TO: All Users of Construction Standards

FROM: Terry H. Otterness, Design Program Manager, Roadway Engineering Group

SUBJECT: Revisions to Construction Standards - English Version

Several changes are being made to Construction Standard Drawings and the Construction Standards Index.

Most of the changes consist of miscellaneous items found during the final development of the Metric Construction Standards. Generally, the revisions consist of minor corrections and a few major items. These include: revising gutter depression depths, eliminating Type A curb and gutter, clarifying gutter depression versus inlet depression at catch basins, revising reinforcing steel clearances and dimensions, and clarifying manhole frames and covers to match what vendors can supply.

There are two new standards involving concrete half barrier and transition, C-10.62 and C-10.71. Standard C-10.22 has a new second sheet that is a timber post alternate for the freeway guard rail.

One standard has been deleted: C-06.20 - Detour Geometrics.
TO: All Users of Construction Standards

FROM: Mr. Terry H. Otterness, Design Program Manager, Roadway Engineering Group  
Mr. August V. Hardt, Assistant State Engineer, District Operations Group, Administration

SUBJECT: Revisions to Construction Standards

Several changes are being made to existing Construction Standard Drawings and the Construction Standards Index.

All Construction Standard Drawings are now converted to CADD. Fifty standards are being reissued without revisions; some have been rearranged. Several other standards are being revised or are new standards.

Major changes include: a reorganization of the C-10 Series, replacing the BCT with a guard rail extruder terminal (GET), which is based on the ET-2000, combining slip form and fixed form for cast in place concrete barrier into one standard with continuous reinforcing, adding a standard for superelevation distribution, adding curb and gutter transitions, consolidating sidewalk details to C-05.20, clarifying contraction joint spacing for curb and gutter and sidewalk, adding a standard for crossroad PCCP joints, splitting C-10.98 and C-10.99 into several new standards based on pay items, adding a new standard for side slope median catch basin, clarifying pipe culvert installation details, detailing storm drain outlet gates, and clarifying median catch basin details.

A complete listing of the revised and new Standards and the various revisions is as follows:

<table>
<thead>
<tr>
<th>REVISED DRAWING</th>
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</table>
| C-02.50 Superelevation Distribution | New standard.  
<p>| C-04.10 Spillway, Embankment | Clarified the terminus of the embankment curb to extend 2 feet beyond the guard rail post to decrease erosion around the post. |</p>
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<tr>
<td>C-04.20 Downdrain, Embankment</td>
<td>Clarified the terminus of the embankment curb to extend 2 feet beyond the guard rail post to decrease erosion around the post.</td>
</tr>
<tr>
<td>C-05.10 Single Curb, Curb &amp; Gutter, Embankment Curb</td>
<td>Added expansion joint detail.</td>
</tr>
<tr>
<td>C-05.11 Ramp Curb and Gutter Layout</td>
<td>Separated the entrance ramp layout (sheet 1) from the exit ramp (new sheet 2). Moved the curb and gutter transition to Std C-05.12. Moved sidewalk details to Std C-05.20.</td>
</tr>
<tr>
<td>C-05.12 Curb and Gutter Transitions</td>
<td>Changed the transition types from letters (A,B...) to numbers (1,2...). Added note regarding length of entrance ramp. Revised note 1. Added perspective view for Type 3 transition. Added Type 4 transition from old Std C-05.11. Added Type 5 and Type 6 transitions.</td>
</tr>
<tr>
<td>C-05.20 Concrete Driveways and Sidewalks</td>
<td>Revised note 2 regarding referencing the contraction joint detail on sheet 2. Added section B-B for driveways with sidewalk separated from the curb. On sheet 2, added information regarding contraction joint spacing, scoring line spacing and contraction joint details. Revised detail and section for driveway with adjacent sidewalk to provide 3' wide sidewalk with 1% cross slope, as per ADA regulations.</td>
</tr>
<tr>
<td>C-05.30 Sidewalk Ramps (sheets 2 &amp; 4 only)</td>
<td>Corrected note 4.</td>
</tr>
<tr>
<td>C-06.10 Driveway &amp; Turnout Layouts</td>
<td>Revised the driveways in the plan and section to match the revised driveway standard with the 3 foot wide strip along the back.</td>
</tr>
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<tr>
<td>C-06.20 Geometrics, Detour</td>
<td>Added note in upper right quadrant to use Detour 'B'.</td>
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<tr>
<td></td>
<td>Corrected &quot;typo&quot; from &quot;34' or under&quot; to &quot;34' or wider&quot;.</td>
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<tr>
<td>C-07.10 Crossroad PCCP Joints</td>
<td>New standard.</td>
</tr>
<tr>
<td>C-08.10 Ramp Geometrics</td>
<td>Revised curve callout to see plans.</td>
</tr>
<tr>
<td>C-10.01 Type A Guard Rail Installation</td>
<td>Combined the sections since the only difference is the use of embankment curb.</td>
</tr>
<tr>
<td></td>
<td>Clarified note and revised drawing regarding guard rail extending beyond the embankment curb.</td>
</tr>
<tr>
<td></td>
<td>Added a note referring to C-10.03 for measurement limits.</td>
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<tr>
<td></td>
<td>Revised reference of BCT to a reference to a generic end treatment.</td>
</tr>
<tr>
<td></td>
<td>Added a note to see the Standard Specifications for reflector tab spacing.</td>
</tr>
<tr>
<td>C-10.02 Type B Guard Rail Installation</td>
<td>Combined the sections since the only difference is the use of embankment curb.</td>
</tr>
<tr>
<td></td>
<td>Clarified note and revised drawing regarding guard rail extending beyond the embankment curb.</td>
</tr>
<tr>
<td></td>
<td>Added a note referring to C-10.03 for measurement limits.</td>
</tr>
<tr>
<td></td>
<td>Revised reference of BCT to a reference to a generic end treatment.</td>
</tr>
<tr>
<td></td>
<td>Added a note to see Standard Specifications for reflector tab spacing.</td>
</tr>
<tr>
<td>C-10.03 Measurement Limits for W Beam System</td>
<td>Rearranged standard into two sheets and added departures.</td>
</tr>
<tr>
<td></td>
<td>Changed buried anchor to nested W Beam, Std C-10.28.</td>
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<tr>
<td></td>
<td>Changed BCT to new GET.</td>
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<tr>
<td></td>
<td>Added approach and departure transitions to bridges.</td>
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<tr>
<td></td>
<td>Changed measurement of Concrete Half Barrier Transitions from Lin. Ft. to Each.</td>
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<tr>
<td></td>
<td>Deleted the median barrier transition.</td>
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<td></td>
<td>Added departure for thr ball bridge retrofit.</td>
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<td>C-10.06  Half Barrier Terminal w/ Type B or C Curb &amp; Gutter</td>
<td>New standard.</td>
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<tr>
<td></td>
<td>Shows installation details for half barrier with a new GET.</td>
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<tr>
<td>C-10.15  Barrier Details at Piers</td>
<td>New standard from old Std C-10.20.</td>
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<tr>
<td></td>
<td>Revised to show only installation details with barrier moved to new Std C-10.64.</td>
</tr>
<tr>
<td>C-10.20  G4(1W) and G4(2W) Blocked Out W Beam (Timber Post)</td>
<td>New standard from old Std C-10.04.</td>
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<tr>
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<td>No changes.</td>
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<tr>
<td>C-10.21  G4(1S) and G4(2S) Blocked Out W Beam (Steel Post)</td>
<td>New standard from old Std C-10.05.</td>
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<tr>
<td></td>
<td>No changes.</td>
</tr>
<tr>
<td>C-10.22  G4(1S-Modified) Blocked Out W Beam (Steel Post) with Special Curb &amp; Gutter</td>
<td>New standard from old Std C-10.06.</td>
</tr>
<tr>
<td></td>
<td>Added reference to Curb and Gutter in Section.</td>
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<tr>
<td></td>
<td>Revised callout for Curb and Gutter.</td>
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<tr>
<td></td>
<td>Added note limiting height of curb to 4 inches.</td>
</tr>
<tr>
<td>C-10.23  G9(A) and G9(B) Blocked Out Thrie Beam (Steel Post)</td>
<td>New standard from old Std C-10.07.</td>
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<tr>
<td></td>
<td>No changes.</td>
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<tr>
<td>C-10.24  G9(C) Blocked Out Thrie Beam (Steel Post)</td>
<td>New standard from old Std C-10.08.</td>
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<tr>
<td></td>
<td>No changes.</td>
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<tr>
<td>C-10.28  Nested Steel W Beam Short Span Type 1 and 2 (sheet 1 only)</td>
<td>Moved and revised section A-A to improve understanding that nested rail is additional W Beam to the regular guard rail.</td>
</tr>
<tr>
<td>C-10.40  Guard Rail Extruder Terminal GET-1</td>
<td>New standard to be used on non-curb conditions.</td>
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<td>Includes installation details for use with Type A and B guard rail.</td>
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<tr>
<td>C-10.41  Guard Rail Extruder Terminal GET-2</td>
<td>New standard to be used on curbed conditions.</td>
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<tr>
<td></td>
<td>Includes installation details for use with Type A and B guard rail.</td>
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</table>
**REVISED DRAWING**

C-10.44  Hardware for Guard Rail Extruder Terminal

C-10.45  Guardrail Anchor Assembly Steel Terminal Post

C-10.60  Half Barrier, Cast in Place Slip Form & Fixed Form

C-10.61  Half Barrier, Precast

C-10.64  Half Barrier (At Piers)

C-10.65  Half Barrier with Sidewalk

C-10.66  Median Barrier, Cast in Place Slip Form & Fixed Form

C-10.68  Median Barrier, Precast

**REVISION**

New standard.

New standard from old Std C-10.21.
Added note referring to measurement limits on Std C-10.03.
Removed references to BCT.

New standard from old Std C-10.09.
Changed to both slip form and fixed form.
Widened base to offset the B joint 2 inches away from the face of the barrier.
Added detail for barrier with 2'-6" wide gutter.
Revised joint to a type B joint with rebar.

New standard from old Std C-10.11.
Added General Notes and rebar details.

New standard from portion of old Std C-10.20.
Can be cast-in-place with continuous reinforcing or precast in sections.

New standard regarding the "special concrete barrier" from old Std C-10.99.

New standard from old Std C-10.12.
Changed to both slip form and fixed form.

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| C-10.75 Barrier Transition-Tangent Departure | New standard from old Std C-10.98.  
All transitions this standard are for departure condition.  
Changed Type A to Type 1 and Type B to Type 2.  
Shortened length of Type 2 from 30' to 20'.  
Added new Type 3 transition, which is a 20' long transition from half barrier to freeway curb and without sidewalk. |
| C-10.76 Barrier Transition-Curve | New standard from old Std C-10.99 and shows only the transition.  
Revised the elevation of the sidewalk to match that of the gutter.  
Shows limits of the barrier gutter transition. |
| C-11.10 Roadway Cattle Guard | Added details for the angle assemblies.  
Incorporated elements from Stds C-11.11 & C-11.12.  
Deleted note referring to Stds C-11.11 & C-11.12.  
Added note describing Angle Assembly Detail No. 2. |
| C-11.20 Cattle Guard, Drainage | Revised note that the transition of the C-04.10 spillway shall be symmetrical about the subgrade/slope hinge point. |
| C-12.10 Fence, Woven Wire | Added ASTM design numbers to the fence fabric dimensions. |
| C-13.10 Pipe Culvert Installations | Revised reference in note from C-14.00 to B-11.11 and B-11.14.  
Revised note 3 so that dimensions W and E are for all conditions.  
Added note that defines the minimum cover to be 12 inches.  
Added note and detail that defines pipe berm requirements.  
Added note that plating of slopes at pipe locations are similar for pipes without end sections and for multiple pipe installations.  
Revised and expanded table for multiple pipe installations.  
Moved several details to new sheet 2.  
Removed several details to new sheet 2.  
Added a detail and note for multiple end sections. |
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<tr>
<td>C-13.15 Typical Pipe Installation</td>
<td>Added new note defining the construction requirements for non-trench condition. Added dimensional note in the non-trench condition detail showing minimum width for pipe stability for trench and non-trench condition.</td>
</tr>
<tr>
<td>C-13.60 Slotted Drain Details</td>
<td>Changed welding of bearing bars to pipe to a continuous weld as per Std Specs.</td>
</tr>
<tr>
<td>C-13.75 Storm Drain Outlet Details</td>
<td>Added a table showing dimensions for gates for various sizes of pipes. Deleted note with duplicate information shown in the anchor bolt detail. Deleted note to see plans for access barrier gate dimension schedule. Added note to space the barrier bars evenly. Added note on hinge pin material and installation. Added overall width dimension of the hinge. Deleted three notes about the outlet collar that are in Std C-13.80. Deleted drainage outlet detail.</td>
</tr>
<tr>
<td>C-13.80 Pipe Collar Details</td>
<td>Revised clear cover dimension in general note 3 from 2&quot; to 3&quot; to match drawings. Added drainage outlet detail from Std C-13.75.</td>
</tr>
<tr>
<td>C-15.10 Catch Basin, Type 1</td>
<td>Added location reference point.</td>
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<tr>
<td>C-15.20 Catch Basin, Type 3</td>
<td>Added location reference point.</td>
</tr>
<tr>
<td>C-15.30 Catch Basin, Type 4</td>
<td>Added note identifying stove bolts and added location reference point.</td>
</tr>
<tr>
<td>C-15.40 Catch Basin, Type 5</td>
<td>Added location reference point.</td>
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<tr>
<td>REVISED DRAWING</td>
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<tr>
<td>C-15.70 Catch Basin Miscellaneous Details</td>
<td>Added note indicating maximum gutter depression of 3 inches.</td>
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<td>Added note regarding distance for full depression along curb.</td>
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<td>Added note regarding non-use of apron on this standard with C-15.80.</td>
</tr>
<tr>
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<td>Revised length of gutter depression transition from 3 feet minimum to 3 feet.</td>
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<tr>
<td>C-15.75 Catch Basin, Drop Inlet</td>
<td>New standard from old Std C-14.30.</td>
</tr>
<tr>
<td>C-15.80 Catch Basin, Median, Flush</td>
<td>Revised the perspective view, concentrating on the apron.</td>
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<tr>
<td></td>
<td>Revised back slope of apron on median dike to 10:1.</td>
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<td></td>
<td>Revised fore slope of apron from 6:1 to match profile of median.</td>
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<td>Added note to see plans for the grate elevation of the catch basin.</td>
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<td></td>
<td>Added note that states that the top elevation of the back portion of the apron is controlled by the sides of the apron.</td>
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<td>Added a median ditch grade detail.</td>
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<td>Revised the 'H' dimension to reflect the inside catch basin wall height.</td>
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<td></td>
<td>Added a variable dimension for the back portion of the apron, which reflects the fact that the back slope is fixed at 10:1 and the side slopes are variable.</td>
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<td>Added note indicating location on catch basin for station referencing.</td>
</tr>
<tr>
<td>C-15.81 Catch Basin, Median, Side Slope</td>
<td>New standard for use on narrow medians where the roadways are superelevated.</td>
</tr>
<tr>
<td>C-15.90 Catch Basin, Median Dike, Precast</td>
<td>Added location reference point.</td>
</tr>
<tr>
<td>C-15.91 Freeway Catch Basin Details</td>
<td>Revised location of location reference point to lip of gutter.</td>
</tr>
<tr>
<td></td>
<td>Moved frame and grate details to sheet 2.</td>
</tr>
<tr>
<td>C-16.40 Irrigation Sleeves</td>
<td>Added note 6 defining material to be used for caps or plugs is to be recommended by pipe supplier and approved by the Engineer.</td>
</tr>
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</table>
REVISION

C-17.10 Bank Protection, Rail Types 1,2,3
Added callouts in perspective view for single and double wrapped wire ties.
Modified table, eliminating the embankment slope rate.

C-18.10 Manhole Details
Revised general note 4. Changed from Std C-07.30, which does not exist, to Std C-18.30. Also changed note to reference C-18.30 for other information.
Added note to see Std C-18.40 for location reference point.
Added note that defines height of manhole.

C-19.10 Ford - Concrete Walls
Changed callout in elevation view from "Upstream" to "Downstream".
Added joint detail.

C-22.15 Sanitary Sewer Encasement
Rearranged general note 4.

C-22.20 Pipe Support Across Trenches
Revised rebar in Type B from two bars to one bar.

C-23.30 Valve Box Installation
Moved three notes from sheets 2 and 3 to sheet 1.

C-23.55 Waterline Cut and Plug for 12" Diameter Main and Smaller
Removed note about dry blocks being shimmed.
The following existing Construction Standard Drawings are being deleted.

**DELETED DRAWINGS**

C-02.40  Pavement Crown, Parabolic (Rev. 1/83)

C-10.04  G4(1W) and G4(2W) Blocked Out W Beam (Timber Post) (Rev. 7/85)

C-10.05  G4(1S) and G4(2S) Blocked Out W Beam (Steel Post) (Rev. 7/85)

C-10.06  G4(1S-Modified) Blocked Out W Beam (Steel Post) with Special Curb and Gutter (Rev. 7/85)

C-10.07  G9(A) and G9(B) Blocked Out Thrie Beam (Steel Post) (Rev. 7/85)

C-10.08  G9(C) Blocked Out Thrie Beam (Steel Post) (Rev. 7/85)

C-10.09  Half Barrier, Cast in Place, Slip Form (Rev. 10/89)

C-10.10  Half Barrier, Cast in Place, Fixed Form (Rev. 11/83)

C-10.11  Half Barrier, Precast (Rev. 1/83)

C-10.12  Median Barrier, Cast in Place, Slip Form (Rev. 1/93)

C-10.13  Median Barrier, Cast in Place, Fixed Form (Rev. 1/91)

C-10.14  Median Barrier, Precast (Rev. 1/91)

C-10.15  Flared Breakaway Cable Terminal Assembly (Timber Post) (Rev. 7/85)

C-10.16  Flared Breakaway Cable Terminal Assembly (Steel Post) (Rev. 7/85)
C-10.17  BCT Assembly, Steel (Rev. 3/87)

C-10.18  BCT Assembly, Timber (Rev. 10/87)

C-10.19  Guardrail Assembly (Rev. 10/89)

C-10.20  Barrier Details at Piers (Rev. 10/89)

C-10.21  Guardrail Anchor Assembly, Steel Terminal Post (Rev. 3/87)

C-10.22  Guardrail Anchor Assembly, Timber Terminal Post (Rev. 6/86)

C-10.98  Barrier Transition - Tangent (Rev. 10/89)

C-10.99  Barrier Transition, Curve (Rev. 10/89)

C-11.11  Roadway Cattle Guard - Grill & Grill Clamp Detail (Rev. 1/83)

C-11.12  Roadway Cattle Guard - Footing Type, Misc. Details (Rev. 1/83)

C-14.30  Headwall, Drop Inlet (Rev. 1/83)
### CONSTRUCTION STANDARD - INDEX

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<td>GROOVING FOR BITUMINOUS SHOULDER</td>
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<td>TYPE &amp; GUARD RAIL INSTALLATION, REFLECTOR TAB</td>
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CONSTRUCTION DRAWING SYMBOLS

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

SYMBOL LEGEND
C-OH10

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**CONSTRUCTION DRAWING SYMBOLS**

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*STATE OF ARIZONA*
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

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C-9213
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**ABBREVIATION**: BST, BBT, BSP, Bor, BLYD, Blvd, Bdy, BC, BCT, Br, Bldg, Calc, C-I-P, CI, CIP, CB, CG, Ctr, Cto, Chan, CR, Col, Comp, C in P, Conc, CB, CBT, Conn, Cst, Cont, Coord, Cor, Corr, CAP, CAPA, Drn, DA, Dwg, Dr, Dvy, DIP, E, Ex, Emt, East, EB.
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MINIMUM SLOPES

INTERMEDIATE SLOPES

MAXIMUM SLOPES

MINIMUM DITCH CONDITIONS DETAIL

GENERAL NOTES
1. Roadway width, cut ditch width, crossover, and pavement structure section will be shown on project plans.
2. Design highwater should not be located above the subgrade in unlined ditch.
3. Pavement structure slope is normal, as depicted, and controlled by 0%. See Shoulder Wedge Details.
4. Slopes beyond the pavement structure, such as embankment, cut slopes and roadways, are relative to horizontal.
5. See Subgrade/Slope Hinge Treatment Details for slopes within interchange areas, see project plans.
6. When median slopes intersect, see project plans for controls.
7. These slopes are intended to be used with new or reconstructed roadways.

* The 5 min is required when guard rail is utilized on the project. Treatment shall be uniform throughout the project length.
* The 5 min requirement may be waived under specific conditions where guard rail is not utilized. The 5 min shall not be waived when the thickness of structure section has not been finalized.

SHOULDER WEDGE DETAIL

SLOPE Rounding DETAIL

Except in solid rock, or as directed by the Engineer, the intersection of roadway ditches and grade levels shall be rounded. The same as 1, use 2 semi-tangents for slope rounding. For each additional foot cut add 1 to semi-tangent to 15 maximum.
GENERAL NOTES

1. Roadway width, curvethrd width, cross slope, and pavement structure section will be
   shown on project plans.

2. Design highwater should not be located above the subgrade in unpaved ditches.

3. Pavement structure slope is nominal. Actual slope is controlled by Q. See Shoulder
   Wedge Detail.

4. Slopes beyond the pavement structure, such as embankment and cut slopes, are
   relative to horizontal.

5. These slopes are intended to be used with new or reconstructed roadways.

   The 6% min. is required when guard rail is utilized on the project. Treatment shall be
   uniform throughout the project length. The 6% requirement may be waived under
   special conditions where guard rail is not utilized. The 6% shall not be waived when
   the thickness of structure section has not been finalized.

MINIMUM SLOPES

MINIMUM DITCH CONDITIONS DETAIL

SHOULDER WEDGE DETAIL

SLOPE ROUNDOING DETAIL

Except in solid rock, or as directed by the Engineer, the intersection of
roadway cut slopes with the ground surfaces shall be rounded.
For cuts up to 6', use 5' semi-tangents for slope rounding. For each additional
foot of cut add 1' to semi-tangent to 11' maximum.

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
SLOPES
SECONDARY/LOCAL ROADWAYS

10/95
C-0230
GENERAL NOTES

1. Roadway width, cut ditch width, cross slope, and pavement structure section will be shown on project plans.

2. Design highwater should not be located above the subgrade in unpaved ditches.

3. Pavement structure slope is nominal. Actual slope is controlled by CD. See Shoulder Wedge Detail.

4. Slopes beyond the pavement structure, such as embankment and cut slopes, are relative to horizontal.

5. These slopes are intended to be used with new or reconstructed roadways.

**SUBGRADE/SLOPE HINGE TREATMENT DETAIL**

- Width (W) = Roadway Width
- Width (W) = Width (W)

### MINIMUM DITCH CONDITIONS DETAIL

- As Required
- Near Traffic Lane Edge
- See Shoulder Wedge Detail

### GENERAL NOTES

- 8% Min
- 8% Max
- 12% Max

### MINIMUM SLOPES

- See Subgrade/Slope Hinge Treatment Detail
- Subgrade Slope
- Horizontal

### INTERMEDIATE SLOPES

- See Subgrade/Slope Hinge Treatment Detail
- Subgrade

### MAXIMUM SLOPES

- See Subgrade/Slope Hinge Treatment Detail
- Subgrade

### SLOPE Rounding DETAIL

Except in solid rock, or as directed by the Engineer, the intersection of roadway cut slopes with the ground surfaces shall be rounded. For cuts to 8%, use 5 semi-tangents for slope rounding for each additional foot of cut and 1" semi-tangent to 11" maximum.
**General Notes**

1. Round edge profile intersections with vertical curves having an approximate length in feet equal to the design speed in mph.

2. For main roadway curves without spirals, $L_s$ is the same as for spiraled curves but with 0.1 $L_s$ on tangent and 0.8 $L_s$ on curve.

3. Shoulders transition with the adjacent travel lane when their normal cross slopes are the same.

4. If shoulders have a normal cross slope steeper than the adjacent lane, the shoulder transition will begin at a different point than that of the adjacent lane. See shoulder transition detail.

**Legend**

- A: Point at which adverse crown removal begins.
- B: Point at which super-elevation transition begins.
- C: Point of equity between super-elevation and normal crown.
- D: P.C. location for circular curve transition.
- E: Point at which full super-elevation is reached.
- $L_s$: Length of Normal Crown Removal.
- $L_e$: Length of Super-elevation Runoff.
- $\alpha$: Distance BC = INCL 12\%/6.
- $\gamma$: Length of Shoulder Transition = INCL 12\%/6 of shoulder.

**Shoulder Transition Detail**

**Spiral Curve Transition**

1. Way roadway-axis of rotation at const. & high point of normal crown on outside of curve.

2. Way roadway-axis of rotation at const. & high point of normal crown on inside of curve.

3. Way roadway-axis of rotation at const. (for opposite deflecting curve, E.T.L. profiles are reversed).
GENERAL NOTES

1. Round edge profile intersections with vertical curves having height in feet equal to design speed in m.p.h.

2. For main roadway curves without spirals, $L_s$ is the same as for spiraled curves but with $0.7L_s$ on tangent and $0.3L_s$ on curve.

3. Shoulders transition with the adjacent travel lane when their normal cross slopes are the same.

4. If shoulders have a normal cross slope steeper than the adjacent lane, the shoulder transition will begin at a different point than that of the adjacent lane. See shoulder transition details.

LEGEND

A - Point at which adverse crown removal begins.
B - Point at which superelevation transition begins.
C - Point of equality between superelevation and normal crown.
D - PL location for circular curve transition.
E - Point at which full superelevation is reached.
E.T.L. - Edge of traveled lane
* - Distance BC = (INC $L_s$)/*.
0 - Length of Shoulder Transition = INC $L_s$/INC of shoulder.

SHOULDER TRANSITION DETAIL

STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS

7/94

SUSPENSION DISTRIBUTION C-02.50

2-WAY ROADWAY-AXIS OF ROTATION AT $\theta$
(FOR OPPOSITE DEFLECTING CURVE, E.T.L. PROFILES ARE REVERSED)
GENERAL NOTES

1. Dimensions of ditches shall be shown on the plans as bottom width, depth, and length.

2. Ditches shall be constructed with a minimum grade to prevent erosion. Ditch outlet treatment shall be as provided on plans.

CROWN DITCH

GRADER DITCH

DITCH

CHANNEL

DITCH AND DIKE
GENERAL NOTES
1. Dimensions of dikes shall be shown on the plans as top width, height, length and top of dike elevation.
2. Dike side slopes outside the recovery area shall be shown on the plans.

SLOPE TABLE

<table>
<thead>
<tr>
<th>Inside Recovery Area</th>
<th>Outside Recovery Area</th>
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<tr>
<td>Slope</td>
<td>Maximum</td>
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<tr>
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<td>4%</td>
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<tr>
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<td>10%</td>
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TYPE B TRANSVERSE MEDIAN DIKE
* Slope relative to grade of median at intersection with toe

TYPICAL DIKE INSTALLATION AT STRUCTURE
Place dikes at structures to create water cushion.

TYPICAL TRANSVERSE MEDIAN DIKE INSTALLATION
GENERAL NOTES

1. Dimensions for ditch dikes shall be shown on the plans as ditch stationing, height, length, dike back slope and top of dike elevation.

2. Dimensions for cut ditch widening shall be shown on the plans as beginning and ending stations.

CUT DITCH WIDENING DETAIL

SECTION B-B
- Slope relative to grade of cut ditch at intersection with toe

SECTION A-A

SECTION C-C
**GENERAL NOTES**

1. Pipe berms not required when pipe projection is protected by guard rail.

2. Berm construction similar for multiple pipe installation and for pipes without end sections.


If point A is within the recovery area, then a pipe berm is required and point B is set at the edge of the recovery area.

**PIPE BERM REQUIREMENT DETAIL**

- **Existing Toe of Slope**
- **Recovery Area**
- **Slope to Grade**
- **1' Min**

**STRAIGHT PIPE PLAN**

- **10' Min**
- **2.5' Min**
- **0' Min**
- **2.5' Min**

- **Pipe Baskets and Bedding Material Limits**
  See Std C-13.15.

**ELEVATION**

- **101**
- **301**

**SKewed PIPE PLAN**

- **NOTE:**
  - Single Pipe Installation: D = Outside Diameter of Pipe
  - Multiple Pipe Installation: D = Outside Edge to Outside Edge of Pipes

**STATE OF ARIZONA**

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

3/94

Ditches, Channels, Dikes and Berms
PIPE BERMS

C-03.10

Sheet 2 of 4
GENERAL NOTES

1. Berm construction similar to box culvert and pipe with headwall.
2. Berm construction shown is for extension of existing facilities. Berm construction similar for new facilities.

ELEVATION

SECTION A-A (FOR CBC)

RECOVERY AREA

SLOPE TO DRAIN

1st SLOPE

RECOVERY AREA

SLOPE TO DRAIN

1st SLOPE

SECTION A-A (FOR PIPE WITH HEADWALL)

STRAIGHT HEADWALL PLAN

RECOVERY AREA

EXISTING TOE OF SLOPE

2nd SLOPE

RECOVERY AREA

EXISTING TOE OF SLOPE

2nd SLOPE

SKewed HEADWALL PLAN

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

DITCHES, CHANNELS, Dikes and Berms
HEADWALL BERRMS

C-0310
3/94

DESIGN NO:

2010

REFERENCE NO:

0118

DRAWN BY:

3/94

ENGINEER:

3/94

CHECKED BY:

3/94

PROJECT:

3/94

ABSTRACT:

3/94

C-0310

3/94

MATERIAL:

3/94

SPECIFICATION:

3/94

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GENERAL NOTES

1. Concrete for the spillway inlet, spillway outlet shall be Class B.
2. Where rock is encountered, the outlet may be omitted.
3. When outlet is used, the wire mesh shall extend through the joint into the outlet in lieu of bending into the key.
4. Spillway invert slope shall be uniformly downward from A to B.
1. Round all exposed concrete corners.
2. Tank, stub, trash rack and angle supports shall be shop fabricated, welded and galvanized in accordance with AASHTO M 36.
3. Stub shall be of annular corrugation. Sandwich plating beyond stub may be either annular or helical corrugation.
4. Panelizable couplings shall be mechanical, heat-shrinkable polyolefin sheets on place do type neoprene sheet or slip seam at min 12° and min 18 ga.
5. Inverted slope shall be uniformly downward from one foot inside of embankment curb base.
6. Inlet and outlet concrete shall be C30/35. Embankment curb concrete shall be in accordance with Standard Specifications.
GENERAL NOTES

1. Round all exposed concrete corners.

2. Tank, stub, trash rack and angle supports shall be shop fabricated, welded and galvanized in accordance with ASTM A 25.

3. Stub shall be of angular corrosion.

4. Perforable couplings shall be mechanical, heat-sensitizable polyethylene sheets on plaque lath type neoprene sheet or static seal of min 1/2" width and min 1/8" gap.

5. Inlet invert slope shall be uniformly downward from one foot inside of embankment curb base.

6. Inlet and outlet concrete shall be Class B.

DETAIL ANCHOR

OUTLET DETAIL

OUTLET-HEADWALL AND CONCRETE APRON

SECTION A-A

DETAILED TRASH RACK

DETAILED ANGLE SUPPORTS FOR TRASH RACK

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
DOWRAIN, EMBANKMENT
C-04.20
GENERAL NOTES

1. Stub shall have annular corrugation. Downdrain sloping beyond stub may be either annular or helical.

2. Coupling shall be mechanical heat-shrinkable polyolefin sheath. One-piece type I rubber sheath or slip seals at 12" min. width and 18 ga. min.

3. Maximum Q Allowable = 8 cfs
   Minimum Q Allowable = 1 fps
GENERAL NOTES

SINGLE CURB AND CURB AND GUTTER

1. Single curb and curb and gutter may be constructed by the use of forms or the concrete may be extruded.

2. When the pavement section slopes away from the curb, the slope of the gutter shall match the pavement cross slope. Therefore, the gutter depression is not applicable.

3. Two inch deep contraction joints shall be placed in the curb and the gutter at locations which match the joints in adjacent portland cement concrete pavement and at approximately 3 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand scored or sawed.

4. Expansion joints shall be located at tangent points in curb returning, at structures and at maximum 60 foot intervals. The one-half inch joint filler shall extend the full depth at the concrete.

5. Concrete shall be finished with a steel trowel followed by brushing with a file brush along the length of the curb and gutter.

6. All exposed edges and hand troweled joints shall be finished with a tool having a one-fourth inch radius unless a larger radius is indicated.

EMBANKMENT CURB

1. In addition, finishing will be required after extrusion or removal of the forms when the curb presents a neat appearance and the surface is uniform in texture and color.

2. The curb shall conform to the cross section as shown except that the horizontal dimensions shall not vary more than one-half inch.
GENERAL NOTES
SINGLE CURB AND CURB AND GUTTER

1. Single curb, and curb and gutter may be constructed by the use of forms or the concrete may be extruded.

2. When the pavement section slopes away from the gutter, the slope of the gutter shall match the pavement cross slope.

3. Two inch deep contraction joints shall be placed in the curb and the gutter at locations which match the joints in adjacent portions of the concrete pavement and at approximate 15 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand tied or sawed.

4. Expansion joints shall be located at tangent points in curb returns, all structures and at maximum 60 foot intervals. The one-half inch joint filler shall extend the full depth of the concrete.

5. Concrete shall be finished with a steel trowel followed by brushing with a fine brush along the length of the curb and gutter.

6. All exposed edges and hand trowel joints shall be finished with a tool having a one-fourth inch radius unless a larger radius is indicated.

EMBANKMENT CURB
1. No additional finishing will be required after extrusion or removal of the forms when the curb presents a neat appearance and the surface is uniform in texture and color.

2. The curb shall continue to the cross section as shown except that the horizontal dimensions shall not vary more than one-half inch.
GENERAL NOTES

1. See Std. C-0510 for dimensions and other general notes.
2. Expansion joint filler shall be 1/2" bluishous type preformed expansion joint filler.
3. Expansion joints shall be constructed at the end of all edges, at joints of curvature, at adjoining structures, at driveways and at a maximum spacing of 50'. The expansion joint shall provide for concrete separation of the sidewalk from adjoining concrete.
**GENERAL NOTES**

1. All gutter flow lines shall be constructed to an accurate grade.
2. See Slotted Drain Stds. C-13.60 and C-15.9%, for curb and gutter with slotted drain.
3. See Std. C-05.10 for additional general notes and dimensions.

---

**SECTION A-A**

- Varies 4'-0" to 6'-0"
- Varies 2'-6" to 4'-6"
- Curb & Gutter Type B or C
- Std C-05.10

**SECTION B-B**

- 15 Transition
- Top of Curb
- Bottom of Curb at Rear Face
- Dimensions may vary.
  - Std C-05.10
  - Type D-0-3

**TYPE 1 - CURB & GUTTER TRANSITION - AT RAMP TAPERS**

- Dimension may vary where exit occurs on curves, see plans

**TYPE 2 - CURB & GUTTER TRANSITION**

- Dimension may vary.
  - Std C-05.10
  - Type D-0-3

---

**DESIGN SPECIFICS**

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
C-05.12
Sheet 1 of 1

**7/94**
1. PERSPECTIVE VIEW

2. SECTION A-A

3. TYPE 4 - CURB & GUTTER TRANSITION

PLAN VIEW

TYPE 3 - CURB & GUTTER TRANSITION AT PAVED CORE
Type 5 - Curb & Gutter Transition

Curb & Gutter
Type B or C (modified)
Gutter width = 4' - 6"
Sta. C-05.10

Curb & Gutter
Type B, Sta. C-05.10
or Non-ADOT Std
See Plans

Type 6 - Curb & Gutter Transition

Curb & Gutter
Type C or D
Sta. C-05.10
See Plans
1. TYPE 5 - CURB & GUTTER TRANSITION

Curb & Gutter
Type B or C
Gutter Width: 4'-6"
Std. C-0520

Curb & Gutter
Type A, Std. C-0540
or Non-ADOT Std.
See Plans

2. TYPE 6 - CURB & GUTTER TRANSITION

Curb & Gutter
Type 5 or 4
Std. C-0510
See Plans
GENERAL NOTES

1. Unless otherwise specified, driveways shall be 6 inches in depth.

2. Half inch deep transverse contraction joints shall be placed in driveways if the driveway width is over 20 feet. If the driveway thickness is greater than 6 inches, then the contraction joint depth shall be 1/3, where T is the thickness of the driveway. Joints shall be either formed or sawed. Formed joints shall be finished with a tool having a 1/4" radius. See sheet 2 of 2 for the contraction joint detail.

3. Expansion joints shall be located between driveways and sidewalks and at abutting structures. The one-half inch joint filler shall extend the full depth of the concrete. See sheet 2 of 2 for the expansion joint detail.

4. Concrete shall be finished by means of a float, then steel troweled and then broomed with a line brush in a transverse direction.

5. Top of curb (T) and driveway elevations shown are in relation to the gutter, gutter-first.

6. When curb heights of 6" or less are shown on plans, use dimensions shown in 1/8".

7. When curb heights of 7" or more are shown on plans, see plans.

LEGEND

- Cross slope 0.00' Per Ft (Typical)
- Straight grade with downward slope.
- Maximum slope = 0.02' Per Ft.

DEPRESSED CURB AT DRIVEWAY ENTRANCE
GENERAL NOTES

1. Unless otherwise specified, sidewalks shall be 4 inches in depth.

2. One inch deep transverse contraction joints shall be placed in sidewalks at intervals of approximately 15 feet or at a spacing that matches adjacent curb and gutter. In no case shall the joint be over 1 foot in width. A 1/2 inch deep longitudinal contraction joint shall be placed in the center of the sidewalk. The maximum area of sidewalk without contraction joints or scoring lines shall be approximately 16 square feet. Joints shall be formed, filled, or sawn. Formed joints shall be finished with a tool having a 3/8" radius.

3. Expansion joints shall be located between sidewalks and driveways and at separation structures. Expansion joints shall match the joints in the adjacent concrete pavement or existing concrete curb and gutter. The maximum length of sidewalk without an expansion joint shall be 60 transverse feet. The one-half inch joint filler shall extend the full depth of the concrete.

4. Concrete shall be finished by means of a float, then steel troweled and then broomed with a fine brush in a transverse direction.

5. Sidewalks shall be constructed to a desirable width of 5 feet on major streets, a minimum width of 4 feet on residential streets, or as shown on the plans.

6. Scoring lines shall be 1 1/2 inch in depth. They shall be placed at 5 foot spacing when the contraction joint interval is 15 feet and at 6 foot spacing when the contraction joint interval is 12 feet.

CONCRETE SIDEWALK ADJACENT TO CURB

CONCRETE SIDEWALK SETBACK FROM CURB
GENERAL NOTES

1. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter.
   Curb = 0'.'

2. See Std C-05.30, C-05.31 and C-05.20 for joint requirements.

3. When curb heights of 6' are shown on plans, use dimensions shown in 1/8.

4. If field modification is required, bottom width shall be 4' minimum, as per ADA requirements.

- Use type AI curb if median is to be landscaped.

---

PLAN

- Single Curb
  Std C-05.30

- Median Paving
  When shown on plans
  See Std C-05.40

Sidewalk Ramp
Control Point
See Plans

3'-3" 2'-8" 2'-6" 3'-3"

Width Per Plans

Lane Width

4" Concrete

ELEVATION

DEPRESSED CURB AT SIDEWALK RAMP

SECTION A-A

GROOVE DETAIL

PERSPECTIVE

6" Grooves at 1' C to C
See Groove Detail

Lane Width

Match Slope on
Median Paving

Match Curb

TC+1/2"
GENERAL NOTES

1. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter and are located radially. See C-05.10, C-05.31, and C-05.20 for joint requirements.

2. When curb heights at 5' or less are shown on plans, use dimensions shown in 1.1.3.

3. When curb heights of greater than 7' are shown on plans, use dimensions shown in 1.1.3.

4. See plans and AASHTO requirements.

PLAN

Transition to Match East Curb & Gutter and Sidewalk
Existing Dimensions May Vary
See Plans

Ramp Curb Height to Match Sidewalk Elevation

Rough Broom Finish
Use Staple Pattern

\( \frac{1}{4} \) Grooves at 1' C to C
See Groove Detail

ELEVATION

DEPRESSED CURB AT SIDEWALK RAMP

SECTION A-A

Ramp Width 8' 3"
Sidewalk Width Per Plan 6'
Variations 6 Min
Concrete

Groove Detail

Ramp Width 8' 3"
Sidewalk Width Per Plan 6'

\( \frac{1}{4} \) R (Typ)

Concrete

Gutter

Match Gutter for Line TC-1'

TC-1' 6-2"
GENERAL NOTES

1. Top of curb (TC) elevations shown are in relation to the gutter and are located radially. Gutter 40°.
2. See SCDOT C-0330, C-0531, and C-0520 for joint requirements.

i) Mal Maximum Slope.

GROOVE DETAIL

WITH RAMP CURB

SECTION A-A

WITHOUT RAMP CURB

SECTION B-B
GENERAL NOTES

1. Top of curb (TC) elevations shown are in relation to the gutter and are located
   per plans. Gutter-0."

2. See Stds C-08.10, C-08.11 and C-08.20 for joint
   requirements.

   * IGD Maximum Slope, 10%.

---

ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP

See Std C-10.99

SECTION A-A
GENERAL NOTES

1. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter.

2. See Std C-05.10, C-05.11 and C-05.20 for joint requirements.

3. When curb heights of 6" or less are shown on plans, use dimensions shown in I.F.

4. When curb heights of greater than 6" are shown on plans, see plans and ADA requirements.

   - For sidewalk widths greater than 6'-6", the overall sidewalk ramp width shall match the sidewalk width.

ELEVATION

DEPRESSED CURB AT SIDEWALK RAMP

- 6'-6"
- 6'
- 3'-5" Varies
- 4" Concrete
- 1/2" R (Type)
- 1/2" R

ROADWAY WIDTH 8'/5"" 3'-5"

GROOVE DETAIL

4" Concrete

Contraction joint or formed separately

MATCH CURB: FORBID LINE

SIDEWALK RAMP TYPE 4

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

C-05.10
Sheet 4 of 4
GENERAL NOTES

1. Traffic signal foundations, traffic sign foundations and pull boxes for traffic signs and traffic signals shall be installed prior to placement of median paving.

2. See Stc C-05.10, C-05.11 and C-05.20 for joint requirements.

3. Decorative median paving shall be stipped concrete, concrete pavers or as specified on the project plans.

4. Decorative median paving shall not be placed on a median nose transition or on a median island on a structure.

5. A 4" x 8" concrete header shall be used to end decorative paving at locations when concrete sidewalk ramps are not present.

6. Median nose transitions shall not be placed on departure ends of raised medians.

7. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter, gutter-0'.

8. When curb heights of 6" are shown on plans, use dimensions shown in C 6'.

9. See Structure Plans for raised median on structures.

SECTION A-A

SECTION B-B

SECTION C-C

NOSE TRANSITION LAYOUT
GENERAL NOTES

1. The RCCP surfaces within the bus bay area shall be textured transversely. Surface texturing to conform to Section 40L.
2. Transverse weakened plane joints shall be constructed at a maximum spacing of 12' and shall align with joints in the concrete curb and gutter.
3. For additional data on spalled drains, see slotted drain STS C-1260.
4. For joint expansion joint with preformed joint filler, see Detail A.
5. Concrete pad to be poured separately from concrete bus bay pavement.
6. For sidewalk construction details, see Std. C-0520.
GENERAL NOTES

1. The PCCP surfaces within the bus bay area shall be textured transversely. Surface texturing must conform to Section A-A.

2. Transverse weakened plane joints shall be constructed at a maximum spacing of 15' and shall align with joints in the concrete curb and gutter.

3. For additional data on slotted drains, see piping system Sci C-13.60.


5. Concrete pad to be poured separately from concrete bus bay pavement.

6. For sidewalk construction details, see Sci C-05.80.
GENERAL NOTES

1. Driveway types:
   Residential - one providing access to a single family residence, to a duplex, or to an apartment building containing five or fewer dwelling units.
   Commercial - one providing access to an office, retail or institutional building or to an apartment building having more than five dwelling units.
   Industrial - one directly serving a substantial number of truck movements to and from loading docks of an industrial facility, warehouse or truck terminal.

2. Joint use driveways may become desirable for landowners of adjacent properties to service both properties, if this is the case, only one of the two adjacent landowners need apply for the access permit, but a notarized written mutual agreement, signed by all parties involved, must accompany the application form.

3. Driveways for high volume traffic generators shall be approved individually by Traffic Engineering section.

4. Driveways with curb returns in urban areas shall be installed only with the approval of Traffic Engineering section.

5. Driveways and depressed curbs shall be located as noted on plans or as directed by the Engineer.

6. Drainage structures shall be provided under driveways where necessary.

7. Dimensions indicated as minimum shall be avoided whenever possible in favor of those indicated as desirable.

8. The type "A" turnout is the preferable turnout design. Type "B" and "C" shall only be used when absolutely necessary.

9. Fixed turnouts, plans notation will be W X L, surface material, type and standards. Examples 20' x 30' AC10, Type A, 5% C 0.625. Show radius R in graphically.

10. Construction of curb, gutter, sidewalk and drainage facilities in urban areas by the permittee along that portion of the roadway frontage under permit application, may be a stipulation of the permit approval if there appears to be reasonable need.

11. Excavation or embankment for turnouts shall be included in quantities for main roadways.

12. Base material shall be the same as that shown for main roadway, unless otherwise noted.


RURAL DEVELOPMENTS

URBAN DEVELOPMENTS
GENERAL NOTES

1. Grade as shown on plans or as negotiated between Property Owner and Engineer.
2. When field conditions require modifications to plans, contact Design Engineer for assistance.
3. See Sheet 1 of 2 for other General Notes.
4. Breakage greater than 6% requires a vertical curve, 1100' Min. Horizontal curve shall not encroach on roadway or sidewalk.

URBAN CROSS SECTION
UP GRADE

URBAN CROSS SECTION
DOWN GRADE

CONCRETE SIDEWALK
UP GRADE

CONCRETE SIDEWALK
DOWN GRADE

DESIRABLE URBAN CROSS SECTION

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DRIVEWAY & TURNOUT LAYOUTS

C-0630
Sheet 3 of 3
GENERAL NOTES

1. Grade as shown on plans or as negotiated between Property Owner and Engineer.
2. When field conditions require modifications to plans, contact Design Engineer for assistance.
3. See Sheet 1 of 2 for all other General Notes.
   Break angle greater than 6% requires a vertical curve. Less than 6% it shall not encroach on roadway or sidewalk.

URBAN CROSS SECTION

(UP GRADE)

1. Std C-05.20
   or 6' Desirable Without Sidewalk
   (See Plans Typical Sections)

2. Control Point
   See General Notes

3. TCE or R/W Line
   Driveway Surface

CONCRETE SIDEWALK

(UP GRADE)

1. Control Point
   See General Notes

2. Existing Cross Slope
   or Flatter

3. Edge of Paved Shoulder
   Commercial & Industrial
   20'-40' Desirable
   Residential 10' Min Desirable

4. TCE or R/W Line
   Driveway Surface

CONCRETE SIDEWALK

(DOWN GRADE)

1. Control Point
   Commercial & Industrial
   20'-40' Desirable
   Residential 10' Min Desirable

2. TCE or R/W Line
   Driveway Surface

3. See General Notes

DESIRABLE URBAN CROSS SECTION

1. Std C-05.20
   or 6' Desirable Without Sidewalk
   (See Plans Typical Sections)
GENERAL NOTES

1. Detour "A" entrance shall be used where an approaching vehicle must turn left. Detour "B" shall be used where an approaching vehicle must turn right.

2. Detour from a horizontal curve on the inside of the curve the detour take off shall be a curve, see tape. On the outside a tangent take off shall be used. A vertical curve may be required to effect a smooth grade change.

3. The design speed shall be comparable between vertical and horizontal alignment.

4. The entrance design speed at a detour shall not be less than the normal posted speed of the existing roadway. The design speed for the remainder of the detour may be 20 mph below the normal posted speed.

5. Any intermediate detour entrance may be designed on the basis of normal posted speed less 20 mph where visible construction activity has slowed traffic for the preceding 1/4 mile.

6. The minimum width of the detour shall be 28' for existing roadway 36' or wider and a minimum of 24' for existing roadways less than 36' in width.

7. The entrance taper for Detour "A" shall be extended until full detour width is attained. For Detour "B" the entrance taper shall be extended until a minimum of 50' is attained beyond the edge of existing roadway.

8. Any deviation from this standard must be approved by the Plans Engineer and Traffic Engineer and the Engineer shall submit the alignment and profile of the proposed change for their review.

9. Native material used in constructing the detour embankment will be considered suitable for backfill around pipes, however, it shall be reasonably free of rocks and debris.

**Adjusted Tangent Section Lengths as Required, Keep by Distance

Width 24' or 28'

SPECIAL DETOUR SECTION

<table>
<thead>
<tr>
<th>TANGENT ROADWAY</th>
<th>CURVED ROADWAY</th>
<th>MAXIMUM HORIZONTAL CURVATURE</th>
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<td>Entrance Design Speed</td>
<td>Curved Design Speed</td>
<td>Curve No. I</td>
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<td>1'</td>
</tr>
<tr>
<td>60</td>
<td>3'</td>
<td>2' 3' 10</td>
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<tr>
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<td>4'</td>
<td>3' 4' 5' 5'</td>
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<tr>
<td>40</td>
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<td>7' 8' 9' 9'</td>
</tr>
<tr>
<td>10</td>
<td>15'</td>
<td>8' 9' 10'</td>
</tr>
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</table>
GENERAL NOTES

1. When load transfer dowel assemblies are required, use dimensions shown in 1.2a. See Assembly Placement and Edge Clearance Details, 5th Ed. C-07.02.

2. In slip form type pavement construction, LWP joints shall be used. In fixed form construction, either LWP or LC joints may be used.

3. Same as weakened plane joint detail, except initial saw cut will not be required.

JOINT ABBREVIATIONS

LWP - Longitudinal Weakened Plane Joint
TRP - Transverse Weakened Plane Joint
LC - Longitudinal Construction Joint
TC - Transverse Construction Joint
E - Expansion Joints
S - AC/PCCP Pavement Edge Seal Joints
P - PCCP Thickness

LOMON TOITIAL WEAKENED PLANE JOINT
LWP Joint

TRANSVERSE WEAKENED PLANE JOINT
TRP Joint
w/Load Transfer Dowel Assemblies

TRANSVERSE CONSTRUCTION JOINT
TC Joint
Skewed Joint

EXPANSION JOINT
E Joint

EXPANSION JOINT
H Joint

AC/PCCP EDGE SEAL JOINT
S Joint

WEAKENED PLANE JOINT DETAIL

State of Arizona
Department of Transportation
Division of Highways
Standard Drawings

PCCP JOINTS

Sheet 5 of 7
GENERAL NOTES

1. Joints are generally shown with pavement sloping toward the joint. Joints are similar with pavement sloping away from the joint.

Curb & Gutter Joint

G Joint

Median Barrier Joint

B Joint

PCCP on Both Sides of Barrier

Joint Abbreviations

- G - Gutter Joint
- T - PCCP Thickness
- D - Gutter Thickness
- B - Barrier Joint

Half Barrier Joint

B Joint

No. 5 x 2'-0" Reinforcing Bars at 5'-0" C to C

New PCCP

New AC Pavement

Half Barrier

Median Barrier

Silicone Sealant

No. 5 x 2'-0" Reinforcing Bars at 5'-0" C to C

New PCCP

Foating

I'-0" I'-0" I'-0" I'-0"
GENERAL NOTES

1. Load transfer dowel assemblies shall be used with non-skewed PCP joints.

2. Load transfer dowel assemblies are to be placed at each transverse weakened plane joint on the traveled lanes as shown on the plans.

3. See Stc C-01.01 thru C-01.05 for additional information.

4. See Stc C-07.01 thru C-07.05 for transverse joint spacing.

5. See Stc C-07.01 thru C-07.05 for pavement thickness less than 12" or greater than 14".

Load transfer dowel assembly shall be assembled from the following materials.

**QUANTITY TABLE**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Lane Width</th>
<th>12'</th>
<th>14'</th>
<th>16'</th>
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<tr>
<td>7</td>
<td></td>
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<td>12</td>
<td>14</td>
</tr>
</tbody>
</table>

**DIMENSION TABLE**

<table>
<thead>
<tr>
<th>Lane Width</th>
<th>12'</th>
<th>14'</th>
<th>16'</th>
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</thead>
<tbody>
<tr>
<td>9</td>
<td>10'-4&quot;</td>
<td>12'-4&quot;</td>
<td>14'-4&quot;</td>
</tr>
</tbody>
</table>
1. Skewed PCCP joints shall be used when load transfer dowel assemblies are not required.

2. "A" shall equal 6 minimum typical, "B" shall equal 3 minimum typical.

3. See Std C-01-01 for PCCP joints and additional notes.

4. All transverse joints shall be in line with joints in adjacent slabs.

5. See Std C-01-01 for curb and gutter joint requirements.

6. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.

7. The reinforcing bars in the LWP and LC joints shall be placed no greater than 1-3" from the LC joint.

Transverse Construction Joint (TC) allowable limits (Typ).
**GENERAL NOTES**

1. Skewed PCCP joints shall be used when load transfer cover assemblies are not required.
2. A' shall equal 4' minimum (typical), B' shall equal 3' minimum (typical)
   C' shall equal 3' minimum (typical)
3. See Std C-07.01 for PCCP joints and additional notes.
4. All transverse joints shall be in line with joints in adjacent road.
5. See Std C-05.02 for curb and gutter joint requirements.
6. At intersection of side roads or streets, joint shall be placed to give the intersection a symmetrical appearance with conforming to the cross section of the intersecting road or street.
7. The reinforcing bars in the LWP & LC joints shall be placed no greater than 1" from the TC joint.
   • Transverse Construction Joint (TC) allowable limits (Typ)}
GENERAL NOTES

1. Skewed PCCP joints shall be used when load transfer dowel assemblies are not required.

2. 'A' shall equal 4' minimum (typical).
   'B' shall equal 3' minimum (typical).
   'C' shall equal 2' minimum (typical).

3. See Std C-07.01 for PCCP Joints and Additional Notes.

4. All transverse joints shall be in line with joints in adjacent sides.

5. See Std C-05.10 for curb and gutter joint requirements.

6. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.

7. The reinforcing bars in the LWP & LC joints shall be placed no greater than 1/3' from the 'C' joint.

   Transverse Construction Joint (TC) allowable limits (Typical).
PLAN 84.25' PCCP

GENERAL NOTES

1. Skewed PCCP joints shall be used when load transfer dowel assemblies are not required.

2. 'A' shall equal 4 minimum (typical).
3. 'B' shall equal 3 minimum (typical).
4. 'C' shall equal 2 minimum (typical).

5. See Std C 07.01 for PCCP joints and additional notes.

6. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.

7. The reinforcing bars in the LWP & LC joints shall be placed no greater than 1'-3" from the TC Joint.

8. Transverse Construction Joint (TC) allowable limits (typ).

CONTRACTOR: STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS 1/93

MAINLINE PCCP JOINT LOCATIONS SKEewed JOINTS
Direction of Pour & Traffic

Concrete Kerf Barrier or Concrete Curb & Gutter

Direction of Pour & Traffic

AC Shoulder

Repeat Sequence

Typical Joint Sequence (TRP Joints)

PLAN
46' PCCP

PLAN
43.5' PCCP

PLAN
36' PCCP

PLAN
24' PCCP

( Widening)

GENERAL NOTES

1. Non-skered PCCP joints shall be used with load transfer dowel assemblies.

2. See Std C-07.01 for PCCP joints and additional notes.

3. All transverse joints shall be in line with joints in adjacent slabs and are perpendicular (90°) to the longitudinal joints.

4. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.

5. See Std C-05.01 for curb and gutter joint requirements.

6. The reinforcing bars in the LWP & LC joints shall be placed no greater than 1 1/2" from the LC joint.

7. Transverse weathered plane joint shall be constructed at least 6'-0" from a transverse construction joint.
GENERAL NOTES

1. Non-skewed PCCP joints shall be used with load transfer dowel assemblies.

2. See Std C-07.03 for PCCP joints and additional notes.

3. All transverse joints shall be in line with joints in adjacent slabs and are perpendicular (90°) to the longitudinal joints.

4. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.

5. See Std C-06.10 for curb and gutter joint requirements.

6. The reinforcing bars in the LWP & LC joints shall be placed no greater than 1-3/8" from the TC joints.

7. Transverse weakened plane joint shall be constructed at least 6'-0" from a transverse construction joint.
GENERAL NOTES

1. Non-sealed PCCP joints shall be used with load transfer dowel assemblies.
2. See Std C-07.01 for PCCP joints and additional notes.
3. All transverse joints shall be in line with joints in adjacent pads and are perpendicular (90°) to the longitudinal joints.
4. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.
5. See Std C-06.10 for curb and gutter joint requirements.
6. The reinforcing bars in the LWP & LC joints shall be spaced no greater than 1-3" from the TC joint.
7. Transverse weakened plane joint shall be constructed at least 3-0" from a transverse construction joint.

PLAN
70' PCCP

PLAN
67.5' PCCP
GENERAL NOTES

1. Non-skewed PCCP joints shall be used with load transfer dowel assemblies.

2. See Std C-07.01 for PCCP joints and additional notes.

3. All transverse joints shall be in line with joints in adjacent slabs and are perpendicular (90°) to the longitudinal joints.

4. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.

5. See Std C-05.10 for curb and gutter joint requirements.

6. The reinforcing bars in the LRP & LC joints shall be placed no greater than 1-3" from the LC joint.

7. Transverse weakened plane joint shall be constructed at least 8-0" from a transverse construction joint.

PLAN
84.25' PCCP

PLAN
96.25' PCCP

PLAN
72.25' PCCP
RAMP TERMINAL AT CROSSROAD

GENERAL NOTES
1. See Std C-07.04 for General Notes and Transverse Joint Layout at Gore Areas.

Without Curbing & Gutter
- 6' Minimum
- 9' Maximum
- 3' Minimum

2. Transition, See Std C-05.02
3. Mainline Structure Section, See Plans
4. Ramp Structure Section, See Plans
5. Gore Structure Section, See Plans

SECTION A-A
RAMP TAPER

SECTION B-B
GORE AREA
GENERAL NOTES

1. Bedding per Section 501 of the Standard Specifications.

2. Asphalt concrete shall be in accordance with the requirements of the Standard Specifications.

3. 12" qb is required on the sides of trenches that are not parallel at the center line of the street.

4. Types D & E require 9" of AB at top of trench when there is an existing base.

5. See Standard Drawing C-1315 for Typical Pipe Installation.

LEGEND

- Compacted Backfill
  Density Per Section 501

- AB, Crushed Backfill or Native Backfill Per Section 302-2 and 501

- AB Per Section 303-2 and 501

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

TRENCH BACKFILL
AND PAVEMENT REPLACEMENT

C-07.06
GENERAL NOTES

1. Bedding per Section 562.

2. All backfill shall be in accordance with the requirements of the Standard Specifications.

3. 12" GP is required on the sides of trenches that are not parallel to the center line of the street.

4. Types D & E require 3' of GP at top of trench when there is an existing base.

5. See Standard Drawing 003.15 for Typical pipe installation.

LEGEND

- Compacted Backfill
- Density Per Section 501

- AB, Granular Backfill or Native
- Backfill Per Section 502-2 and 501

- AB Per Section 501-2 and 501

- Compacted Backfill
- Density Per Section 501

- AB, Granular Backfill or Native
- Backfill Per Section 502-2 and 501

- AB Per Section 501-2 and 501

- AC Pave, Match Existing
- Pave and Course by Type and thickness

- AC Pave, Match Existing
- Pave and Course by Type and thickness

- Wet Thoroughly and
- Paint With Drout

- Existing PCCP

- Surface Outside Of Trench Lines
- Damaged During Construction shall
- Be Restored To Original Thickness
- and Condition

- AC Surface Course

- AC Base Course

- Same Surface As
- Existing Pavement
- Unless Otherwise
- Noted

- Bituminous

- Utility Concrete

- AB Or Decomposed
- Granite Per Sec 503

- 12" AB Or Existing
- Subgrade Thickness
- Is Greater

- 12" Trench Width

- 12" Trench Width

- 12" Trench Width
GENERAL NOTES
1. See Std C-07.01 for joint information.
2. See plans for crossroad dimensions.
3. See Std C-07.04 and C-07.05 for ramp joints.
4. The ratio of transverse to longitudinal joint spacing shall be greater than 3:1 but not more than 15.
5. Transverse joints shall be perpendicular (90°) to the longitudinal joints, except as shown at the ramp terminal.

- 6' minimum
- Varies - 12' maximum
- 8' minimum
- Varies - 12 when adjacent gutter widths are 2' or less.
- 15 when adjacent gutter widths are greater than 2.'
GENERAL NOTES

1. For paved gore area details, see Std C-08.20.

2. Parallel deceleration is to be used only under special conditions necessitating ramp curvature ahead of nose.

3. The So0 taper and corresponding offsets shall also apply when the main roadway has curvature or combined tangent and curvature.
   * Normal to ramp.
   ** Distance normal to main roadway construction centerline.

EXIT RAMP

Paved Gore Area

Construction 6

EXIT RAMP

Paved Gore Area

Construction 6

300' + 0.49 Lg

ENTRANCE RAMP

Paved Gore Area

Construction 6

So0 Taper

5' Lg Min
1. For paved gore area details, see Std C-08.20.
2. Parallel deceleration lane to be used only under special conditions necessitating ramp curvature ahead of gore.
3. The 50ft taper and corresponding offsets shall also apply when the main roadway has curvature or combined tangent and curvature.
   a) Normal to ramp.
   b) Distance normal to main roadway construction centerline.
GENERAL NOTES
1. Paved gore area shall be Class 5 Concrete, f_c = 4000 psi or asphaltic concrete as called for on plans.
2. See Sta. C-07.01 and C-07.04 for joint layout and details.

PLAN
CONCRETE GORE AREA
WITH ABUTTING CONCRETE PAVEMENT

PLAN
CONCRETE GORE AREA
WITH ABUTTING AC PAVEMENT

PLAN
ASPHALTIC CONCRETE GORE AREA
WITH ABUTTING AC PAVEMENT

SECTION A-A

SECTION B-B

SECTION C-C
1. Shoulder Grooving shall be applied to the shoulders of rural highways when called for on the Plans in accordance with the following shoulder widths:
   - Undivided Highways: Shoulder 6' and greater
   - Divided Highways: Right shoulder 6' and greater, left shoulder 4' and greater

2. Shoulder Grooving shall be omitted across principal intersecting roadways or other interruptions in normal shoulder width as directed by the Engineer.

3. Shoulder Grooving shall be constructed by making indentations in the asphalt concrete.
   The indentations may be formed by rolling the hot asphalt concrete with a roller to which heat segments of 2" inside diameter discs have been welded to the drum. The roller segments shall be 5' long and spaced at approximate 6' centers.

4. Each roller shall be equipped with an acceptable guide that extends in front of the roller and is clearly visible to the operator in order that proper alignment of the completed scored shoulder is obtained.

5. The contractor may utilize other equipment or methods to construct the shoulder grooving if approved by the Engineer.
GENERAL NOTES

1. All embankment curb shall be protected by guard rail.

2. Guard rail shall extend beyond the limits of embankment curb.

3. See Std. C-10.03 for measurement limits.


SECTION

TYPE A GUARD RAIL INSTALLATION

REFLECTOR TAB DETAIL
GENERAL NOTES

1. All embankment curb shall be protected by guard rail.

2. Guard rail shall extend beyond the limits of embankment curb.

3. See Std. C-10.03 for measurement limits.


PLAN

SECTION

TYPE B GUARD RAIL INSTALLATION

REFLECTOR TAB DETAIL
GENERAL NOTES

1. Length shall be as shown unless otherwise indicated on project plans.

2. Post type (Timber or Steel) for transitions shall match post type of adjoining guard rail.

3. Beam (Shown) or Use Three Beam Guard Rail Measurement (Lin Ft)
Length: 12'-6" or as shown on Plans

4. Guard Rail Extruder Terminal GET-1 or GET-2 Measurement (Each)
Length: 50'-0" or as shown on Plans

Bolted Anchor for Guard Rail Measurement (Each)
Number as shown on Plans

6. Guard Rail Extruder Terminal GET-1 or GET-2 Measurement (Each)
Length: 50'-0" or as shown on Plans

7. Steel, Type L, Z, or Z2 Measurement (Lin Ft)
Length: 25'-0" or 37'-6"

8. Shallow Pipe or Spillway/Embayment Inlet

Concrete Half Barrier Transition Measurement Each 12-0"
Length: 20'-10"

9. Approach
Beam (Shown) or Use Three Beam Transition to Concrete Half Barrier Measurement (Each)
Length: 37'-6"

10. Rub Rail Measurement (Each)
Length: 24'-11/16"
GENERAL NOTES

1. See plans and barrier summary sheets for location and type of guardrail, timber post installation shown.

2. See Construction Standard Drawings C-05.03, 05.04, 10.01, and 10.02 for dimensions and details not shown.

3. Type B guard rail installation shown. For Type A guard rail installation use Type D-1 Curb and Gutter instead of the Type D-2 Curb and Gutter shown.

4. See Plans for type and location of drainage facilities.

5. Bituminous joint filler (1/2") shall be placed where the curb & gutter or concrete widening abuts dotted drains, catch basins, ditches, barrier, etc. Two inch (2") deep spaced joints shall be placed at all joint transitions in PCDD or at 15 ft intervals where adjacent to AC or continuously reinforced concrete pavement.

PLAN
TYPICAL HALF BARRIER TERMINAL
W/TYPE B OR C CURB & GUTTER
GENERAL NOTES
1. • Indicates ARTBA designation.
2. See Std C-10.20 and C-10.21 for additional information and dimensions.

SECTION A-A

PLANT

25'-0" Nested Steel W Beam

PLAN

6'-3"

12'-6"

Maximum Span

ELEVATION

NESTED STEEL W BEAM - TYPE 1 - SHORT SPAN
(Splice Connection Inside Span) Length = 25'-0"

PLAN

37'-6" Nested Steel W Beam

ELEVATION

NESTED STEEL W BEAM - TYPE 2 - SHORT SPAN
(Splice Connection Outside Span) Length = 37'-6"
GENERAL NOTES

1. Use Type 3 Nested Steel W Beam to span drainages or roadway turns as shown in the plan view.

2. Use Type 3 to span multiple obstructions as shown in the elevation view.

PLAN

37'-6" Nested Steel W Beam

6'-3" 18'-9" 6'-3" 6'-3"

Maximum Span

ELEVATION

NESTED STEEL W BEAM - TYPE 3 - LONG SPAN

Length = 37'-6"
**GENERAL NOTES**

1. Drill through top of box culvert with rotary drill.
2. Bracket may be made of one piece hot bent. Or two pieces welded together.
3. Short timber posts anchored to box culvert roof shall be 8" x 8" only.

---

**INSTALLATION DETAIL**

1. 3/8" UNC x (T-2½") Hex Bolt and hex nut with one Type B Plain Washer Under Nut (Typ).

**BOLTED ANCHOR**

**BRACKET DETAIL**

1. 3/8" UNC x (T-2½") Hex Bolt and two hex nuts with one Type B Plain Washer Under Nut (Typ).

**TIMBER POST INSTALLATION DETAIL**

1. 3/8" UNC x (T-2½") Hex Bolt and hex nut with one Type B Plain Washer Under Nut (Typ).

**STEEL POST INSTALLATION DETAIL**

1. 3/8" UNC x (T-2½") Hex Bolt and two hex nuts with one Type B Plain Washer Under Nut (Typ).
Concrete Barrier Transition, Std C-10.70 or Bridge Concrete Barrier Transition, Std B-20.20

Terminal Connector Anchor Assembly, Std C-10.70 & C-10.74

Ferrule Ring Nut Block Anchor Assembly (Typ) Std C-10.70 & C-10.74

T Beam Back Up Plate All Non Led Connections

C6x8.2 Rub Rail Std C-10.80

W Beam Terminal Connector (Typ)

Block 1 Std C-10.70

Block 2 Std C-10.70

Block 3 Std C-10.70

Block 4 Std C-10.70

Block 5 Std C-10.70

PLAN

2' 1-1/2' 3-1/2' 9"

W-8x6 UNCx3/4" Bolt
With 1/2" Narrow Type A Plain Washer (Under Head)

2'-1/2" 2'-1/2" 2'-1/2" 2'-1/2"

3/4"-10UNCx1/2" Button Head Bolt (Typ)
And Recess Nut (Typ) with 1/2" Narrow Type A Plain Washer (Under Head) (Typ)

3/4"-10UNCx3/4" Hex Bolt (Typ)

W-8x10 UNCx1/2" Hex Bolt With
1/2" Narrow Type A Plain Washer (Under Head). Anchor with 2 Bolts (At opposite corners) (Typ)

Rectangular Plate Washer (Typ)
Required Under Head of Five Bolts Along Concrete Transition

ELEVATION

Note: For Notes and Dimensions Not Shown, See Guard Rail Transition Above

Guard Rail Transition

To Existing Concrete Barrier Transition

Existing Concrete Barrier Transition

1'-0"
Concrete Barrier Transition, Std C-10,30 or Bridge Concrete Barrier Transition, Std B-22,60

10"x10"x5'-6" Wood Post

6"x8"x14" Wood Block (Typ)

8"x8"x9'-4" Wood Post (Typ)

6x8,2 Rub Rail
Std C-10,80

6x8,2 Rub Rail
Std C-10,80

Measurement Limit

G420 System
Or G424 System

Traffic

PLAN

Rectangular Plate
Washer Required
Under Head of Bolt
on the first Two Posts
Only.

5/16"-12UNCx1/2" Button Head Bolt (8) and
Recess Nut (8) with Wide Type A Plain
Washer Under Nut (Typ).

Guided Rail Transition
(Timber Post)

Rectangular Plate
Washer Not Required

ELEVATION

Note:
For notes and dimensions not shown,
See Guard Rail Transition Above.

Guard Rail Transition
To Existing Concrete Barrier Transition

ELEVATION

6x8,2 Rub Rail
Std C-10,80

Post System
Concrete Barrier Transition, Std C-10.70 or Bridge Concrete Barrier Transition, Std B-26.74

Terminal Connector Anchor Assembly
Std C-10.70 & C-10.74

Ferrule Ring Nut Block Anchor
Std C-10.70 & C-10.74

Block Anchor Assembly (Typ)
Std C-10.70 & C-10.74

W Beam Back Up Plate
At Non-Lip Connections

Measurement Limit

W Beam Terminal Connector (Ø)

Traffic

Block 1
Std C-10.39

Block 2
Std C-10.39

Block 3
Std C-10.39

Block 4
Std C-10.39

Block 5
Std C-10.39

Std C-10.31
Sheet 2 of 3 or Sheet 3 of 3

GENERAL NOTES
* indicates AASHTO designation

PLAN

25 Nesting W Beam

2'-6" 3'-15/8" 3'-15/8" 3'-15/8" 3'-15/8" 9'

2'-6"

4'

4'

1/2"-10xNCx3/8" Hex Bolt (Typ)
Rectangular Nut Washer (Ø)
Required Under Head of 5 Bolts
Along Concrete Transition

1/2"-15NCx3/4" Button Head Bolt (Ø)
and Recess Nut (Ø) with 1" Narrow
Type A Plain Washer (Under Head (Typ)
This splice connection only

1/2"-15NCx3/4" Button Head Bolt (Ø)
and Recess Nut (Ø) with 1" Narrow
Type A Plain Washer (Under Head (Typ)

Guard Rail Transition

Note: For Notes and Dimensions Not Shown, See Guard Rail Transition Above

Guard Rail Transition

Existing Concrete Barrier Transition

1'-0"

ELEVATION

ELEVATION
Concrete Barrier Transition, Std C-10.10, C-10.17 or Bridge Concrete Barrier Transition, Std B-2.2.19

6" x 6" x 1/4" Structural Steel Tube, see Tubular Blockout Detail

3'-11/2"  3'-11/2"  3'-11/2"  3'-11/2"  3'-11/2"  6'-3"  6'-3"

Nested W Beam

Rectangular Flat Plate Washer (D) required under head of bolts of first two posts only.

Curb and Cattle or Embankment Curb

6" x 6" x 1/4" Structural Steel Tube

V-6" x 6" x 1/4" Hex Bolt and Hex Nut with one Wide Type A Washer (Typ)

6" x 8.5" x 6" Structural Shape Post (Typ)

Measurement Limit

96US50x14" or 96x9x14" Structural Shape Back (Typ)

6" x 8.2 Rub Rail Std C-10.80

1'-9/2"  1'-9/2"  1'-9/2"  1'-9/2"  1'-9/2"  1'-9/2"  1'-9/2"  1'-9/2"

Guard Rail Transition (Steel Post)
GENERAL NOTES

1. For use with one-way traffic or with two-way traffic outside the clear zone.

- Indicates AASHTO designation

PLAN

ELEVATION

Note:
For notes and dimensions not shown, see Guard Rail Transition above.
Notes:
Block 1 is a 3/4"x12"x14" Plate

1/4" 12NC Hex Nut
Tack Weld to Plate

3/4" Plate

1/2" R

Tyco at All 4 Corners

3" Hole

1" Hole

1" Hole, 4 Holes

1/2" 1/4"

1/2" 41/2" 41/2" 1/2"

12"

Blocks 2, 3, 4 and 5

Half Barrier (Block 1 Shown)

Half Barrier (Block 2 Shown)

Median Barrier (Block 2 Shown)

Concrete Barrier

Farfile Wing Nut Block Anchor Std. C-10.74

Concrete Barrier

Block Anchor Assembly Std. C-10.74

Concrete Anchor Standard Drawings

Hardware for W Beam Transition to Concrete Barrier

State of Arizona
Department of Transportation
Division of Highways
Block A

Dimension

<table>
<thead>
<tr>
<th>Block</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>11/4&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>3</td>
<td>21/2&quot;</td>
<td>11/4&quot;</td>
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<tr>
<td>4</td>
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<td>21/4&quot;</td>
</tr>
<tr>
<td>5</td>
<td>41/2&quot;</td>
<td>31/2&quot;</td>
</tr>
</tbody>
</table>

Median Barrier

Block and anchorage details

Block Details
Delete

GENERAL NOTES
1. See Std. C-10.44 for additional information.
   ○ Indicates ARIBA designation

PLAN

ELEVATION

25' Steel W Beam

Length of Guard Rail Extruder

25' x 5' Lag Screws

Post 1
Post 2
Post 3
Post 4
Post 5
Post 6
Post 7
Post 8

3/8" - 1/2 UNC x 1/2" Button Head Bolt (Ø1) and Recess Nut (3/8" with Wide Type A Flange Washer Under Nut (Typ.)

3/8" - 1/2 UNC x 1/2" Button Head Bolt (Ø1) and Recess Nut (3/8" Typ.)

See Cable Assembly Detail
Std. C-10.44

See Offset End Detail
Std. C-10.44

Guard Rail Exit Slot Away From Traffic

Guard Rail Extruder
Delete

SECTION

Roadway Width

Rounding - See Plans
3'-7"
2'-0"

Pavement Width

Normal Slope Per Plans
0.01%)

Optional Construction Joint

Subgrade

Gutter Flow Line

Variable Width Gutter
See Plans
Gutter Depression to Match
Adjoining Gutter Depression

①

PLAN

37'-6"
22"

② Curb & Gutter
See Plans

Gutter Line

Curb & Gutter
See Plans

③

Soil Taper
Gutter Flow Line

SECTION

Roadway Width

Rounding - See Plans
3'-7"

Pavement Width

Normal Slope Per Plans
0.01%)

Optional Construction Joint

Subgrade

Gutter Flow Line

Variable Width Gutter
See Plans
Gutter Depression to Match
Adjoining Gutter Depression

①

PLAN

37'-6"
18"

③ Curb & Gutter
See Plans

Gutter Line

Curb & Gutter
See Plans

③

Soil Taper
Gutter Flow Line

TYPE B GUARD RAIL INSTALLATION

TYPE A GUARD RAIL INSTALLATION
TYPE B GUARD RAIL INSTALLATION

SECTION

PLAN

TYPE A GUARD RAIL INSTALLATION

SECTION

PLAN
GENERAL NOTES

1. Soil plates, steel tubes, offset strut,
   tubes, bearing plate and pipe sleeves
   shall be fabricated from structural
   steel ASTM A36.

SOIL PLATE DETAIL

18"x24"x1/2"

TYPE A POST DETAIL

See Soil Plate Detail (Typ)

TYPE B POST DETAIL

See Soil Plate Detail (Typ)

STEEL TUBE DETAIL

See Steel Tube Detail (Typ)
ELEVATION
CABLE ASSEMBLY DETAIL

SIDE VIEW
SECTION A-A
CABLE ANCHOR DETAIL

SECTION B-B
CABLE ANCHOR DETAIL

GENERAL NOTES
1. The cable assembly shall be tightened to remove slack.

POST ANCHOR DETAIL

BEARING PLATE DETAIL

PIPE SLEEVE DETAIL

STANDARD DRAWINGS
STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HARDWARE FOR
GUARD RAIL EXTRUDER TERMINAL
Sheet 2 of 3
C-10.44
GENERAL NOTES

1. Concrete shall be Class C, design strength 15000 PSI.

2. Half Barrier shall be placed upon either Asphaltic or Portland Cement Concrete Pavement.

3. Pavement thickness adjacent to Half Barrier shall be 6" minimum.

4. The Half Barrier shall be placed upon a bed of grout in order to provide a uniform bearing.

5. Dowel joints shall be grouted under pressure until all of the openings and the joints are filled.

6. This standard shall not be used when an individual run consists of less than five 20 feet sections.

7. All bend dimensions for reinforcing steel shall be out-of-out of bars.

ELEVATION

CONSTRUCTION JOINT DETAIL

SECTION A-A

SECTION B-B

SECTION C-C

PLAN

Elevation

See Construction Joint Detail
7. GENERAL NOTES

1. Concrete shall be Class 5, design strength ffc 13000 PSI.

2. Half Barrier shall be placed upon either asphaltic or Portland cement Concrete Pavement.

3. Pavement thickness adjacent to half Barrier shall be 9" minimum.

4. The Half Barrier shall be placed upon a bed of gravel in order to provide a uniform bearing.

5. Dowelled joints shall be grouted under pressure with all of the openings and the joints are filled.

6. This section shall not be used when an individual run consists of less than five 20 foot sections.
GENERAL NOTES

1. Half Barrier shall be constructed by the slip form or formed cast-in-place method.

2. When obstructions are encountered which prevent the use of slip form equipment, the closure shall be accomplished by the use of stationary forms.

3. Concrete shall be Class S, design strength f' = 3000 psf.

4. No. 4 Rebar shall extend 12" past the construction joint of the completion of the day's pour.

5. Thickness of footing, 0" can be adjusted to match the PCP thickness, as approved by the Engineer.

6. When the pavement section slopes away from the gutter, the slope of the gutter shall match the pavement cross slope. Therefore, the 2" gutter depression is not applicable.

7. When bridges are encountered, the cross slope of the gutter shall be transitioned to match the cross slope of the bridge. Length of the transition is 15 feet.

PLAN

No. 4 Rebar
Continuous

No. 6 Rebar
S Shaped (Typ)

ELEVATION

Gutter Width Varies
See Plans
2'-6" or 4'-6" (Typ)

Barrier Gutter Detail

SECTION A-A

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

CONCRETE
HALF BARRIER WITH GUTTER

C-10562
10/95

(Names and Titles)

(Stamp and Seal)
GENERAL NOTES

1. Concrete shall be Class S, design strength f'c = 3000 psi.
2. If the footing and barrier are cast monolithically, No. 6 S shaped rebars will not be required.
3. In no case shall the width of barrier exceed the width of the barrier footing or overhang the adjacent pavement.
4. No. 4 Rebar shall extend 12" past the construction joint at the completion of the day's pour.
GENERAL NOTES

1. Concrete shall be Class S, design strength f_s = 3000 PSI.
2. If the footing and barrier are cast monolithically, No. 6 S-shaped rebars will not be required.
3. In no case shall the width of barrier exceed the width of the barrier footing or overhang the adjacent pavement.
4. No. 4 Rebar shall extend 12' past the construction joint at the completion of the day's pour.

WITH AC SECTION A-A

WITH RCCP SECTION A-A

KEY WAY DETAIL
GENERAL NOTES

1. Concrete shall be Class S, design strength f'_c = 4000 psi.

2. The Hilt Barrier shall be placed upon a bed of grout in order to provide a uniform bearing.

3. Dowelled joints shall be grouted under pressure until all of the openings and joints are filled.

4. This standard shall not be used when an individual run consists of less than five 20-foot sections.

5. All bend dimensions for reinforcing steel shall be out-to-out of bars.

---

PLAN

- 19'-11¾" long
- 5'-0" wide
- Lifting Device Location
- Needles at 10'-0" c.c.
- 5'-0" wide
- 1" dia. x 18" dowel (Typ.)
- Top of Pavement
- Pressure Grout Hole

ELEVATION

- Dowel Hole (Typical)
- 1/2" Radius (Typ.)
- 2" Clearance (Typ.) unless otherwise shown
- Pavement Surface See Plan
- 2'-0" wide
- 5'-0" wide
- 1'-0" wide
- 1/2" thick

WITH AC SECTION A-A

AT REBAR - WITH PCCP SECTION B-B

KEY WAY DETAIL

---

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
HALF BARRIER AT PIER/S
PRECAST

C-1064
Date: 2/1/1975

Architect
Engineer
GENERAL NOTES

1. Concrete shall be Class S, design strength f_c = 4000 psi.

2. The half barrier shall be placed upon a bed of grout in order to provide a uniform bearing.

3. Dowelled joints shall be grouted under pressure until all of the openings and the joints are filled.

4. This standard shall not be used when an individual run consists of less than five 20-foot sections.

---

[Diagrams and details of a construction joint detail, including dimensions and materials specifications.]
GENERAL NOTES

1. All concrete shall be Class "5" (f'c = 3000 psi).
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. Transverse construction joints shall extend through the foundation slab and be located at intervals not to exceed 20 feet.
5. See drainage sheets for specified drain and catch basin details.
6. Departure termination may be substituted for the C-1076 barrier transition under departure conditions.
7. See Std. C-05.20 for sidewalk construction.
8. All bend dimensions for reinforcing steel shall be cut-to-out of bend.

PLAN VIEW

SECTION B-B
AT CATCH BASINS

SECTION A-A

ELEVATION

DEPARTURE TERMINATION DETAIL

BARRIER GUTTER DETAIL
GENERAL NOTES

1. All concrete shall be Class "5" (f'c = 3000 psi).
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. Transverse construction joints shall extend through the foundation slab and be located at intervals not to exceed 20 feet.
5. See drainage sheets for slotted drain and catch basin details.
6. Departure termination may be substituted for the C-10.76 barrier transition under departure conditions.
7. See Std. C-05.20 for sidewalk construction.

ELEVATION

PLAN VIEW

SECTION B-B
AT CATCH BASINS

SECTION A-A

BARRIER GUTTER DETAIL

DEPARTURE TERMINATION DETAIL
GENERAL NOTES

1. Half barrier shall be constructed by the slip form or formed cast-in-place method.

2. When obstacles are encountered which prevent the use of slip form equipment, the closure shall be accomplished by the use of stationary forms.

3. Concrete shall be Class S, design strength f'_c = 3000 PSI.

4. If the footing and barrier are cast monolithically, No. 5 S shaped rebars will not be required.

5. In no case shall the width of barrier exceed the width of the barrier footing or overhang the adjacent pavement.

6. No. 4 rebar shall extend 12" past the construction joint at the completion of the day's pour.

▲ Depth to match adjacent PCP thickness 18" Min.

SECTION A-A

WITH PCC PAVEMENT

WITH AC PAVEMENT

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

7/94
GENERAL NOTES

1. Concrete shall be Class C, design strength T2: 4000 PSI.
2. Haff Barrier shall be placed upon either Asphaltic or Portland Cement Concrete Pavement.
3. Pavement thickness adjacent to Haff Barrier shall be 4" minimum.
4. The Haff Barrier shall be placed upon a bed of grout in order to provide a uniform bearing.
5. Dowel joints shall be grouted under pressure until all of the openings and the joints are filled.
6. This standard shall not be used when an individual run consists of less than five 20 foot sections.
7. All bend dimensions for reinforcing steel shall be cut to cut-off at bars.
GENERAL NOTES

1. Concrete shall be Class F, design strength 15,000 psi.
2. Half barrier shall be placed upon either Asphalt or Portland Cement Concrete Pavement.
3. Pavement thicknesses adjacent to half barrier shall be 3" minimum.
4. The half barrier shall be placed upon a bed of grout in order to provide a uniform bearing.
5. Dowelled joints shall be grouted under pressure until all of the openings and the joints are filled.
6. This standard shall not be used when an individual run consists of less than five 20 foot sections.

PLAN

ELEVATION

SECTION B-B

CONSTRUCTION JOINT DETAIL
GENERAL NOTES
1. Concrete shall be constructed by the fixed form cast-in-place method.
2. Concrete shall be Class 5, design strength f_c = 3000 psi.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. All bend dimensions for reinforcing steel shall out-to-out of bars.

PLAN

ELEVATION
BARRIER WITHOUT CURB
GENERAL NOTES

1. Concrete shall be constructed by the Fixed Form Cast-in-Place method.

2. Concrete shall be Class S, design strength f_c = 3000 psi.

PLAN

ELEVATION

BARRIER WITHOUT CURB
1. Lift barrier shall be constructed by the flexible form method.
2. Concrete shall be Class S, design strength f_c = 3000 PSI.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. All bend dimensions for reinforcing steel shall be cut-to-cut on bars.

**GENERAL NOTES**

**PLAN**

- Terminal Connector
  - Anchor Assembly
  - Std C-10,74

- Ferrule Ring Nut
  - Block Anchor
  - Std C-10,74

- Block Anchor Assembly (Typ)
  - Std C-10,74

- Curb Transition Detail

**ELEVATION**

- Barrier with Curb and Gutter

See Dowel Installation and Construction Joint Detail

See Rub Rail Slot Detail
BLOCK ANCHOR ASSEMBLY

TERMINAL CONNECTOR ANCHOR ASSEMBLY

FERRULE WING NUT BLOCK ANCHOR

Each weld shall develop the tensile strength of the wire.
GENERAL NOTES

1. All concrete shall be Class 'F' for +3000 psi.
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. See drainage sheets for slotted drain and catch basin details.
5. Barrier transition shall match both adjoining curb and gutter and concrete half barrier.
6. See Sec. C-05.20 for sidewalk construction.
7. All bend dimensions for reinforcing steel shall be O.D. - O.D. of bars.

PLAN VIEW

BARREL GUTTER DETAIL

SECTION A-A

SECTION B-B

ELEVATION

SECTION C-C

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
BARRIER TRANSITION-TANGENT DEPARTURE TYPE I
1. All concrete shall be Class "F" (f.c. 3000 psi).
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. See drainage sheets for ditch and catch basin details.
5. Barrier transition shall match both adjoining curb and gutter and concrete half barriers.
6. See Std C-0520 for sidewalk construction.
GENERAL NOTES:
1. All concrete shall be Class "C" for #4000 psi.
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. See drainage sheets for slotted drain and catch basin details.
5. Barrier transition shall match both adjoining curb and gutter and concrete half barrier.
6. See Std. C-05.20 for sidewalk construction.
7. All band dimensions for reinforcing steel shall be out-to-out of bars.

BARRIER GUTTER DETAIL

SECTION A-A

SECTION B-B

SECTION C-C

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

BARREL TRANSITION-TANGENT DEPARTURE TYPE 2

C-04.75
Sheet 2 of 3

10/95
Concrete Curb and Gutter Type B or C. See Plans.

Gutter Line

Top of Curb

Gutter Line

PLAN VIEW

Traffic

A → B → C

Concrete Half Barrier. See Plan. 

See Detail Installation and Construction Joint Detail. Std C-10.10

BARRIER GUTTER DETAIL

ELEVATION

SECTION A-A

SECTION B-B

GENERAL NOTES

1. All concrete shall be Class 5 (to ±1000 psi).
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. See drainage sheets for slotted drain and catch basin details.
5. Barrier transition shall match both adjoining curb and gutter and concrete half barrier.
6. All bend dimensions for reinforcing steel shall be out-to-out of bars.

- Varies - 2'-6", 4'-5' or width as per plans.
GENERAL NOTES

1. All concrete shall be Class "S" (mix +3000 psi).
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. See drainage sheets for silted drain and catch basin details.
5. Barrier transition shall match the adjoining concrete half barrier.
6. See Std. C.05.20 for sidewalk construction.
7. All bend dimensions for reinforcing steel shall be out-to-out of bars.

SECTION A-A

1. 1/2" Preformed Expansion Joint filler

SECTION B-B

1. 1/2" Preformed Expansion Joint filler

SECTION C-C

1. 1/2" Preformed Expansion Joint filler

PLAN VIEW

1. Barrier Gutter Transition
2. Sidewalk Ramp Type 3
3. Curb Gutter Transition Type 4
4. Outside Edge of Sidewalk Std. C.05.20
5. Radius Per Plane
6. 1/8" Bituminous Joint filler

ELEVATION

1. Concrete Half Barrier Std. C.08.65 or As Per Plans
2. Gutter Line & Top of Sidewalk

BARRIER GUTTER DETAIL

1. See Diagram Installation and Construction joint detail Std. C.10.10

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
10/95
BARRIER TRANSITION CURVE
C.10.76
GENERAL NOTES

1. All concrete shall be Class 510 if f'c = 3000 psi.
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. See drainage sheets for sorted drain and Canton basin details.
5. Barrier transition shall match the adjoining concrete half barrier.
6. See Std. C-05.20 for sidewalk construction.

SECTION A-A

SECTION B-B

SECTION C-C
Concrete Barrier Transition, Std C-1070

CE6x8.2 Rub Rail

Rub Rail Terminal Assembly, Std C-1083

C4100 System
C4104 System
C4108 System
C4101 System

PLAN

Rub Rail Anchor Std C-1083

3/8"-18NCx3" Round Head Square Neck Bolt and Hex Nut with Wide Type A Plain Washer Under Nut (Typ)

6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3"

Modified CE6x8.2 Rub Rail See Rub Rail Detail

ELEVATION - TIMBER POST

Rub Rail Anchor Std C-1083

3/8"-18NCx3" Round Head Square Neck Bolt and Hex Nut with Wide Type A Plain Washer Under Nut (Typ)

ELEVATION - STEEL POST
MODIFIED C6X8.2 RUB RAIL DETAIL

GENERAL NOTES

1. All slots in rub rail are ¾” x 2”.
   All square holes are ¾”.

Top & Bottom

Cut flanges and bend

DESIGN APPROVED
STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

C-10280
10-95

RUB RAIL

DRAFTED
CHECKED
APPROVED
GENERAL NOTES

1. Posts shall be 12'-8" C to C. Structural steel shall conform to ASTM A-36, galvanized ASTM A-123.

2. Hex head bolt shall conform to ASTM A-307, galvanized ASTM A-153 Class C.

3. Hexagonal spring lock washer shell conform to ASTM A-315, galvanized ASTM A-153 Class C.

4. Tension wire: AISC No. 80.1481 galvanized to conform to ASTM A-416 Class 2.

5. Hog ring ARC No. 12 0.105" galvanized ASTM A-416 Class 2, Fasten glare screen to top and bottom tension wire spaced approximately 2' apart.

6. Glare Screen: 18 Gauge steel, ASTM A-526, galvanized ASTM A-522/G0230, expanded to the following dimension: 1.33" portion of diamond and 0.1" portion of diamond (center to center) of bridge a with a strand width of 0.250" at approximately 20° to the plane of the original sheet. Top edge to be sharp cut and crimped on 17" centers. Glare screen shall be installed such that the portion of screen blocks light from headlights. See direction detail.

7. Slices allowed in glare screen at posts only, with one full diamond overrided.

8. Glare screen shall be constructed without interruption to the greatest degree possible.

ELEVATION

TENSION WIRE ROUTING DETAIL
1. Cattle guard shall be sloped to conform to the roadway grade and cross section except that where an odd number of grid units is specified in a crowned roadway, the center grid unit shall have a level cross slope.

2. Grid units shall be set on an angle assembly consisting of one 6"x3/4"x3/4" angle and 3/8" diameter stud with head. The studs shall be placed on 1'-0" alternate centers. See Angle Assembly Detail No. 2.

3. Where the adjacent roadway is paved, an angle assembly shall consist of one 4"x4"x3/8" angle and 3/4" diameter stud with head. The studs shall be placed on 1'-0" alternate centers. See Angle Assembly Detail No. 1.

4. Where the adjacent roadway is unpaved, an angle assembly shall consist of one 4"x4"x3/8" angle and one 2"x2"x3/8" angle connected with 3/8" diameter stud. The assembly shall be crowned at the centerline and constructed with a bevel cut and wedged. The studs shall be bent 90° and placed on 1'-0" centers. See Angle Assembly Detail No. 3.

5. Each angle and angle assembly shall be fabricated to form a single piece for the full length of the cattle guard.

6. Quantities shown for concrete and reinforcing bars are to be considered approximations for informational purposes only.

7. When guard roll is to be used at the cattle guard, it may be possible to reduce the number of grid units required.
GENERAL NOTES

1. Material for shoulder transition shall be placed to the finished roadway elevation for the entire length of the transition. When the roadway is paved, aggregate subbase or aggregate base shall be used. When roadway is unpaved, a material equivalent to the existing roadway shall be used.

END VIEW

SECTION D-D

POST AND BRACE ASSEMBLY

SHOULDER TRANSITION AT CATTLE GUARDS

3/4" 10UNC x 3 1/2" Hex Bolt and Hex Nut, with Type A Flat Washers

2" Square (Outside Nominal Dimension) x 5-9/16 Tubular Post

3/4" Diameter Hole in 8" Wide Concrete Curb Footing, 4 Pieces

Concrete Curb Footing

3/4" 10UNC x 9 1/2" Hex Bolt and Hex Nut, with Type A Flat Washer

Cattle Guard

10d Taper Shoulder Transition
GENERAL NOTES

1. Material for shoulder transition shall be placed to the finished roadway elevation for the entire length of the transition. When the roadway is paved, aggregate subbase or aggregate base shall be used. When roadway is unpaved, a material equivalent to the existing roadway shall be used.

END VIEW

POST AND BRACE ASSEMBLY

SECTION D-D

SHOULDER TRANSITION AT CATTLE_GUARDS

SECTION E-E

Post and Brace Assembly

6'-0"

3'-9"

D-

D-

6'-0"

3'-9"

41/2" (Typ)

5/8" Diameter Hole in 8" Wide Concrete Curb Footing, 4 Places

Concrete Curb Footing

3/4"-10UNC x 9 1/2" Hex Bolt and Hex Nut, with Type A Wide Plain Washer

3'-9"

41/2"

2'-0"

1'-11 3/4"

1'-11 3/4"

3'-9"

41/2"

5/8" Diameter Hole (Typ)

Remove 2" of Flange (Typ)

U61 Taper Shoulder Transition

Cattle Guard

Roadway

U61 Taper Shoulder Transition

3/4"-10UNC x 3 3/4" Hex Bolt and Hex Nut, with Type A Wide Plain Washer
GENERAL NOTES

1. See Std C-113D for all other Cattle Guard details.
2. This standard shall be used in embankment or where highly erodible soil is found.
3. All concrete shall be Class B.

SECTION A-A

SECTION C-C
IN EMBANKMENT

SECTION B-B
WHERE USED FOR TRLU DRAINAGE
CATTLE GUARD OPEN BOTH ENDS
GENERAL NOTES

1. This design applicable only to wood tie track construction. Wood dulna shall be unprimed and cut from material meeting the specifications of the existing ties.

2. 3" x 3" x 3/8" treads, 2" x 5/8" bearing bars and 2" nominal diameter pipe wing assemblies shall be primed with one coat of No. 1 paint and finished with two coats of yellow enamel paint.

SECTION A-A

NOTE:
For Section Between Double Track, Detail No. 3

SECTION B-B

DETAIL NO. 4

DETAIL NO. 5

DETAIL NO. 1

FOR 8' TIES

DETAIL NO. 2

FOR 9' TIES

DETAIL NO. 3

NOTE:
Varies with Tie Length
See Detail No. 1 and No. 2

SHIM HEIGHT

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</tbody>
</table>

DIAMETER GALVANIZED DOME HEAD SPIKE LENGTH:

11" 11" 11" 13" 13" 13"
GENERAL NOTES

1. Length of post and braces shall not be less than 7'-0'.

2. Woven wire fence fabric shall be attached to the post at the top, bottom, and intermediate wires.

3. Intermediate Post Assemblies shall be located as shown and at intervals to utilize standard rolls to minimize cutting and waste.

4. A twisted wire stay shall be centered between posts.

5. ASTM design number

TYPICAL WOVEN WIRE FENCE INSTALLATION-TYPE 1 WW SHOWN

TYPE 1 WOVEN WIRE (WW)

TYPE 2 WOVEN WIRE (WW)

TYPE 3 WOVEN WIRE (WW)

TYPE 4 WOVEN WIRE (WW)

FENCE FABRIC DIMENSIONS AND DESIGN NUMBERS
GENERAL NOTES

1. Intermediate Post Assemblies shall be located as shown and at intervals not to exceed 650', or midway between all braced posts.

2. For game fence the bottom wire shall be barbed.

3. The stays on game fence shall have their ends turned up, to prevent injuries to game.

TYPICAL BARBED WIRE FENCE INSTALLATION-TYPE 2 BW SHOWN

TYPE 1 BARBED WIRE (BW) (4 WIRE)

BARBED WIRE GAME FENCE (GF)

TYPE 2 BARBED WIRE (BW) (5 WIRE)
GENERAL NOTES
1. Post assemblies shall consist of an upright angle 2"x2"x1/4" at 4.0 GPa, and brace angles 2"x2"x1/4 at 3.1 lb/ft.

TYPICAL FENCE LOCATION AT CATTLE GUARD

TYPICAL FENCE LOCATION

DETAIL A
TYPICAL CROSS SECTIONS OF LINE POST SHAPES

DETAIL B
INTERMEDIATE POST ASSEMBLY

DETAIL C
END POST ASSEMBLY

DETAIL D
CORNER POST ASSEMBLY

DETAIL E
FENCE CONNECTION TO WINGWALL
TYPICAL CHAIN LINK FENCE INSTALLATION - TYPE I SHOWN

TYPICAL POST DIMENSIONS

<table>
<thead>
<tr>
<th>Fabric Height</th>
<th>Corner, End, Intermediate, Gate, Latch and Pull Posts</th>
<th>Line Posts</th>
</tr>
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<tr>
<td></td>
<td>Round</td>
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<tr>
<td></td>
<td>Length</td>
<td>(D)</td>
</tr>
<tr>
<td>36&quot;</td>
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<tr>
<td>48&quot;</td>
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<td>2.175&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
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<td>2.175&quot;</td>
</tr>
<tr>
<td>72&quot;</td>
<td>9'-0&quot;</td>
<td>2.375&quot;</td>
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<tr>
<td>Over 12&quot;</td>
<td>Height</td>
<td>2.375&quot;</td>
</tr>
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</table>

GENERAL NOTES

1. Posts shall be round, injection, or roll-formed and shall conform to the nominal dimensions. Tolerances for all materials shall be according to ASTM A 699. In addition, the net area of which the posts are fabricated shall have a minimum thickness before galvanizing of not less than 0.117" for line posts and 0.130" for terminal posts.

2. Chain link fabric shall be either zinc-coated or aluminum-coated steel wire fence fabric. Zinc-coated steel wire fabric shall conform to the requirements of ASTM A 699 Class C coating. Aluminum-coated steel wire fabric shall conform to the requirements of ASTM A 494, with a minimum weight of coating of 0.40 ounce per square foot of wire surface area. Fabric shall be 11 gauge for all fence fabric 60 inches or less in height and shall be 9 gauge for fabrics greater than 60 inches in height.

3. Tension wires shall be 7 gauge (0.177 inch diameter) cold-drawn steel wire with a minimum tensile strength of 75,000 pounds per square inch and shall be zinc-coated or aluminum-coated.

4. Truss rods shall be 3/8 inch diameter adjustable rods. Truss tighteners shall have a strap thickness of not less than 3/8 inch.

5. Stretchers bars shall be 3/4 inch by 1/4 inch steel flat bars. Stretchers or bands shall be 3/4 inch by one inch preformed steel bands.

6. Bottom tension wire shall be 3 inches from top of crown on concrete footings.

7. Intermediate post assemblies shall be spaced at 500 foot intervals or midway between pull posts, when the distance between such posts is less than 1,000 feet and more than 500 feet.

8. See sheet 3 of 3 for typical fence location.
TYPICAL CHAIN LINK FENCE INSTALLATION - TYPE 2 SHOWN

TYPICAL POST DIMENSIONS

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<td>Round</td>
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<td>Length (001)</td>
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TYPICAL GATE DIMENSIONS

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<th>Vertical Brace</th>
<th>Gate Post Size</th>
<th>Gate Leaf Width</th>
<th>Vertical Brace</th>
<th>Gate Post Size</th>
<th>Gate Leaf Width</th>
<th>No of Equally Spaced Vertical Braces</th>
<th>Tension Rods Per Braided Panel</th>
<th>Gate Post Size</th>
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<td>Over 6' H</td>
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<td>00</td>
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<td></td>
<td>4.0000'</td>
<td>13' to 16'</td>
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<td>12' to 14'</td>
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<td>1</td>
<td>2.8750'</td>
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<td>14' to 16'</td>
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<td>6.0000'</td>
<td>14' to 16'</td>
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<td>6.0000'</td>
<td>27' and Larger</td>
<td>3</td>
<td>1</td>
<td>2.8750'</td>
</tr>
<tr>
<td>16' and Larger</td>
<td></td>
<td>7.0000'</td>
<td>16' and Larger</td>
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<td>7.0000'</td>
<td></td>
<td></td>
<td></td>
<td>2.8750'</td>
</tr>
</tbody>
</table>

GATES FOR CHAIN LINK FENCE - TYPE I SHOWN
(Type 2, With Barbed Wire Type Only)
GENERAL NOTES

1. All concrete shall be Class 5, 4000 psi.

2. All posts, nuts, washers and fittings shall meet the dimensional requirements of the American National Standards Institute, unless otherwise designated and shall be galvanized in accordance with ASTM A53.

3. Galvanized swaged fitting and U-bolt shall conform to ASTM A499.

4. The 3/8" galvanized wire rope shall conform to AASHTO M32 Grade 7 Type II.

5. The wire fabric, ties, bands, stretcher bars, and other fittings and hardware shall conform to AASHTO M32.

6. The wire fabric shall follow contour of the median.

7. The excavation for the concrete anchor blocks shall be to net lines. Maximum excess shall be 3'.

8. Perforated posts shall be square tube formed from 0.055" USG gauge ASTM A53 cold rolled carbon steel. The square tubes shall be welded directly in the corner by high frequency resistance welding or equivalent. The post to be externally coated to agree within 0.316" inner or 0.300" outer. The corner shall be 90° ± 1/8°.

9. Perforated posts shall be galvanized to the requirements of ASTM A525. Coating thickness shall be 0.010.

10. The posts shall have enough tension to prevent sagging. The location of the concrete anchor blocks may be varied to provide enough tension to help prevent sagging.

11. Two interior U-bolt and clamp bars shall be spaced at 1/2 of the distance between posts.


13. An alternate to rectangular concrete anchor block shall be a 36" diameter round footing with a service depth of 6'.

14. The median approach grade within 100' of the Chain Link Cable Barrier shall not exceed a grade slope of 10 percent.
GENERAL NOTES

1. Minimum cover on pipe culverts shall be 12".
2. See remaining C-13 Series standards for other pipe details.
3. After welding, the damaged coating shall be cleaned by a wire brush and painted with at least one full coat of paint No. 4, or given two coats of an approved hot asphalt paint, as directed by the Engineer.

1. PIPE AND CATCH BASIN INSTALLATION
   AT SAG CONDITION OF CUT DITCH

2. PIPE AND CATCH BASIN INSTALLATION
   AT BASE OF TRANSVERSE DIKE

3. PIPE AND CATCH BASIN INSTALLATION
   AT FACE OF TRANSVERSE DIKE
GENERAL NOTES

1. Pipes shall be installed either in a trench condition or in a non-trench condition in natural ground or in embankment.

2. In a trench condition, the vertical and horizontal limits shall be maintained. If the horizontal limits are exceeded or the vertical limits are not maintained, a non-trench condition exists.

3. Bracing and sloping shall conform to OSHA requirements.

4. Pipe backfill may be bedding materials.

5. In a non-trench condition, the embankment for pipe stability shall be constructed in lifts to the limits shown in the detail, simultaneously with the bedding material and pipe backfill. If the contractor chooses to construct it as a trench condition, the embankment shall be constructed before excavating the trench.

6. Outside diameter of full circle pipe or outside dimension of the pipe without a protective pipe.

A - Minimum wall thickness for NRCP. See Plans.

A - 2 feet maximum for diameters up to 4 feet and 1.5 feet maximum for diameters 4 feet and over.

C - 6 inches except when unyielding or unstable material. See standard specifications.

---

TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
WITHOUT BRACING

TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
WITH BRACING SHOWN

TRENCH CONDITION
NRCP IN NATURAL GROUND
OR IN EMBANKMENT

---

TRENCH BACKFILL
PIPE BACKFILL
BEDDING

---

NON-TRENCH CONDITION
GENERAL NOTES

1. Design of end section shall conform to standards.
2. End section joint conformation shall match the side joints.
3. Embankment slope shall be warped to match slope of end section.

<table>
<thead>
<tr>
<th>Pipe Dia</th>
<th>Approx Weight</th>
<th>Dimensions - Inches</th>
<th>Approx Slope</th>
</tr>
</thead>
<tbody>
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<tr>
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<td>5380#</td>
<td>A: 21 B: 85 C: 98 D: 78 F: 3</td>
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PLAN

SECTION A-A

FRONT ELEVATION

RIGHT ANGLE CULVERT

SKEWED CULVERT
GENERAL NOTES

1. The end section may be jointed to the pipe or connector section by bolts, rivets, dished bands, slip-seam bands or threaded rod type fasteners. For allowable connector types, see Table.

2. The type 1 connector is by means of bolts or rivets. Maximum circumferential fastener spacing shall be 12" and with a minimum of 8 fasteners per joint. The type 1 joint may be used with either annular or helical corrugations.

3. Type 2 and 3 connectors shall be used only with annular or helical pipe with a requisite number of annular corrugations.

4. Type 4 and 5 connectors shall be only used with helical pipe.

5. All steel and section components shall be galvanized.

6. Top of embankment shall be grade to match toe of skewed end section.

7. A form shall be added to match toe of skewed end section.

8. The foregoing applies to all cross section configurations.

### Dimensions - Inches

#### Type 1

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Inf.</th>
<th>Width</th>
<th>Height</th>
<th>Slope</th>
<th>Approx</th>
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### Dimensions - Inches

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<th>Height</th>
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<td>11</td>
<td>59</td>
<td>84</td>
<td>2</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. The end section may be joined to the pipe or connector section by bolts, rivets, slipped bands, slip-seam bands, or threaded rod type fasteners. For allowable connector types, see table.

2. The type 1 connector is by means of bolts or rivets. Maximum circumferential fastener spacing shall be 12" and with a minimum of 8 fasteners per joint. The type 1 joint may be used with either annular or helical corrugations.

3. Type 2 and 3 connectors shall be used only with annular or helical pipe with a requisite number of annular corrugations.

4. Type 4 and 5 connectors shall be used only with helical pipe.

5. All steel and section components shall be galvanized.

6. Toe of embankment shall be wrapped to match toe of skewed end section.

7. A permit shall be issued to abnormal projections per Std C-12310.

8. The foregoing applies to all cross section configurations.

**Dimensions - Inches**

<table>
<thead>
<tr>
<th>Pipe Dia</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>H1</th>
<th>H2</th>
<th>M1</th>
<th>M2</th>
<th>Approx. Slope</th>
<th>Connection Type</th>
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**Dimensions - Inches**

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<tr>
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<th>C</th>
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<th>B</th>
<th>H1</th>
<th>H2</th>
<th>M1</th>
<th>M2</th>
<th>Approx. Slope</th>
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<td>53</td>
<td>84</td>
<td>2 ½</td>
<td>1, 2, 4, 5</td>
<td></td>
</tr>
</tbody>
</table>
GENERAL NOTES
1. For lateral dimensions of invert paving, use 72" control for CMP and span for CWP.
2. Paving shall be scored laterally at 1-6' minimum intervals along the length of the pipe.
3. Use bevel on inlet headwall only.
4. Wire mesh shall be fastened or welded to corrugation crests at intervals and in a manner approved by the Engineer. Laps shall be 6' minimum.
5. Paving shall not be placed until backfilling is completed.
6. Concrete shall be Class B.
7. See Std C-1420 for headwall and bevel dimensions not shown.

HEADWALL INSTALLATION

PROJECTING INSTALLATION

SECTION A-A

SECTION B-B

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

PIPE AND PIPE ARCH CORRUGATED METAL CONCRETE INVERT PAVING

C-1320
GENERAL NOTES
1. For lateral dimensions of invert paving, use 72° control for CMP and span for CMA.
2. Paving shall be scored longitudinally at 1'-6" minimum lateral intervals.
3. Use level on invert headwall only.
4. Wire mesh shall be fastened to corrugation crests at intervals and in a manner approved by the Engineer. Lens shall be 6" minimum.
5. Paving shall not be placed until backfilling is completed.
6. Concrete shall be Class B.
7. See Std C-14.20 for headwall and level dimensions not shown.

HEADWALL INSTALLATION

PROJECTING INSTALLATION

SECTION A-A

SECTION B-B

Hot Mix Asphalt
Dampproofing
GENERAL NOTES

1. This end treatment is to be used only for those cattle and/or vehicle passes not used for drainage.

2. All concrete shall be Class B. An optional 12" AB Invert paving base course and 6" of concrete may be used in the 14" diameter pipe.

3. Anchor bolts shall be retained in a horizontal position during pour with final tightening a minimum of 7 days after pour.

4. Pipe shall be backfilled before concrete bond beam is constructed. Minimum forming may be used.

5. Edges of wire mesh shall be fastened or welded to corrugation crests at intervals and in a manner approved by the Engineer. Laps shall be a minimum of 6".

6. For installation normal to roadway centerline only.
**GENERAL NOTES**

1. Slotted drain pipe shall be 24" x 6" corrugated steel pipe with a minimum wall thickness of 0.064" and shall conform to the requirements of ASTM A536.

2. All concrete shall be Class B.

3. Reinforcing steel shall conform to AASHTO Grade 40.

4. Structural steel shall conform to ASTM A36.

5. Concrete anchors shall conform to ASTM A490 and hex nuts shall conform to ASTM A453 Grade A.

6. All slotted drain pipe hardware except anchor bolts and reinforcing steel shall be given two coats of primer.

7. When annular pipe is used, apply water proof sealer before attaching coupling band.

8. When helical pipe is used, it shall be formed with at least one annular corrugation at each end of each pipe section. Water proof sealer shall be applied to the annular corrugation prior to attachment of coupling band.

9. Cover slot during construction with removable tape or other acceptable substitute.

10. Slotted drain pipe shall be clean at the time of placement.

11. Concrete curb and gutter thru the slotted drains shall be paid for under the respective curb and gutter items.

12. Refer to curb and gutter details for dimensions and details not shown.


**SECTION A-A**

- **Finish Grade**
  - Cross Bar Spacer
  - $\frac{3}{4}$" Square Hole

- **Coupling Band**
  - CMP Joint Sealing
  - $\frac{3}{4}$" Drilled Hole (Typ.)
  - CMP Coupling Band with 90° 2½" x 1½" x ½" x $\frac{3}{4}$" Round Head Screw Anchor Bolt with $\frac{3}{4}$"-13UNC Heavy Hex Nut

**SECTION B-B**

- **Finish Grade**
  - Bear Bar
  - $\frac{3}{4}$" Hole x $\frac{3}{4}$" Plate Cont.

**TYPE A, D & G CURB AND GUTTER WITH SLOTTED DRAIN**

- Concrete Class B
- AB Class 2
- 20' 6" SLOTTED DRAIN Pipe
- See Pavement Structure
- Edge of Base Material or PCP Placed Directly on Subgrade
- 18" or 24" CMP

**TYPE B OR C CURB AND GUTTER WITH SLOTTED DRAIN**

- Gutter Depression
- Length of Slotted Drain Per Plans
- Skid C-15,70
- If Required

**CONNECTION OF SLOTTED DRAIN TO CATCH BASIN AND SLOTTED DRAIN END CAP**

- 22 Ga Galv Steel End Cap
- 20' 6" SLOTTED DRAIN Pipe
- The 18" x 6" or 24" x 6" CMP stub shall be included in the price of respective catch basins.
SECTION A-A
TYPICAL CONNECTION BETWEEN CATCH BASIN AND MANHOLE

SECTION C-C
TYPICAL CONNECTION BETWEEN CATCH BASIN AND MAIN STORM DRAIN

GENERAL NOTES
1. Pipe collars not required where direct catch basin connections can be made within 1' of a normal 90° installation, either horizontally or vertically.
2. "T" connections direct to the main drainage trunk line should be avoided and used only where manhole connections are impractical.
GENERAL NOTES

1. Prefabricated tees shall be used when the outside diameter of the inlet pipe exceeds one half of the inside diameter of the main storm drain, except when the manholes are shown on plans.

2. Centerline of the inlet pipe shall intersect the centerline of the main storm drain except when elevation "S" is shown on plans.

3. If Z is 45° or less, type 1 shall be used.

4. All concrete shall be class B.

5. All reinforcing steel shall conform to 1003-1, 2, grade 40.

6. Reinforcing steel shall have 2" minimum cover.

SECTION A-A

CONNECTON DETAIL

CATCH BASIN ABOVE STORM DRAIN

TYPE 2

SIDE INLET

TYPE 1
GENERAL NOTES

1. All shear pin angles shall fit snug and true to face. Cover with waterproof grease prior to installation of pin.
2. Shear pin holes in the angle shall be drilled for a tight fit of the pins.
3. Both ends of the shear pins shall be beamed after installation.
4. Shear pin material shall be commercially pure aluminum wire alloy 1050, Temper 0, Federal Spec. QQ-AS411.
5. Gasketize all ferrous parts after fabrication.
6. Frame and hinge angles shall have the outstanding legs out.
7. All steel shall be in accordance with ASM A57.
8. Barrier bars shall be equally spaced.
9. Hinge pin material shall be bolt stock and threaded on both ends so nut and lock washer are flush with the lower angle. Cover pin with waterproof grease prior to installation. Insert or damage exposed threads after installation.

PIPE ACCESS BARRIER FRONT ELEVATION

ACCESS BARRIER GATE DIMENSION SCHEDULE

<table>
<thead>
<tr>
<th>Size of Outlet Pipe</th>
<th>No. of Barrier Gates</th>
<th>Frame Angles</th>
<th>Shear Pin Angle</th>
<th>Shear Pins</th>
<th>Hinge Angle</th>
<th>Hinge Standard Pipe</th>
<th>Length of Vert. Bars</th>
<th>W Out to Frame Angle</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Str. Steel (lbs)</th>
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<td>4 x 4 x 5/8&quot;</td>
<td>2-1/2&quot;</td>
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<td>J x J</td>
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<td>J x J</td>
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INSTALLATION DETAIL FOR DOUBLE GATES

STORM DRAIN OUTLET DETAILS

DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS

DRAINAGE DIVISION OF WATERSHEDS

STATE OF ARIZONA

C-13.75

Sheet 1 of 2

1/94

Per Gate
**GENERAL NOTES**

1. All Concrete shall be Class B.
2. All reinforcing steel shall conform to A992-03, Grade 40.
3. All reinforcing steel shall have 3" minimum clear cover.
4. A concrete collar shall be required where pipes of different diameters or materials are joined or where the design change in alignment or grade exceeds that allowed for a standard joint.
5. When pipes of different diameters are joined with a concrete collar, 7" & 11" shall be those of the larger diameter.
6. The diameter of the circular ties shall be the outside diameter of pipe + 1.
7. Pipe ends to be trimmed such that the maximum distance between pipes at any point is 25.

**PIECE COLLAR TABLE**

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<td>5</td>
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**OUTLET COLLAR DETAIL**
1. Piles can be placed in any well.

2. Sump floor shall have a wood travel finish and a minimum 4% slope in all directions to outlet.

3. All structural steel shall be ASTM A58.

4. Grates shall be installed in accordance with Standard Welding Specifications.

5. Grate, frame, beam and nose angle shall be given one shop coat of No. 1 paint.

6. All concrete shall be Class B.

7. Construction joints and grates shall be placed to meet field conditions. See Std C-157.0.

8. Any specified joint depressions shall be worked to opening according to Std C-157.0.

9. Curb opening areas, etc., for type I single and type I double equal 0.25 and 0.34, respectively, for each inch of "h" = joint depression - 0.02. See Std C-157.0.

10. See Stan C-157.0 and C-155.0 for grate and frame details and grate opening areas.

11. * 1/2" for longitudinal and 1" for transverse bar grates.

   ** 2-1/2" for LG, LB, LT, TR and TB series grates, 1-1/2" for LG, LB, LT, TR and TB series 2 grates. Use 1/4" with combined curb and grater.


   12. * 1/2" when H is 12" or less.

   ** 1/2" when H is greater than 12". See Section B-B.
GENERAL NOTES

1. Type 3 - sump only.
2. Type 3 - wing illustrated, sump with wing basin upstream.
3. Type 1 - double wing, sump with symmetrical wing basin each side.
4. Pipes can be placed in any wall except wall adjacent to wing basin.
5. Sump floor shall have a wood travel finish and a minimum slope of 4% in all directions toward outlet pipe.
6. Gutter depression shall be tapered to opening according to Std C-15.70.
7. All structural steel shall be ASTM A36.
8. Nose angle, frame and cover shall be given the shop coat of No. 1 paint.
9. All concrete shall be class B.
10. All reinforcing bars shall be "4", 3/8" - 1/2" C to C, both ways and 1/2" clear to inside of walls and outside of wing basin floor except as shown.
11. Curb opening area (sq ft per inch of curb) = gutter depression = curb opening length (ft) x 0.0833.
12. Welding shall be in accordance with Standard Welding Specifications.
13. - Construction joints at or below bottom of curb line. Construction joints and drain shall be placed to meet field conditions. Std C-15.70.
   A = 6" when H is 6" or less, 8" when H is greater than 8.
   B = See Section 8-B, Std C-15.70.
   H = 3" - 6" min when L = 3'
       3' - 6" min when L = 4'
       3' - 6" min when L = 5'
       3' - 6" min when L = 6'

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWING

CATCH BASIN, TYPE 3
C-15.20
**GENERAL NOTES**

1. Pipes can be placed in any well.
2. Sump floor shall have a wood trowel finish and a minimum 1/4" slope in all directions towards outlet pipe.
3. Curb over catch basin shall be constructed until catch basin concrete has set for a minimum of 24 hours.
4. See Specs C-150.50 and C-150.60 for grate and frame details and opening areas.
5. Any specified grate depressions shall be served to opening according to Std C-150.60.
6. All structural steel shall be ASTM A36.
7. Grate, frame, and beam shall be given one shop coat of No. 1 paint.
8. All concrete shall be Class B.
9. Construction joints and drains shall be placed to meet field conditions, Site C-150.70.
10. * - 3" for longitudinal and 3" for transverse bar grates.
    ** - 6" when it is 8" or less, 8" when it is greater than 8. See Section B-B.

**PLAN - CATCH BASIN TYPE 4 - SINGLE**

**PLAN - CATCH BASIN TYPE 4 - DOUBLE**

**SECTION A-A**

**SECTION B-B**

USE THIS SECTION WHEN T=8"

**DETAIL NO. 1**

1/4" Steel Bows 2 Per Frame, Avoid Conflict with Grate
GENERAL NOTES

1. Pipes can be placed in any wall.
2. Sump floor shall have a wood trowel finish and a minimum 4% slope in all directions toward outlet pipe.
3. Curb over catch basin shall not be constructed until catch basin concrete has set for a minimum of 24 hours.
4. See Gourley C-15.50 and C-15.60 for grate and frame details and opening areas.
5. Any specified gutter depression shall be warped to opening according to 315 C-15.75.
6. All structural steel shall be ASTM A955.
7. Grate, frame and beam shall be given one shop coat of No. 1 paint.
8. All concrete shall be Class B.
9. Construction joints and slabs shall be placed to meet finish conditions, 515 C-15.70.
10. • 3" for longitudinal and 3" for transverse bar grates.
   ☛ 4" when H is 8' or less,
   8" when H is greater than 8'.
   See Section B-B.

PLAN - CATCH BASIN TYPE 4 - SINGLE

PLAN - CATCH BASIN TYPE 4 - DOUBLE

SECTION B-B
USE THIS SECTION WHEN 1+H'

DETAIL NO. 1

§5x18.5 or §5x19.5

2" Stove Bolt 1.
2 Bar Frame, Avoid Conflict with Grate.
GENERAL NOTES

1. LW = Longitudinal welded
   LB = Longitudinal bolted
   EF = Electroforged

2. Restrict use to grades of 3% or less.

3. Grating units and frames shall be fabricated from structural steel ASTM A36 except as noted.

4. All welding shall be in accordance with Standard Welding Specifications.

5. The completed assembly shall be given one shop coat of No. 1 paint.

6. Frames and grates shall fit to a maximum rough of 0.050" at any point.

7. For Type EF grates, see Std C-1550.

SECTION FRAME

PLAN

Delete Anchors on One End for Basins Using 1 Beam Grate Support
Std C-1550, Detail No. 2
(Typ)

SECTION

GRATES TYPE TW-1 AND TW-2

CAST IRON, CAST STEEL OR STEEL BAR STOCK

BAR SPACER DETAIL

<table>
<thead>
<tr>
<th>Grate Type</th>
<th>Clear Bar Spacing</th>
<th>No. Bars</th>
<th>x</th>
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<td>26</td>
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SECTION A-A

Nut and Cut Washers
Spot Weld or Peen
⅛" Rods
Threaded Ends

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

CATCH BASKET GRATES
TRANSVERSE BARS

Rev.
C-1550
7/94

HP/Ottoson

C-1550
GENERAL NOTES

1. No inlet depression shall extend into a traffic lane.
2. Maximum combined inlet and gutter depression is 3 inches. See Detail No. 2.
3. Maximum distance along curb between catch basins where full gutter depression is used is 10 feet.
4. See Std. C-15.80 for aprons used with C-15.80 Catch Basin.

LEGEND

- Normal pavement or gutter flow line elevation.
- Depressed elevation.
- Straight grade with downward slope.
- Normal gutter width per Std. C-025.10.
- Types 1, 3, & 5.
- Type 4 & C-15.90.

INLET DEPRESSION

INLET DEPRESSION
CATCH BASIN WITH SLOTTED DRAIN

CATCH BASIN SPACING AT SUMP CONDITION

INLET DEPRESSION
CATCH BASIN TYPE 4
OFF ROADWAY LOCATION

CATCH BASIN CONSTRUCTION DRAIN
DRAIN MAY BE DELETED AT OPTION OF ENGINEER

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

CATCH BASIN MISC. DETAILS
GENERAL NOTES

1. No gutter depression shall extend into a traffic lane.

2. Maximum gutter depression is 3 inches. See Detail No. 1.

3. Maximum distance along curb between catch basins where full gutter depression is used is 10 feet.

4. See Std. C-15.80 for aprons used with C-15.80 Catch Basin.

LEGEND

- Normal pavement or gutter flow line elevation.
- Depressed elevation.
- Straight grade with downward slope.
- Normal gutter width per Std. C-05.10.
- Types 1, 3, & 5.
- Type 4 & C-15.70.

CATCH BASIN SPACING AT SUMP CONDITION

3-0' 3-0' 3-0' 3-0' 20-0' Min

Sump

Gutter Control Grade

Catch Basin Limits

Curb Opening

Grate Opening

Gutter Depression

Catch Basin with Slotted Drain

Slotted Drain When Shown on Plans

Catch Basin

3-0'

Slotted Drain

Curb Elevation

Normal Gutter Slope

Gutter Control Grade

Catch Basin Type 4

OFF ROADWAY LOCATION

CATCH BASIN CONSTRUCTION DRAIN

DRAIN MAY BE DELETED AT OPTION OF ENGINEER

Type FF, LB or LB Grate

Principal Flow

2" AC Apron

Apron Shall Be Shaped to Suit Local Conditions and Shall Extend a Min of 4'-0" from Edge of Grate in All Directions. Grate Shall Be Depressed a Minimum of 4" Below Surrounding Terrain and Bearing Bars Shall Parallel Direction of Principal Flow.

Catch Basin Wall

6" x 18 ga. C.M.R

Length as Required

Plug with Conc Upon Placement Completion

Slope to Drain

Normal Gutter Slope

Gutter Depression

See Std. C-05.10 or as Per Plans

W

Curb Elevation

Normal Gutter Slope

Gutter Depression

See Std. C-05.10 or as Per Plans

DETAIL NO. 1

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS STANDARD DRAWINGS

CATCH BASIN WSC. DETAILS

7/94

C-15.70
GENERAL NOTES
1. See also Std. C-135G.
2. High point of headwall shall not project more than 3' above slope.
3. All concrete shall be Class B.
4. All reinforcing bars shall be Number 4.
5.1'-0" C to C and 3'-0" clear to inside of walls and floor.

---

<table>
<thead>
<tr>
<th>PIPE</th>
<th>DIMENSIONS</th>
<th>QUANTITIES</th>
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<tbody>
<tr>
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<td>Concrete C.F.</td>
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</tr>
<tr>
<td>L.D.</td>
<td>W</td>
<td>Single</td>
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<td>9'-2&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>4'-6&quot;</td>
<td>10'-6&quot;</td>
</tr>
</tbody>
</table>
GENERAL NOTES
1. See also Std. C-13.00.
2. High point of headwall shall not project more than 3" above slab.
3. All concrete shall be Class C.
4. All reinforcing bars shall be Number 4, 1" O.C. C-10 C and 3" clear to inside of walls and floor.

PLAN

ELEVATION

SECTION Y-Y

SECTION Z-Z

PIPE | DIMENSIONS | QUANTITIES
--- | --- | ---
| | Concrete C.T. | Reinforcing Steel
| | Single | Double | Single | Double |
| | C.A.M. | For Concrete | C.A.M. | For Concrete |
| | Pipe | Deduct | Pipe | Deduct |
| 18" | 2'-6" | 2'-8" | 2'-8" | 1'-3" | 1'-3" | 1'-3" | 5'-1" | 9" | 2'-6" | 0.76 | 0.63 | 1.12 | 0.06 | 65 | 107 |
| 24" | 3'-0" | 6'-6" | 3'-0" | 1'-7.5" | 1'-15.5" | 1'-11.5" | 3'-5" | 11" | 2'-5" | 1.00 | 0.04 | 1.55 | 0.09 | 92 | 136 |
| 30" | 3'-6" | 7'-10" | 4'-4" | 2'-0" | 1'-6" | 2'-7.5" | 3'-9" | 1'-1" | 3'-0" | 1.50 | 0.06 | 2.29 | 0.13 | 112 | 184 |
| 36" | 4'-0" | 9'-2" | 9'-2" | 2'-4.5" | 1'-10.5" | 3'-3" | 4'-0" | 1'-4" | 3'-3" | 1.96 | 0.09 | 3.01 | 0.17 | 145 | 214 |
| 42" | 4'-3" | 10'-6" | 6'-0" | 2'-3" | 2'-10.5" | 4'-4" | 1'-6" | 4'-5" | 2.49 | 0.11 | 3.85 | 0.23 | 189 | 279 |
1. Apron shall be AC or portland cement concrete as specified on plans.

2. All concrete shall be Class B.

3. Grating shall be fabricated of structural steel.

4. Structural steel shall be in accordance with ASTM A36.

5. Welding shall be in accordance with Standard Welding Specifications.

6. Grating assembly shall be given one shop coat of No. 1 paint.

7. 'H' indicated on plans.
   - 'B' when wall height exceeds 'B'

---

**SECTION A-A**
- Elevation Controlled by Side of the Apron
- See Grating Details
- See Section B-B
- 100% Pipe or Median Ditch Grade. (1-Rey or 2-Rey Flow Respectively)
- Grade to Median Ditch to Metal Grate Elevation

**SECTION B-B**
- See Median Ditch Grade Detail
- Match Median Cross Slope Typical
- Cutoff Rebar Same Material as Apron
- "4" Bars. 1'-0" C to C Hors and Vert. 1'/2" Clear to Inside of Wall No Bottom Reinforcing

**MEDIAN DITCH GRADE DETAIL**
- 4-1/4"x4" Bolt Anchors. Bend 45°
- 2-1/2"x2-1/2" Bar Anchor. Bend 45°
- 2"x2-1/2" Zest. 4-1/4"x4" or detail No. 1 Alternate
- Apron
- Grate Elevation
- See Plans
- 100% Pipe or Median Ditch Grade.
GENERAL NOTES

1. Apron shall be AC or portland cement concrete as specified on plans.
2. All concrete shall be Class B.
3. Grating shall be fabricated of structural steel.
4. Structural steel shall be in accordance with ASTM A36.
5. Welding shall be in accordance with Standard Welding Specifications.
6. Grating assembly shall be given one shop coat of No. 1 paint.
7. "W" indicated on plans.
   - B" when wall height exceeds 8"
GENERAL NOTES
1. Concrete shall conform to the requirements for Class 5 Concrete. The minimum strength shall be 4000 psi.
2. Grout shall be in accordance with Standard Specifications except water content shall be such that the consistency is proper for smooth troweling.
3. Grate cross rods shall be resistance welded, fillet welded or electro-forged to bearing bars.
4. The completed grate shall be given one shop coat of No. 1 paint.
5. Foundation soil and backfill shall be in accordance with Section 203-9 of the Standard Specifications.

SECTION A-A

SECTION C-C

SECTION D-D

BOLT DOWN CLIP DETAIL
GENERAL NOTES

1. Concrete shall conform to the requirements for Class S Concrete. The minimum strength shall be 4000 psi.

2. Grout shall be in accordance with Standard Specifications except water content shall be such that the consistency is proper for smooth troweling.

3. Grate cross rods shall be resistance welded, flat-welded or electro-forged to bearing bars.

4. The completed grate shall be given one shop coat of No. 1 paint.

5. Foundation soil and backfill shall be compacted to not less than 95% of the maximum density determined in accordance with the requirements of the Materials Testing Manual of the Materials Services.
GENERAL NOTES

1. All concrete shall be Class B.
2. All reinforcing steel shall conform to 1003-1, 1003-2, Grade 40.
3. All reinforcing steel shall have 2" min clear cover unless otherwise noted.
4. Reinforcing steel shall be No. 4 rebar, 12" C to C horizontal & vertical in walls.
5. Pipe can be placed in any way.
6. See Std C-13.60 and C-13.85 for more information and dimensions of silted drains.
7. **: 8" when H is less than B.
   **: 6" when H is greater than B

PLAN

SECTION A-A

SECTION B-B

TIMBER CAP DETAIL

NOTE:
Band Rebars and Cover with two layers of 4" x 4" Timbers

Remove Base for Placement of Special Catch Basin

Grate Elevation
See Plans

18" or 24" Dia Silted Drain

7" Type B Curb
4" Type C Curb

Grate & Frame
Std C-19.81
Sheet 2 of 2

Grate & Frame
Std C-19.81
Sheet 2 of 2

Shut

Flow Line

Flow Line

4" x 4" Timbers or as Approved by the Engineer

Grating Contract

4' 0"
4' 4"

4' 6"

9'

5'

18" or 24" Dia Silted Drain

Units of Work

Location as Shown on Plans

Location Marker on Structure

SUBGRADE

FR to SUBGRADE
GENERAL NOTES

1. All structural steel shall be in accordance with A572 Grade 50.

2. Grating design is not suitable for locations subject to bicycle traffic.

3. All welding shall be in accordance with Standard Welding Specifications.

4. The completed grate assembly (frame & grate) shall be given two shop coats of No. 1 paint.

5. The installation and inspection of steel studs welded to steel acting as connection devices to the concrete shall conform to the American Welding Society's Structural Welding Code AWS D1.1, Specifications 4.2.1-4.27.

GRATE AND FRAME DIMENSIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Curb Height</th>
<th>Gutter Width</th>
<th>Catch Basin Frame</th>
<th>Catch Basin Grate</th>
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</thead>
<tbody>
<tr>
<td>B</td>
<td>6'</td>
<td>2' - 6'</td>
<td>12&quot; - 18&quot;</td>
<td>25&quot; - 37&quot; - 40&quot;</td>
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<tr>
<td>C</td>
<td>3'</td>
<td>2' - 6'</td>
<td>13&quot; - 18&quot;</td>
<td>26&quot; - 34&quot; - 22&quot;</td>
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</table>

SECTION A-A

SECTION B-B

BRACE PLATE DETAIL
GENERAL NOTES

1. All structural steel shall be in accordance with ASTM Spec A-36.
2. All reinforcing steel shall conform to 1003-1, 1003-2, Grade 40.
3. All welding shall be in accordance with A307 specifications.
4. The completed grate assembly (frame & grating) shall be given two shop coats of No. 1 paint.
5. The installation and inspection of steel stud walls and connections shall be in accordance with the American Welding Society’s Structural Welding Code (AWS D1.1), Specifications 4.2.1-4.27.

GRATE AND FRAME DIMENSIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Curb Height</th>
<th>Gutter Width</th>
<th>Catch Basin Frame</th>
<th>Catch Basin Grate</th>
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<td>13&quot;-18&quot;-22&quot;</td>
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BRACE PLATE DETAIL

Concrete Anchor Studs (Typ)
GENERAL NOTES

1. See Std C-19.31 for dimensions, sizes and details not shown for installation of catch basin and half barrier.

2. See Std C-13.60 for dimensions, sizes and details not shown for installation of slotted drain.

3. Unless otherwise noted, reinforcement steel in half barrier for installation with catch basin and slotted drain shall conform to sizes and number specified.

4. The installation and inspection of steel studs welded to steel acting as a connection device to the concrete shall conform to ANSI 11.1 and specifications 4.21 - 4.27.

5. Where applicable, see Std C-10.60 for weed growth placement.

6. See Std C-10.66 for additional general notes.

7. Grate design is not suitable for locations subject to bicycle traffic.

SECTION A-A

SECTION B-B

HALF BARRIER INSTALLATION AT SLOTTED DRAIN LOCATIONS

REINFORCING DETAIL

CATCH BASIN WITH HALF BARRIER

PLAN

SECTION C-C

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

CATCH BASIN WITH HALF BARRIER

C-19.31

10/95
GENERAL NOTES

1. All concrete shall be Class B.

2. All reinforcing bars shall be #4 except two #6 bars over pipe. Bar spacing approximately 2'-0" center to center unless otherwise noted.

3. 30° wing wall flare shown 45° normally desirable.

See hydraulics and utility and rail road engineering sections.

<table>
<thead>
<tr>
<th>PIPE DIMENSIONS</th>
<th>QUANTITIES</th>
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<td>54&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>8'-0&quot;</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. All concrete shall be Class B.

2. All reinforcing bars shall be No except two No. bars over pipe. Bar spacing approximately 1-"0" center to center unless otherwise noted.

3. 30° wing wall flare shown. 45° normally applicable. See Hydraulics and Utility and Railroad Engineering Sections.

<table>
<thead>
<tr>
<th>PIPE</th>
<th>DIMENSIONS</th>
<th>QUANTITIES</th>
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<td>1'-9&quot;</td>
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<td>30&quot;</td>
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<td>1'-6&quot;</td>
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<tr>
<td>36&quot;</td>
<td>4'-0&quot;</td>
<td>3'-6&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
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<td>4'-4&quot;</td>
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<td>48&quot;</td>
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<td>7'-0&quot;</td>
<td>6'-1&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
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<td>6'-11&quot;</td>
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</tbody>
</table>

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DESIGN APPROVAL: 7/94

IRRIGATION HEADWALLS
18" TO 60" DIAMETER PIPES

C-18 JD

DESIGNER: D.O. Otten

CHECKER: H. Smith
GENERAL NOTES
1. All concrete shall be Class B.
2. Structural steel shall be in accordance with ASTM A36.
3. All cover steel and exposed appurtenances shall be given one shop coat of No. 1 paint.
4. Pipe shall specify locked or bolted cover for standpipe No. 2.
5. For specific details of a flush pavement or sidewalk installation, see Utility and Retired Engineering Division.

BOLTED COVER FOR STANDPIPE NO. 2

COVER
IRRIGATION STANDPIPE NO. 1

LOCKING COVER
IRRIGATION STANDPIPE NO. 2
GENERAL NOTES

1. Irrigation sleeves shall be installed in a trench condition. See Std C-13.15 and Std C-7.06.

2. Backfill and backfill material shall be Class 2 Aggregate Base.

3. Pipe installation shall conform to Section 501 of Standard Specifications.

4. The contractor shall engrave a 4" high letter "S" on the face of all curbs at sleeve locations. The width of the letter shall be 3/4" and shall penetrate the concrete surface 1/4".

5. For non-continuous sleeves under crossroads, Std C-520 Type "A" curb shall be required where median is irrigated. See plans for locations. Dumbell waterstop shall be at all expansion joints.

6. Materials used for caps or plugs shall be as recommended by the pipe supplier and approved by the Engineer.

** Generally, sleeves shall be installed parallel to the roadway subgrade. Slopes may vary in super-elevated sections. Minimum slope not less than 1 in 9.

SLEEVE UNDER CROSSROAD

SLEEVE UNDER MAINLINE

SLEEVE UNDER RAMP

DUMBEll WATERSTOP

SLEEVE UNDER DRIVEWAYS AND PARKING AREAS

DETAIL C
SLEEVE TERMINATION AT ELEVATED ROADWAY
GENERAL NOTES

1. Rock shall be sound and durable, of rounded or angular shape and with a nominal diameter of 8" minimum and 27" maximum. Flat or needle shapes are not acceptable. Rock shall be complemented by 50% min 8" to 10" and 50% max 18" to 27".

2. Wire mesh splices shall have a 6" minimum lap horizontally and vertically.

TYPE 4 AND 5 BANK PROTECTION

Type 4 and 5 Bank Protection

Type 6 Bank Protection

Dike or Embankment

2"x4" Galvanized woven wire fabric. Horizontal wires shall be 3 strands, twisted, min 1/8" gauge; diagonal wires min 1/8 gauge.

Rock Backfill

2" Galvanized Crowbar wire fabric. Type 4 and 5 Bank Protection

Head of Rail

8-4'

Intermediate Panel

End Panel

Min 18' Rails or Equal 10' Long

2 Strands #9 Galvanized Wire Twisted Taut
GENERAL NOTES

1. Precast manholes shall conform to the requirements of AASHTO M299 except that the compressive strength of each unit will be determined and accepted in accordance with Section 1006.7 of the AASHTO Specifications.

2. Concrete for all other manholes shall be Class B.

3. Every fifth course of bricks in Manhole No. 1 shall be laid as stretchers.

4. See Std C-18.30 and C-18.40 for additional information and dimensions.

5. See plans for Std C-18.20 frame and cover type.

6. Steps shall be placed in manholes in accordance with the requirements of AASHTO M299.

7. See Std C-18.40 for location of Station Location Reference Point.

8. Manhole height, "H," shall be measured from the lowest pipe invert to the top of the manhole frame.
GENERAL NOTES

1. Precast Manholes shall conform to the requirements of AASHTO M285 except that the compressive strength of each unit will be determined and accepted in accordance with Section 1006.7 of the ADOT Specifications.

2. Concrete for all other manholes shall be Class B.

3. Every fourth course of bricks in Manhole No. 1 shall be laid as stretchers.

4. See Std C-18.30 for additional information and dimensions.

5. See plans for Std C-18.20 frame and cover type.

6. Stamps shall be placed in manholes in accordance with the requirements of AASHTO M285.

7. See Std C-18.40 for location of station, location reference, and length.

8. Manhole height, 'H', shall be measured from the lowest point invert to the top of the manhole frame.
GENERAL NOTES

1. When specified on the plans, the cover (excluding grates) shall include agency identification and
   conform to the following: On frame cover, to contain name of agency and utility, as directed. Letters and words to be
   uniformly spaced. Letters to be 2” high and raised 1/8” above level of cover. Type of letters and layout to be submitted for
   approval.

2. Casting weights shown are minimum weights and are for either cast iron or ductile iron castings. Maximum casting weights shall not exceed 105 percent of weights shown.

3. 150 loading minimum.

4. Details shown are typical.

5. Alternate designs of manhole frame and cover may be utilized with the approval of the engineer as long as minimum loading and weight are equivalent.

SECTION OF FRAME

24" MANHOLE FRAME & COVER
Approx Wt: Frame 173 Lbs
Cover 170 Lbs

SECTION A-A OF COVER

SECTION OF FRAME

30" MANHOLE FRAME & COVER
Approx Wt: Frame 204 Lbs
Cover 223 Lbs

SECTION B-B

SECTION C-C

36" NOMINAL CMP FRAME & GRATE
Approx Wt: Frame 125 Lbs
Cover 167 Lbs

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

MANHOLE FRAME AND COVER DETAILS

C-18,20
GENERAL NOTES

1. When Type A cover (24" or 30") is specified on the plans then the cover shall include agency identification and conform to the following:
   - Lettering on manhole cover to contain name of agency and utility or as directed. Letters and words to be clearly spaced. Lettering to be 2" in weight and raised 1/8" above eye of cover.
   - All dimensions are subject to approval. Castings shall be painted or dipped in commercial quality primer paint, unless otherwise specified.

2. Weight of castings shall not be more than 2% less than the approximate weight as specified.

3. 100 loading minimum.

4. Details shown are typical.

5. Alternate designs of manhole frame and cover may be utilized with the approval of the engineer as long as minimum loading and weight are equivalent.

SECTION OF FRAME
SECTION A-A OF COVER
24" MANHOLE FRAME & COVER
Approx Mt Frame 220 Lbs
Cover 200 Lbs

SECTION OF FRAME
30" MANHOLE FRAME & COVER
Approx Mt Frame 324 Lbs
Cover 324 Lbs

SECTION C-C
36" CMP FRAME & GRATE
Approx Mt Frame and Cover = 330 Lbs
GENERAL NOTES
1. All dimensions are minimum except where noted.
2. Location & elevation shown on plans.
3. Construction to conform to Sect. 303-2 or 501.

PLAN

PRECAST ADJUSTING RING DETAIL

SECTION

MANHOLE COVER FRAME
ADJUSTMENT - PAVEMENT
CUT AND REPLACEMENT

Four Steel Spacers, 4"x2" Thickness
As Required From 3" to 7". When
Thickness Is Lesser Than 4", Use
Brick Or Precast Adjusting Rings.

12 No. 2 Hoops For
4" Ring Tied with
No. 4 A.A.A. Gage Wire, 6" & 8" Ring
Require 12 No. 2
Hoops.

Wet Thoroughly and
Paint With Grout.

Verdigris
2 Min.
CONCRETE SURFACE ROAD

CONCRETE WALLS

See Depth Gauge DETAIL

Roadway Width

6" Concrete
Class B

Finished Grade

See Joint DETAIL

3" Weep Holes

2-4 Bars
Top and Bottom

DEPTH GAUGE DETAIL

2½" x 4" x 18 Gauge Steel Sheet Metal Number Tag, both sides, fastened with "U" shaped 3/8" x 3" Bolts Through Tube

1½" x 3-10" Perforated Teescooping 90 Tube 12 Gauge, ½" Holes 1 C to 4 Sides

2" x 3½" x 3½" Numerals

1½" x 10" Perforated Teescooping 90 Tube 12 Gauge, ½" Holes 1 C to 4 Sides

Finished Grade

1/2"外出

1/2"外出

3" Weep Hole

3½" Max

3½" Min

ELEVATION LOOKING UPSTREAM

Finished Grade

Vertical Alignment to be as near Average Transverse Grade of Stream as Possible

Bituminous Surfaces Road

CONCRETE WALLS

See Depth Gauge DETAIL

Roadway Width

6" Concrete
Class B

Finished Grade

See Joint DETAIL

3" Weep Holes

2-4 Bars
Top and Bottom

GENERAL NOTES

1. Road walls shall be Class B concrete.
2. Depth gauge tubing shall be protected against concrete entering through bottom or perforations.
3. Depth gauge tubing and both sides of metal tube shall be painted with two coats of white enamel. Numerals and pipes shall be painted with one coat of gloss black enamel.

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

G-1910
GENERAL NOTES

1. A survey monument, frame and cover complete in place shall be considered a unit.

2. A right of way marker consisting of a survey monument and a reference marker complete in place shall be considered a unit.

3. All markers shall be placed as shown on the plans or as directed by the engineer.

4. Frames may be either Type A or Type B.

5. Frames shall weigh at least 53 pounds.

6. Covers shall weigh at least 16 pounds.

7. Portions of the frame and cover to be machined is shown by the symbol "F". The allowable tolerance for machined areas shall be 1/16". All concrete shall conform to the requirements of the specifications.

* 1/2" or pavement structure thickness, whichever is greater.
GENERAL NOTES

1. All survey monuments, frame and cover, concrete in place shall be considered a unit.

2. A right of way marker, consisting of a survey monument and a reference marker complete in place shall be considered a unit.

3. All markers shall be placed as shown on the plans or as directed by the engineer.

4. Frames may be either Type A or Type B.

5. Frames shall weigh at least 53 pounds.

6. Covers shall weigh at least 16 pounds.

7. Portions of the frame and cover to be machined is shown by the symbol "X". The allowable tolerance for machined areas shall be 1/64". Concrete shall conform to the requirements of the specifications.

+ 12" or pavement structure thickness, whichever is greater.
GENERAL NOTES

1. Standard Marker may be used as bench, survey monument, or R/W markers.

2. Standard Marker shall be made of brass, bronze, or aluminum.

3. Standard Marker will be furnished by the Department. Cast-in lettering format may vary.

4. Bench Marks shall be established on headwalls, bridge abutments or other permanent structures.

5. Surfaces of Aluminum Markers in contact with concrete shall be epoxy coated.

6. Fluted shank may be straight or twisted.

7. Station, Elevation, Year, or other information shall be hand stamped in field, as approved by the Engineer.

ELEVATION
STANDARD MARKER
GENERAL NOTES

1. All concrete shall be Class B.

FOR SINGLE INSTALLATION

<table>
<thead>
<tr>
<th>QUANTITIES PER FT OF SLAB LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCRETE</td>
</tr>
<tr>
<td>0.31 CY</td>
</tr>
<tr>
<td>REINFORCING STEEL</td>
</tr>
<tr>
<td>35.27 Lbs.</td>
</tr>
</tbody>
</table>

SECTION A-A

CROSS SECTION

Utility Line

Concrete Slab

Slab Length as Shown on Plans

Roadway

5'-0"
GENERAL NOTES

1. Type A encasement to be used for sewer laterals or house connections below water lines.

2. Type B encasement to be used for sewer laterals or house connections above water lines.

3. The encasement shall extend at least 6' on each side of the water line and must include the nearest joint.

4. Protection for Type A required when distance from bottom of water to top of sewer line is 24" or less. When the sewer is 4" or 6" house connection protection is required if distance is more than 12".

5. For Type A crossings, Class ISO CIP, or ductile iron pipe may be used as an alternate. For Type B crossing reinforced encasement is always required.

TYPE A ENCASEMENT

TYPE B ENCASEMENT
GENERAL NOTES

1. Type A encasement to be used for sewer laterals or house connections BELOW water lines.

2. Type B encasement to be used for sewer laterals or house connections ABOVE water lines.

3. The encasement shell extend at least 6" on each side of the water line and must include the nearest joint.

4. Protection for Type A required when distance from bottom of water to top of sewer line is 24" or less. When the sewer is a 4" or 6" house connection no protection is required if distance is more than 12".

5. For Type A crossings, Class 150 CIP, or puntile iron pipe may be used as an alternate. For Type B crossing reinforced encasement is always required.

TYPE A ENCASEMENT

TYPE B ENCASEMENT
GENERAL NOTES

1. Type A pipe support may be used for any type of crossing condition.

2. Type B pipe support may be used for crossing pipes with a bell diameter of 18" or less if sufficient clearance over storm sewer is available and total span is less than 36'.

3. Intermediate pipe support shall be used in conjunction with Type C pipe support if total span exceeds 36' in table.

4. Contractor shall be responsible for furnishing all supports for permanent and temporary. Temporary supports shall not be a separate pay item.

5. Permanent pipe supports may be decreased from plan quantities or extended to include some listed below as temporary supports if conditions warrant these changes at the time of construction. Decision shall be made by the engineer.

6. When Type A pipe support is used and whenever be directed by the engineer, the contractor shall pour the wall with suitable openings to prevent unequal pressure resulting from settling of the backfill. Volume of the placed opening shall not exceed ½ the volume of the supporting wall.

7. Use Type B pipe support instead of Type C when clearance between pipes is less than 1' in table.

8. Concrete cover for reinforcing steel shall be 5", minimum.

### SCHEDULE OF REQUIRED SUPPORTS

<table>
<thead>
<tr>
<th>PERMANENT</th>
<th>TEMPORARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewer Lines</td>
<td>Cast Iron Pipe</td>
</tr>
<tr>
<td>Cond. Storm Drain</td>
<td>Cond. Irrg Pipe</td>
</tr>
<tr>
<td>Cond. Box Culvert</td>
<td>Buried Telco</td>
</tr>
<tr>
<td>Traffic Control Conduit</td>
<td>Gas Pipes</td>
</tr>
</tbody>
</table>

NOTE: Other utilities as noted on the plans or as required by the engineer at time of construction.

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PIPE SUPPORT ACROSS TRENCHES

C-2220
Sheet 1 of 3
GENERAL NOTES

1. Type A pipe support may be used for any type crossing condition.

2. Type C pipe support may be used for crossing pipes with a bell diameter of 18" or less if sufficient clearance over storm sewer is available and total span is less than 35'.

3. Intermediate pipe support shall be used in conjunction with Type C pipe support if total span exceeds max. 8' in table.

4. The contractor shall be responsible for furnishing all support in both permanent and temporary. Temporary supports shall not be a separate pay item.

5. Permanent pipe supports may be decreased from plans quantities or extended to include some listed below as temporary supports if conditions warrant these changes at the time of construction. Decision shall be made by the engineer.

6. When Type A pipe support is used and whenever so directed by the engineer, the contractor shall pierce the wall with suitable openings to prevent unusual pressure resulting from freezing of the backfill. The volume of the pierced opening shall not exceed 1/2 the volume of the supporting wall.

7. Use Type B pipe support instead of Type C when clearance between pipes is less than 8' in table.

SCHEDULE OF REQUIRED SUPPORTS

<table>
<thead>
<tr>
<th>PERMANENT</th>
<th>TEMPORARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewer Lines</td>
<td>Cast Iron Pipe</td>
</tr>
<tr>
<td>Concr Irrig Pipe</td>
<td>Concr Box Culvert</td>
</tr>
<tr>
<td>Buried Telco</td>
<td>Traffic Control Conduit</td>
</tr>
<tr>
<td>Gas Pipes</td>
<td>Water and Sewer Lines</td>
</tr>
</tbody>
</table>

NOTE:
Other utilities as noted on the plans or as required by the engineer at time of construction.
ALTERNATE TO PIPE SUPPORT
GENERAL NOTES

1. Precast, reinforced manhole sections shall be manufactured in accordance with AASHTO M99 except that the compressive strength of each unit will be determined and accepted in accordance with Section 1006.7 of the specifications.

2. Manhole steps shall be installed at the site of the manhole section manufacture in accordance with industry standards meeting AASHTO M99 requirements. Steps not required in 60" manhole.

3. Use low alkali cement only.

4. Pipe sizes and elevation shown on plans.

5. Frame and cover shall be adjusted to the finished grade prior to placing the asphaltic concrete or PCP surface.

PRECAST SEWER MANHOLE

TYPE B TOP

TYPE A TOP

PRECAST E ccentric Control Top Manhole
GENERAL NOTES

1. Compact soil at end of pipe to 95% of maximum density.

2. If depth of cover is less than 5 or greater than 15, increase plug thickness a minimum of 4".

TYPICAL STUB OUT

PIPE PLUG MARKER

STORM DRAIN LINE PLUG

SEWER LINE PLUG
GENERAL NOTES

1. Thrust blocks are to extend to undisturbed ground.
2. All concrete shall be class B.
3. Table is based on 3000°F sq. ft. soil, if conditions are found to indicate soil bearing less, the areas shall be increased accordingly.
4. Areas for pipe larger than 18" shall be calculated for each project.
5. Form at non-bearing vertical surfaces.

MINIMUM THRUST BLOCK AREA REQUIRED (T x W)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>WATER PIPE TEC, DEAD END, 90° BEND</th>
<th>45° &amp; 22.5° BENDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; &amp; LESS</td>
<td>3 SQ. FEET</td>
<td>3 SQ. FEET</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4'</td>
<td>3'</td>
</tr>
<tr>
<td>8&quot;</td>
<td>6'</td>
<td>3'</td>
</tr>
<tr>
<td>10&quot;</td>
<td>9'</td>
<td>5'</td>
</tr>
<tr>
<td>12&quot;</td>
<td>13'</td>
<td>7'</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23'</td>
<td>12'</td>
</tr>
</tbody>
</table>
1. Gate valves 4" to 16" may be used with any type of pipe.
2. Gate valves larger than 16" to be detailed on plans.
3. Butterfly valves 3" to 12" may be used with any type of pipe.
4. Butterfly valves larger than 12" to be detailed on plans.
5. Valve box and cover required per Sto C-25.30.
GENERAL NOTES

1. Either this detail or restraint rods may be used when allowed to relocate a water line upward to cross over a conflict.

2. Ductile iron pipe may be used.

3. Anchor blocks for pipe larger than 12" shall be calculated for each project.

4. Reinforcing bars to be coated with 2 coats of coal tar, epoxy, or by other approved methods.

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>MINIMUM BAR SIZE</th>
<th>A-DIMENSION (INCHES)</th>
<th>MINIMUM BLOCK DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>#6</td>
<td>6&quot;</td>
<td>4x4x2.5&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>#8</td>
<td>9&quot;</td>
<td>4x5x2.5&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>#8</td>
<td>9&quot;</td>
<td>4x5x5&quot;</td>
</tr>
</tbody>
</table>

* For 125 psi Working Pressure
GENERAL NOTES

1. This detail covers moving of water mains, 2" to 12" only.
2. Thrust blocking per Std C-23.10 and C-23.20.
3. If offset is to go over obstruction, joint restraints must be used.
4. Pipe is to be cast iron or ductile iron.
5. 45° cast iron bends may be used in place of cast iron offsets.
6. Drop section is to be prefabricated and installed as a single unit for cast iron mechanical joints.

CAST IRON

ASBESTOS CEMENT

CAST IRON
MECHANICAL JOINT
GENERAL NOTES

1. Extension to valve stems required on all valves where operating nut is over 3' below surface. Extension stem shall be 1/2" minimum diameter steel designation A-15, with square socket on bottom to fit 2" square valve nut. Length to fit each installation 2' square operating nut to be held on top of the extension stem with stop nut.

2. If two or more joints of ACP are used to make riser, use standard AC pipe rubber gasket coupling to join pipe. Where riser pipe length exceeds 10', use 12' AC pipe.

3. All steel to have prime coat of paint No. 4 and first finish coat of Light Gray Enamel paint as per section 1001-4.26.

4. Valve Box shall be adjusted to the finished grade prior to the placing of the asphaltic concrete surface or PCCP.

5. Ground below the concrete pad or three bricks to be compacted to 95% of the maximum density.

6. Use Portland, Type I/A, or equal deep sifted cover 14" or more type, allowing adjustable cast iron valve box. C minimum 15,000 psi.

Aesthetic Concrete Pavement
See Type A-2 for PCCP

Concrete to Be
On Undisturbed
or Compacted Soil

Poured Concrete Cylinder 6" thick and 40" square or Round, Valve Box Centered

Compacted Back-Fill In Layers so as not to Disturb the Riser Pipe

8" Class B ACP Riser Pipe or Approved Equal

Extension Stem See Note 1

Concrete and Collar See Detail A

TYPE A-1
TO BE USED IN AREAS SUBJECT TO VEHICULAR TRAFFIC

DETAIL A
GENERAL NOTES

1. Extension to valve stems required on all valves where operating nut is over 5 below surface. Extension stem shall be 3/4" minimum diameter steel designation A-3, with square socket on bottom to fit 3/4" square valve nut. Length to fit each installation, 2" square operating nut to be held on top of the extension stem with stop nut.

2. If two or more joints of ACP are used to make riser, use standard AC pipe rubber gasket coupling to join pipe, where riser pipe length exceeds 10', use 12" AC pipe.

3. All steel to have prime coat or paint No. 4 and one heavy application of paint coat of paint No. 10092-400 as per section 1002.

4. Valve box shall be adjusted to the finished grade prior to the laying of the decorative concrete or PCP.

5. Ground below the concrete pad or three bricks to be compacted to 95% of the maximum density.

6. Use Parkson Tyler Agco, or stout deep skirted cover (4' or more) type, grading adjustable cast iron valve box, B minimum 10,000 psi.

TYPE A-1
TO BE USED IN AREAS SUBJECT TO VEHICULAR TRAFFIC

Square with 4 Sides Tapered

DETAIL A
TYPE A-2
TO BE USED WHEN VALVE BOX IS LOCATED WITHIN PCCP PAVEMENT

TYPE B
NOT SUBJECT TO VEHICULAR TRAFFIC
GENERAL NOTES

1. Thrust blocks are to extend to undisturbed ground.
2. Optional blocking of 2'-4" x 12" solid concrete masonry units may be used as indicated.
3. All concrete shall be class B normally, cure 24 hours before backfilling, or use high early strength concrete.
4. All taps shall be made by city crews or prevailing rates.
5. Install permanent blocking under valve before tap is made. All flange bolts shall be clear of footing.
6. All tapping sleeves must be pressure tested prior to request for tap by city.
7. Contractor shall excavate as shown and shall set tapping sleeve and valve, and tighten all bolts prior to requesting city to make tap.
8. Tapping sleeve to be placed a minimum of 18" from any bell, coupling, valve, or other obstruction.
9. Areas for pipe larger than 16" shall be calculated for each project.

<table>
<thead>
<tr>
<th>SIZE OF PIPE BEING CONNECTED</th>
<th>MINIMUM THRU-AREA REQURED (A X B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; &amp; LESS</td>
<td>3 SQUARE FEET</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4 SQUARE FEET</td>
</tr>
<tr>
<td>8&quot;</td>
<td>6 SQUARE FEET</td>
</tr>
<tr>
<td>10&quot;</td>
<td>9 SQUARE FEET</td>
</tr>
<tr>
<td>12&quot;</td>
<td>12 SQUARE FEET</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23 SQUARE FEET</td>
</tr>
</tbody>
</table>
1. This detail is for use only on underground installations where the use of concrete thrust blocking per STO C-2190 cannot be used because of obstructions, or requirements of the specifications.

2. Washers may be cast iron or steel, and may be round or square. Holes shall be \( \frac{1}{4} \) inch larger than the rods.

3. All the rods and coupling, turnbuckles, bolts and nuts from these joints shall be of carbon steel equivalent to A-36, except for the minimum thickness of the plating, which shall be 0.002 in. on carbon steel and 0.003 in. on cast iron. Carbon steel plates shall have class 2A threads and the nuts, rod couplings and turnbuckles shall have 2B threads.

4. High strength, heat-treated cast iron, hex head bolts with hexagon nuts, all in accordance with the strength requirements of AWWA C-301, may be used in lieu of the carbon steel plates and nuts.

5. The sketches in this series of figures show acceptable methods of providing anchorage. There is no particular significance to be attached to whether the anchor is a bell and socket joint or a standard tee joint. The anchoring procedure illustrated above in most cases is either type of joint. In some cases, dimensions of the particular pipe or flange available for working around the particular joint will influence the choice of methods used.

6. In certain assemblies of rod and clamp shown, rods run from a lug on the fitting for a clamp behind the rod head to a clamp bolted to a face of a bell. Note that this arrangement anchors only one joint. The stability of the joint where the clamp is against the face of the bell depends on having soil above a relatively large piece of pipe below the joint. Consequently, if the distance between the first and the second joint is less than 12 feet, the second joint shown shall be anchored by a clamp bearing the hub of the bell and rods to a clamp at the face of the next bell.

7. For pipe larger than 12 inch diameter, restraint details shall be submitted for approval prior to installation.

8. All exposed metal shall be coated with asphaltic primer per subsection 907-202.

9. Bolt holes in clamps shall be \( \frac{1}{4} \) inch larger than the bolts.
GENERAL NOTES

1. This detail is for use only in underground installations where the use of concrete fill blocks is prohibited. See 3.10 C-334.50 cannot be used because of obstructions, requirements of the specifications.

2. Connectors may be cast iron or steel, and may be round or square. Holes shall be 1/4 inch larger than the rods.

3. All tie rods, rod couplings, turnbuckles, bolts, and nuts for these joints shall be of carbon steel equivalent to ASTM A 320, grade 3, with cadmium plating in accordance with ASTM A 159, except that the minimum thickness of the plating shall be 0.002 in. Cadmium plated bolts shall have class 2A threads and the nuts, rod couplings and turnbuckles shall have 2B threads.

4. High-strength heat treated cast iron tee-head bolts with hexagon nuts, all in accordance with the strength requirements of AWS C 3.11, may be used in lieu of the cadmium plated bolts and nuts.

5. The sketches in this series of figures show acceptable methods of providing anchorage. There is no particular significance to be attached to whether the sketch shows a bell and socket joint or a standard mechanical joint. The anchoring procedure illustrated applies in most cases to either type of joint. In some cases, dimensions of the particular pipe or hub end space available for working around the particular joint will influence the choice of methods used.

6. In certain assemblies of rod and clamps shown, rods run from a lug on the fitting or a clamp behind the hub of a bell to a clamp against a face of a bell. Note that this arrangement anchors only one joint. The stability of the joint where the clamp is against the face of the bell depends on having soil above a relatively long piece of pipe on both sides of the joint. Consequently, if the distance between the first and second joint is less than 12 feet, the second joint shown shall be anchored by a clamp against the face of the bell and rods to a clamp at the face of the next bell.

7. For pipe larger than 12 inch diameter, restraint details shall be submitted for approval prior to installation.

8. All exposed metal shall be painted with asphalt primer per subsection 334.10.

9. Bolt holes in clamps shall be 1/8 inch larger than the bolts.

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>CLAMP</th>
<th>ROD</th>
<th>BOLTS</th>
<th>WASHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAST IRON</td>
<td>STEEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4&quot;</td>
<td>12½”</td>
<td>10½”</td>
<td>2½”</td>
<td>2½”</td>
<td>1½”</td>
<td>2½”</td>
<td>1½”-3”</td>
<td>1½”-3”</td>
</tr>
<tr>
<td>6&quot;</td>
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<td>3½”</td>
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<tr>
<td>12&quot;</td>
<td>20½”</td>
<td>18½”</td>
<td>8½”</td>
<td>7½”</td>
<td>1½”</td>
<td>2½”</td>
<td>1½”-3”</td>
<td>1½”-3”</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. The meter boxes shall conform to the dimensions as shown and shall be made of portland cement concrete poured and templated or vibrated in true forms.

2. Use Class 5 concrete, f'c=4000 psi.

---

The diagram includes dimensions for meter boxes, with notes on layout and construction details. The dimensions are provided in the diagram and include:

- **PLAN**
  - A
  - B
  - C
  - D
  - E
  - F
  - G
  - H
  - I
  - J
  - K
  - L
  - M
  - N

- **SECTION A-A**
  - X
  - Y
  - Z
  - M

- **SECTION B-B**
  - X
  - Y
  - M

Break Out If Necessary to Set Box to Proper Grade.
GENERAL NOTES

1. Cut and plugs must be adequately "dry blocked".
2. Dry blocks shall be standard size solid masonry concrete blocks, ASTM C-190.
3. The quantity and arrangement of the blocking must withstand the line pressure by holding the cap or plug in position.
4. Concrete thrust blocks shall not be poured until line pressure is restored and the cap or plug is inspected for leakage.
5. Concrete shall not be poured over any portion of the abandoned pipe.
6. Minimum thrust block area per Std C-23,00.
7. Where a 4" or larger line is specified to be abandoned, the cut and plug should occur at the supply line main to avoid creating an unused dead end line.

PLAN

SECTION A-A

ELEVATION
GENERAL NOTES

1. All joints in hydrant run-out to be mechanical joints.
2. Hydrant Tee, Cowl or approved equal may be used in place of tee and 90° bend.
3. 90° bend not required if sufficient room for perpendicular installation.
4. See Std C-23.10 and C-23.15 for concrete thrust blocks.
5. A flange by mechanical joint shutoff valve, connecting directly to the tee or below at the main shall be used.
6. Fire hydrant, fire hydrant threads, valve and valve boxes per municipality requirements.

PLAN

Fire hydrant
See Note 6

ALTERNATE PLAN

(See Note 3)

ELEVATION

For Valve Box Instalation
See Std C-23.30

2-4 Min
0.3-0.5 Min

Water Main

6' Valve

Thrust Blocks
See Std C-23.10

Corey Aggregate as per AASHO M-43, No 57
Minimum of 8 Cu FT

Corey Type

Water Main

6' Short Body
90° 1/2 Bend
See Note 2

Sidewalk or Back of Curb

Pumper Connection To Face Curb

Varies

Thrust Blocks
See Std C-23.10

Water Main
GENERAL NOTES

1. Obstructions such as utility poles, street signs, irrigation boxes, fences, etc., must not be placed between curb and hydrant.

2. *Radius varies by municipality.

3. Dimensions shown on plans supersede locations shown on this detail.

4. On locations in midblock, the fire hydrant will be aligned with a property line.

AREA WITH SIDEWALK

PARKWAY AREA OR NO SIDEWALK