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1) Hydrology calculations shall adhere to the San Bernardino County Hydrology Manual.
2) Structural calculations shall adhere to the Los Angeles County Flood Control District Structural Design Manual and to the State of California Department of Transportation Bridge Planning and Design Manuals and the Standard Plans.
3) Basin structural design shall adhere to the Los Angeles County Flood Control District Design Manual for Debris Dams and Basins.
4) Hydraulic design shall adhere to the Los Angeles County Flood Control District Hydraulic Design Manual and to the State of California Department of Transportation Highway Design Manual. Lined drainage facilities shall be designed with a bulk factor of 50% increase in water depth when there are no facilities to remove debris.
Closed conduit systems shall be designed with a surface backup system to handle a Q100 frequency storm, a bulk factor of 60% increase in Q100 and a debris basin system to remove debris. Culverts under roadways, except when connected to lined open channels, shall be designed in accordance with Caltrans Highway Design Manual.
5) Earth channel design shall adhere to the following:
   a) Bulk depth
      i) For graded earth channels, use dbulk = 1.5dwater
      ii) For natural drainage courses, compute dbulk based upon dbulk = 2 Q100
   b) For total depth use total = dbulk + freeboard
      * when v = 6 f.p.s. use dwater + 2’ freeboard
      * 8 f.p.s. use v = velocity
      * v = 28 f.p.s. use dbulk + 3’ freeboard
   c) Dike width
      When bottom width = 12’ to 30’ use dike width = 15’
      bottom width = 40’ or more use dike width = 16’

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**EARTH CHANNEL SECTION**

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**SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT**

**FILE NO.**

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**S.P. 100**
The curves represent reactions at the shear pins due to hydrostatic head on the debris-obstructed barriers. The height and width of the openings determine which barrier (see sheet 3) numbers 1, 2, or 3 between the curves, or number 4 beyond the curves, is to be used.

PROTECTION BARRIER

Note: Barrier number shall be specified on project drawings.
GENERAL NOTES:

1. Tension cable to be new 1/2", or used 9/16". 6 x 7 hemp core center wire rope in good condition and free from broken wires.

2. Tension cables 10,000 lbs. and clamp at each tension pile. Place cable clamps at each side of tension pile to hold tension.

3. Tension fencing with 10,000 lbs. pull during tying. Maintain tension until fencing is completely tied at every pile. Tie every horizontal fencing wire to piles where laps occur.

4. Install diagonal braces at every 40 spans, at end or beginning of tension pull, and at every angle point in end spans.

5. Use two 1/2" cable clamps at all cable splices.

6. Timber pile to conform to Specification on file in the Department of Transportation/Flood Control.

7. For rock bank protection see S.P. 202.

DETAIL OF FENCE BREAK AT ACCESS RAMP

FLOW
38\5:\00 38\5:\50
WRAP CABLES AND TENSION AROUND END PILE.
NOTE: 1. Anchor each fence section in free flowing stream.
2. Place cables and fencing on area to be cleared except on last 3 upstream cables.
3. Place fencing between cable piles as last 3 upstream.
4. 3/4" = 10'

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

REVISIONS

DATE

FILE NO.

S.P. 162

12 of 2
TYPICAL ELEVATION

SINGLE DRAIN

DOUBLE DRAIN

R.C.P. COLLAR DETAIL

(Use Class "A" concrete, f'c = 3000 p.s.l.)

NOTES:
1. UNLESS OTHERWISE NOTED ON THE PLANS USE A 1/2", 5/16".
2. SEE PLANS FOR COLLAR LOCATION AND SPACING.

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

REVISED 3-4-70
TITLE 3-3-70
FILE NR. S.P. 167
DETAILS OF PIPE THRU TRAPEZOIDAL EARTH CHANNEL
(FOR 36" DIA. PIPE AND SMALLER)
ENLARGED PLAN

CONSTRUCT Concrete headwall as shown (See details on page 3).

INSTALL 60 to 90-lb. cold for a
detected course, WELD both ends.

EXISTING CONCRETE PLATE on both sides of headwall.

Tie every other horizontal
fencing wire with double
No. 10 galv. wire (typical
both ends of headwall).

CUT & BOLSTER Existing colony on
shown without any loss of existing
concrete. (See details above-
typical).

EXISTING CONCRETE PLATE on both sides of headwall.

SHELL WELD both ends of coronary

Length to be determined in the field.

HEADDRESS ELEVATION

SIDE INLET WITH HEADWALL

THRU R&W REVETMENT

FOR 36" DIA PIPE AND SMALLER

SECTION B-B

NOTES

1. In general, all construction materials and construction methods, shall conform to the Standard Specifications of the State of California.

2. Headwall structure shall be of CONCRETE or steel, unless otherwise specified

3. Headwall foundation shall be placed at a location adjacent to the conduit.

4. Fences shall be cut and connected to existing
curtain or shown, if necessary shall be omitted on
each side of concrete headwall as shown Existing
headwall sections shall be removed from area
where conduit headwall is to be constructed.

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

JES 06-06-75

5 P 185 B
**NOTES:**

1. In general, all construction materials and construction methods shall conform to the Standard Specifications of the State of California.

2. "D" means inside diameter of side drain pipe.

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**SIDE DRAIN INSTALLATION DETAIL**

For Use With 24" I.D. Pipe or Smaller
Use Special Design For Larger Pipes

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**SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT**

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15-06 S 07-918 07-07 05-07 05-07
SECTIONAL PLAN
(BOLT DETAIL)

INSTALL 3/4" x 20" square or hex head bolt and washer (galv.) total 2 each wall

Face of structure

End rail

SECTON A-A

RAIL AND WIRE REVETMENT
RAIL ANCHOR DETAIL
( FOR INSTALLATION IN ENDS OF WALLS)

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

REVISIONS

K.D.G.
9-28-72

FILE NO.
S.P. 189 C
TYPICAL CHANNEL LINING DETAIL—CONCRETE PAVED

1. In general, all construction materials and construction methods shall conform to the Standard Specifications of the
   State of California.
2. See Special Provisions for additional data relative to channel lining.
3. For dimensions and side slopes, see Typical Channel Section on
   Plan and Profile drawings.
4. See cut transverse weakening plane joints in the invert and side
   walls of the channel at 20' O.C. The joint and level joints
   shall be placed 20' from each cut-off wall. Joints shall be 1/4
   maximum in width and to a depth of within 1/2" of the reinforce-
   ment.
5. The intervals of weepholes shall be such that a
   weephole will be located 2' upstream of all cut-off walls and transverse weakened plane
   joints.
6. The reinforcement mat shall be supported in
   both directions at 4' maximum spacing or
   as directed by the Engineer.
7. Slope paved walls shall be gaged by machines using
   leveling or strip survey and be externally subject to use of a finishing floating upward or
   downward as
   approved by the Engineer. Surfaces of the channel lining shall be finished by a light brooming
   and shall be protected against scarring and damage.

CONSTRUCTION JOINT

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

M. 5-27-72

JES 4-6-72

JES 5-27-72

M 5' 192 E
C.M.P. CONNECTION DETAIL

ABM OR CONCRETE
LINED TRAPEZOIDAL CHANNEL
NO SCALE

NOTE: Size and gauge of C.M.P., angle "A" and dimension "B" to be as shown on the plans.
Concrete pipe (slope as shown on plans)

12" minimum all around pipe

*4 bars x @ 12" O.C.

Typical channel wall reinforcing

SECTION

Concrete pipe "A"

Flow 90°

Trapezoidal channel

Station as shown on the plan

PLAN

NOTE: Diameter of concrete pipe, angle "A" and dimension "B" to be as shown on the plans.

CONCRETE PIPE

CONNECTION DETAIL

ABM OR CONCRETE

LINED TRAPEZOIDAL CHANNEL

NO SCALE

SAN BERNARDINO COUNTY

FLOOD CONTROL DISTRICT

REVISIONS

DRAWN

DATE

FILE NO.

R.L.H. 6-9-69

S.P. 200A
NOTES
1. Set back line 100' from R/W on Santa Ana River and 75' on Mojave River
2. Rock not to be placed against wire

TYPICAL SECTION
LEVEE WITH P&B REVETMENT AND ROCK FACING
NO SCALF
Chamfer all corners, 1/2" radius.

White enamel 14 gauge target plate.

6 Punched holes, finished dia. 3/16".

10 Gage goa. post.

NOTE:

Information Required On Plate
1. Name of owner.
2. Telephone no.
3. Type of installation with appropriate sign.
4. Depth of installation from top of marker.

SECTION A-A

UNDERGROUND UTILITY MARKER
NO SCALE

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

REVISIONS

MM. BY

DATE

B.W.

6/4/69

TILE NO.

S.P. 204
When Rail & Wire revetment and bottom control are being installed concurrently extend Rail & Wire revetment to 3' below profile grade for 24 downstream of bottom control.

Rails, 60 lbs. per yard min. (weld base to base)
Steel landing mat (if perforated mat is used place 26 ga. galvanized sheet metal in front of mat). Mat shall be placed vertically.

R & W revetment per S.P 114 (where shown on plans)
Steel landing mat spot welded or tied w/galv. wire to top and bottom rails.

Vertical rails shall be spaced uniformly across channel (10'-0" O.C. max.)

BOTTOM CONTROL
ADD 3/8" Bars @ 12" O.C. x 1 each face (Min. 4 Total)

ADD 3/8" Bars (Typical both sides of R.C.P.) 2 Bars each face (Total 4)

ADD 3/8" Bars (Typical both sides of R.C.P.) 2 Bars each face (Total 4)

SECTION A-A
NO SCALE

PLAN
NO SCALE

NOTES:
1. Unless Otherwise Noted On The Plans;
   A = 5 Bar Hoop
   B = 6 Bars
   C = 6 Bars
   D = 5 Bars

2. Unless Otherwise Noted On The Plans;
   θ = 60° For Pipes 30" and Smaller
   θ = 45° For Pipes Larger Than 30" But Smaller Than 54"
   θ = 30° For Pipes 54" and Larger

STANDARD R.C.P. CONNECTION
(VERTICAL WALL CHANNEL)