TO: All Users of Construction Standards

FROM: Mr. Terry H. Otterness, Engineer-Manager of Plans
      Mr. August V. Hardt, Deputy State Engineer

SUBJECT: Revisions to Construction Standards

Several changes are being made to existing Construction Standard Drawings and the Construction Standards Index. Major changes include: revising and expanding sidewalk ramps to comply with ADA requirements, revising PCCP joints and locations, changing load transfer dowel assemblies from skewed to non-skewed, widening the base of concrete median barrier, changing the longitudinal bearing bar size of the EF grate, and documenting the deletion of six previously deleted standards.

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

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<th>REVISED DRAWING</th>
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<td>C-02.10 Slopes-Interstate</td>
<td>Added slope rounding detail and modified shoulder wedge detail.</td>
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<td>C-02.20 Slopes - Primary Roadways</td>
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<td>Corrected fill height callout.</td>
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<td>C-02.30 Slopes - Secondary/ Misc. Roadways</td>
<td>Corrected cut slope and shoulder wedge slope callouts.</td>
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<td>Added slope rounding detail and modified shoulder wedge detail.</td>
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<td>C-05.30 Sidewalk Ramps</td>
<td>Revised Types 1,2,&amp; 3 ramps to be in compliance with ADA requirements.</td>
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<td>Added Type 4 (mid-block) ramp, also in compliance with ADA requirements.</td>
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<td>Moved median nose transition to C-05.40.</td>
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<td>C-05.40 Median Paving and Nose Transition</td>
<td>Added median nose transition (from C-05.30). Added layout for triangular islands. Deleted detail of raised concrete median on structure. Added note for raised median on structures to see Structure Plans.</td>
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<td>C-07.02 Load Transfer Dowel Assembly</td>
<td>Changed assemblies from skewed to non-skewed. Added dimension and quantity tables. Changed dowel bar size and added tolerance to placement depth.</td>
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<td>Expanded applications for skewed joints and added non-skewed joints.</td>
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<td>Extended LC/LWP joint thru ramp taper on curb and gutter applications. Clarified joint requirements at ramp terminal at crossroad.</td>
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<td>Widened base from 2'-2&quot; to 2'-6&quot;.</td>
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<td>C-15.50 Catch Basin Grates, Longitudinal Bars</td>
<td>EF grates - changed bearing bars from 1/4 &quot; to 1/2 &quot;.</td>
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Several Construction Standard Drawings have been replaced by new Structures Section Standard Drawings, dated June, 1992. The following Construction Standard Drawings have been deleted and a cross reference list is provided below.

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<td>Plan View, Concrete Pavement</td>
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<td>Plan View, Graded Surface</td>
<td>Irrigation Line (1&quot;-2&quot;)</td>
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<td>Irrigation Line (1&quot;-100&quot;)</td>
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**NOTE:** The table above contains the general abbreviations used in the context of highway and transportation documents.
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**Abbreviations:**
- PS: Prestressed or Prestressing
- Prj: Project
- P/L: Property Line
- PROD: Proposed
- PROX: Protection
- Prov: Provision or Provide
- Quad: Quadrant
- Quan: Quantity or Quantities
- Q: Quantity of Drainage Runoff
- R: Radius
- R/R: Reinf or Reinforcing
- RCP: Reinforced Concrete Pipe
- RCPA: Reinforced Concrete Pipe Arch
- Recast: Reconstruct
- Ref: Reference
- Rnj: Reinforcement
- Rok: Rock
- RFL: Right of Way
- Rd: Road
- Rdw: Roadway
- RCP: Rubber Gasket Reinforced Concrete Pipe
- S: Sewage
- SM: Select Material
- Sh: Sheet
GENERAL NOTES
1. Roadway width, cut ditch width, cross slope, and pavement structure section will be shown on project plans.

2. Design highwater should not be located above the subgrade in unseawed ditch.

3. Pavement structure slope is nominal. Actual slope is controlled by 0.1% subgrade wedge angle.

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

5. For slope controls within interchange areas, see project plans.

6. Where median slopes intersect, see project plans for contours.

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

SHOULDER WEDGE 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 6%, use 5' semi-tangents for slope rounding. For each additional foot of cut add 1' to semi-tangent to 31 maximum.
**GENERAL NOTES**

1. Roadway width, cut off ditch width, cross slope, and pavement structure section will be shown on project plans.
2. Design highwater should not be located above the subgrade in undrained ditch.
3. Pavement structure slope is nominal. Actual slope is controlled by 60. See Shoulder Wedge Detail.
4. Slopes beyond the pavement structure, such as embankment and cut slopes, are relative to horizontal.
5. When median slopes intersect, see project plans for controls.
6. These slopes are intended to be used with new or reconstructed roadways.

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

**SUBGRADE/SLOPE HINGE TREATMENT DETAIL**

**INTERMEDIATE SLOPES**

**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 6%, use 5' semi-tangents for slope rounding. For each additional foot of cut add 1' to semi-tangent to III maximum.
GENERAL NOTES

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

2. Design highwater should not be located above the subgrade in uncut ditch.

3. Pavement structure base is nominal. Actual slope is controlled by QL. 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 8% min required when guard rail is utilized on the project. Treatment shall be uniform throughout the project length.

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

MINIMUM SLOPES

INTERMEDIATE SLOPES

MAXIMUM SLOPES

MINIMUM DITCH CONDITIONS DETAIL

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

1/93

C-02.50
| X          | 2° | 4° | 6° | 8° | 10° | 12° | 14° | 16° | 18° | 20° | 22° | 24° | 26° | 28° | 30° | 32° | 34° | 36° | 38° | 40° | 41° | 42° | 44° |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0          | 0.20| 0.19| 0.18| 0.17| 0.16| 0.15| 0.14| 0.13| 0.12| 0.11| 0.10| 0.09| 0.08| 0.07| 0.06| 0.05| 0.04| 0.03| 0.02| 0.01| 0.00| 0.00| 0.00|
| 10         | 0.40| 0.39| 0.38| 0.37| 0.36| 0.35| 0.34| 0.33| 0.32| 0.31| 0.30| 0.29| 0.28| 0.27| 0.26| 0.25| 0.24| 0.23| 0.22| 0.21| 0.20| 0.20| 0.20|
| 20         | 0.60| 0.59| 0.58| 0.57| 0.56| 0.55| 0.54| 0.53| 0.52| 0.51| 0.50| 0.49| 0.48| 0.47| 0.46| 0.45| 0.44| 0.43| 0.42| 0.41| 0.40| 0.40| 0.40|
| 30         | 0.80| 0.79| 0.78| 0.77| 0.76| 0.75| 0.74| 0.73| 0.72| 0.71| 0.70| 0.69| 0.68| 0.67| 0.66| 0.65| 0.64| 0.63| 0.62| 0.61| 0.60| 0.60| 0.60|
| 40         | 1.00| 0.99| 0.98| 0.97| 0.96| 0.95| 0.94| 0.93| 0.92| 0.91| 0.90| 0.89| 0.88| 0.87| 0.86| 0.85| 0.84| 0.83| 0.82| 0.81| 0.80| 0.80| 0.80|

**CUMULATIVE PERCENT OF CROWN "C" FOR EACH FOOT RIGHT OR LEFT OF X**

**FORMULA**

\[ C = \frac{X}{2} \]

**USE OF TABLE**

- Assume X = 40 ft. and C = 0.45 ft.
- Find Y for X = 8 ft.

Table shows X - 18.00% of C, or 0.16 X 0.45 = 0.072 ft.

**DESIGN APPROVED**

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

Pavement Crown, Parabolic

C-02.40
**CROWN DYKE**

**TYPE A DYKE**

**TYPE B TRANSVERSE MEDIAN DYKE**

* Slope relative to grade of median at intersection with toe

**GRADER DITCH**

**TYPICAL DYKE INSTALLATION AT STRUCTURE**

Place dykes at structures to create water cushion.

**GENERAL NOTES**

1. Dimensions of ditches shall be shown on plans, as bottom width, height and length.
2. Dimensions of dikes shall be shown on plans, as top width, height and length.
3. Ditches shall be constructed with a minimum grade to prevent erosion. Ditch outer treatment shall be as provided on plans.
4. See Std C-0320 for parallel channel and dyke treatment with respect to recovery area.
5. As Required
C-02,20 Slopes

C-02,10 Slopes

GENERAL NOTES

1. For C-02,10 slopes with embankment height over 21', L = L for embankment height from table + 2.25(emb. height - 21').
2. For C-02,20 slopes with embankment height over 32', L = L for embankment height from table + 1.8(emb. height - 32').
3. For C-02,30 slopes with embankment height over 33', L = L for embankment height from table + 1.8(emb. height - 33').
GENERAL NOTES

1. For C-02.10 slopes with embankment height over 24', L = L for embankment height from table + 2.24(emb. height - 24).
2. For C-02.20 slopes with embankment height over 32', L = L for 32' embankment height from table + 1.8(emb. height - 32).
3. For C-02.30 slopes with embankment height over 13', L = L for 13' embankment height from table + 1.8(emb. height - 13).
GENERAL NOTES

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

2. Couplings shall be mechanical heat-shrinkable polyethylene sheets, one piece, 2" type milpreno sheet or slip seam, all 12′ min width and 18' up min.

3. Maximum D Allowable = 8 CFS
   Minimum Y Allowable = 1 fps
GENERAL NOTES

SINGLE 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 portland cement concrete pavement and approximate the curvature when adjacent to aggregate concrete pavement. Joints shall be either hand toled or sawed.

4. One-half inch thick expansion joints shall be located at tangent points in curb return, or structures and at maximum 50 foot intervals. The one-half inch joint filler shall extend the full depth of the concrete.

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

6. All exposed edges and hand toled 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.

CURB TERMINAL SECTION
GENERAL NOTES
1. Flows through the curb and gutter shall be controllable. The remainder of the curb and gutter shall be textured longitudinally to a light broom finish.
2. For curb and gutter with slotted drain, see Slotted Drain Secs. C-15.60 and C-15.61.
3. For additional general notes and dimensions, see Std. C-05.10.

TYPE C - CURB & GUTTER TRANSITION AT PAVED CORE

SECTION A-A

SECTION B-B

TYPE B - CURB & GUTTER TRANSITION

* Dimensions may vary from Sec. C-05.10 Type D, D-1, D-2 or D-3.

TYPE A - CURB & GUTTER TRANSITION - AT RAMP TAPERS

* Dimensions may vary where exit occurs on curves, see plans.
GENERAL NOTES

1. Unless otherwise specified, sidewalks shall be 4 inches in depth and driveways shall be 6 inches in depth.

2. One inch deep transverse contraction joints shall be placed in sidewalks at intervals of approximately 5 feet. If the sidewalk is over 8 feet wide, a 1 inch deep longitudinal contraction joint shall be placed in the center of the sidewalk. The maximum area of sidewalk shall be limited to 160 sq. ft. per contraction joint. The contraction joints in driveways shall be 1 inch in depth. Joints shall be either formed or sawed. Formed joints shall be finished with a tool having a 1/2" radius.

3. One half inch expansion joints shall be located between sidewalks or driveways and all adjoining structures. Maximum length of sidewalk without expansion joint shall be 60 transverse feet. The 1/2" joint filler shall extend the full depth of the concrete.

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

DRIVEWAY WITH SIDEWALK

DRIVEWAY SIDEVIEW

CONCRETE SIDEWALK

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

CONCRETE DRIVEWAYS & SIDEWALKS

C-05.20
GENERAL NOTES
1. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter,
   gutter = 0'.
2. See Std C-05.10, C-05.11 and C-05.20 for joint requirements.
3. When curb heights of 6" are shown on plans, use dimensions shown in T/C.
   Use type A curb if median is to be landscaped.

ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP

SECTION A-A

GROOVE DETAIL
GENERAL NOTES

1. Top of curb (TC) and top of ramp elevations shown are in relation to the gutter and are located relatively. Curb-1/2".

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

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

PLAN

Transition to Match Exit Curb & Curb and Sidewalk Existing Dimensions May Very See Plans

Sidewalk
Std C-05.20
Radius
Per Plans

Top of
Ramp
TC=3'

Top of
Ramp
TC=3'

Top of
Ramp
TC=1/2'

TC=7'
TC=5'
TC=5'
TC=5'

Sidewalk

Curb & Gutter
Std C-05.10

PLAN A-A

SECTION A-A

ROADWAY WIDTH: 80'
SIDewalk Width: 7' Min
Varies

Concrete

4' Concrete

Contract joint or formed separately

ELEVATION

DEPRESSED CURB AT SIDEWALK RAMP

1/2" R (Typ)

1/2" R

1/2" R

Concrete

Match Gutter Flow Line

TC=7'

TC=5'

Match Gutter Flow Line

TC=5'

GROOVE DETAIL

Rough Brown Finish
Use Ripple Pattern

3/8 Groove at 1" C to C
See Groove Detail

PERPECTIVE
GENERAL NOTES
1. Top of curb (TC) elevations shown are in relation to the gutter and are located radially, gutter to curb.
2. See Std C-05.10, C-05.11 and C-05.20 for joint requirements.

(6) Maximum Slope.

PERSPECTIVE

GROOVE DETAIL

SECTION B-B

WITH RAMP CURB

WITHOUT RAMP CURB

SECTION A-A

ELEVATION

DEPRESSED CURB AT SIDEWALK RAMP

PLAN

Type B Curb & Gutter
When Shown on Plans
See Std C-05.11

Sidewalk Ramp
Control Point
See Plans

Radius Per Plans

Barrier Transition
See C-10.99

Barrier Gutter Transition
See C-10.99

Plan Width

1'-0" 2'-6" 2'-6" 2'-6"

1'-0"

Contraction Joint
or Formed Separately

6"

1/2" R (Typ)

Ramp Curb
When Shown
on Plans

Barrier Transition
See C-10.99

1/4" Grooves at 1" C to C
See Groove Detail

1/2" R

Gutter

TC-1/2"

TC-1/4"

TC-1/4"

4" Concrete

0.010" Min

Vertex

0.010"

Sidewalk Width Per Plans

0.625" Roadway Width

5" Min

12"

1/4" C to C (Typ)

Match Gutter Flow Line
TC-0"

Sidewalk Ramp

4" Concrete

0.010" Min

Vertex

0.010"
GENERAL NOTES

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

2. See Sec C-05.30.1 and C-05.30.2 for joint requirements.

3. When curb heights of 6" are shown on plans, use dimensions shown in 1/8.'
   - For sidewalk widths greater than 6'-5", the overall sidewalk ramp width shall match the sidewalk width.

PERSPECTIVE

ELEVATION
DEPRESSED CURB AT SIDEWALK RAMP

SECTION A-A

4. Concrete

Contraction Joint or Formed Separately
GENERAL NOTES

1. Traffic signal foundations, traffic sign foundations, and all boxes for traffic signs and traffic signals shall be installed prior to placement of median paving.
2. See Std C-05.10, C-05.11, and C-05.20 for joint requirements.
3. Decorative median paving shall be stamped concrete, concrete pavers, or as specified on the project plans.
4. Decorative median paving shall not be placed on a median nose transition or on a median island on a structure.
5. A 4" x 6" concrete header shall be used to end decorative paving at locations where concrete sidewalk ramps are not present.
6. Median nose transitions shall not be placed on departure ends of raised medians.
7. Top of curb (TCC) and top of ramp deviations shown are in relation to the gutter (Gutter-10).
8. When curb heights of 6' are shown on plans, use dimensions shown in C-17.
9. See Structure Plans for raised median on structures.

SECTION A-A

SECTION B-B

SECTION C-C

NOSE TRANSITION LAYOUT
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 move-
   ments to and from loading docks of an industrial facility, warehouse or truck
   terminal.

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

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

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

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

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

7. Generators 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. Pavement turnouts, plans note, will be X-10, surface materials, type
   and standard. Examples: 20 X 10' A-10, Type A, Std C-0610. Show
   radius 10' graphically.

10. Construction of curb, gutter, sidewalk and drainage facilities in urban
    areas by the permitting authority portion of the highway frontage
    under permit application, may be a stipulation of the permit approval.
    If there appears to be reasonable need.

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

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


RURAL DEVELOPMENTS

URBAN DEVELOPMENTS
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.

- Breakangle greater than 6% requires a vertical curve, L=1000 min. Vertical curve shall not approach on roadway or sidewalk.

URBAN CROSS SECTION

(UP GRADE)

Or 6% Desirable Without Sidewalk
See Plans Typical Section

(Down Grade)

Commercial & Industrial: 20-40' Desirable
Residential: 10' min Desirable
-2% to -2% Desirable

CONCRETE SIDEWALK

(Up Grade)

Or 6% Desirable Without Sidewalk
See Plans Typical Section

Contral Point

Commercial & Industrial: 20-40' Desirable
Residential: 10' min Desirable

CONCRETE SIDEWALK

(Down Grade)

Or 6% Desirable Without Sidewalk
See Plans Typical Section

Desirable Urban Cross Section
SPECIAL DETOUR SECTION

<table>
<thead>
<tr>
<th>Tangent Roadway</th>
<th>Entrance Design Speed</th>
<th>Entrance Lp, Curvature</th>
<th>Detour Lp, Curvature</th>
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NOTE: Dimensions - angular and distance - used on drawing above are exemplary, 70 mph design speed was used. Refer to table for basic design information.

GENERAL NOTES

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

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

The design speed shall be comparable to vertical and horizontal alignment.

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

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

The minimum length of the detour shall be 28' for existing roadway 30 or under and a minimum of 30' for existing roadways less than 35' in width.

The entrance taper for Detour "A" shall be extended until full detour width is attained. For Detour "B" the entrance taper shall be extended until a minimum of 14' is attained beyond the edge of existing roadway.

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

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

STATE OF ARIZONA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
STANDARD DRAWINGS  
1/83  

DESIGN APPROVED:  
LANGE & HALL  
APPROVAL DATE:  
12/15/92  

SCALE:  
1" = 100'  

SHEET NO:  
C-06.20
GENERAL NOTES

1. When load transfer dowel assemblies are required, use dimensions shown in 1A. See Assembly Placement and Edge Clearance Detail, Std E-07.02.

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

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

JOINT ABBREVIATIONS

LWP - Longitudinal Weakened Plane Joint
TWP - Transverse Weakened Plane Joint
LC - Longitudinal Construction Joint
TC - Transverse Construction Joint
E, H - Expansion Joints
S - AC/PCC Paving Edge Seal Joint
T - PCCP Thickness
Curb & Gutter Joint
C Joint
Pavement Slopes Toward Gutter

Half Barrier Joint
B Joint
Pavement Slopes Toward Barrier

Barrier Joint
B Joint
Pavement Slopes Toward Barrier

Curb & Gutter Joint
C Joint
Pavement Slopes Away From Gutter

Half Barrier Joint
B Joint
Pavement Slopes Away From Gutter

Barrier Joint
B Joint
Pavement Slopes Away From Barrier

Joint Abbreviations:
Q - Curb Joint
T - PCCP Thickness
D - Gutter Thickness
B - Barrier Joint
GENERAL NOTES

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

2. Load transfer dowel assemblies are to be spaced 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".

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

   (See Quantity Table)

   1. Dowel bars - 1/2" dia x 1-6" plain round bars w/coating. See Special Provisions.

   2. Intermediate legs - 2 ga or W-5.5 wire.

   3. End legs - 2 ga or W-5.5 wire.

   4. Upper space bar - 2 ga or W-5.5 wire x 3. See Dimension Table

   5. Lower space bar - 2 ga or W-5.5 wire x 3. See Dimension Table

   6. Tie bars - W-15 wire x 16:

   7. Anchor straps - 1/4" steel strap, 0.078" thick. Place with 1/8" min steel nail for LCS, 4" min steel nail for ACB or BC, 0.45 dia AISN 4200 Class 1 w/4" need or washer to be power driven.

   (See Dimension Table)


QUANTITY TABLE

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DIMENSION TABLE

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ASSEMBLY PLACEMENT AND EDGE CLEARANCE DETAIL

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

LOAD TRANSFER DOWEL ASSEMBLY
C-07.03
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 be equal to minimum typical.  "C" shall equal 3 minimum typical.

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

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

5. See Std C-09.06 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 3.0" from the LC joint.

- Transverse Construction Joint (TC) allowable limits (Typ).

Repeat Sequence: Typical Joint Sequence (TWP Joints)

PLAN
58' PCCP
GENERAL NOTES

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

2. "A" shall equal 4' minimum (typical), 8' shall equal 3' minimum (typical), 12' 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 lifts.

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

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

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

Transverse Construction Joint (TC) allowance limits (Typ).
PLAN
84.25' PCCP

GENERAL NOTES

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

2. 'A' shall equal 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 slab.

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 3" from the LC joint.

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

Concrete Median Barrier

PLAN
72.25' PCCP
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 slow roads or streets, joints shall be placed to give the intersection a symmetric appearance while conforming to the cross section of the intersecting road or street.

5. See Std C-08.10 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 TC joint.

7. Transverse weakened plane joint shall be constructed at least 6‘-0’ from a transverse construction joint.
PLAN
58' PCCP

PLAN
55.5' PCCP

GENERAL NOTES

1. Non-skewed PCCP joints shall be used with load transfer joint assemblies.
2. See Std C-07.03 for PCCP joints and additional notes.
3. All transverse joints shall be in line with joints in adjacent slabs and are perpendicular (90°) to the longitudinal joints.
4. At intersection of side roads or streets, joints shall be placed to give the intersection a symmetrical appearance while conforming to the cross section of the intersecting road or street.
5. See Std C-05.03 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 pipe joint shall be constructed at least 6'-0" from a transverse construction joint.
GENERAL NOTES

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

2. See Std C-20.03 for PCCP joints and construction notes.

3. Transverse joints shall be in line with the centers of the adjacent sidewalks and are perpendicular (90°) to the longitudinal lines.

4. At intersection of side roads or streets, transverse 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 and LC joints shall be placed no greater than 3/4" from the LC joint.

7. Transverse weakened plane joint shall be constructed at least 6" to 8" from a transverse construction joint.
GENERAL NOTES

1. Non-skewed PCCP joints shall be used with load transfer dowel assemblies.
2. See Std C-0310 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-0310 for curb and gutter joint requirements.
6. The reinforcing bars in the LWP & LC joints shall be placed no greater than 1/2" from the LC joint.
7. Transverse weakened gore joint shall be constructed at least 8-6" from a transverse construction joint.
GENERAL NOTES

1. Paved gore area shall be Class 5 Concrete, f_c = 4000 psi or aspheric concrete as called for on plans.

2. For joint layout and details, see Std. C-07.01 & C-07.04

SECTION A-A

SECTION B-B

SECTION C-C

PLAN

CONCRETE GORE AREA
WITH ABUTTING CONCRETE PAVEMENT

CONCRETE GORE AREA
WITH ABUTTING AC PAVEMENT

ASPHALTIC CONCRETE CORE AREA
WITH ABUTTING AC PAVEMENT
GENERAL NOTES

1. Shoulder Grooving shall be applied on left and right shoulders of rural roadways (interstates, primary divided, and undivided) of 50' or wider as called for on the Plans.

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

3. Shoulder Grooving shall be constructed by making indentations in the asphaltic concrete.

4. The indentations may be formed by rolling the hot asphalt concrete with a roller to which half segments of 2" diameter axle have been welded to the drum. The axle segments shall be 2' long and spaced at approximately 12" centers.

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

6. The contractor may utilize other equipment or methods to construct the shoulder grooving if approved by the Engineer.
NORMAL SHOULDER

SHOULDER WITH EMBANKMENT CURB

2' WIDENED SHOULDER TAPER & EMBANKMENT CURB

ENTRANCE RAMP

EXIT RAMP

SECTION A-A

GENERAL NOTES

1. Grooves in curbed shoulders shall terminate at the face of the single curb or at the edge of the gutter.

2. Grooves shall extend through pavement edge of shoulders with no curb.
GENERAL NOTES

1. All embankment curb shall be protected by guard rail.
2. Guard rail, exclusive of flares, shall not begin or end within embankment curb.

PLAN

SECTION A-A

TYPE A GUARD RAIL INSTALLATION

SECTION B-B

REFLECTOR TAB DETAIL
GENERAL NOTES

1. All embankment curb shall be protected by guard rail.
2. Guard rail, exclusive of flares, shall not begin or end within embankment curb.

PLAN

SECTION A-A

SECTION B-B

TYPE B GUARD RAIL INSTALLATION

REFLECTOR TAB DETAIL
GENERAL NOTES

Length shall be shown unless otherwise indicated on project plans.

Concrete Half Barrier Transition Measurement (LP FT)
Length = 20'-0"

Tubular Thrie Beam Measurement (Lin Ft)
Length = 6'-3"

Guard Rail Anchor Measurement (Each)
Length = 12'-6"
Length As Shown On Project Plans

Do Not Torque High Strength Bolts That Go Thru Conc

Buried Anchor For Guard Rail Measurement (Lin Ft)
Length = 40'-7"/8"
Length As Shown On Project Plans

Approach Guard Rail To Bridge Dedo Measurement (Lin Ft)
Length As Shown On Project Plans

Concrete Median Barrier Transition Measurement (Lin Ft)
Length = 31'-6"

Shown W Beam Or Use Thrie Beam Guard Rail Measurement (Lin Ft)
Length = 37'-6"
Length As Shown On Project Plans

Rub Rail Measurement (Each)
Length = 24'-11½"

Bolted Anchor For Guard Rail (Each)
Number As Shown On Project Plans

Rub Rail Measurement (Each)
Length = 24'-11½"

Existing Box Culvert

Existing Plus

Breakaway Cable Terminal
Length = 12'-6"

Shown W Beam Or Use Thrie Beam BCT Attenuator Assembly Curved Or Shoulder Installation
Length = 40'-7"/8"
G9 (C) SYSTEM

PLAN

G9 (C) SYSTEM

ELEVATION

SECTION G9(C)

GENERAL NOTES
- Indicates ARIBA designation

DETAILED A (THRIE BEAM BACK-UP PLATE)

DETAILED B (MODIFIED STRUCTURAL SHAPE BLOCK)
GENERAL NOTES

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

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

3. Concrete shall be Class B, design strength 2000 psi.

4. If the footing and barrier are cast monolithically, No 6 or 7" shaped rebars will not be required.

5. In no case shall the front lip of barrier exceed the footing width.

6. No 4 Rebar shall extend 3" past the construction joint at the completion of the day's pour.

WITH PCC PAVEMENT
SECTION A-A

WITH AC PAVEMENT
SECTION B-B
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 T (≤3000 PSI).

4. If the footing and barrier are cast monolithically, No. 6 5-shaped rebars will not be required.

5. In no case shall the width of barrier exceed the width of 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.

A. Depth to match adjacent PCCP thickness (8" Min).
GENERAL NOTES

1. Concrete shall be Class S, design strength f'c = 3000 psi.
2. Median Barrier shall be placed upon either Asphalitic or Portland Cement Concrete Pavement.
3. Pavement thicknesses adjacent to Median Barrier shall be 3" minimum.
4. Joints shall be finished with a tool having a 3/4" radius.
5. This standard shall not be used when an individual run consists of less than five 20 foot sections.
GENERAL NOTES

1. Concrete shall be Class S, design strength f'c = 3000 psi.

2. Median Barrier shall be placed upon either Asphalt or Portland Cement Concrete Pavement.

3. Pavement thickness adjacent to Median Barrier shall be 3" minimum.

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

5. Doweled 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.

CONSTRUCTION JOINT DETAIL

SECTION B-B

END ELEVATION

SECTION A-A
GENERAL NOTES

- Indicates ARTBA designation.

ELEVATION

Use Rectangular Plate Washer (T) Under Post Bolt Head On First Post

On first two posts use std C-104/7 or C-104/8 as indicated on project plans or special provisions

SECTION A-A

LAYOUT AND DETAILS OF THE FLARE

<table>
<thead>
<tr>
<th>Dist Along 375° Parabolic Curve</th>
<th>Dist Along X Axes</th>
<th>Dist Along Y Axes</th>
<th>To Face Of Guard Rail</th>
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**GENERAL NOTES**

- Indicates ARIBA designation.

**PLAN**

- Use W-Beam Back-Up Plate At Posts Where W Beam Splices Do Not Occur (Typical)

- Use Rectangular Plate Washer (#) Under Bolt Head On First Post

**ELEVATION**

- Start Reflectometer Tabs

- For First Two Posts Use Std C-10.37

**FLARED GEOMETRICS**

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<thead>
<tr>
<th>Date Along 37° Parabolic Curve</th>
<th>Date Along X Axis</th>
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**SECTION A-A**

**LAYOUT AND DETAILS OF THE FLARE**

**STATE OF ARIZONA**

**DEPARTMENT OF TRANSPORTATION**

**DIVISION OF HIGHWAYS**

**STANDARD DRAWINGS**

**FLARED BREAKAWAY CABLE TERMINAL ASSEMBLY (STEEL POST) C-10.37**
**GENERAL NOTES**

1. The BCT cable assembly shall be tightened to remove slack.

2. 3\r\n\r\n3. To ensure that the BCT steel bearing plate remains in position, one wrap of 14 gauge Galvanized steel wire shall be wrapped around the BCT terminal post and near the top of the plate.

- Indicates ARTBA designation

---

**Plan**

- 3/8" UNC-13\r\n- Button Head Bolt (Ø) and Recess Nut (ø) with Wide Type A Plain Washer (Under Nut)
- Beam End Section (Buffer)
- Beam Terminal Connector, 2'-6"

**Elevation**

- 3/8" UNC-2" Button Head Bolt (Ø) and Recess Nut (ø) with Wide Type A Plain Washer (Under Nut)
- Splice Bolt Slot 5\r\n- 6x3\r\n- 1\r\n- 2'-2 1/2"
- 2'-7 1/2"
- 1'-10 1/2"
- 6x3, Type A Plain Washer
- 3' (Typ)
- 24'
- 24'
- 24'
- 24'
- 3' (Typ)
- 3' (Typ)
- 3' (Typ)

**Side View**

- 3/8" UNC-13/4" Hex Bolt and Recess Nut with Wide Type A Plain Washer (Typ)
- 1" UNC-13/4" Hex Bolt and Recess Nut with Wide Type A Plain Washer (Typ)
- BCT Anchor Plate, FL"/2" Axel (Typ)

**Front View**

- 3/8" Die (Typ)
- BCT Cable Assembly
- 1/2" UNC-13/4" Hex Bolt and Recess Nut with Wide Type A Plain Washer (Typ)
- BCT Steel Bearing Plate
- BCT Steel Foundation Plate
- BCT Steel Cable Assembly
- BCT Steel Plate
- 3/8" UNC-13/4" Hex Bolt and Recess Nut with Wide Type A Plain Washer (Typ)
GENERAL NOTES

1. The BCT cable assembly shall be tightened to remove slack.

2. To ensure that the BCT (timber) bearing plate remains in position, two eighteen-penny galvanized steel nails shall be driven into the BCT terminal post (timber) and bent over the plate.

○ Represents ARTBA designation

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

DESIGN APPROVAL
by

Issued: 10/97

SCALE

5/8" = 1'-0"
GENERAL NOTES
1. The BCT cable assembly shall be tightened to remove slack.
2. ¾"-10UNC x 3-½" heavy hex screw, connecting BCT terminal post (steel) and BCT (steel) foundation plates, shall be torqued to 110 ft.lbs.
3. To ensure the BCT (steel) bearing plate remains in position, one wrap of 14 gauge Galvanized steel wire shall be wrapped around the BCT terminal post (steel) and near the top of the plate.

- Indicates ARTBA designation

PLAN

ELEVATION

FRONT VIEW

SIDE VIEW

DETAILS

BCT Anchor Plate, PL ¼" steel # section 12 gauge

BCT Cable Assembly

½"-10UNC x 3½" heavy hex bolt and hex nut with flat plate or washer (Typ)

BCT Cable Assembly

¼"-10UNC x 3½" heavy hex bolt with heavy hex nut with flat plate or washer (Typ and Bottom)

BCT Terminal Post (Steel)

BCT (Steel) Tapered Washer

BCT (Steel) Bearing Plate

BCT (Steel) Foundation Plates

2" Dia Plate (Typ)

1"-10UNC x 3½" hex bolt and hex nut with flat plate or washer (Typ and Bottom)

Steel # section 12 gauge

1"-10UNC x 3½" hex bolt and hex nut with flat plate or washer (Typ)

Fabric / concrete footing

6x6x80x2.8 welded wire fabric / one square

24" Dia concrete footing

Concrete footing, 4000 psi (Typ)
GENERAL NOTES

1. The BCT cable assembly shall be tightened to remove slack.

* - Indicates AASHTO designation

PLAN

Splice Bolt Set: 3/8"x1 3/4" (Typ)
3/8" UNC-3/4" Button Head Bolt (8) and Recess Nut (8) with Rectangular Plate Washer (8) under head

Do Not Torque Bolts

2 1/4" 5 3/8"

ELEVATION

24" die Concrete footing
Case 5 Concrete, ACII Fall (Typ)
6x6-8x8x8x8 Highway Fabric Ledge One Square

24" (Typ)

1 1/2" Polystyrene filler
All four sides (Typ)

DETAIL A

BCT Terminal Post (Timber)

BCT Anchor Plate, PL/3" (Typ)

SIDE VIEW

BCT Cable Assembly

2 1/4" Hex Nut with Type A Plain Washer

DETAIL B

2 1/4" Hex Bolt end Plate

BCT Cable End Plate

2 1/4" Hex Bolt and Nut with Type A Plain Washer

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

NOTE: DRAWINGandiרקיםמרג
correction.

C-10.22
GENERAL NOTES

1. Extend buried H-beam 6'-3" past last short post.
2. Drill through top of box culvert with rotary drill.
3. Bracket may be made of one piece hot bent, or two pieces welded together.
4. Short posts anchored to box culvert roof shall be 8" x 8" only.
5. Rectangular plate washer (Ø) shall be used only at below ground connections.
   • - indicates ARIBA designation

ELEVATION
BOLTED ANCHOR
BOX CULVERT INSTALLATION

INSTALLATION DETAIL

8' x 8' Post
1 1/2"-UNC x 1 1/2" Hex Bolt and Hex Nut with
     Bore Type A Plain
     Washers (Under Head
     And Under Nut)TYP

Box Culvert Roof
3/8"-UNC x 1 1/2" Hex Bolt and Two Hex Nuts With One
     Type B Plain Washer
     Under Nut(TYP)

SECTION A-A

SECTION A-A

BRACKET DETAIL

1/8" Hole (TYP)

1/2" Plate

1" Radius (Max)
GENERAL NOTES
1. Extend buried H-beam 6'-3" past last short post.
2. Drill through top of box culvert with rotary drill.
3. Bracket may be made of one piece hot bent, or two pieces welded together.
4. Rectangular plate washer (S) shall be used only at below ground connection.

- Indicates ARTBA designation

SECTION A-A

PIPE CULVERT INSTALLATION

BURIED ANCHOR

BOLTED ANCHOR

PIECE CULVERT INSTALLATION

INSTALLATION DETAIL

BRACKET DETAIL
### DETAIL F
**SECTION THRU BLOCK AND ANCHORAGE**

- **Concrete Barrier**
- **1" Dia Sleeve**
- **3/8"-10UNC x 1 1/2" Hex**
- **3/8"-10UNC Hex Nut**
- **Ferrule Ring Nut**
- **3/8"-10UNC Hex Nut**
- **Tack Rod To Plate** (Block 3, 4, & 5)
- **1/4" Plate**
- **1/4" Red**
- **3/8" Drill Blocks**
- **1/4" 3/4" 5/16" Drill Block 2**
- **1/4" Drill, 5 Holes**
- **1/4" Drill, 4 Holes**

### DETAIL G
**BLOCK DETAILS**

- **1/2" Block A**
- **1/2" Block B**
- **1/2" Block C**
- **1/2" Block D**
- **1/2" Block E**
- **1/2" Block F**

### DETAIL H
**TERMINAL CONNECTOR BACK PLATE**

- **16" Dril, 2 Holes**
- **2" 2" 2" 2"**
- **12"**
- **4" 4" 4"**
- **1/2" 1/2" 1/2" 1/2"**

### TABLE: DIMENSION

<table>
<thead>
<tr>
<th>BLOCK</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
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<td>3 1/2&quot;</td>
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</tr>
<tr>
<td>5</td>
<td>4 1/2&quot;</td>
<td>4 1/2&quot;</td>
</tr>
</tbody>
</table>

**Note:** Block 1 is a 1/2"x2"x4" Plate. Block 2 may be a solid 0"x4" plate tapered in thickness from 1 1/2" to 1/2" welded to 1/2"x2"x4" plate.
ELEVATION

DETAIL A
RUB RAIL TERMINAL ASSEMBLY

Note: All Slots 1/8" x 2.5". All Square Holes 1/8".

DETAIL B
RUB RAIL SPlice PLATE
<table>
<thead>
<tr>
<th>BLOCK</th>
<th>DIMENSION</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>1 1/4&quot; 1 7/8&quot;</td>
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<tr>
<td>3</td>
<td>3 3/4&quot; 2 3/4&quot;</td>
</tr>
<tr>
<td>4</td>
<td>4 3/4&quot; 3 7/8&quot;</td>
</tr>
<tr>
<td>5</td>
<td>5 1/4&quot; 4 5/8&quot;</td>
</tr>
</tbody>
</table>

Note: Block 1 is a 1/2"x12"x14" plate. Block 2 may be a solid 6"x14" plate tapered in thickness from 1/2" to 3/8" welded to 1/2"x12"x14" plate.

**DETAIL F**

SECTION THRU BLOCK AND ANCHORAGE

**DETAIL G**

BLOCK DETAILS

**DETAIL H**

TERMINAL CONNECTOR BACK PLATE
Note: Block 1 is a 1/4"x1/2"x1/4" Plate.
Block 2 may be a solid 1/4"x1/4" plate.

DETAIL E
BLOCK DETAILS

DETAILED SECTION THRU BLOCK AND ANCHORAGE

DETAIL F
TERMINAL CONNECTOR ANCHOR

Block 5

Concrete Barrier

1" Dia Sleeve

One 3/4"-10 UNC-4D x 1/2"
Hex Bolt (Top Shown)
One 3/4"-10 UNC-4D x 1/2" Bolt
Two Hex Nut With Five
Type B Beveled Washers
Under Head And Nut
Pan Block (Type)

1/4" I-UNC Ferrule
Wing Nut

No. 4 Rebar 1-0"

Task Reel (Typ)

No. 4 Rebar

Typ All Contact Points

Each Reel Shell Develops
The Tensile Strength Of
The Wire

Barrier Face
PLAN

GENERAL NOTES
- Indicates ARIBA designation

ELEVATION
ONE WAY TRAFFIC—RIGHT SIDE OF ROADWAY
OR TWO WAY TRAFFIC
GENERAL NOTES

1. The BCT cable assembly shall be tightened to remove slack.

2. 1/2"-UNC x 3-1/2" heavy hex bolt, connecting BCT terminal post steel and BCT steel foundation plates, shall be torqued to 170 ft-lbs.

3. To ensure that the BCT steel bearing plate remains in position, one wrap of 14 gauge Galvanized Steel wire shall be wrapped around the BCT terminal post steel and near the top of the plate.

DETAIL B
(BASE PLATE B)

DETAIL C

DETAIL D
(BEARING PLATE)

DETAIL E
(BASE PLATE C)

DETAIL F
(BASE PLATE A)

DETAIL G
FLAT PLATE WASHER
GENERAL NOTES
- Indicates ARIBA designation

Rectangular Plate Washer (O) required under head of bolts (end post on both sides only)

1" Die Hole (as required)

3/4" I-LINC x 1 1/2" button head bolts (O)
And recess nut (O) with 1" narrow type A plain washer under head (typ)

6x6-1/2-5/8x5/8 welded wire fabric, lap one square (typ)

ELEVATION
ONE WAY TRAFFIC - LEFT SIDE OF ROADWAY
GENERAL NOTES

1. The BCT cable assembly shall be tightened to remove slack.

2. 3/8" UNC X 2 3/4" heavy hex bolt, connecting Base Plate A to Base Plate B, shall be torqued to 170 ft-lb.

3. To ensure that the BCT (steel bearing plate remains in position, one wrap of 14 gauge steel terminal post (steel) and near the top of the plate.

- indicates ARIBA designation

DETAIL A

DETAIL D
(BEARING PLATE)

DETAIL E
(BASE PLATE C)

DETAIL F
(BASE PLATE A)

DETAIL G
FLAT PLATE WASHER

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

N BEAM BCT ATTENUATOR
ASSEMBLY, CURB INSTALLATION

DESIGN APPROVED:

FRED R. HALE
ASSISTANT DIRECTOR FOR CONSTRUCTION

INSTRUMENT TESTED:

WILLIAM H. HALE
ENGINEER, DIV. 4

INSPECTION APPROVED:

WILLIAM H. HALE
ENGINEER, DIV. 4

CH: 10.50

6/86
GENERAL NOTES

1. The BCT cable assembly shall be tightened to remove slack.

2. 3/8" UNC x 3-1/4" heavy hex bolt, connecting connecting Base Plate A to Base Plate B, shall be torqued to 170 ft.lbs.

3. To ensure that the BCT steel bearing plate remains in position, the wrap of #8 gauge steel wire shall be wrapped around the SC terminal.

- Indicates AASHTO designation

DETAIL A

DETAIL B (BASE PLATE B)

DETAIL C

DETAIL D (BEARING PLATE)

DETAIL E (BASE PLATE C)

DETAIL F (BASE PLATE A)

DETAIL G

FLAT PLATE WASHER
MEDIAN BARRIER GLARE SCREEN

TYPICAL GLARE SCREEN INSTALLATION

Gusset Plates

Notes:
- Contractor may drill holes or cast holes to anchor bolt required to anchor plate of glare screen post assembly to the median barrier. If cast hole is used, seat bolt in bucket, powder, or other material approved by the Engineer.

POST SUPPORT BRACKET

LINE POST
GENERAL NOTES

1. Posts shall be 12'-0" C to C. Structural steel shall conform to ASTM A36. Galv ASTM A-743.

2. Square head bolt shall conform to ASTM A-307, Galv. ASTM A-153 Class C.

3. Type B washer shall conform to ASTM F-436, Galv. ASTM A-313 Class C.

4. Helical spring lock washer shall conform to ASTM A 350, Galv. ASTM A-153 Class C.

SIDE ELEVATION

FASTENER LOCATIONS

DETAIL A

Splices allowed in Glare Screen at Posts Only, With 1 Full Diamond Overlap
GENERAL NOTES:

1. All concrete shall be Class "S" (fc = 3000 psi).
2. All reinforcing steel shall conform to Sect. 1003-1, 1003-2, Grade 40.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. Transverse construction joints shall extend through the foundation slab and be located at intervals not to exceed 20 feet, except for Barrier Transition.
5. The barrier gutter and barrier transition gutter shall be included in the cost of the barrier. The variable with gutter beyond the barrier shall be included in the cost of the curb and gutter.
6. See drainage sheets for slotted drain and catch basin details.
7. See Std. C-1039 for barrier gutter detail.
8. See Std. C-521, detail 4 for Sidewalk Construction.
GENERAL NOTES

1. All concrete shall be Class "S" (f'_c = 3000 psi).
2. All reinforcing steel shall conform to Sect. 1005-2, Grade 40.
3. All reinforcing steel shall have 2" minimum clear cover unless otherwise noted.
4. Transverse construction joints shall extend through the foundation slab and be located at intervals not to exceed 20 feet, except for barrier transitions.
5. The barrier gutter and barrier transition gutter shall be included in the cost of the barrier.
6. See drainage sheets for sloped drain and catch basin details.
7. See Sect. C-10-09 for barrier gutter detail.
8. See S-1, C-11.5 for barrier gutter detail and A-1 for Sidewalk Construction.

PLAN VIEW

SECTION "A-A"
- 5" (Typ)
- 2" B' Clear of Outer Wall
- 2" B' Clear of Barrier Gutter

SECTION "C-C"
- 2 0.5" Expansion Joint w/ Preformed Joint Filler
- 6 Rebar @ 12" Centers
- 5" (Typ)
- 2 0.5" Clear of Barrier Gutter

SECTION "D-D"
- 2 0.5" Expansion Joint w/ Preformed Joint Filler
- 6 Rebar @ 12" Centers
- 2 0.5" Clear of Barrier Gutter

ELEVATION
- 5" (Typ)
- 2" B' Clear of Outer Wall
- 2" B' Clear of Barrier Gutter

SECTION "B-B"
- 6 Rebar @ 12" Centers
- 2 0.5" Clear of Side Wall
- 2 0.5" Clear of Barrier Gutter

Barrier Gutter
- 2 0.5" Clear of Side Wall
- 2 0.5" Clear of Barrier Gutter
GENERAL NOTES:
1. Standard Plans for Cattle Guard, Footing Type, consists of Standards C-11.10, C-11.11, and C-11.12.
2. Cattle guard shall be sloped to conform to the roadway cross section, except that where an odd number of grill units is specified in a crowned roadway, the center grill unit shall be installed level.
3. Where the adjacent roadway is paved, an angle 4" X 4" X 3/8" with 5/8" diameter stud with head, 1'-0" alternate center to center is required.
4. Where the adjacent roadway is unpaved, an angle assembly is required. An angle assembly consists of one 4" X 4" X 3/8" angle and one 2" X 2" X 3/8" angle connected with 5/8" diameter studs. The studs shall be bent 90° and placed on 1'-0" centers.
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.

<table>
<thead>
<tr>
<th>ROADWAY WIDTH (FREY)</th>
<th>GRILL UNITS REQUIRED</th>
<th>CONCRETE CUBIC YARDS</th>
<th>REBAR. LBS.</th>
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</table>
GENERAL NOTES:

1. For Cattle Guard details see Std. G-11.10.

Bar 3 x 1/2 x 6" Long

3/4" Bolt

Diameter Hole In Angle And Bar

1 1/2" Stud

2 1/2" Minimum Bend Radius

2 1/4" 10 UNC x 2 1/2" Heavy Hex Structural Bolt And Heavy Hex Nut Grade "A" With Regular Helical Spring Lock Washer, 4 Per Grill Unit

BEAMS

H-20 Loading
W 8 x 15
S 8 x 10 1/2
Welded Beam

S 8 x 15
Welded Beam

F.P. flow thru high frequency electrical resistance weld

Bar 3 x 1/2 x 6" Long, 4 Per Grill Unit

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS
ROADWAY CATTLE GUARD - GRILL & GRILL CLAMP DETAIL
DRAWN NO. C-11.11

DESIGN APPROVED
1/83
GENERAL NOTES:

1. For Cattle Guard details see Std. C-11.10.

2. Material for shoulder transition shall be placed to the finished roadway elevation for the entire length of the transition. When the roadway is paved, Aggregate Subbase or Aggregate Base shall be used. When roadway is unpaved a material equivalent to the existing roadway shall be used.
1. For all other cattle guard details, see Stds. 0-11.10, 11.11 & 11.12.
2. This standards shall be used in embankment or where highly erodable soil is found.
3. All concrete shall be Class B.
Note: For section between double track, see Det. No. 3

TRANSVERSE & SECTION

DETAIL NO. 1

5 1/8" tie use, 9" tie use.

2 x 1/2" bar. Drill as shown for 5/8" galv. dome head drive spikes. See Table.

DETOL NO. 2

1 1/2" x 1/8" bar. 2 x 1/2" bar. Drill as shown for 5/8" galv. dome head drive spikes. See Table.

DETOL NO. 3

Center section for double tracks on 15' centers

SHIM HEIGHT

<table>
<thead>
<tr>
<th>RAIL LMS./YD.</th>
<th>80</th>
<th>90</th>
<th>110</th>
<th>119</th>
<th>131</th>
<th>150</th>
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<tbody>
<tr>
<td>2 1/4&quot;</td>
<td>2 7/8&quot;</td>
<td>3 1/2&quot;</td>
<td>1 7/8&quot;</td>
<td>4 1/16&quot;</td>
<td>4 3/8&quot;</td>
<td>4 9/16&quot;</td>
</tr>
<tr>
<td>5/8&quot; DIA. GALV. DOME HEAD SPIKE LENGTH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13&quot;</td>
<td>12&quot;</td>
<td>11&quot;</td>
<td>11&quot;</td>
<td>13&quot;</td>
<td>13&quot;</td>
<td>13&quot;</td>
</tr>
</tbody>
</table>

GENERAL NOTES

1. This design applicable only to wood tie track construction. Wood shims shall be unainted and cut from material meeting the specifications of the existing ties.
2. 3 x 3/4" x 1/16" treads, 2 x 1/2" bearing bars and 2" n. d. pipe wing assemblies shall be primed with one coat on No. 1 paint and finished with two coats of yellow enamel paint.
GENERAL NOTES

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

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

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

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

TYPICAL WOVEN WIRE FENCE INSTALLATION - TYPE 1 WW SHOWN

FENCE FABRIC DIMENSIONS AND DESIGN NUMBERS
GENERAL NOTES

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

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

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

TYPICAL BARBED WIRE FENCE INSTALLATION—TYPE 2 BW SHOWN

10" Diameter x 3-0" Concrete Footing

12" Max At Corner

16'-0" Max Typical (5 Wire)
25'-0" Max Typical (4 Wire)

Gate/End Post Assembly
Detail C

Latch/End Post Assembly
Detail C

16'-0" Max Typical (5 Wire)
25'-0" Max Typical (4 Wire)

6'-10" to top of wire

10'-0"

3-3'-0" Stays per panel, Typical — 6'

12'-0"

3-2'-0" Stays per panel, Typical — 6'

BARBED WIRE GAME FENCE (GF)

TYPE 1 BARBED WIRE (BW) (4 WIRE)

TYPE 2 BARBED WIRE (BW) (5 WIRE)
TYPICAL FENCE INSTALLATION AT CATTLE GUARD

ABUTTING FENCE
ABUTTING FENCE AT POST

DETAIL A
TYPICAL CROSS SECTIONS OF LINE POST SHAPES

DETAIL B
INTERMEDIATE POST ASSEMBLY

DETAIL C
END POST ASSEMBLY

DETAIL E
CORNER POST ASSEMBLY

POST ASSEMBLED:
UPRIGHT ANGLES 2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{2} AT 4.0 LB/FT, BRACE ANGLES 2\times2\frac{1}{2} AT 3.19 LB/FT.

TYPICAL FENCE LOCATION
GENERAL NOTES

1. Posts shall be round pipe, H-section or self-formed and shall conform to the nominal dimensions and shall have a nominal thickness, before galvanizing, of not less than 0.08 inch.

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 A592, Class I coating. Aluminum-coated steel shall conform to the requirements of ASTM A491, with a minimum weight of coating of 0.10 ounce per square foot of wire surface area. Fabric shall be 11 gauge for all fence fabric 60 inches or less in height and shall be 9 gauge for fabrics greater than 60 inches in height.

3. Tension wires shall be 7 gauge 10/177 inch diameter coil spring steel wire with a minimum tensile strength of 75,000 pounds per square inch, and shall be zinc-coated or aluminum-coated.

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

5. Stretcher bars shall be 5/16 inch by 5/8 inch steel flat bars. Stretcher bar bands shall be 5/8 inch by one inch preformed steel bands.

6. Bottom tension wire shall be 5 inches from top of crown on concrete foundations.

7. Intermediate post assemblies shall be spaced at 500 foot intervals or midway between pull posts where the distance between such posts is less than 1000 feet and more than 500 feet.

8. Typical fence location – See sheet 3 of 3.

TYPICAL CHAIN LINK FENCE INSTALLATION – TYPE I SHOWN

TYPICAL POST DIMENSIONS

<table>
<thead>
<tr>
<th>Corner End/Intermediate</th>
<th>Gate</th>
<th>Roll Formed</th>
<th>Line Posts</th>
<th>Gate</th>
<th>Roll Formed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabric Height</td>
<td>48&quot;</td>
<td>6'/0&quot;</td>
<td>3.25&quot;</td>
<td>350 3.50&quot;</td>
<td>10/0</td>
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<tr>
<td>60&quot;</td>
<td>10'/3&quot;</td>
<td>2.00</td>
<td>350 3.50&quot;</td>
<td>10/3</td>
<td>3.50&quot;</td>
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<tr>
<td>72&quot;</td>
<td>10'/3&quot;</td>
<td>2.50</td>
<td>350 3.50&quot;</td>
<td>10'/3&quot;</td>
<td>3.50&quot;</td>
</tr>
<tr>
<td>72&quot;</td>
<td>72&quot;</td>
<td>3.10</td>
<td>2.875</td>
<td>350 3.50&quot;</td>
<td>10/3</td>
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<tr>
<td>72&quot;</td>
<td>10'/3&quot;</td>
<td>2.875</td>
<td>350 3.50&quot;</td>
<td>10'/3&quot;</td>
<td>3.50&quot;</td>
</tr>
</tbody>
</table>

DESIGN APPROVED:

[Signature]

[Date]

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

APPROVED FOR DISTRIBUTION:

[Signature]

[Date]

Fence, Chain Link Type I

Sheet 3 of 3
GENERAL NOTES

1. Barbed wire for use with Type 2 chain link fence shall be 12-gauge steel wire with 4 point /4 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 A276, Type 1, Class 1 coating. Aluminum-coated steel wire shall conform to the requirements of ASTM A385, 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 M311.

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

4. For details and notes not shown—see chain link fence—Type 1.

5. Typical fence location—See sheet 3 of 3.

TYPICAL CHAIN LINK FENCE INSTALLATION—TYPE 2 SHOWN

<table>
<thead>
<tr>
<th>Corner End, Intermediate, Gate</th>
<th>Latch and Pull Posts</th>
<th>Line Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabric</td>
<td>Post Roll Rod and Roll Formed</td>
<td>Post Roll Rod and Roll Formed</td>
</tr>
<tr>
<td>Height</td>
<td>Length (lbs. and roll)</td>
<td>Length (lbs. and roll)</td>
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<tr>
<td>72&quot;</td>
<td>10'1&quot; x 6'0&quot;</td>
<td>10'1&quot; x 6'0&quot;</td>
</tr>
</tbody>
</table>

DETAIL G

BARBED WIRE SUPPORT ARM

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

DESIGN APPROVED: D. TAYLOR

DETAILED ADJ: T. HAMILTON

Fence, Chain Link Type 2

C-12.20
Sheet 2 of 3
TYPICAL FENCE LOCATION

SINGLE GATE

DOUBLE GATE

ROLLING GATE

TYPICAL GATE DIMENSIONS

<table>
<thead>
<tr>
<th>Gate Leaf Width</th>
<th>Vertical Size</th>
<th>Gate Post Width</th>
<th>Vertical Size</th>
<th>Gate Post</th>
<th>Leaf Size</th>
<th>Spaced Vertical Perimeter Size</th>
<th>Braced Panel Size</th>
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<tbody>
<tr>
<td>3' 1/2' - 6'</td>
<td>0 - 2,000''</td>
<td>3' 1/2' - 6'</td>
<td>0 - 2,000''</td>
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<td>2,000''</td>
<td>3' 1/2' - 6'</td>
<td>2,000''</td>
</tr>
<tr>
<td>6' - 12'</td>
<td>3' 1/2 - 6'</td>
<td>6' - 12'</td>
<td>3' 1/2 - 6'</td>
<td>6' - 12'</td>
<td>1 - 6'</td>
<td>2,8750''</td>
<td></td>
</tr>
<tr>
<td>12' - 18'</td>
<td>3' 1/2 - 6'</td>
<td>12' - 18'</td>
<td>3' 1/2 - 6'</td>
<td>12' - 18'</td>
<td>2 - 6'</td>
<td>2,8750''</td>
<td></td>
</tr>
</tbody>
</table>

GATES FOR CHAIN LINK FENCE - TYPE I SHOWN
(TYPE 2, WITH BARBED WIRE TYPICAL)
GENERAL NOTES

All concrete shall be Class S, 4000 psi. 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.

Galvanized swaged fittings and U-bolt shall conform to ASTM A493. The 3/4" galvanized wire rope shall conform to AASHTO M30 Class B, Type 2.

The wire fabric, fasteners, strap, anchor bars, and other fittings and hardware shall conform to AASHTO M118.

The wire fabric fence shall follow contour of the graded median.

The excavation for the concrete anchor blocks shall be to neat lines. Maximum excess shall be 3".

Perforated posts shall be square tube formed from 0.050" USS gauge ASTM A36 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 scarred to agree with standard corner radii of 0.144".

Perforated posts shall be galvanized to the requirements of ASTM A525. Coating Designer shall be C-90.

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.

Two interior U-bolt and clamp bars shall be spaced at 4/5 of the distance between posts. See Standard C1220 for 48" fabric details.

An alternate to rectangular concrete anchor block shall be a 3/4" diameter round fastening with an additional depth of 4.5'

The median approach grade within 100' of the Chain Link Cable Barrier should not exceed a grade break of 10 percent.

NOTE: Shown G4-12WI System Without Curb, May Use Other Systems With Or Without Curb.

ELEVATION

PLAN
GENERAL NOTES

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

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

3. Bracing and sloping shall conform to OSHA requirements.

4. Pipe backfill may be bedding material.

D — Outside diameter of full circle pipe or outside dimension (span or rise) of arch, arch pipe, elliptical pipe.

T — Minimum wall thickness for NRC/PCP, as per project plans.

Δ — D + 2 feet maximum for diameters up to 4 feet and D + 3 feet maximum for diameters 4 feet and over.

Ø — 6 inches except when on yielding or unstable material, then as per the standard specifications.

NON - TRENCH CONDITION
TRENCH CONDITION
BEDDING
PIPE BACKFILL
TRENCH BACKFILL

TRENCH CONDITION
NRC/PCP IN NATURAL GROUND OR IN EMBANKMENT
### General Notes
Design of end section shall conform to standards for reinforced concrete pipe.
End section joint configuration shall match the pipe joints.
Embankment slope shall be warped to match slope of end section.

### Spacing for Multiple Installation

### Culvert Length as Shown on Plans

### Design Symbols
- Culvert length
- Roadway grade
- Normal toe of slope
- See Table

### Dimensions Table

<table>
<thead>
<tr>
<th>Pipe Dia.</th>
<th>Approx. Weight</th>
<th>Thickness</th>
<th>Outside Diameter (A)</th>
<th>Inside Diameter (B)</th>
<th>End Notch Height (C)</th>
<th>Rear Notch Height (D)</th>
<th>Front Elevation (E)</th>
<th>Height (F)</th>
<th>Slope</th>
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<tr>
<td>24</td>
<td>1500#</td>
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<td>78</td>
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<td>54</td>
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<td>36</td>
<td>4100#</td>
<td>6</td>
<td>63</td>
<td>36</td>
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<td>5380#</td>
<td>6½</td>
<td>63</td>
<td>35</td>
<td>78</td>
<td>78</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**GENERAL NOTES**

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

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

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

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

All steel end section components shall be galvanized.

Toe of embankment shall be warped to match toe of skewed end sections.

A beam shall be added to abnormal projections per Std. C-13.10.

The foregoing applies to all cross section configurations.
GENERAL NOTES

For lateral dimension of invert paving, use 72° control for CHF and span for CHPA.

Paving shall be scored longitudinally at 1'-6" min. lateral intervals.
Use bevel on inlet headwall only.
Wire mesh shall be fastened or welded to corrugation crests at intervals and in a manner approved by the Engineer. Laps shall be 4" min.
Paving shall not be placed until backfilling is completed.

Concrete shall be Class "F".
See Std. 0-14.20 for headwall and bevel dimensions not shown.
LONGITUDINAL SECTION

PLANE NORMAL TO SLOPE

GENERAL NOTES

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

All concrete shall be Class B. An optional 12" A.R. invert paving base course and 6" of concrete may be used in the 144" diameter pipe.

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

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

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

For installation normal to roadway centerline only.
SECTION A-A
Typical Slotted Drain & Catch Basin
Installation Without Manhole

SECTION B-B
Typical Connection Between C.B. & Main Storm Drain

Notes:
1. Pipe collars not required where direct C.B. Connections can be made within 7° of a normal 90° installation, either horizontally or vertically.
2. 'T' Connections direct to the Main Drainage Truck Line should be avoided and used only where Manhole Connections are impracticable.
**NOTES:**

1. PREFABRICATED TEES SHALL BE USED WHEN THE OUTSIDE DIAMETER OF THE INLET PIPE EXCEEDS ONE HALF THE INSIDE DIAMETER OF THE MAIN STORM DRAIN, EXCEPT WHEN MANHOLES ARE SHOWN ON PLAN.

2. CENTERLINE OF INLET PIPE SHALL INTERSECT CENTERLINE OF MAIN STORM DRAIN EXCEPT WHEN ELEVATION "S" IS SHOWN ON PLANS.

3. IF $\angle A$ 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 SHALL HAVE 2" MIN. COVER.
GENERAL NOTES:

1. All concrete shall be Class 'B'.

2. All reinforcing steel shall conform to IC03-L2, Grade 40.

3. All reinforcing steel shall have a 2” 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" and "T" shall be those of the larger diameter.

6. The diameter of the Circular Ties shall be the outside diameter of pipe + T.

7. Pipe ends to be trimmed such that the maximum distance between pipes at any point is 2’.
GENERAL NOTES
1. See also Std. C-13.10
2. High point of headwall shall not project more than 3" above slope.
3. All concrete shall be Class B
4. All reinforcing bars shall be number 4,
   1'-0" c to c and 3" clear to inside of walls and floor.
PLAN, CATCH BASIN TYPE 4 - SINGLE

PLAN, CATCH BASIN TYPE 4 - DOUBLE

GENERAL NOTES

Pipes can be placed in any wall. Sump floor shall have a wood trowel finish and a minimum slope of 1/2 for a minimum of 24 hours. Curb over catch basin shall not be constructed until catch basin concrete has set for 24 hours except as shown.

For details and opening areas, see Std. G-50, C-15.50.

Any specified gutter depression shall be warped to opening according to Std. C-15.70.

All structural steel shall be ASTM A 36. Gutter, frame, and beam shall be given one shop coat of No. 1 paint.

All concrete shall be Class B. Construction joints & drains shall be placed to meet field conditions. See Std. G-15.70.

- 3/4" for longitudinal and 3" for transverse bar grates.

** 2'-0" for LW, LB, EF, TW and TB series 1 grates. 1'-6" for LW, LB, EF, TW and TB series 2 grates. Use 1'-6" with combined curb & gutter.

- 0" when H=8" or less; 8" when H is greater than 8'. See Section B-B.

SECTION A-A

DETAIL NO. 1

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

DESIGN APPROVED
6/86

CATCH BASIN, TYPE 4

DATE:
G-15.70

6/86
Delete anchors on one side for curb opening basin. See Std. C-15.10.

Delete anchors on one side for beam grate support. See Std. C-15.10, Detail No. 2.

SECTION

FRAME

<table>
<thead>
<tr>
<th>Type</th>
<th>Clear Spacing</th>
<th>No. Bars</th>
<th>X</th>
<th>Grate Opening Sq. Ft.</th>
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<td>26</td>
<td>1&quot;</td>
<td>3.21</td>
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<tr>
<td>TW or TB-1.1</td>
<td>1 3/8&quot;</td>
<td>21</td>
<td>1&quot;</td>
<td>3.32</td>
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<td>TW or TB-1.2</td>
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<td>1&quot;</td>
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<td>TW or TB-2.2</td>
<td>2&quot;</td>
<td>16</td>
<td>1&quot;</td>
<td>2.65</td>
</tr>
</tbody>
</table>

NOTE: See also Type EP grates, Std. C-15.50.

GENERAL NOTES

Grating units and frames shall be fabricated from structural steel except as noted. Structural steel shall be in accordance with ASTM A 36.

Welding shall be in accordance with Standard Welding Specifications.

The completed assembly shall be given one shop coat of No. 1 paint. TW indicates transverse welded. TB indicates transverse bolted.

Frame and grate shall fit to a max. rock of 0.095" at any point. Restrict use to grades of 3% or less.
GUTTER DEPRESSION AND SPACING
CATCH BASIN TYPES 1, 4 & 5

GUTTER DEPRESSION
CATCH BASIN TYPE 3

Apex shall be shaped to suit local conditions and shall extend a minimum of 4"-0" from edge of grate in all directions. Grate shall be depressed a minimum of 4" below surrounding terrain and bearing bars shall parallel direction of principal flow.

Catch basin wall:
- 6" X 18 ga. C.M.P.
- Plug with conc. upon completion.
- Subgrade
- Slope to drain

CATCH BASIN CONSTRUCTION DRAIN
Drain may be deleted at option of Engineer.

GENERAL NOTES
No gutter depression shall extend into a traffic lane.

LEGEND
- Gutter depression: 3" max. (See Detail No. 1)
- O = Normal pavement or gutter flow line elev.
- D = Depressed elevation.
- S = Straight grade with downward slope.
- W = Normal gutter width per Std. C=05.10

CATCH BASIN MSG. DETAILS
DATE: 1/91
DHS
STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DESIGN SP HIGHWAY
STANDARD DRAWINGS
Dike back sloped to intersect ditch grade, (slope referenced to ditch grade.)

PLAN PERSPECTIVE
ILLUSTRATING 1-WAY FLOW WITH DYKE

PLAN

SECTION A-A

SECTION B-B

GENERAL NOTES

Apron shall be A.C. or P.O. concrete as specified on Plans.
Concrete shall be Class B.
Grating shall be fabricated of structural steel.
Structural steel shall be in accordance with ASTM A 36.
Welding shall be in accordance with Standard Welding Specifications.
Grating assembly shall be given one shop cost of No. 1 paint.
"MP" indicated on Plans.

STATE OF ARIZONA
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DIVISION OF HIGHWAYS
STANDARD DRAWINGS

CATCH BASIN, MEDIUM

DETAIL NO. 1

GRATING DETAIL

* 8" when wall height exceeds 8'.
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 trolling.

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

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

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

1. For dimensions, sizes and details not shown for installation of catch basin and half barrier, see Std. C-10.91.

2. For dimensions, sizes and details not shown for installation of slotted drain, see Std. D-13.60.

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 steelacing as a connection device to the concrete shall conform to AWS D1.6 and Specifications 4.2i-4.27.

5. Where applicable, see Std. C-10.09 for weep hole placement.

6. For additional general notes, see Std. C-10.99.

7. Grate design is not suitable for locations subject to bicycle traffic. See Std. C-10.99.

Section A-A

Section B-B

Section C-C

Catch Basin With Half Barrier

Reinforcing Detail

Half Barrier Installation At Slotted Drain Locations
PIPE DIMENSIONS QUANTITIES

<table>
<thead>
<tr>
<th>I.D.</th>
<th>L</th>
<th>E</th>
<th>F (Approx)</th>
<th>G.Y. Conc.</th>
<th>R.G.P.</th>
<th>Reinfl. Steel</th>
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</thead>
<tbody>
<tr>
<td>18&quot;</td>
<td>2'-0&quot;</td>
<td>1'-0&quot;</td>
<td>1'-9&quot;</td>
<td>0.97</td>
<td>0.96</td>
<td>65</td>
</tr>
<tr>
<td>24&quot;</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
<td>1'-9&quot;</td>
<td>1.11</td>
<td>1.07</td>
<td>78</td>
</tr>
<tr>
<td>30&quot;</td>
<td>3'-0&quot;</td>
<td>1'-6&quot;</td>
<td>2'-7&quot;</td>
<td>1.50</td>
<td>1.44</td>
<td>108</td>
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<tr>
<td>36&quot;</td>
<td>4'-0&quot;</td>
<td>2'-0&quot;</td>
<td>3'-6&quot;</td>
<td>2.03</td>
<td>2.01</td>
<td>150</td>
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<tr>
<td>42&quot;</td>
<td>5'-0&quot;</td>
<td>2'-6&quot;</td>
<td>4'-4&quot;</td>
<td>2.71</td>
<td>2.63</td>
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<td>48&quot;</td>
<td>6'-0&quot;</td>
<td>3'-0&quot;</td>
<td>5'-2&quot;</td>
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<td>3.30</td>
<td>270</td>
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<tr>
<td>54&quot;</td>
<td>7'-0&quot;</td>
<td>3'-6&quot;</td>
<td>6'-1&quot;</td>
<td>4.14</td>
<td>4.02</td>
<td>335</td>
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<tr>
<td>60&quot;</td>
<td>8'-0&quot;</td>
<td>4'-0&quot;</td>
<td>6'-11&quot;</td>
<td>4.96</td>
<td>4.80</td>
<td>410</td>
</tr>
</tbody>
</table>

GENERAL NOTES

All concrete shall be Class B.

All reinforcing bars shall be #4 except two #6 bars over pipe. Bar spacing approximately 1'-0" c to c unless otherwise noted.

30° wing wall flare shown; 41° normally desirable. See Hydraulics and Utility & R.R. Engnr. Divisions.
Masonry Mortar

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

PART SECTION
FLUSH IRRIGATION VALVE

Utility concrete ring for lawn installation

Concrete "T" or "L" to be included with valve.

Slope to fit local conditions

16 ga. galv. iron gate

Pipe size 6" thru 18" as called for on plans

ELEVATION
SECTION
PRECAST IRRIGATION GATE:
For open ditch installation
TYPE 1

TYPE 2
For pipes 6" through 24". Gate and frame shall be galvanized iron. Type shown is for concrete pipe. For C.H.P., external steel adjustable band shall be used in place of internal steel ring.

IRRIGATION GATE
For standpipe installation
TYPE 2

ELEVATION
SECTION
SLEEVE UNDER CROSSROAD

- 2'-0" Back of Curb Median

SLEEVE UNDER MAINLINE

SLEEVE UNDER RAMP

SLEEVE UNDER DRIVEWAYS
AND PARKING AREAS

GENERAL NOTES

1. Irrigation sleeves shall be installed in a trench condition. See Std. C-13.35 and Std. C-7.06.

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

3. Pipe installation shall conform to Section 50 of Standard Specifications.

4. The Contractor shall imprint a 4" high letter "S" on the face of all curbs at sleeve locations. The width of the letter shall be 1/2" and shall penetrate the concrete surface 1/2".

5. For non-continuous sleeves under crossroads, Std. C-5.10 Type "A" curb shall be required where median is irrigated. See plans for locations. Dumbell waterstop shall be at all expansion joints.

- Generally, sleeves shall be installed parallel to the roadway. Subgrade slope may vary in super-elevated sections. Minimum slope nominal to drain.

DESIGN APPROVED

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

IRRIGATION SLEEVES
C-16.40
10/89
GENERAL NOTES

Rock shall be sound and durable, of rounded or angular shape and with a nominal diameter of 8" min. and 12" max. Flat or needle shapes are not acceptable.

Wire mesh splice shall have 6" min. lap vertically and horizontally.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>EMBANKMENT SLOPE RATE</th>
<th>&quot;H&quot;</th>
<th>TOP OF BANK PROTECTION ABOVE STREAM BED</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3/4&quot; or 1 1/2&quot;</td>
<td>0&quot; to 2&quot;</td>
<td>2&quot; to 4&quot;</td>
</tr>
<tr>
<td>1</td>
<td>3/4&quot; or 1 1/2&quot;</td>
<td>0&quot; to 2&quot;</td>
<td>2&quot; to 4&quot;</td>
</tr>
<tr>
<td>2</td>
<td>3/4&quot; or 1 1/2&quot;</td>
<td>0&quot; to 2&quot;</td>
<td>2&quot; to 4&quot;</td>
</tr>
</tbody>
</table>

*When other embankment slope rates are encountered, warp to 2:1 or 1 1/2:1; that is warp 1:1 slope to 1 1/2:1.
Thread cable through wire fabric and wrap one turn on each rail.

Galv. wire fabric placed as shown to enclose all but the top surface of the rock backfill and attached to the rails by a single wrapping with 3 strands of #9 Galv. wire, 1'-0" c to c.

6 X 6-W, 4 X W, 4 Galv. Wire fabric placed as shown to enclose all but the top surface of the rock backfill and attached to the rails by a single wrapping with 3 strands of #9 Galv. wire, 1'-0" c to c.

Rail heads face out.

50# Railroad rail, 4' c to c
Type 4 = 15' long
Type 5 = 18' long

6 X 19 Galv. Plow Steel, preformed, fibercore cable 3/8" at top; 3/4" at bottom.

Rock backfill

Type 4 = 4'
Type 5 = 5'

3/8" Dia. Cable
Rock backfill
Low stream bed

3/4" Dia. Cable placed under basket.

50# Railroad rail, 4' c to c
Type 4 = 15' long
Type 5 = 18' long

General Notes

Rock shall be sound and durable, of rounded or angular shape and with a nominal diameter of 8" min. and 21" max.
Flat or needle shapes are not acceptable.
Rock shall be comprised of 50% min. 8" to 12" and 5% max. 10" to 21".

Wire mesh splice shall have 6" min. lap vertically and horizontally.

2" x 4" Galv. woven wire fabric; horizontal wires shall be 2 strands, twisted, min. 12 1/2 ga; diagonal wires min. 16 ga. Attach to rails as shown by single wrapping with 2 strands of #9 Galv. wire.

Dyke or Emb.

Head of rail

Min. 1 3/8 rails or equal 10' long.

2 Strands #9 Galv. wire twisted taut.

Type 6 Bank Protection

Types 4 & 5 Bank Protection

SECTION A-A
GENERAL NOTES

1. Precast Manholes shall conform to the requirements of AASHTO M 199 except that the compressive strength of each unit will be determined and accepted in accordance with Section 1006.7 of the ADOT Specifications.
2. Concrete for all other manholes shall be Class B.
3. Every fifth course of bricks in Manhole No. 1 shall be laid as stretchers.
4. For manhole cut and replacement of bituminous or concrete pavement see Std. G-7-50.
5. For Std. G-18-20 frame and cover type, see Plans.
6. Steps shall be placed in manholes in accordance with the requirements of AASHTO M 199.

#6 10'-0" bars.
Circular bend.

Reinforcing shall be in accordance with AASHTO M-199.
24" MANHOLE FRAME & COVER
Approx. Wt: Frame 205 lbs.
Cover 200 lbs.

30" MANHOLE FRAME & COVER
Approx. Wt: Frame 224 lbs.
Cover 324 lbs.

36" CMP FRAME & GRATE
Approx. Wt: Frame & Cover = 330 lbs.

GENERAL NOTES

1. When 'Type A' cover (24" or 30") is specified on the plans then the cover shall include agency identification and conform to the following: Lettering on manhole cover to contain name of agency and utility or as directed. Letters to be equally spaced. Letters to be 2" in height and raised 1/2" above level of cover. Type of letters and layout to be submitted for approval. Castings shall be painted or dipped in commercial quality asphaltum paint, unless otherwise specified.

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

3. H2O 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.
Four Steel Spacers, 4" x 2" Thickness As Required From 4" To 2". When Thickness is less than 1/2" Use Mortar. When Greater Than 2", Use Brick or Precast Adjusting Rings.

#6 Bars

Existing

PCCP

Existing

AC Pvm+

Cutline

(2) No. 2 Hoops For 4" Ring Tied With No. 4 A.S. & W. Gauge Wire. 6" & 8" Ring Require 41 No. 2 Hoops.

PRECAST ADJUSTING RING DETAIL

GENERAL NOTES

1. All dimensions are minimum except where noted.
2. Location & elevation shown on D. ans.
3. Compaction to conform to Sect. 503-2 or 501.

Wet Thoroughly And Paint With Grout

SECTION

MANHOLE COVER FRAME

ADJUSTMENT - PAVEMENT

CUT AND REPLACEMENT

PLAN
**CONCRETE SURFACE FORD CONCRETE WALLS**

- **Flow**
- **Finished Grade**
- **Slope 0.015' / ft.**
- **2-1/4 bars top and bottom**
- **Fine aggregate**
- **3" Class B Concrete Finished 6 Grade**
- **See Plans for base material 1-0"**
- **2-1/4 bars top and bottom**
- **1-0""**
- **2-1/4 bars top and bottom**
- **Fine aggregate**
- **3" Class BConcrete Finished 6 Grade**
- **See Plans for base material 1-0"**
- **2-1/4 bars top and bottom**

**BITUMINOUS SURFACE FORD CONCRETE WALLS**

- **Flow**
- **Finished Grade**
- **Slope 0.015' / ft.**
- **2-1/4 bars top and bottom**
- **Fine aggregate**
- **3" Class B Concrete Finished 6 Grade**
- **See Plans for base material 1-0"**
- **2-1/4 bars top and bottom**
- **1-0""**
- **2-1/4 bars top and bottom**

**GENERAL NOTES**

Ford walls shall be Class B concrete.

Depth gauge tubing shall be protected against concrete entering through bottom or perforations. Depth Gauge tubing and both sides of numeral tabs shall be painted 2-coats white enamel. Numerals and markers shall be 1-coat Gloss black enamel.

**DEPTH GAUGE DETAIL**

- 2-1/4" x 10" perforated telescoping sq. tube, 12 ga., 7/16" holes 1" c to c, 4- sides.
- 1 3/8" x 3'-0" perforated telescoping sq. tube, 12 ga., 7/16" holes 1" c to c, 4- sides.
- 2" x 2 1/4" x 1/2" numerals.
- 2 1/2" x 1/8" x 18 Ga. sheet metal number tabs, both sides. Fasten with 2-3/8" X 3" bolts through tube.
TYPE 1
BITUMINOUS SURFACE FORD

Optional Rock Basket downstream from cutoff wall. See Detail A.

Flow

Width of Seal Coat
Roadway Width

Depth Gauge

Finished Grade

Slope 0.015'/ft.

To be used when treated base is called for on Plans.

DETAIL A

6 X 6-1/2 X 1/4 welded wire fabric. Tie with 2-strands 99 ga. galv. wire 2" c to c each way. Tie top and bottom of basket to top 2"x12" plank at 5' intervals and at each end. Tie by encircling plank with 2-strands of No. 9 wire.

2" nom. pipes, 7'-0" spaced 8' c to c

12' dia. x 12' deep conc. foundation for depth gauge. Full circle for Type 1; half circle for Type 2.

GENERAL NOTES

All timber shall be rough, pressure treated and unpainted.

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

See Plans for bituminous surface and base material details.


Depth Gauge foundation may be utility concrete.

ELEVATION - TYPE 2

3" Max.

Depth Gauge

3" Min.

Optional Rock Basket full length of structure. See Detail A and Plans.

2" nom. pipe, See Detail A.

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

REV.
1/83

DETAILED ENGINEERING FOR
FORDS - TYPES 1 & 2
G-19.20
PLAN

VARIES, MAX. 2'-0"

R/W Line

4" x 4" x 5/16"

Chamfer 3/4"

Letters shall be 2" Series 3 in conformance with MUTCD.

ELEVATION

Survey Monument

Reference Marker

ELEVATION

H.W. R. OF W.

P.C.

May be poured to neat lines below grade.

2'-0"

2'-6"

2-Coat White Bottom, Lettering

1-Coat Black Remal

L-Shaped Cast # 4 Steel

2"-3/4"

2"-0"

1'-8"

1'-4"

1'-2"

1'-0"

3/-0"

5/-0" min.

1'-0"

1'-8"

1'-6"

1'-4"

1'-2"

1'-0"

1/2" min.

2"-0" min.

Cast Iron Frame

*12" or Povnt. Structure Thickness, Whichever is Greater.

Original Stone

GENERAL NOTES

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

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

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

Frames may be either Type A or Type B. Frames shall weigh at least 68 pounds.

Covers shall weigh at least 16 pounds.

Portions of frame and cover to be machined is shown by the symbol "Φ". The allowable tolerances for machined areas shall be ± 1/64".

Concrete shall conform to the requirements of the specifications.
GENERAL NOTES

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

SECTION A-A
TYPE 'A' ENCASEMENT

TYPE 'A' ENCASEMENT - FOR SEWER LATERALS OR HOUSE CONNECTIONS BELOW WATER LINES.

TYPE 'B' ENCASEMENT - FOR SEWER LATERALS OR HOUSE CONNECTIONS ABOVE WATER LINES.

**NOTES**

1. THE ENCASEMENT SHALL EXTEND AT LEAST 6' ON EACH SIDE OF THE WATER LINE AND MUST INCLUDE THE NEAREST JOINT.
2. PROTECTION FOR TYPE 'A' REQUIRED WHEN DISTANCE FROM BOTTOM OF WATER TO TOP OF SEWER LINE IS 24' OR LESS EXCEPT WHEN SEWER IS 4' OR 6' HOUSE CONNECTION NO PROTECTION IS REQUIRED IF DISTANCE IS MORE THAN 12'.
3. FOR TYPE 'A' CROSSINGS, CLASS 150 C.J.P. OR DUCTILE PIPE MAY BE USED AS AN ALTERNATE. FOR TYPE 'B' CROSSING REINFORCED ENCASEMENT IS ALWAYS REQUIRED.
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. Supports shall not be a separate pay item.
5. Permanent pipe supports may be decreased from plan quantities or extended to include some listed below as temporary supports if conditions warrant these changes at the time of construction. Decision shall be made by the engineer.
6. When type 'A' pipe support is used and whenever so directed by the engineer, the contractor shall pierce the wall with suitable openings to prevent unequal pressure resulting from flooding of the backfill. The volume of the pierced opening shall not exceed \( \frac{1}{2} \) the volume of the supporting wall.
7. Use type 'B' pipe support instead of type 'C' when clearance is less than 'Y' in table, between pipes.

### Schedule of Required Supports

<table>
<thead>
<tr>
<th>Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewer lines</td>
</tr>
<tr>
<td>Cast iron pipe</td>
</tr>
<tr>
<td>Concrete storm drain</td>
</tr>
<tr>
<td>Concrete culvert</td>
</tr>
<tr>
<td>Buried telco</td>
</tr>
<tr>
<td>Traffic control conduit</td>
</tr>
<tr>
<td>Gas pipes</td>
</tr>
<tr>
<td>Water &amp; sewer lines</td>
</tr>
</tbody>
</table>

### Temporary

<table>
<thead>
<tr>
<th>Sewer lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete culvert</td>
</tr>
<tr>
<td>Traffic control conduit</td>
</tr>
</tbody>
</table>

Note: Other utilities as noted on the plans or as required by the engineer at the time of construction.
EXISTING CROSSING PIPE

NEW DUCTILE IRON PIPE
CLASS 52 SIZE TO MATCH EXISTING PIPE

NOT TO EXCEED ONE PIPE LENGTH

JOINT METHOD WILL VARY DEPENDING ON EXISTING PIPE MATERIAL

VARIES

VARIERS

BACKFILL & COMPACT PER SECTION 501

ALTERNATE TO PIPE SUPPORT
**GENERAL NOTES**

1. Pre-cast, reinforced MH sections shall be manufactured in accordance with AASHTO M199 except that the compressive strength of each unit will be determined and accepted in accordance with Section 1003.7 the Specifications.

2. MH steps shall be installed at site of MH section manufacture in accordance with industry standards meeting AASHTO M199 requirements.

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 at the asphaltic concrete or PCCP surface.

---

**PRECAST SEWER MANHOLE**
NOTES

1. NOTE: COMPACT SOIL AT END OF PIPE TO 95% OF MAXIMUM DENSITY.

2. IF DEPTH OF COVER IS LESS THAN 5' OR GREATER THAN 10' INCREASE PLUG THICKNESS A MIN. OF 4''
MANHOLE WALL

FLEXIBLE WATERTIGHT COUPLING

CONCRETE TO SPRING LINE OF PIPE

STUB PIPE

MANHOLE WALL

FLEXIBLE WATERTIGHT COUPLING

ALL PIPE TO BE VITRIFIED CLAY

CONCRETE TO SPRING LINE OF PIPE

SAME DIA.

"Y" BRANCH

MASONRY ANCHORS MIN. ONE TIE PER TWO SQ. FT. OF CONTACT AREA FOR DROP CONNECTIONS TO EXISTING MANHOLE ONLY.

45° MITERED BEND

3/4 OF SEWER

TOP OF SEWER

4"

CLASS "B" CONCRETE

MANHOLE FOUNDATION

FOR DROP OF 5' OR MORE

HAND SHAPED INVERT.

TOP OF SEWER

CONCRETE FOUNDATIONS ON NEW MANHOLES TO EXTEND UNDER DROP CONNECTION.

TYPE A

2.5' TO 5' DROP

TYPE B

5' OR MORE

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DRAWINGS

DROPPED SEWER CONNECTIONS

10/99
THE WORD 'SEWER' ON COVER
UNPAVED STREETS & ALLEYS

CLASS 'B' CONCRETE
6' THICK, 40' DIAMETER

PAVED STREETS & ALLEYS

COMPACTED BACKFILL
OR UNDISTURBED EARTH

STANDARD 45° BEND

VIT. CLAY PIPE

TO BE LAID ON UNDISTURBED EARTH
OR COMPACTED BACKFILL MATERIAL
OR AB CLASS 2

FLOW LINE ELEVATION
SHOWN ON PLANS TO THIS POINT

STATION & LENGTH SHOWN ON PLANS TO THIS POINT

CLEANOUT INSTALLATION
Typical Locations of Thrust Blocks

Note: Thrust blocks are to extend to undisturbed ground. Concrete to be Class 'B'.

Minimum Thrust Block Area Required (Y x W)

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Water Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TEE, DEAD END, 90° BEND</td>
</tr>
<tr>
<td>4&quot; &amp; LESS</td>
<td>3 SQ. FEET</td>
</tr>
<tr>
<td>6&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>13&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23&quot;</td>
</tr>
</tbody>
</table>

Notes:
1. Table is based on 3000#/SF. FT. soil. If conditions are found to indicate soil bearing is less, the areas shall be increased accordingly.
2. Areas for pipe larger than 16" shall be calculated for each project.
3. Form all non-bearing vertical surfaces.
CONCRETE FOOTING
CLASS 'B' CONC.

TRENCH WIDTH

WATER MAIN

TRENCH WALL

HUB-END GATE VALVE

STANDARD JOINT

SHORT LENGTH
(APPROX. 3FT.)

FINISH GRADE

X+2

MIN.

BRICK PIER
AS REQUIRED

X+4" OR
12"MIN.

SIDE OPERATOR

CEMENT GROUTING UNDER VALVE
(NDV-SHRINKING)

CLASS 'B' CONCRETE
FORM AS REQUIRED TO KEEP CLEAR OF JOINTS.

NOTE

THIS DETAIL COVERS WATER GATE VALVES,
4' TO 16' INCLUSIVE, REGARDLESS OF TYPE
OF PIPE USED, LARGER LINES TO BE
DETAILED ON PLANS.

GATE VALVE

CONC. FOOTING EQUAL TO TRENCH WIDTH

BUTTERFLY VALVE

NOTES

1. THIS DETAIL COVERS BUTTERFLY VALVE
INSTALLATION, 3' TO 12' INCLUSIVE, REGARD
LESS OF TYPE OF PIPE OR JOINT USED, LARGER
LINES TO BE DETAILED ON PLANS.

2. VALVE BOX AND COVER REQUIRED PER
STD. C-23.30
NOTE

BARS TO CONCRETE THRUST BLOCK TO BE COATED WITH 2 COATS COAL TAR, EPOXY OR BY OTHER APPROVED METHOD. BARS TO HAVE 90° HOOK ON LOWER END, AS PER TABLE.

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>MIN. BAR SIZE</th>
<th>A-DIMENSION (HOOK)</th>
<th>MIN. BLOCK DIM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'</td>
<td>#6</td>
<td>6'</td>
<td>3' x 3' x 3'</td>
</tr>
<tr>
<td>8'</td>
<td>#6</td>
<td>9'</td>
<td>4' x 4' x 2.5'</td>
</tr>
<tr>
<td>12'</td>
<td>#8</td>
<td>9'</td>
<td>4' x 5' x 5'</td>
</tr>
</tbody>
</table>

* FOR 125 PSI WORKING PRESSURE

NOTES

1. EITHER THIS DETAIL OR RESTRAINT RODS CAN BE USED, WHEN IT IS ALLOWED TO RELOCATE A WATER LINE UPWARD TO CROSS OVER A CONFLICT.

2. DUCTILE IRON PIPE MAY BE USED.

3. THRUST BLOCKS FOR PIPE LARGER THAN 12" SHALL BE CALCULATED FOR EACH PROJECT.
NOTES
1. THIS DETAIL COVERS MOVING OF WATER MAINS, 2' TO 12' ONLY.
2. THRUST BLOCKING PER STD. NO. 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.
NOTES

1. EXTENSION STEM WITH SOLAR SOCKET ON BOTTOM TO FIT 2" SQUARE VALVE NUT. EXTENSION TO VALVE STEMS REQUIRED ON ALL VALVES INSTALLED WHERE OPERATING NUT IS OVER 5' BELOW SURFACE. LENGTH TO FIT EACH INSTALLATION. OPERATING NUT TO BE HELD ON TOP OF EXTENSION WITH STOP NUT.

2. IF TWO OR MORE JOINTS OF A.C.P. ARE USED TO MAKE RISER USE STANDARD A.C.P. RUBBER GASKET COUPLING TO JOIN PIPE. WHERE RISER LENGTH EXCEEDS 10' USE 12" A.C.P. PIPE.

3. STEM PAINTING: ALL STEEL TO HAVE PRUKE COAT OF PAINT NO. 4 AND ONE HEAVY APPLICATION (FINISH COAT) OF PAINT NO. J0002-4.06 AS PER Sect.1002.
NOTES

4. Valve box shall be adjusted to the finished grade prior to placing of the asphaltic concrete surface or P.C.C.P.

5. Ground below concrete pad or 3 bricks to be compacted 95% of max. density.

TYPE 'A-1' (To be used in areas subject to vehicular traffic.)

Finish grade
Cover only
Class 'B' concrete

TYPE 'B' (Not subject to vehicular traffic)

Alternate bricks

SEE NOTE 3

TYPE 'A-2' (To be used when valve box is located within P.C.C.P. pavement)
CONCRETE RING
NOT REQUIRED
WHEN ADJUSTED IN
UNPAVED AREAS

SEE NOTE 6

THE WORD 'WATER' ON COVER (TYP.)

ASPHALTIC CONCRETE:
SEE NOTE 4

FINISH GRADE

6' THICK 30' DIA.

SEE NOTE 6

NOTES

6. USE PARKSON, TYLER, APCO, OR EQUAL DEEP
SKIRTED LID (4' OR MORE) TYPE, SLIDING ADJUSTABLE CAST IRON
VALVE BOX, C.I. MIN. T.S. 30,000 P.S.I.
NOTES

1. BLOCKS ARE TO EXTEND TO UNDISTURBED GROUND.
2. ALL TAPS SHALL BE MADE BY CITY CREWS AT PREVAILING RATES.
3. INSTALL PERMANENT BLOCKING UNDER VALVE BEFORE TAP IS MADE. ALL FLANGE BOLTS SHALL BE CLEAR OF FOOTING.
4. ALL TAPPING SLEEVES MUST BE PRESSURE TESTED PRIOR TO REQUESTS FOR TAP BY CITY.
5. CONTRACTOR SHALL EXCAVATE AS SHOWN AND SHALL SET TAPPING SLEEVE AND VALVE AND TIGHTEN ALL BOLTS PRIOR TO REQUESTING CITY TO MAKE TAP.
6. TAPPING SLEEVE TO BE PLACED A MINIMUM OF 18" FROM ANY BELL, COUPLING, VALVE, OR OTHER OBSTRUCTION.
7. 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 EQUALS (A X B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; &amp; LESS</td>
<td>3 SQUARE FEET</td>
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<tr>
<td>6&quot;</td>
<td>4 SQUARE FEET</td>
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<td>8&quot;</td>
<td>6 SQUARE FEET</td>
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<td>10&quot;</td>
<td>9 SQUARE FEET</td>
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<tr>
<td>12&quot;</td>
<td>13 SQUARE FEET</td>
</tr>
<tr>
<td>16&quot;</td>
<td>23 SQUARE FEET</td>
</tr>
</tbody>
</table>
RODS ARE ATTACHED TO LUGS CAST ON BELL OF HYDRANT. IF HYDRANT IS NOT FITTED WITH LUGS, RODS ARE ATTACHED AS SHOWN BY THE DOTTED LINES.
THIS DETAIL IS FOR USE ONLY ON UNDERGROUND INSTALLATIONS WHERE THE USE OF CONCRETE THRUST BLOCKING PER
STD. NO. C-23.10 CANNOT BE USED BECAUSE OF OBSTRUCTIONS, OR REQUIREMENTS OF THE SPECIFICATIONS...

CLAMPS SHALL BE 1/2 BY 2 INCHES FOR PIPE 4 AND 6 INCHES IN DIAMETER; 5/8 BY 2 1/2 INCHES FOR PIPE 8 AND 10
INCHES; 7/8 BY 3 INCHES FOR PIPE 12 INCHES. BOLT HOLES SHALL BE 1/4 INCH IN DIAMETER LARGER THAN BOLTS.

RODS SHALL BE 3/4 INCHES IN DIAMETER FOR PIPES 4, 6 AND 8 INCHES IN DIAMETER; 7/8 INCHES FOR PIPE 10 INCHES AND
1 INCH IN DIAMETER FOR PIPE 12 INCHES.

BOLTS SHALL BE 5/8 INCHES IN DIAMETER FOR PIPE 4, 6, AND 8 INCHES IN DIAMETER; 7/8 INCHES FOR PIPE 10 INCHES AND
7/8 INCHES IN DIAMETER FOR PIPE 12 INCHES.

WASHERS MAY BE CAST IRON OR STEEL, ROUND OR SQUARE. DIMENSIONS FOR CAST IRON WASHERS ARE 5/8 BY 3 INCHES
FOR PIPE 4, 6, 8 AND 10 INCHES IN DIAMETER AND 7/8 BY 3 1/2 INCHES FOR PIPE 12 INCHES. DIMENSIONS FOR STEEL
WASHERS ARE 1/2 BY 3 INCHES FOR PIPE 4, 6, 8 AND 10 INCHES IN DIAMETER AND 1/2 BY 3 1/2 INCHES FOR PIPE 12 IN DIAM.
HOLES SHALL BE 1/8 INCH LARGER THAN THE RODS.

FOR PIPE LARGER THAN 12" IN DIAM., RESTRAINT DETAILS SHALL BE SUBMITTED FOR APPROVAL PRIOR TO INSTALLATION.

1. ALL TIE RODS, ROD COUPLINGS, TURNBUCKLES, BOLTS AND NUTS FOR THESE JOINTS SHALL BE OF CARBON STEEL
   EQUIVALENT TO A.S.T.M. A-307, GRADE B, WITH CADMIUM PLATING IN ACCORDANCE WITH A.S.T.M. A-165, EXCEPT THAT
   THE MINIMUM THICKNESS OF THE PLATING SHALL BE .002 OF AN INCH. CADMIUM PLATED BOLTS SHALL HAVE CLASS 2A
   THREADS AND THE NUTS, ROD COUPLINGS AND TURNBUCKLES SHALL HAVE 2B THREADS.

2. HIGH STRENGTH, HEAT TREATED CAST IRON TEE-HEAD BOLTS WITH HEXAGON NUTS, ALL IN ACCORDANCE WITH THE
   STRENGTH REQUIREMENTS OF A.W.W.A C-944, MAY BE USED IN LIEU OF THE CADMIUM PLATED BOLTS AND NUTS.

3. THE SKETCHES IN THIS SERIES OF FIGURES SHOW ACCEPTABLE METHODS OF PROVIDING ANCHORAGE. THERE IS NO
   PARTICULAR SIGNIFICANCE TO BE ATTACHED TO WHETHER THE SKETCH SHOWS A BELL AND SPIGOT JOINT OR A
   STANDARD MECHANICAL JOINT. THE ANCHORING PROCEDURE ILLUSTRATED APPLIES IN MOST CASES TO EITHER TYPE
   OF JOINT. IN SOME CASES, DIMENSIONS OF THE PARTICULAR PIPE OR HUB AND SPACE AVAILABLE FOR WORKING
   AROUND THE PARTICULAR JOINT WILL INFLUENCE THE CHOICE OF METHODS USED.

4. IN CERTAIN ASSEMBLIES OF RODS AND CLAMPS SHOWN, RODS Run FROM A LUG ON THE FITTING (OR A CLAMP BEHIND
   THE HUB OF A BELL) TO A CLAMP AGAINST A FACE OF A BELL. NOTE THAT THIS ARRANGEMENT ANCHORS ONLY ONE
   JOINT. THE STABILITY OF THE JOINT WHERE THE CLAMP IS AGAINST THE FACE OF THE BELL DEPENDS ON HAVING SOIL
   ABOVE A RELATIVELY LONG PIECE OF PIPE ON BOTH SIDES OF THE JOINT. CONSEQUENTLY, IF THE DISTANCE BETWEEN
   THE FIRST AND SECOND JOINTS IS LESS THAN 12 FEET, THE SECOND JOINT SHOWN SHALL BE ANCHORED BY A CLAMP
   BEHIND THE HUB OF THE BELL AND RODS TO A CLAMP AT THE FACE OF THE NEXT BELL.

5. COATING TYPE: ASPHALTIC PRIMER PER SUBSECTION 907-2.02, - ALL EXPOSED METAL.
CAST IRON WATER METER BOX LID FITTING BOX NO. 1, 2, 3, OR 4 AS REQUIRED

PLAN VIEW

SECTION A-A

BREAK OUT IF NECESSARY TO SET BOX TO PROPER GRADE

SECTION B-B

METER BOX DIMENSIONS

<table>
<thead>
<tr>
<th>DIM.</th>
<th>BOX NUMBER</th>
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<tbody>
<tr>
<td>A</td>
<td>19&quot;</td>
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<tr>
<td>B</td>
<td>12 1/4&quot;</td>
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<tr>
<td>C</td>
<td>12&quot;</td>
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<td>G</td>
<td>7 1/4&quot;</td>
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<td>H</td>
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<td>I</td>
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<td>L</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>M</td>
<td>16&quot;</td>
</tr>
<tr>
<td>N</td>
<td>2 1/2&quot;</td>
</tr>
</tbody>
</table>

1/4" OR 3/4" METER

1" METER

1/2" METER

2" METER

NOTES

1. THE METER BOXES SHALL CONFORM TO THE DIMENSIONS AS SHOWN AND SHALL BE MADE OF PORTLAND CEMENT CONCRETE PCURED AND TAMBED OR VIBRATED IN TRUE FORMS.

2. USE CLASS 'S' CONCRETE, f'c=4000 p.s.i.
NOTES

1. CUT AND PLUGS MUST BE ADEQUATELY "DRY BLOCKED''.

2. DRY BLOCKS SHALL BE STANDARD SIZE SOLID MASONRY CONCRETE BLOCKS, (ASTM C - 139).  

3. THE QUANTITY AND ARRANGEMENT OF THE BLOCKING MUST WITHSTAND LINE PRESSURE BY HOLDING THE CAP OR PLUG IN POSITION.

4. DRY BLOCKS SHALL BE PROPERLY SHIMMED TIGHT AND SECURE AGAINST THE CAP BEFORE LINE PRESSURE IS RESTORED.

5. CONCRETE THRUST BLOCKS SHALL NOT BE POURED UNTIL LINE PRESSURE IS RESTORED AND THE CAP OR PLUG IS INSPECTED FOR LEAKAGE.

6. CONCRETE SHALL NOT BE POURED OVER ANY PORTION OF THE ABANDONED PIPE.

7. MINIMUM THRUST BLOCK AREA PER STD. C-23.10.

8. WHERE A 4" OR LARGER LINE IS SPECIFIED TO BE ABANDONED, THE CUT AND PLUG SHOULD OCCUR AT THE SUPPLY MAIN TO AVOID CREATING AN UNUSED DEADEND LINE.
NOTES

1. ALL JOINTS IN HYDRANT RLN-OUT TO BE MECHANICAL JOINTS.
2. HYDRANT TEE: CLOY 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. FOR CONCRETE THRUST BLOCKS SEE STD. DETAIL.
5. A FLANGE BY MECHANICAL JOINT SHUTOFF VALVE CONNECTING DIRECTLY TO THE TEE OR BELOW AT THE MAIN SHALL BE USED.
6. FIRE HYDRANT, FIRE HYDRANT THREADS, VALVE AND VALVE BOXES PER MUNICIPALITY REQUIREMENTS.

FINISHED GRADE

SEE STD. C-23.10
FOR VALVE BOX INSTALLATION

6" VALVE

WATER MAIN

PUMPER CONNECTION TO FACE CURB

WATER VALVE BLOCKING SEE STD. C-23.5

COREY TYPE

COARSE AGGREGATE AS PER AASHTO N-43, NO. 57 MINIMUM OF 8 CU. FT.

SEE NOTE 6.
NOTES

1. OBSTRUCTION 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 HERE.
4. ON LOCATIONS IN MIDBLOCK, THE FIRE HYDRANT WILL BE ALIGNED WITH A PROPERTY LINE.

PARKWAY AREA OR NO SIDEWALK

AREA WITH SIDEWALK