Several changes are being made to Construction Standard Drawings and the Construction Standards index. Please update your C-Standards with the attached drawings included in this supplement packet:

- Standard C-05.10 is revised to reflect a new gutter depression depth of 5/8”. This is a design change to facilitate increased drainage spread on pavement.

- Standard C-05.11 is deleted because it is not a Construction Standard.

- In order to meet the ADA requirements, new details for sidewalk ramp with pedestrian bypass (Type 1) and sidewalk ramp with pedestrian bypass for use with pedestrian push button (Type 6) were added to Standard C-05.30. Minor modifications were made to the original sheets 1 through 4. Designer note: Ramp type numbers have been revised.

- Standard C-06.10 (Sheet 1 of 2), General Note #4 is revised to clarify property line.

- Standard C-08.10 is deleted since ramp geometrics are covered in the “Roadway Design Guidelines”.

- Standard C-10.31 is revised to comply with NCHRP 350 requirements.

- Standard C-10.45 is modified to reflect new length of foundation tubes.

- Standard C-10.62 contains minor modifications.

- New Standard C-10.63 is developed for 42” ‘F’ Shape concrete barrier.

- Standards C-10.70 and C-10.71 are revised to type ‘F’ shape and to comply with NCHRP 350 requirements.

- New Standards C-10.72 and C-10.73 are developed for 42” ‘F’ Shape concrete barrier.

- Standard C-10.75, New Jersey barrier is changed to Type ‘F’ configuration.
- New Standard C-10.86 is developed for 42” ‘F’ Shape concrete barrier.

- Standard C-15.91 is revised to reflect new gutter depression depth of 1 5/8”.

Design Personnel should review the revised drawings and incorporate into their design plans as appropriate. Also, please support any requests from field to implement changes on current construction projects where appropriate. Construction Personnel should review all drawings for possible implementation with on-going construction projects. The updated 1A Sheet (List of Standards) is available at the Roadway Support Desk – 712-8667 or 8671.

Please distribute to all users within your Group or District. Additional copies may be obtained from ADOT Engineering Records at 712-8216. Questions regarding the Drawings may be directed to Tom Scheck (712-8674), Jeri Pulkinen (712-7735) or me (712-7341).

C: Roadway Group          Statewide Project Management Group
    Valley Freeway Group   Traffic Group
    Bridge Group          Contracts & Specifications Section
    Construction Group    Central Maintenance Group
    Local Government Section  District Engineers (10)
    FHWA                   Engineering Consultant Services
    Engineering Records    Regional Traffic Engineers (4)
    District Permits Offices (10)
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**Abbreviations:**
- EP: Edge of Pavement
- Grd: Grade
- M: Miles
- MP: Miles Per Hour
- MA: Mineral Aggregate
- Min: Minimum
- Misc: Miscellaneous
- Mod: Modify or Modified
- Mon: Monument
- Mt: Mountain
- NM: National
- NRCP: Non-Reinforced Cast-In-Place
- NC: Normal Crown
- NB: Northbound
- O: Obiterative
- Orig: Original
- OD: Outside Diameter
- OH: Overhead
- OP: Overpass
- P: Parkway
- Pavement
- Ped: Pedestrian
- Pi: Point
- PCC: Point of Compound Curve
- PC: Point of Curvature
- PI: Point of Intersection
- PRC: Point of Reverse Curve
- PT: Point of Tangency
- POC: Point on Curve
- POS: Point on Spiral
- PDT: Point on Tangent
- PE: Polyeethylene
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GENERAL NOTES

1. Roadway width, cut ditch width, area slopes, and pavement structure section will be shown on project plans.
2. Design highways should not be located above the subgrade in ungraded ditch.
3. Pavement structure slope is nominal. Actual slope is controlled by 8% see Shoulder Wedge Detail.
4. Slopes beyond the pavement structure, such as embankment and cut slopes, are relative to horizontal.
5. If slope controls 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 9% min. is required when guard rail is utilized on the project. Treatment shall be uniform throughout the project length.

The 9% requirement may be waived under special conditions where guard rail is not utilized. The 9% min. shall not be waived when the thickness of structure section has not been finalized.

MINIMUM SLOPES

INTERMEDIATE SLOPES

MAXIMUM SLOPES

MINIMUM DITCH CONDITIONS DETAIL

GENERAL NOTES

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MINIMUM SLOPES

INTERMEDIATE SLOPES

MAXIMUM SLOPES

MINIMUM DITCH CONDITIONS DETAIL
**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 ditch.

3. Pavement structure slope is nonlinear. Actual slope is controlled by ID. See Shoulder Wedge Detail.

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

5. When median slopes intersect, see project plans for controls.

6. These slopes are intended to be used with new or reconstructed roadways. The 9% min is required when guard rail is utilized on the project. Treatment shall be uniform throughout the project length. The 9% requirement may be waived under special conditions where guard rail is not utilized. The 9% min shall not be waived when the thickness of structure section has not been finalized.

**MINIMUM SLOPES**

**INTERMEDIATE SLOPES**

**MAXIMUM SLOPES**

**MINIMUM DITCH CONDITIONS DETAIL**
GENERAL NOTES
1. Round edge profiles intersect 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 spiral curves but with \( 0.7 L_s \) on tans-
   gent and \( 0.3 L_s \) 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 details.

LEGEND
\( A \) - Point at which adverse crown removal begins.
\( B \) - Point at which super-elevation transition begins.
\( C \) - Point of equality between super-elevation and
   normal crown
\( D \) - P.C. location for curve transition.
\( E \) - Point at which full super-elevation is reached.
\( \text{E.T.L.} \) - Edge of traveled lane
\( \text{E.C.} \) - Length of Normal Crown Removal
\( \text{E.C.} \) - Length of Super-elevation Runoff
\( \text{E.T.L.} \) - Edge of traveled lane
\( \text{E.C.} \) - Distance BC + INCD \( L_s \)/Y
\( \text{E.C.} \) - Length of Shoulder Transition +
   \( \text{INCD} \) (\( L_s \)+ INCD of shoulder)

SHOULDER TRANSITION DETAIL

CIRCULAR CURVE TRANSITION

I-WAY ROADWAY-AXIS OF ROTATION AT CONST. &
HIGH POINT OF NORMAL CROWN ON OUTSIDE OF CURVE
RIGHT TURNING ROADWAY

2-WAY ROADWAY-AXIS OF ROTATION AT &
(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. Stitches shall be constructed with a minimum grade to prevent erosion. Ditch outlet treatment shall be as provided on plans.

CROWN DITCH

GRADER DITCH

CHANNEL

DITCH

DITCH AND DIKE
GENERAL NOTES

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

SLOPE TABLE

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ELEVATION PER PLANE

EDGE OF TRAVEL LANE

TYPE B TRANSVERSE MEDIAN DIKE
- Slope relative to grade of median at intersection with toe

DIKE INSTALLATION AT STRUCTURE

Place dikes at structures to create water collection.
GENERAL NOTES

1. Dimensions for ditch dikes shall be shown on the plans as dike 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.
GENERAL NOTES

1. Pipe berms not required when pipe projection is protected by guard rail.
2. Berm construction similar for multiple pipe installations and for pipes without end sections.
3. Berm construction shown is for pipe extensions.

PIPE BERM REQUIREMENT DETAIL

STRAIGHT PIPE PLAN

ELEVATION

PIPE BERM REQUIREMENT DETAIL

SKewed PIPE PLAN

NOTE:
Single Pipe Installations: D = Outside Diameter of Pipe
Multiple Pipe Installations: D = Outside Edge to Outside Edge of Pipes
GENERAL NOTES
1. Berm construction similar for box culvert and pipe with headwall.
2. Berm construction shown is for extension of existing facilities. Berm construction similar for new facilities.

STRAIGHT HEADWALL PLAN

ELEVATION

SKewed HEADWALL PLAN

SECTION A-A (FOR CBC)

SECTION A-A (FOR PIPE WITH HEADWALL)
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.
GENERAL NOTES

1. Round all exposed concrete corners.
2. Tank, sub, trash rack, and anchor supports shall be shop fabricated, welded, and galvanized in accordance with ASTM A 36.
3. Sub shall be of annular corrugation. Downspout piping beyond stub may be either annular or helical corrugation.
4. Perforable couplings shall be mechanical, heat-shrinkable polyethylene sleeves on pipe type neoprene sheet or allies seams at min 12" width and min 18 ga.
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. Embankment curb concrete shall be in accordance with Standard Specifications.

OUTLET DETAIL

OUTLET-HEADWALL AND CONCRETE APRON

SECTION A-A

CMP OUTLET ON ROCK

DETAIL TRASH RACK

DETAIL ANGLE SUPPORTS FOR TRASH RACK

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

10/95

DESIGNER

CHECKER

INSTRUMENT

STATE PROJECT

DATE: 10/26/94

SBC-102574

C-0420
### GENERAL NOTES

1. For C-02.10 slopes with embankment height over 20', use length for 20' embankment height from Table 2.24.

2. For C-02.20 slopes with embankment height over 30', use length for 30' embankment height from Table 2.26.

3. For C-02.30 slopes with embankment height over 33', use length for 33' embankment height from Table 2.26.

4. For spillway details, see Std C-04.10.

### Spillway Length Table

#### Thickness

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**C-02.10 and C-02.20 SLOPES**

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**C-02.30 SLOPES**
GENERAL NOTES

1. Stub shall have annular corrugation. Downstream piping beyond stub may be either annular or helical.

2. Couplings shall be mechanical heat-shrinkable polyolefin sheets; one place into type neoprene sheet or to be sealed with 12” min. width and 18” min. flange.

3. Maximum O Allowable = 8 cfs
   Minimum V Allowable = 1 fps

SECTION A-A
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 is built up 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 pavement. The joints in the gutter shall be placed at each pavement change of elevations and at approximately 50 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand tooled or sawed.

4. Expansion joints shall be located at tangent points in curb returns, at structures and at maximum 50 foot intervals. The one-fourth 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 fine brush along the length of the curb and gutter.

6. All exposed edges and hard tooled 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 conform to the cross section as shown except that the horizontal dimensions shall not vary more than one-half inch.

EXPANSION JOINT DETAIL

VALLEY GUTTER

EMBANKMENT CURB

C, C-1 & C-1

See General Note 2

Edge of Pavement

Curb and Gutter Type B, C, B-1 & C-1

FREEWAY CURB & GUTTER

SINGLE CURB TYPE A & A1

C & G TYPE

CURB "H" GUTTER GUTTER DEPRESSION "D"

A 0 N/A N/A

A-1 0 N/A N/A

B 2'-6" 1 1/2" N/A

B-1 6" 3d N/A

B-2 6" 3d N/A

C 3" 6d 1/2"

C-1 3" 6d N/A

See Plans (6 or 7 Inch Typical)

See Plans (6 or 7 Inch Typical)

EXPANSION JOINT DETAIL

VALLEY GUTTER

EMBANKMENT CURB

SINGLE CURB, CURB & GUTTER, EMBANKMENT CURB

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
GENERAL NOTES

1. All gutter flow lines shall be constructed to an accurate grade.
2. See Splitter Drain Slabs, C-13,60 and C-15,91, for curb and gutter with splitter drain.
3. See Std. C-05.10 for additional general notes and dimensions.

SECTION A-A

SECTION B-B

TYPE 1 - CURB & GUTTER TRANSITION - AT RAMP TAPERS
- Dimension may vary where exit occurs on curves, see plans

TYPE 2 - CURB & GUTTER TRANSITION

Entrance Ramp - 100' - Exit Ramp - 28.6'
PERSPECTIVE VIEW

SECTION A-A

CURB & GUTTER TRANSITION

TYPE 3 - CURB & GUTTER TRANSITION AT PAVED GORE
GENERAL NOTES

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

2. Two inch deep transverse contraction joints shall be placed in driveways along the centerline of the driveway.

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

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. Top of curb (TC) and driveway elevations shown are in relation to the gutter. Curb +0.00.

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

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

LEGEND

G Cross slope 0.01 Per Ft. (Typical)

O Straight grade with downward slope.

* Maximum slope = 0.02 Per Ft.

SECTION A-A

SECTION B-B
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 5 feet or at a spacing that matches adjacent curb and gutter. If the sidewalk is over 7 feet in width, a 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 36 square feet. Joints shall be either formed or sawed. Filled joints shall be finished with a tool having a 1/4" radius.

3. Expansion joints shall be located between sidewalks and driveways and at abutting structures. Expansion joints shall match the joints in the adjacent concrete pavement or existing concrete curb and sidewalk. 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 1/2 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. For use when sidewalk is not continuous both sides. If sidewalk is anticipated in the future, utilize Type 1 or Type 6 Ramp.

2. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter and are located radially, gutter "0".

3. See Std C-0510 and C-0513 for joint requirements.

4. Where curb heights of 6" or less are shown on plans, use dimensions shown in "7a.

5. When curb heights of greater than 7" are shown on plans, see plans and ADA requirements.

SECTION A-A

SIDEWALK RAMP WITHOUT PEDESTRIAN BYPASS

ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP
GENERAL NOTES

1. Top of curb (TC) elevations shown are in relation to the gutter and are located radially, gutter 6".

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

WITH RAMP CURB

GROOVE DETAIL

SIDEWALK RAMP AT BARRIER TERMINUS

SIDEWALK BEHIND BARRIER
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 and C-05.20 for joint requirements.
3. When curb heights of 6" or less are shown on plans, use dimensions shown in 1 1/2".
4. When curb heights of greater than 1" 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.

PLAN

ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP

SECTION A-A

GROOVE DETAIL

SIDEWALK RAMP AT MIDBLOCK

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

Sheet 4 of 6

DESIGN APPROVER
DESIGNER
SIGNED:
8/99

S-05.30
GENERAL NOTES
1. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter.
   "Gutter-0".
2. See Std C-05:10 and C-05:20 for joint requirements.
3. When curb heights of 6" are shown on plans, use dimensions shown in 1 Tc.
4. If field modification is required, bottom width shall be 4' minimum, as per ADA requirements.
   Use type A1 curb if median is to be landscaped.

PLAN

ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP

SECTION A-A

PERSPECTIVE

GROOVE DETAIL

SIDEWALK RAMP AT MEDIAN ISLAND CROSSING

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

Jamm H. Cottines
Director

Sheets 1 of 4

C-05:30

8/99
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 Std C-05.10, C-05.11 and C-05.20 for joint requirements.

3. Decorative median paving shall be stamped 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 6" concrete header shall be used to end decorative paving at locations when concrete slowdown 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 C.

8. When curb heights of 6" are shown on plans, use dimensions shown in drawing 2.

9. See Structure Plans for raised median on structures.
The PCPC surfaces within the bus bay area shall be textured transversely, surface texturing to conform to Section 40E.

Transverse weakened plane joints shall be constructed at a maximum spacing of 0'-0" and shall align with joints in the concrete curb and gutter.

For additional data on slotted drains, see slotted drain Sts C-1350.

For Y2' expansion joint with preformed joint filler, see Detail A.

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

For sidewalk construction details, see Sts. C-0025.
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 trucks moving 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. The property line can be located anywhere, in reference to the driveway, depending on mutual agreement.

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. Paved turnouts, when not on a public street, shall have a minimum 1200' of surface material, type and standard. Examples: 20' x 30' AC-10, Type A, 5%r C-0610. Show radius of curvature.

10. Construction of curbs, gutter, sidewalk, and drainage facilities in urban areas by the permittee, along that portion of the highway 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 materials shall be the same as that shown for main roadway, unless otherwise noted.

13. Desirable street center line for rural turnouts are 60'.

RURAL DEVELOPMENTS

1. 10 Win, 20' Desirable
2. 15 Win
3. 25 Win, 40' Desirable
4. 40 Win
5. One Way Couplet for Use Only on One Way Roadways
6. Residential - 10 Win, 30' Max
7. Commercial - One Way 15 Win, 30' Max
8. Two Way 25 Win, 40' Max
9. Driveways
10. Industrial - 20 Win, 40' Max

URBAN DEVELOPMENTS

1. 10 Win, 20' Desirable
2. 15 Win
3. 25 Win, 40' Desirable
4. 40 Win
5. Industrial - 30 Win, 30' Max
6. Driveways
7. Residential - 10 Win, 30' Max
8. Commercial - One Way 15 Win, 30' Max
9. Two Way 25 Win, 40' Max
10. Driveways
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.

4. Breakage greater than 1% requires a vertical curve. L402" Min. Vertical curve shall not encroach on roadway or sidewalk.

URBAN CROSS SECTION (UP GRADE)

Driveway Surface

Extension of Driveway Grade (Typ)

URBAN CROSS SECTION (DOWN GRADE)

Driveway Surface

Commercial & Industrial
20'-40' Desirable
Residential 10' Min Desirable

RURAL CROSS SECTION (UP GRADE)

RURAL CROSS SECTION (DOWN GRADE)

22' to 33' Desirable

DESIRABLE URBAN CROSS SECTION
GENERAL NOTES

1. Where load transfer dowel assemblies are required, use dimensions shown in Fig. 17a. See Assembly Placement and Edge Clearance Detail, Std C-0702.

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
TWP - Transverse Weakened Plane Joint
LC - Longitudinal Construction Joint
TC - Transverse Construction Joint
E, H - Expansion Joints
S - AC/PCCP Pavement Edge Seal Joint
T - PCCP Thickness

AC/PCCP EDGE SEAL JOINT

S Joint

WEAKENED PLANE JOINT DETAIL
GENERAL NOTES

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

2. A "B" joint shall be placed where piers, abutments, barrier transitions, light pole foundations, sign structure foundations, catch basins, spotted drains and Special Construction Operations (SCO) are located alongside the PCCP edge unless otherwise noted in the plans or the standard drawings.

JOINT ABBREVIATIONS

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

Curb & Gutter Joint
- G Joint
- Curb & Gutter Joint

Half Barrier Joint
- B Joint
- Half Barrier Joint

Single Curb Joint
- A Joint
- Single Curb Joint

Median Barrier Joint
- B Joint
- Median Barrier Joint

Footings:
- New PCCP
- Varies
- Varies
- Varies
- Varies
- New AC Pavement
- Varies
- Varies
- Varies
- Varies
- New PCCP
- New PCCP
- New PCCP
- New PCCP
- New PCCP

Joints:
- No. 5 x 2'-0" Reinforcing Bars at 5'-0" C to C
- No. 5 x 1'-8" Reinforcing Bars at 5'-0" C to C
- No. 5 x 2'-0" Reinforcing Bars at 5'-0" C to C
- New AC Pavement
- New PCCP

Expansion Joint Material:
- Preformed Expansion Joint Material (Typ)
- Silicone Sealant
- Recess 1/4" from Pavement Surface See Note 2

Design Approach:
- John H. Cattaneo

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STATE OF ARIZONA

Sheet 1 of 2
GENERAL NOTES

1. Load transfer dowel assemblies shall be used with non-swept PCPP 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 Std C-07.01 thru C-07.05 for additional information.

4. See plans or Std C-07.03 thru C-07.05 for transverse joint spacing.

5. Plans for pavement thickness less than 12" or greater than 14".

Load transfer dowel assembly shall be assembled from the following materials. (See Quantity Table):

- Dowel bars - 1/2" dia x 1-1/2" plain round bars w/coating.
- See Special Provisions.
- Intermediate legs - 2 Ga or W-5.5 wire.
- End legs - 2 Ga or W-5.5 wire.
- Upper space bar - 2 Ga or W-5.5 wire or 0.450 dia ASTM A27 Class I w/1/2" head or washer to be power driven.

PLAN VIEW

1. LOAD TRANSFER DOWEL ASSEMBLY

- Structural Base See Plans
- Lane Width
- See Note 1 and C-07.01
- Load Transfer Dowel Assembly (Typ)
- LC or LMP Joint
- Structural Base See Plans
- LMP or LC Joint

TRANSVERSE WEAKENED PLANE JOINT WITH LOAD TRANSFER DOWEL ASSEMBLY

- Structural Base See Plans
- Lane Width
- See Note 1
- 10'-4" 12'-4" 14'-4"

ASSEMBLY PLACEMENT AND EDGE CLEARANCE DETAIL

- Lane Width
- 12' 14' 16'
- Item No.
- 11 13 15
- 15 18 22 26
- 4 4 4
- 2 2 2
- 5 5 6 7
- 10 12 14
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 2" minimum (typical).
   "C" shall equal 2" minimum (typical).

3. See Std C-07.02 for PCCP joints and additional notes.

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

5. See Std C-05.02 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 LMP & LC joints shall be placed no greater than 1/3" from the TC joint.

- Transverse Construction Joint (TC)
- Allowable limits (typ).

PLAN
58° PCCP

PLAN
55.5° PCCP
GENERAL NOTES

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).
   "C" shall equal 2" minimum (typical).

3. See Std C-03.01 for PCCP joints and additions.

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

5. See Std C-03.10 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 LMP & LC joints shall be placed no greater than 1-3" from the TC joint.

8. Transverse construction joint joints shall be located.

Typical Joint Sequence (TJP Joint):
General Notes:

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

2. At shall equal 4 minimum (typical).
   \( T \) shall equal 3 minimum (typical).
   \( C \) shall equal 2 minimum (typical).

3. See Spec C-0101.01 for PCCP joint requirements.

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

5. See Spec C-0501.00 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.

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

8. Transverse construction joint (TC) allowable limit (typical).

Plan 96.25' PCCP

Concrete Median Barrier

Plan 84.25' PCCP

Concrete Half Barrier or Concrete Curb & Gutter

Concrete Median Barrier

Plan 72.25' PCCP

Concrete Half Barrier or Concrete Curb & Gutter

Concrete Half Barrier or Concrete Curb & Gutter
GENERAL NOTES

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

2. See Std C-07.01 for PCP Joints and additional notes.

3. All transverse joints shall be in line with joints in adjacent slabs and be 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 LWP & LC joints shall be placed no greater than 1'-3" from the TD joint.

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

PLAN 58' PCCP

PLAN 55.5' PCCP
GENERAL NOTES
1. Non-skewed PCPP joints shall be used with load transfer dowel assemblies.
2. See Std C-07.01 for PCPP joints and additional notes.
3. All transverse joints shall be in line with joints in adjacent tabs and are perpendicular 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 LBP & LC joints shall be placed no greater than 1-3' from the LC joint.
7. Transverse weakened 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-07.01 for PCCP joints and additional notes.
3. All transverse joints shall be in line with joints in adjacent slabs and are perpendicular to the longitudinal joints.
4. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetric 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'-3" from the LC joint.
7. Transverse weakened plane joint shall be constructed at least 1'-3" from a transverse construction joint.
GENERAL NOTES

1. Dimensions with a tolerance may be adjusted to align the nearest transverse weakened plane construction joint as directed.

2. See Std C-07.01 for Joint Information.

3. See plans for ramp dimensions.

4. See Std C-07.05 for Sections A-A and B-B.

5. The ratio of transverse to longitudinal joint spacing shall be greater than 1/2, but not more than 1/2.

6. Ramp transverse joints shall be perpendicular (90°) to the ramp longitudinal joints, except as shown at the ramp terminal.

\[ \text{Angle Minimum} \]

\[ \text{Varies - 18 Maximum} \]

\[ \text{11 Minimum} \]

\[ \text{Transition, See Std C-05.12} \]

\[ \text{Without Curb & Gutter} \]

\[ \text{12 Face of Curo to Face of Curo} \]

\[ \text{Mainline Structure Section, See Plans} \]

\[ \text{Ramp Structure Section, See Plans} \]

\[ \text{Gore Structure Section, See Std C-08.20} \]

RAMP TERMINAL AT CROSSROAD

RAMP WITHOUT CURB AND GUTTER

RAMP WITH CURB AND GUTTER
GENERAL NOTES

1. For paved gore area details, see Std C-88.20.
2. Parallel deceleration lane to be used only under special conditions necessitating ramp curvature ahead of gore.
3. The 50-lb 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 E

300 + 0.49 lbs

EXIT RAMP

Paved Gore Area

Construction E

Paved Gore Area

Construction E

0.49 lbs mph

1375.37

50-lb Taper

RAMP GEOMETRIES

STATE OF ARIZONA
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DIVISION OF HIGHWAYS
STANDARD DRAWINGS

RAMP GEOMETRIES

C-8810
GENERAL NOTES

1. Paved gore area shall be Class S Concrete, f'c = 4000 psi or asphaltic concrete as called for on plans.

2. See Std. C-07.01 and C-07.04 for joint layout and details.

SECTION A-A

SECTION B-B

SECTION C-C
GENERAL NOTES

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: Shoulders 6' and greater
   - Divided highways: Right shoulders 6' and greater; left shoulders 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 half segments of 2" inside diameter pipe have been welded to the drum. The pipe segments shall be 2" long and spaced at approximate 8" 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 curbs shall be protected by guard rail.
2. Guard rail shall extend beyond the limits of embankment curbs.
3. See Std. C-10.03 for measurement limits.

SECTION

TYPE A GUARD RAIL INSTALLATION

REFLECTOR TAB DETAIL

STATE OF ARIZONA
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STANDARD DRAWINGS

DESIGN APPROVED

JULY 94

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

& RALPH MILLER

C-10.01

DESIGNER

DATE

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DEPARTMENT OF TRANSPORTATION
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 B GUARD RAIL INSTALLATION
**GENERAL NOTES**

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

2. Post type (Timber, Steel, or Concrete) shall match post type of adjoining guard rail.
THREE BEAM BRIDGE RETROFIT

BRIDGE DADO RETROFIT

Measurement Limits for W Beam and Three Beam System
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-0501, 0512, 1001, and 1002 for dimensions and details not shown.

3. Type B guard rail installation shown. For Type A guard rail installation, use Type B-1 Curb and Gutter instead of the Type D-2 Curb and Gutter shown. For Type A guard rail installation, the Guard Rail Extruder Terminal as per Standard Drawing C-1001.

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

5. Bituminous joint filler (5") shall be placed where the curb & gutter or concrete widening abuts silted drainage ditches, catch basins, ditches, barrier, etc. Scored joints, 2 inches in depth, shall be placed to match adjacent joints in PCCP 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. Height of curb shelf not exceed 4 inches.
   • - indicates AASHTO designation

PLAN

Curb & Gutter
Type B, C, B-1 or C-1
Std C-05-10 As Per Plans

ELEVATION

G40(S-MODIFIED)

W BEAM BACK-UP PLATE DETAIL

See W Beam Back-Up Plate Detail

1 1/2" Splice Bolt (Typ)

1/2"-UNCX1" Hex Bolt (Ø)
and Hex Nut (Ø) with Wide
Type A Plain Washer (Typ)

1/2"-UNCX1/2" Button Head Bolt (Ø)
and Recess Nut (Ø) with Wide
Type A Plain Washer (Typ)

SECTION

Curb & Gutter
Type B, C, B-1 or C-1
Std C-05-10 As Per Plans

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GENERAL NOTES

1. ● Indicates ARTBA designation.
2. See Std C-10.20 and C-10.21 for additional information and dimensions.

SECTION A-A

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

SECTION B-B

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

1. Use Type 3 Nested Steel # Beam to span downtown or fills as shown in the plan view.

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

PLAN

ELEVATION

NESTED STEEL # BEAM - TYPE 3 - LONG SPAN
Length = 37'-6"
GENERAL NOTES

1. See Std C-10.20 and C-10.21 for additional information and dimensions.

PLAN

<table>
<thead>
<tr>
<th>G4 (55) System</th>
</tr>
</thead>
<tbody>
<tr>
<td>G4 (25) System</td>
</tr>
<tr>
<td>G4 (15) System</td>
</tr>
<tr>
<td>G4 (15W) System</td>
</tr>
</tbody>
</table>

Steel # Beam

Traffic

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

72" Timber Post (Shown: Type)

Box Culvert - Width Varies

ELEVATION

BOLTED ANCHOR
BOX CULVERT INSTALLATION
**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**

**BOLTED ANCHOR**

**TIMBER POST INSTALLATION DETAIL**

**INSTALLATION DETAIL**

**STEEL POST INSTALLATION DETAIL**

**BRACKET DETAIL**
GENERAL NOTES
1. Curb not required when drainage flows transversely away from barrier.

2. Treatment at back of lip curb modified for constructibility purposes. Front slope and height of lip curb shall not be exceeded.

* - Indicate ARTBA designation.

PLAN

Concrete Barrier Transition Type 10' to Thrie Beam
Type C 10'0 x 3'0 on Bridge
Concrete Barrier Transition Set 30 Series

Thrie Beam Terminal Connector (●)

2.5' x 5" Lip Curb
See Lip Curb Detail

SECTION A-A

F Shape Barrier
Transition Curb

W - Thrie Beam
Transition Section (●)

LIP CURB DETAIL

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
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STANDARD DRAWINGS

C-10.30

4/00

[Diagram showing details of a barrier system with labels and measurements]
Concrete Barrier Transition, Std C-10.10 on Bridge Concrete Barrier Transition, Std B-20.20

10"x10"x6'-6" Wood Post

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

6"x8"x14" Wood Block (Typ)

Measurement Limit

5415 System
Or GU20 System

Traffic

PLAN

Rectangular Plate Washer (W) Required Under Head of Bolt on the First Two Posts Only.

3'-1/2"

9"

ELEVATION

3'-1/2"

3'-1/2"

3'-1/2"

3'-1/2"

3'-1/2"

3'-1/2"

6'-3"

6'-3"

3'-1/2"

3'-1/2"

1'-0"

Post System

Rectangular Plate Washer (W) Not Required

5/8" (16NCx18"") Button Head Bolt (B) and Recess Nut (R) with Wide Type A Plain Washer (Under Nut) (Typ)

Guard Rail Transition (Timber Post)

Guard Rail Transition To Existing Concrete Barrier Transition

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

State of Arizona
Department of Transportation
Division of Highways
Standard Drawings

Design Approved

1/30/94

DRAWING NO.
C-10.30
Sheet 2 of 3
**GENERAL NOTES**

1. 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 appropriate 15 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand tooled or sewed.

2. Curb not required when drainage flows transversely away from barrier.

- Indicate ARIBA designation.
Concrete Barrier Transition, Type F' to # Beam
Std C-10.71 or Bridge Concrete
Barrier Transition, DWG SD 0002

Gavanized
(Steel Pipe)
(XXX)

5-7/8" x 14" Hex Bolt and Hex Nut
With Wipe Type A Plain
Washer (Typ)

Anchor Plate
See Detail A

Thrie Beam Guardrail Transition System

- Thrie Beam
Transition Section (Typ)

ELEVATION

GENERAL NOTES
1. For use with one-way traffic or
with two-way traffic outside the
clear zone.
- Indicate AWTBA designation.
1. For use with one-way traffic or bridge concrete barrier transition, Std B-2139 & B-2120

- Indicates ARTBA designation

# Beam Back Up Plate
All Non-Lap Connections

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

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

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

# Beam Terminal Connector (#)

PLAN

Rectangular Plate Washer (#)
Required under head of five bolts along concrete transition

3/4"-10UNCx3" Hex Bolt (Typ)
With 3/4" Narrow Type A Plain Washer Under Head, Anchor with 2 Bolts at Opposite Corners (Typ)

1/2"-13UNCX1/2" Button Head Bolt (#)
and Recess Nut (#) with 1" Narrow Type A Plain Washer Under Head (Typ)
This Splice Connection Only

ELEVATION

Existing Concrete Barrier Transition

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

Guard Rail Transition

DESIGN APPROVED
10/95

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STANDARD DRAWINGS

GUARD RAIL TRANSITION
# BEAM TO CONCRETE HALF BARRIER TRANSITION

Sheet 1 of 3
4" x 8' x 14' Wood Blockout (Typ)

6" x 8.5" x 6'-0" or 6" x 9" x 6'-0"
Structural Shape Post (Typ)

3/8"-11UNC x 3" Button Head Bolt (Ø) and Recess Nut (Ø) with Wide Type A Plain Washer Under Nut (Typ)

Concrete Barrier Transition, Std C-10.70, C-10.71 or Bridge Concrete Barrier Transition, Std B-21.19 & B-21.20

Steel # Beam 12 Gauge

Curb and Gutter
h = 4', Std C-00.39 Per Plans

Guard Rail Transition (Steel Post)
**BLOCK AND ANCHORAGE DETAILS**

**DIMENSION**

<table>
<thead>
<tr>
<th>BLOCK</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1½&quot;</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>3</td>
<td>2½&quot;</td>
<td>1½&quot;</td>
</tr>
<tr>
<td>4</td>
<td>3½&quot;</td>
<td>2½&quot;</td>
</tr>
<tr>
<td>5</td>
<td>4½&quot;</td>
<td>3½&quot;</td>
</tr>
</tbody>
</table>

*Note: Block 1 is a ½"x12"x14" Plate*

**HALL BARRIER**

(Block 1 Shown)

**HALL BARRIER**

(Block 2 Shown)

**MEDIAN BARRIER**

(Block 2 Shown)

**BLOCK DETAILS**

Blocks 2, 3, 4 and 5
1. The cable assembly shall be tightened to remove slack.

2. To ensure that the bearing plate remains in position, one wrap of 14 gauge galvanized steel wire shall be wrapped around the terminal post near the top of the plate.

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

* See W-Beam End Section (Rounded), ARTRA Std. RE-6-15, for dimension variables.

O - indicates ARTRA designation
GENERAL NOTES

1. Half Barrier shall be constructed by the slip form or formed Cest-In-Piece 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_c = 3000 psi.
4. If the footing and barrier are cast monolithically, No. 6 S shaped rebar 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 2' past the construction joint at the completion of the day's pour.

▲ Depth to match adjacent PCCP thickness 18" Min.

WITH PCC PAVEMENT
BARRIER WITH CUTTER

WITH AC PAVEMENT
SECTION B-B

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HALF BARRIER
CAST IN PLACE
SLIP FORM & FIXED FORM

C-10,60
GENERAL NOTES

1. Concrete shall be Class S, design strength T2 >3000 PSL.

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

3. Pavement thickness adjacent to half barrier shall be 3½ minimum.

4. 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 foot sections.
**GENERAL NOTES**

1. Concrete shall be Class S, design strength f'c = 3000 PSI.
2. Half Barrier shall be placed upon either Asphaltic or Portland Cement Concrete Pavement.
3. Pavement thickness adjacent to Half Barrier shall be ¾" 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.
7. All bend dimensions for reinforcing steel shall be cut-to-out-of-bend.

---

**ELEVATION**

- **SECTION A-A**
  - 2" Grout
  - 1/4" AC or ASPC
  - 3/4" Rebar (Typical)
  - Dowel Hole (Typical)

- **SECTION B-B**
  - 2" Diameter Rebar Hole at 10' C to C
  - 2" Diameter Rebar (Typical)
  - 1" Radius (Typical)
  - 4½" Clearance (Typical) unless otherwise shown

- **SECTION C-C**
  - 2" Diameter Rebar Hole at 10' C to C
  - 1 Cu Ft Aggregate Material (Sected)
  - Shown 6" Minimum Asphaltic Concrete, or Use Portland Cement Concrete Pavement

---

**CONSTRUCTION JOURNAL DETAIL**

- **PLAN**
  - Lifting Device Location
  - 19'11½" Pressure Grout Hole
  - 1" Dia x 18" Dowel (Typical)
  - Top of Pavement

- **ELEVATION**
  - Filler Material (See Plans)
  - 10" Radius
  - 2" Clearance (Typical) unless otherwise shown
  - Pavement Surface
  - 3" Clearance
  - Grout

---

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CONCRETE HALF BARRIER 42" TYPE 9'- PRECAST

4/00

C-10.6516
1. Half Barrier shall be constructed by the slip form or formed Cast-in-Piece method.
2. When obstacles are encountered which prevents 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 is 3000 PSI.
4. No. 4 Rebar shall extend 12" past the construction joint at the completion of the day's pour.
5. Thickness of footing, 0" can be adjusted to match the PCPP 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.
8. Two inch deep contraction joints shall be placed in the gutter at locations which match the joints in adjacent Portland cement concrete pavement and at approximate 15 foot centers when adjacent to asphalt concrete pavement. Joints shall be either hand foiled or sawed.
GENERAL NOTES

1. Half Barrier shall be constructed by the slip form or formed Cast-In-Place method.
2. When obstacles are encountered which prevents the use of slip form equipment, the closure shall be accomplished by the use of stationary forms.
3. Concrete shall be Class 5, design strength f'c = 3000 PSI.
4. No. 4 Rebar shall extend 12" past the construction joint at the completion of the pour.
5. Thickness of footing, "D" 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.
8. Two inch deep contraction joints shall be placed in the gutter at locations which match the joints in adjacent portland cement concrete pavement and at approximate 15 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand tooled or sawed.

No. 6 Rebar 5 Shaped (Typ)

No. 4 Rebar Continuous

PLAN

No. 4 Rebar Continuous

No. 6 Rebar 5 Shaped (Typ)

ELEVATION

No. 6 Rebar 5 Shaped

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

BARRIER GUTTER DETAIL

No. 6 Rebar Variable

SECTION A-A

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

PCCP, See Plans

Base Material, See Plans

2'-0" 1'-4½" 4½" 4" 10' Radius

Gutter Detail See Plan 2'-6" or 4'-6" (Typ)
GENERAL NOTES

1. Concrete shall be Class 5, design strength f_c = 3000 PSI.
2. If the footing and barrier are cast monolithically, No. 6 and 5-shaped rebar 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.

PLAN

ELEVATION

WITH AC
SECTION A-A

WITH PCCP
SECTION A-A

KEY WAY DETAIL

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STICK Approval
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STICK Approval
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GENERAL NOTES

1. Concrete shall be Class S, design strength f_c = 4000 PSI.
2. The wall barrier shall be placed upon a bed of grout in order to provide a uniform bearing.
3. Dowel 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.

PLAN

ELEVATION

CONSTRUCTION JOINT DETAIL
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.

WITH AC
SECTION A-A

WITH PCPP
SECTION A-A

KEY WAY DETAIL
GENERAL NOTES

1. Concrete shall be Class C, design strength is 4000 PSI.

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

3. Dowel 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.

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

ELEVATION

CONSTRUCTION JOINT DETAIL

WITH AC
SECTION A-A

AT REBAR – WITH PCPP
SECTION B-B

KEY WAY DETAIL
GENERAL NOTES

1. Median 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 using stationary forms.

3. Concrete shall be Class 5, design strength 13500 PSI.

4. If the footing and barrier are cast monolithically, No. 6 or 5 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 PCC thickness 18" Min.

SECTION A-A
GENERAL NOTES

1. Median barrier shall be constructed by the slip form or by the 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 headed rebars will not be required.

5. In no case shall the width of barrier exceed the width of the barrier footing or overlap 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 PCCP thickness 18" Min.
GENERAL NOTES

1. Concrete shall be Class S, design strength 12,+6000 PSI.
2. Half Barrier shall be placed upon either Asphaltic or Portland Cement Concrete Pavement.
3. Pavement thicknesses adjacent to Half Barrier shall be 1/2" 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.
7. All bend dimensions for reinforcing steel shall be cut-to-cut at 3/8".

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 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 shell out-to-out of bars.

PLAN

ELEVATION
BARRIER WITHOUT CURB

* 1'-0" Min or Max
Thickness of Adjacent PCC Pavement
GENERAL NOTES

1. See section B-B for calson reinforcement.

* 1'-0" Min or Max
  Thickness of Adjacent
  ACC Pavement

See Option 1 Construction
Joint Detail, Sheet 3
GENERAL NOTES

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

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

3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.

4. All bond dimensions for reinforcing steel shall out-to-out of bars.

5. Two inch deep contraction joints shall be placed in the gutter at locations which match the joints in adjacent Portland cement concrete pavement and at all adjacent ISRA adjacent to asphaltic concrete pavement. Joints shall be either hand tooled or sawed.

PLAN

BARRIER END DETAIL

ELEVATION

BARRIER WITH CURB AND GUTTER

1" Min. or Match
Thickness of Adjacent ACC Pavement
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-of-out of bars.

PLAN

ELEVATION
BARRIER WITHOUT CURB

* 1'-0" Min or Match Thickness of Adjacent PCC Pavement
GENERAL NOTES

1. See section B-B for caisson reinforcement.

* 1'-0" Min or Max
  Thickness of Adjacent
  PCC Pavement

(2) See Optional Construction
  Joint Details, Sheet 3
CONSTRUCTION JOINT DETAIL (OPTIONAL)

Concrete Barrier Transition

Epoxy Grout (Type)

6 No. 8 Rebar

No. 4 Rebar Tie @ 12"
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.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. All bend dimensions for reinforcing steel shall be out-to-out of bars.
5. Two inch deep contraction joints shall be placed in the gutter at locations which match the joints in adjacent Portland cement concrete pavement and at an approximate 15 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand foiled or sawed.

ELEVATION
BARRIER WITH CURB AND GUTTER

PLAN

BARRIER END DETAIL

CONSTRUCTION JOINT DETAIL (OPTIONAL)

See Construction Joint Detail (Optional)
GENERAL NOTES

1. All concrete shall be Class "S" (5'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 spotted drain and catch basin details.
5. Barrier transition shall match both adjoining curb and gutter and concrete half barrier.
7. All band dimensions for reinforcing steel shall be out-of-out of bars.
8. Two-inch deep construction joints shall be placed in the gutter at locations where the joints match the construction joints in the pavement and at approximate 15 foot intervals when adjacent to aesthetic concrete pavement. Joints shall be either hand tooled or sawed.

PLAN VIEW

SECTION C-C

TRANSITION TO VERTICAL TYPE CURB

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
BARRIER TRANSITION 32" TYPE 1
TANGENT DEPARTURE

Sheet 1 of 2
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. 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 cut-to-out of bars.
7. Two inch deep construction joints shall be placed in the gutter at locations which match the joints in adjacent portland cement concrete pavement and at approximate 10 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand tooled or sawed.

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

TRANSITION TO FREEWAY CURB

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

BARRIER TRANSITION 32" TYPE 9
TANGENT DEPARTURE

TYPE 2

Design No. 1997-1075
Sheet 3 of 3
GENERAL NOTES

1. All slots in rub rail are 3/4" x 3".
All square holes are %4" x 1/2".

MODIFIED C6X8.2 RUB RAIL DETAIL
PLAN
RUB RAIL BACK BLOCKOUT DETAIL

SECTION

SECTION

PLAN
STEEL POST

PLAN
TIMBER POST

RUB RAIL TERMINAL ASSEMBLY

1/4"-12UNCx1/2" Hex Bolt
and hex Nut with
Washer Type A Plain
Washer (Typ)

1/4"-12UNCx1/2" Round Head
Square Neck Bolt and hex
Nut with Washer Type A Plain
Washer (Typ)

Rub Rail Back
Blockout

Cut Std 6"x8"x14" Wood Blockout

Rub Rail Back Blockout Detail

See Rub Rail Back Blockout Detail

1/4"-12UNCx1/2" Round Head
Square Neck Bolt and hex
Nut with Washer Type A Plain
Washer (Typ)

1/4"-12UNCx1/2" Round Head
Square Neck Bolt and hex
Nut with Washer Type A Plain
Washer (Typ)

Rub Rail Terminal
Anchor (Typ)
Std. C-10.74

Rub Rail Terminal
Anchor (Typ)
Std. C-10.74

Median Barrier

Half Barrier

Elevation
RUB RAIL ANCHOR

C6x8.2 Rub Rail
Std. C-10.80

C6x8.2 Rub Rail
Std. C-10.80

C6x8.2 Rub Rail
Std. C-10.80

ELEVATION
RUB RAIL ANCHOR

C6x8.2 Rub Rail
Std. C-10.80

C6x8.2 Rub Rail
Std. C-10.80

6"x8"x14"

C4561 or C4562
System Steel Post

C4561 or C4562
System Wood Post
GENERAL NOTES

1. Half Barrier Transition shall be constructed by the formed Cast-In-Place method.

2. Concrete shall be Class S, design strength f'c = 3000 PSI.

3. If the footing and barrier are cast monolithically, No. 6 S rebars will not be required.

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

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

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

7. Two inch deep contraction joints shall be placed in the gutter at locations which match the joints in adjacent portland cement concrete pavement and at approximate 5 foot centers when adjacent to aesthetic concrete pavement. Joints shall be either hand tooled or sawed.
GENERAL NOTES

1. Posts shall be 12'-6" to C. Structural steel shall conform to ASTM A-36, galvanized ASTM A-123.


3. Hat section lock washer shall conform to ASTM A-333, galvanized ASTM A-153 Class C.

4. Tension wires: XG-100418 galvanized to conform to ASTM A-166 Class 2.

5. Hog ring: XG-100418 galvanized ASTM A-166 Class 2. Fasten glare screen to top and bottom tension wire spaced approximately 2" apart.

6. Glare Screen: 16 Gauge steel ASTM A-526, galvanized ASTM A-153/SG/100%. Expanded to the following dimensions: L18" short of diamond and 4.0" long of diamond centered to center of bridge with a width of L2500" and an angle of 20° to the plane of the original sheet. Top edge to be shop cut and clipped on 1" centers. glare screen shall be installed such that flat portion of screen blocks light from headlights, see direction detail.

7. Splices allowed in glare screen at posts only, with one flat diamond overlap.

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

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

2. Grill units shall be set on an angle assembly consisting of one 6\(\times\)6\(\times\)\(\frac{3}{4}\)" angle and \(\frac{3}{8}\) diameter studs 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\(\times\)4\(\times\)\(\frac{3}{4}\)" angle and \(\frac{3}{8}\) diameter studs 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\(\times\)4\(\times\)\(\frac{3}{4}\)" angle and one 2\(\times\)2\(\times\)\(\frac{3}{4}\)" angle and connected with \(\frac{3}{8}\) diameter studs. The assembly shall be crowned at the centerline and constructed with a bevel cut and welded. 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. Where guard rail is to be used at the cattle guard, it may be possible to reduce the number of grill units required.

UNIT TABLE

<table>
<thead>
<tr>
<th>Roadway Width (ft)</th>
<th>Grill Units Required</th>
<th>Concrete Cubic Yards</th>
<th>Reinforcement Lbs</th>
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<td>2</td>
<td>5.8</td>
<td>173.5</td>
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<td>24</td>
<td>5</td>
<td>12.5</td>
<td>376.1</td>
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<td>6</td>
<td>14.7</td>
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<td>32</td>
<td>7</td>
<td>16.9</td>
<td>511.2</td>
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<tr>
<td>36</td>
<td>8</td>
<td>18.9</td>
<td>511.2</td>
</tr>
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</table>
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
GENERAL NOTES

1. See Std C-1110 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 C-C
WHERE USED FOR THRU DRAINAGE-
CATTLE GUARD OPEN BOTH ENDS
**GENERAL NOTES**

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

2. 2½" x 3½" x 14'-0" ties, 2½" x 3½" bearing bars and 2½" nominal diameter pipe for assemblies shall be primed with one coat of No. 1 paint and finished with two coats of yellow enamel paint.

---

**SECTION A-A**

- 1½" x 2½" x 6½" Oberture
- 2½" x 3½" x 14'-0" Ties
- 1½" x 2½" x 6½" Oberture
- 2½" x 3½" x 14'-0" Ties
- 2½" x 3½" x 14'-0" Ties

**FOR 8' TIES**

- 2½" x 3½" x 14'-0" Ties
- 1½" x 2½" x 6½" Oberture
- 9½" x 3½"

**FOR 9' TIES**

- 2½" x 3½" x 14'-0" Ties
- 1½" x 2½" x 6½" Oberture
- 9½" x 3½"

---

**SECTION B-B**

- 3½" x 3½" x 14'-0" Ties
- 3½" x 3½" x 14'-0" Ties
- 3½" x 3½" x 14'-0" Ties
- 3½" x 3½" x 14'-0" Ties

**DETAIL NO. 1**

- 2½" x 3½" x 14'-0" Ties
- 1½" x 2½" x 6½" Oberture
- 9½" x 3½"

**DETAIL NO. 2**

- 2½" x 3½" x 14'-0" Ties
- 1½" x 2½" x 6½" Oberture
- 9½" x 3½"

**DETAIL NO. 3**

- Varies with tie length
- See Detail No. 1 and No. 2

---

**TABLE: SHIM HEIGHT**

<table>
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<tr>
<th>Rail Lbs/Yd</th>
<th>80</th>
<th>90</th>
<th>110</th>
<th>115</th>
<th>119</th>
<th>131</th>
<th>150</th>
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</thead>
<tbody>
<tr>
<td>2½&quot; x 3½&quot;</td>
<td>2½&quot;</td>
<td>2½&quot;</td>
<td>3½&quot;</td>
<td>3½&quot;</td>
<td>4½&quot;</td>
<td>4½&quot;</td>
<td>4½&quot;</td>
</tr>
</tbody>
</table>

**DIAMETER GALVANIZED DOME HEAD SPIKE LENGTH**

| 1½" | 1½" | 1½" | 1½" | 1½" | 1½" |

---

**DESIGN APPROVED**

<table>
<thead>
<tr>
<th>STATE OF ARIZONA</th>
<th>DEPARTMENT OF TRANSPORTATION</th>
<th>DIVISION OF HIGHWAYS</th>
<th>STANDARD DRAWINGS</th>
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</thead>
<tbody>
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<td></td>
<td></td>
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</tr>
<tr>
<td>1/96</td>
<td></td>
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</tr>
</tbody>
</table>

---

**CATTLE GUARD, RAILROAD**

| C-1130             |                               |                     |                  |

---

**Russell M. Williams**

| 7/96               |                               |                     |                  |
GENERAL NOTES

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

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
1. Intermediate Post Assemblies shall be located as shown and at intervals not to exceed 500 ft. or midway between all braced posts.

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

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)
TYPICAL FENCE LOCATION AT CATTLE GUARD

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
GENERAL NOTES

1. Posts shall be round, H-section, or roll-formed and shall conform to the nominal dimensional requirements shown on the plans. Dimensional tolerances for all heights shall be according to ASTM A-500. In addition, the material of which posts are fabricated shall have a nominal thickness, before galvanizing, of not less than 0.112" for the posts and 0.130" for terminal posts.

2. Chain link fabric shall be either zinc-coated or aluminum-coated steel wire fabric. Zinc-coated steel fabric shall conform to the requirements of ASTM A389, Class 1 coating. Aluminum-coated steel fabric shall conform to the requirements of ASTM A-495, with a minimum weight of coating of 0.40 ounce per square foot. Wire surface area fabric shall be #1 gauge for all fabric 60 inches or less in height. For larger heights, #1 gauge for fabrics greater than 60 inches in height. Tension wires shall be 7 gauge (0.017 inch diameter) galvanized steel wire with a minimum tensile strength of 15,000 pounds per square inch and shall be zinc-coated or aluminum-coated. 

3. Tension wires shall be 7 gauge (0.017 inch diameter) galvanized steel wire with a minimum tensile strength of 15,000 pounds per square inch and shall be zinc-coated or aluminum-coated.

4. Truss rods shall be 0.5 inch diameter adjustable rods. Truss tensioners shall have a strap thickness of not less than 0.1 inch.

5. Stretcher bars shall be 0.5 inch by 0.5 inch steel flat bars. Stretcher bar bands shall be 0.5 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 more if between post assemblies 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 I SHOWN

TYPICAL POST DIMENSIONS

<table>
<thead>
<tr>
<th>Fabric Height</th>
<th>Corner, End, Inter., Gate, Latch and Pull Posts</th>
<th>Line Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Round</td>
<td>Roll Formed</td>
</tr>
<tr>
<td></td>
<td>Length</td>
<td>OD</td>
</tr>
<tr>
<td>36'</td>
<td>6'-0&quot;</td>
<td>2.375</td>
</tr>
<tr>
<td>48'</td>
<td>7'-0&quot;</td>
<td>2.375</td>
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<tr>
<td>60'</td>
<td>8'-0&quot;</td>
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<tr>
<td>72'</td>
<td>9'-0&quot;</td>
<td>2.375</td>
</tr>
<tr>
<td>Over 72'</td>
<td>Height</td>
<td>2.875</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. Barbed wire for use with Type 2 chain link fence shall be 12 guage steel wire with 4 point 14 guage barbs spaced five inches apart and shall be either zinc-coated or aluminum-coated. Zinc-coated steel wire shall conform to the requirements of ASTM A224, Class I coating. Aluminum-coated steel wire shall conform to the requirements of ASTM 630, Type 1, Class I coating.

2. Barbed wire support arm shall be of the type shown on the plans, shall be fabricated from commercial quality steel, and shall be zinc-coated in accordance with the requirements of AASHTO M115.

3. Bottom tension wire shall be clear top of crown on concrete footings.

4. For details and notes not shown - see plan view fence on Type I, sheet 1 of 3.

5. See sheet 3 of 3 for typical fence location.

TYPICAL CHAIN LINK FENCE INSTALLATION - TYPE 2 SHOWN

TYPICAL POST DIMENSIONS

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Corner, End, Intermediate, Gate, Latch and Pull Posts</th>
<th>Line Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>Round</td>
<td>Roll Formed</td>
</tr>
<tr>
<td></td>
<td>Length</td>
<td>Length</td>
</tr>
<tr>
<td>72&quot;</td>
<td>0&quot;</td>
<td>2.375&quot;</td>
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DETAILED CONSTRUCTION

DETAIL G
BARBED WIRE SUPPORT ARM
GENERAL NOTES

1. All concrete shall be Class 5, 4000 psi.
2. All bolts, 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.
4. The 3/8" galvanized wire rope shall conform to AASHTO M22 Class B, Type 2.
5. The wire fabric, ties, bands, stretcher bars, and other fittings and hardware shall conform to AASHTO M51.
6. The wire fabric fencing shall follow contour of the graded median.
7. The excavation for the concrete anchor blocks shall be to neat lines, maximum excess shall be 3".
8. Perforated posts shall be square tubes formed from 0.055 x 0.055 gauge ASTM A 536 Grade B 55, 36 x 36 cold rolled carbon steel. The square tubes shall be welded directly in the corner by high frequency resistance welding or equal. The posts to be externally coated to agree with standard corner raiid of 3/8" radius.
9. Perforated posts shall be galvanized to the requirements of ASTM A 653/A 653M. Coating Designator shall be Z75.
10. The cables shall have enough tension to prevent sagging. The location of the concrete anchor blocks may also be varied to provide enough tension to help prevent sagging.
11. Two interior U-bolt and clamp bars shall be spaced at 1/3 of the distance between posts.
13. An alternate to rectangular concrete anchor blocks shall be a 36" diameter round footing with an additional depth of 4'.
14. The median approach grade within 100 ft of the Chain Link Cable Barrier should not exceed a grade break of 10 percent.

NOTE: Shown G4 UNI System Without Curb. May Use Other Systems With or Without Curb.
GENERAL NOTES
1. See plans for any required inlet and/or outlet protection.
2. See remaining C-13 Series standards, Std B-1111 and Std B-1114.
3. Dimensions A and E apply to both non-trench and trench conditions.
4. Minimum cover over pipe culverts shall be 12", measured from the top of pipe.
5. See Pipe Berm Requirement Detail for pipe berm requirements and Std C-1033D for installation. 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.
6. Potting of slopes at pipe locations similar for pipes without end sections and for multiple pipe installations.

CULVERT INSTALLATION WITHOUT END TREATMENT

CULVERT INSTALLATION WITH END SECTION

CULVERT INSTALLATION WITH HEADWALL

MINIMUM SPACING FOR MULTIPLE INSTALLATIONS

<table>
<thead>
<tr>
<th>Diameter or Span</th>
<th>Installation Type</th>
<th>Headwall (E)</th>
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<tbody>
<tr>
<td>18&quot;</td>
<td>Projecting (R)</td>
<td>2'-6&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>12&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>15&quot;</td>
<td>3'-9&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>18&quot;</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>21&quot;</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>48&quot; to 96&quot;</td>
<td>60&quot; or 5x/2</td>
<td>60&quot; and 36&quot;</td>
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<tr>
<td>72&quot; and Over</td>
<td>36&quot;</td>
<td>60&quot; and 36&quot;</td>
</tr>
</tbody>
</table>

PLATING SLOPES AT PIPE LOCATIONS

PIPE BERM REQUIREMENT DETAIL

MULTIPLE INSTALLATIONS WITH END SECTIONS

MULTIPLE INSTALLATIONS WITHOUT END SECTIONS
GENERAL NOTES

1. Minimum cover over pipe culverts shall be 12", measured from the top of pipe.

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 A, or given two coats of an approved hot asphalt paint, as directed by the Engineer.

SPECIAL MULTIPLE PIPE END SECTION DETAIL
FOR PIPE CULVERT EXTENSIONS ONLY

PERFORATED CMP INSTALLATION

PIPE AND CATCH BASIN INSTALLATION
AT SAG CONDITION OF CUT DITCH

PIPE AND CATCH BASIN INSTALLATION
AT BASE OF TRANSVERSE DIKE

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 horizontal limits are exceeded or the vertical limits are not maintained, a non-trench condition exists.

3. Bracing and sheeting shall conform to OSHA requirements.

4. Pipe backfill may be bedding material.

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 materials and pipe backfill. If the contractor chooses to construct it as a trench condition, the embankment shall be constructed before excavating the trench.


a. D+5 inches each side minimum for diameters less than 4 feet.
   - D+2 feet maximum for diameters up to 4 feet.
   - D+1 feet each side minimum for diameters equal to or over 4 feet.
   - D+3 feet maximum for diameters 4 feet or over.

b. 6 inches except when an unyielding or unsteable material. See standard specifications.

- TRENCH BACKFILL
- PIPE BACKFILL
- BEDDING

TRENCH CONDITION

IN NATURAL GROUND OR IN EMBANKMENT
WITHOUT BRACING

TRENCH CONDITION

IN NATURAL GROUND OR IN EMBANKMENT
WITH BRACING SHOWN

TRENCH CONDITION

NRCICP IN NATURAL GROUND
OR IN EMBANKMENT

NON-TRENCH CONDITION

Embankment for Pipe Stability

Existing Ground Line

Embankment for Pipe Stability

Top of Embankment

Slope or Bracing Per OSHA Requirements

Slope or Bracing Per OSHA Requirements

Slope or Bracing Per OSHA Requirements

Trench Form
20° Min.

Trench Form
20° Min.

Trench Form
20° Min.
GENERAL NOTES
1. Design of end section shall conform to standards.
2. End section joint conformation shall match the pipe 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>
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<tr>
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<td>5380&quot;</td>
<td>4 1/2 21 63 35 98 78</td>
<td>3</td>
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</table>

PLAN

SECTION A-A

FRONT ELEVATION

RIGHT ANGLE CULVERT

SKEWED CULVERT
RIGHT ANGLE CULVERT

SKewed CULVERT

GENERAL NOTES
1. The end section may be joined to the pipe or connector section by bolts, rivets, dimpled 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. Minimum circumferential fastener spacing shall be 12" and with a minimum of 5 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 end section components shall be galvanized.
6. Toe of embankment shall be crimped to match toe of skewed end section.
7. A bump shall be added to abnormal projections per Std C-1330.
8. The foregoing applies to all cross section configurations.

<table>
<thead>
<tr>
<th>Dimensions - Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe Dia</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>18&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
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<tr>
<td>42&quot;</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions - Inches</th>
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</thead>
<tbody>
<tr>
<td>Pipe Arch</td>
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<tr>
<td>-----------</td>
</tr>
<tr>
<td>21&quot;</td>
</tr>
<tr>
<td>28&quot;</td>
</tr>
<tr>
<td>35&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
</tr>
<tr>
<td>49&quot;</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. For lateral dimensions of invert paving, use T2" control for CMP and span for CMPC.

2. Paving shall be scored laterally at 2'-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 corrugations 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 B-1112 for headwall and bevel dimensions not shown.
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 144" 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 backfill 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. Legs shall be a minimum of 6".

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

1. Slotted drain pipe shall be 2¾"x¾" corrugated steel pipe with a minimum wall thickness of 0.034" and shall conform to the requirements of AASHTO M325.

2. All concrete shall be Class B.

3. Reinforcing steel shall conform to A302-1, Grade 40.

4. Structure steel shall conform to ASTM A36.

5. Concrete anchors shall conform to ASTM A307 and hex nuts shall conform to ASTM A563 Grade A.

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

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 final acceptance.

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

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


14. Rebars shall be 3/8" diameter and 2'@2' o.c. for all reinforcing.

15. Bearing Bar 1/2"x1/2" Plate Cont. 7/8" x 7/8" Head Square Neck Bolt with 3/4" Heavy Hex Nut.

16. CMP Coupling Band with BPI 2/3' x 2/3' x 5/8' x 2 1/2".

17. CMP Slotted Drain.
GENERAL NOTES

1. Pipe colors not required where direct catch basin connections can be made within 90° 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 tee shall be used when the outside diameter of the inlet pipe exceeds one half of the outside 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 L is 45° or less, type I 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.
GENERAL NOTES

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

2. If depth of cover is less than 5' or greater than 10', increase plug thickness a minimum of 4'.

DRAINAGE OUTLET INTO CHANNEL

STORM DRAIN PLUG
GENERAL NOTES
1. All Concrete shall be Class B.
2. All reinforcing steel shall conform to AASHTO M18, Grade 40.
3. All reinforcing steel shall have 3" minimum clear cover.
4. 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, “T” & “Y” shall be those of 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 2".

PIPE COLLAR TABLE

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>L</th>
<th>T</th>
<th># of Ties</th>
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</thead>
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<tr>
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<td>1.00</td>
<td>4&quot;</td>
<td>3</td>
</tr>
<tr>
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<td>3</td>
</tr>
<tr>
<td>24&quot;</td>
<td>1.00</td>
<td>6&quot;</td>
<td>3</td>
</tr>
<tr>
<td>30&quot;</td>
<td>1.50</td>
<td>8&quot;</td>
<td>3</td>
</tr>
<tr>
<td>36&quot;</td>
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<td>48&quot;</td>
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<tr>
<td>84&quot;</td>
<td>2.25</td>
<td>16&quot;</td>
<td>5</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. Catch basin can be used on grade or at roadway edge.

2. Catch basin has three configurations:
   - Sump Only
   - Sump portion of catch basin
     (See detail No. 41)
   - Single wing illustrated
     - Sump with wing basin upstream
     - Double wing basin with symmetrical wing basins each side.

3. Pipes can be placed in any wall except wall adjacent to wing basin.

4. Floor shall have a wood finish. Slope of the sump portion of the catch basin along the axis of the pipe shall be 4%.

5. Any specified inlet depression shall be warped to opening according to 5% of C(15,70).

6. All structural steel shall be ASTM A36.

7. Nose plate, access frame, and cover shall be painted with one coat of No. 1 paint.

8. All concrete shall be Class B.

9. All reinforcing bars shall be A-4 1/2" C to C both ways and 1/2" clear to inside of walls and outside of wing basin floor except as shown.

10. Curb opening area (sq ft) per inch of curb:
    - "4" curb depression x curb opening length (ft) x 0.0633.

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

12. Construction joints and dams shall be placed to meet field conditions. See Std C(15), 70.

13. GT = 6" when H is 8" or less.
    - 8" when H is greater than 8".
GENERAL NOTES
1. See sheet 1 of 2 for other dimensions, notes and reinforcing steel.
2. @ = 6" when H is 8' or less, 8" when H is greater than 8'.

SECTION A-A
USE THIS SECTION WHEN H IS GREATER THAN 5'

PLAN

Curb Support Anchor
4' Max Anchor Spacing
See Detail No. 2

Catch Basin Sump
Wing Basin

Construction Joint
20s

No Bottom Reinforcing

Construction Joint

DETAIL NO. 1
Nose Plate
8" x 9" Bent Plate
Lengths: 2'-11 1/2" or 2'-19 1/2" + L + 5'

Anchor
No. 4 Bar

b Bar, 6" C to C
See Detail No. 3

DETAIL NO. 3

DETAIL NO. 2
CURB SUPPORT ANCHOR

DETAIL NO. 4
Normal Gutter Slope

1/2" BOLT x 1/2"
Max Head Bolt
With 3" of Thread

No. 4 Bar

Sheet 2 of 2
CATCH BASIN, TYPE 3
C-1520

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

DESIGN APPROVED

STATE ENGINEER

DRAFTED BY

REVISION HISTORY

DATE

C-1520
5/97
**GENERAL NOTES**

1. Catch basin can be used on grade or at roadway seg.
2. Pipes can be placed in any wall.
3. Floor shall have a wood trowel finish and a minimum 6" slope along the axis of the pipe toward the pipe.
4. Curb over catch basin shall not be constructed until catch basin concrete has set for a minimum of 24 hours.
5. Catch basin can be used with curb and gutter (as shown) or without.
6. See SdC 115.50 for grade and frame details and opening areas.
7. Any specified inlet depression shall be warped to opening according to SdC 20.3.17G.
8. All structural steel shall be ASTM A36.
9. Grate, frame, and beam shall be given one shop coat of No. 1 paint.
10. All concrete shall be Class B.
11. Construction joints and slabs shall be placed to meet field conditions. See SdC C-15.10.
12. Silicone sealer shall be placed between the grate frame and PCP, recessed 3/4" from the pavement surface.
13. See Detail No. 2 for catch basin with wide gutter.
14. **G1**: 6" when h is 8" or less.<br>6" when h is greater than 8".<br>See Section B-B.
   - 9" when pavement is AC.<br>Screen pavement thickness when pavement is PCP.

---

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

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

**SECTION A-A**

**SECTION B-B**

**SECTION C-C**

**DETAIL NO. 1**

**DETAIL NO. 2**
**GENERAL NOTES**

1. Catch basin can be used on grade or at roadway sep.
2. Catch basin has three configurations:
   - Sump-Sump portion of catch basin
   - Single Wing (Illustrated)-Sump with wing basin
   - Double Wing (Illustrated)-Sump with symmetrical wing basins each side.
3. Pipes can be placed in any wall except wall adjacent to a wing basin.
4. Floor shall have a wood traffic finish. Slope of the sump portion of the catch basin along the axis of the pipe shall be 4%.
5. Any specified inlet depression shall be warped to opening according to Std C-150.10.
6. All structural steel shall be ASTM A36.
7. Nose plate shall be given one shop coat of No. 1 paint.
8. All concrete shall be Class B.
9. All reinforcing bars shall be No. 4, 1/2" C to C both ways and 1/2" clear to inside of wall and outside of wing seal floor except as shown.
10. Curb opening area 1" per inch of curb height. Inlet depression + curb opening length (1") x 0.0034.
11. Staining shall be in accordance with Standard Weeding Specifications.
12. See Std C-15.50 for grate and frame details and opening areas.
13. Construction joints and grading shall be placed to meet field conditions. Std C-15.10.
14. Silicone sealant shall be placed between the grate frame and PCP, recessed 7/8" from the pavement surface.
15. H: 6" when H is 8' or less, 8" when H is greater than 8'. See Section C-C.
16. T: 9" when pavement is AC. Match pavement thickness when pavement is PCP.

**SECTION C-C**

USE THIS SECTION WHEN T=8"  

**SECTION D-D**

No Bottom Reinforcing
GENERAL NOTES

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

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

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

4. Frames and grates shall fit to a maximum rough at any point.

5. Grate opening is 3.97 sq. ft.

SECTION

FRAME

SECTION A-A

GRATE
GENERAL NOTES

1. Cover shall be non-locking.
2. Frame and cover shall be cast iron or structural steel.
3. Catch basin access frame and cover is for use in sidewalk area only.
4. Cover shall be filled with concrete and broom finished.
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. 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.
5. See Detail No. 2 for grate type catch basins with wide gutter.

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-15.80.

CATCH BASIN SPACING AT ROADWAY SAG CONDITION

INLET DEPRESSION

CATCH BASIN WITH SLOTTED DRAIN

INLET DEPRESSION
CATCH BASIN WITH WIDE GUTTER

DETAIL NO. 1

DETAIL NO. 2
SECTION

Curb & Gutter
See Plans

Normal Gutter Slope

Gutter Flow Line

Normal Gutter Slope

Varies

SECTION

Curb & Gutter
See Plans

Gutter Line

Normal Gutter Slope

Gutter Control Grade

Normal Gutter Slope

Slotted Drain
When Shown on Plans

CATCH BASIN CONSTRUCTION DRAIN

6" x 18 ga. CMP
Length as Required

Catch Basin Wall

Slope to Drain

Subgrade

Plug With Conc
Upon Pavement
Completion

GENERAL NOTES
1. Construction drain may be deleted at the option of the Engineer.

LEGEND
O - Normal pavement or gutter flow line elevation.

TYPE 4 CATCH BASIN WITHOUT CURB
## General Notes
1. See also Std. C-13.100.
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. 5'-0" C to E and 3' clear to inside of walls and floor.

## Plan

### Elevation

### Section Y-Y

### Section Z-Z

## Pipe Dimensions and Quantities

<table>
<thead>
<tr>
<th>Pipe</th>
<th>Dimensions</th>
<th>Quantities</th>
<th>Concrete C.T.</th>
<th>Reinforcing Steel</th>
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<td>Double</td>
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<tr>
<td>L.D.</td>
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<td>C.M.P.</td>
<td>C.M.P.</td>
<td>For Concrete Pipe Deduct</td>
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<td>Lb.</td>
<td>For Concrete Pipe Deduct</td>
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<td>2&quot;-8&quot;</td>
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<td>9&quot;</td>
<td>1-3/8&quot;</td>
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<td>30&quot;</td>
<td>3°-6&quot;</td>
<td>7'-10&quot;</td>
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<td>278</td>
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</tbody>
</table>
GENERAL NOTES

1. Apron shall be portland cement concrete, Class B.
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. As indicated on plans.
   - 6" when wall height exceeds 6".

SECTION C-C

SECTION A-A

SECTION B-B

SECTION D-D

WALL HEIGHT DETAIL

DIMENSION TABLE

<table>
<thead>
<tr>
<th>Slope</th>
<th>A</th>
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<tbody>
<tr>
<td>6d/1</td>
<td>0.50'</td>
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<tr>
<td>4d/1</td>
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<tr>
<td>3d/1</td>
<td>1.00'</td>
</tr>
<tr>
<td>2d/1</td>
<td>1.50'</td>
</tr>
</tbody>
</table>

CATCH BASIN, MEDIAN SIDE SLOPE

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

DESIGN APPROVED: 5/97

REVISED: 5/97
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. 3 paint.

5. Foundation soils and backfill shall be in accordance with Section 203-5 of the Standard Specifications.

SECTION A-A

SECTION B-B

END VIEW

BOLT DOWN CLIP DETAIL

LOCATION AS SHOWN ON PLAN

PLAN

SECTION C-C

SECTION D-D

DESIGN APPROVED

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

10/95

CATCH BASIN, MEDIAN Dike PREDAST

PRELIMINARY

DRAWING NO.

C-15.90
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, 1/2" C to C horizontal & vertical in walls.
5. Pipe can be placed in any wall.
6. See Std C-1560 and C-1565 for more information and dimensions of slotted drain.
7. "t" is 6" when H is less than 8'.
   "t" is 8" when H is greater than 8'
GENERAL NOTES

1. All structural steel shall be in accordance with ASTM Spec. A-36.

2. Grate 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 costs 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 4.31-4.27.

<table>
<thead>
<tr>
<th>GRATE AND FRAME DIMENSIONS</th>
<th>Catch Basin Frame</th>
<th>Catch Basin Grate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Curb Height</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>6'</td>
<td>2'6&quot;</td>
</tr>
<tr>
<td>C</td>
<td>3'</td>
<td>2'-6&quot;</td>
</tr>
</tbody>
</table>

**PLAN VIEW FRAME**

**PLAN VIEW GRATE**

**SECTION A-A**

**SECTION B-B**

**BRACE PLATE DETAIL**
GENERAL NOTES

1. See Std C-15.91 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 used to steel acting as a connection device to the concrete shall conform to AWS D11 and specifications 4.21 - 4.27.

5. Where applicable, see Std C-10.60 for water main placement.

6. See Std C-10.65 for additional general notes.

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

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

CATCH BASIN WITH HALF BARRIER

HALF BARRIER INSTALLATION AT SLOTTED DRAIN LOCATIONS

REINFORCING DETAIL
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 1'-0" center to center unless otherwise noted.

3. 30" wing wall. Flare shown, 45° normally does not show. See Hydraulics and Utility and Railroad Engineering Sections.

<table>
<thead>
<tr>
<th>PIPE DIAMETERS</th>
<th>DIMENSIONS</th>
<th>QUANTITIES</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
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<td>54&quot;</td>
<td>7'-0&quot;</td>
<td>3'-6&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>8'-0&quot;</td>
<td>4'-0&quot;</td>
</tr>
</tbody>
</table>

DESIGN APPROVAL
Robert H. Coffin
Director of Construction
Department of Transportation
Division of Highways
State of Arizona

IMPROVEMENT NO.
18" TO 60" DIAMETER PIPES

C-16/10
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. Plans shall specify pock or bolted cover for standpipe No. 2.
5. For specific details of a flush pavement or sidewalk installation, see Utility and Railroad Engineering Section.

COVER
IRRIGATION STANDPIPE NO. 1

LOCKING COVER
IRRIGATION STANDPIPE NO. 2

BOLTED COVER FOR STANDPIPE NO. 2

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

IRRIGATION STANDPIPES
C-16.20
**TYPE 1 IRRIGATION GATE**

For Open ditch installation

**TYPE 2 IRRIGATION GATE**

For pipes 6” through 24” Gate and frame shall be galvanized iron. Type shown is for concrete pipe.

For Cast iron external steel adjustable bend shall be used in lieu of internal steel ring.

**PART SECTION**

FLUSH IRRIGATION VALVE

Concrete 12” or 18” to be included with valve.

Irrigation Valve Number of Valve shall correspond to the size of pipe in inches. No 6 to No 20.

**ELEVATION**

**SECTION**

16 Gauge Galvanized Iron Gate

Pipe Size 6” Thru 18” as Listed for on Plans

Slot in Concrete for Gate
GENERAL NOTES

1. Irrigation sleeves shall be installed in a trench condition. See Std C-13 and Std C-10.6.2.
2. Bedding and backfill material shall be Class 2 Aggregate Base.
3. Pipe installation shall conform to Section 501 of Standard Specifications.
4. The Contractor shall imprint a 4" high letter "D" on the face of all curbs at sleeve locations. The width of the letter shall be 1/2", and shall penetrate the concrete surface 1/8".
5. For non-continuous sleeves under crossroads, Std C-5.10 Type "A-1" 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. Slope may vary in superlabeled sections. Minimum slope nominal 10% drain.**
GENERAL NOTES
1. Rock shall be sound and durable, of rounded or angular shape and with a nominal diameter of 8" minimum and 12" maximum. Flat or needle shapes are not acceptable.
2. Wire mesh splice shall have a 6" minimum lap vertically and horizontally.

TYPE 1 AND 2 BANK PROTECTION

Win 20' Railroad Rail or Equal
T-6" Center to Center
Type 1/12' Long, Type 2/12' Long

TYPE 3 BANK PROTECTION

Win 20' Railroad Rail or Equal, 1/2' Long
T-6" C to C

<table>
<thead>
<tr>
<th>TYPE</th>
<th>H</th>
<th>TOP OF BANK PROTECTION ABOVE THE STREAM BED</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0' to 2'</td>
<td>2' to 4'</td>
</tr>
<tr>
<td>1</td>
<td>0' to 3'</td>
<td>4' to 7'</td>
</tr>
<tr>
<td>2</td>
<td>0' to 6'</td>
<td>6' to 12'</td>
</tr>
</tbody>
</table>
GENERAL NOTES
1. Rock shall be sound and durable, of rounded or angular shape and with a nominal diameter of 8" minimum and 21" maximum. Flat or needle shapes are not acceptable. Rock shall be comprised of 50% min. 8" to 12" and 50% max. 18" to 21".
2. Wire mesh splice shall have a 6' minimum lap vertically and horizontally.

PLAN

SECTION A-A

TYPE 4 AND 5 BANK PROTECTION

TYPE 6 BANK PROTECTION
**GENERAL NOTES**

1. Precast manholes shall conform to the requirements of AS5910 M99 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 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 AS5910 M99.

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. When specified on the plans, the cover (excluding grates) shall include agency identification and conform to the following: Lettering on manhole cover to contain name of agency and utility as directed. Letters and words to be equally spaced. Letters to be 2 in. in height and raised 1/8 in. 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. H20 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

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

SECTION B-B

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

SECTION C-C
GENERAL NOTES
1. All dimensions are minimum except where noted.
2. Location & elevation shown on plans.
3. Compaction to conform to Sect. 303-2 or 501.

PLAN

Four Steel Spacers, 4"x3" thickness as required from ½" to 2". When thickness is less than ¾", use mortar. When greater than 2", use brick or precast adjusting rings.

PRECAST ADJUSTING RING DETAIL

Detail:
- (2) No. 2 Hoops for 4" ring, tied with No. 4 A.S.A.R. Gauge Wire. 6" & 9" ring require (4) No. 2 Hoops.
- Wet thoroughly and paint with grout.

SECTION
MANHOLE COVER FRAME
ADJUSTMENT - PAVEMENT
CUT AND REPLACEMENT

EXISTING
PCCP

EXISTING
AC Paving

6" Bars

6" Bars
CONCRETE SURFACE ROAD
CONCRETE WALLS

* Min Distance Below Stream Bed

BITUMINOUS SURFACE ROAD
CONCRETE WALLS

GENERAL NOTES

1. Ford walls shall be Class B concrete.
2. Depth gauge readings shall be protected against concrete entering through bottom or perforations.
3. Depth gauge tubing and both sides of numeral tabs shall be painted with two coats of white enamel. Numerals and markers shall be painted with one coat of gloss black enamel.

DEPTH GAUGE DETAIL

ELEVATION LOOKING UPSTREAM
GENERAL NOTES

1. All timber shall be rough, pressure treated and untreated.

2. Rock basket, full length of structure, shall be included only when called for on plans.

3. See plans for bituminous surface and base materials.

4. See Std C-19.10 for Depth Gauge details. Depth Gauge Foundation may be utility concrete.

WITH TREATED BASE

TYPE 1
BITUMINOUS SURFACE ROAD

DETAIL A

6x6 Welded Wire Fabric. Tie with 2 Strips of 20 Ga. Tie at top and bottom of basket to top 2x2 Plank at 5'-0" intervals and at each end. Tie by encircling Plank with two Strands of No. 9 Wire.

TYPE 2
BITUMINOUS SURFACE FORD
TIMBER CUTOFF WALLS

ELEVATION - TYPE 2

Options for Rock Basket
Full Length of Structure
See Detail A and Plans
**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 "Ph." The allowable tolerance for machined areas shall be ±1/64". Concrete shall conform to the requirements of the specifications.

8. "B" or pavement structure thickness, whichever is greater.

**H.W.Y. R. OF W: P.C. 10+43.82**

**ELEVATION**

**SURVEY MONUMENT**

**RIGHT OF WAY MARKER**

**ELEVATION**

**REFERENCE MARKER**

**FRAME AND COVER**

**COVER SECTION**

**SURVEY MONUMENT**

**FRAME A**

**FRAME B**

**PLAN**

**SECTION**
GENERAL NOTES

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

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

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

4. Bench Marks shall be established on headwalls, bridge curbs 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. 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 5" 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 12" 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 C.I.P. or ductile iron pipe may be used as an alternative. For Type B crossing reinforced encasement is always required.

TYPE A ENCASEMENT

- Water Line
- Class B Concrete
- 6'-0" Perpendicular

No. 3 Stirrups 8" C to C
No. 4 Bars 8" C to C
Class B Concrete
Concrete or Sand Bedding Per Sect. 501

TYPE B ENCASEMENT

- Water Line
- Class B Concrete
- 6'-0" Perpendicular

Do Not Allow Concrete to Clog Joint (Typ)
**GENERAL NOTES**

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

2. Type C pipe support may be used for crossings where a 6" diameter of 18" or less, if sufficient clearance over storm sewer is available and total span is less than 34'.

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

4. The contractor shall be responsible for furnishing all supports both 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 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 place the wall with suitable openings to prevent unequal pressure resulting from flooding of the backfill. The volume of the placed opening shall not exceed 3/4 the volume of the supporting wall.

7. Use Type B pipe support instead of Type C when clearance between pipes is less than 3' in table.

8. Concrete cover for reinforcing steel shall be 3", 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>Conc Irrig Pipe</td>
<td>Conc Box Culvert</td>
</tr>
<tr>
<td>Buried Trench</td>
<td>Traffic Control</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 M299 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 M299 requirements. Steps not required in 60" manhole.

3. Use low alkali cement only.

4. Pipe sizes and elevations shown on plans.

5. Frame and cover shall be adjusted to the finished grade prior to placing of the aesthetic concrete or RCCP surface.

---

**TYPE B TOP**

- 24" or 30" Frame and Cover Per Std C-1820
- 26 3/4" on 48" Manhole 30" on 60" Manhole
- Brick or Concrete for fine Adjustment
- Flat Reinforced Concrete Top
- Rubber Gasket with Expanded Bell Joint
- Bell Up or Down Contractor Option
- Meets or Approved Gasket

**TYPE A TOP**

- 26 3/4" on 48" Manhole 30" on 60" Manhole
- Brick may be used in lieu of Precast Adjusting Rings
- Steps in 48" Manhole only See Note 2
- Belt or Down Contractor Option

---

**PRECAST SEWER MANHOLE**

- 48" ID, 60" for 15" Pipe and Over
- 5" Concrete Mortar (Typ)
- 4" (Typ)
- Pressed Into Base
- Cast In Place
- Round or Square Base Optional
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 12', increase plug thickness a minimum of 4'.
TYPE A
2.5' TO 5' DROP

TYPE B
5' OR MORE DROP
CLEANOUT INSTALLATION

- 8" Cast Iron Frame and Cover
- Unpaved Streets and Alleys
- Paved Streets and Alleys
- Standard 45° Bend
- Class B Concrete 6" Thick, 40" Diameter
- Vitrified Clay Pipe
- Compacted Backfill or Undisturbed Earth
- To be Laid on Undisturbed Earth or Compacted Backfill Material or AB Class 2
- Flow Line Elevation Shown on Plans to this Point
- Station and Length Shown on Plans to this Point
1. Thrust blocks are to extend to undisturbed ground.
2. All concrete shall be class B.
3. Table is based on 3000 psi. If soil, if conditions are found to indicate soil bearing less, the areas shall be increased accordingly.
4. Areas for pipe larger than 15" shall be calculated for each project.
5. Form all non-bearing vertical surfaces.

### GENERAL NOTES

#### MINIMUM THRUST BLOCK AREA REQUIRED (Y x W)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>WATER PIPE</th>
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<tbody>
<tr>
<td></td>
<td>TEE, DEAD END, 45° &amp; 22½° BENDS</td>
</tr>
<tr>
<td>4&quot; &amp; LESS</td>
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<td>6&quot;</td>
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<td>9&quot;</td>
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<tr>
<td>12&quot;</td>
<td>13&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23&quot;</td>
</tr>
</tbody>
</table>

### SECTION A-A

**Area required for 90° Bend**

**Y x Area Required for 90° Bend**

**Total Area equals Area Required for Tee**

**Thrust Block**

**Curb Stop**
GENERAL NOTES

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 Std C-23.30.
GENERAL NOTES

1. Either 3/4" or 1" rebar 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>4-DIMENSION HOOP</th>
<th>MINIMUM BLOCK DIMENSION</th>
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<tbody>
<tr>
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<td>*6</td>
<td>5&quot;</td>
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<td>9&quot;</td>
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</tr>
<tr>
<td>12&quot;</td>
<td>*6</td>
<td>9&quot;</td>
<td>4x2x5</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-2310 and C-2320.
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 sections is to be prefabricated and installed as a single unit for cast iron mechanical joints.

CAST IRON

ASBESTOS CEMENT
TYPE A-2
TO BE USED WHEN VALVE BOX IS LOCATED WITHIN PCCP PAVEMENT

TYPE B
NOT SUBJECT TO VEHICULAR TRAFFIC

Cast Iron Cover and Valve Box
See Note 6

Asphaltic Conc Pavement
See Note 4

Concrete Ring not Required when Adjusted in Unpaved Areas

Pour Concrete Color
6" thick and 30" diameter
GENERAL NOTES

1. Thrust blocks are to extend to undisturbed ground.
2. Optional blocking of 2½" x 2½" 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 at 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 sleeves 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.

SIZE OF PIPE BEING CONNECTED  MINIMUM THRUST AREA REQUIRED (A x B)

<table>
<thead>
<tr>
<th>Size</th>
<th>Area</th>
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<tr>
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<tr>
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<tr>
<td>12&quot;</td>
<td>13 SQUARE FEET</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23 SQUARE FEET</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. This detail is for use only on underground installations where the use of concrete thrust basing per Std DC 2230 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. Washers shall be 3/4 inch larger than the rod.

3. All the rods, rod couplings, turnbuckles, bolts and nuts for these joints shall be of carbon steel equivalent to ASTM A-507, grade B, with cadmium plating. In accordance with ASTM B 766, except that the minimum thickness of the plating shall be 0.002 of an inch. 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 ASME C-15, 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 spigot 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 and space available for working around the particular joint will influence the choice of methods used.

6. In certain assemblies of rod and clamps shown, one clamp run from a lug on the fitting or a clamp behind a 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 bolt above a relatively long piece of pipe on both sides of 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 behind 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 907.200.

9. Bolt holes in clamps shall be 3/4 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 BOLTS</th>
<th>WASHERS CAST IRON</th>
<th>WASHERS STEEL</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1/2&quot;</td>
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<td>3/4&quot; x 3&quot;</td>
<td>1/2&quot; x 3&quot;</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 tamped in true forms.

2. Use Class 5 concrete, f_c=4000 psi.

---

**METER BOX DIMENSIONS**

<table>
<thead>
<tr>
<th>BOX NUMBER</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>A</td>
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<td>29½&quot;</td>
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<td>12&quot;</td>
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<td>18½&quot;</td>
<td>20½&quot;</td>
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<tr>
<td>C</td>
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<td>12&quot;</td>
<td>13&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>D</td>
<td>14&quot;</td>
<td>19&quot;</td>
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*½" or ¾" METER 1' METER 1½" METER 2' METER*
GENERAL NOTES

1. All steel per section 1004-1 and 1004-2.

SPECIFICATIONS

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<th>D</th>
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DESIGN APPROVED

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

STRENGTH OF MATERIALS

DESIGN BY: J. E. Cottenco

C-23.50
**GENERAL NOTES**

1. Cut and plugs must be adequately “dry blocked”.
2. Dry blocks shall be standard size solid masonry concrete blocks (ASTM C-195).
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 the 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-2210.
7. Where a 4" or larger line is specified to be abandoned, the cut end plug should occur at the supply line main to avoid creating an unused deadend line.
GENERAL NOTES

1. All joints in hydrant run-out to be mechanical joints.

2. Hydrant Tee 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 shut-off 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.

ELEVATION
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