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 supplemental packet:

- Standard C-05.30 (Sheet 1 and Sheet 6) are revised to show correct orientation of the grooving on winged portions of the sidewalk.

- Standard C-9.10 is deleted. Traffic Engineering recently issued new standard drawings for Rumble Strips.

- Standard C-10.30 is revised to show guardrail transition to concrete half barrier 32” ‘F’ - Shape for AC pavement in rural condition.

- Standard C-10.31 shows minor modifications.

- Standard C-10.32 is revised for Departure Guard Rail Transition.

- Standard C-10.39 is deleted because it is no longer in use.

- Standard C-10.60 and C-10.61 are revised to reflect ‘F’ Shape Concrete Barrier.

- **New** Standard C-10.61a is developed for 42” ‘F’ Shape Concrete Barrier.

- Standard C-10.62 contains minor modifications.
- Standard C-10.64 is revised to reflect ‘F’ Shape Concrete Barrier.

- **New** Standard C-10.64a is developed for 42” ‘F’ Shape Concrete Barrier.

- Standard C-10.65, C-10.66 and C-10.68 are revised to reflect ‘F’ Shape Concrete Barrier.

- Standards C-10.70 (Sheet 3), C-10.71 (Sheet 2), C-10.72 (Sheet 3) and C-10.73 (Sheet 2) are revised to show the correct spacing of the anchor bolt plates.

- Standard C-10.74, C-10.80 and C-10.83 are deleted because they are no longer applied to new design.

- Standard C-15.92 is revised to reflect ‘F’ Shape Concrete Barrier. Minor modifications are made to dimensions and notes.

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 at 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 at 712-8674 or me at 712-7341.

C: Roadway Group

Engineering Records

Statewide Project Mgmt. Group

Valley Freeway Group

Traffic Group

Bridge Group

Construction Group

Contracts and Specifications Section

Local Government Section

FHWA

Engineering Consultant Services

Central Maintenance Group

District Engineers (10)

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District Permits Offices (9)
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Barbed Wire Fence & Gate
Chain Link Fence & Gate
Guard Rail & Breakaway Cable Terminal
Guard Rail & Guard Rail Extruder Terminal
Gas Line

NEW FEATURES
EXISTING FEATURES

Irrigation Ditch, Concrete
Irrigation Ditch, Earth
Irrigation Line (1"x20")
Irrigation Line (1"x100")
Overhead Power/Joint Use Line
Overhead Telephone Line
Sanitary Sewer (1"x20")
Sanitary Sewer (1"x100")
Storm Drain (1"x20" & 1"x50")
Storm Drain (1"x100")
Street Light and With Mast Arm
Telephone/Power Pedestal
Utility Pole with Down Guy and Anchor
Underground Power/Joint Use Line
Underground Telephone Line
Water/Gas Meter Box
Water/Gas Valve

NEW FEATURES
EXISTING FEATURES
CONSTRUCTION DRAWING SYMBOLS

NEW FEATURES          EXISTING FEATURES

Water Line

Drainage Channel

Drainage Ditch

Major Wash

Minor Wash

E Grade, Profile

Hedge

Palm Tree

Shrubbery

Unclassified Tree

Sign, Single Post

Sign, Multiple Post

Dimensions

Visible Outlines, Sections, etc..

Index Contour Line

1. Depressed Index Contour Line

2. Depressed Intermediate Contour Line

3. Block Wall (1" to 20")

4. Median Barrier

5. Fire Hydrant

6. Standpipe

7. Transmission Tower

8. Windmill

9. Melt Box

10. Flag Pole

North Arrow

CONSTRUCTION DRAWING SYMBOLS

NEW FEATURES          EXISTING FEATURES

FH

OS P

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

STANDARD DRAWINGS

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**Notes:**
- The table lists various words and their corresponding abbreviations.
- The abbreviations are used to represent specific terms in a concise manner.
- The table is organized in a clear, readable format with columns for words, abbreviations, and notes.
- The abbreviations are used in the field of transportation and civil engineering.
- The table is part of a larger document that includes standard drawings and definitions for road and highway terminology.
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</table>
1. Roadway width, cut-off 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. Where median slopes intersect, see project plans for controls.

6. 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 Ditch Conditions Detail

Minimum SLOPES

SUBGRADE/SLOPE HINGE TREATMENT DETAIL

INTERMEDIATE SLOPES

SHOULDER WEDGE DETAIL

MAXIMUM SLOPES

SLOPE Rounding DETAIL

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

1. Roadway width, cut or fill width, cross slope, and pavement structure section will be shown on project plans.
2. Design highwater should not be located above the subgrade in unexcavated ditch.
3. Pavement structure slope is nominal, actual slope is controlled by 5D, see Shoulder Wedge Detail.
4. Slopes beyond the pavement structure, such as embankment and cut slopes, are relative to horizontal.
5. These slopes are intended to be used with new or reconstructed roadways.

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

**MINIMUM SLOPES**

**INTERMEDIATE SLOPES**

**SUBGRADE/SLOPE HINGE TREATMENT DETAIL**

**SHOULDER WEDGE DETAIL**

**MAXIMUM SLOPES**

**MINIMUM DITCH CONDITIONS DETAIL**

**SLOPE ROUNding DETAIL**

Except in solid rock, or as directed by the engineer, the intersection of roadway cut slopes with the ground surfaces shall be rounded. For cuts up to 10; use 5D semi-tangents for slope rounding. For each additional foot of cut add 1D to semi-tangent to 1D maximum.
GENERAL NOTES

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

2. For main roadway curves without spirals, Ls is the same as for spiral curves but with 0.7 Ls on tangent and 0.3 s on curve.

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

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

LEGEND

A = Point at which adverse crown removal begins.
B = Point at which superelevation transition begins.
C = Point of equality between superelevation and normal crown.
D = P.C. location for circular curve transition.
E = Point at which full superelevation is reached.

Ls = Length of Normal Crown Removal
Ls = Length of Superelevation Runoff
E.T.L. = Edge of traveled lane
Δ = Distance BC = INI Ls/Lv
Δ = Length of Shoulder Transition = INI Ls/VIN of shoulder.

SHOULDER TRANSITION DETAIL
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
TYPE A DIKE

CROWN DIKE

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

SLOPE TABLE

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<th>Inside Recovery Area</th>
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TYPE B TRANSVERSE MEDIAN DIKE
- Slope relative to grade of median at intersection with toe.

○ TYPICAL TRANSVERSE MEDIAN DIKE INSTALLATION

○ TYPICAL DIKE INSTALLATION AT STRUCTURE
Place dikes at structures to create water drainage.
GENERAL NOTES

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

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

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

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


PIECE BERM REQUIREMENT DETAIL

1. 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.

STRAIGHT PIPE PLAN

ELEVATION

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.

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

DITCHES, CHANNELS, DRAINS AND BERM
HEADWALL BERRNS

Drawing No: 3-33,0

3/94

1st Slope
2nd Slope
Recovery Area

Section A-A (For CBC)

Section A-A (For Pipe with Headwall)

Vary slope, Slope shall match to top of wing wall.

Slope shall match wing wall design slope 10%, 4%, or 6:1.

Structure Backfill Limits
See Std B-19.50
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, slab, trash rack end angle supports shall be shop fabricated, welded and galvanized in accordance with ASTM A 76.

3. Slab shall be of annual corrugation. Downdrain piping beyond slab may be either annual or helical corrugation.

4. Permissible couplings shall be mechanical, heat-shrinkable polyethylene sheet on male type neoprene sheet or self-seal 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

Sheet No. 4

10/95

DESIGNER:

CONSTRUCTION:

CHECKER:

DRAWN:

SCALE:

DATE:

C-04-20
### LENGTH OF SPILLWAY

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### GENERAL NOTES

1. For C-02.10 slopes with embankment height over 20’, use length for 20’ embankment height from table + 224’.
2. For C-02.20 slopes with embankment height over 32’, use length for 32’ embankment height from table + 18’.
3. For C-02.30 slopes with embankment height over 32’, use length for 32’ embankment height from table + 18’.
4. For spillway details, see Std C-04.10.
### GENERAL NOTES

1. For C-02.10 slopes with embankment height over 24", use length for 24" embankment height from table 2.24.
2. For C-02.20 slopes with embankment height over 32", use length for 32" embankment height from table 1.86.
3. For C-02.30 slopes with embankment height over 38", use length for 38" embankment height from table 1.86.

4. For downstream details, see Std C-04.20.

### LENGTH OF DOWNDRAIN

#### For C-02.10, C-02.20, and C-02.30 Slopes

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### C-02.10 AND C-02.20 SLOPES

- **Inlet**:
- **Outlet**:
- **Drainage Length**:

### C-02.30 SLOPES

- **Inlet**:
- **Outlet**:
- **Drainage Length**:
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 piece of type neoprene sheet or gasket shall be at least 12" wide and 18" long.

3. Maximum Q 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 slopes away from the gutter, 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 contraction joints between pavement and at approximate 10 foot centers when adjacent to asphaltic concrete pavement, joints shall be either hand trowled or sawed.

4. Expansion joints shall be located at tangent points in curb returns, at structures and at maximum 60 foot intervals. The one-inch thin 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 hand trowled 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.

EMBANKMENT CURB

EXPANSION JOINT DETAIL

VALLEY GUTTER

Curb and Gutter Type G

Curb and Gutter Type D-1, D-2, & D-3

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

Curb and Gutter Type A & A1
**GENERAL NOTES**

1. All gutter flow lines shall be constructed to an accurate grade.
2. See Spilt Drain Sld. C-13.60 and C-15.91, for curb and gutter with spilt drain.
3. See Std. C-05.10 for additional general notes and dimensions.

**SECTION A-A**

- Vari's 4'-0" to 8'-0"
- 4'-6" Varis 2'-6" to 4'-6"
- Gutter Line

**SECTION B-B**

- 15' Transition
- Top of Curb
- Match Gutter Grades

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

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

**TYPE 2 - CURB & GUTTER TRANSITION**

- Dimensions may vary, 5.01 C-05.10 Type D, D-1, D-2 or D-3
① PERSPECTIVE VIEW

② ELEVATION

③ PLAN VIEW

TYPE 3 - CURB & GUTTER TRANSITION AT PAVED GORE

④ SECTION A-A

- Curb height varies 0'' to 1'' max. In depressed curb area beyond the end of barrier, see Plans for curb height.

⑤ TYPE 4 - CURB & GUTTER TRANSITION
TYPE 5 - CURB & GUTTER TRANSITION

TYPE 6 - CURB & GUTTER TRANSITION
**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 if the driveway width is over 20 feet. If the driveway thickness is greater than 6 inches, then the contraction joint depth shall be 1/3 where 1 is the thickness of the driveway. Joints shall be either formed or sawed. Formed joints shall be finished with a tooth having a 1/4 radius. See sheet 2 of 2 for the Expansion Joint Detail.

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

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

5. Top of curb (TDC) and driveway elevations shown are in relation to the gutter, Gutter-0.0.

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

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

---

**LEGEND**

- Cross slope 0.05% Per Ft (Typical)
- Straight grade with downward slope.
- Maximum slope = 0.02% Per Ft.

---

**SECTION A-A**

- Sidewalk Width as Shown on Project Plan
- Slope 0.01% Per Ft (Typical)

**SECTION B-B**

- Parkway Width as Shown on Project Plan
- Slope 0.01% Per Ft (Typical)
1. Unless otherwise specified, sidewalks shall be 4 inches in depth.

2. One inch deep transverse contraction joints shall be placed in sidewalks at intervals of approximately 15 feet or at a spacing that matches adjacent curb and gutter. 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 sewed. Filled joints shall be finished with a too having a 1/8" 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 trowelled 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 24 feet.

CONCRETE SIDEWALK SETBACK FROM CURB

CONCRETE SIDEWALK ADJACENT TO CURB
GENERAL NOTES

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

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

3. When curb heights of 8" or less are shown on plans, use dimensions shown in 1:72.

4. When curb heights of greater than 1" are shown on plans, see plans and ADA requirements.

LEGEND

- Cross slope 0.01% Per Ft (Typ)
- Maximum slope = 0.02% Per Ft.

ELEVATION

DEPRESSED CURB AT SIDEWALK RAMP

SECTION A-A

SIDEWALK RAMP WITH PEDESTRIAN BYPASS
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 to center.

3. See Std C-051.00 and C-051.20 for joint requirements.

4. When curb heights of 6" or less are shown on plans, use dimensions shown in 1.7a.

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

DEPRESSED CURB AT SIDEWALK RAMP

ELEVATION

PLAN

GROOVE DETAIL

PERSPECTIVE
GENERAL NOTES
1. Top of curb (TC) elevations shown are in relation to the gutter and are located radially, gutter right.
2. See Std C-05.30 and C-05.20 for joint requirements.

PERSPECTIVE

GROOVE DETAIL

SIDEWALK RAMP AT BARRIER TERMINUS
SIDEWALK BEHIND BARRIER

ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP

SECTION B-B

SECTION A-A
GENERAL NOTES

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

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

3. When curb heights of 6" are shown on plans, use dimensions shown in 1.1a.

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

SIDEWALK RAMP AT MEDIAN ISLAND CROSSING

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

Design Approver: 
Joseph Altomare

Sheet 1 of 4
GENERAL NOTES

1. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter and are located 100". Curb to 100".

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

3. When curb heights of 8' or less are shown on plans, use dimensions shown in 1.7a.

4. When curb heights of greater than 8' are shown on plans, see plans and ADA requirements.

LEGEND

- Cross slope 10.01% Per Ft (Typ)
- Maximum slope = 0.02% Per Ft
- 30" x 48" access area for Pedestrian Push Button
- Control for Field Layout

ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP

SIDEWALK RAMP WITH PEDESTRIAN BYPASS
(For use with Pedestrian Push Button)
GENERAL NOTES

1. Traffic signal foundations, traffic signal foundations, and all boxes for traffic signals and traffic signs 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 plan.
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 (G).
8. When curb heights of 6" are shown on plans, use dimensions shown in (f).
9. See Structure Plans for raised median on structures.
GENERAL NOTES

1. The PCP surfaces within the bus bay area shall be textured transversely, surface texturing to conform to Section 401.

2. Transverse weakened plane joints shall be constructed at a maximum spacing of 10' and shall align with joints in the concrete curb and gutter.

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

4. For V2 expansion joint with preformed joint filler, see Detail A.

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

6. For sidewalk construction details, see Stan C-005.0.
GENERAL NOTES

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

2. Joint use driveways may become desirable for landowners of adjacent properties to service both properties. If this is the case, only one of the two adjacent landowners need apply for the access permit, but a notarized written mutual agreement, signed by all parties involved, must accompany the application form. 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 preferred turnout design. Type "B" and "C" shall only be used when absolutely necessary.

9. Paved turnouts, when not necessary, will be 6' x 6' surface materials, type and standard. Examples: 20' x 30' AC-10, Type A, Slab C-06.10. Show radius of graphically.

10. Construction of curb, gutter, sidewalk and drainage facilities in urban areas by the permittee using that portion of the highway frontage under permit application may be a restriction 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.

GENERAL NOTES

1. Grades 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 6% requires a vertical curve. 1800" Min. Vertical curve shall not encroach on roadway or sidewalk.

URBAN CROSS SECTION
(LP GRADE)

Control Point

Driveway Surface

Extension of Driveway Grade (Typ)

or 6' Driveway Without Sidewalk
(See Plans Typical Section)

URBAN CROSS SECTION
(DOWN GRADE)

Control Point

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

Driveway Surface

or 6' Driveway Without Sidewalk
(See Plans Typical Section)

DESIRED URBAN CROSS SECTION

-22 or -24

-22 to -20

 existing cross slope or flatter

RURAL CROSS SECTION
(LP GRADE)

Control Point

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

Driveway Surface

Existing Cross Slope or Flatter

or 6' Driveway Without Sidewalk
(See Plans Typical Section)

RURAL CROSS SECTION
(DOWN GRADE)

Control Point

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

Driveway Surface

-20 to -20 Desirable

-22 to -24

or 6' Driveway Without Sidewalk
(See Plans Typical Section)
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, or any other structures are at the PCCP edge unless otherwise noted in the plans or the standard drawings.

SINGLE CURB JOINT

A Joint

MEDIAN BARRIER JOINT

B Joint

PCCP On Both Sides of Barrier

JINT ABBREVIATIONS

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

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

PCCP JOINTS
C-07201
Sheet 1 of 2

8/98
GENERAL NOTES

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

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

3. See 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. See 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 1/2" dia x 1 6" 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 x 96".
- Lower space bar - 2 Ga or W-5.5 wire x 96".
- Tie bars - W-5.5 wire x 16".
- Anchor straps - 1" x 3" steel strap, 0.079 thick. Piece with 1-3/8" slotted hole for 1 3/4" dia steel nail for 40C or 40E. 0.145 dia ASTM A27 Class 1 w/1/4" head or washer to be power driven.

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<td>7</td>
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DIMENSION TABLE

<table>
<thead>
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<th>Lane Width</th>
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<td>12&quot;</td>
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<tr>
<td>10'-4&quot;</td>
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ASSEMBLY PLACEMENT AND EDGE CLEARANCE DETAIL
GENERAL NOTES

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

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

3. See Std C-07.04 for PCP joints and additional notes.

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

5. See Std C-05.04 for curb and gutter joint requirements.

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

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

8. Transverse Construction Joint (TC) allowable limits 1'-4".

9. Typical Joint Sequence (LWP Joints):

- PLAN 46' PCCP
- PLAN 43.5' PCCP
- PLAN 36' PCCP

- PLAN 24' PCCP
- PLAN 24' PCCP (Widening)
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-07.01 for PCCP joints and additional notes.
4. All transverse joints shall be in line with joints in adjacent slabs.
5. See Std C-05.10 for curb and gutter joint requirements.
6. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.
7. The reinforcing bars in the LWP & LC joints shall be placed no greater than 1-3/4" 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-07.01 for PCCP joints and additional notes.

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

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

6. At intersection of slide 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 TTO:
allowable limits (typ.)
GENERAL NOTES

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

2. All skew equal 5 minimum (typical).

3. Fix joint 10 equal 5 minimum (typical).

4. See Std C-05:00 for PCP joints and additional notes.

5. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance.

6. At the intersection of the intersecting road or street.

7. Rebar reinforcement shall be placed no greater than 1-3" from the LC joint.

8. Transverse construction joint (TCI) allowable limits (typical).
GENERAL NOTES

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

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

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

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

5. See Std C-05.10.4 for curb and gutter joint requirements.

6. The reinforcing bars in the LMP & 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 lanes 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-05.10 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 LC joint.

7. Transverse weakened zone 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 symmetrical appearance while conforming to the cross section of the intersecting road or street.
5. See Std C-05.02 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 6'-0" from a transverse construction joint.
GENERAL NOTES

1. Dimensions with a tolerance may be adjusted to align to 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 \( \frac{3}{4} \) but not more than \( \frac{15}{16} \).

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

   ▲ 6″ Minimum
   ○ Varies - 18 Maximum
   △ 11 Minimum
   ◯ Transition, See Std C-05.12
   □ Without Curo & Gutter
   ○ 12 Face of Curo to Face of Curo
   □ Mainline Structure Section,
     See Plans
   □ Ramp Structure Section,
     See Plans
   □ Gore Structure Section,
     See Std C-08.20

TYPICAL TRANSVERSE WEAKENED PLANE JOINT LAYOUT AT GORE AREAS

RAMP TERMINAL AT CROSSROAD

RAMP WITHOUT CURB AND GUTTER

RAMP WITH CURB AND GUTTER

**Notes:**
- Dimensions with a tolerance may be adjusted to align to the nearest transverse weakened plane construction joint as directed.
- See Std C-07.01 for Joint Information.
- See plans for ramp dimensions.
- See Std C-07.05 for Sections A-A and B-B.
- The ratio of transverse to longitudinal joint spacing shall be greater than \( \frac{3}{4} \) but not more than \( \frac{15}{16} \).
- Ramp transverse joints shall be perpendicular (90°) to the ramp longitudinal joints, except as shown at the ramp terminal.

**Diagrams:**
- Typical transverse weakened plane joint layout at gore areas.
- Ramp terminal at crossroad.
- Ramp without curb and gutter.
- Ramp with curb and gutter.
RAMP TERMINAL AT CROSSROAD

RAMP WITH CURB AND GUTTER

RAMP WITHOUT CURB AND GUTTER

GENERAL NOTES
1. See Std C-07.04 for General Notes and Transverse Joint Layout at Core Areas.
   - Without Curb & Gutter
   - 6" Minimum
   - Varies - 18" Maximum
   - 20 Face of Curb to Face of Curb
   - Transition, See Std C-05.02
   - Maltrine Structure Section, See Plans
   - Ramp Structure Section, See Plans
   - Core Structure Section, See Std C-06.20

SECTION A-A
- Ramp Taper
- Edge of Maltrine Punt
- Edge of Ramp Pavement
- Varies
- Structural Section

SECTION B-B
- Gore Area
- Edge of Maltrine Punt
- Edge of Ramp Pavement
GENERAL NOTES

1. Bedding per Section 501 of the Standard Specifications.
2. Asphalt concrete shall be in accordance with the requirements of the Standard Specifications.
3. 12" Trench is required on the sides of trenches that are not parallel at the center line of the street.
4. Types D & E require 9' of AB at top of trench when there is an existing base.

LEGEND

- Compacted Backfill: Density Per Section 501
- AB, Granular Back Fill or Native Back Fill Per Section 302-2 and 501
- AB Per Section 303-2 and 501

TYPE A
AC Pavement + Match Existing Pavement and Course By Type and Thickness

TYPE B
AC Pavement + Match Existing Pavement and Course By Type and Thickness

TYPE C
Class F Concrete Wet Thoroughly and Paint With Gruet Existing RCCP

TYPE D
Asphalt Concrete

TYPE E
Oil Cake

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

TYPE G
AC Surface Course
AC Base Course

TYPE H
Same Surface As Existing Pavement Unless Otherwise Noted

UTILITY Concrete

12" Trench Width

12" AB Or Existing Subgrade Wherever Is Greater

Total Thickness

12" Trench Width

12" Trench Width

12" Trench Width
GENERAL NOTES

1. See Std C-07.01 for joint information.
2. See plans for crossroad dimensions.
3. See Std C-07.04 and C-07.05 for ramp joints.
4. The ratio of transverse to longitudinal joint spacing shall be greater than 3/5 but not more than 3/2.
5. Transverse joints shall be perpendicular to the longitudinal joints, except as shown at the ramp terminals.

- 6" Minimum
- 12" Variants - 18" Maximum
- 8" Minimum
- 12" Variants - 12" when adjacent gutter widths are 2' or less.
- 15" when adjacent gutter widths are greater than 2'.

CROSSROAD AT RAMP TERMINAL
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.


REFERENCE DRAWING

SECTION

PLAN

TYPE A GUARD RAIL INSTALLATION

REFLECTOR TAB DETAIL
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

USE APPROPRIATE END TREATMENT

PLAN

TYPE B GUARD RAIL INSTALLATION

REFLECTOR TAB DETAIL
GENERAL NOTES

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

2. Post type timber or Steel for transitions shall match post type of adjoining guard rail.

HALF BARRIER TRANSITIONS

Bridge Concrete Barrier Transition Measurement (Each) Length = 16'-7"
THREE BEAM BRIDGE RETROFIT

- **Departure**
  - W Beam Guard Rail Measurement (Each)
  - Length as Shown on Plans
  - Length = 18'-0"

- **Tubular Three Beam Measurement (Each)**
  - Length as Shown on Plans
  - Length = 18'-0"

- **Approach**
  - W Beam Guard Rail Measurement (Each)
  - Length as Shown on Plans

Rub Rail Measurement (Each)
Length = 24'-111/2"

BRIDGE DADO RETROFIT

- **Departure**
  - W Beam Guard Rail Measurement (Each)
  - Length as Shown on Plans
  - Length = 13'-6" Typ.

- **Approach**
  - W Beam Guard Rail Measurement (Each)
  - Length as Shown on Plans
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-0610, 0612, 1006, and 1003 for dimensions and details not shown.

3. Type B guard rail installation shown. For Type A guard rail installation, see Type B-Curb and Gutter shown, for Type A guard rail installation, see the Guard Rail Extruder Terminal as per Standard Drawing C-1041.

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

5. Bituminous joint filler (2") shall be used where the curb and gutter or concrete widening abuts worsted drain, catch basin, drain, gutter, etc. Scorched 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.

SECTION A-A

SECTION B-B

PLAN

1. TYPICAL HALF BARRIER TERMINAL W/TYPICAL CURB & GUTTER
G4(IS) SYSTEM

PLAN

Traffic

TOP VIEW

ELEVATION

G4(IS) SYSTEM

SECTION G4(IS)
SHOWN WITHOUT CURB

SECTION G4(IS)
SHOWN WITH CURB

1 1/4" HOLE

WOODEN BLOCK DETAIL

GENERAL NOTES
• Indicates ARTBA designation

-3/4" - 1 1/4" Button Head Bolt (●) and Recess Nut (●) (Typ)
1/2" x 1/2" Splice Bolt (Max 1 Typ)

ROADWAY WIDTH

-3/4" HOLE

Curb As Per Plans

6" x 8" x 14" Wood Block

#6 x 5 1/2" or #6 x 6 1/2" Structural Shape Posts

Steel # Beam, 12 Ga

7/8" Hole

6" x 8" x 14" Wood Block

#6 x 5 1/2" or #6 x 6 1/2" Structural Shape Posts

Steel # Beam, 12 Ga

7/8" Hole

6" x 8" x 14" Wood Block

#6 x 5 1/2" or #6 x 6 1/2" Structural Shape Posts
GENERAL NOTES

1. Height of curb shell not exceed 4 inches.

- Indicates ARTBA designation

PLAN

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

Traffic

ELEVATION

G4(15=MODIFIED)

W BEAM BACK-UP PLATE DETAIL

SIDE VIEW

FRONT VIEW

SECTION

5 1/2" Slot Yx2x2y

2-5/32" Hex Bolt (8)

3/8" "UNC x 5/8" Splice Bolt (Typ)

2 1/4"

1/8" (Typ)

5'-3"

2"

5/32"

5/16" (Typ)

5/16" "UNC x 1/2" Button Head Bolt (8)

and Recess Nut (8) with Wide

Type A Plain Washer (Typ)

See W Beam Back-up Plate Detail

1/2"

2"

1/2"

2"

1/2"

5/32"

2-5/32" Button Head Bolt

and Recess Nut (8) with Wide

Type A Plain Washer (Under Nut) (Typ)

Steel W Beam, 12 Gage

2-5/32" "UNC x 2" Button Head Bolt

(8) with Wide Type A

Plain Washer (Under Nut) (Typ)

2"

2"

1/4"

5/32"

5/32"

5/16" (Typ)

1/8" (Typ)

W4x4x1/2x4", W4x4x8x4" or W4x4x22x4"

Structural Shape Block

Roadway Width
GENERAL NOTES

1. ● Indicates ARTSA designation.

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

ELEVATION

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

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

1. Use Type 3 Nested Steel W Beam to span downspout or gully Inlets as shown in the plan view.

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

PLAN

37'-6" Nested Steel W Beam

ELEVATION

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

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

PLAN

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 anchoring to box culvert roof shall be 8" x 8" only.
Concrete Barrier Transition
Type 2A to Thrie Beam
See C-00117 for Bridge Concrete
Barrier Transition and to Barrier

Thrie Beam
Terminal Connector (2)

255/8" Lip Curb
See Lip Curb Detail

PLAN

GENERAL NOTES

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

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

● - Indicate ARTBA designation.

SECTION A-A

SEE LIP CURB DETAIL

LIP CURB DETAIL

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

GUARD RAIL, TRANSITION THRIE BEAM TO CONCRETE WALL BARRIER (CT) TYPE 2 APPROACH (AC PAVEMENT)

D-16.30
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 aesthetic concrete pavement. Joints shall be either hand tooled or
sewed.

2. Curb not required when drainage flows transversely away from barrier.
   • Indicate APTBA designation.

PLAN

ELEVATION

LIP CURB DETAIL
GENERAL NOTES
1. For use with one-way traffic or
   with two-way traffic outside the
   clear zone.
   - Indicate AASHTO designation.
GENERAL NOTES

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), ARTBA Std. RE-6-75, for dimension variables.
   - O = Indicates ARTBA designation

PLAN

ELEVATION

BEARING PLATE DETAIL

ANCHOR PLATE DETAIL
1. Half Barrier shall be constructed by the slip form or formed Cast-In-Place method.

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

3. Concrete shall be Class C, design strength f = 3000 psi.

4. If the footing and barrier are cast monolithically, No. 6 and 8 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 PCCP thickness (8" Min.)
1. Concrete shall be Class S, design strength 12,300 PSL.

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

3. Pavement thickness adjacent to Half Barrier shall be 4½ minimum.

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

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

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

7. At bend dimensions for reinforcing steel shall be cut-to-out of bars.
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 7½ minimum.

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

5. Dowelled joints shall be grouted under pressure 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. At bend dimensions for reinforcing steel shall be cut-to-cut of bars.

CONSTRUCTION JOIN DETAIL

- Concrete shall be placed in the form of a half barrier.
- Dowelled joints shall be grouted under pressure.
- Reinforcing steel shall be cut-to-cut of bars.

SECTION A-A
- Fill material shall be placed at the specified dimensions.

SECTION B-B
- Clearances shall be maintained as shown.

SECTION C-C
- Weep holes shall be sealed with grout.

ELEVATION
- Dimensions shall be checked for accuracy.
- Reinforcing steel shall be properly placed.

PLAN
- Lifting devices shall be placed as shown.
- Clearances shall be maintained as shown.

DATE
- Drawing shall be dated.

DRAWN
- Drawing shall be signed by an authorized person.

STATE OF ARIZONA
- Department of Transportation
- Division of Highways
- Standard Drawings

CONCRETE HALF BARRIER 42" TYPE 9", PRECAST
- Drawing shall be labeled appropriately.

SCALE
- Drawing shall be scaled correctly.
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 S, design strength f_c = 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, '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 approximately 15 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand tooled or sawed.

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PLAN

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ELEVATION

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BARRIER GUTTER DETAIL

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SECTION A-A

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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 PCRP 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 10 foot intervals when adjacent to asphaltic concrete pavement. Joints shall be either hand foiled or sealed.

PLAN

ELEVATION

SECTION A-A

BARRIER GUTTER DETAIL
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 5-shaped rebars will not be required.

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

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

1. Concrete slab shall be Class S, design strength f_2 = 4000 PSI.

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

3. Dovetail 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.
GENERAL NOTES

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

1. Concrete shall be Class S, design strength f = 4000 PSI.

2. The left 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.

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

ELEVATION

CONSTRUCTION JOINT DETAIL

WITH AC SECTION A-A

AT REBAR - WITH PCGP SECTION B-B

KEY WAY DETAIL

PRESSURE
GROUT HOLE

1 1/4" x 18" Dowel (Typ)
GENERAL NOTES

1. All concrete shall be Class "5" (fc = 3000 psi).
2. All reinforcing steel shall conform to Section 1003.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. Transverse construction joints shall extend through the foundation slab and be located at intervals not to exceed 20 ft.
5. See drainage sheets for splayed drain and catch basin details.
6. Departure termination may be substituted for the C-1078 barrier transition under departure conditions.
7. See Std. C-09.20 for sidewalk construction.
8. All bend dimensions for reinforcing steel shall be cut-to-cut of bars.
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 by the use of stationary forms.

3. Concrete shall be Class 5, design strength f'_c < 3000 PSI.

4. If the footing end barrier is cast monolithically, No. 6 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 PCCP thickness (8" Min.).

SECTION A-A

WITH PCC PAVEMENT

WITH AC PAVEMENT
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. 6 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 PCCP thickness 18" Min.

WITH PCC PAVEMENT
SECTION A-A
GENERAL NOTES
1. Concrete shall be Class S, design strength f_ = 4000 PSL.
2. Half barrier shall be placed upon either Asphaltic or Portland Cement Concrete Pavement.
3. Pavement thickness adjacent to half barrier shall be 3/4 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 diameters for reinforcing steel shall be cut-out of bars.

PLAN

ELEVATION

SECTION B-B
CONSTRUCTION JOINT DETAIL
GENERAL NOTES

1. See section B-B for calson reinforcement.
GENERAL NOTES

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

2. Concrete shall be Class 5, design strength f_{c} = 3000 psi.

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

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

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 asphaltic cement concrete pavement, joints shall be either hand tooled or sawed.

---

PLAN

See Construction Joint Detail (Optional)

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 S, design strength f_c = 2000 psi.

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

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

ELEVATION
BARRIER WITHOUT CURB
GENERAL NOTES

1. See section B-B for caisson reinforcement.
GENERAL NOTES

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

2. Concrete shall be Class C, 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 in the center 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 approximately 15 foot centers when adjacent to asphaltic concrete pavement. Joints shall be either hand troweled or sawed.

PLAN

ELEVATION

BARRIER WITH CURB AND GUTTER

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

BARRIER END DETAIL

Sheets 1 of 2
GENERAL NOTES

1. All concrete shall be Class "S" (fc = 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 out to out of bar.
7. Two inch deep contraction joints shall be placed in the gutter at positions 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.

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

SECTION C-C

TRANSITION TO FREeway CURB
**GENERAL NOTES**

1. All concrete shall be Class "S" 1/2c +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 the adjoining concrete half barrier.
6. See Std. C-05.20 for sidewalk construction.
7. All bar dimensions for reinforcing steel shall be cut-to-cut of bars.
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 shall be required.
4. In no case shall the width of barrier exceed the width of the barrier footing or overlap 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, "C", 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 50-foot centers when adjacent to aesthetic concrete pavement. Joints shall be either hand tooled or sawed.

CONSTRUCTION JOINT DETAIL

(OPTIONAL)
GENERAL NOTES

1. Posts shall be 12'-6" C to C. Structural steel shall conform to ASTM A-36, galvanized ASTM A-123.
2. Hex head bolt shall conform to ASTM A-307, galvanized ASTM A-153 Class C.
3. Helical spring lock washer shall conform to ASTM A-350, galvanized ASTM A-153 Class C.
4. Tension wire ANG No 90,148-1" galvanized to conform to ASTM A-156 Class 2.
5. Hog rings ANG No 12 (10.56") galvanized ASTM A-36 Class 2. Fasten glare screen to top and bottom tension wire spaced approximately 2" apart.
6. Glare Screen, 18 Gauge steel, ASTM A-526, galvanized ASTM A-526/5265/52665, expanded to the following dimensions: L13" shortway of diamond and 4.0" longway of diamond centered to center of bridge with a Strand width of 0.250" angled at approximately 20° to the plane of the original sheet. Top edge to be shop curved and cramped on 12" center. Glare screen shall be installed such that flat portion of screen blocks light from headlights. See direction details.
7. Splices allowed in glare screen at posts only, with one full 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 x 3/8 x 3/8" angle and 5/8" diameter studs with head. The studs shall be placed on 1'-0" alternate centers. See Angle Assembly Detail No. 1.

3. Where the adjacent roadway is paved, an angle assembly shall consist of one 4 x 4 x 3/8" angle and 5/8" 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 x 4 x 3/8" angle and one 2 x 2 x 3/8" angle and connected with 5/8" 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. When 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</th>
<th>Grill Units</th>
<th>Concrete</th>
<th>Rebar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>Units Required</td>
<td>Cubic Yards</td>
<td>Lbs</td>
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<td>2</td>
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<td>173.5</td>
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<td>6</td>
<td>16.9</td>
<td>511.2</td>
</tr>
<tr>
<td>40</td>
<td>7</td>
<td>18.9</td>
<td>511.2</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. Material for shoulder transition shall be placed to the finished roadway elevation for the entire length of the transition, then 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

WHERE USED FOR THRU DRAINAGE - CATTLE GUARD OPEN BOTH ENDS
GENERAL NOTES
1. This design applicable only to wood tie track construction. Wood ties shall be unweathered and cut from material meeting the specifications of the existing ties.

2. 2½" x 2½" x 3/16" treated, 2½" x 2½" bearing bars and 2½" nominal diameter pipe for all connections shall be painted with one coat of No. 1 paint and finished with two coats of yellow enamel paint.

SECTION A-A

FOR 8' TIES

2½" x 2½" Bar

Grill as shown for ½"

Galvanized Dome Head

Drive Spikes

See Table for Length

FOR 9' TIES

2½" x 2½" Bar

Grill as shown for ½"

Galvanized Dome Head

Drive Spikes

See Table for Length

DETAIL NO. 1

DETAIL NO. 2

Varies with tie length

See Detail No. 1 and No. 2

DETAIL NO. 3
GENERAL NOTES

1. Lengths of posts and braces shall not be less than 7'-0".

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

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

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

- ASTM design number

TYPICAL WOVEN WIRE FENCE INSTALLATION-TYPE 1 WW SHOWN

TYPE I WOVEN WIRE (WW)

TYPE 2 WOVEN WIRE (WW)

TYPE 3 WOVEN WIRE (WW)

TYPE 4 WOVEN WIRE (WW)

FENCE FABRIC DIMENSIONS

AND DESIGN NUMBERS
GENERAL NOTES

1. Intermediate Post Assemblies shall be located, as shown and at intervals not to exceed 600', or midway between all braced posts.

2. For game fence, the bottom wire shall be barbedless.

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

1. Posts shall be round, V-section, or Z-section and conform to the nominal dimensional requirements shown on the plans. Dimensional tolerances for all shapes shall be according to ASTM A-520. In addition, the material of which posts are fabricated shall have a nominal thickness, before galvanizing, of not less than 0.118" for the posts and 0.130" for terminal posts.

2. Chain link fabric shall be either zinc-coated or aluminum-coated steel wire fence fabric. Zinc-coated steel fabric shall conform to the requirements of ASTM A399, Class I coating. Aluminum-coated steel fabric shall conform to the requirements of ASTM A495, with a minimum weight of coating of 0.40 ounce per square foot of wire surface area. Fabric shall be furnished in fence fabric 60 inches or less in width and a gauge for fabrics greater than 60 inches in height.

3. Tension wires shall be 7 gauge (0.177 inch diameter) cold-drawn steel wire with a minimum tensile strength of 15,000 pounds per square inch and shall be zinc-coated or aluminum-coated.

4. Tension wires shall be 0.189 inch diameter adjustable rods. Truss tightening shall have a strip thickness of not less than 0.4 inch.

5. Stretcher bars shall be 1/2 inch by 7/8 inch steel flat bars. Stretcher bar bands shall be 1/2 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 between put posts when the distance between such posts is less than 1,000 feet and more than 500 feet.

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

TYPICAL CHAIN LINK FENCE INSTALLATION - TYPE I SHOWN

TYPICAL POST DIMENSIONS

<table>
<thead>
<tr>
<th>Fabric Height</th>
<th>Corner, End, Intermediate, Gate, Latch, and Put Posts</th>
<th>Line Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Round: Length: Length: Roll Formed</td>
<td>Round: Length: Length: Roll Formed</td>
</tr>
<tr>
<td>36&quot;</td>
<td>4&quot;-3&quot; 2.175&quot; 1.500&quot; 1.875&quot;x1.625&quot; 1.875&quot;x1.625&quot;</td>
<td></td>
</tr>
<tr>
<td>48&quot;</td>
<td>7&quot;-3&quot; 2.175&quot; 1.500&quot; 1.875&quot;x1.625&quot; 1.875&quot;x1.625&quot;</td>
<td></td>
</tr>
<tr>
<td>60&quot;</td>
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<td></td>
</tr>
<tr>
<td>72&quot;</td>
<td>9&quot;-3&quot; 2.175&quot; 1.500&quot; 1.875&quot;x1.625&quot; 1.875&quot;x1.625&quot;</td>
<td></td>
</tr>
<tr>
<td>Over 72&quot;</td>
<td>Height: 1/2-3&quot; 2.175&quot; 1.500&quot; 1.875&quot;x1.625&quot; 1.875&quot;x1.625&quot;</td>
<td></td>
</tr>
</tbody>
</table>

As Required By Engineer
GENERAL NOTES

1. Barbed wire for use with Type 2 chain link fence shall be 12 gauge steel wire with 4 point 14 gauge 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 1 coating. Aluminum-coated steel wire shall conform to the requirements of ASTM D3538, Type 1, Class 1 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 M27.

3. Bottom tension wire shall be at least two turns on concrete footings.

4. For details and notes not shown — see chain link fence Type 1, 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>Material</th>
<th>Length (ft)</th>
<th>Roll</th>
<th>Round</th>
<th>Roll</th>
<th>Round</th>
</tr>
</thead>
<tbody>
<tr>
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<td>72&quot;</td>
<td>2, 2.175&quot;</td>
<td>3.50&quot;x3.50&quot;, 2.50&quot;x2.50&quot;</td>
<td>8&quot;</td>
<td>1.900&quot;</td>
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</table>

DETAIL G

BARBED WIRE SUPPORT ARM
DOUBLE GATE LATCH ASSEMBLY

ROLLING GATE

16' Min. to 28' Max

3' Clear Max

1.315' OD Pipe

1.90' OD x 10' Pipe Sleeve

10" Element x 1' 0" Concrete Footing

SINGLE GATE

TYPICAL GATE DIMENSIONS

<table>
<thead>
<tr>
<th>Gate Leaf Width</th>
<th>Vertical Brace</th>
<th>Gate Post Size</th>
<th>Vertical Brace</th>
<th>Gate Post Size</th>
<th>Gate Leaf Width</th>
<th>No of Equally Spaced Vertical Brace</th>
<th>Tension Rods Per Braced Panel</th>
<th>Gate Post Size</th>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>6' to 12'</td>
<td>1</td>
<td>0</td>
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<tr>
<td>3' to 8'</td>
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<td>3 to 8'</td>
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<td>2,875&quot;</td>
<td>6' to 12'</td>
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<td>0</td>
<td>2,875&quot;</td>
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<tr>
<td>8' to 16'</td>
<td>4,000&quot;</td>
<td>8' to 16'</td>
<td>1</td>
<td>4,000&quot;</td>
<td>13' to 16'</td>
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<td>1</td>
<td>2,875&quot;</td>
</tr>
<tr>
<td>16' to 18'</td>
<td>4,000&quot;</td>
<td>16' to 21'</td>
<td>2</td>
<td>2,875&quot;</td>
<td>21' to 27'</td>
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<td>1</td>
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<td>28' and Larger</td>
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<td>2,875&quot;</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2,875&quot;</td>
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</tbody>
</table>

GATES FOR CHAIN LINK FENCE - TYPE 1 SHOWN
(Type 2, With Barbed Wire Typical)
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 A153.
3. Galvanized swaged fitting and u-bolt shall conform to ASTM A495.
5. The wire fabric, ties, bands, stretcher bars, and other fittings and hardware shall conform to ASTM M81.
6. The wire fabric fence 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 to 0.065 gauge ASTM A-36A/A-36M 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 daubed to agree with standard corner radii of 3/4" and 1/4".
9. Perforated posts shall be galvanized to the requirements of ASTM A 653/A 653M. Coating Designator shall be 275.
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 1/3 of the distance between posts.
13. An alternate to rectangular concrete anchor blocks shall be a 36" diameter round footing with additional depth of 4'.
14. The median approach grade within 100' of the Chain Link Cable Barrier shall not exceed a grade break of 10 percent.

NOTE: Shown G4 (2W) System Without Curb. May Use Other Systems With or Without Curb.
GENERAL NOTES

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

2. See remaining C-13 Series standards for other pipe details.

3. After granding, the damaged coating shall be cleaned by a wire brush and painted with at least one full coat of Paint No. 4, or given two coats of an approved hot asphalt paint, as directed by the Engineer.
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 these limits are exceeded or the vertical limits are not maintained, a non-trench condition exists.

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

6. - Inside diameter of full circle pipe or outside diameter of corrugated or flanged pipe, elliptical pipe.
   - Minimum wall thickness for NRC ICP, See Plans.

7. - D-5: Minimum inside diameter for diameters less than 4 feet.
   - D-6 feet maximum for diameters up to 4 feet.
   - D-7 foot each inside minimum for diameters equal to or over 4 feet.
   - D-3 feet maximum for diameters 4 feet or over.
   - 6 inches except when unloading or unstacking material. See standard specifications.

8. TRENCH BACKFILL
9. PIPE BACKFILL
10. BEDDING

TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
Bbidgshown
<table>
<thead>
<tr>
<th>Pipe Dia</th>
<th>Approx Weight</th>
<th>Dimensions - Inches</th>
<th>Approx Slope</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>T</td>
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<tr>
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<td>125</td>
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<tr>
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<td>4</td>
<td>155</td>
</tr>
<tr>
<td>42&quot;</td>
<td>5300&quot;</td>
<td>4</td>
<td>175</td>
</tr>
</tbody>
</table>

**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.
GENERAL NOTES

1. For lateral dimensions of invert paving, use 12" control for CMP and span for CMPL.

2. Paving shall be scored laterally at 5'-6" minimum intervals along the length of the pipe.

3. Use bevel on inlet headwall only.

4. Wire mesh shall be fastened or welded to corrugation greats at intervals and in a manner approved by the Engineer. Lots shall be 6" minimum.

5. Paving shall not be placed until backfilling is completed.

6. Concrete shall be Class B.

7. See Std B-112 for headwall and bevel dimensions not shown.

HEADWALL INSTALLATION

PROJECTING INSTALLATION

SECTION A-A

SECTION B-B

DESIGN APPROVED

JULY 1998

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

PIPE AND PIPE AERIAL CORRUGATED METAL CONCRETE INVERT PAVING

C-13.30
GENERAL NOTES

1. For lateral dimensions of invert paving, use 12" control for CMP and span for CMPE.

2. Paving shall be scored laterally at 1'-6" minimum intervals along the length of the pipe.

3. Use bevel on inlet headwall only.

4. Wire mesh shall be fastened or welded to corrugations at intervals and in a manner approved by the Engineer. Liner 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.

HEADWALL INSTALLATION

PROJECTING INSTALLATION

SECTION A-A

SECTION B-B
**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 forming may be used.

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

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

1. Pipe colors not required where direct catch basin connections can be made within 1' of a normal 90°
   installation, either horizontally or vertically.

2. "T" connections direct to the main drain trunks line should be avoided and used only where manhole
   connections are impractical.

SECTION A-A
TYPICAL CONNECTION BETWEEN
CATCH BASIN AND MANHOLE

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

SECTION B-B

SECTION D-D

PLAN
TYPICAL SLOTTED DRAIN AND CATCH BASIN
INSTALLATION WITH MANHOLE

PLAN
TYPICAL SLOTTED DRAIN AND CATCH BASIN
INSTALLATION WITHOUT MANHOLE
1. Prefabricated tee shall be used when the outside diameter of the inlet pipe exceeds one half of the inside diameter of the main storm drain, except when the manholes are shown on plans.

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

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

4. All concrete shall be class B.

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

6. Reinforcing steel shall have 2" minimum cover.
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'.

---

**GENERAL NOTES**

**DRAINAGE OUTLET INTO CHANNEL**

**STORM DRAIN PLUG**
GENERAL NOTES

1. All Concrete shall be Class B.

2. All reinforcing steel shall conform to AASHTO-L-2, 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-1" & "T-1" shall be those of the larger diameter.

6. The diameter of the circular ties shall be the outside diameter of pipe x 1.5.

7. Pipe ends to be trimmed such that the maximum distance between pipes at any point is 2".

<table>
<thead>
<tr>
<th>PIPE COLLAR TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe Size</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>12&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
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<tr>
<td>24&quot;</td>
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<tr>
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<tr>
<td>72&quot;</td>
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<tr>
<td>78&quot;</td>
</tr>
<tr>
<td>84&quot;</td>
</tr>
<tr>
<td>96&quot;</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. 4).
   - Single Ring Illustrated-Sump with wing basin upstream.
   - Double Ring Illustrated 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 floor finish. Slope of the sump portion of the catch basin along the axes of the pipe shall be 4%. 

5. Any specified inlet depression shall be warped to opening according to Std C-15,70.

6. All structural steel shall be ASTM A36.

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

8. All concrete shall be Class B.

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

10. Curb opening area (sq ft) per inch of curb "H" + gutter depression + curb opening length (ft) x 0.0833.

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

12. Construction joints and angles shall be placed to meet field conditions. See Std 15,70.

13. "H" = 6" when it is 8" or less.
   - 8" when it is greater than 8".

SECTION A-A
USE THIS SECTION WHEN HIS 5" OR LESS

SECTION B-B

SECTION C-C

PLAN

No. 3 Bars, 3" C to C
No. 3 Bars, 3" C to C

Access Frame and Cover
Std C-15,65

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

Gutter Control Grade

Location as Shown on Plans

CATCH BASIN TYPE 3
STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

J. H. Critz

5-97
GENERAL NOTES
1. See sheet 1 of 2 for other dimensions, notes and reinforcing steel.
2. \( \theta + \): 6' when \( H \) is 8' or less.
   8' when \( H \) is greater than 8'.

DETAIL NO. 3

DETAIL NO. 1

DETAIL NO. 2
CURB SUPPORT ANCHOR

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

Note: Reinforcing bars shown are for floor of wing and wall only. See sections on sheet 1 for other reinforcing.
GENERAL NOTES

1. Catch basin can be used on grade or at roadway sep.
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 51a C-16-95 for grade and frame details and parking areas.
7. Any specified inlet depression shall be warped to operate according to 51d C-16-95.
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 details shall be placed to meet field conditions. See Std C-16-95.
12. Silicone sealant shall be placed between the grate frame and PCCP, recessed 1/4" from the pavement surface.
13. See Detail No. 2 for catch basin with wide gutter.
14. FT - 6" when H is 8" or less,
   8" when H is greater than 8.
   See Section B-B.
   - Gutter - 2'-6" or 4'-6" (Typ)
   - Veriles - 2'-6" or 4'-6" (Typ)

STATE OF ARIZONA
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DIVISION OF HIGHWAYS
STANDARD DRAWINGS
AC-97

CATCH BASIN, TYPE 4
C-16-95
GENERAL NOTES

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

2. Catch basin has three configurations:
   - Single Winged Sump
   - Single Winged Sump with wing basin
   - Double Winged Sump with symmetrical wing basins

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

4. Floor shall have a wood travel finish. Slope of the sump portion of the catch basin along the axis of the pipe shall be 1:40.

5. Any specified inlet depression shall be warped to opening according to Std C-15,170.

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, 11⁄2" C to C both ways and 11⁄2" clear to inside of walls and outside of wing basin floor except as shown.

10. Curb opening area is ft² per inch of curb "t" + inlet depression + curb opening length (ft) x 0.0834.

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

12. See Std C-15,590 for grate and frame details and opening areas.

13. Construction joints and grating shall be placed to meet field conditions. Std C-15,70.

14. Silicone sealant shall be placed between the grate frame and PCP, recessed 1/4" from the pavement surface.

15. : 6" when h < 6" or less.
   8" when h > 6".

16. : when pavement is AC.
   Match pavement thickness when pavement is PCP.
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 void of 0.037 at any point.

5. Grate opening is 3.97 Sq. Ft.

SECTION

FRAME

SECTION A-A

GRATE

PLAN

PLAN

13 Bearing Bars
3/4 x 3/4 at 1 1/2 C to C

2 7/8 x 1/2
End Bars

3/8 x 3/8 Bar

3/16 Cross Bars May Be Wire Welded, Resistance Welded, or Electroformed to Bearing Bars.
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 gutters.

LEGEND

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

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

STATE OF ARIZONA
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DIVISION OF HIGHWAYS
STANDARD DRAWINGS

C-15.10
CATCH BASIN WSC DETAILS

5/97

DESIGN APPROVED
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DIVISION OF HIGHWAYS
STANDARD DRAWINGS

C-15.10
CATCH BASIN WSC DETAILS

5/97

DESIGN APPROVED
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DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

C-15.10
CATCH BASIN WSC DETAILS

5/97
GENERAL NOTES
1. Construction drain may be deleted at the option of the Engineer.

LEGEND
C - Normal pavement or gutter flow line elevation.

CATCH BASIN CONSTRUCTION DRAIN

TYPE 4 CATCH BASIN WITHOUT CURB
GENERAL NOTES

1. Apron shall be portland cement concrete.
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. 1/4" indicated on plans.
   + 8" when wall height exceeds 8"

SECTION A-A

SECTION B-B

MEDIAN DITCH GRADE DETAIL

GRATING DETAIL

DETAIL NO. 1

PERSPECTIVE
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 cost of No. 1 paint.
7. If indicated on plans.
   • 6" when wall height exceeds 8'

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>
</tr>
</thead>
<tbody>
<tr>
<td>6%</td>
<td>0.50'</td>
</tr>
<tr>
<td>4%</td>
<td>0.75'</td>
</tr>
<tr>
<td>3%</td>
<td>1.00'</td>
</tr>
<tr>
<td>2%</td>
<td>1.50'</td>
</tr>
</tbody>
</table>
GENERAL NOTES

1. Concrete shall conform to the requirements for Class 3 Concrete. The minimum strength shall be 4000 psi.

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

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

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

5. Foundation soil and backfill shall be in accordance with Section 203-5 of the Standard Specifications.
**GENERAL NOTES**

1. All concrete shall be Class B.
2. All reinforcing steel shall conform to AASHTO M-146, Grade 40.
3. All reinforcing steel shall have 2" min clear cover unless otherwise noted.
4. Reinforcing steel shall be No. 4 rebars, 1/2" C to C horizontal & vertical in walls.
5. Pipe can be placed in any wall.
6. See Std C-13,60 and C-13,65 for more information and dimensions of slotted drains.
7. Sphere = 6" when H is less than 8'.
   = 8" when H is greater than 8'.
GENERAL NOTES

1. See Std C-15.81 for dimensions, sizes and details not shown for installation of catch basin and half barrier.

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

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

4. The installation and inspection of steel studs welded to steel acting as a connection device to the concrete shall conform to ANSI/AASHTO/ANSI A30.5-96 Section 7.

5. Where applicable, see Std C-10.60 for weld hole placement.

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

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

- For 18’ Diameter Slotted Drain
- For 24’ Diameter Slotted Drain

8. 3’ min gutter depression when slotted drain is used.
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 desirable. See Hydraulics and Utility and Railroad Engineering Sections.

<table>
<thead>
<tr>
<th>PIPE</th>
<th>DIMENSIONS</th>
<th>QUANTITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>L</td>
<td>E</td>
</tr>
<tr>
<td>18&quot;</td>
<td>2'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>2'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>3'-0&quot;</td>
<td>1'-6&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>4'-0&quot;</td>
<td>2'-0&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>5'-0&quot;</td>
<td>2'-6&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<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>
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 appendages shall be given one shop coat of No. 1 paint.
4. Plans shall specify locked or bolted cover for standpipe No. 2.
5. For specific details of a flush pavement or sidewalk installation, see Utility and Railroad Engineering Section.
TYPE 2 IRRIGATION GATE

For pipes 6" through 24", Gate and frame shall be galvanized iron. Type shown is for concrete pipe. For CRP, external steel adjustable bend shall be used in place 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.

6" Utility Concrete Ring for Lawn Installation

Masonry Mortar: Slope to fit local conditions

6" Ground Line

Varies 6" to 20"
GENERAL NOTES

1. Irrigation sleeves shall be installed in a trench condition. See Std C-13.15 and Std C-70.1.
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 "I" on the face of all curbs at sleeve locations. The width of the letter shall be 3", and shall penetrate the concrete surface.
5. For non-continuous sleeves under crossroads, Std C-5110 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 super-elevated sections, minimum slope nominal 10 to 1 drain.

SAFETY FIRST

STATE OF ARIZONA
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DIVISION OF HIGHWAYS

IRRIGATION SLEEVES
C-16.40
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 meshsplice shall have a 6" minimum lap vertically and horizontally.

PERSPECTIVE

Drawn for types 1 and 2, Type 3 Similar

*9 Gau Wire Ties
See Perspective

6x6-WLxW1/4 Galvanized Wire Mesh

Type 1 and 2 Bank Protection

<table>
<thead>
<tr>
<th>TYPE</th>
<th>H</th>
<th>TOP OF BANK PROTECTION ABOVE THE STREAM BED</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2&quot; to 4&quot;</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4&quot; to 7&quot;</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6&quot; to 12&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Type 3 Bank Protection

*When other embankment slope rates are encountered, warp to 2:1 or 1:1.5
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 panels shall have a 6" minimum lap vertically and horizontally.

TYPE 4 AND 5 BANK PROTECTION

SECTION A-A

Type 4/5

Type 4/5

2" Diameter Wire

Sheet Metal

Rock Backfill

Low Stream Bed

50" Railroad Rail

4 Center to Center

Type 4/5 Long

Type 5-1/6 Long

1/16" Dile Cable

EnG-M1x4x14 Galvanized Wire Fabric Placed as Shown to Enclose All but the Top Surface of the Rock Backfill

Single Wrapped with 3 Strands of 19 Galvanized Wire 1/0.9 C to C

5/8" Diameter Cable Placed under Basket

50" Railroad Rail

4 Center to Center

Type 4/5 Long

Type 5-1/6 Long

PLAN

2½" x 4½" Galvanized Woven Wire Fabric: Horizontal wires by 6 Strands, Twisted, Min 3/16" Gauge, Diagonal Wires Min 14 Gauge

2½" x 4½" Galvanized Woven Wire Fabric: Horizontal wires by 6 Strands, Twisted, Min 3/16" Gauge, Diagonal Wires Min 14 Gauge

Rock Backfill

Low Stream Bed

50" Railroad Rail

4 Center to Center

Type 4/5 Long

Type 5-1/6 Long

Type 6 BANK PROTECTION

Intermediate Panel

End Panel

8'4" x 8'4"

Min 15" Rolls or Equal 10' Long

2 Strands 9 Galvanized Wire Twisted Taut

Single Wrapped with 3 Strands of 19 Galvanized Wire 1/0.9 C to C

5/8" Diameter Cable Placed under Basket

50" Railroad Rail

4 Center to Center

Type 4/5 Long

Type 5-1/6 Long

Dike or Embankment

Min 15" Rolls or Equal 10' Long

2 Strands 9 Galvanized Wire Twisted Taut

Intermediate Panel

End Panel

8'4" x 8'4"

Min 15" Rolls or Equal 10' Long

2 Strands 9 Galvanized Wire Twisted Taut
GENERAL NOTES

1. Precast manholes shall conform to the requirements of AASHTO M-69 except that the compressive strength of each unit will be determined and accepted in accordance with Section 1006.7 of the AASHTO Specifications.

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

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

4. See Std C-18.20 for additional information and dimensions.

5. See plans for Std C-18.20 for additional information and dimensions.

6. Steep shall be placed in manholes in accordance with the requirements of AASHTO M-69.

7. See Std C-18.20 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 conforms 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 height and raised 1/4 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-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 A-A OF COVER

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

SECTION B-B

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

SECTION C-C

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

DESIGN APPROVED

J. M. H. Cottlinae

DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
DIVISION OF HIGHWAYS

MANHOLE FRAME AND COVER DETAILS

C-1820
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.
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 piping shall be protected against concrete entering through bottom or perforations.
3. Depth gauge piping 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
Generic Notes:
1. All timber shall be rough, pressure treated and unspliced.
2. Rock basket, full length of structure, shall be included only when called for on plans.
3. See plans for bituminous surface and base material details.
4. See Std C-19.10 for Depth Gauge details. Depth Gauge Foundation may be utility concrete.

Type 1
Bituminous Surface Road

Type 2
Bituminous Surface Ford
Timber Cutoff Walls
GENERAL NOTES

1. Standard Marker may be used as bench, survey monument or R/I markers.
2. Standard Marker shall be made of brass, bronze or aluminum.
3. Standard Marker will be furnished by the Department. Cast-In lettering format may vary.
4. Bench Marks shall be established on headwalls, bridge 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.
GENERAL NOTES

1. All concrete shall be Class B.

FOR SINGLE INSTALLATION

<table>
<thead>
<tr>
<th>QUANTITIES PER FT OF SLAB LENGTH</th>
<th>CONCRETE</th>
<th>REINFORCING STEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.31 CY</td>
<td>35.22 Lbs</td>
<td></td>
</tr>
</tbody>
</table>

CROSS SECTION

- Utility Line
- Concrete Slab
- Sub Length as Shown on Plans
- Roadway
GENERAL NOTES

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

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

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

4. Protection for Type A required when distance from bottom of water to top of sewer line is 12" or less. When the sewer is 14" or 16" house connection no protection is required if distance is more than 12".

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

TYPE A ENCASMENT

TYPE B ENCASMENT
GENERAL NOTES

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

2. Type C pipe support may be used for crossing pipes with a bell diameter of 18" or less if sufficient clearance over storm sewer is available and total span is less than 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 noted as temporary supports if conditions warrant these changes at 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 undue pressure resulting from flooding of the bottom. The volume of the placed opening shall not exceed 50% of the volume of the supporting wall.

7. Use Type B pipe support instead of Type C when clearance between pipes is less than Y 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>Irrig Pipe</td>
<td>Conc Storm Drain</td>
</tr>
<tr>
<td>Buried Telco</td>
<td>Traffic Control Conduit</td>
</tr>
<tr>
<td>Gas Pipes</td>
<td>Water and Sewer Lines</td>
</tr>
</tbody>
</table>

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

1. Pre-cut, 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 manufactured 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 elevation shown on plans.

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

TYPICAL STUB OUT

PIPE PLUG MARKER

STORM DRAIN LINE PLUG

SEWER LINE PLUG

PIPE SIZE | PLUG THICKNESS 'A'
--- | ---
12' - 36' | 8'
36' - 48' | 12'
51' - 72' | 18'
75' - 90' | 24'
96' - 108' | 32'
108' - 120' | 36'
120' - 150' | 40'

3/4" Layer Cement Plaster (Water Tight)

Black or Brick and Mortar Plug, See Note 2

Vitrified Clay Coupling

#20 Copper Wire with Yellow Insulation or 2x4 Stake

Anchor with Brick or Stake at Trench Bottom or Tie to Bell End
TYPE A
2.5' TO 5' DROP

TYPE B
5' OR MORE DROP

Masonry Anchors Min. One Tie per Two Sq Ft of Contact Area For Drop Connections to Existing Manholes Only

Square Concrete Encasement Class B or Masonry Encasement Grouted Solid

Concrete Foundations on New Manholes to Extend Under Drop Connection

Hand Shaped Invert

NOTE:
D = Same Diameter Pipe

Flexible Water Tight Coupling

Concrete to Spring Line of Pipe

Flexible Water Tight Coupling

Manhole Wall

Stub Pipe

Concrete to Spring Line of Pipe

Y Branch

45° Mitred Bend

4"
CLEANOUT INSTALLATION
1. Thrust blocks are to extend to undisturbed ground.
2. All concrete shall be class B.
3. Table is based on 3000 lb/ft². Add 1 lb/ft² for conditions of load, which may indicate soil bearing less than 3000 lb/ft². Areas shall be increased accordingly.
4. Areas for pipe larger than 16" shall be calculated for each project.
5. Form all non-bearing vertical surfaces.

### MINIMUM THRUST BLOCK AREA

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>TEED, DEAD END, 90° BEND</th>
<th>45° &amp; 22½° BEND</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; &amp; LESS</td>
<td>3 SQ. FEET</td>
<td>3 SQ. FEET</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4' *</td>
<td>3' *</td>
</tr>
<tr>
<td>8&quot;</td>
<td>6' *</td>
<td>3' *</td>
</tr>
<tr>
<td>10&quot;</td>
<td>9' *</td>
<td>5' *</td>
</tr>
<tr>
<td>12&quot;</td>
<td>13' *</td>
<td>7' *</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23' *</td>
<td>12' *</td>
</tr>
</tbody>
</table>
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 this detail or restraint rods may be used when allowed to intersect 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>MINIMUM BLOCK DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>4#6</td>
<td>6&quot; x 3&quot; x 3&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>4#6</td>
<td>9&quot; x 4&quot; x 0.75&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>4#8</td>
<td>9&quot; x 4&quot; x 0.5&quot;</td>
</tr>
</tbody>
</table>

* For 125 psi Working Pressure

Thrust Block
Per Std C-23.10

Class B Concrete

Backfill with Gravels Material

CIWJ Pipe

CIWJ 45° Bend
Short Radius

Mechanical Joint

Reinforcing Bars to have 90° Bend on Lower End

See Table for Dimensions
CAST IRON

Remainder of Trench to be Backfilled Per Section 501

6" Minimum Clearance Backfilled with Selected Fine Material or Sand

NEW PIPE

CAST IRON

Remainder of Trench to be Backfilled Per Section 501

6" Minimum Clearance Backfilled with Selected Fine Material or Sand

NEW PIPE

ASBESTOS CEMENT

Remainder of Trench to be Backfilled Per Section 501

6" Minimum Clearance Backfilled with Selected Fine Material or Sand

NEW PIPE

CAST IRON

MECHANICAL JOINT

Remainder of Trench to be Backfilled Per Section 501

6" Minimum Clearance Backfilled with Selected Fine Material or Sand

NEW PIPE

GENERAL NOTES

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

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

2. If two or more joints of ACP are used to make riser, use standard ACP pipe rubber gasket coupling to join pipe. Where riser pipe length exceeds 15', use 12" KC pipe.

3. All steel to have prime cost of paint No. 4 and one heavy application (finish coat) of Light Grey Enamel paint as per section 1052-406.

4. Valve box shall be adjusted to the finished grade prior to the paving of the asphaltic concrete surface or RCSP.

5. Ground below the concrete pad or these bricks to be compacted to 80% of the maximum density.

6. Use Parson, Tyler, Apco, or equal deep skirted cover 14" or more type, slotted adjustable cast iron valve box, C- minimum 15,000 psig.

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

DETAIL A
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

The Word “Water”
on the Cover (Typ)

Asphaltic Conc
Pavement
See Note 4

Concrete Ring not
Required when adjusted
in Unpaved Areas

Poured Concrete Casing
5” thick and 30” diameter

Finish Grade
Cover Only

8” Class ISO ACP Riser
Pipe or Approved Equal

Class B Concrete
Alternate Bricks
GENERAL NOTES

1. Thrust blocks are to extend to undisturbed ground.
2. Optional bolting of 2"x8"x12" 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 tape shall be made by city crews at prevailing rates.
5. Install permanent bolting under valve before tap is made. All flange bolts shall be clear of footing.
6. All tapping sleeves must be pressure tested prior to request for tap by city.
7. Contractor shall excavate as shown and shall set tapping sleeve and valve, and tighten all bolts prior to requesting city to make tap.
8. Tapping sleeve to be placed a minimum of 18" from any bell, coupling, valve, or other obstruction.
9. Areas for pipe larger than 16" shall be calculated for each project.

<table>
<thead>
<tr>
<th>SIZE OF PIPE BEING CONNECTED</th>
<th>MINIMUM THRUST AREA REQUIRED (A x B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; &amp; LESS</td>
<td>3 SQUARE FEET</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4 SQUARE FEET</td>
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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>
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</table>

PLAN

ELEVATION
GENERAL NOTES

1. A cement to use only on underground installations where the use of concrete thrust
   bearing pipe ASTM C 273-93 cannot be used because of obstructions, or requirements of the
   specifications.

2. Washers may be cast iron or steel, and may be round or square. Holes shall be 
   ½ 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 500, grade B, with cement
   plate in accordance with ASTM B 76, except
   that the minimum thickness of the plate shall
   be 0.002 of an inch. Carbon plate shall have
   class 24 threads and nut, rod couplings
   and turnbuckles shall have 26 threads.

4. High strength, heat treated cast iron tee head 
   bolts with hexagon nuts, all in accordance with 
   the strength requirements of AWWA C 110, may be 
   used in lieu of the carbon plate 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 bolt and splice 
   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 pipe and 
   frame available for working around the particular 
   joint will influence the choice of methods used.

6. In certain assemblies of rod and clamps shown, 
   rods run from a lug on the fitting or a clamp 
   behind the hub of a bolt to a clamp against a 
   face of a plate. Note that this arrangement 
   anchors only one joint. The stability of the 
   joint where the clamp is against the face of 
   the bolt 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 bolt and rods to a clamp 
   at the face of the next bolt.

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 ⅜ 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</th>
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<tr>
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<td></td>
<td></td>
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<td>STEEL</td>
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<td>10½</td>
<td>10½</td>
<td>2½</td>
<td>1½</td>
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<td>⅛&quot; x 3&quot;</td>
<td></td>
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<tr>
<td>6&quot;</td>
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<td>3½</td>
<td>2½</td>
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<td>⅛&quot; x 3&quot;</td>
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<td>8&quot;</td>
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<td>16½</td>
<td>4½</td>
<td>3½</td>
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<td>⅛&quot; x 3&quot;</td>
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<tr>
<td>10½</td>
<td>18½</td>
<td>18½</td>
<td>5½</td>
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<td>⅛&quot; x 3&quot;</td>
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<tr>
<td>12&quot;</td>
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<td>22½</td>
<td>5½</td>
<td>3½</td>
<td>⅛&quot; x 3&quot;</td>
<td>⅛&quot; x 3½</td>
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</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 or vibrated 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>
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<tbody>
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<td>3½&quot;</td>
<td>4&quot;</td>
<td>4&quot;</td>
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Break out if necessary to set Box to proper grade.
GENERAL NOTES

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

SPECIFICATIONS

<table>
<thead>
<tr>
<th>NO</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>STEEL PLATE BRACE</th>
<th>WEIGHT</th>
<th>MATERIAL</th>
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<td>None</td>
<td>None</td>
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<tr>
<td>2</td>
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<td>2(\frac{1}{8})&quot;</td>
<td>1(\frac{3}{4})&quot;</td>
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<td>Detail 2</td>
<td>33 Lbs</td>
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GENERAL NOTES

1. Cut and plugs must be adequately "dry blocked".
2. Dry blocks shall be standard size solid masonry concrete blocks, ASTM C-129.
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-23.10.
7. Where 4" or larger line is specified to be abandoned, the cut and plug should occur at the supply line main to avoid creating an unused dead-end line.
GENERAL NOTES

1. All joints in hydrant run-out to be mechanical joints.
2. Hydrant Tee Cou 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 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.
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