CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)
STANDARD SPECIFICATIONS
SECTION 19-3.062 – SLURRY CEMENT BACKFILL (ISSUED 11-21-08)
AS AMENDMENT TO STANDARD SPECIFICATIONS DATED MAY 2006
19-3.062 SLURRY CEMENT BACKFILL

- Slurry cement backfill shall consist of a fluid, workable mixture of aggregate, cementitious material, and water.
- At the option of the Contractor, slurry cement backfill may be used as structure backfill for pipe culverts, except that slurry cement backfill shall not be used as structure backfill for aluminum and aluminum-coated pipe culverts.
- When slurry cement backfill is used for structure backfill, the width of the excavation shown on the plans may be reduced so that the clear distance between the outside of the pipe and the side of the excavation, on each side of the pipe, is a minimum of 6 inches for pipes up to and including 42 inches in diameter or span, or one foot for pipes over 42 inches in diameter or span.
- Slurry cement backfill shall be placed only for that portion of the structure backfill below the original ground or the grading plane or the top of the embankment placed prior to excavating for the culvert pipe. Where necessary, earth plugs shall be compacted at each end of the pipe prior to placing backfill in a manner that will completely contain the slurry in the pipe trench.
- Cementitious material shall conform to the provisions in Section 90-2.01, "Cementitious Materials." Supplementary cementitious material will not be required.
- Water used for slurry cement backfill shall be free from oil, salts and other impurities which would have an adverse effect on the quality of the backfill material.
- At the option of the Contractor, aggregate shall be either (1) material selected from excavation, imported material or a combination thereof, which is free of organic material and other deleterious substances, or (2) commercial quality concrete sand. Material selected from excavation, imported material or a combination thereof, shall meet the following grading:

<table>
<thead>
<tr>
<th>Sieve Sizes</th>
<th>Percentage Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>1&quot;</td>
<td>80 - 100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>60 - 100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>50 - 100</td>
</tr>
<tr>
<td>No. 4</td>
<td>40 - 80</td>
</tr>
<tr>
<td>No. 100</td>
<td>10 - 40</td>
</tr>
</tbody>
</table>

- The aggregate, cementitious material, and water shall be proportioned either by weight or by volume. Slurry cement backfill shall contain not less than 188 pounds of cementitious material per cubic yard. The water content shall be sufficient to produce a fluid, workable mix that will flow and can be pumped without segregation of the aggregate while being placed.
- Materials for slurry cement backfill shall be thoroughly machine-mixed in a pugmill, rotary drum, or other approved mixer. Mixing shall continue until the cement and water are thoroughly dispersed throughout the material. Slurry cement backfill shall be placed in the work within one hour after mixing.
. Slurry cement backfill shall be placed in a uniform manner that will prevent voids in, or segregation of, the backfill, and will not float or shift the culvert. Foreign material which falls into the trench prior to or during placing of the slurry cement backfill shall be immediately removed.
. Backfilling over or placing any material over slurry cement backfill shall not commence until 4 hours after the slurry cement backfill has been placed, except that when concrete sand is used for the aggregate and the in-place material is free draining, backfilling may commence as soon as the surface water is gone.
. Slurry cement backfill used as structure backfill for pipe culverts will be considered structure backfill for compensation purposes.
CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)
STANDARD Specifications
SECTION 19-5.03 – RELATIVE COMPACTION (95 PERCENT)
19-5.03 RELATIVE COMPACTION (95 PERCENT)

- Relative compaction of not less than 95 percent shall be obtained for a minimum depth of 0.5-foot below the grading plane for the width between the outer edges of shoulders, whether in excavation or embankment.
- In addition, relative compaction of not less than 95 percent shall be obtained for a minimum depth of 2.5 feet below finished grade for the width of the traveled way plus 3 feet on each side thereof, whether in excavation or in embankment.
- Except for the outer 5 feet measured horizontally from the embankment side slopes, the full width of embankment within 150 feet of bridge abutments shall be compacted to a relative compaction of not less than 95 percent. The 150-foot limit of 95 percent compaction will be measured horizontally from the bridge abutment and either parallel or concentric with the roadway centerline. In addition, a relative compaction of not less than 95 percent shall be obtained for embankment under retaining wall footings without pile foundations within the limits established by inclined planes sloping 1.5:1 (horizontal:vertical) out and down from lines one foot outside the bottom edges of the footing.
DRAWINGS
NOTE:
1. ALL LANDSCAPING AND IRRIGATION PLANS MUST BE APPROVED BY THE TRANSPORTATION DEPARTMENT.
2. CONTINUED MAINTENANCE OF PLANTED LANDSCAPING MUST BE GUARANTEED THROUGH A MAINTENANCE DISTRICT OR OTHER COUNTY APPROVED MECHANISM.
3. ANY IRRIGATION MUST BE PROVIDED BY EITHER A DRIP SYSTEM OR POP-UP TYPE SPRAY HEADS.
4. INSTALL 8" CURB AND GUTTER (STD. #201) IN PLACE OF TYPE "D" CURB WHEN FLOW LINE IS AGAINST MEDIAN DUE TO SUPERELEVATION.
5. ADD #4 REBAR x 10" DOWELS AT 24" C-C TO TIE CURB TO MAINTENANCE SIDEWALK.
6. DRAINAGE SYSTEM REQUIRED.
CLASS "B" CONCRETE

1.601 CU. FT. / L.F.

1 CU. YD. = 16.86 L.F.

ABBREVIATIONS:

TC = TOP OF CURB
FL = FLOWLINE
EG = EDGE OF GUTTER
EP = EDGE OF PAVEMENT

TYPE A-6 CURB

STANDARD NO. 200
CLASS "B" CONCRETE

1.73 CU. FT. / L.F.

1 CU. YD. = 15.60 L.F.

ABBREVIATIONS:
TC = TOP OF CURB
FL = FLOWLINE
EG = EDGE OF GUTTER
EP = EDGE OF PAVEMENT

APPROVED BY:

DATE: 05/01/07

TYPE A-8 CURB

STANDARD NO. 201
CLASS "B" CONCRETE

0.888 CU FT. / L.F.

1 CU. YD. = 30.41 L.F.
TOP OF FILLER 1/4" BELOW SURFACE

SECTION "A-A"
EXPANSION JOINT
EXPANSION JOINTS TO BE INSTALLED AT ALL B.C.'S, E.C.'S, CURB RETURNS, AND STRUCTURES.

SECTION "B-B"
WEAKENED PLANE JOINT
10' INTERVAL BETWEEN TRANSVERSE JOINTS MAY BE VARIED TO ALLOW MATCHING OF JOINTS IN ADJACENT EXISTING IMPROVEMENTS.

TYPICAL PLAN VIEW

APPROVED BY:

COUNTRY OF RIVERSIDE
CURB AND GUTTER JOINTS
STANDARD NO. 205

REV.  BY:  APRD  DATE
1   1  8-71, 4-80
2   4  11-04
3   5
4   6
CONCRETE DRIVEWAY APPROACH WITH A.C. DIKE
(NOT APPLICABLE TO INTERIM DIKE LOCATION)

Asphaltic Concrete Driveway Approach with A.C. Dike

NOTES:
1. ALL CONSTRUCTION SHALL BE 2-1/2" MIN. THICKNESS ASPHALTIC CONCRETE ON 4" MIN. THICKNESS CLASS 2 OR CLASS 3 BASE, OR 3-1/2" THICKNESS A.C. ON NATIVE SOIL.
2. 20' OF FULL HEIGHT DIKE REQUIRED BETWEEN DRIVEWAYS WITHIN ANY ONE PROPERTY UNLESS OTHERWISE PERMITTED.

NOT TO SCALE

APPROVED BY:

COUNTY OF RIVERSIDE
RESIDENTIAL
DRIVEWAY
WITH A.C. DIKE
STANDARD NO. 206
NOTES:

1. ALL CONSTRUCTION SHALL BE CLASS "3" CONCRETE.
2. 20' OF FULL-HEIGHT CURB REQUIRED BETWEEN DRIVEWAYS WITHIN ANY ONE PROPERTY FRONTAGE.
3. USE 6 MIL PLASTIC SHEETING WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL
   CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).
4. CONSTRUCT THE PROFILE GRADE OF THE PRIVATE ON-SITE DRIVEWAY SO THAT IT PROVIDES
   SMOOTH VEHICLE ACCESS OVER THE DRIVE APPROACH.
CROSS GUTTER FOR USE WITH TYPES "A-6" AND "A-8" CURB.
2) APRON THICKNESS TO BE 8" MINIMUM.
3) CROSS GUTTER THICKNESS TO BE 8" MINIMUM.
4) CLASS "A" CONCRETE.
5) PLACE MIN. 6" BASE UNDER ENTIRE SPANDREL AND CROSS GUTTER AREA.
6) WEAKENED PLANE JOINTS TO BE CONSTRUCTED AT 1/3 POINTS ON 25' RADIUS SPANDRELS, AND AT 1/4 POINTS ON 35' RADIUS SPANDRELS.
7) CONSTRUCT WEAKENED PLANE JOINT(S) PER STANDARD #205 AT MIDPOINT OF CROSS GUTTERS LESS THAN 40' LONG, OR AT 1/3 POINTS OF CROSS GUTTERS OF 40' OR LONGER.
8) THIS PORTION OF SPANDREL AND CROSS GUTTER SHALL BE CONSTRUCTED WITH 12 INCH THICK, CLASS "A" CONCRETE.
9) CONSTRUCT EXPANSION JOINT PER STANDARD #205.
10) CONSTRUCT WEAKENED PLANE JOINT PER STANDARD #205.
11) CONSTRUCT CROSS GUTTER PER TYPICAL SECTION ON SHEET 2.
12) WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).
EXTEND 6 MIL PLASTIC SHEETING 2' BEYOND CONCRETE. SEE NOTE 1.

SURFACING 3/8"  CLASS "A" CONCRETE  LEVEL LINE
6" MIN.

1" SURFACING 1 1/2"  CLASS 2 AGGREGATE BASE
8" MIN.

SUBGRADE COMPACTED TO 95%
6 MIL PLASTIC SHEETING. SEE NOTE 1.

CROSS GUTTER

NOTE
1. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).
NOTE: A.C. DIKE REQUIRED WHERE FILL SLOPES ARE STEEPER THAN 4:1, MATERIAL IS SUSCEPTIBLE TO EROSION, OR WHERE ROADWAY GRADIENT EXCEEDS 3%.

APPROVED BY:

DATE: 05/01/07

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

COUNTY OF RIVERSIDE

ASPHALT CONCRETE DIKES

STANDARD NO. 212
EXCEPT FOR REINFORCING BAR SHOWN ADJACENT TO FRAME, REINFORCE TOP SLAB WITH NO. 4 BARS SPACED 6" C-C.

FRAME 23 3/4" OPENING

2" CLEARANCE (TYP) BACK OF CURB

PARKWAY COVER & FRAME STD. NO. 808.

ANCHOR R=4"

CURB DEPRESSION 1 1/2" OR AS NOTED

STRAIGHT GRADE

4'-0" MIN. OPENING OPENING TO BE SPECIFIED ON IMPROVEMENT PLAN. SEE NOTES ON SHEET 2.

6' MIN.

GUTTER

EXPANSION JOINT

SEE STD. 311 FOR GUTTER DEPRESSION

1'-6" TYP.

NORMAL GUTTER FLOWLINE ELEVATION

BASIN INLET FLOWLINE ELEVATION

SEE STD. NO. 304 FOR DETAIL OF OPENING

6" THICK APRON NO. 4 BARS @ 18" C-C MIN. 3" EMBEDMENT

CONSTRUCTION JOINT

1/2" PER 1'

EXTEND 6 MIL PLASTIC SHEETING 2' BEYOND CONCRETE. SEE NOTE 12.

SECTION A-A

NO. 4 BARS @ 18" C-C WALLS AND FLOOR

CATCH BASIN SHALL BE CLASS "A" P.C.C.

*TOP OF CATCH BASIN TO BE POURED MONOLITHIC WITH SIDEWALK, 6 FT.

NOT TO SCALE

COUNTY OF RIVERSIDE

CURB INLET CATCH BASIN

STANDARD NO. 300 (1 OF 2)

APPROVED BY:

DATE: 05/01/07

DIRECTOR OF TRANSPORTATION

GEORGE A. JOHNSON, RCE 42328

REVISIONS

REV. BY: APR'D DATE

8-71, 8-88 1 4

4-90, 11-04 2 5

3
1. CONNECTION PIPES MAY BE PLACED ANY POSITION AROUND THE WALLS, PROVIDED THEY POINT IN THE PROPER DIRECTION AND THE POSITION IS OTHERWISE CONSISTENT WITH THE IMPROVEMENT PLAN.

2. CURVATURE OF THE LIP AND SIDEWALLS AT GUTTER OPENING SHALL BE FORMED BY CURVED FORMS AND SHALL NOT BE MADE BY PLASTERING.

3. DIMENSIONS:
   T = 6" IF H IS 8 FEET OR LESS.
   T = 8" IF H IS GREATER THAN 8 FEET AND LESS THAN 20 FEET.
   H = 3 FEET 6 INCHES, UNLESS OTHERWISE SPECIFIED.

4. FLOOR OF BASIN SHALL BE GIVEN A STEEL - TROWELLED FINISH.

5. MANHOLE SHALL BE PLACED AS SHOWN ON STANDARD NO. 300, UNLESS NOTED DIFFERENTLY ON IMPROVEMENT PLANS.

6. OUTLET PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS Poured.

7. OPENING SHALL BE 4'-0" (MINIMUM) UNLESS OTHERWISE SPECIFIED.

8. REINFORCING STEEL SHALL BE NO. 4 ROUND DEFORMED BARS IN TOP SLAB, AT 18" CENTERS IN THE SIDES AND FLOOR OF THE BOX.

9. 3/4 INCH PLAIN ROUND GALVANIZED STEEL STEPS (ALHAMBRA FDY. A-3320 OR EQUAL) ARE REQUIRED AS FOLLOWS:
   IF H IS 3.5 FEET OR LESS, NO STEPS ARE REQUIRED.
   IF H IS MORE THAN 3.5 FEET, AND NOT MORE THAN 5 FEET, INSTALL 1 STEP 16" ABOVE FLOOR OF THE BASIN.
   IF H IS MORE THAN 5 FEET, INSTALL STEPS 12 INCHES APART, WITH THE TOP STEP 6 INCHES BELOW THE SURFACE OF THE BASIN.
   ALL STEPS SHALL BE 4 INCHES FROM THE WALL, EXCEPT THE TOP STEP, WHICH SHALL BE 2 1/2 INCHES (CLEAR) FROM THE WALL, AND ANCHORED NOT LESS THAN 5 INCHES INTO THE WALL OF THE BASIN.

10. SURFACE OF ALL EXPOSED CONCRETE IN BASIN SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH AND SCORING TO EXISTING OR PROPOSED CURB AND WALL ADJACENT TO THE BASIN.


12. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).
NOT TO SCALE

1 1/8" HOLE IN PLATE
ADJUSTING NUTS TO BE TIGHTENED AND SECURED IN PLACE WHEN STEEL PLATE ANGLE IS IN PROPER POSITION.
C R=1" MIN.
1/2" Ø STIRRUP, WELD AS SHOWN

FACE PLATE 5/16" X 10" ROLLED PLATE (ASTM A36) FORMED AS SHOWN (ALHAMBRA FOUNDRY NO. A-3911 OR EQUIVALENT) & EXTEND LENGTH OF BOX.

FACE PLATE ANCHORAGE 1/2" Ø STEEL ANCHOR 42" O.C. (MAX.) PLACE AS SHOWN.

PROTECTION BAR: PLAIN ROUND STEEL BAR 1" DIA. SHALL BE INSTALLED WHEN NORMAL CURB HEIGHT IS GREATER THAN 6". BAR SHALL BE EMBEDDED 5" AT EACH END.

SUPPORT BAR 1" DIA. X 22" LONG WITH SQUARE HEAD AND HEX NUT, BEND AS SHOWN. SPACING SHALL NOT EXCEED 4 FEET.

ALL EXPOSED METAL PARTS SHALL BE GALVANIZED.

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

COUNTY OF RIVERSIDE
CURB SUPPORT DETAIL
STANDARD NO. 304
F.L. OF PIPE 1/2" ABOVE GUTTER FLOW LINE
INVERT ELEV. PER PLAN

SIDEWALK 6'

6'

VARIES

RAW

4" WYE AS REQUIRED
INSTALL REMOVABLE PLUG
4" P.V.C.

CURB & GUTTER

FL

2%

A

A

INV. ELEV. PER PLAN
3"X4" REDUCER

4"X4"X4" TEE

3" MIN. P.V.C. (SCHEDULE 40)
3" MIN. RECTANGULAR CAST IRON PIPE
4" MIN. ROUND CAST IRON PIPE

ELEVATION

INSTALL POLYETHYLENE PLASTIC JOINT MATERIAL "QUICK JOINT" OR EQUAL.

1 1/2" MIN. COVER

4'

9'

6'

2'

MIN.

NOT TO SCALE

SECTION A-A

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

COUNTY OF RIVERSIDE

PRIVATE DRAIN THROUGH CURB

STANDARD NO. 310

REVISIONS

REV. BY: APR'D DATE

11-04

1 4

2 5

3 6
CASE A

CASE B (CONTINUOUS GRADE)

CASE C (SAG)

NOT TO SCALE

NOTES:
1. Gutter depression shall be case B unless otherwise specified on project drawings.
2. Elevations of outer corners shown on project. If no elevations are specified, the outer edge of gutter depression shall conform to finished street surface.
3. A = 4 feet unless otherwise specified. W = 4 feet min., unless otherwise specified.
4. Where no curb exists, curbs shall be constructed between ends of gutter depression. Curb section shall conform to that of controlling agency.
5. Depression shall be class "B" concrete.
6. When abutting soil has a high sulfate content, special considerations are required. See specifications (Section 16.04).

* Catch basin opening = normal curb height +4 inches unless otherwise specified.
1. GUTTER DEPRESSION SHALL BE:
   (A) CASE "A" SEE STD. NO. 302 COMBINATION CATCH BASIN, UNLESS OTHERWISE SPECIFIED.
   (B) CASE "B" SEE STD. NO. 301 COMBINATION INLET CATCH BASIN, UNLESS OTHERWISE SPECIFIED.

2. ELEVATIONS AT OUTER CORNERS SHOWN ON THE PROJECT DRAWINGS. IF NO ELEVATIONS ARE SPECIFIED, THE OUTER EDGE OF THE GUTTER DEPRESSION SHALL CONFORM TO THE FINISHED STREET SURFACE.

3. $A = 4'$ UNLESS OTHERWISE SPECIFIED.
   $T = $ SEE STD. DRAWING NO. 302 (2) DIMENSIONS.
   $W = $ SEE STD. DRAWING 302 (2) DIMENSIONS.

4. WHERE NO CURB EXISTS, CURB SHALL BE CONSTRUCTED BETWEEN ENDS OF GUTTER DEPRESSION. CURB SECTION SHALL CONFORM TO THAT OF CONTROLLING AGENCY.

5. DEPRESSION SHALL BE CLASS B CONCRETE.

6. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).
WEAKENED PLANE JOINT AT APPROXIMATELY 5' INTERVALS

FLOWLINE FOR ACCESS RAMP REQUIREMENTS, SEE STANDARD NO. 403

SIDEWALK ON INSIDE OF KNUCKLE

- UTILITY POLE, WHEN ALLOWED, SHALL BE PLACED BEHIND SIDEWALK EXCEPT: 1. TRANSMISSION POWER POLES (SEE BELOW).
- VARIABLE
- 6' MIN. TO FL

FLOWLINE FOR ACCESS RAMP REQUIREMENTS, SEE STANDARD NO. 403

SIDEWALK AT INTERSECTION

- Variable

1/2" EXPANSION MATERIAL NOT TO SCALE

NOTE:
1. VARIABLE DISTANCES TO BE SHOWN ON APPLICABLE TYPICAL ROAD SECTION STANDARD.
2. CONSTRUCTION TO BE OF CLASS "B" CONCRETE 4" MINIMUM THICKNESS.

APPROVED BY: COUNTY OF RIVERSIDE

SIDEWALK, FIRE HYDRANT, & UTILITY POLE LOCATION (SIDEWALK AT CURB)

REVISIONS REV. BY: APR'D DATE REV. BY: APR'D DATE
8-71, 8-77 1 4
11-77, 8-82 2 5
9-88, 11-04 3 6

STANDARD NO. 400 (1 OF 2)
sidewalk on inside of knuckle

1/2" expansion material

curb face

utility pole other than line transmission pole shall be placed at front of sidewalk

R/W

weakened plane joint at approximately 5' intervals

5' sidewalk

6.5' min. to fl

fire hydrant 1.5 feet from flowline & 1' from curb return line

flowline

5' sidewalk

face of transmission pole shall be placed 1'-6" behind flowline.

sidewalk

1/2" expansion material

access ramp requirements

see standard no. 403

note:
1. variable distances to be shown on applicable typical road section standard.
2. construction to be of class "B" concrete 4" minimum thickness.

approved by:

director of transportation

george a. johnson, rce 42328

county of riverside

sidewalk, fire hydrant, & utility pole location
(sidewalk at R/W)

standard no. 400 (2 of 2)

revisions | rev. by | apr'd | date | rev. by | apr'd | date
---|---|---|---|---|---|---
8-71, 8-77 | 1 | 11-04 | | 4 | | |
11-77, 8-82 | 2 | | | 5 | | |
9-88, 2-90 | 3 | | | 6 | | |
NOTE:
1. AGGREGATE BASE OR APPROVED SELECT MATERIAL WHEN SOILS REPORT INDICATES PRESENCE OF EXPANSIVE SOIL CONDITIONS.
2. ALL CONSTRUCTION SHALL BE CLASS "B" CONCRETE.
3. WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

COUNTY OF RIVERSIDE

SIDEWALK AND CURB

STANDARD NO. 401
SECTION A-A

COLD JOINT  SEE NOTE 9

TABLE Y

<table>
<thead>
<tr>
<th>CF</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>7.90'</td>
</tr>
<tr>
<td>8&quot;</td>
<td>10.53'</td>
</tr>
</tbody>
</table>

Y = CURB FACE (FT.)
6.33%

EXTEND 6 MIL PLASTIC SHEETING 2' BEYOND CONCRETE. SEE NOTE 5.

SEE SHEET 4 OF 4 FOR NOTES.

NOT TO SCALE

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

COUNTY OF RIVERSIDE

CURB RAMP CASE A

STANDARD NO. 403 (1 OF 4)
SECTION A-A

EXPANSION JOINT (SEE STD. NO. 205)
EXPANSION JOINT (SEE STD. NO. 205)
CROSSWALK
CROSSWALK

1/2 DELTA
1/4 DELTA
1/4 DELTA
1/4 DELTA

RADIUS = 25' OR 35'

ECR

GREEN JOINT

WEAKENED PLANE JOINT (SEE NOTE 7)

RAMP CONSTRUCTION SHALL INCLUDE CURB AND GUTTER AND SIDEWALK FROM BCR TO ECR

SEE NOTE 11 AND DETAIL BELOW

SEE TABLE X ON SHEET 3

1.67" TO 2.35"
CENTER TO CENTER SPACING

RAISED TRUNCATED DOME PATTERN
0.45"  0.20"
0.90"

RAISED TRUNCATED DOME DETECTABLE WARNING SURFACE SEE NOTE 11

CONSTRUCT RETAINING CURB UNLESS OTHERWISE SPECIFIED

3' MIN. DETECTABLE WARNING

2% MAX.
2% PVMT

EXTEND 6 MIL PLASTIC SHEETING 2' BEYOND CONCRETE SEE NOTE 6.

4' MAX.

SEE NOTE 4

SEE NOTE 10

2'

SEE SHEET 4 OF 4 FOR NOTES.

NOT TO SCALE

CURB RAMP CASE B

STANDARD NO. 403 (2 OF 4)

8-77, 5-80
10-81, 6-82
9-88, 2-90

11-04

11/15/04

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

APPROVED BY:

COUNTY OF RIVERSIDE
TABLE X

<table>
<thead>
<tr>
<th>CF (IN)</th>
<th>RADIUS (FT)</th>
<th>SIDE SLOPE</th>
<th>X</th>
<th>TC GRADE (ALONG CURB RETURN)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>6&quot;</td>
<td>35'</td>
<td>10%</td>
<td>X_S</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X_L</td>
<td>5.6</td>
</tr>
<tr>
<td>8&quot;</td>
<td>35'</td>
<td>10%</td>
<td>X_S</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X_L</td>
<td>7.5</td>
</tr>
</tbody>
</table>

TO CALCULATE "X" DIMENSION:

SHORT SIDE (DOWN SLOPE):

\[ X_S (FT) = \frac{CURB FACE (FT)}{\text{SIDE SLOPE} + \text{TC GRADE}} \]

LONG SIDE (UP SLOPE):

\[ X_L (FT) = \frac{CURB FACE (FT)}{\text{SIDE SLOPE} - \text{TC GRADE}} \]

ENGINEER TO SHOW \( X_S \) AND \( X_L \) ON IMPROVEMENT PLANS

GROOVING DETAIL

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

COUNTY OF RIVERSIDE

CURB RAMP

STANDARD NO. 403 (3 OF 4)
CONSTRUCTION NOTES:

1. If distance from curb to back of sidewalk is too short to accommodate ramp and 4' landing, then use the case "B" ramp.

2. If sidewalk is less than 6' wide, the full width of the sidewalk shall be depressed as shown in case B. Minimum sidewalk width is 4' from back of curb.

3. The ramp shall have a 12" wide border with grooves 1/4" wide and 1/4" deep approximately 3/4" on center. See grooving detail.

4. Transitions from ramps to walks, gutters, or streets shall be flush and free of abrupt changes.

5. When abutting soil has a high sulfate content, special considerations are required. See specifications (section 16.04).

6. Ramp side slope varies uniformly from a maximum of up to 10% at curb to conform with longitudinal sidewalk slope adjacent to top of the ramp (except in case B).

7. Construct weakened plane joints at 1/4 deltas when radius equals 35' and at inside edge of grooved border when radius equals 25'.

8. If expansive soil is encountered, then ramp shall be constructed over class 2 aggregate material.

9. Concrete shall be class B.

10. Maximum slopes of adjoining gutters: the road surface immediately adjacent to the curb ramp and continuous passage to the curb ramp shall not exceed 5% within 4' of the bottom of the curb ramp.

11. Detectable warning surfaces are required on all curb ramps that enter into a vehicular travel way.

Approved by:

[Signature]

Date: 11/15/04

Director of Transportation

George A. Johnson, RCE 42328

COUNTY OF RIVERSIDE

CURB RAMP CONSTRUCTION NOTES

REVISIONS | REV. BY | APR'D | DATE | REV. BY | APR'D | DATE
---|---|---|---|---|---|---
8-77, 5-80 | 11-04 | 1 | 4 | 2 | 5 | 3
10-81, 6-82 | | | | 9-88, 2-90 | | | | 8
12-97

STANDARD NO. 403 (4 OF 4)
WHITE REFLECTIVE LETTERS ON INTERSTATE
GREEN REFLECTIVE SHEETING

GALVANIZED POST
2" I.D. STD. PIPE
12'-0" LONG

EXPANSION
PAPER

CONCRETE
COMPACTED
EARTH
1/2" X 8" ROD ANCHOR

12" ROUND
OR SQUARE

DIRT LOCATION

SIDEWALK LOCATION

5/8" HOLE

24" OR 30"

A - 5/8" X 15" CADMIUM PLATED CARRIAGE BOLT
B - 14 GAUGE TOP AND CROSS SADDLE OF
ANODIZED ALUMINUM
C - SIGN PLATES, (ANODIZED ALUMINUM
EXTRUSION OF 6063 T-4 ALLOY MATERIAL)
D - CAST ANODIZED ALUMINUM POST WITH
THREE 3/8" ALLEN HEAD STAINLESS STEEL
SET SCREWS.
E - PLUG 1'-0" X 1'-0" X 1'-0" DEEP, EXPANSION
PAPER ON ALL SIDES.

NOTE:
ONE COMPLETE NAME SIGN UNIT IS REQUIRED
AT EACH INTERSECTION WHEN PAVED WIDTHS
OR CURBED WIDTHS OF ALL INTERSECTING
STREETS ARE 40 FEET OR LESS. AT INTER-
SECTIONS WITH AN ULTIMATE PAVED WIDTH
OR CURBED WIDTH GREATER THAN 40 FEET,
USE STANDARD 815. STD. 815 IS INTENDED FOR
RESIDENTIAL STREETS WITHIN A TRACT. OTHER
TYPES OF INTERSECTIONS, USE STD. 815.

INSIDE OF KNUCKLE INTERSECTION
SIGN INSTALLATION DETAILS

NOT TO SCALE

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

REVISIONS

REV. BY: APR'D DATE

REV. BY: APR'D DATE

STREET NAME SIGN
(CURB TO CURB WIDTH LESS THAN OR EQUAL TO 40')

STANDARD NO. 816
NOT TO SCALE

NOTES:

1. REPLACE STRUCTURAL SECTION AS FOLLOWS:
   SURFACING: EXISTING THICKNESS; OR 3" MIN. A.C., TYPE B.
   BASE: CLASS 2 A.B. IN SAME THICKNESS AS EXISTING
   BASE MATERIAL, 6" MIN. AS DIRECTED BY THE
   INSPECTOR.

2. MAXIMUM LIFT THICKNESS IS 8 INCHES; MAXIMUM LIFT THICKNESS
   WHEN PONDING AND JETTING IS 4 FEET.

3. WHEN A FIRM FOUNDATION IS NOT ENCOUNTERED, DUE TO SOFT,
   SPONGY OR OTHER UNSUITABLE MATERIAL, SUCH MATERIAL
   SHALL BE REMOVED TO THE LIMITS DIRECTED BY THE DIREC-
   TOR OF TRANSPORTATION OR AFFECTED UTILITY COMPANY
   AND THE RESULTING EXCAVATION BACKFILLED WITH PIPE BED-
   DING MATERIAL.
MONUMENTING STREET INTERSECTIONS WHERE CURB AND GUTTERS ARE INSTALLED

NOTES:

1. L & T SHOWN HEREON INDICATES LEAD AND TACK OR STEEL PIN MONUMENT SET IN CONCRETE CURB.

2. LEAD AND TAG OR STEEL PIN MONUMENT WITNESS TO PROPERTY CORNER MAY BE SET ("E" MONUMENT), IN LIEU OF SETTING FRONT LOT CORNERS ("D" MONUMENT).


NOT TO SCALE

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

DATE: 05/01/07

STREET CENTERLINE MONUMENT

COUNTY OF RIVERSIDE

STANDARD NO. 901

<table>
<thead>
<tr>
<th>REVISIONS</th>
<th>REV. BY</th>
<th>APR'ID</th>
<th>DATE</th>
<th>REV. BY</th>
<th>APR'D</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-71</td>
<td>1</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-90</td>
<td>2</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NOTES:
ORNAMENTAL CONCRETE AS APPROVED BY THE ELECTRIC SERVINGUTILITY.

DESIGN PARAMETERS:
- 80 MPH WIND FACTOR
- 1.3 GUST FACTOR
- ROUND OR OCTAGONAL, TAPERED POLE WITH ACRYLIC ANTI-GRAFFITICOATING.

ALTERNATE POLE MATERIALS, OR SIGNIFICANT DEVIATION FROM THESE STANDARDS SHALL REQUIRE APPROVAL BY THE SERVING UTILITY COMPANY AND THE DIRECTOR OF TRANSPORTATION.

SEE STREET LIGHTING SPECIFICATION SECTION 22 OF THIS ORDINANCE FOR ADDITIONAL REQUIREMENTS.

THE POLES SHALL BE GALVANIZED STEEL IN IID JURISDICTION.

SQUARE OR ROUND FOUNDATION NOT TO SCALE

22,000 LUMEN LUMINAIRE FULL CUT-OFF
HIGH PRESSURE SODIUM TYPE TO BE SHOWN ON STREET LIGHTING PLAN. FOR PRIVATE LIGHTING RESTRICTIONS WITHIN 45 MILE RADIUS OF MT. PALOMAR SEE LATEST COUNTY ORD. REGULATING LIGHT POLLUTION.

R/W

21'

PARKWAY

VAR. 5'

VAR.

MEANDERING SIDEWALK

-18'

R/W

18'

PARKWAY

4'

5'

STRAIGHT SIDEWALK

-18'

R/W

SIDEWALK SECTIONS

EXTEND 6 MIL PLASTIC SHEETING 2' BEYOND CONCRETE.

6 MIL PLASTIC SHEETING.

6 MIL PLASTIC SHEETING.

6 MIL PLASTIC SHEETING.

6 MIL PLASTIC SHEETING.

4 - 1" X 36" X 4" ANCHOR BOLTS

* WHEN ABUTTING SOIL HAS A HIGH SULFATE CONTENT, SPECIAL CONSIDERATIONS ARE REQUIRED. SEE SPECIFICATIONS (SECTION 16.04).

APPROVED BY:

DATE: 11/15/04

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

REVISIONS

REV. BY: APR'D DATE

11-77, 11-82 11-04 1

9-88, 2-90 2

6-94, 12-97 3

COUNTY OF RIVERSIDE

ARTERIAL HIGHWAY LIGHTING

STANDARD NO. 1001
IISNS STRAIGHT ARM MOUNTING
NOT TO SCALE

CLAMP DETAIL
NOT TO SCALE

APPROVED BY:

DATE: 05/01/07

COUNTY OF RIVERSIDE

TRAFFIC SIGNAL POLE
IISNS STRAIGHT ARM
MOUNTING DETAIL

STANDARD NO. 1200
LOOP DETECTOR PLACEMENT DETAIL
NOT TO SCALE

6' DIA.  1' TRIANGLE

MINIMUM ADVANCED DETECTOR SETBACK FROM LIMIT LINE
(MUTCD 2003 CA SUPPLEMENT)

<table>
<thead>
<tr>
<th>SETBACK</th>
<th>SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>100'</td>
<td>25</td>
</tr>
<tr>
<td>140'</td>
<td>30</td>
</tr>
<tr>
<td>185'</td>
<td>35</td>
</tr>
<tr>
<td>230'</td>
<td>40</td>
</tr>
<tr>
<td>285'</td>
<td>45</td>
</tr>
<tr>
<td>345'</td>
<td>50</td>
</tr>
<tr>
<td>405'</td>
<td>55</td>
</tr>
<tr>
<td>475'</td>
<td>60</td>
</tr>
</tbody>
</table>

LOOP DETECTOR SAWCUT DETAIL
NOT TO SCALE

APPROVED BY:

DIRECTOR OF TRANSPORTATION
GEORGE A. JOHNSON, RCE 42328

COUNTY OF RIVERSIDE

TYPE E LOOP DETECTOR SAWCUT & PLACEMENT DETAIL

STANDARD NO. 1201
COUNTY OF RIVERSIDE
BUILDING DEPARTMENT
**TYPE 1: 6" TOE**

- **"H"** 6" MAX
- **"W"** 6" MAX
- **Y-BARS** 6" CONCRETE BLOCK
- **#4 HORIZONTAL REBAR AT 24" ON CENTER**
- **3" MAX.**
- **FINISH GRADE**
- **16" MAX.

**TYPE 2: 6" HEEL**

- **"H"** 6" MAX
- **Z-BARS** 6" CONCRETE BLOCK
- **#4 HORIZONTAL REBAR AT 24" ON CENTER**
- **3" MAX.**
- **FINISH GRADE**
- **16" MAX.

---

**TYPE 1: 6" TOE**

<table>
<thead>
<tr>
<th>GRADE CONDITION</th>
<th>&quot;H&quot; (WALL HEIGHT)</th>
<th>&quot;H1&quot; (12&quot; BLOCK)</th>
<th>&quot;W&quot; (FOOTING WIDTH)</th>
<th>X BARS</th>
<th>Y BARS</th>
<th>Z BARS</th>
<th>&quot;H&quot; (KEY DEPTH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLOPING GRADE AT TOP OF WALL</td>
<td>6'-1&quot; to 6'-0&quot;</td>
<td>24&quot;</td>
<td>69&quot;</td>
<td>#4 @ 16&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 11&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>(2:1 MAX)</td>
<td>4'-1&quot; to 6'-0&quot;</td>
<td>N/R</td>
<td>48&quot;</td>
<td>#4 @ 16&quot;</td>
<td>#4 @ 16&quot;</td>
<td>#4 @ 12&quot;</td>
<td>25&quot;</td>
</tr>
<tr>
<td>LEVEL GRADE AT TOP OF WALL</td>
<td>3'-1&quot; to 4'-0&quot;</td>
<td>N/R</td>
<td>30&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td></td>
<td>Up to 3'-0&quot;</td>
<td>N/R</td>
<td>18&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

**TYPE 2: 6" HEEL**

<table>
<thead>
<tr>
<th>GRADE CONDITION</th>
<th>&quot;H&quot; (WALL HEIGHT)</th>
<th>&quot;H1&quot; (12&quot; BLOCK)</th>
<th>&quot;W&quot; (FOOTING WIDTH)</th>
<th>X BARS</th>
<th>Y BARS</th>
<th>Z BARS</th>
<th>&quot;K&quot; (KEY DEPTH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLOPING GRADE AT TOP OF WALL</td>
<td>6'-1&quot; to 6'-0&quot;</td>
<td>24&quot;</td>
<td>39&quot;</td>
<td>#4 @ 16&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 12&quot;</td>
<td>28&quot;</td>
</tr>
<tr>
<td>(2:1 MAX)</td>
<td>4'-1&quot; to 6'-0&quot;</td>
<td>N/R</td>
<td>29&quot;</td>
<td>#4 @ 16&quot;</td>
<td>#4 @ 16&quot;</td>
<td>#4 @ 12&quot;</td>
<td>22&quot;</td>
</tr>
<tr>
<td>LEVEL GRADE AT TOP OF WALL</td>
<td>3'-1&quot; to 4'-0&quot;</td>
<td>N/R</td>
<td>18&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td></td>
<td>Up to 3'-0&quot;</td>
<td>N/R</td>
<td>18&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>#4 @ 32&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

N/R = NOT REQUIRED

**DISCLAIMER:**

Alternate retaining wall designs may be possible when provided with an engineered analysis. Use of this standard design is at the user’s risk and carries no implied or inferred guarantee against failure or defects.

---

Western Riverside County Code Uniformity Program

County of Riverside

Building Department

Retaining Walls

(951) 955-1800

4080 Lemon St, 2nd Fl * P.O. Box 1629 * Riverside, CA 92501

Fax (951) 955-1806

01/17/2007

RCLM/RRT/WALL/FNL/YSD

PAGE 1 OF 2
GENERAL NOTES:
1) ALL WORK SHALL CONFORM TO THE ADOPTED CODES AND ZONING REGULATIONS.
2) CONCRETE BLOCK MASONRY SHALL COMPLY WITH THE FOLLOWING:
   A. CONCRETE MASONRY SHALL CONFORM TO ASTM C-90, GRADE M OR S.
   B. MORTAR: TYPE M OR S.
   C. GROUT ALL CELLS W/2000 PSI PORTLAND CEMENT GROUT.
3) THE ULTIMATE COMpressive STRENGTH REQUIRED FOR FOUNDATION CONCRETE SHALL BE 2500 PSI.
4) ALL REINFORCING STEEL SHALL BE INTERMEDIATE GRADE ASTM A615-40 AND OVERLAP SPLICES SHALL BE 40 BAR DIAMETERS MINIMUM. ALL REBAR HOOKS SHALL BE A MINIMUM OF 12 TIMES THE REBAR DIAMETER (12d) IN LENGTH.
5) PROVIDE RETAINING WALL DRAINAGE SYSTEM AS FOLLOWS:
   PROVIDE 1 CF/FT OF CLEAN COARSE GRAVEL WITH 4" DIAMETER PERFORATED PVC DRAINAGE PIPE WITH 1% GRADIENT TO DRAIN - OR OMIT HEAD JOINTS IN FIRST COURSE.
6) OPTIONAL: INSTALLATION OF A MOISTURE BARRIER ON THE FILL SIDE OF THE WALL WILL HELP TO PREVENT MOISTURE FROM PENETRATING THE VISIBLE SIDE OF THE WALL, RESULTING IN DISCOLORATION.
7) THIS RETAINING WALL STANDARD IS NOT DESIGNED TO SUPPORT SURCHARGE LOADS FROM MOTOR VEHICLES OR OTHER STRUCTURES.
8) CLEANOUTS SHALL BE PROVIDED FOR ALL GROUT POURS OVER 5 FEET IN HEIGHT. WHERE REQUIRED, CLEANOUTS SHALL BE PROVIDED IN THE BOTTOM COURSE AT EVERY VERTICAL BAR AND SHALL BE SEALED AFTER INSPECTION AND BEFORE GROUTING.

REQUIRED INSPECTIONS:
1) FOOTING:
   EXCAVATION TRENCH CLEAN WITH STEEL IN PLACE AND SUPPORTED 3" ABOVE AND AWAY FROM THE SURROUNDING EARTH/DIRT.
2) REBAR/PRE-GROUT AND DRAINAGE SYSTEM:
   BOND BEAM REBAR AND VERTICAL REBAR IN PLACE - INSPECTION PRIOR TO PLACING GROUT.
   DRAINAGE SYSTEM COMPLETE.
3) FINAL:
   AFTER GROUT IS PLACED AND BACKFILL COMPLETED - PRIOR TO ANY DECORATIVE CAP PLACEMENT.

SETBACK FROM TOP OF SLOPE:
All footings adjacent to slopes to be at least 5' to daylight as shown below.

DISCLAIMER:
ALTERNATE RETAINING WALL DESIGNS MAY BE POSSIBLE WHEN PROVIDED WITH AN ENGINEERED ANALYSIS. USE OF THIS STANDARD DESIGN IS AT THE USER’S RISK AND CARRIES NO IMPLIED OR INFERRED GUARANTEE AGAINST FAILURE OR DEFECTS.

DESIGN PARAMETERS:
ACTIVE SOIL PRESSURE (PSF) = 30
LEVEL BACKFILL = 43
SLOPING (2:1 MAX) = 150
PASSIVE SOIL BEARING (PSF) = 0.25
COEFFICIENT OF FRICTION = 1500
ALLOWABLE SOIL BEARING PRESSURE (PSF) (NO INCREASES TAKEN FOR DEPTH OR WIDTH OF FOOTING)
RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
PERIOD OF CATCH BASIN NO. 1

SEE STD. DRAWING CB105 CATCH BASIN INLET FOR DETAILS.

SLOPE TO OUTLET FROM ALL DIRECTIONS

SEE STANDARD DRAWING NO. CB109, SPECIAL CONNECTIONS.

SECTION A-A

NOTES

1. DIMENSIONS: UNLESS OTHERWISE SPECIFIED.
   V = 6" @ 15 15/16" @ W = 15  15/16" @ W = 6  15/16".
   T = 6" IF V IS 4" OR LESS.
   T = 8" IF V IS LESS THAN 6".
   T = 10" IF V IS 8" OR MORE.
   D = 18" UNLESS OTHERWISE SPECIFIED.
   A" = 38" UNLESS OTHERWISE SPECIFIED.

2. STRUCTURAL CONCRETE SHALL BE CLASS "A"
P.C.C. (SACK)


4. THE SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM TO SLOPE, GRADE, COLOR, FINISH AND CURVATURE OF THE LIP AND SIDEWALLS AT THE GUTTER OPENING. THE GUTTER OPENING SHALL NOT BE MADE BY PLASTERING, THE OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE THE CONCRETE IS POURED.

5. STEPS:
   3/4" PLAIN ROUND GALVANIZED STEEL STAIRS SHALL BE INSTALLED 15" APART WHEN V EXCEEDS 4"-6" THE TOP STEP SHALL BE 6" BELOW THE TOP SURFACE AND SHALL BE 2 1/2" CLEAR FROM THE WALL. ALL OTHER STEPS SHALL BE 4" CLEAR FROM THE WALL. ONLY ONE STEP 12" FROM THE BOTTOM SHALL BE INSTALLED IF V IS 4"-6" OR LESS, ALL STEPS SHALL BE ANCHORED NOT LESS THAN 4" INTO THE WALL OF THE BASIN.

6. CURB, GUTTER AND LOCAL DEPRESSIONS SHALL BE CLASS "B" CONCRETE.

7. SEE STANDARD DRAWING CB106 FOR WALL & FLOOR STEEL REINFORCING.
SECTION - AA

Slope to outlet in all directions

3" Minimum Embedment

DETAIL OF END WALL

No. of Gratings
6/16 x 10
Face Plate
Dowels
2 x 4 Steel angles

STEEL LIST

<table>
<thead>
<tr>
<th>No.</th>
<th>Gratings</th>
<th>Face Plate</th>
<th>Dowels</th>
<th>2 x 4 Steal angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>3-1/2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>7-43</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>19</td>
<td>10-1/0</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

DETAIL OF DOWEL

See Standard Drawing No. CB 105
For Detail of Angle & Anchor.

See Standard Drawing No. M H 259 and Note 5
See Section A-A
See Notes for placement of connection pipe

PLAN

2'-6" Min. H.T.S.

DETAILED DRAWING

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

CITY OF RIVERSIDE

CATCH BASIN
NO. 4

STANDARD DRAWING NUMBER CB101
SHEET 1 OF 2

R.C.E. NO. 3230

APPROVED BY

DATE: April 5, 2004

GRATE TYPE

34"
R.C.E.C. STD. CB104

32"
CALTRANS STD. D77-B
NOTES FOR CATCH BASIN NO. 4

1. Dimensions: Unless otherwise specified.

- \( V = 3.5 \) feet.
- \( T = 6 \) inches, if \( V \) is \( 4 \) feet or less.
- \( T = 8 \) inches, if \( V \) is between \( 4 \) feet and \( 8 \) feet.
- \( T = 10 \) inches, if \( V \) is \( 8 \) feet or over.
- \( W = 2 \) feet, \( 11-3/8 \) inches for one grating.
  Add \( 3 \) feet, \( 5-3/8 \) inches for each additional grating.

Hike-up shall be parallel to plane of gutter - slope \( 3/4 \) inch to \( 1 \) foot.
Slope of floor parallel with curb shall be \( 1 \) in \( 12 \).

2. Concrete shall be Class "A" Portland Cement Concrete (6.0 Sack).

3. The reinforcing steel shall be Number 4 deformed bars. Clearance shall be \( 1-1/2 \) inches from top of slab. See standard drawing CB106 and note 3.

4. The surface of all exposed concrete shall conform to slope, grade, color, finish, and scoring in the existing of proposed curb and walk adjacent to the basin. The basin floor shall be given a tight wood float finish. Curvature of the lip and sidewalks at the gutter opening shall not be made by plastering. The outlet pipe shall be trimmed to final shape and length before the concrete is poured.

5. Steps: \( 3/4 \) inch plain round galvanized steel steps are required as follows:

- If \( V \) is \( 4.5 \) feet or less, no steps are required.
- If \( V \) is more than \( 4.5 \) feet, and not more than \( 5.0 \) feet, install one step 12 inches above floor of basin.
- If \( V \) is more than \( 5.0 \) feet, install steps 16 inches apart, with the top step 6 inches below the top of grating.

All steps shall be \( 4 \) inches clear from the wall, and anchored not less than \( 4 \) inches in wall of basin.
**TOP OF MANHOLE FRAME & COVER**

TOTAL WT. = 180 lbs.

- 23 5/8" Outside dia. of cover
- 22" Dia. clear opening
- Allen socket set screw
- 1 1/2" Rod of cover

**BOTTOM OF MANHOLE COVER**

- 3/4" Dia. pick hole
- Allen socket set screw. See note.
- Gap on rim of cover opposite pick hole
- Outline where rib joins rim
- Outline where ribs join
- 3 1/4" x 3 1/4" same angle throughout

**CROSS SECTION THRU FRAME & COVER**

- 3 1/4" x 3 1/4" clear opening
- 22" Dia.

**CROSS SECTION THRU RIM**

- 2" clear opening
- 2"

**NOTES**

1. Frame and cover shall be gray cast iron conforming to the latest A.S.T.M. standard A.A68, class 30 or better. Galvanize per A.S.T.M. A385.


3. Frame and cover shall be tested for accuracy of fit and shall be marked in sets before delivery. Retap frame as required to suit set screws.

---

**MANHOLE FRAME & COVER FOR CATCH BASINS**

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

APPROVED BY:

[Signature]

DATE: August 12, 2008

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

STANDARD DRAWING NUMBER CB103
SECTION C-C

4"X3"X  \( \frac{3}{4} \)" X 36  \( \frac{1}{2} \)" ANGLE

SECTION D-D

3 1/2"X 1/4"X 8"X NO. 4 ANGLE

Wrenching Requirements

3 1/2"X 1/4"X 8"X NO. 4 ANGLE

NUTS AT EACH CORNER

3 1/2"X 1/4"X 8"X NO. 4 ANGLE

NUTS AT OUTSIDE CORNERS OF BAS.

SECTION

SHEARED

PLAN

CENTER SUPPORT ASSEMBLY

SEE NOTE NO. 3

PLAN

NORMAL DIRECTION OF FLOW

ELEVATION

5" 18\( \frac{1}{16} \)" H-BEAM

SELECTIVE

CENTER SPACER

SEE NOTE DETAIL

CENTER SPACER

SEE DETAIL

NOTES

1. CENTER SUPPORT ASSEMBLY SHALL BE USED WHEN TWO OR MORE GRAHTINGS ARE SPECIFIED.

2. ALL BOLTS USED IN CENTER SUPPORT SHALL BE \( \frac{3}{4} \)".

3. FRAME MAY BE RIVETED OR WELDED.

4. BOLTS (NUTS OR WELDS) SHALL BE USED TO JOIN TWO OR MORE FRAMES TOGETHER AND TO THE "H" BEAM.

5. DETAIL OF END SPACERS SHOWS FINISHED DIMENSIONS.

6. ALL PARTS SHALL BE OF STRUCTURAL GRADE STEEL EXCEPT END SPACERS, WHICH MAY BE OF EITHER CAST IRON OR STEEL.

7. ALL EXPOSED METAL PARTS SHALL BE GALVANIZED PRIOR TO ASSEMBLY, WELDING, MACHINING, AND DRILLING SHALL BE DONE BEFORE GALVANIZING. ALL DIMENSIONS ARE FINISHED DIMENSIONS AND INCLUDE GALVANIZING.

TOTAL WEIGHT: 860 LBS. FOR GRATE SHOWN

44" LONG FOR CATCH BASIN - NO. 4 WITH GRATE AS SHOWN.

42" LONG FOR CATCH BASIN - NO. 4 WITH CALTRANS GRATE.

W

GRATE TYPE

25 1/2" AS SHOWN ABOVE

24" CALTRANS STD. D77-B

CATCH BASIN GRATE

RIVERSIDE COUNTY FLOOD CONTROL
WATER CONSERVATION DISTRICT

APPROVED BY:  

CIVIL ENGINEER

DATE:  April 15, 2004

STANDARD DRAWING NUMBER CB104
SUPPORT BOLT ANGLE shall vary to conform with batter of adjoining curb.

Protection bar shall be installed and support bolts spaced, according to Sheet 2 of 2.

Support bolts shall be equal in length to curb face + 4" for all curb batters.

All exposed metal parts shall be galvanized after fabrication.

Protection bar spacing, protection bar "s" shall be installed when the minimum clear opening of the catch basin exceeds 6". Bar "s" shall be placed such that no minimum clear opening exceeds 6".

When one bar is required "s" shall be 6 3/4", however this shall be reduced if necessary so that the center of the protection bar is not less than 2 1/4" from the rolled plate.

When two or more bars are required "s" shall be 6 3/4" with remaining bars spaced at 6 3/4". The spacing of top bar shall be reduced if necessary so that the center of the bar is not less than 2 1/4" from the rolled plate.

Where catch basin are to be constructed on curves, the maximum chord length for face plate shall be such that the maximum dimension from said chord (measured perpendicular thereto) to the true curve will not exceed one inch. Where more than one chord is required, chord length shall be equal.

Where length of face plate is between 22' and 43', two sections may be used when length exceeds 43', three sections may be used. Sections shall be spliced according to the splice detail. Splice shall be placed one foot from support bolt. See Sheet 2 of 2.

Length of face plate is w + 12" for all catch basins except the driveway catch basin.

Catch basin opening = normal curb face + 4" inches unless otherwise specified.

Spacing of all anchorage

Set end anchors 3" from ends of face plate.

Place one a anchor at each side of any and all splice joints and within 6" thereof.

Note:

Catch basin top sl not shown.

1/8" x 1/2" (length after weld) electrically welded studs.

Nelson 4F shear connector. K.S. M. welding system, ladder stud connector or equal, stagger as indicated below.

NOTE

Reinforcing steel and splice not shown above details.

Space anchors approximately every 15' max c.c. between anchors and anchors of splice joints except one at B c location. Space B anchors at approximately 45' max. beginning and end anchors.

Alternate methods for face
REMOVABLE PROTECTION BAR FOR CATCH BASINS

SECTION A-A

NOTES:

1. All bars shall be $\frac{1}{2}$" Galv., hot-rolled steel per A.S.T.M. Designation A-36. Bar lengths shall not exceed 21", and shall be cut to fit in field. When L is over 21", protection bar shall consist of two or more sections, depending upon length of basin. Location of special support bars and additional socket set screw shall be determined by the Engineer in the field.

2. Install coupling at downstream end of catch basin opening.

<table>
<thead>
<tr>
<th>&quot;W&quot; (in)</th>
<th>NUMBER OF SUPPORT BOLTS</th>
<th>NUMBER OF X' LENGTHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5' to 10'</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10' to 15'</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15' to 20'</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20' to 25'</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25' to 30'</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
# Wall and Floor Steel

## Catch Basin Reinforcement - "W" to 14' (incl.)

<table>
<thead>
<tr>
<th>V(H) f</th>
<th>Front Wall Steel</th>
<th>Rear Wall Steel</th>
<th>End Wall Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inches</td>
<td>Inches</td>
<td>Inches</td>
</tr>
<tr>
<td>From</td>
<td>Bars A &amp; B</td>
<td>Bars C</td>
<td>Bars D</td>
</tr>
<tr>
<td>To</td>
<td>Bars E Hor &amp; Vert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5 8 3 22&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>4 5 8</td>
<td>3 32&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>5 6 8</td>
<td>3 32&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>6 7 8</td>
<td>3 32&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>7 8 9</td>
<td>3 32&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>8 9 10</td>
<td>3 32&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>9 10</td>
<td>3 32&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>10 11</td>
<td>3 32&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>11 12</td>
<td>3 32&quot;</td>
<td>3 32&quot;</td>
<td>5 8 3 22&quot;</td>
</tr>
<tr>
<td>X</td>
<td>10 18 9 44&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>10 18 9 44&quot;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes
1. Wall & floor reinforcing shown hereon shall be used with Catch Basin Standard Drawings.
2. Reinforcing steel shown hereon shall be used in all Catch Basins on State Highways regardless of basin length or depth.
3. Provide wall & floor steel reinforcing when the following V depths are equaled or exceeded:
   - Basin length = W
   - Basin depth = V
   - To 7.0' 10'
   - 7' To 14.0' 6'
   - 14' To 21.0' All Depths

---

# Catch Basin Reinforcement - "W" Greater Than 14'

## Floor Reinforcement Section 2

- #4 bars @ 24"
- #6 bars @ 24"

### Grating Basin Reinforcement

---

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

CATCH BASIN REINFORCEMENT

STANDARD DRAWING NUMBER CB106

APPROVED BY:

[Signature]

DATE: April 2, 2006
NOTES

   Table of Values for T shown on this plan.

2. Stations specified on drawings apply at the intersection of center lines of main line and laterals, except that stations for catch basin connector pipe apply at inside wall of structure.

3. Reinforcing steel shall be straight bars \( \frac{1}{2} \)" clear from inside face of concrete unless otherwise shown. W bars are of size and spacing specified for wall steel on plan, and shall be cut in center of opening and bent into top and bottom of junction structure.

4. Junction structure shall be poured monolithically with main line storm drain, manhole or transition.

5. Floor of structure shall be steel-traveled to the spring line.

6. Structural Concrete shall be Class "A".

7. Embankment \( R_b \) shall be 5" for B ≥ 96" or less and 0" for B over 96".

8. Backfill under structure with 1:3-5 mix concrete, or compact soil to relative density required by specifications. Backfill may be omitted if structure is laid on undisturbed earth to storm drain wall.

9. The need for an edge beam and/or additional reinforcement shall be investigated by the engineer for any one of the following conditions:
   a. Angle A is less than 30°
   b. top of inlet pipe is less than 6" below the soffit
   c. Flow line of inlet pipe is less than 7" above the floor of the RCB at the inside face.

X. Limits of existing construction removal.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

JUNCTION STRUCTURE
NO. 1

STANDARD DRAWING NUMBER JS226
CASE I - BEAM
SUPPORT D = 30" OR LESS
PLAN

CASE 2 - COLUMN SUPPORT
D = 60" OR LESS FOR C.M.P.
D = 30" OR LESS FOR R.C.P. OR C.P.

For outlet see standard
catch basin plans.

NOTES
1. All corrugated metal pipe and fittings shall be galvanized.
2. Use Junction Structure No. 1 where size of the inlet pipe exceeds dimensions given above.
3. Unless otherwise specified Case 2 Support shall be used.
4. Elevation "S" shall be specified on project drawings.

# 6 @ 6" length = D in ft. + 3", placed under cut bars and on top of uncut bars in bottom of top slab. Omit bars that fall over sidewalls.

SECTION D-D
CASE 3 - TOP SLAB ENTRANCE
D = 30" OR LESS

# 5 @ 4 to be placed 2 Clear of Hole.

Cut bars 2 Clear of Hole.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
JUNCTION STRUCTURE NO. 3
STANDARD DRAWING NUMBER JS228
NOTES

1. TABLE of values for "F" on the plan

2. CENTER OF MANHOLE SHAFT shall be located over center line of storm drain when diameter D₂ is 48" or less, in which case place 6" bars symmetrically around shaft at 45° with center line and omit J bars.

3. DETAIL M: When depth of manhole from street grade to top of bar is less than 2'-4½" for paved street or 3'-6" for unpaved street, construct monolithic shaft as per Detail M. Shaft for any depth of manhole may be constructed as per Detail M. When diameter D₂ is 48" or less, center of shaft may be located as per note 2.

4. THICKNESS OF DECK shall vary when necessary to provide level pipe seat, but shall not be less than finishing values for "F" shown on this plan.

5. REINFORCING STEEL to be round, deformed bars, 1/2" clear from inside face of concrete unless shown otherwise.

6. STEPS shall be ¾" round, galvanized steel and anchored not less than 4" inches in the webs of structure unless otherwise shown. The spacing shall be 16". The lowest step shall not be more than 2'-0" above the invert. See Std Dwg. MH 259.

7. RINGS, REDUCER AND PIPE for access shaft shall be seated in mortar and neatly pointed or wired inside the shaft.

8. STATIONS of manholes shown on plan shall be at center of shaft. Elevations shown at stations refer to prolonged invert grade lines.

9. FLOOR of manhole shall be steel-traveled to Springing line.

10. BODY of manhole shall be poured in one continuous operation, except that a construction joint with a longitudinal keyway may be placed at the springing line.

11. LENGTH L AND EMBEDMENT P shall have the following values unless otherwise shown on plan:
   - D₂ ≥ 66" or less, L=7'-6", P=5'
   - D₂ over 66", L=6'-0", P=8'

L may be increased or location of manhole shifted to meet pipe ends when L greater than that shown above is specified. D bars shall be continued 6'-0" c.c.

12. D BARS shall be #4 for D₂ < 33" or less, #5 for D₂ ≥ 33" to 42" inclusive, and #6 for D₂ > 42" or over. Tie bars shall be #3 bars.

13. STRUCTURAL CONCRETE shall be Class "A".

14. Centerline of inlet pipe to intersect inside face of concrete at springing line unless otherwise shown.

15. Where Pressure Manhole No. 2 is specified on plans, see Std Dwg MH 259 and note 3.

* Use D₂ or D₁, whichever is greater.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

MANHOLE NO. 2

STANDARD DRAWING NUMBER MH 252
Size and spacing of steel as shown on improvement plan, except that 5 bars on each side of shaft shall be not smaller than #5 @ 4" or equivalent.

#5 @ 4" x 5'

5 bars 7' long, 4" o.c. of size shown for transverse steel on improvement plan, except not less than #5. Warp these bars under bars that have been cut for shaft opening.

SECTION A-A

NOTE

1- DEPTH P: When depth P from street grade to lop of pipe seat is less than 2'-10 1/2" in paved streets or 3'-6" in unpaved streets, construct 2 ft. diameter shaft, using concrete rings as per Standard Plan for concrete rings; otherwise, construct 3 ft. shaft as shown on this plan.

2- STATIONS shown on improvement plan refer to center line of shaft.

3- STEPS shall be 3/4" round, galvanized steel anchored not less than 4" in walls of structure and unless otherwise shown shall be spaced 16" on centers. The lowest step shall be not more than 2 feet above the floor.

SECTION B-B
MANHOLE FOR BOX
SECTION STORM DRAIN

MANHOLE NO. 3

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

MANHOLE NO. 3
STANDARD DRAWING NUMBER MH253
VERTICAL SECTION OF PLAIN CONCRETE ECCENTRIC MANHOLE SHAFT

NOTES

1. ALL JOINTS shall be filled with 1-2 mortar and neatly pointed or wiped on inside of shaft.

2. COLLAR of 1-2 mortar around cover frame shall be omitted on rock and all streets and in paved streets.

3. STEPS shall be 3/8 inch round galvanized steel. Top step shall be placed directly beneath the manhole cover frame.

   Width of all steps shall be 4 inches between leg centers. Except where shown otherwise, spacing of steps in shaft shall be 12 inches on center.

4. ECCENTRIC MANHOLE shaft reducer, and rings may be plain concrete. For unreinforced sections, the minimum thickness shall be 3 inches. The concrete used shall be Class A.

Cross section of reinforced concrete ring

VERTICAL SECTION OF REINFORCED CONCRETE ECCENTRIC MANHOLE SHAFT

MANHOLE SHAFT FOR CAST PIPE
PLAN VIEW

Note
Δ = When steel forms are used eliminate hook and use upset end.

FRONT ELEVATION

*Varies to suit dimension Show On Structure

1/4" Round Mild Steel Bar, Bend Hot.

SECTION A-A
GALVANIZE AFTER BENDING

NOTE:
THIS DETAIL SHALL BE USED WHEREVER STEPS ARE REQUIRED.

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

CHIEF ENGINEER
DATE: April 25, 2004

STANDARD DROP STEP

STANDARD DRAWING NUMBER MH259
COVER FOR 24" CLEAR OPENING FRAME  BOTTOM PLAN OF COVER

SECTION A-A

SECTION THRU FRAME

DETAIL OF FRAME
NOTES:
1. THE CAST IRON USED SHALL CONFORM WITH ASTM A-48 CLASS 35B.
2. THE FRAME AND COVER SHALL BE COATED WITH ASPHALTUM OR BITUMINOUS PAINT AFTER TESTING AND INSPECTION.
3. COVERS SHALL BE CAST WITH THE LETTERS "D" AND "RFC&WC&", THE LETTER "D" SHALL BE APPROXIMATELY 2 1/2 INCHES HIGH WITH 1/2-INCH LINE WIDTH AND PLACED IN THE CENTER OF THE COVER. ALL LETTERS SHALL BE FLUSH WITH THE FINISHED SURFACE OF THE COVER.
4. FOUNDRY IDENTIFYING MARK, HEAT AND DATE SHALL BE CAST ON THE BOTTOM OF THE COVER AND ON THE INSIDE OF THE FRAME.
5. IMPORTED COVERS AND FRAMES SHALL HAVE THE COUNTRY OF ORIGIN MARKING IN COMPLIANCE WITH FEDERAL REGULATIONS.
6. WEIGHT OF FRAME SHALL BE 265 POUNDS. WEIGHT OF COVER SHALL BE 175 POUNDS. ACTUAL WEIGHTS SHALL BE WITHIN A RANGE OF 95% TO 110%.
7. THE MANHOLE FRAME AND COVER SHALL BE INSPECTED BY THE ENGINEER PRIOR TO SHIPMENT TO THE JOB SITE. ACCEPTANCE WILL BE INDICATED BY THE AGENCY’S MARK.
8. THE PROOF-LOAD FOR TEST METHOD B OF THE Standard Specifications IS 40,700 POUNDS.
9. COVERS FOR MANHOLES LOCATED IN EASEMENTS, ALLEYS, PARKWAYS AND ALL OTHER PLACES EXCEPT PAVED STREETS SHALL BE PROVIDED WITH SOCKET SET SCREW LOCKING DEVICES. DRILL AND TAP TWO HOLES TO A DEPTH OF ONE INCH AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4-INCH X 1/2-INCH STAINLESS STEEL SOCKET SET SCREWS WITH 3/4-INCH RECESSED HEX HEAD. ALL THREADS SHALL BE N.C.
NOTES

1. THE HORIZONTAL ANGEL OF DIVERGENCE OR CONVERGENCE, Ø, SHALL NOT EXCEED 5° 45'.

2. DETAILS OF CONSTRUCTION JOINTS SHALL BE AS SHOWN ON THE PROJECT DRAWINGS FOR SINGLE BARREL BOX STRUCTURE.

3. THE REINFORCING STEEL BAR SIZES, SPACING AND COVER OVER THE STEEL OF STRAIGHT TRANSVERSE BARS IN TOP OR BOTTOM SLABS, OF L-BARS IN TOP OR BOTTOM CORNERS, OF STRAIGHT VERTICAL BARS IN SIDE WALLS AND OF LONGITUDINAL DISTRIBUTION AND TIE BARS IN TOP OR BOTTOM SLABS OR SIDE WALLS SHALL BE THOSE OF WHICHEVER ADJOINING BOX SECTION PROVIDES THE GREATER STEEL AREA FOR EACH TYPE OF BAR. THE BAR LENGTHS SHALL VARY UNIFORMLY THROUGHOUT THE TRANSITION.


5. STRUCTURAL CONCRETE SHALL BE CLASS "A".

6. THE TRANSITION STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE GENERAL STRUCTURAL NOTES APPLYING TO BOX STRUCTURES, AS SHOWN ON THE PROJECT DRAWINGS.
NOTE:

1. STRUCTURAL CONCRETE SHALL BE CLASS "A".

2. ALL LONGITUDINAL BARS SHALL BE 4 @ #18 INCHES UNLESS OTHERWISE NOTED. PLACE BARS IN TOP AND BOTTOM SLABS SYMMETRICALLY ABOUT CENTERLINE. PLACE BARS IN WALLS SYMMETRICALLY ABOUT MID-HEIGHT OF WALLS. J BARS ARE IN REPLACEMENT OF THE LONGITUDINAL BARS.

3. CLEAR COVER FOR STEEL SHALL BE 2 INCHES FOR TOP SLAB AND SIDE WALLS AND 3 INCHES FOR THE INNER FACE AND 3 INCHES FOR THE OUTER FACE OF THE BOTTOM SLAB.

4. STEEL IS DIMENSIONED TO BACK OF BAR BEND.

5. FOR CONSTRUCTION ON CURVES, STRAIGHT TRANSVERSE BARS IN TOP AND BOTTOM SLABS SHALL BE ALIGNED RADIALY WITH SPACING MEASURED AT CENTERLINE. FOR STRAIGHT BARS AND L-BARS IN WALLS SPACING SHALL BE MEASURED BETWEEN THE VERTICAL LEGS OF BARS.

6. ALL TRANSVERSE CONSTRUCTION JOINTS SHALL BE IN A VERTICAL PLANE NORMAL TO THE CENTERLINE AND THE SPACING THEREOF SHALL NOT EXCEED 50 FEET OR BE LESS THAN 10 FEET. CONTINUOUS KEYWAYS SHALL BE CONSTRUCTED AS SHOWN IN DETAIL B.

A COMPLETE CURTAIN OF TRANSVERSE STEEL SHALL BE PLACED 3 INCHES FROM EACH FACE OF THE JOINTS AND LONGITUDINAL STEEL WILL NOT BE CONTINUOUS THROUGH THE JOINTS. IN ADDITION, EXPANSION JOINTS SHALL BE CONSTRUCTED BETWEEN REINFORCED CONCRETE CHANNEL AND REINFORCED CONCRETE BOX SECTIONS AS SHOWN IN DETAIL C. DOWELS SHALL BE PLACED AT 12" SPACING CENTERED IN THE MIDDLE THIRD OF BOTTOM SLAB AND THE TOP THIRD OF SIDE WALLS. A MINIMUM OF 3 DOWELS PER SLAB AND WALLS SHALL BE PLACED.

7. ALL QUANTITIES SHOWN ARE APPROXIMATE.

8. ALL SPLICES ARE SUBJECT TO APPROVAL BY THE ENGINEER.

9. ENGINEER SHALL DETERMINE WHETHER WEEPHOLES OR SUBDRAINS ARE REQUIRED.

TYPICAL SECTION

SINGLE CELL RCB STRUCTURAL DETAILS

VERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

STANDARD DRAWING NUMBER BX401
NOTES

1. A CONCRETE COLLAR IS REQUIRED WHERE THE CHANGE IN GRADE EXCEEDS 0.10 FT. PER FOOT, OR IF CHANGE IN ALIGNMENT EXCEEDS 0.10 FT. PER FOOT.

2. IF THE EXTREME ENDS OF THE PIPE LEAVE A CLEAR SPACE THAT IS GREATER THAN 1", BUT LESS THAN 6", A CONCRETE COLLAR IS REQUIRED (SEE DETAIL "A" THIS SHEET). IF THE CLEAR SPACE IS 6" OR GREATER, A TRANSITION STRUCTURE IS REQUIRED.

3. CONCRETE COLLAR SHALL NOT BE USED FOR A SIZE CHANGE ON THE MAIN LINE.

4. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE. D₀₁ OR D₂₁, WHICHEVER IS GREATER.

5. FOR PIPE LARGER THAN 66" A SPECIAL COLLAR DETAIL IS REQUIRED.

6. FOR PIPE SIZE NOT LISTED USE THE NEXT SIZE LARGER.

7. OMIT REINFORCING ON PIPES 24" AND LESS IN DIAMETER AND ON ALL PIPES WHERE ANGLE A IS LESS THAN 10°.

8. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE D + (2 X WALL THICKNESS) + 8".

9. WHEN D₀₁ IS EQUAL TO OR LESS THAN D₂ JOIN INVERTS AND WHEN D₀₁ IS GREATER THAN D₂ JOIN SOFFITS.

10. PIPE MAY BE CORRUGATED METAL PIPE, CONCRETE PIPE, OR REINFORCED CONCRETE PIPE.

DETAIL "A"
TYPICAL JOINT FOR REINFORCED CONCRETE PIPE

<table>
<thead>
<tr>
<th>D</th>
<th>L</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>1.0&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>1.0&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>1.0&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>1.5&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>1.5&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>57&quot;</td>
<td>1.5&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>1.75&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>66&quot;</td>
<td>1.75&quot;</td>
<td>11&quot;</td>
</tr>
</tbody>
</table>

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

CONCRETE COLLAR FOR PIPE 12 INCHES THROUGH 66 INCHES

STANDARD DRAWING NUMBER MB03
NOTES

1. Concrete for encasement and blanket shall be CLASS "B" concrete.

2. The concrete encasement or blanket shall extend across the full width of the storm drain trench plus an additional 12" inches into undisturbed earth on each side of the storm drain trench.

3. When the clearance between the bottom of the storm drain and the top of the sewer is between 6 inches and 18" inches the sewer shall be encased for Case I or blanketed for Case II as shown below.

   ![Typical Section](image)

   **Concrete Encasement**

   **Concrete Blanket**

   **Existing Sewer**

   **New Sewer**

   **6 Min.**

   **6 Min.**

   **6 Min.**

   **6 Min.**

   **CONCRETE ENCAEMENT SECTION A-A**

   **CONCRETE BLANKET SECTION B-B**

   **PROTECTION FOR NEW SEWERS - CASE I**

   **PROTECTION FOR EXISTING SEWERS - CASE II**

NOTES

1. **CAST IN-PLACE STORM DRAINS**
   (a) When the clearance between the bottom of the storm drain and the top of the sewer is less than 6 inches, the sewer shall be encased monolithically with the base of the storm drain; in addition it shall be constructed or replaced, as the case may be, with standard cast iron soil pipe, in the case of house connections, or with class "B" or class "150" cast iron pipe, in the case of main line sewers.
   (b) When the bottom slab of the cast-in-place storm drain intersects sewers under 15 inches in diameter, construct per typical encasement as shown below.

2. **PRECAST PIPE STORM DRAINS**
   When the clearance between the bottom of the storm drain and the top of the sewer is less than 6 inches, the sewer shall be encased, in addition it shall be constructed or replaced with standard cast iron soil pipe, in the case of house connections, or with class "B" or class "150" cast iron pipe, in the case of main line sewers.

3. **WRAP 1/2" MASTIC AROUND SEWER PIPE.**
   (1) Cut off 2" clear of C.I.P.
   (2) Construct C.I.P. or replace existing sewer pipe with C.I.P.
   (3) Clearance between the top of the sewer pipe and the steel reinforcement shall be a minimum of 1/2".

   ![Typical Encasement Where Sewer Is In Base and Approximately At Right Angles To Storm Drain](image)
CASE - A
Above Storm Drain to House Connection - Specials required: 2 - 4 1/8 Bends

CASE - B
Above Storm Drain to Chimney - Specials required: 2 - 4 1/8 Bends

CASE - C
Below Storm Drain to House Connection - Specials required: 2 - 4 1/8 Bends

CASE - D
Below Storm Drain to Y - Specials required: 3 - 4 1/8 Bends

CASE - E
Below Storm Drain to Flat Saddle - Specials required: 3 - 4 1/8 Bends, 1 Saddle

CASE - F
Below Storm Drain to Saddle - Specials required 3 - 4 1/8 Bends, 1 Saddle

FOR NOTES SEE STANDARD DRAWING No. 808 SHEET 2

Cross Section of Concrete Reinforcement For 4" Pipe

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
REMODELING DETAILS HOUSE CONNECTION SEWERS
STANDARD DRAWING NUMBER M808 SHEET 1 OF 2
CASE-G
Below Storm Drain to Chimney - Specials required: 2 - 4" 1/2" Bands.

CASE-H
Below Storm Drain to Y - Specials required: 3 - 4" 1/2" Bands, 1 - 4" x 4" Y.

CASE-K
Below Storm Drain to House Connection. Slope slightly modified.

CASE-R
Connection with New Sewer - Specials required: 2 - 4" 1/2" Bands.

NOTES
1. Existing pipes are indicated by broken lines.
2. Pipes to be constructed are indicated by full lines.
3. All pipes shall be 4" internal diameter, or shall match existing laterals.
4. All bands shall be 4" - 1/2" bands unless specified otherwise.
5. Concrete reinforcement, cross section shown sheet 1 shall be used on all pipes to be constructed under storm drain, top portion within 1' of storm drain to be omitted.
6. Dimensions:
   - L is specified on plans as the average total length.
   - N = (d_2 + 24") less enough to avoid a fraction of a foot.
   - N = V_2 M, except where specified otherwise on plan.
   - R, used for CASE-K, is specified where L does not extend to the band.
   - V_2, used for CASE-H, is specified to the nearest foot and in summary, is itemized as Concrete Reinforcement for 6" pipe.
7. A 4" Saddle, where used, shall be connected to the pipe constituting the existing Y or T, or to the next lower pipe length.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH</td>
<td>Ahead</td>
</tr>
<tr>
<td>BK</td>
<td>Back</td>
</tr>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>AB</td>
<td>Aggregate Base</td>
</tr>
<tr>
<td>ABND</td>
<td>Abandoned</td>
</tr>
<tr>
<td>AC</td>
<td>Asphalt Concrete</td>
</tr>
<tr>
<td>ACP</td>
<td>Asbestos Cement Pipe</td>
</tr>
<tr>
<td>ANG</td>
<td>Angle Point</td>
</tr>
<tr>
<td>APPROX</td>
<td>Approximate</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Society for Testing Materials</td>
</tr>
<tr>
<td>APWA</td>
<td>American Public Works Association</td>
</tr>
<tr>
<td>ANWWA</td>
<td>American Water Works Association</td>
</tr>
<tr>
<td>b</td>
<td>Channel Base Width</td>
</tr>
<tr>
<td>BC</td>
<td>Beginning of Curve</td>
</tr>
<tr>
<td>BCR</td>
<td>Beginning of Curve Return</td>
</tr>
<tr>
<td>BM</td>
<td>Bench Mark</td>
</tr>
<tr>
<td>BNRF</td>
<td>Burlington Northern Santa Fe</td>
</tr>
<tr>
<td>BVD</td>
<td>Beginning of Vertical Curve</td>
</tr>
<tr>
<td>CALC</td>
<td>Calculated</td>
</tr>
<tr>
<td>CB</td>
<td>Catch Basin</td>
</tr>
<tr>
<td>CC</td>
<td>Center to Center</td>
</tr>
<tr>
<td>CF</td>
<td>Curb Face or Cubic Feet</td>
</tr>
<tr>
<td>CFS</td>
<td>Cubic Feet Per Second</td>
</tr>
<tr>
<td>CSG</td>
<td>Curb and Gutter</td>
</tr>
<tr>
<td>CPP</td>
<td>Cast in Place Pipe</td>
</tr>
<tr>
<td>CIP</td>
<td>Cast Iron Pipe</td>
</tr>
<tr>
<td>CJ</td>
<td>Construction Joint</td>
</tr>
<tr>
<td>CL</td>
<td>Class</td>
</tr>
<tr>
<td>CLR</td>
<td>Clear</td>
</tr>
<tr>
<td>CML/LC</td>
<td>Cement Mortar Lined and Coated</td>
</tr>
<tr>
<td>CMP</td>
<td>Corrugated Metal Pipe</td>
</tr>
<tr>
<td>CMPA</td>
<td>Corrugated Metal Pipe Arch</td>
</tr>
<tr>
<td>CO</td>
<td>Clean Out</td>
</tr>
<tr>
<td>CONC</td>
<td>Concrete</td>
</tr>
<tr>
<td>CONSTRUCT</td>
<td>Construct</td>
</tr>
<tr>
<td>COR</td>
<td>Corner</td>
</tr>
<tr>
<td>CP</td>
<td>Control Point</td>
</tr>
<tr>
<td>CSP</td>
<td>Corrugated Steel Pipe</td>
</tr>
<tr>
<td>CY</td>
<td>Cubic Yards</td>
</tr>
<tr>
<td>D</td>
<td>Depth</td>
</tr>
<tr>
<td>Δ</td>
<td>Curve Total Deflection Angle</td>
</tr>
<tr>
<td>DG</td>
<td>Decomposed Granite</td>
</tr>
<tr>
<td>DIA</td>
<td>Diameter</td>
</tr>
<tr>
<td>DIP</td>
<td>Ductile Iron Pipe</td>
</tr>
<tr>
<td>DN</td>
<td>Down</td>
</tr>
<tr>
<td>D/W</td>
<td>Driveway</td>
</tr>
<tr>
<td>DWG</td>
<td>Drawing</td>
</tr>
<tr>
<td>E</td>
<td>East or Electrical</td>
</tr>
<tr>
<td>EA</td>
<td>Each</td>
</tr>
<tr>
<td>EC</td>
<td>End of Curve</td>
</tr>
<tr>
<td>ECR</td>
<td>End of Curve Return</td>
</tr>
<tr>
<td>EF</td>
<td>Each Face</td>
</tr>
<tr>
<td>ELEV</td>
<td>Elevation</td>
</tr>
<tr>
<td>ELY</td>
<td>Easterly</td>
</tr>
<tr>
<td>EP</td>
<td>Edge of Pavement</td>
</tr>
<tr>
<td>EQ</td>
<td>Equation or Equal</td>
</tr>
<tr>
<td>EVC</td>
<td>End of Vertical Curve</td>
</tr>
<tr>
<td>EW</td>
<td>Each Way</td>
</tr>
<tr>
<td>EX</td>
<td>Existing</td>
</tr>
<tr>
<td>EXCAV</td>
<td>Excavation</td>
</tr>
<tr>
<td>EX GND</td>
<td>Existing Ground (Earthworks)</td>
</tr>
<tr>
<td>F</td>
<td>Fire</td>
</tr>
<tr>
<td>FB</td>
<td>Field Book</td>
</tr>
<tr>
<td>FG</td>
<td>Finished Grade</td>
</tr>
<tr>
<td>FH</td>
<td>Fire Hydrant</td>
</tr>
<tr>
<td>FL</td>
<td>Flow Line</td>
</tr>
<tr>
<td>fps</td>
<td>Feet per Second</td>
</tr>
<tr>
<td>FT</td>
<td>Feet or Foot</td>
</tr>
<tr>
<td>FWY</td>
<td>Freeway</td>
</tr>
<tr>
<td>G</td>
<td>Gas</td>
</tr>
<tr>
<td>GALV</td>
<td>Galvanized</td>
</tr>
<tr>
<td>H</td>
<td>Height</td>
</tr>
<tr>
<td>HC</td>
<td>House Connection</td>
</tr>
<tr>
<td>HDPE</td>
<td>High Density Polyethylene</td>
</tr>
<tr>
<td>HGL</td>
<td>Hydraulic Grade Line</td>
</tr>
<tr>
<td>HORIZ</td>
<td>Horizontal</td>
</tr>
<tr>
<td>ID</td>
<td>Inside Dimension</td>
</tr>
<tr>
<td>IN</td>
<td>Inch or Inches</td>
</tr>
<tr>
<td>IP</td>
<td>Iron Pipe</td>
</tr>
<tr>
<td>IRR</td>
<td>Irrigation</td>
</tr>
<tr>
<td>JS</td>
<td>Junction Structure</td>
</tr>
<tr>
<td>L</td>
<td>Length</td>
</tr>
</tbody>
</table>

**Symbols**

- **ABRACAD**  
- **BILLBOARD**
- **BUSHES**
- **CATCH BASIN, PROPOSED**
- **CONTROL POINT**
- **ELECTRICITY (S) ON POLE**
- **ELECTRICITY ON POLE, CANTILEVER ARM**
- **ELECTRICITY ON POWER POLE, CANTILEVER ARM**
- **FIRE HYDRANT**
- **GATE, DOUBLE DRIVE**
- **HEDGE**
- **HYDRAULIC GRADE LINE**
- **MAIL BOX**
- **MANHOLE COVER, EXISTING**
- **MANHOLE COVER, PROPOSED**
- **METER, WATER OR GAS**
- **NORTH ARROW**
- **POLE, GUY WITH ANCHORS**
- **POLE, POWER OR TELEPHONE**
- **SIGN, STREET**
- **SOIL BORINGS**
- **TRAFFIC DETECTOR LOOP**
- **TREE, OTHER THAN PALM**
- **TREE, PALM**
- **VALVE, WATER OR GAS**
- **WATER SURFACE PROFILE**

**Abbreviations and Symbols**

Ride County Flood Control

Ride Conservation District

Standard Drawing Number M814
ADDITIONAL PAVEMENT REMOval AND REPLACEMENT SHALL CONFORM TO COUNTY OR CITY PAVEMENT RESTORATION STANDARDS OR AS SHOWN ON DRAWINGS.

EXCAVATION PAY LINES

BACKFILL PAY LINES

SHAPE BEDDING TO FIT CURVATURE AND GRADE OF PIPE.

4" MIN.

R.C.P. BEDDING & PAY LINES

NORMAL CONDITION

R.C. CHANNEL PAY LINES

NORMAL CONDITION

FILTER MATERIAL

R.C.P. BEDDING & PAY LINES

GROUNDWATER CONDITION

R.C. CHANNEL PAY LINES

GROUNDWATER CONDITION

SIDE COUNTY FLOOD CONTROL
AND
IER CONSERVATION DISTRICT

BEDDING AND PAY LINES

STANDARD DRAWING NUMBER M815
FRONT VIEW

<table>
<thead>
<tr>
<th>ID (IN)</th>
<th>MAX COVER (FT)</th>
<th>L (IN)</th>
<th>A BARS</th>
<th>L, P</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>5, 4</td>
<td>4 Ø 6</td>
<td>T-6&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15, 5</td>
<td>4 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>5, 4</td>
<td>4 Ø 6</td>
<td>T-8&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 5</td>
<td>4 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15, 5</td>
<td>5 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>5, 5</td>
<td>4 Ø 6</td>
<td>T-10&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 5</td>
<td>5 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15, 5</td>
<td>5 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>5, 5</td>
<td>5 Ø 6</td>
<td>2'-0&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 5</td>
<td>6 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15, 6</td>
<td>6 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>5, 5</td>
<td>5 Ø 6</td>
<td>2'-2&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 5</td>
<td>6 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15, 6</td>
<td>6 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>5, 5</td>
<td>5 Ø 6</td>
<td>2'-4&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 5</td>
<td>6 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15, 6</td>
<td>6 Ø 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>5, 5</td>
<td>6 Ø 6</td>
<td>2'-5&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 6</td>
<td>6 Ø 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15, 6</td>
<td>6 Ø 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>5, 5</td>
<td>6 Ø 6</td>
<td>2'-7&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10, 6</td>
<td>6 Ø 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15, 6</td>
<td>7 Ø 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES
1. CONCRETE SHALL BE CLASS 'A'.
2. ALL REINFORCING STEEL SHALL BE CENTERED IN BULKHEAD EXCEPT FOR PIPE DIAMETER GREATER THAN 96", VERTICAL "A" BARS SHALL BE PLACED AT 2" CLEAR FROM THE INSIDE FACE OF THE BULKHEAD. HORIZONTAL "A" BARS SHALL BE PLACED TOWARDS OUTSIDE FACE OF BULKHEAD PER DETAIL.
3. LIFTS SHALL BE WOVEN STEEL CABLE WITH SAME MINIMUM DIAMETER (Ø) AS "A" BARS. WEAVE CABLE THROUGH HORIZONTAL "A" BARS. COAT EXPOSED PORTION OF CABLE LIFTS WITH AN APPROVED BTUMINOUS PAINT PRIOR TO BACKFILLING TRENCH.

CONCRETE BULKHEAD

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

CONTRACTOR

DATE: APRIL 3, 2004

STANDARD DRAWING NUMBER M816
NOTE:
MINOR VARIATIONS IN DIMENSIONS MAY BE ACCEPTED BY THE ENGINEER.

TYPE I 10'-0" ARROW

TYPE I 18'-0" ARROW

TYPE I 24'-0" ARROW

TYPE II (L) ARROW
(FOR TYPE II (R) ARROW, USE MIRROR IMAGE)

TYPE III (L) ARROW
(FOR TYPE III (R) ARROW, USE MIRROR IMAGE)

BIKE LANE ARROW

TYPE VII (L) ARROW
(FOR TYPE VII (R) ARROW, USE MIRROR IMAGE)

TYPE VIII ARROW

TYPE IX ARROW
**WORD MARKINGS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Area (sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANE</td>
<td>24</td>
</tr>
<tr>
<td>CLEAR</td>
<td>27</td>
</tr>
<tr>
<td>BIKE</td>
<td>21</td>
</tr>
<tr>
<td>ONLY</td>
<td>22</td>
</tr>
<tr>
<td>NO</td>
<td>14</td>
</tr>
<tr>
<td>POOL</td>
<td>23</td>
</tr>
<tr>
<td>CAR</td>
<td>17</td>
</tr>
<tr>
<td>BUS</td>
<td>20</td>
</tr>
<tr>
<td>ONLY</td>
<td>16</td>
</tr>
<tr>
<td>KEEP</td>
<td>17</td>
</tr>
<tr>
<td>BUS</td>
<td>18</td>
</tr>
</tbody>
</table>

**NOTES:**

1. If a message consists of more than one word, it should read "UP", i.e., the first word should be nearest the driver.

2. The space between words should be at least four times the height of the characters for low-speed roads, but not more than ten times the height of the characters. The space may be reduced appropriately where there is limited space because of local conditions.

3. Minor variations in dimensions may be accepted by the Engineer.

4. Portions of a letter, number, or symbol may be separated by connecting segments not to exceed 2" in width.

5. Crosswalks contiguous to school grounds are to be 1'-0" yellow lines in place of 1'-0" white shown.

6. The words "NO PARKING" pavement marking is to be used for parking facilities. For typical locations of markings, see Standard Plans A08A and A08B.

7. The words "NO PARKING" shall be painted in white letters no less than 1'-0" high on a contrasting background and located so that it is visible to traffic enforcement officials.

**CROSSWALK AND LIMIT LINE**

- White series of lozenges triangles
- 1'-0" white line

**YIELD LINE**

- White series of lozenges triangles
- Direction of travel

**STATE OF CALIFORNIA**

**DEPARTMENT OF TRANSPORTATION**

**PAVEMENT MARKINGS**

**WORDS AND CROSSWALKS**

**NO SCALE**

A24E
### Table: Spans 4' Thru 8'

<table>
<thead>
<tr>
<th>Span</th>
<th>Height</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
<th>7'</th>
<th>8'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Roof</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Nails</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Invert</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Rebar</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Size Bar</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Diameter</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table: Spans 10' Thru 14'

<table>
<thead>
<tr>
<th>Span</th>
<th>Height</th>
<th>10'</th>
<th>12'</th>
<th>14'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Roof</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Nails</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Invert</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Rebar</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Size Bar</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Diameter</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### Diagram: Typical Section
- **Span:** 10' Thru 14'
- **Height:** 4' Thru 8'

### Notes:
1. For boxes with span or height less than any of those shown in tables, use next smaller box concrete dimensions and reinforcement, make necessary changes in bar lengths and quantities.
2. Quantities are approximate for design purposes only.
3. For boxes with span or height or cover greater than those shown in tables, a special design is required.
4. It is permissible to alternate the 180° hooks on every other bar.
5. "a" bars are at half spacing (spans 10' - 14' only).
6. "c" bars are at half spacing (spans 10' - 14' only).
7. Provide paving notch when top is exposed and when pavement is part of concrete, and adjust quantities.
8. For design and details not shown, see Standard Plan 592.
9. For exposed top, provide at least one "a" bar each way 2'-0" (at "a" bars or full span and adjust).
### TABLE OF MINIMUM COVER AND STRUTTING REQUIREMENTS FOR CONSTRUCTION LOADS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>18-50 k AXLE</th>
<th>50-75 k AXLE</th>
<th>75-110 k AXLE</th>
<th>110-150 k AXLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAXIMUM DESIGN FILL</td>
<td>SPAN</td>
<td>CELLS</td>
<td>MIN COVER</td>
</tr>
<tr>
<td>BOX CULVERTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10'-0&quot; to 20'-0&quot;</td>
<td>4'-0&quot; to 5'-0&quot;</td>
<td>Single and Multiple</td>
<td>5'-0&quot;</td>
<td>—</td>
</tr>
<tr>
<td>10'-0&quot; to 14'-0&quot;</td>
<td>4'-0&quot; to 5'-0&quot;</td>
<td>Single and Multiple</td>
<td>5'-0&quot;</td>
<td>—</td>
</tr>
<tr>
<td>BOX CULVERTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TABLE OF MINIMUM COVER FOR CONSTRUCTION LOADS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DIA OR SPAN</th>
<th>18-50 k AXLE</th>
<th>50-75 k AXLE</th>
<th>75-110 k AXLE</th>
<th>110-150 k AXLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED CONCRETE CULVERTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipes</td>
<td>DIA 12&quot; to 39&quot;</td>
<td>2'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>DIA 42&quot; to 108&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>Arches</td>
<td>Span 14'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>Span 18'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>METAL CULVERTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipes</td>
<td>DIA 12&quot; to 48&quot;</td>
<td>2'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>DIA 18&quot; to 42&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>RCB Culverts</td>
<td>Width of road</td>
<td>Min cover</td>
<td>Length to be strutted</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MINIMUM LENGTH OF STRUTTING

- Continuous sill
- Mid-height
- 6" x 8" Post
- Wedges

### RCB STRUTTING DETAILS

**NOTES:**
Length of strutting to be determined by the Engineer, but shall not be less than as shown in the sketch above.

- Assumed tire patterns:
  - 50 k axle: 2'-0" x 1'-4"
  - 75 k axle: 3'-0" x 2'-0"
  - 110 k axle: 3'-0" x 2'-0"
  - 150 k axle: 3'-0" x 3'-0"

- Impact = 102

**Sills to be glue-laminated or solid timber.**
For strut requirements of Structural Steel Plate Vehicular Undercrossing, Structural Steel Plate Arches and Structural Steel Plate Pipes during construction, see Standard Plans D88A.

### STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

**CONSTRUCTION LOADS ON CULVERTS**

**NO SCALE**

D88
### ELECTROLIERS

<table>
<thead>
<tr>
<th>STANDARD TYPES</th>
<th>15, 150</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>15, 150</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>30</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

- **Double Arm Lighting standard**
- **Existing electrolier**
- **Electrolier foundation (Future Installation)**

### NOTES:

- **Luminaires shall be 310 W HPS when installed on Type B1, B0, B3, UL, 33, 35 and 36-20A Standards, unless otherwise specified. Luminaires shall be 250 W HPS when installed on other type standards or poles, unless otherwise specified.**
- **Luminaires shall be the cutoff type.**
- **Type B medium cutoff lighting distribution, unless otherwise specified.**

### ELECTROLIERS (see project notes or project plans)

### LUMINARES on wood pole

### STANDARD NOTES:

- **Abandon. If applied to conduit, remove conductors.**
- **Install pull box in existing conduit run.**
- **Pedestrian barricade, type as indicated on plan.**
- **Connect new and existing conduit. Remove existing conductors and install conductors as indicated.**
- **Conduit to remain for future use, remove conductors, install pull wire or rope.**
- **Detector handle.**
- **Fact foundation to be abandoned.**
- **Install sign on signal mast arm.**
- **Slip connection on standard arm.**
- **Pedestal Electric control.**
- **Electrical unit.**
- **Equipment or material to be removed and become the property of the Contractor.**
- **Removal electrolier, fusible and ballast. Tape ends of conductors.**
- **Relocate equipment.**
- **Remove and reuse equipment.**
- **Remove and salvage equipment.**
- **Install slip base insert.**
- **splice new to existing conductors.**
- **Service disconnect.**
- **Standard to remain for future use, remove luminaire, pole conductors, fusible and ballast.**
- **Telephone service point.**

### ABBREVIATIONS AND EQUIPMENT DESIGNATIONS

- **RBS** box: Battery backup system
- **RC** box: Bolt circle
- **CCTV** box: Conduct
- **CHT** box: Closed circuit television
- **CMS** box: Circuit
- **DLC** box: Changeable message sign
- **EMS** box: Circulating/fanable message sign
- **EVC** box: Emergency vehicle cabinet
- **EVD** box: Emergency vehicle dector
- **FBA** box: First base
- **EFBA** box: Flashing beacon control assembly
- **FBS** box: Flashing beacon with ship base
- **FPO** box: Fiber optic
- **G** box: Ground (Equipment Grounding Conductor)
- **GFCI** box: Ground fault circuit interrupt
- **HAR** box: Highway advisory radio
- **HEX** box: Headlight
- **HPS** box: High pressure sodium
- **IPS** box: Independently illuminated street name sign
- **ISL** box: Induction sign lighting
- **LED** box: Light emitting diode
- **LMA** box: Luminaire mast arm
- **LPS** box: Low pressure sodium
- **LET** box: Lighting
- **LUM** box: Luminaire
- **MAA** box: Mast arm mounting vehicle signal faces, top attachment
- **MAA+** box: Mast arm mounting vehicle signal faces, side attachment
- **MAA-A** box: Mast arm mounting vehicle signal faces, side attachment - 4 signal section
- **MAA-B** box: Mast arm mounting vehicle signal faces, side attachment - 5 signal section
- **MAA-C** box: Mast arm mounting vehicle signal faces, side attachment - 6 signal section
- **MC** box: Mercury contactor
- **MRC** box: Mercury contactor - recloser
- **MT** box: Multiple to multiple transformer
- **NC** box: Neutral (Grounded Conductor)
- **NOD** box: Normally closed
- **PBB** box: Pull box
- **PEC** box: Photoelectric control (Type A, B, or C as shown)
- **PED** box: Pedestrian
- **PEU** box: Photovoltaic unit
- **PPB** box: Pedestrian push button
- **RL** box: Relocated equipment
- **RM** box: Ramps metering
- **SBI** box: Slip base insert
- **SBP** box: Slip base
- **SCC** box: Signal interconnect cable
- **SID** box: Signal
- **SMA** box: Signal mast arm
- **SMA** box: Series to multiple transformer
- **SRS** box: Street name sign
- **SV** box: Service point
- **TEC** box: Telephone demarcation cabinet
- **TWS** box: Traffic monitoring station
- **TDS** box: Traffic Operations System
- **VHH** box: Vehicle
- **XFR** box: Transformer
- **COM** box: Communication
- **RMIS** box: Roadway weather information system

### SOFFIT AND WALL MOUNTED LUMINARES

- **CIP** box: Pendant, 20 W HPS
- **CIP** box: Flush, 20 W HPS
- **CIP** box: Rail surface, 20 W HPS
- **CIP** box: Existing soffit or wall luminaire to remain unmodified.
- **CIP** box: Existing soffit or wall luminaire to be modified as specified.

**NOTE:** Arrow indicates "street side" of luminaire.
REAR VIEW

SIGN MOUNTING DETAILS

SECTION A-A

DETAIL U

PIPE CLAMP

Channel

#8 total 10


2" Cir

4" O.D. 6" or

4" Spiral 6" plumb with 1'-6" lap at splice and

135° hook @ terminations

FOR UNIFORM TUBE THICKNESS AT TUBE THICKNESS CHANGE

POLE SPLICES

DETAIL T

Steel sleeve at each welded joint

Backup ring

1/4" x 3"

1/2" x 6'

1/2" penetration

NOTES:

Bolt circles and anchor bolt sizes have been revised. The Contractor shall verify dependent dimensions for poles to be installed on existing foundations before fabricating the poles.

ELEVATION

CAST-IN-DRILLED HOLE PILE FOUNDATION

Reinforced Pile

2006 STANDARD PLAN ES-N

ELECTRICAL SYSTEMS (SIGNAL AND LIGHTING STANDARDS DETAILS No. 2)

NO SCALE

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

ES-7N
NOTES:
1. The inside and outside surfaces of the RCB roof shall be marked "TOP".
2. H minimum shall equal the wall thickness. H maximum shall be 8" for spans through 8', and 14" for spans over 8'.
3. Quantities are approximate and for design purposes only.
4. For design and details not shown see "Prestressed RCB Culvert, Miscellaneous Details" sheet.
5. For external sealing band applications see "Prestressed RCB Culvert, Excavation and Backfill Details" sheet.

AAASHTO STANDARD SHAPE M259 AND M27:

<table>
<thead>
<tr>
<th>SPAN (ft)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum earth cover (ft)</td>
<td>10</td>
<td>20</td>
<td>12</td>
<td>20</td>
<td>10</td>
<td>20</td>
<td>16</td>
</tr>
</tbody>
</table>

Concrete (inches):

<table>
<thead>
<tr>
<th>Reinf areas (Square inch/LF)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>7.57</td>
<td>9</td>
</tr>
<tr>
<td>Sidewall</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Invert</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6.6</td>
</tr>
</tbody>
</table>

Minimum welded wire fabric:

<table>
<thead>
<tr>
<th>Reinf areas (Square inch/LF)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;a&quot;</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
</tr>
<tr>
<td>&quot;b&quot;</td>
<td>0.36</td>
<td>0.32</td>
<td>0.27</td>
<td>0.22</td>
<td>0.18</td>
<td>0.14</td>
<td>0.1</td>
</tr>
<tr>
<td>&quot;c&quot;</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
<td>0.28</td>
</tr>
</tbody>
</table>

TABLE:

<table>
<thead>
<tr>
<th>SPAN (ft)</th>
<th>EXTERNAL SEALING BAND WIDTH (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-6</td>
<td>10</td>
</tr>
<tr>
<td>7-8</td>
<td>11</td>
</tr>
<tr>
<td>10-12</td>
<td>13</td>
</tr>
</tbody>
</table>

DESIGN BEARING PRESSURE TSF:

<table>
<thead>
<tr>
<th>SPAN (ft)</th>
<th>COVER</th>
<th>10'</th>
<th>20'</th>
</tr>
</thead>
<tbody>
<tr>
<td>4' thru 8'</td>
<td>1.3</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>10' thru 12'</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>14'</td>
<td>1.1</td>
<td>2.1</td>
<td></td>
</tr>
</tbody>
</table>

* See Note 3
**DESIGN NOTES**

Specifications:
- Design: Bridge Design Specifications (1983 AASHTO Specifications with revisions by Caltrans). Depth of cover is assumed to be uniform.
- Earth Load:
  - Earth pressures for two conditions: -140 lb/ft² vert, 42 lb/ft² horiz
  - -140 lb/ft² horiz, 140 lb/ft² vert
- Unit Stresses:
  - $f'c = 5.0$ KSI
  - $f'c = 65.0$ KSI for weld wire fabric
  - n = 7
- Shear:
  - Maximum allowable shear, $v = 3.5\sqrt{f'c}$, PSI
- Exclusion:
  - Axial loading on the members has not been considered.
- Earthwork:
  - See "Precast RCB Culvert, Excavation and Backfill Details" sheet.

---

**CAST-IN-PLACE END ELEVATION**

**PRECAST RCB TERMINOLOGY**

Note: Inner and outer reinforcement to be exposed to cast-in-place construction. All wires shall be exposed on all sides.

- Skewed precast end box
- Skew angle
- 1'-7" Extended height parapet
- 10" Standard height parapet

---

**PARTIAL PLAN VIEW**

For illustrative purposes only. For correct skew direction see plans.

---

**STANDARD DRAWING**

**CULVERT - PRECAST RCB**

**MISCELLANEOUS DETAILS**
EXCAVATION IN TRENCH

EXCAVATION IN EMBANKMENT

NOTES:
1. Slope or shore excavation sides as necessary.
2. Dimensions shown are minimum.
3. Method 2 and 3 for single or multiple boxes requires an approved external sealing band. See "Precast RCB Culvert, Reinforcement and Design Tables" sheet.
4. Construction of Roadway Structural Section in Method 2 or Method 3 shall not disturb the external sealing band installation.

BACKFILL

* 1'0" Where Method 1 or 2 Backfill is used.
2'0" Where Method 3 Backfill is used.
NOTE: The normal condition, bedding & pay lines are to be used unless otherwise indicated in the specifications or as directed by the engineer.