIGN

<table>
<thead>
<tr>
<th>DESIGN SPEED (mph)</th>
<th>CONCRETE BARRIER</th>
<th>GUIDE RAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
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<td>15</td>
</tr>
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<td>9</td>
</tr>
<tr>
<td>50</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

TREATMENT AT OBSTRUCTIONS
FOR MEDIAN WIDTHS OF 16' TO 20'
WHERE CONTINUOUS BARRIER IS REQUIRED

TABLE 2
FLARE RATES FOR BARRIER DESIGN

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 GUIDE LINES.

2. PROVIDE SINGLE FACE CONCRETE BARRIER THRU THE AREA OF THE OBSTRUCTION. NO MINIMUM BARRIER-TO-OBSTRUCTION DISTANCE IS REQUIRED. FOR DETAILS, SEE RC-58.
TREATMENT AT OBSTRUCTIONS FOR MEDIAN WIDTHS OF 20' TO 40'
WHERE CONTINUOUS BARRIER IS NOT REQUIRED

TREATMENT AT OBSTRUCTIONS FOR MEDIAN WIDTHS GREATER THAN 40' WHERE CONTINUOUS BARRIER IS NOT REQUIRED

MEDIAN TREATMENT AT DUAL STRUCTURES

TREATMENT - CUT TO FILL CONDITIONS

SECTION A-A
FOR WITH FLAT WASHERS I USE WASHERS ON BOTH SIDES. TREATMENT 8-1/4" 0 HOLES IN VALLEY INNER RAIL " INNER RAIL WITH 8-1/4" 0 HOLES

1/3 BARS, 3 LOOPS, HORIZONTALLY "± CL. 3" OUTER RAIL. OUTER RAIL 1/3 BARS, 3 LOOPS, HORIZONTALLY WITH 8-1/4" 0 HOLES.

PLANE CONCRETE ANCHOR BASE PLATE END POST SUPPORT ANGLES

DETAIL E USE BASE PLATE FOR ALL TYPE 2-W AND 2-M GUIDE RAIL POSTS.

DETAIL C

BOLTS, TWO SPARE HOLES ARE FOR POSITIONING. SEE DETAIL E

DETAIL B (ALTERNATE)

USE BASE PLATE FOR ALL TYPE 2-WM ANCHOR BOLTS.

DETAIL A

DO NOT ALLOW BOLTS TO PROTRUDE ABOVE TOP OF RAIL ELEMENT

CROSSING UNDERGROUND STRUCTURE

END SEPARATE OR ADDITIONAL PAYMENTS WILL BE Made FOR INSTALLING RAIL EXPANSION JOINTS.

TYPICAL INSTALLATION

END SEPARATE OR ADDITIONAL PAYMENTS WILL BE Made FOR INSTALLING RAIL EXPANSION JOINTS.

TYPICAL END TREATMENT

END TREATMENT-DRIVeways & OPENINGS

REAL EXPANSION JOINT DETAIL

TYPICAL END TREATMENT

REAL EXPANSION JOINT DETAIL

TYPICAL END TREATMENT

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TYPICAL END TREATMENT

REAL EXPANSION JOINT DETAIL
NOTES

1. PROVIDE CONCRETE MEDIAN BARRIER MEETING THE REQUIREMENTS OF PUBLICATION NO. 18 SPECIFICATIONS, SECTION 623.

2. PROVIDE PRECAST CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22 x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW.

3. FOR CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION, USE PREWOOLDED JOINT MATERIAL AT ALL CONSTRUCTION JOINTS.

4. CONCRETE MEDIAN BARRIER CONSTRUCTION ON EXISTING PAVEMENT WILL REQUIRE SPECIAL DETAILS TO BE SHOWN ON THE CONSTRUCTION DRAWINGS.

5. FOR PERMANENT AND TEMPORARY BARRIER INSTALLATIONS, USE SIDE-MOUNT DOWEL-BARRIER MOUNT DOWEL OR TOP-MOUNT DOWELS. BARRIER MOUNT DOWEL OR REFLECTOR UNIT AS DETERMINED ON A PROJECT BY PROJECT BASIS. LOCATE SIDE-MOUNT DOWELS 6 INCHES FROM THE TOP OF THE MEDIAN BARRIER ON A CENTERLINE OR L/2 ON THE DESIGNATED BARRIER SECTION. INSTALL TOP-MOUNT DOWELS AS TYPICAL.

6. CENTER BAR-MOUNT DOWEL ALONG LONGITUDINAL CENTERLINE OF MEDIAN BARRIER.

7. LOCATE REFLECTOR UNITS AS SHOWN ON TRAFFIC STANDARD TC7709.

8. MONOLITHIC CONSTRUCTION

FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER

RECOMMENDED: APR. 25, 1974

SHEET 3 OF 3

MONOLITHIC CONSTRUCTION

DOWEL CONSTRUCTION

TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

TYPICAL REFLECTOR UNIT, SEE NOTES 5 AND 6

TYPICAL PRECAST CONSTRUCTION

FOR SLOTTED PLATE CONNECTION DETAILS, SEE SHEET 5 OF 5

FOR REINFORCEMENT DETAILS, SEE NOTE 7.

TYPICAL REFLECTOR UNIT, SEE NOTES 5 AND 6

SUBBASE MATERIAL, SEE NOTE 7.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER

RECOMMENDED: APR. 25, 1974

SHEET 3 OF 3

MONOLITHIC CONSTRUCTION

DOWEL CONSTRUCTION

TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

TYPICAL REFLECTOR UNIT, SEE NOTES 5 AND 6

TYPICAL PRECAST CONSTRUCTION

FOR SLOTTED PLATE CONNECTION DETAILS, SEE SHEET 5 OF 5

FOR REINFORCEMENT DETAILS, SEE NOTE 7.

TYPICAL REFLECTOR UNIT, SEE NOTES 5 AND 6

SUBBASE MATERIAL, SEE NOTE 7.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
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 design manual, part 2, chapter 12. A 20:1 sloped surface is acceptable for permanent installations where the legal speed limit is 30 MPH or less; otherwise, use an impact attenuating device designed to absorb the energy of an impacting vehicle in the weight range of 1,200 to 2,000 lbs. at the specified design speed, with a maximum average force of 5.5 G's and a maximum peak force of 15 G's. When concrete barrier is separated from the end of parallel ramps or intersections, a 7'-0" end transition may be used. 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 flare rate until the end of the barrier system can be buried in a cut section.
2. 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.
3. Refer to table 1, sheet 3 of 3, for flare rate requirements.

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 design manual, part 2, chapter 12. A 20:1 sloped surface is acceptable for permanent installations where the legal speed limit is 30 MPH or less; otherwise, use an impact attenuating device designed to absorb the energy of an impacting vehicle in the weight range of 1,200 to 2,000 lbs. at the specified design speed, with a maximum average force of 5.5 G's and a maximum peak force of 15 G's. When concrete barrier is separated from the end of parallel ramps or intersections, a 7'-0" end transition may be used. 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 flare rate until the end of the barrier system can be buried in a cut section.
2. 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.
3. Refer to table 1, sheet 3 of 3, for flare rate requirements.

Provide suitable lifting devices for handling, installing, and removing precast concrete barriers. Galvanized metal devices as specified in publication for specifications, section 1105.021.1.

Provide reinforcement meeting the requirements of publication for specifications, section 709, with a minimum concrete cover of 1/2".
DELINEATION OF IMPACT ATTENUATING DEVICES

Table 1

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Concrete Barrier</th>
<th>Guide Rail</th>
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</thead>
<tbody>
<tr>
<td>70</td>
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<td>60</td>
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<tr>
<td>30</td>
<td>24 x 1</td>
<td>24 x 1</td>
</tr>
</tbody>
</table>

NOTES

1. Provide 1/16" x 7/16" x 21" plates meeting the requirements of Publication for Specifications, Section 119.0.01, Section 119.0.02, or 119.0.03 in accordance with Bulletin 26, Bureau of Design. Submit a 22" x 26" reproducible shop drawing for review. See Note 1, Sheet 1 of 2.

2. Provide vertical rectangle, standard aluminum, pressure sensitive clearance markers, W16-2R and/or W16-2L, fabricated from Class I sheeting material, for delineation of impact attenuating devices. Install markers adjacent to the leading end of impact attenuating devices on inertial barriers (sand barrels), provide sensitive sheeting, without rigid backing, directly to barrier front or nose section. Do not post-mount markers in front of impact attenuating devices. Markers are provided in two sizes: 12" x 38" and 18" x 36". When one marker is required, use 18" x 36". When two markers are required side by side, use 12" x 36." Provide color for clearance markers as follows:

- (A) MEDICAL - BLACK STRIPES (NON-REFLECTORIZED)
- (B) FIELD - YELLOW (REFLECTORIZED)

CONCRETE MEDIAN BARRIER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
1. PROVIDE SINGLE FACE CONCRETE BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 623.

2. PROVIDE PRECAST SINGLE FACE CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW. MODIFICATIONS OR DEVIATIONS FROM THE STANDARD WILL ALSO REQUIRE THE SUBMISSION OF SHOP DRAWINGS FOR REVIEW.

3. PROVIDE BARRIER-MOUNT OR REFLECTOR UNIT DELINEATORS. AS INDICATED.

4. PROVIDE REINFORCEMENT FOR SINGLE FACE CONCRETE BARRIER AS INDICATED ON SHEET 3 OF 5.

5. PROVIDE END TRANSITIONS OR IMPACT ATTENUATING DEVICES AS INDICATED ON RC-57.
NOTES:

1. PROVIDE PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 1105.02. GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408 SPECIFICATIONS, SECTION 1105.02 OR COAT AS SPECIFIED IN SECTION 605.21. 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 SECTION 610. IF THE HEIGHT OR SLOPE IS INCREASED, PROVIDE OVERTURNING MOMENT COMPUTATIONS WITH THE CONSTRUCTION PLANS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER

SLOT DETAIL
PERMISSIBLE TAPER

SLOTTED PLATE CONNECTION
TYPICAL REINFORCEMENT DETAILS FOR 34" BARRIER

REINFORCEMENT STEEL

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

END TRANSITION

END TRANSITION

END TRANSITION

END TRANSITION

WELDED WIRE FABRIC

NOTES
1. PROVIDE SLOTS FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIERS. ALTERNATE METHODS OF DEVICES MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN. GALLSTONE METAL DEVICES AS SPECIFIED IN PUBLICATION 408 SPECIFICATIONS, SECTION 709.02.

LEGEND
@ PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 1½", KEEP WIRE FABRIC OR BAR LIMITS AT 1½" MINIMUM FOR PRECAST BARRIER WITH PLATE CONNECTIONS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER

RC-58
FOR FLARE RATES SEE TABLE

TYPICAL NONCONTINUOUS SINGLE-FACE BARRIER TREATMENT AT PIERS

TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED

TABLE 1: FLARE RATES FOR BARRIER DESIGN

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Maximum Flare Rates for Guide Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>15 x 1</td>
</tr>
<tr>
<td>60</td>
<td>13 x 1</td>
</tr>
<tr>
<td>50</td>
<td>11 x 1</td>
</tr>
<tr>
<td>40</td>
<td>9 x 1</td>
</tr>
<tr>
<td>30</td>
<td>7 x 1</td>
</tr>
</tbody>
</table>

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. WHEN THE END OF CONCRETE BARRIER TERMINATES WITHIN THE CLEAR ZONE, IT MUST BE BURIED INTO THE SLOPE. OTHERWISE USE AN IMPACT ATTENUATING DEVICE.
TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

NOTES

1. PROVIDE CONCRETE GLARE SCREEN MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTIONS 622 AND 714.

2. FOR INSTALLATION OF GLARE SCREEN ON TOP OF EXISTING CONCRETE MEDIAN BARRIER, PROVIDE PLASTIC PADDLES OR MODULAR SYSTEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.

3. FOR PRECAST BARRIERS, PROVIDE SLOTTED PLATE CONNECTIONS AS INDICATED ON RC-57, SHEET 3 OF 3.

4. PROVIDE PRECAST CONCRETE GLARE SCREEN SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE MATERIALS AND TESTING DIVISION, BUREAU OF CONSTRUCTION AND MATERIALS FOR REVIEW.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE GLARE SCREEN
NECESSITY FOR GLARE SCREEN IS DEPENDENT ON GEOMETRICS.

EXPANSION JOINT MATERIAL

FOR ADDITIONAL DETAILS FOR TYPICAL BARRIER TREATMENT AT PIERS, SEE RC-58, SHEET 5 OF 5.

TYPICAL TREATMENT AT PIERS

SECTION 0-0

VARIABLE WIDTH

SECTION E-E

VARIABLE WIDTH

SECTION F-F

CONCRETE GLARE SCREEN

CONCRETE MEDIAN BARRIER

CONCRETE MEDIAN BARRIER

CONCRETE GLARE SCREEN END TRANSITION

CONCRETE GLARE SCREEN END TRANSITION

PAVEMENT SURFACE

NOTES

1. PROVIDE BARRIER-MOUNT DELINEATORS, WHEN INDICATED, AS SPECIFIED ON RC-57, SHEET 1 OF 3.

TYPICAL END TRANSITION CONSTRUCTION

FOR CONCRETE GLARE SCREEN

CAST-IN-PLACE CONSTRUCTION ONLY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TABLE I

FLARE RATES FOR BARRIER DESIGN

<table>
<thead>
<tr>
<th>DESIGN SPEED (MPH)</th>
<th>MAXIMUM FLARE RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>20 x 1</td>
</tr>
<tr>
<td>60</td>
<td>17 x 1</td>
</tr>
<tr>
<td>50</td>
<td>14 x 1</td>
</tr>
<tr>
<td>40</td>
<td>11 x 1</td>
</tr>
<tr>
<td>30</td>
<td>8 x 1</td>
</tr>
</tbody>
</table>
1. Construct in accordance with the requirements of Publication No., Section 524.
2. Fill all depressions greater than 3 inches and less than 1 foot with posts of compacted earth to prevent animals from going under the right-of-way fence.
3. Install concrete footing or drive anchors at maximum intervals of 160 feet for all line posts.
4. Plate pull posts at angle points in vertical alignment at maximum 500 feet intervals between end and corner posts in level terrain and where directed.

NOTES:

1. Construct in accordance with the requirements of Publication No., Section 524.
2. Fill all depressions greater than 3 inches and less than 1 foot with posts of compacted earth to prevent animals from going under the right-of-way fence.
3. Install concrete footing or drive anchors at maximum intervals of 160 feet for all line posts.
4. Plate pull posts at angle points in vertical alignment at maximum 500 feet intervals between end and corner posts in level terrain and where directed.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RIGHT-OF-WAY FENCE
R/W FENCE TREATMENT AT HIGH WALLED ABUTMENT

R/W FENCE TREATMENT AT STUB ABUTMENTS

R/W FENCE TREATMENT AT CULVERTS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RIGHT-OF-WAY FENCE
Panel length varies with required length of barricade.

Extruded aluminum channel with class I, class I-A or class II reflective material applied, see note 1.

Panel length varies with required length of barricade post clip and post clip bolt, see details.

Alternate red and white stripes, traffic side only, see note 1.

Traffic 6" x 9 steel post, see detail A.

Aluminum panel - steel posts

* A 6" x 9 steel shape may also be used.

Class I, class I-A or class II reflective material applied to panel, see note 1.

Extruded aluminum channel (dimensions for panels may vary depending upon manufacturing company's design).

NOTES

1. Only class I, class I-A or class II reflective sheeting material supplied by a manufacturer, as listed in bulletin 15 permitted.

2. Mechanically drive posts or erect in concrete footing.

3. See RC-52, sheet 1 of 5, for mounting of steel posts on concrete pavement, see detail D, for mounting of wood posts on concrete pavement.

4. Use materials which meet the requirements of publication 408, section 678, commonwealth of pennsylvania department of transportation bureau of design.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PERMANENT BARRICADES
ALUMINUM PANEL

WOOD POST FOR ALUMINUM PANEL

DIRECTOR, BUREAU OF DESIGN
CHIEF ENGINEER

REVISED 1993

RC-63
Panel length varies with required length of barricade.

Class I, Class I-A or Class II reflective material applied to 0.063" x 10" aluminum blank and fastened to wood planks, see Note 1, Sheet 1 of 2.

2" x 10" nominal planks, pressure treated.

6" x 8" wood post.

Alternate red and white stripes, traffic side only, see Note 1, Sheet 1 of 2.

Butt splice, when required, see Detail B.

Steel post for wood panel.

Wood post for wood panel.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
PERMANENT BARRICADES
WOOD PANEL

DETAIL A
Panel to post connection.

DETAIL B
Butt splice.

DETAIL C
Panel to post connection.

DETAIL D
Butt splice.

WOOD PANEL - STEEL POSTS
* A 6 x 8.5 steel shape may also be used.

WOOD PANEL - WOOD POSTS

10' maximum post spacing.
DETAIL A
CONTRACTION JOINT
TYPICAL CROSS SECTION

DETAIL B
CONTRACTION JOINT
TYPICAL CROSS SECTION

DETAIL C
CONTRACTION JOINT
TYPICAL CROSS SECTION

PLAN CONCRETE CURB

PLAN CONCRETE GUTTER

PLAIN CONCRETE CURB GUTTER

NOTES
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 630 FOR PLAIN CONCRETE CURB AND DEPRESSED CURB, SECTION 640 FOR PLAIN CONCRETE CURB AND DEPRESSED CURB FOR DRIVES.

2. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS.

3. PLACE 1" INCH PREMOLOED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.

4. SEE RC-50 FOR PLAIN CONCRETE CURB SLOPED TOP TREATMENT AT END OF STRUCTURES.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
CURBS AND GUTTERS

DEPRESSED CURB FOR DRIVES

SECTION A-A
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 633.
2. INSTALL TYPE W INLETS WITH CONCRETE MOUNTABLE CURBS AND LOCATE INLETS AS SHOWN ON THE DRAWINGS. MAKE THE BACKSLOPE TRAVERSABLE IN THE AREA OF THE INLET AS INDICATED.
3. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS AND SEAL AS SPECIFIED IN SECTION 501.5(1), PUB. 408.
4. PLACE 1/4-INCH PREWELD EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
5. PROVIDE ELONGATED ISLANDS NOT LESS THAN 4'-0" WIDE AND 20'-0" LONG, EXCEPT IN SPECIAL CASES WHERE SPACE IS SEVERELY LIMITED.

NOTES

CONCRETE MOUNTABLE CURBS

- PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 633.
- INSTALL TYPE W INLETS WITH CONCRETE MOUNTABLE CURBS AND LOCATE INLETS AS SHOWN ON THE DRAWINGS. MAKE THE BACKSLOPE TRAVERSABLE IN THE AREA OF THE INLET AS INDICATED.
- SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS AND SEAL AS SPECIFIED IN SECTION 501.5(1), PUB. 408.
- PLACE 1/4-INCH PREWELD EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
- PROVIDE ELONGATED ISLANDS NOT LESS THAN 4'-0" WIDE AND 20'-0" LONG, EXCEPT IN SPECIAL CASES WHERE SPACE IS SEVERELY LIMITED.

CONCRETE MOUNTABLE CURB ON EXISTING CONCRETE PAVEMENT AND BRIDGE DECKS

PLAIN CONCRETE CURB WHEN AN OVERLAY IS PLACED ON THE EXISTING PAVEMENT. HOWEVER, EXPOSED FINAL FACE OF CURB SHALL BE 2' MAXIMUM.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MOUNTABLE CURBS
1. Use materials and construction methods which meet the requirements of Publication 408, Section 629.

2. Space contraction joints in uniform lengths or sections and place in line with adjacent pavement joints.

3. The contraction joints and corrugations may be constructed at a skew to match the pavement joints.

4. Place 2" premoled expansion joint filler material at structures and at the end of the work day. Cut material to conform to area adjacent to curb or to cross sectional area.

Notes:

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE TRAFFIC SEPARATOR

DATE: 1/25/94
PREPARED: M.M. Vite
CHECKED: T.C. Stiner

RC-66
NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION FOR SPECIFICATIONS, SECTIONS 630, 640, 620, 420, 421 AND 422.

2. PROVIDE 3/4" EXPANSION JOINT MATERIAL WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.

3. IF PEDESTRIAN CROSSWALKS ARE NOT WIDE ENOUGH TO PROVIDE MINIMUM 4'-0" WIDE WHEELCHAIR OVERRUN ZONE AT THE BOTTOM OF THE RAMP, POSITION CROSSWALKS AS INDICATED IN DETAIL A.

4. SEAL JOINTS WITH AN APPROVED SEALING MATERIAL.

5. PROVIDE SLIP RESISTANT TEXTURE ON CURB RAMP BY COARSE BROOMING TRANSVERSE TO THE SLOPE OF THE RAMP. EXTEND TEXTURE THE FULL WIDTH AND LENGTH OF THE CURB RAMP INCLUDING FLARED SIDE RAMPS.

6. CONSTRUCTION DETAILS SHALL BE MODIFIED TO ADAPT DIMENSIONS TO EXISTING CURB ALTERATIONS WHERE THE CURB IS LESS THAN THE STANDARD 8-INCH HEIGHT.

7. CURB RAMP AND PLATE SIDE LENGTHS ARE VARIABLE AND BASED ON CURB HEIGHT AND THE SIDEWALK PITCH. SEE TABLE A-1 SH. 2 OF 2 FOR TYPICAL RAMP DIMENSIONS.

8. DEPRESSED CURB WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH SECTION 630.4.

9. WHENEVER POSSIBLE, CONSTRUCT THE TRANSITION SLOPE FROM THE CURB RAMP AND PLATE SIDES TO ADJOINING SURFACES WITH A GRADUAL CURVE RATHER THAN AN ABRUPT ANGLE.

10. BUILT-UP CURB RAMP TO BE CONSTRUCTED OF BITUMINOUS MATERIAL AS INDICATED, INCLUDING SURFACE PREPARATION AND TACK COAT, AS REQUIRED.
**Roadway Surface**

- Elevation

**Type 2 Curb Ramp**

**Elevation**

- Schedule of Curbs

**Type 3 Built-Up Curb Ramp**

**Section C-C**

- Schedule of Curbs

**Table A: Curb Ramp Dimensions**

<table>
<thead>
<tr>
<th>Type</th>
<th>Rise of Ramp</th>
<th>Max. Ramp Slope</th>
<th>Normal Ramp Length</th>
<th>Side Plane Dimension at Curb</th>
<th>Side Plane Dimension at Curb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>3&quot;</td>
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<td>3.0 ft</td>
<td>3.0 ft</td>
<td>3.0 ft</td>
</tr>
<tr>
<td></td>
<td>4&quot;</td>
<td>12 ft</td>
<td>4.0 ft</td>
<td>4.0 ft</td>
<td>4.0 ft</td>
</tr>
<tr>
<td></td>
<td>6&quot;</td>
<td>12 ft</td>
<td>6.0 ft</td>
<td>6.0 ft</td>
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<tr>
<td></td>
<td>7&quot;</td>
<td>12 ft</td>
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<tr>
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<td>8&quot;</td>
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<tr>
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<td>9.0 ft</td>
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<td></td>
<td>10&quot;</td>
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<td>12.0 ft</td>
<td>12.0 ft</td>
</tr>
</tbody>
</table>

**Type 4 and 4A Section D-D**

- Schedule of Curbs

**Commonwealth of Pennsylvania Department of Transportation**

**Bureau of Design**

**Type 2 Curb Ramp and Type 5 Curb Ramp**

- Notes: A pedestrian barrier such as a railing is required along the inside and rear of the curbs in the sidewalk area.

**Type 5 Curb Ramp and Type 5 Curb Ramp**

- Notes: Use only when space limitations prohibit the construction of 12" x 1 of flatter slopes.

**Type 5 Curb Ramp**

- Notes: Use only when space limitations prohibit the construction of 12" x 1 of flatter slopes.
FINISHED SLOPE, AS REQUIRED
ROCK LINING
ELEVATION, EXTEND ABOVE THE DESIGN FLOW ELEVATION.

NOTES
1. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBICATION 408 SPECIFICATIONS, SECTION 135 AND FURNISH AND INSTALL IN ACCORDANCE WITH SECTION 212.
2. PROVIDE GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
3. ROCK SIZE AS PER DESIGN DRAWINGS, NOMINAL PLACEMENT THICKNESS AS PER PUB.408, Sec.850.

SECTION A-A
ROCK LINING

SECTION B-B
ROCK BASIN

SECTION D-D
ENERGY DISSIPATOR

SECTION C-C
PAVED ENERGY DISSIPATOR
TOE OF SLOPE DISCHARGE INTO A STABILIZED CHANNEL OR ON A TEMPORARILY PROTECTED AREA, SEE DETAIL A.

ANGLE AS REQUIRED

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.

PLAN

SECTION A-A

FOR FILL SLOPES PROVIDE METAL, FLEXIBLE RUBBER OR PLASTIC PIPE ADEQUATELY ANCHORED TO FILL SLOPE. (LENGTH IS VARIABLE)

SUITABLE CONNECTION FOR THE TYPE OF PIPE USED ON FILL SLOPE. ELBOW OR METAL PIPE

SLOPE TO DRAIN TOWARD ROADWAY

ANGLE AS REQUIRED

TOP OF SLOPE

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.

PLAN

SECTION A-A

FOR FILL SLOPES PROVIDE METAL, FLEXIBLE RUBBER OR PLASTIC PIPE ADEQUATELY ANCHORED TO FILL SLOPE. (LENGTH IS VARIABLE)

SUITABLE CONNECTION FOR THE TYPE OF PIPE USED ON FILL SLOPE. ELBOW OR METAL PIPE

SLOPE TO DRAIN TOWARD ROADWAY

ANGLE AS REQUIRED

TOP OF SLOPE

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.

PLAN

SECTION A-A

FOR FILL SLOPES PROVIDE METAL, FLEXIBLE RUBBER OR PLASTIC PIPE ADEQUATELY ANCHORED TO FILL SLOPE. (LENGTH IS VARIABLE)

SUITABLE CONNECTION FOR THE TYPE OF PIPE USED ON FILL SLOPE. ELBOW OR METAL PIPE

SLOPE TO DRAIN TOWARD ROADWAY

ANGLE AS REQUIRED

TOP OF SLOPE

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.

PLAN

SECTION A-A

FOR FILL SLOPES PROVIDE METAL, FLEXIBLE RUBBER OR PLASTIC PIPE ADEQUATELY ANCHORED TO FILL SLOPE. (LENGTH IS VARIABLE)

SUITABLE CONNECTION FOR THE TYPE OF PIPE USED ON FILL SLOPE. ELBOW OR METAL PIPE

SLOPE TO DRAIN TOWARD ROADWAY

ANGLE AS REQUIRED

TOP OF SLOPE

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.

PLAN

SECTION A-A

FOR FILL SLOPES PROVIDE METAL, FLEXIBLE RUBBER OR PLASTIC PIPE ADEQUATELY ANCHORED TO FILL SLOPE. (LENGTH IS VARIABLE)

SUITABLE CONNECTION FOR THE TYPE OF PIPE USED ON FILL SLOPE. ELBOW OR METAL PIPE

SLOPE TO DRAIN TOWARD ROADWAY

ANGLE AS REQUIRED

TOP OF SLOPE

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.

PLAN

SECTION A-A

FOR FILL SLOPES PROVIDE METAL, FLEXIBLE RUBBER OR PLASTIC PIPE ADEQUATELY ANCHORED TO FILL SLOPE. (LENGTH IS VARIABLE)

SUITABLE CONNECTION FOR THE TYPE OF PIPE USED ON FILL SLOPE. ELBOW OR METAL PIPE

SLOPE TO DRAIN TOWARD ROADWAY

ANGLE AS REQUIRED

TOP OF SLOPE

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.

PLAN

SECTION A-A

FOR FILL SLOPES PROVIDE METAL, FLEXIBLE RUBBER OR PLASTIC PIPE ADEQUATELY ANCHORED TO FILL SLOPE. (LENGTH IS VARIABLE)

SUITABLE CONNECTION FOR THE TYPE OF PIPE USED ON FILL SLOPE. ELBOW OR METAL PIPE

SLOPE TO DRAIN TOWARD ROADWAY

ANGLE AS REQUIRED

TOP OF SLOPE

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.

PLAN

SECTION A-A

FOR FILL SLOPES PROVIDE METAL, FLEXIBLE RUBBER OR PLASTIC PIPE ADEQUATELY ANCHORED TO FILL SLOPE. (LENGTH IS VARIABLE)

SUITABLE CONNECTION FOR THE TYPE OF PIPE USED ON FILL SLOPE. ELBOW OR METAL PIPE

SLOPE TO DRAIN TOWARD ROADWAY

ANGLE AS REQUIRED

TOP OF SLOPE

10' BERM AT TOP OF EMBANKMENT

DIRECTION OF FLOW

ANCHORING POST

CLASS 3 GEOTEXTILE MATERIAL

COMPACTED EXCAVATED SOIL

EMBANKMENT SLOPE (OR EXISTING GROUND LINE)

EXISTING GROUND LINE

METAL END SECTION, FOR DETAILS, SEE RC-33.
**NOTES**

1. **Upon establishment of suitable soil stabilization and at the direction of the engineer, remove the endwall standboxes. Standboxes become the property of the contractor.**

2. **Clean the basin and/or area upstream from the standbox periodically and deposit the sediment and debris in an area approved by the engineer.**

**SECTION B-B**

- **Temporary berm or dike** may be altered to be used as permanent facility, as required, for drainage purposes.

- **Silt barrier fence** should be located to prevent the infiltration of fines or sediments into the inlet box. If backfill operations have not been performed, locate the silt barrier fence outside the area excavated for the inlet box.

**SECTION A-A**

- **Silt barrier fence** for inlet protection

**COMMONWEALTH OF PENNSYLVANIA**

**DEPARTMENT OF TRANSPORTATION**

**BUREAU OF DESIGN**

**EROSION & SEDIMENT POLLUTION CONTROL**

**DIRECTOR, BUREAU OF DESIGN**

**NOTES**

- **Cover 1/4 of the height of width at the bottom of the standbox. Use the 'dimension details' shown on sheet 2 if bottom is not paved. Use asphalt material for fastening if paved apron is provided.**

- **Class 3, Type B geotextile material**, see Sheet 2 and Publication 408 specifications, Section 705.7.

**PLACEMENT**

- **Place 2" x 2" wood strips around the top nailed to the posts and with the geotextile stapled to these wooden pieces.**

- **Provide mesh support for both 18" and 30" high fences. Use 18" high fence where contributing drainage area is less than 0.5 acre and 30" high fence where the area is between 0.5 and 1.0 acre.**

**DETAIL A**

- **Supply all endwall standboxes with Class 3 geotextile material as shown in detail B.**

**DETAIL B**

- **Class 3, Type B geotextile material.**
1. Provide materials and construction meeting the requirements of publication 408, sections 910 and 1101.
2. Level top of forms in both directions.
3. Galvanize all anchor head hardware, steel flat or spring lock washers and top 1/2" of anchor bolts.
4. Ground rod ½" x 6" minimum Copper clad steel with 25 ohm maximum resistance to earth ground.
5. See RC-83 for pole details.
6. For lighting pole anchorages on Bridges, see bridge construction standard drawings, BC-722.
7. Provide 30 inches of "G" ground wire coiled above foundation. Wire extends through center of foundation.
8. Minimum bend radius to be twelve times conduit diameter, unless otherwise specified.
9. Top of conduit rising not to be higher than 1' from the top of the foundation.
10. The lighting pole manufacturer will provide template for setting anchor bolts for type "A" or type "S" lighting poles and all hardware, including galvanized hex head cap bolt or stud and nut of appropriate length.
11. Use 3-conduit access where plan circuits indicate branches tapped into pole base. Position conduits in foundation to avoid unnecessary bends. Provide one or two conduits as required.
12. For type "S" poles - Provide a maximum of 4" to the top of the foundation, anchor bolt, or stub of breakaway device, whichever is higher, measured from an imaginary long chord, aligned radially perpendicular to the centerline of the roadway, and connecting any point within the length of the chord extending to the ground surface on both sides of the support. Provide a maximum taper of 45 degrees to the edge of the foundation as required to satisfy the above requirement. Begin the taper not less than 1' from the outside of the breakaway base dimension. Modify the 4" dimension in Table A as required. Mounting surface of foundation is to extend above the ground line.

**Table A: Foundation Dimensions**

<table>
<thead>
<tr>
<th>Height</th>
<th>D x D</th>
<th>E x E</th>
<th>A UGER</th>
<th>DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1'</td>
<td>6 x 6</td>
<td>2' x 2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1' 6&quot;</td>
<td>6 x 6</td>
<td>2' x 2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2'</td>
<td>6 x 6</td>
<td>2' x 2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2' 6&quot;</td>
<td>6 x 6</td>
<td>2' x 2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3'</td>
<td>6 x 6</td>
<td>2' x 2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3' 6&quot;</td>
<td>6 x 6</td>
<td>2' x 2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4'</td>
<td>6 x 6</td>
<td>2' x 2</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Commonwealth of Pennsylvania Department of Transportation**

**Bureau of Design**

**Highway Lighting Foundations**

**Conventional Lighting Pole**

**Type FC Foundation**

See Note 12

**Type P Foundation**

See Note 12
NOTES
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION FOR, SECTIONS 910 AND 1101.
2. PROVIDE A 30' LENGTH OF #4 GROUND WIRE COILED ABOVE FOUNDATION, EXTEND WIRE THROUGH THE 1¼" CONDUIT IN THE CENTER OF THE FOUNDATION.
3. THE SIZE OF PEDESTAL OR DRILLED CAISSON SHOWN #4 (MIN) ACCOMMODATE THE PEDESTAL WELD ASSEMBLY AND ALLOW PROPER INSTALLATION OF PEDESTAL STEEL, 1½" MIN. DIAMETER, Ø4-9 MS. BOLT CIRCLE DIAMETER, 30" AND LESS. FOR BOLT CIRCLE DIAMETERS GREATER THAN 30", MODIFY PEDESTAL OR DRILLED CAISSONS ACCORDINGLY.
4. FOR REINFORCEMENT BAR FABRICATION DETAILS, SEE BRIDGE CONSTRUCTION STANDARD DRAWING, BC-736.
5. SEAL WITH GALVANIZED SCREEN, ½" TO 5" OPENING, TO PREVENT ENTRY OF RODENTS. SCREEN TO BE OF SUFFICIENT STIFFNESS TO PREVENT ENTRY BETWEEN SCREEN AND FOUNDATION WHILE PERMITTING DRAINAGE.
6. VERIFY THE GROUND ELEVATION AT THE FOUNDATION LOCATION FOR ALL HIGH MAST POLES. NOTIFY THE DEPT. OF ANY DISCREPANCY OF MORE THAN FIVE (5) FEET BEFORE PROCEEDING WITH CONSTRUCTION. THE POLE LENGTH MAY BE AFFECTED.

TABLE B
<table>
<thead>
<tr>
<th>POLE HEIGHTS</th>
<th>VERTICAL STEEL</th>
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<tbody>
<tr>
<td>80'</td>
<td>16-#9</td>
</tr>
<tr>
<td>90'</td>
<td>16-#9</td>
</tr>
<tr>
<td>100'</td>
<td>16-#9</td>
</tr>
<tr>
<td>110'</td>
<td>16-#9</td>
</tr>
<tr>
<td>120'</td>
<td>16-#11</td>
</tr>
</tbody>
</table>

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN
HIGHWAY LIGHTING FOUNDATIONS
HIGH MAST LIGHTING POLE

DIRECTOR, BUREAU OF DESIGN
M.T. Mccarthy

APPROVED: MAR. 26, 1974
RC-80
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 910.31pl.

2. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS SUBJECT TO LOADS NO HEAVIER THAN PEDESTRIAN TRAFFIC. USE JB-1 AND JB-12 JUNCTION BOXES IN OTHER LOCATIONS AS SHOWN ON RC-82.

3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR THE LOCATION SIZE AND NUMBER OF CONDUITS, SEE THE LIGHTING PLANS.

4. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE; WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 4" TO THE TOP OF THE JUNCTION BOX MEASURED FROM A TRAIT OF 60" CHORD ALIGNED RADIALY (PERPENDICULAR) TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.

5. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 910.31pl.

6. PROVIDE POSITIVE DRAINAGE FOR CAST-IN-PLACE OR PRECAST CONDUITS AT 1½" - 2" NON-METALLIC CORD IN ACCORDANCE WITH SECTION 910.31pl.

7. PROVIDE PROTECTIVE COATINGS - STEEL FRAME AND STEEL COVER PLATE. COAT THE ENTIRE STEEL ASSEMBLY WITH ALUMINUM MASTIC IN ACCORDANCE WITH PUB. 408, SEC. 1021, OR HOT DIP GALVANIZING IN ACCORDANCE WITH PUB. 408, SEC. 1105.02(1).

8. PROVIDE AS A MINIMUM 
   CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND CLASS A CONCRETE FOR PRECAST BOXES

9. PROVIDE STRUCTURAL STEEL MEETING ASTM - A36.

10. PROVIDE PROTECTIVE COATINGS - STEEL FRAME AND STEEL COVER PLATE.

DETAILS A, B, AND C

TYPE JB-1

(2'-0" x 2'-0")

SECTION A-A

NO. 57 OR NO. 67 COARSE AGGREGATE

SEE DETAIL A

DETAIL A

MULTIPLE CONDUITS IN PLACE
(CAST-IN-PLACE OR PRECAST UNITS)

SECTION B-B

NO. 57 OR NO. 67 COARSE AGGREGATE

SEE DETAIL A

DETAIL B

MULTIPLE CONDUITS IN PLACE
(CAST-IN-PLACE OR PRECAST UNITS)

TRIPLE CONDUITS PER VERTICAL FACE

DETAIL C

TYPICAL KNIGHTOUT
(PRECAST UNITS ONLY)

FRAME PLAN
(WITHOUT FRAME AND COVER PLATE)

FRAME PLAN
(WITHOUT COVER PLATE)
1" CHAMFER COVER WITH 3-PLY BITUMINOUS PAPER AND BREAK THROUGH HOLE SLOPE TO LI-DRAIN.

6" METAL PIPES FOR LIFTING COVER (TYP.)

ANCHOR BARS SPACING, THIS SIDE AND OPPOSITE SAME AS JB-11.

1/4" L4" x 3" x 5/8"
MATERIAL CORNERS, WELDED

FRAME PLAN (STEEL OR ALUMINUM)

SECTION A-A
JUNCTION BOX JB-11
1/2"-3" x 2'-6"
NORMAL POSITION OF CONDUIT OR SLEEVE

SECTION B-B
JUNCTION BOX JB-12
1/2"-3" x 2'-6"
NORMAL POSITION OF CONDUIT OR SLEEVE

SEE DETAIL A
1" CHAMFER (TYP.)

SEE DETAIL A
1/2" PREMOLDED JOINT FILLER (WHERE BOX IS SET IN PAVED AREA)

SEE DETAIL B
REINFORCING RODS # 4", BOTH WAYS CUB OR PAVED AREA

USE JB-11 AND JB-12 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS, SEE DETAILS ON RC-81.

PROTECTIVE COATINGS - STEEL FRAME AND STEEL LID, COAT THE ENTIRE STEEL ASSEMBLY WITH ALUMINUM MASTIC IN ACCORDANCE WITH PUB 408, SEC. 1101, OR HOT TIP GALVANIZING IN ACCORDANCE WITH PUB 408, SEC. 1105.3201.

PROVIDE 2 FT. 3 IN. OF NO. 57 OR NO. 67 COARSE AGGREGATE WHEN NO UNDERDRAIN IS AVAILABLE.

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

IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 4" TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 60° CHORD ALIGNED RADIALS PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE OR BOTH SIDES OF THE JUNCTION BOX.

CHORD ALIGNED RADIALLY PERPENDICULAR TO THE CENTERLINE OF THE BOX, AS INDICATED IN SECTION 910.311.

FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE SPACE CONDUITS AT 6" TO 10" AND STaggerED ABOUT 180°, PROVIDE A MINIMUM OF 4" CLEARANCE BETWEEN CONDUITS ON THE SAME VERTICAL FACE. PROVIDE 2 FT. 3 IN. OF NO. 57 OR NO. 67 COARSE AGGREGATE TO THE TOP OF THE JUNCTION BOX, AS INDICATED IN DETAIL D, AND LOCATE AS INDICATED IN DETAIL C. COVER THE BOX WITH 3-PLY BITUMINOUS PAPER AND BREAK THROUGH HOLE AFTER COMPLETION.

THE ENTIRE STEEL ASSEMBLY WITH ALUMINUM MASTIC IN ACCORDANCE WITH PUB 408, SEC. 1101, OR HOT TIP GALVANIZING IN ACCORDANCE WITH PUB 408, SEC. 1105.3201.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
EXHIBIT OF DIVISION

HIGHWAY LIGHTING
JUNCTION BOXES-HEAVY DUTY CAST-IN-PLACE OR PRECAST

NOTES
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUB 408, SECTIONS 910, 1101 AND 1107.

2. USE JB-11 AND JB-12 JUNCTION BOXES IN LOAD-BEARING WALLS OR OTHER LOCATIONS SUBJECT TO LOAD BEARING, USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS, SEE DETAILS ON RC-81.

3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15, FOR A BULLETIN IN LISTING, SUBMIT A COPY TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS TESTING DIVISION FOR REVIEW.

4. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM A-36, PROVIDE ALUMINUM CONFORMING TO ASTM B-221 ALLOY 6061 - T6.

11. PROVIDE CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND CLASS A2 CONCRETE FOR PRECAST BOXES.
DRIVE EXTENSION  
OVERLOAD CLUTCH  
TERMINAL BOX  
DRILL MOTOR  

CONTROL SWITCH  
ON-WALL SPINDLE  
PLUG FOR POWER  

POWER SUPPLY  
TRANSFORMER IS OPTIONAL  

CABLE STRAP  
GROUND LUG  

GUIDE CABLE  
WINCH  
WINCH CABLE  
SOLID NEUTRAL BAR ISOLATED FROM GROUND  

SAFETY CABLES - (2 REQUIRED)  
WINCH POLE IS FURNISHED WITHOUT LATCHING DEVICE.)  

POWDER BARK  
SOLID WIRE BAR  

POLE OVERLAP DETAIL  

TYPICAL LOWER SECTION MECHANISM  
TYPICAL CIRCUIT SCHEMATIC  
TYPICAL HIGH MAST POLE  

NOTE 1. SEAL HEAD FRAME AND LUMINAIRE ASSEMBLIES TO PREVENT INTRUSION OF BIRD LIFE.  

NOTE 2. PROVIDE 2 POLE, CIRCUIT BREAKER DISCONNECT, RATED FOR 240 / 480 VOLT SYSTEM, AND IN NEMA I ENCLOSURE.  

NOTE 3. GROUND LIGHTING ROD GROUNDING CONDUCTOR DIRECTLY ON THE POLE SHAFT WITH LUGS PROVIDED BY THE MANUFACTURER OF LIGHTNING ROD. BOND THE NEUTRAL WIRE TO THE GROUND EITHER AT THE GROUND LUG OR INSIDE THE ENCLOSURE AT THE POLE BASE.  

NOTE 4. ALL MISCELLANEOUS HARDWARE SHALL BE STAINLESS STEEL.  

NOTE 5. PROVIDE WIRING, FROM JUNCTION BOX TO LUMINAIRE, IN ADVICE PROVIDED IN LUMINAIRE RING ON IN SEALTITE FLEXIBLE CORD.  

NOTE 6. APPLY POLE IDENTIFICATION & DATE TAG TO EACH HIGH MAST POLE.  

NOTE 7. PROVIDE BOXES AS PER PUBLICATION 408 SPECIFICATIONS, SECTION 1101.3.1. PADLOCKS ARE NOT REQUIRED FOR THE BOXES.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN  
HIGHWAY LIGHTING  
HIGH MAST LIGHTING POLE DETAILS
TYPICAL TERMINAL POLE EQUIPMENT ARRANGEMENT FOR POWER SUPPLY

- **Cable and Conduit Marker**
  - Facing North Sky
  - Weatherhead
  - Clamp Conduit to Pole
  - Conduit on Far Side of Pole

- **Typical Terminal Pole Equipment**
  - Control Device (Plug-in Twist Lock Type)
  - Photometric Control Element (Plug-in Type)
  - Mechanical Connector Coat Connection and Wire with Compound to Prevent Corrosion

- **Backfill Free of Sharp Rocks or Broken Concrete**
  - 240/480 Volt Circuits

**NOTES FOR DIRECT-BURIED CABLE AND CONDUIT**

- **Notes for Direct-Buried Cable and Conduit**
  - Trench along the general line shown on the plans.
  - Do not trench in Guide Rail Line.
  - Locate direct-buried conduit with temporary plastic markers or other approved method where there is a possibility of disturbance by Guide Rail Erection or similar construction.

- **Mechanical Connector Coat Connection and Wire with Compound to Prevent Corrosion**
  - 240/480 Volt Circuits
  - Typical Control Cabinet Schematic Wiring Diagram

**WIRING DETAIL**

- **Wiring Detail**
  - Notes:
    1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 486, SECTIONS 910 AND 1101.
    2. PROVIDE ABOVEGROUND ELECTRIC SERVICE EXCEPT WHERE DEPARTMENT APPROVED SPECIAL UNMETERED ENERGY only RATE IS AVAILABLE.
    3. MAKE ALL SPLICES WITH PRE-MOLDED, WATERPROOF, DISCONNECTABLE CONNECTOR KITS.

**COMMONWEALTH OF PENNSYLVANIA**

DEPARTMENT OF TRANSPORTATION

HIGHWAY LIGHTING

LIGHTING AND ELECTRICAL DETAILS