STATE OF ARIZONA
STATE HIGHWAY DEPARTMENT
ROADWAY STANDARDS
1959

CONSTRUCTION
"C"
STANDARDS

HIGHWAY PLANS SERVICES

ISSUED TO

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**Detail of Letters**

- **Min. weight of lid:** 31 lbs.
- **Min. weight of frame:** 10 lbs.
- **Std. survey monument brass cap:** See Std. C-38
- **Gage iron frame:** Bit, surface
- **Class A' concrete:**
  - **Agg. base**
  - **Original stone:** When found, shall be encased in concrete.
  - **Original general land office pipe with brass cap:** When found, shall be reset in new concrete. See Construction Manual.

**Survey Monument & Cover**

**Reference Marker**

- **Transit point marker** shall be cast in place.
- **Std. B. M. Brass cap (see Std. C-38)**
- **Chamfer 1/4**

**Note:**

- R/W markers shall be placed where shown on plans or as directed by Engineer.
- R/W marker shall consist of transit point and reference marker.

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**Arizona Highway Department**

**Plans Division**

**Survey Monument and Cover**

**Right of Way Markers**

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<td>HMG Dec</td>
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See Plans for details of roadway width, cut ditch, type and thickness of roadway surfacing, superstructure, and curve widening.

Standard Crown Slope for PCC concrete 0.01' per foot; for Bit. Surf. Treat. and Bit. Mix. Surf. 0.015' per foot.

Standard Cut and embankment slopes as shown on this sheet may be superseded by special slopes where shown on plans.

For Cuts up to 6' use 5' semi-tangents (L) for slope rounding. For each additional foot of cut add 1' to semi-tangent to 12' maximum.

Finish with approved drag so that the ground will not have a scarred appearance.

Do not daylight small negative slopes, but round as indicated.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

SLOPES

SLOPE Rounding

HAFFIELD
10/20/85

PLANS 224/255
SLOPES 10/20/85

DRAWN

TRACED

CHECKED

APPROVED
EMBANKMENT CURB - CONCRETE

EMBANKMENT CURB - BITUMINOUS

PAVED GUTTER IN CUTS - BITUMINOUS

PAVED TURNOUTS

NOTES

W indicates width of paved surface of turnout.
L indicates length of paved surface of turnout.
Farm road turnout, 10 min. width. (W)
County road turnout, 20 min. width. (W)
Size and type of turnouts is noted on plans
as follows: W, L, Surface, and Type (12' x 30' B.M.S. Type A)
Base material thickness under turnout is the same
as shown on the roadway section, unless otherwise noted.
Any excavation or embankment for turnouts is
included in the roadway quantities.
Turnouts are to be placed where shown on plans,
or as directed by the Engineer.

SPILLWAY INLETS

SPILLWAY

Note:
Spillway inlets and spillways
shall be of the same
material as the curb.

Maximum spacing of spillways shall not exceed 400'
CROWN DYKE
To be paid for by lineal measure.

CROWN DITCH
To be paid for by lineal measure.

Crown protection should be constructed in such a manner
that the flow of intercepted water shall not exceed 0.5%.

Grader ditch section may be used or a ditch section
similar to above may be made in any manner
approved by the Engineer.

GRADER DITCH
To be paid for by lineal measure.

Note: When necessary
the slope may be flattened
to 6:1 with bit mix or soil
cement protection as called
for on plans.

TYPE A DYKE

Dimensions of ditches and dykes
as shown on plans are respectively
width, depth or height, and length.

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

DITCHES AND DYKES

DRAWN GH DEC 1945
TRACED GH DEC 1945
CHECKED HWJ DEC 1945
APPROVED WJ DEC 1945

C-4
NOTES:

SEE PLANS FOR DETAILS OF TYPE AND THICKNESS OF ROADWAY SURFACING, WIDTH OF CUT DITCH AND WIDTH OF SHOULDER.

STANDARD CUT AND EMBANKMENT SLOPES AS SHOWN ON THIS SHEET MAY BE SUPERSEDED IN ROCK EROSION OR OTHER SPECIAL CONDITIONS.

STANDARD SLOPE FOR P.C. CONCRETE 0.01' PER FOOT, FOR BIT. MIX SURFACE 0.015' PER FOOT.

FOR CUTS UP TO 6' USE 5' SEMI-TANGENTS (L) FOR SLOPE Rounding. FOR EACH ADDITIONAL FOOT OF CUT ADD 1' TO SEMI-TANGENT TO 11' MAXIMUM. FINISH WITH APPROVED DRAG SO THAT THE GROUND WILL NOT HAVE A SCARRRED APPEARANCE.

NOTE — TWO LANE ONE WAY ROADWAY SHOWN.

* 38' FOR TWO LANE ONE WAY ROADWAY.

50' FOR THREE LANE ONE WAY ROADWAY.
**CLASS A CONCRETE FORD**

- Conc. Walls
- Full length of structure with fine aggregate. Class A Conc.
- See Plans for base material details.
- 2-#6 bars, top and bottom, lap 2'-6".

**BIT. MIX. SURFACE FORD**

- Conc. Walls
- Full length of structure with fine aggregate. Class A Conc.
- See Plans for Bit. Mix. Surf. and base material details.
- 2-#6 bars top and bottom, lap 2'-6".

**ELEVATION LOOKING UPSTREAM**

- Upstream Wall...
- Wall may be built to this line...
- 3" weep holes @ 20 cts.
- Depth Gauge: 3" Max.
- Wall to be built to one foot above high water level.

**DEPTH GAUGE INSTALLATION**

- 3" Cap
- 3" x 3'-0" pipe
- Paint 2 field coats white enamel, 1" wide bands 1 coat black enamel.

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**ARIZONA HIGHWAY DEPARTMENT**

**PLANS DIVISION**

**TYPE A FORD**

**C-5**
GENERAL NOTES

AFTER SUBMISSION AND APPROVAL OF BRACKETS AND PLATES, MANUFACTURERS PLANS AND SPECIFICATIONS SHALL BE USED IN CONJUNCTION WITH STANDARD ERECTION DETAILS ON THIS DRAWING. IF SPRING SUPPORT BRACKET IS USED FOR TYPE "A" ROAD GUARD THE MINIMUM TENSILE STRENGTH SHALL BE 100,000 P.S.I.

POSTS SHALL BE NOMINAL 6"x6"ROUGH, PRESSURE TREATED AND UNPAINTED. SEE STANDARD SPECIFICATIONS 1960 FOR ALLOWABLE SPECIES AND GRADING.

HOLES SHALL BE BORED AND POST TOPS TRIMMED BEFORE TREATMENT UNLESS OTHERWISE CALLED FOR EITHER TYPE "A" OR "B" ROAD GUARD MAY BE USED. PLACE 2"X6"FLAT TOP SILVER REFLECTIVE SHEETING TAB ON END POSTS AND EVERY THIRD INTERMEDIATE POST FACED TRAFFIC.

FOR INSTALLATION AT STRUCTURE APPROACHES SEE STANDARD C-42 SEE STANDARD C-3 FOR POST SETTING IN CURBED SECTIONS.

TYPE "A" ROAD GUARD

TYPE "B" ROAD GUARD

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

REV 1/4/60

C-7-1
NOTE: Use driving head for driving all steel posts.

TYPE "A"

TAB DETAIL

STEEL POST DETAILS

STEEL POSTS

NOTE:
- Point face plates with one coat industrial synthetic alkyd primer and one coat of industrial synthetic black enamel or equal before reflectorized material is applied.
- Type "BL" and Mile Post face plate mounting details same as Type "BR".
- 7'-6" posts shall be painted one coat industrial synthetic primer or galvanized.
- 4'-6" posts shall be painted one coat industrial synthetic primer and one coat industrial synthetic enamel (Black).
- Wood posts shall be Redwood 8' x 8', S.A.S.

Guide post locations shown on plans are approximate and changes may be necessary to meet field conditions. When placed in rows, guide posts shall be spaced at 200' centers unless otherwise called for on plans.

After erection and painting, install a 2" x 6" reflectorized tab facing traffic, on each Type "A" post.

All guide posts along outside of curves shall have a 2" x 6" reflectorized tab fastened on back of post at top. Mile posts complete shall be furnished by the State and installed by the Engineer.

ARIZONA HIGHWAY DEPARTMENT

PLANS DIVISION

SIGN POSTS

MILE POSTS

DRAWN

J. Snyder 12-20-57

CHECKED

J. Snyder 12-20-57

DRAWING NO.

C-8-2

This detail supersedes Drawing No. C-8-1

APPROVED

TRAFFIC ENG.

APPROVED

ENGR. PLANS
Note: All Rein. Bars are #4 @ Approx. 12" Ctrs. Unless Noted Otherwise.

### Quantities for One Headwall

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<td>54&quot;</td>
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### General Notes

1. All concrete shall be Class 'A'.
2. All exposed corners shall have a 3/4" chamfer.
3. Concrete pipe joints shall be constructed as per Std. C-33-1.
4. All concrete pipe under roadway shall be R.C.
5. Double riveted bituminous coated CMP may be used for irrigation purposes where called for on plans.

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**ARIZONA HIGHWAY DEPARTMENT**

**PLANS DIVISION**

**IRRIGATION HEADWALLS**

**18" TO 60" DIAMETERPIPES**

**DRAWN** R.J. 5-10-56

**TRACED** R.J. 5-11-56

**CHECKED** L.M. 5-12-56

**APPROVED** C-9-A
Note Dimension W to be increased to take care of increased width or length due to skew. Quantities are for one headwall only.
SECTION ZZ

PLAN

Note -- All reinforcing to be 4 bars approx. 12" oc

SECTION YY

PLANT

PIPE

DIMENSIONS

I.D. W A B E F H J K L

Single Double

18" 2'6" 5'2" 2'8" 1'3" 3'9" 1'3½" 3'10" 3'1" 9' 1'6" 0.76 0.03 1.12 0.06 75" 107"

24" 3'0" 6'6" 3'6" 1'7½" 1'1½" 1'1½" 4'4" 3'5" 11" 2'3" 1.04 0.04 1.55 0.09 92" 136"

30" 3'6" 7'10" 4'4" 2'0" 1'6" 2'7½" 4'3" 3'5" 1'1½" 3'0" 1.30 0.06 2.29 0.13 112" 166"

36" 4'0" 9'2" 5'2" 2'4½" 1'10½" 3'3" 5'4" 4'0" 1'4" 3'9" 1.56 0.09 3.01 0.17 145" 214"

42" 4'6" 10'6" 6'0" 2'9" 2'3" 3'10½" 5'10" 4'4" 1'6" 4'6" 2.40 0.11 3.85 0.23 189" 279"

Reference Std. C-13

ARIZONA HIGHWAY DEPARTMENT

PLANS DIVISION

DROP INLET HEADWALLS

DRAWN K.S. OCT 1939
TRACED K.S. OCT 1939
CHECKED K.S. OCT 1939
APPROVED K.S. OCT 1939

C-II
WING AND U-TYPE HEADWALLS

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Note: Dimensions and quantities shown are calculated on a basis of using concrete pipe. Dimension W to be increased to take care of increased width or length due to skew.
Pipe should be laid on a straight gradient (1/2% min) and on solid base at all points.
Minimum cover "C" shall be 1' 6" for reinforced concrete pipe and 3' for corrugated metal pipe.
All concrete pipe under roadway shall be R.C. Catch basins, in connection with angle headwalls, shall be excavated as shown in Fig. A and classed as channel excavation.
Riprap, conc. or Bituminous aprons shall be placed as shown when required for protection.
Reference Std. C-33-1

AZRIONA HIGHWAY DEPARTMENT
PLANS DIVISION

PIPE CULVERT INSTALLATION

DRAWN: GM, MAY 1945
TRACED: GM, MAY 1945
CHECKED: 
APPROVED: PLANS EMGR

C-13
PLATES SHALL BE STAGGERED AS SHOWN ABOVE.
BOLT HEADS ON OUTSIDE OF PIPE AND NUTS Inside.

* 4" MINIMUM SPACE BETWEEN PIPES
MAY BE USED ONLY IN SPECIAL CASES
WHEN SHOWN ON PLANS.

STURCTURAL PIPE

* WHEN HEADWALLS ARE USED SPACE AS PER
HEADWALL STANDARD
C.M.P. ARCHES

SPACING FOR MULTIPLE INSTALLATIONS

METHOD OF PLACING STRUTS

COMPRESSION CAPS AND SILLS TO BE SAME DIMENSION TIMBER
AS STRUTS AND PLACED WITH LEAST DIMENSION VERTICAL.
COMPRESSION CAPS TO BE OF SOFT WOOD TO ALLOW COMPRESSION
LENGTH OF STRUTS 1.05 FOR C.M.P. - 1.03 FOR R PIPE
OF STRUT AND - WEDGES.
STRUT SPACING COMPUTED FOR FULL DIMENSION (NOT NOMINAL)
SOUND STRUCTURAL TIMBER.
STRUTS SHALL BE LEFT IN PLACE UNTIL FILL IS CONSOLIDATED.
C.M.P. ARCHES SHALL NOT BE STRUTTED.
STRUTS WILL NOT BE REQUIRED FOR 48" C.M.P. UNDER FILLS
OF 15" OR LESS EXCEPT WHEN NOTED ON PLANS.
BOTTOM PLATES OF STRUCTURAL PLATE PIPE SHALL BE NO 1 GAUGE.
ENDS OF C.M.P., STRUCTURAL PLATE PIPE AND PIPE ARCHES SHALL
NOT BE BEVELED.

SPACING IN FEET OF TIMBER STRUTS
FOR C.M.P. & STRUCTURAL PLATE PIPE

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ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

CORRUGATED METAL AND
STRUCTURAL PLATE PIPE
INSTALLATION

DRAWN: L.D. MOE 10-20-59
CHECKED: S.M. N. 7/27-59
APPROVED: L.D. MOE 10-20-59

REV: C13-A
PLAN
Of 23' x 26' Cattle Guard Plate.
Manufactured by Sheffield Car Co., Three Rivers, Michigan.

**Timber Sizes for End Frames**

1" x 6" x 10'-0"
2" x 6" x 6'-0"
2" x 6" x 2'-0"
2" x 6" x 3'-0"
2" x 6" x 10'-0"
2" x 6" x 1 '-7" (2)
6" x 6" x 4'-0"

**Slats**

5" x 6" x 9'-0"

**Note:**
The 6' x 6" costs and the 2" x 6" & 3" x 6" timbers that are fastened to the ties shall be pressure treated in accordance with Standard Specifications and unpainted. The remaining timbers shall be painted one coat of #7 and one coat of #8 paint. The metal plates shall be furnished with the manufacturers shop coat of paint or shall be given one coat of #1 paint.

**Detail of 2" x 3" Timber Between Adjacent Plates. Fastened Down With 3/4" x 7" Lag Screws Each Piece.**

**Table:**

<table>
<thead>
<tr>
<th>DIMENSIONS</th>
<th>A</th>
<th>B</th>
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<td>13 Track Centers</td>
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<td>14 Track Centers</td>
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ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION
RAILROAD CATTLE GUARD
DRAWN TRACED CHECKED APPROVED
L.0. Feere 11-12-57 L.E. Moore 11-12-57 L. E. Hines 12-2-38
DRAWING NO. C-14-R
REV. 12/15/58
**Line Fence and Gates**

**Steel Posts**

- **STD. TYPE 1 GATE**
  - (Set gate to be self-closing)

- **STD. FLOOD GATE**
  - Length is variable
  - End panel for flood gate only.

- **STD. LINE PANEL**

- **STANDARD STRAIN POST**
  - To be spaced not over 500'

- **TYPICAL STEEL LINE POST SECTIONS**

- Wire shall be strung on opposite side of post from highway except on curves as shown.

- No portion of fence shall extend outside of Highway Right of Way Line.

- Line posts may be T-rip, T-section or similar commercial types (excepting angle or grid). They shall be 9-ga. steel grade and rolled from standard sectional terrains or re-rolled rails, both produced by the open hearth process. They shall be punched with holes or corrugated edges to hold wire in position and weigh 180 lbs per ft, minimum exclusive of anchor.

- Clamps of 10 ga. (or heavier) gauge wire shall be provided for attaching fence. Punched log type anchors are not permitted.

- All posts and braces shall be painted to manufacturer's standard or discontinued.
WING FENCE DETAIL

THIS DETAIL SHALL BE USED LT. AND RT. WHERE WING FENCES ARE CALLED FOR ON PLANS.

EXISTING 25' STANDARD LINE PANEL.

LENGTHEN WIRES AND FASTEN SECURELY TO POST.

PLACE NEW ANGLE BRACE HERE.

8" END PANEL TO REMAIN.

2 NEW STAYS

8" END PANEL EXISTING GATE REMOVE POST AND BRACE AFTER WIRES HAVE BEEN LENGTHENED AND SECURED.

DETAIL FOR ELIMINATING EXISTING LINE GATES

STD. LINE POST

2 STRANDS BARBED WIRE

#9 GA

#11 GA

#9 DOUBLE WRAPPED GALVANIZED WIRE TIES - 4 EACH POST.

SPECIAL STOCK FENCE

REFER TO STD. C-16 FOR DETAILS NOT SHOWN.
**Fabricated Wire Fence & Gate**

All materials and fittings shall be new and hot-dip galvanized.

Section A-A
Corner or End Post

All Pipe Posts to be Capped 36ga. Tie Wire or 6ga. Wire Clip.

5ga. Tie Wires Top and Bottom.

7/8" Steel Bar Band

Strain Post

Line Post "N" Section or Pipe

Fence Wire 3ga.
6.1'-2" mesh.

Brace

5/8" Tension Rod

Stretcher Bar Band

Stretcher Bar 1/2" x 1/4"

CORNER OR END PANEL

To be spaced at 500' intervals

Note:
All material and fittings shall be new and hot dip galvanized.

| Strain, End & Corner Posts | Pipe 2 1/2" O.D. - 3.65 lbs per lin ft min. |
| Line Posts | Pipe 2" O.D. - 2.72 lbs per lin ft min. "H" Sec. 1.625" x 1.875" - 2.80 lbs per lin ft min. |
| Braces | Pipe 1 1/8" O.D. - 2.27 lbs per lin ft min. "H" Sec. 1.5" x 1.31" - 2.2 lbs per lin ft min. |
BARRIER FENCE - STEEL POSTS
TYPE 1
Elev. 1/2" = 1'-0"

Notes:
Cable shall be 3/8" galvanized strand - 7 wire common - 4200' test.
Wood posts shall be nominal 6x6 rough sawn, pressure treated and unpainted.
Allowable species, grading and pressure treatment shall conform to the requirements of the 1960 Standard Specifications for Road Guard Posts.

BARRIER FENCE - WOOD POSTS
TYPE 2
Scale 1/2" = 1'-0"

Typical Installation at Dykes
Barrier Fence shall be used only to prevent promiscuous vehicular crossings between roadways and shall not be used where accident prevention devices are necessary nor where physical barriers are present.
CONTRACTION CONTROL JOINT
See Detail

SAWED
CONTRACTION JOINT
CONSTRUCTION JOINT

CONTRACTIVE JOINTS @ 15' centers

1-1/2" x 3-1/2" Key Joint

LONGITUDINAL SECTION THRU PAVEMENT

TRANSVERSE EXPANSION JOINT AT STRUCTURES ONLY

Expansion Joint Filler,

Bridge Abutment

2-1/2 x 12 ga. max. thickness continuous sheet metal. To remain in place. Length = W - 2" W = Slab width.

2-1/4 - 4" Max.

TRANSVERSE
CONTRACTION CONTROL JOINT
60' Max. Spacing

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

TRANSVERSE JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT

All transverse joints shall match location of joints in adjacent slabs.

All general requirements may be superseded by special notations on the plans.

At intersections of side roads or streets, joints shall be so placed as to give the intersection a symmetrical appearance and to conform to the cross section of the intersecting road or street.

ARIZONA HIGHWAY DEPARTMENT

PLANS DIVISION

TRANSVERSE JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT

DRAWN: CJC Jan. 1946
CHECKED: CJC Feb. 1946
APPROVED: 3/1/46

DRAWING NO: C-18
PLAN OF LONGITUDINAL JOINT DETAIL "E" OR "F"

LONGITUDINAL JOINT DETAIL "G"
Concrete pavement shall be placed prior to placing of curb & gutter. Curb & gutter joints to match location of joints in concrete pavement.

LONGITUDINAL JOINT DETAIL "H"

GENERAL NOTES
All tie bars in center joints shall be deformed bars and shall have unbroken bond. They shall be held securely in place, parallel to the subgrade & perpendicular to the center line of the road.

All formed longitudinal joints shall be finished with an edging tool not less than 1/2" wide and 1/8" long. Edging operation shall be followed by a burlap drag W/Width of traffic lane. d = depth shown on Plans.

All general requirements may be superseded by special notations on the plans.

ARIZONA HIGHWAY DEPARTMENT PLANS DIVISION
LONLITUDINAL JOINTS FOR PORTLAND CEMENT CONCRETE PAVEMENT

DRAWN D.K. MAR., 1959
TRACED H.A. JUNE, 1959
CHECKED M.K. JULY 1959
REPRODUCED

C-19
SINGLE CURB
ROADWAY WIDTH
2" chute
h curb height as shown on plans
batter
SLOPE OF PAVEMENT
1-6
4.6 2-2.5
Type "A" (For 6" curb height or over)

COMBINED CURR & GUTTER
ROADWAY WIDTH
2" chute
h curb height as shown on the plans
batter
SLOPE OF PAVEMENT
1-6
4.6 2-2.5

INTEGRAL CURB
ROADWAY WIDTH
2" chute
h curb height as shown on the plans
batter
SLOPE OF PAVEMENT
1-6
4.6 2-2.5

SINGLE CURB
ROADWAY WIDTH
2" chute
h curb height as shown on the plans
batter
SLOPE OF PAVEMENT
1-6
4.6 2-2.5
Type "B" (For curb height of less than 6")

TYPE "C"
Roadway Width
2-2.5
SLOPE OF PAVEMENT
1-6
4.6

TYPE "D"
Roadway Width
2-2.5
SLOPE OF PAVEMENT
1-6
4.6

Type "H"
We only adjacent to inside lane on divided roadways with 6 or more lanes.

TYPE "E"
Roadway Width
2-2.5
SLOPE OF PAVEMENT
1-6
4.6

General Notes
All curbs & gutters to be single course Class "A" concrete.

CONCRETE SIDEWALK

Concrete sidewalk shall be single course Class "A" concrete, 8" thick, jointed on 50'-0" centers, placed with a 
4" deep jointing tool of centres equal to the width of the sidewalk.

After grading to a depth of 1' a interval of 1' to match joints in adjacent curb. Sidewalk shall be edged 
with a 4" flat edging tool.

Sidewalk across driveways shall be 2bf.

Payment for joint filler shall be included in unit price but for other items.

Valley Gutter

SECTION A-A

Valley gutter shall be single course Class "A" concrete, 8" thick, jointed on 50'-0" centers, placed with a 
4" deep jointing tool of centres equal to the width of the sidewalk.

After grading to a depth of 1' a interval of 1' to match joints in adjacent curb. Sidewalk shall be edged 
with a 4" flat edging tool.

Sidewalk across driveways shall be 2bf.

Expansion joint between Curb & Sidewalk

Depressed Curb for Driveway Entrance

NOTE: Reading these specs for example of types never apply.
Material to be used in construction of wall shall comply with requirements of Std Spec.
**TYPE "A" BANK PROTECTION**

- Rock Backfill (Min. rock - None passing 6" sq. opening)
- Single wrapped with 2 strands #9 wire 4'/6" to c.

**NOTE:**
Wire mesh to entirely enclose rock backfill.

**TYPE "B" BANK PROTECTION**

- 2" x 4" Delta mesh, Horizontal wires to be 2 strands, twisted, min. 12½ ya. Diagonal wires min. 14 ya.

**TYPE "C" BANK PROTECTION**

- Use 6 x 19 galvanized wire with 3/16" wire diameter
- All wire and cable to be galvanized
- Where more than one width is used, lace together with 2 strands #9 wire and treat at every rail.
TYPE C RIPRAPP

TYPICAL SECTION

Max flood stage
Existing groundline
Backfill
Stretcher course

Header course
every 4th course

5'-0' min or to bedrock if less.

Stagger joints of adjoining courses.

Type A (Plain hand placed)
Type B (Grouted hand placed)
Sacked concrete may be substituted for Type A or Type B.
Size of rock shall conform to Std. Specs.

In case of insufficient bond or bearing, excavate trench and fill with concrete.

Note:
Special mix 4-sack concrete shall be used, see Std. Specs. Sacked concrete riprap shall consist of 10 oz. burlap sacks containing one cubic foot of wet concrete when placed, unless otherwise specified. Stretcher shall be placed so that folded or tied ends will not be adjacent. Headers shall be placed with folds or ties toward the earth face.
Not more than two vertical courses shall be placed in any tier until initial set has taken place in the first course of such tier.

PLAN OF FIRST COURSE IN TRENCH

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

RIPRAPP

C23A
Riprap or Bit. Mix, as directed by the engineer, when called for on plans.

**SECTION**

Note:
- Include elbow as part of total length. Call for hinged band coupling for pipe joints. Use 12" band width for pipes over 12' long, 1" band width for pipes 12' long or less. Catch basin to have bituminous coating. C.M.P shall be plain unless otherwise specified. Catch basin shall be shifted to fit the ground so as to lessen the angle in the C.M.P as much as possible.

1/4 ga. Corrugated Metal

Two foot length of 8" pipe included in catch basin. Additional length of pipe shown on plans.

1/4 ga. Corrugated Metal Plate.

8" Perforated C.M.P -- Place holes down.

PERFORATED C.M.P INSTALLATION

SIDE ELEVATION

Type B

CATCH BASINS

FRONT ELEVATION

1/4 ga. Corrugated Metal

NOTE:
- Unless otherwise shown.

FINISHED SHOULDER LINE: 1-0 1-0

8-1/2" Fine Aggregate

SIDE ELEVATION

Type A

ARIZONA HIGHWAY DEPARTMENT

PLANS DIVISION

CORRUGATED METAL CATCH BASINS

AND PERFORATED C.M.P

DRAWN: C.B. 7/4/78
CHECKED: H.H.C. 8/20/78
APPROVED: 9/18/78

C-24
GENERAL NOTES

Warp face of standard curb and gutter (or curb) into catch basin in lengths of 8 feet on each side. The curb and gutter section of the catch basin shall conform in surface finish to the adjoining curb and gutter.

All concrete shall be class A.

All exposed edges shall be finished to 1/4 radius with a suitable edger. Frame and gating units shall be structural steel A.S.T.M. A 7 painted one shop coat of No. 1 paint and one field coat of No. 3 paint.

When catch basins are located in curb returns, the catch basin curb face shall confrom to the radius of the return.

Area of grate opening = 3.43 ft^2
The finish of the top slab shall conform in marking and finish to the adjacent concrete. Where no sidewalk exists the surface shall be trowel finished, with no mortar coat.

The concrete cover shall be composed of one part Portland cement and three parts clean well graded aggregate. All other concrete shall be Class A.

When catch basins are located in a curb return, the angle iron above the mud shall conform to the curvature of the curb.

Reverved edges shall be finished to ½" radius with a suitable edge. Paint curb angle one shop coat of No. 1 paint and one field coat of No. 3 paint.

Area of curb opening = 1.75" min. and 2.33" max.
NOTES:
Outlet pipes to be placed in position as shown on plans.
Floor of basin shall be given a steel troweled finish. Slope of floor parallel with curb shall be 1 in 12.

Note:
- If V = 4 or less, t = 6.
- If 4 < V ≤ 8, t = 8.
- If 8 < V ≤ 10, t = 10.
- If V > 10, t = 12.

V = 3.6 unless otherwise specified.
W = 2.11 ½ for one grating. Add 3.5 ½" for each additional grating. Unless otherwise specified, the basin shall have one grating.
Center support assembly shall be used when two or more gratings are specified.
Bolts shall be used to join two or more frames together and to the H-beam.

Frame and grating units shall be structural steel A.S.T.M. A-7 painted one shop coat of No. 1 paint and one field coat of No. 3 paint.

Area of single grate opening = 4.42 ft²

All concrete Class A
Reinforcing steel 1 ½" edge distance except where noted.
NOTES:
Chamfer all exposed edges 3/8".
This catch basin shall be used
for median drains only when called
for on plans.
All concrete Class A.

24" Pipe Culvert

24" Pipe Culvert

#4 bar 6'-9" bend as shown.
Lap 1'-2"

1/8" U bolt handle
to drop in recess in
cover. Thread 1/4"

6'-9" Plate

SECTION C-C

1'-2 1/4" 1/4" 1'-6 1/4" 1'-2 3/4"

1/2" Galv Pipe
Sleeve

3 1/2"

7"

1/16"

1 1/3"
1 2/9"end
4 1' 3"
1 2' 9"

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

CATCH BASIN
NO. 5

CONCRETE - 10% CY

A' bars B' bars C' bars D' bars Cover bars
No. Length No. Length No. Length No. Length
8 5'-3" 12 2'9" 14 3'-9" 6 4'-9"end 1 8'-9"end
2 4'-3"

DRAWN L.G. Mapel 2-21-50
CHECKED R.H. Oakley 2-3-50
APPROVED ENGR. PLANS 3-12-50

REV.
1/9/60
DRAWING NO.
C-27B
**SECTION OF FRAME**
Approx. weight 260 lbs.

**TYPE "A" COVER**
Approx. weight 190 lbs.

**TYPE "A-I" COVER**
shall be the same as Type A except that the cover shall be vented with a 1 1/2" to 2" hole equally spaced in a circle 10" from the center of the cover.

**NOTATIONS**
- The bearing face shall be machined so that the cover will have a uniform bearing in any position in the frame.
- The diameter of the manhole cover shall be in accordance with the diameters shown in drawings 541-A and 541-B.
Irrigation Valve
Number of valve shall correspond to the size of the pipe in inches. No. 6 to No. 20.

Concrete "For'L" to be included with valve.

Slope to fit local conditions.

Part Section
Standard Irrigation Valve
Detail C

Plan
Variable 6" to 20"

Ground Line

Class A concrete ring for lawn installation.

Oval Gate Iron Gate

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

PRECAST IRRIGATION GATE
For open ditch installation.
Detail B

For pipes 6" thru 24". Gate and frame shall be G.I. or aluminum. Type shown is for concrete pipe. For C.M.P., external steel adjustable band shall be used instead of internal steel ring.

Note:
Gates will be specified on plans for pipes larger than 24".

ARIZONA HIGHWAY DEPARTMENT
PLANS DIVISION

IRRIGATION VALVE
IRRIGATION GATE

C-32
TYPICAL INSTALLATION PLAN OF ROAD GUARD AT BRIDGE APPROACHES

Minimum length of Shoulder Flare 20'
End of Road Guard Flare (Depends on W)

A - End of Structure

Width should be for Pedestrian Walkway if required.

Control line
A - End of Roadway 2'1

Top of Curb line projected parallel to 2'1 of Roadway.

Bracket is required.

Bracket angle varies depending on make of Road Guard

Face of Road Guard (Control Point)

Detail Section A-A

NOTES:

Y = W \times \frac{x^2}{F^2}

Y = Offset from top of Curb line (Control line) to Shoulder line.
F = Length of Road Guard Flare.
X = Distance from beginning past away from structure.

Y = Offset to face of Road Guard at each post.

GENERAL NOTES:

When value of W is different than shown in table, then use basic formula to find values for Y.

When Road Guard is to be continued beyond end of Road Guard Flare required for W offset, the end of Road Guard shall then be continued at the shoulder line, to the last offset pointed line.

When W = 0, no flare is required, Shoulder line is then the control line.

Offset from Roadway \( \frac{x}{2} \) = Y + A - All figures are expressed in feet.

Place Road Guard both sides of roadway.
Save existing specimen trees. For traffic safety maintain 8 ft min horizontal shoulder clearance and 10 ft min vertical clearance of tree branches.

The final grade should conform as nearly as possible to the original surface, where trees are involved.

Natural ground to be left around base of trees as directed by Engineer.

No grading of right of way shall be done until a thorough inspection has been made for possible preservation of existing growth. The trees and shrubs to be retained will be carefully and clearly marked. Unnecessary destruction of existing ground cover is prohibited.

PLANT CONSERVATION.

ROCK WORK

Straight rock cuts should not be rounded where rock has an earth overburden. Treat the overburden the same as a straight cut. In cuts which are composed of rock and earth, abutting each other let the excavation follow a smooth rounding course.

Trees and shrubs on top of cuts at crowns of V.G. should be preserved where possible.

Small pockets of earth should be left between rocks to permit small growth to re-seed.

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PLANT CONSERVATION & ROCK AND EARTH CUTS

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PLANT CONSERVATION & ROCK AND EARTH CUTS
### PARABOLIC CROWN FORMULA AND TABLE

**ARIZONA STATE HIGHWAY DEPARTMENT PLANS DIVISION**

**CALCULATED AND DRAWN JUNE 1941**

**BY LESLIE HODGSON, HIGHWAY ENGINEER**

**CHECKED BY**

**APPROVED BY ENGINEER OF PLANS**

**C-39**

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

| P    | 1'   | 2'   | 3'   | 4'   | 5'   | 6'   | 7'   | 8'   | 9'   | 10'  | 11'  | 12'  | 13'  | 14'  | 15'  | 16'  | 17'  | 18'  | 19'  | 20'  | 21'  | 22'  | 23'  | 24'  | 25'  | 26'  | 27'  | 28'  | 29'  | 30'  | 31'  | 32'  | 33'  | 34'  | 35'  | 36'  | 37'  | 38'  | 39'  | 40'  | 41'  | 42'  | 43'  | 44'  | 45'  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1    | 0.05 | 0.10 | 0.14 | 0.18 | 0.21 | 0.24 | 0.26 | 0.29 | 0.31 | 0.33 | 0.35 | 0.37 | 0.38 | 0.40 | 0.42 | 0.44 | 0.46 | 0.48 | 0.51 | 0.53 | 0.55 | 0.57 | 0.59 | 0.61 | 0.63 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 |
| 2    | 0.05 | 0.11 | 0.16 | 0.20 | 0.23 | 0.26 | 0.28 | 0.30 | 0.32 | 0.34 | 0.36 | 0.38 | 0.40 | 0.42 | 0.44 | 0.46 | 0.48 | 0.50 | 0.53 | 0.55 | 0.57 | 0.59 | 0.61 | 0.63 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.76 |
| 3    | 0.05 | 0.12 | 0.17 | 0.21 | 0.24 | 0.26 | 0.28 | 0.30 | 0.32 | 0.34 | 0.36 | 0.38 | 0.40 | 0.42 | 0.44 | 0.46 | 0.48 | 0.50 | 0.53 | 0.55 | 0.57 | 0.59 | 0.61 | 0.63 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.77 |
| 4    | 0.05 | 0.13 | 0.18 | 0.22 | 0.25 | 0.27 | 0.29 | 0.31 | 0.33 | 0.35 | 0.37 | 0.39 | 0.41 | 0.43 | 0.45 | 0.47 | 0.49 | 0.51 | 0.54 | 0.56 | 0.58 | 0.60 | 0.62 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.78 |
| 5    | 0.05 | 0.14 | 0.19 | 0.24 | 0.27 | 0.29 | 0.31 | 0.33 | 0.35 | 0.37 | 0.39 | 0.41 | 0.43 | 0.45 | 0.47 | 0.49 | 0.51 | 0.53 | 0.56 | 0.58 | 0.60 | 0.62 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.79 |
| 6    | 0.05 | 0.15 | 0.20 | 0.25 | 0.29 | 0.31 | 0.34 | 0.36 | 0.38 | 0.40 | 0.42 | 0.44 | 0.46 | 0.48 | 0.50 | 0.52 | 0.54 | 0.56 | 0.58 | 0.60 | 0.62 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.80 |
| 7    | 0.05 | 0.16 | 0.21 | 0.27 | 0.31 | 0.34 | 0.37 | 0.39 | 0.42 | 0.44 | 0.46 | 0.48 | 0.50 | 0.52 | 0.54 | 0.56 | 0.58 | 0.60 | 0.62 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.78 | 0.80 | 0.86 |
| 8    | 0.05 | 0.17 | 0.22 | 0.28 | 0.33 | 0.36 | 0.39 | 0.42 | 0.45 | 0.47 | 0.50 | 0.52 | 0.54 | 0.56 | 0.58 | 0.60 | 0.62 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.78 | 0.80 | 0.86 | 0.91 | 0.97 |
| 9    | 0.05 | 0.18 | 0.23 | 0.30 | 0.35 | 0.39 | 0.42 | 0.45 | 0.48 | 0.51 | 0.54 | 0.56 | 0.58 | 0.60 | 0.62 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.78 | 0.80 | 0.86 | 0.91 | 0.97 |
| 10   | 0.05 | 0.19 | 0.24 | 0.31 | 0.37 | 0.41 | 0.44 | 0.48 | 0.51 | 0.54 | 0.57 | 0.60 | 0.62 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.78 | 0.80 | 0.86 | 0.91 | 0.97 |
| 11   | 0.05 | 0.20 | 0.25 | 0.32 | 0.39 | 0.44 | 0.48 | 0.52 | 0.55 | 0.58 | 0.61 | 0.64 | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.74 | 0.78 | 0.80 | 0.86 | 0.91 | 0.97 |
| 12   | 0.05 | 0.21 | 0.26 | 0.34 | 0.42 | 0.47 | 0.52 | 0.56 | 0.60 | 0.63 | 0.66 | 0.70 | 0.71 | 0.73 | 0.74 | 0.78 | 0.80 | 0.86 | 0.91 | 0.97 |

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**FORMULA**

\[
W = \frac{p^2}{2C}
\]

**USE OF TABLE**

**EXAMPLE:**

**ASSUME** \( W = 40 \) \( ft \) **AND** \( C = 0.45 \) \( ft \)

**FIND** \( C \) IF \( P = 8 \) \( ft \)

**TABLE SHOWS** \( C = 16.00\% \) **OF** \( C \), **OR** \( 0.45 \times 0.16 = 0.0737 \)**

---

**INTERPRETATION OF "W" AND "C"**

WHERE CURBS AND GUTTERS ARE USED
Bench Mark to be established by the Engineer on culvert headwalls, bridge curbs, abutment walls & markers F.A. project markers or other permanent structures. Location and data shall be noted on "As Built" plans.

Pour Date

Project Number

Station

SECTION A-A

CONSTRUCTION MARKER

For concrete pavement. Scale - Full Size

Marker to be made of brass or bronze, and is to be furnished by the State and placed at beginning and end of each day's pour, after marking by the Engineer.

Reference transit point shall be punched in cap by the Engineer.

计划

SURVEY MONUMENT MARKER

类 A 混凝土

项目标记

项目标记要由工程师提供的

按要求安装和标记的工程

每个联邦援助项目

项目标记应安装在 R/W 线上。

平面图

BENCH MARKER OR SURVEY MONUMENT MARKER

ARIZONA HIGHWAY DEPT.

ELEVATION

STD. BENCH MARKER

ARIZONA HIGHWAY DEPT.

Diameter

3" INCHES

Top of finished pavement

CLASS A CONCRETE

0.06 C.Y.

SECTION 8-B

POUR DATE

PROJECT NUMBER

STATION

POUR DATE

PROJECT NUMBER

STATION

SECTION 8-B

POUR DATE

PROJECT NUMBER

STATION

ARIZONA HIGHWAY DEPARTMENT

PLANS DIVISION

PROJECT MARKER

BENCH MARKER

CONSTRUCTION MARKER

REV. 3-6-66

1/15

1/4/68

DRAWN

TRACED

CHECKED

APPROVED

PLANS ENGINEER

C-38
**W-32**

Advance Warning Sign

Back ground - highway yellow. Border, symbol, & lettering - black. Reflecterized by reflecter buttons or by flat top silver reflective sheathing in symbol and letters or on background.

**X-1**

Railroad Crossing Sign

The 4" pipe standard. 11' 6" long.

Background white, lettering black. Reflecterized by reflecter buttons in letters or by flat top silver reflective sheathing background.

**NOTES:**

Refer to Bulletin No. 5 - Joint Committee on Grade Crossing Protection, Association of American Railroads.

For details not shown on this sheet refer to Signal Section Drawings No. 41691 or 41653 when flashing light type required.

Min. 350' 2

Shoulder Line - 2

**FINISHED**

Shoulder Line 2

6' Min.

Min. 2' 0" Min.

SHAPELESS

FINISHED

SHOULDER LINE

ARIZONA HIGHWAY DEPARTMENT

PLANS DIVISION

RAILROAD CROSSING SIGNS.

DRAWING NO. C-37

REVISED BY M.S. Nov. 1967

CHECKED BY D.J. Nov. 1967

DRAWN BY H.W. Nov. 1967

1/4" = 1'-0"

1/8" = 1'-0"
**Notes**

Standard R.R. Crossing consists of two flange rails and necessary number of brace plates and brace nuts. Welded nut and brace plate to be placed every third tie. Construction and assembly details as shown. Length of R.R. Crossing is noted on plans in linear feet.

For crossings on Southern Pacific Company use S.P. Standard C.S.576 for crossings on Santa Fe Railway use S.F. Standard C.S. 50136-144.

Finished roadway surface of crossing (between rails) shall be same as adjacent roadway, unless noted otherwise on plans.